



This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

- + *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.
- + *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.
- + *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.
- + *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at <http://books.google.com/>



3 3433 02366700 3



6



TORB
Stamps

THE

“INDISPENSABLE”

BICYCLIST'S HANDBOOK,

A

COMPLETE CYCLOPÆDIA UPON THE SUBJECT

OF

THE BICYCLE AND SAFETY BICYCLE,
AND THEIR CONSTRUCTION.

By Henry Sturmey,

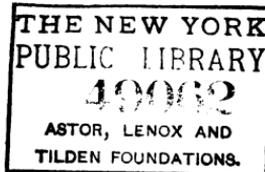
AUTHOR OF “THE TRICYCLIST'S INDISPENSABLE HANDBOOK,” “THE COMPLETE
GUIDE TO BICYCLING,” ETC., AND EDITOR OF *The Cyclist*.

PROFUSELY ILLUSTRATED.

SIXTH EDITION. EIGHTEENTH THOUSAND.

1887.

LONDON: ILIFFE AND SON, 98, FLEET STREET, E.C.



PREFACE.

FOR five years, *i.e.*, from 1878 to 1882, new editions of this work were issued annually, and each proved a greater success than its predecessor, but the preparation of such a compilation as this is a work of time, and business increasing upon me, I found it impossible to continue the publication annually, besides which, such was not requisite, as at the time the later edition was issued bicycles had ceased to so entirely alter their style for each season's trade, as was the case in the earlier years of its publication. The edition of 1882, however, having run out of print, I was repeatedly called upon for another edition, and accordingly, in the spring of 1885, set to work upon its preparation, but time passed rapidly, and business matters pressed so heavily upon me, that the middle of August had arrived ere the book was half complete, and, extracting therefore the portions relating to the safety bicycle then just strongly striking the public fancy, I issued them in the form of a "Handbook to the Safety Bicycle," leaving the remainder of the work to be completed in the following year; but I had hardly recommenced work upon it, when I met with a severe accident, which removed me from all business for three months, and rendered a further postponement imperative. I feel that this explanation is necessary to account for the division of Section I. into two portions, the first part being that which was completed and printed in 1885. Having, happily, at last succeeded in completing the volume, and bringing it up to date, I place it before the public in the hope that it may meet with at least equal success with the five preceding editions.

H. S.

Coventry, July 20th, 1887.

CONTENTS.

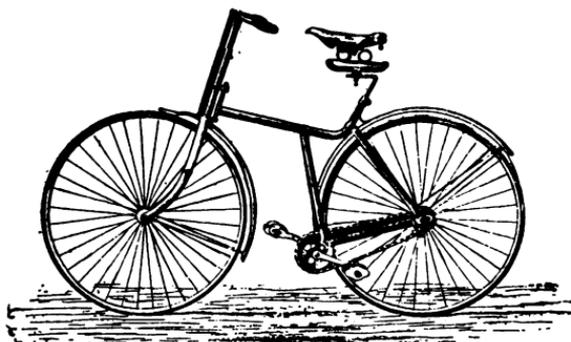
	PAGE
SECTION I. ANALYSIS OF THE MODERN BICYCLE.— WHEELS:—Tyres—Rims—Spokes—Hubs—Patent and Rigid Wheels—Crank—Pedals. DRIVING GEAR:—Levers—Chains —Gear Wheels. BEARINGS:—Plain—Coned—Parallel—Ball —Varieties of each—Back Wheel Bearings—Crank Wheel Bearings for Safeties. FRAMEWORK:—Forks—Safety Forks— Heads—Handle-bar and Bracket—Handles—Steering Gear— Backbone—Springs—Saddles—Steps. BRAKES:—Back Wheel —Front Wheel. ACCESSORIES:—Spanners—Oiltin—Lubri- cators—Pouches—Valises—Lamps—Bells—Bugles—Horns— Whistles—General Items	3 to 130
SECTION IA. ANALYSIS OF THE MODERN BICYCLE (Continued).—Tyres—Tyre Fasteners—Rims—Spokes—Wheels —Binding Rings—Crank—Pedals—Chains—Chain Adjust- ments—Driving Gear—Bearings—Brackets—Backbone and Forks—Anti-vibration Gear—Frames—Spring Frames—Steer- ing Heads—Handles—Bars—Steering Gear—Springs—Saddles —Combinations—Steps—Brakes—Wrenches—Oilcans—Lug- gage Carriers—Bells—Lamps—Lamp Brackets—Cyclometers —Stands—Home Trainers—Miscellaneous Items	131 to 197
SECTION II. THE BICYCLES OF TO-DAY AND THEIR CONSTRUCTION.—Ordinary Bicycles—Notes on the Trade and fully-illustrated Specifications of 210 different patterns..	198 to 278
SECTION IIA. THE BICYCLES OF TO-DAY AND THEIR CONSTRUCTION.—Safety Bicycles—Fully-illustrated Specifications of 136 different patterns	279 to 345
SECTION III. THE TRADE IN AMERICA.—Notes on the Trade and fully-illustrated Specifications of 20 distinct varieties—Directory of American Manufacturers and Importers —Tabular View of American Prices	346 to 362
SECTION IV. Comparative Table of Prices and Weights of Ordinary Bicycles—Comparative Table of Prices, Sizes Gearings, Principles and Weights of Safety Bicycles—Hints on Selection and Purchase of Machines—Directory to British Manufacturers—Addenda	363 to 383

ADVERTISEMENTS.

THE † BEST † MACHINES
ARE



THE SPARKBROOK BICYCLE.



THE SPARKBROOK SAFETY.

MANUFACTURERS—

THE
SPARKBROOK MANUFACTURING Co., Ltd.,

MUCH PARK STREET, COVENTRY.

ILLUSTRATED PRICE LISTS FREE ON APPLICATION.

INTRODUCTORY NOTES.



SINCE the publication of the last edition of this work in 1882 no very great changes have taken place in the general design of the ordinary bicycle, but modifications in detail have largely been made, and many striking changes are noticeable. Not the least is the complete and entire discarding of straight handle-bars in favour of the bent or cowhorn varieties, and the gradual growth into favour of the T or cross handle end. Except in the cheapest patterns it is now a rarity to find a machine sent out to the public without ball bearings to the back wheel, and the straight or plain back wheel pin has disappeared altogether. In back forks the solid variety, so long the only kind used, has now almost entirely given place to the semi-hollow form, and in saddles the combination or long-seated American system is steadily making headway. Hollow rims, too, have asserted their essentiality in the construction of a first-class machine, and for racers and many roadsters the tangent spoke has come back to us again, and has this time come to stay. Since the appearance of the last edition, the modern safety has arisen and taken a firm hold on the popular fancy as being a happy medium between the bicycle and the more cumbersome tricycle. The front-driven dwarf machine, or Kangaroo-pattern, has come and very nearly gone since the "Indispensable" last appeared. Its success was phenomenal, and it served its purpose well by preparing the popular mind for the reception of the rear-driver, which now holds premier position in popularity. The sudden and surprising demand for these machines has caused many to exclaim that the days of the ordinary bicycle are numbered, but in this opinion I cannot concur. The ordinary bicycle for the young and active is the most delightful form of cycle to possess, and the youth of England and other active nations will ever select it in preference to its, perhaps, safer yet more cumbrous rival. To retain its hold as a touring machine, however, I feel certain that more

attention must be paid to the comfort and comparative safety of the rider, and I hope to see in the near future a gradual inclination towards larger back wheels, more rake, longer cranks, and the addition of footrests, when the ordinary and original machine will with common care be equal in safety and comfort to any form of cycle extant. In both forms of machines a very noticeable feature in their construction at the present time is the almost universal adoption of enamelling for the spokes and frames, and the abandonment of nickel-plating, except for the smaller fittings and easily-cleaned parts, the all-bright and full-nickelled machines of former years being now, except in America and the Continent, things of the past—in short, the bicycle in this country is being recognised as a useful assistant to business men rather than an expensive toy. In prices, too, a very noticeable change has taken place since my last issue in the almost universal abolition of different prices for different sizes, and both ordinaries and safeties are pretty generally now put out at one price, extras only being charged for additional or expensive fittings. In the manufacture, England still holds her own easily, though competition is springing up around her. America now largely builds for the supply of her own markets, and Germany also is starting in the trade, so that the old country will have to look to her laurels in the near future, though hitherto her competitors have been content to feebly copy her designs, and thus tacitly acknowledge the fact that England leads the world in cycle construction.



SECTION I.

ANALYSIS OF THE MODERN BICYCLE.

WHEELS :—Tyres—Rims—Spokes—Hubs—Patent and Rigid Wheels—Crank
—Pedals.—**DRIVING GEAR** :—Levers—Chains—Gear Wheels.—
BEARINGS :—Plain—Coned—Parallel—Ball—Varieties of each—Back
Wheel Bearings—Crank Wheel Bearings for Safeties.—**FRAMEWORK** :
—Forks—Safety Forks—Heads—Handle-bar and Bracket—Handles—
Steering Gear—Backbone—Springs—Saddles—Steps.—**BRAKES** :—
Back Wheel—Front Wheel.—**ACCESSORIES** :—Spanners—Oil-tin—
Lubricators—Pouches—Valises—Lamps—Bells—Bugles—Horns—
Whistles—General Items.

“**S**IMPLE enough! isn't it? A couple of wheels, a few bits of wire and rubber, and you stick a man on top, and there you are!” Such is about the general idea of a bicycle and its construction, but even a casual inquiry into the detail of a modern machine will show to the veriest tyro how erroneous such a supposition is. Although bicycles proper have latterly been gradually tending towards a general simplification and uniformity in detail, there are yet endless variations brought into existence by the inventive genius of manufacturers and riders, and the past season has seen a new departure in the shape of the now numerous forms of safety bicycles, the introduction of which has given scope for the ingenuity of man to be brought to bear on the invention and construction of gearings and novelties in detail galore. Simple as the simplest of our leading machines are, it may seem strange to the unobservant to be told that from 150 to 300, or even more, separate pieces of metal are called into requisition before the finished article is complete and fit for riding. The object of the present work is the consideration of these various parts and portions of the perfect bicycle, as well as the placing before the reader the different types and styles of the complete machine, and in analysing the construction of the vehicle. My plan will be to describe first those methods of obtaining the desired ends in general and common use—making no mention whatever of designs now obsolete—and afterwards detailing the numerous patents and specialities, and commenting briefly upon their salient points.

As I have just said, the general and popular idea of a bicycle is a couple of wheels with a man on it, and as the wheels are the most prominent feature in its design, I shall treat upon them first, and afterwards discuss the framework connecting them and supporting the rider.

THE TYRES,

or those portions of the wheels which come in contact with the ground, are in all cases composed of indiarubber cords, the objects and advantages of which must be apparent at sight, the peculiar qualities of rubber serving to destroy to a great extent jar and vibration, thus saving both the rider and machine from much wear and tear. Simple as a rubber tyre may seem, there are several varieties, but the general and common form is a round solid cord varying from three-quarters of an inch to one inch in diameter, and red in colour. Grey tyres, and sometimes black, are used occasionally, but they are rarely seen. For racing wheels, very much smaller tyres than those mentioned are used, but for road-work, practically, the thicker the better, though, as thickness is increased weight is also increased, and a deader run to the machine is the consequence, so that few, except for very rough roads, exceed seven-eighths of an inch. Rubbers are secured to the rim, as a rule, by being first stretched on—there should be very little of this—and then made fast with a special cement. The best tyres of ordinary type are, undoubtedly,

Hancock's Moulded Tyres, which are made in five sizes, smooth and even throughout their thickness. They may be recog-



HANCOCK'S $\frac{7}{8}$ IN. MOULDED TYRE.

nised by the very straight, clean moulding ridge which will be found upon them in place of the ragged, uneven juncture of a rolled tyre.

The **Victor Compressed Tyres** are an American invention, which possibly will shortly be introduced to this country. They are of the moulded variety and of the ordinary shape, their speciality being the method by which they are put on. This is a secret, but, instead of being stretched, the tyre is really compressed on, and by a special process cemented so firmly to the rims that the rubber will part before the cement. This is a real improvement, as there is nothing more dangerous in a bicycle than a loose tyre.

Compressed tyres are in a few instances applied. In place of being solid they have a hole throughout their length, through which a wire is passed, and by tightening a nut uniting the ends of this the tyre is secured in place. This style does not cut so easily as the stretched variety, nor do the cuts stretch and widen, but should the wire break, as it occasionally may, the consequence is that the entire tyre becomes detached.

Sparrow's Leather Tyre consists of a strip of special leather cemented to the outside of the rubber tyre, the surface of which has been pared off flat to accommodate it. Its object is to prevent side-slipping on greasy roads, a fault more or less common to all the varieties of the bicycle.

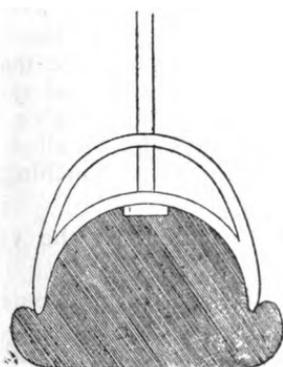
Hancock's Patent Non-slipping Tyres, designed to fulfil the same end, have come largely into use. They are compound in construction, having an inner section of soft red rubber next the



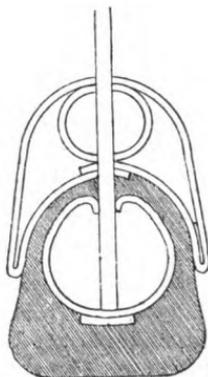
HANCOCK'S PATENT NON-SLIPPING TYRE.

rim, the latter being corrugated longitudinally. These corrugations grip the road surface, and certainly, except for excessively greasy work, are a distinct gain on the ordinary tyre, though somewhat heavier and less elastic. Their hard surface is not so easily cut as that of a soft tyre, which is a point in their favour.

Golding's Tyre.—This is a recent introduction, but seems most practical in its nature. As will be seen by the illustration, the tyre is of a somewhat peculiar character, and is hollow, the hole being placed close to the inner edge of the rubber, thus leaving a thick portion of rubber on the outside with a thin portion on the inside. The whole tyre is split on this inner side, and through this a number of circularly bent thin strips of sheet steel are placed, to



ORDINARY TYRE UNDER PRESSURE
ON A LEVEL SURFACE.



GOLDING'S TYRE UNDER PRESSURE.
The curves at the sides vary very little
under ordinary conditions.

which the spokes are fastened. These all drawing the semi-tubes downwards when tightened secure the rubber to the rim by holding

the two tightly together in such a way that it is an absolute impossibility for the tyre to come out, whilst the tyre itself, being hollow, is very much lighter, and the rubber on the outside gives all the elasticity obtainable by using heavier rubber. The illustrations show the difference between this and the ordinary tyre when subjected to pressure. In fixing them, the end of each length is slightly opened and forced over the end of the preceding one, first, however, clipping off the edges of the part which will overlap. Holes are made at the proper distances for the spokes through the rims and binders. The heads of the spokes are curved as shown. When all are in place, each spoke, from its head, passes through the hole and the groove in the binder, the groove in the rubber tyre, the holes through the flanges in the U rim, the holes in the closed tube, and the hole in the curve of the U rim. The spokes are gradually screwed up as the fixing proceeds, and, when complete, the whole is rigid and the rubber tyre immovable.

Clarke's Tyre is specially made to fit a rim of special section. It is made with parallel sides and slightly curved inner and outer surfaces, the corners of the former being cut away to form a groove which enables the tyre to get a grip on the road surface.

The **American Star Tyre** is made to fit a special rim. Exteriously it resembles the ordinary, but is flat at the base, and constructed with a bedding of hard, inelastic rubber, which has little or no tendency to stretch round and pull out of the rim. An outer skin of tougher rubber, too, prevents to a certain extent the cutting of the tyre.

Grout's Patent Tyre is a very considerable difference from anything else in the same line. The tyre is backed with a band of canvas to prevent stretching, and is of the usual shape, save that pieces are cut out about every inch or so apart, giving the rubber very much the appearance of a cog-wheel. It is claimed that the series of teeth or knobs, that is, portions of the original tyre left uncut, have greater power of elasticity by being able to give on all sides, and that the intervals between the several knobs allow them to pass over many small obstacles and stones without touching them at all, thus very much lessening vibration.

All these several varieties of tyres are secured, by the various methods mentioned, to the

RIMS or FELLOES, which are the steel peripheries of the wheels, and which serve to form the stiff and perfect circle of the wheel which supports the spokes and carries the weight of the rider. Of these there are several patterns, the most common and, indeed, the almost universal being the

Crescent Rim, constructed of rolled steel, with a section like that of a new moon or Turkish crescent, thick in the centre, where strength is required, and fine at the edges.



WARWICK'S CRESCENT RIM.

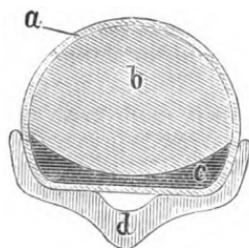
Warwick's Potential or Fluted Felloe may be described as a crescent felloe, with a fluting or U shaped depression in the centre.



WARWICK'S POTENTIAL OR FLUTED FELLOE.

It is decidedly stronger, in a vertical direction, than any other solid felloe in use, though it does not gain proportionately sideways.

The American Star Rim is very similar in section to the "Potential," but is broader and flatter, the internal section forming an almost flat bed for the base of the tyre and leaving a groove down



AMERICAN STAR RIM.

the centre, in which the spoke-heads rest without proving detrimental and destructive to the inner surface of the tyre, as is usually the case.

Bell's Patent Rim has, I believe, been done nothing with commercially. It has good features, but the difficulty of manufacture has been insurmountable. Its shape will be seen by the annexed illustration. Its object, perfect security of the tyre.

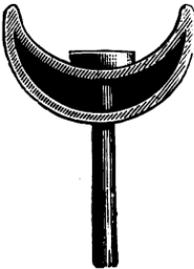
Fox's Paragon Rim has in view the same object as the previous one, but is lighter, simpler in construction, and more successful in operation. It may be described as consisting of an ordinary crescent



FOX'S PARAGON RIM.

section solid rim, with a couple of flanges or ribs projecting inwards along each side, whilst the rubber tyre is constructed with longitudinal grooves, into which these ribs or flanges fit, and so hold the rubber in with absolute security.

Clarke's Safety Rim is made with vertical parallel sides and a lightly curved base, the edges being bent sharply out at an angle of about 135° with the sides. The almost square edges and parallel sides are well designed to hold the tyre, and as the latter runs outwards with parallel sides, and the rim edges are turned well outwards, it is prevented in a great measure from being cut by pressure between the rim edges and the ground.



Roadster.



Racer.

THE CLUB HOLLOW FELLOE.

All these varieties are constructed of solid metal, but of late **Hollow Rims** have come very much into vogue and have been very extensively used, especially on racing machines. Of these

The **Club Hollow Felloe** is illustrated on preceding page. It is constructed of a steel tube rolled to a crescent section without join.

The **Invincible, or Double Section Hollow Rim**, is illustrated below. It is constructed of sheet steel rolled to a deep U section, on the top of which is brazed a second but shallower

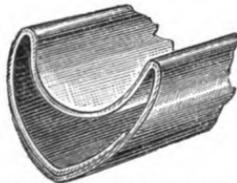


THE INVINCIBLE, OR DOUBLE SECTION HOLLOW RIM.

sheet having two overlapping flanges. The spokes are screwed down upon little bearing plugs, which are dropped into the rim through holes in the upper section. It is the lightest in the market.

The **Humber Hollow Rim** is very little used. Like the last, it is constructed of rolled sheet steel, but in three sections, an outer deep U with flanges turned inwards bearing upon the other two, the upper one of which is a shallow groove resting upon the inner one, in shape very much resembling the Potential solid rim, and serving to support and stiffen the other two. The spokes bearing upon the outer section tend to draw the whole together and keep them from coming to pieces.

Warwick's Hollow Rim is now very extensively used. It is made from a single piece of sheet steel of equal thickness, the two edges being brazed together one over the other at the bottom of



WARWICK'S HOLLOW RIM.

rim in such a way that the spokes, passing through these, bear upon a double thickness of metal, and also serve to keep the two sections together. It is made in all sizes from half inch to one inch in section.

Golding's Hollow Rim is constructed of sheet steel rolled to shape, and is stayed centrally by a round tube of the same material placed within the hollow rim, which is thus supported at every point of contact by a true circle, which it is exceedingly difficult to crush, and so bend the rim. It is illustrated in section, together with the special variety of tyre used with it, on page 5.

Fox's Rim Cases are an addition to the rim proper, and consist of a thin extra rim or cover, fitting the rim exactly, and held firmly to it by its edges being turned in over the edges of the rim. These cases are made of non-oxidizable metal, and have the appearance of being nickel-plated, thus giving a machine the appearance attained by plated rims without their readily rustable properties. The cases, too, are made either plain or in various patterns, both chased and embossed, some being very elegant.

The principle of wheel construction is that the rim or felloe should be perfectly true, that is to say, a perfect circle, both horizontally and vertically, when separate from the wheel.

The **SPOKES** then act as stays, keeping the whole firm and true, and preventing any but excessive strain causing the rim to depart from its circuit. The spokes also act as suspension rods, for the weight of the rider rests upon the *centre* of the wheel, and is *suspended* from that part of the rim which happens to be uppermost by means of the spoke or spokes then most perpendicular, the weight being shifted from spoke to spoke as the wheel revolves. Spokes are of various kinds. They are composed of either charcoal iron wire, or steel wire cut to the requisite length; a head is, as a rule, hammered at one end and the spokes passed through holes drilled at equal distances in the rim; they then proceed alternately to each side of the hub or centre of the wheel (which will be described presently), where they are secured in several ways. Steel spokes are lighter and stiffer, but are more apt to break than those of charcoal iron, which will bend a good deal before snapping. Of the varieties the nipplespoke is so rarely used now that I will not describe it, and the same may be said of the once popular lock-nutted spoke; indeed, the

Direct Action Spoke is the now almost universal one, consisting of a length of wire with a head at one end and a worm or screw at the other. The heads bear firmly into holes countersunk in the rim, and the screwed ends of the spoke screw into the hub flanges, and are thus brought to any desired tension, the best kind, in my opinion, having the end of the spoke upon which the worm is cut "upset," or thickened to nearly twice the diameter of the spoke itself, this variety being termed "butt-ended." The thickness of the wire used varies, but as a rule a size smaller is used in the small wheels than is put into the large ones. The size of the wire is determined according to the Birmingham Wire Gauge, that known as No. 12 being most commonly used for roadsters,

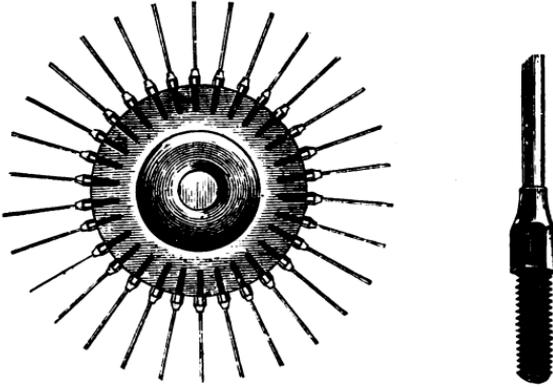
whilst higher gauges, even up to 15, are used for racing machines, and gauges as low as No. 10 for sociables and four-in-hands. As to the number of spokes which should go to build a wheel, my idea of the proper number is "spokes for inches," *i.e.*, a 40in. wheel to have 40 spokes, and so on in proportion. To this it is now almost universally the custom to add 10, a 50in. wheel thus having 60 spokes, a 60in. 70, and so on through the various sizes. Of course the more the spokes the thinner is the wire used, so that more spokes do not necessarily mean more weight; but it must be remembered that more surface is presented to the air, which means so much more labour, especially in a high wind; also, more spokes take more time to clean, and, being closer together, give much more trouble, on account of the difficulty of getting the hand and cleaning cloth between them; with spokes to the inch it is close work, with more, of course, this difficulty is increased, as well as being next to impossible to clean the hub or use a hub lamp. So much for the spokes in ordinary.

The **HUB** forms the solid centre of the wheel, from which the spokes radiate. It is composed of two parts, *viz.*—the axle, and the collars or flanges: the former is a stout bar of steel or iron, forming the true centre of the wheel; it varies from $\frac{1}{2}$ in. to 1in. in thickness, and should not be less than 10in. in length. The collars are circular plates of metal, varying in thickness from $\frac{1}{8}$ in. to $\frac{1}{2}$ in. at the edges, and from $\frac{3}{4}$ in. to 2in. in the centre; these are firmly secured to the axle by different methods. In some makes both collars and axle are in one solid piece; but most are constructed separately, and are firmly united by brazing; increased facilities being thereby obtained for case-hardening the axle. For nuted spokes the collars are generally of steel or iron, wide at the edges in order to take the width of the nipple, but when direct-action spokes are used, they are usually of gun-metal or brass—some few use steel, thin at the edges and gradually spreading out inwards until they reach the axle; this is in order to give a large surface against the axle, as, unless a firm hold is obtained and the brazing well done, they are apt to work loose. These gun-metal flanges have—or ought to have—the exterior lower portion recessed to the depth of about $\frac{1}{2}$ in., the indentation extending some $1\frac{1}{2}$ in. around the axle, and the holes for the spokes drilled right through; by this means the spokes may easily be tapped out in case of breakage on the worm and a portion remaining in the hub. The pedals are also brought closer together without decreasing the distance between the flanges, which should never, unless on very small wheels, be less than 6in. apart, as, with a less amount of "dish," as it is called, the wheel is liable to buckle.

The hubs for the back wheel are usually constructed solid of either steel, iron, or gun-metal, but occasionally they are complex. They are hollow, simply having a hole drilled longitudinally through them for the reception of the back wheel pin. If composed of gun-metal or brass they should be provided with a steel core to take the friction

of the bearings. These are the kind of hubs used upon all ordinary wheels. As, however, there are a large variety of wheels in which divergencies in both spoke and hub exist, I shall proceed to describe them together. Thus—

The **Club Spoke** is in reality a lock-nutted direct spoke, and may be briefly described as such; a very neat form of lock-nut screwing down and fastening the spokes when adjusted.



THE CLUB SPOKE.

Carver's Hollow Spokes are in outward appearance exactly similar to the ordinary direct-action spokes; and, indeed, the principle of the wheel is identical, the difference being that the spokes are hollow instead of solid. They are constructed of steel ribbon formed longitudinally into a tube, and having a couple of inches of stouter tube, bearing the head and worm respectively, brazed on to the ends of the tube, which are supported by the insertion of an equal length of solid wire in the interior. They are somewhat lighter than solid spokes *of the same size*, but as these latter are now made very fine, the difference in most wheels is scarcely noticeable. Their transverse rigidity makes a wheel very stiff.

The **Stanley Spoke**.—In this a very neat nipple is made use of, tapped both internally and externally, and provided with hexagonal head fitting neatly the spoke, which thus outwardly resembles the "Club" spoke, the tops of the nipples being bevelled off and graduated to the size of the wire; unlike that spoke, however, the principle of action is different, the nipple being first screwed into the hub, and the spoke itself—an ordinary direct one—into the nipple. Thus, if a spoke breaks off, the broken part is at once removed by screwing out the nipple.

Andrews's Compound Spoke.—This is made in both the direct and tangent principles, but it differs from all others in the spoke itself being constructed of two pieces. Each half is headed at one end, with a worm at the other. The heads are passed through holes

in the rim and hub, and the other ends united by a long fine nut containing right and left-handed threads, by turning which the two ends of the spoke are drawn together, and the proper tension thus obtained. It makes a very strong wheel, and the slight extra thickness of the nuts in the centre of the spokes is hardly perceptible. The chief advantage is that spare spokes can be easier carried and easier put in by this method than in the ordinary way.

The **Otto Corrugated Spoke** is very peculiar in its construction. In general principle of fastening it is of the direct class, but is corrugated, or, in other words, resembles a coiled spring pulled out as nearly straight as possible. The object of this is to secure a spring in the wheel itself, which the arrangement is said to do. I have not yet tested the system, but I hear glowing accounts from those who have.

In **Bagshaw's Patent Hub** the flanges are deeply recessed, and the overlapping flange thus formed is drilled right through all round, the spokes passing through the holes and screwing into small cubical metallic blocks fitting neatly around the flange. When the wheel is "made up," a couple of semi-circular caps screw on over all to hide the blocks and give the whole a neat appearance. The advantage gained by this method is that the spokes are not so liable to break off at the hub, and should they do so they can be renovated without trouble.

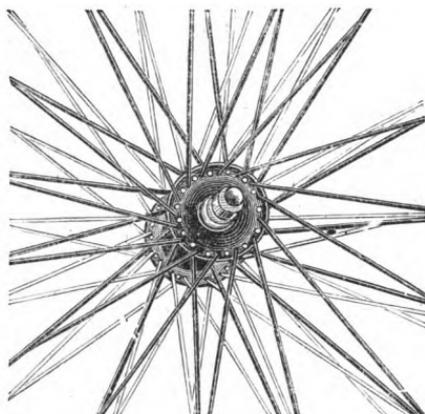
Morris's Cambrian Hub is precisely similar.

In **Barwell's Clamp Wheel** the spokes used are the ordinary direct action ones. The hub has a series of grooves upon its outer face, in number according to the number of spokes, and holes are drilled in continuance of the grooves. Into these, then, the spokes screw as in an ordinary wheel, and when set up true and firm, a clamp with corresponding grooves is screwed on. In this wheel a new spoke is not easily fitted, but a loose one can be readjusted.

Laced Spokes are mostly used with the hollow felloes previously mentioned. The hubs are of thin steel, and are pierced with small holes near the edges, and through these are passed lengths of wire twice the length of an ordinary spoke, and headed at both ends. Each length forms two spokes, which are carried alternately to the rim and there secured by means of small nipples. Being thin the spokes are light, and also offer little resistance to the wind, whilst by reason of their peculiar arrangement—interlacing or crossing each other, and setting at a tangent to the hub—the power is carried to the rim direct, which, being of itself so stiff, requires little assistance from lateral spokes.

The **Royal Mail Laced Spokes** are the same in general construction as those in ordinary use, but at every point where the spokes cross each other they are held together by a small ring which passes round them both, and is furthermore brazed on, to make all secure. This prevents their rattling, and also holds a broken one in place should such an accident occur.

The **Single Tangent Spoke**, introduced first by James Starley, and in its present form by H. J. Pausey, is a sort of cross between the direct spoke and the laced. In place of being made in pairs the



SINGLE TANGENT SPOKES.

spokes are made singly, and are headed at the bends in the hub, so that each spoke has a distinct strain upon itself alone, and one sharp bend is avoided. It makes a very neat, strong and rigid wheel, and the spokes are not so liable to break at the bends as with the laced variety.

The New Rapid Wheel.—This is built on the tangent principle, and its sole feature is that in it the principle of tangentiality is carried out to the full, the spokes being so arranged that each one is a true tangent to the peripheries of the hub flanges both forwards and backwards. One set of spokes is fitted in one direction on one side the flange, the other, setting in the opposite direction, departs from the other side of the flange. They pass each other five times in their passage to the rim, but are only crossed, that is, interlaced, the last time.

Otto's Wheel is constructed with the corrugated spokes before mentioned. In it a third flange is introduced, placed centrally between the other two, which, by the way, are closer together than with ordinary wheels. Thus it will be seen that there are three rows of spokes, the theory of construction being that, whilst the side spokes take the side strain and keep the wheel true, the centre line bears all the direct hanging strain, and all three sets being of the corrugated type, it is claimed that a wheel has so much spring in itself as practically to obviate the necessity for the use of rubber were it not for the fact that the latter substance deadens sound and prevents, to a great extent, rattle.

The Fluted Hub is specially designed for use with laced spoke wheels. The hub flange, which is thin, is corrugated or fluted, and

the perforations for the spokes are made at the angles of the flutes ; the result of it is that the spokes as they depart from each side the flange lay snugly in the corrugations and depart direct from the hole in the flange to the rim, the great bending and side pressure on the ordinary style being obviated by their use.

Having now fully discussed the question of the wheels themselves, we come to their immediate adjuncts, and take first the small levers by means of which the motive power is applied. These are

The **CRANKS**, which are of two kinds, viz., fixed and detachable. The crank itself is a flat iron or steel bar, from 5in. to 6in. in length ; in thickness it graduates from some $\frac{3}{4}$ in. at the axle to $\frac{1}{2}$ in. at the end ; for the first four inches or so it is about $\frac{3}{4}$ in. in width, after which it widens suddenly out to 1in. ; in the centre of this wide part, a slot $\frac{3}{4}$ in. wide and 2in. in length is cut ; this receives the pedal, which by this means may be placed at any distance within the length of the slot to suit the rider. Some few makers still adhere to the old plan of having from two to four circular holes pierced in the crank at given distances, instead of the slot. Both methods have their points, for and against ; with the former the pedal can be adjusted to a greater nicety, and looks better, but is liable, if the securing nut does not bite well, to slip up and down the slot, which it cannot do when secured in holes.

The difference between fixed and detachable cranks lies in the mode of attachment to the axle ; the usual method for fixed cranks is to secure them by means of a "key," or thin tapering bar of metal, which is driven in between the axle and crank, fitting into slots cut for the purpose, the crank being first shrunk on, to give it a firm hold independent of the key. It is no uncommon thing, however, for this key to work loose, in which case the rider has perforce, if it be lost, to walk or ride with one pedal until he reaches a smithy, or is obliged repeatedly to dismount and knock it in, if he has luck enough to discover it in time. In order to get over this difficulty

The **Detachable Crank** has been invented. In detail it is the same as any other, but is fixed to the axle in the following manner :— At its base, the end or "boss" is suddenly widened out to about 1in. in thickness ; this is pierced edgeways, leaving a space about $\frac{1}{2}$ in. broad, reaching nearly to the shaft of the crank. The end of the axle has a flat cut in it, and the crank put on ; a space will then be found left between the axle and the crank shaft, into which is driven a long tapering wedge-shaped piece of metal, called a cotter ; this has a thread cut on its smaller end, which is rounded for the purpose ; on this a nut is fixed, and the cotter being firmly driven in, the nut is tightened, and the whole secured. This is the original plan (Starley's), but, amongst other methods, the following are also used :—

The **Centaur Crank** is first screwed up to a shoulder on the axle with right and left-handed threads, so that the pressure of the

foot tends to make it all the more secure; whilst, to prevent its loosening by "back-peddalling," a slightly tapered conical pin is driven through the boss of the crank in the same way as the cross-key of the ordinary detachable crank, and secured with a nut, the pin just striking across the worm of the screw on the axle.

The **Timberlake Crank** has the shaft split up centrally for some 3 inches; this allows the sides to be drawn together by the cotter, thus obtaining a better grip on the axle.

Hillman's Patent Crank differs from Starley's in that both the flat on the axle and the slot in the crank are cut longitudinally, the latter being somewhat longer than usual and cut right through to the axle for about half way; the back of the slot slightly tapers, and the key is somewhat in the shape of a hammer-head; it passes through the crank, and is secured and tightened by means of a nut on the shaft behind the crank, one end intruding very slightly upon the hole cut for the axle, into the flat on which it fits, holding all secure. The advantage of this method lies in its neatness and easy adjustment, and in its having no projecting ends to catch the trousers when riding with them.

The **Club Crank** is most simple, being driven on to the spindle firmly. It is made with two square recesses just behind the boss, and a special tool is supplied with it, this being a stout arch with jaws fitting the square recesses, and a centre screw bearing on the axle end. The use of this is to detach the crank when needed.

There are a few other varieties, but the difference between them is very trifling. The different varieties of this class of crank have no very special advantages or disadvantages over the others, except those I have mentioned: they all gain the same end, and possess equally an advantage over the fixed style; as, in case of their loosening, they can be quickly tightened with the wrench. They can also as readily be taken off for the purpose of cleaning the bearings, and for the same reason are more easily straightened when bent by a fall. On the other hand, it must be remembered that unless very carefully fitted—hence avoid them on "cheap" machines—they frequently work loose. They are specially adapted for use with ball bearings.

Godfrey's Patent Variable Throw Crank is one of the novelties of the present season. The crank end is of the ordinary shape, but the boss, or part where it joins the axle, is enlarged to some three inches in diameter. This enlarged portion is hollow, and fitted with a slide catch on an eccentric. The action of this catch, when properly adjusted, is such that, by simply holding the foot firmly at the bottom of the stroke, the impetus which the wheel has carries the clutch past the point and moves it on until, the wheel having made half a revolution, it drops down into another position and holds it there. The change thus made gives a difference in crank throw of some $1\frac{1}{2}$ inches, and it will be readily seen that this

is a great advantage when heavy work or hill-climbing is necessary, the shorter throw being used for good roads and fair winds, and the longer throw instantly available for bad roads and steep hills. The whole arrangement is about the lightest and neatest I have seen, and, when properly adjusted, appears to be fully practicable and likely to prove a good thing. These cranks can be fitted to any ordinary machine.

The mediums of application of power to the cranks are the **PEDALS**, which are secured to the crank ends by fitting into the slots or holes, as the case may be, where they are firmly fastened with nuts. They are of various kinds—some patented—that most in favour for general use at present being the

Rubber Bar Pedal.—This consists of a metal tube some four inches in length, at both ends of which a flat oblong piece of steel is set at right angles; these are widened out in the middle to keep the foot from slipping off sideways, and the ends connected by small steel rods running parallel to the central tube; on these, bars of thin rubber are secured, upon which the foot rests. This gives a firm, soft hold to the foot, but is rather slippery in wet weather. The whole revolves on a steel pin passing through the central tube; this pin is now mostly fitted with conical ends, one being fixed, the other movable, so that when worn, by screwing up the outer cone, compensation can be made for wear. This effectually prevents rattle, but the plain pin, when well lubricated, runs easiest. Great diversity exists in the construction of the pedal itself, and quite a rush has latterly been made in the manufacture of pedals working upon balls placed between conical surfaces, upon which I shall speak shortly.

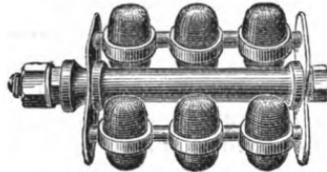
The **Rat-trap Pedal** in general construction is the same as the bar pedal, but the rubber bars are replaced by two flat pieces of steel, having serrated edges like the teeth of a rat-trap. They give a firm hold to the feet, and are much lighter than the others, but are prone to wear out the boots.

These two form the kind of pedal in common use, the latter being in favour with makers of light machines. The following varieties, being for the most part patent, are specialities:—

The **Overman Square-rubbered Pedal** is an American introduction, which, however, is, I believe, to be ere long placed on the market in this country. In it the bars of rubber are square, their surfaces being cut diagonally to facilitate the grip. As they are fitted on round bars, they are enabled to yield to the pressure of the foot and set at the same angle as the sole of the boot, thus preventing, in a great measure, slipping and ensuring a firm and comfortable tread.

Settle's Patent consists in using two bars upon each side upon which to secure the rubber, which is constructed specially for the purpose, the two bars in one piece, which makes it a matter of absolute impossibility for the rubber to slip round upon the bar, and thus throw the foot off.

Singer's Improved Pedal is like the ordinary ones in all except the side pieces, and these, instead of being straight lengths of steel, bearing rubber bars, are stampings, made with three round holes on each side, into which as many rubber plugs fit, as shown in the an-

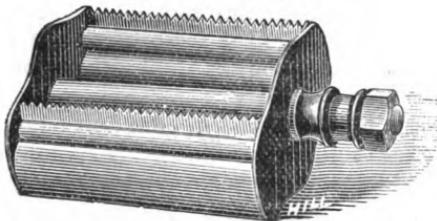


SINGER'S IMPROVED PEDAL.

nexed illustration. These give a lighter pedal, and greater depth of rubber, making the vibration when riding over rough ground very much less.

Jackson's Pedal is somewhat similar, but in place of specially-constructed rubber plugs a number of short pieces of rubber tyre are used, and these are held in place by clamping, the side bars being made in two pieces screwed together and holding the rubbers by tight pressure centrally.

The **Combined Pedal** consists of an ordinary rubber pedal with thin rat-trap bars secured as well, in such a manner that on one side the pedal presents the appearance of a rubber, and on the other that of one of the rat-trap class. It is one of the best in use, and is a fast increasing favourite, as the rat-trap side can be used in greasy weather, and the more comfortable and less destructive rubber utilised for ordinary purposes. It is perfectly balanced.

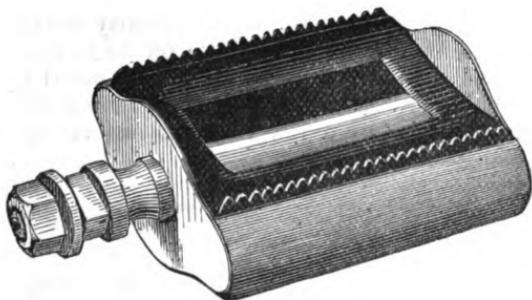


THE COMBINED PEDAL.

The **Atalanta Leather Pedal** has sharply toothed side plates, on the side of which stout pieces of leather are secured, the edges coming just above the tooth points. These are to give a better hold in slippery weather, and on any great pressure being applied the steel points are brought into contact with the boot.

Butler's Pedal Slipper can be applied to any ordinary rubber pedal, and is a light steel plate, the usual width and length of a rubber pedal; its outside edges are turned up and serrated, and the centre has two spring cheeks in a downward direction.

These latter grip the central cylinder, and hold the "slipper" firm upon the rubber, thus converting one side of an ordinary pedal into a rat-trap one, the plate being easily removable at any moment.



BUTLER'S PEDAL SLIPPER.

(Fitted to an ordinary pedal.)

Andrews's Pedal is a variety in construction only, the side bars being screwed to the ends instead of the whole being rivetted up. This allows new rubbers to be put on at any time when needed by the veriest novice without difficulty.

The Facile Pedal simply consists of a short bar of rubber upon a pin. On this the foot presses, and as the motion is entirely up and down immediately beneath the rider the surface presented is quite sufficient. It has the advantage of simplicity, there being no parts whatever to get out of order, and no bearings introduced to cause friction and require adjustment and oil, though, until one is thoroughly used to it, the foot is apt to slip off sideways when heavy pressure is applied, and I think the addition of a flange on the outside to prevent this would be appreciated by many.

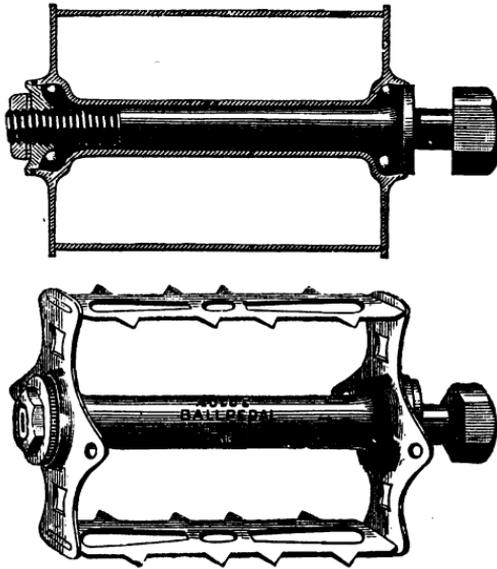
Singer's 'Xtraordinary Pedal is constructed on the same principle so far as the rubbers are concerned as his ordinary pedal, but in place of working upon a transverse pin, it merely oscillates on the top of a vertical one, this latter being screwed for a space of some four or five inches and fitted with nut and lock-nut. This arrangement fits into a hole at the end of the 'Xtra levers elsewhere described, and is thus enabled to be raised or lowered to suit the various heights of riders who may happen to ride the same machine.

Hancock's Pedals are formed entirely of gun-metal, and are of a neat and novel shape, being, as it were, "looped" at the edges, and provided with a spike at the corner of each "loop." They are neat, light, and hold fairly well.

As I have said before, the great majority of these run either upon a plain lubricated pin, or upon one with coned ends; latterly, however, the pedal—which is, perhaps, subjected to more strain than any other part of the machine—has been made to run upon balls.

B

Ball Pedals, therefore, are now very much in vogue, and are fast taking their position as the pedal of the future, not the least advantage gained by their use being the absence of the continuous oiling up requisite with cones or plain pin, as balls only require oiling at comparatively rare intervals. Nearly every maker now makes his own, the balls being placed in a recess or case in the pedal ends in such a manner that they separate the pedal from the pin, and take all the wear. Although there exists practically but little difference in any, there are a few varieties deserving of prominent notice, these being—



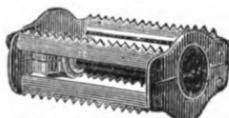
BOWN'S ADJUSTABLE BALL PEDAL.

Bown's Adjustable Ball Pedal, which has the cases for the balls placed in the pedal plates, and conical surfaces both upon the inner sides of the pedal pin and ball cases. The balls are placed between these, and, as shown in the illustrations, a cone working on a worm at the pin-end screws up by means of a milled edge, and adjusts for wear, being firmly secured by a lock-piece when properly adjusted.

Rudge's Ball Pedals have a grooved case or box on the inner side of each footplate, in which a number of steel balls are placed, and the pin is provided with a grooved cone by which they can be adjusted.

Hillman's Ball Pedal is an excessively neat unadjustable pedal, but differs from all the others in having, not a single row, but a double one at each end. These run in grooves, very much resem-

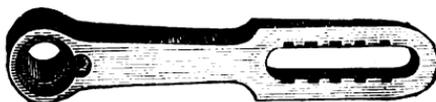
bling those cut in the axle for double ball bearings (described further on). All the balls are inside the pedal ends, beyond which no nut projects, a neat plate being fitted which covers all in and most effectively keeps out the dust, making at the same time one of the neatest pedals in use. They are fitted with rubber bars on one side



HILLMAN HERBERT & COOPER'S
PATENT BALL PEDAL.

and rat-trap plates on the other, and the central pin runs through without an encasing tube. They run very freely, but I prefer a single bar of good thick rubber for comfort. Besides the above many manufacturers make their own ball pedals, but the difference between them being practically *nil*, I have not deemed a separate description requisite. Before leaving the subject of cranks and pedals, I must not omit descriptions of some improvements in which alterations are made more or less in both. These are—

Carver's Safety Pedal, which has the face of the crank cut with eight or nine grooves, and the flat of the pedal-pin fitted with corresponding protuberances. By this arrangement it is impossible for the crank to slip up or down the slot when not quite tightly secured.



THE COVENTRY MACHINISTS' CO.'S SAFETY PEDAL.

The **Coventry Machinists' Co.'s Safety Pedal** is somewhat similar, having the same object in view; in it the grooves are replaced by a series of small holes drilled in the face of the crank on each side of the slot, and the pedal pin is provided with a couple of pins to fit.

The **Challenge and Matchless Pedals** are very similar. A series of grooves are cut across the edge of the crank, and the pedal fitted with a projection to correspond. All are equally good.

Effe's Adjustable Throw Pedal.—This is quite a novelty, and only just out. It consists in fitting to the pedal pin a species of eccentric pin. The side of the pedal is provided with a catch, by pressing which with the foot it is enabled to turn round the eccentric and take up a position on the opposite side; thus with, say, 5in. cranks and a 2in. eccentric the pedal would give a throw of six inches on the one side and four inches on the other. The especial feature of this is that the whole affair is fitted very neatly to the pedal, which can be attached by the usual bolt and nut to the crank

end in the same manner as the ordinary pedal, so that no fitting whatever is required, whilst, should the gear get out of order, the machine can still be driven, as the pedal will revolve upon its pin and the cranks remain opposite each other. It is not yet fairly on the market, but if introduced at a reasonable figure should, I think, prove a good thing.

Whilst the crank and pedal, in one or other of their various forms or combinations, form the simplest driving-gear for a bicycle, there are many other methods which have recently been introduced, and which, during the past few months, have multiplied with such rapidity and come into such prominence that they require a special chapter to themselves. These different styles of

DRIVING GEAR

have been introduced to gain some end, the main one being that of enabling the rider to ride a smaller wheel than he could in comfort with the ordinary crank and pedal, and machines on which these various devices are fitted are known by the generic name of "Safeties." There are two principles of driving that are utilised, though all of them are subservient entirely to the crank and pedal, these being used in each variety, but in combination with other mechanical contrivances. These several driving combinations are sub-divided into two main classes, the first and the older being the lever action, of which there are several patented arrangements differing considerably in detail. The general feature of the lever gears, in contradistinction to the rotary gear, is that the motion of the foot is more approaching an up and down one than a rotary motion. As a rule, the rider is better enabled to use his entire weight with the lever motions, and the action is essentially powerful, though it necessitates a wheel being driven—as in the crank machines—so as to revolve once with each revolution of the pedals, and as some of these lever actions are fitted to small wheels, the motion with such is a rapid one. Doubtless, the simplest of this class of driving gear is

The Facile Lever, which is of a very simple variety. In this a short crank is used. The fork—hereafter to be described—is continued below the bearing, so as to form a fulcrum for a straight lever. This fulcrum is at one end of the lever, and the foot at the other, on the pedal previously described. At a point some few inches from the pedal a forked rod is hinged to the lever, and ends in a bearing which attaches by a pin and nut to the crank, in the same way as an ordinary pedal would do. It will thus be seen that a pressure on the pedal draws the crank downwards by means of the lever and connecting rod.

The Rambler Levers are very similar, with this exception, that in place of the hinged connecting rod bolted to the crank end, the lever is provided with a rigid arc of metal, and to the crank end is fitted a short roller. The arc bears upon this roller, and the pressure of the foot forcing it down presses the roller, and with it the

crank end, and consequently the wheel, forwards, the arc working to and fro upon the rollers.

Taylor's Lever—or, more properly, driving gear, as, practically, there are no levers used—is somewhat similar in one respect to the previous two described. In this the fork end is carried downwards and finishes in a pair of guides or grooves. A carrier formed of four rollers work up and down in this grooved slide, and to this the pedal is attached. A hinged connecting rod, somewhat similar to that on the "Facile," connects the pedal and the crank end, and rotation is caused by pressing the pedal downwards in this slide, the crank being drawn downwards with it, and the whole arrangement working in a very similar manner to the piston and connecting rod of an engine. Each of these three methods necessitates the use of a small wheel, or, at any rate, of a comparatively small one. With the next three, wheels of any size can be driven, the first and oldest being

The **'Xtra Levers**, or more properly those of the "'Xtraordinary Challenge." The object of this arrangement is to enable the rider to sit farther behind the centre of the wheel and yet to have the pedals properly beneath him. The lever itself is long and curved, J-shaped, in fact; the upper end of the J is fitted with an universal joint to which a short rod is attached, this rod being jointed in a similar manner to the fork sides just below the top of the wheel. At the commencement of the curve of the lever a long bearing, equalling in length the bearing of a pedal, is attached, and this bears upon a long pin attached to the crank end in place of the usual pedal. The pedal proper—made as previously described—is attached to the other end of the lever, and is placed almost immediately below the rider. In this motion the action of pressure on the pedal directly forces the crank round, the action of the lever tending to nearly straighten its upper end with the joint before described, this producing a powerful combination. The pedal action is somewhat elliptical, a great part of the stroke being nearly vertical. The levers themselves are now made hollow, and are much stronger and stiffer than when first introduced.

The **Devon Levers** are designed to attain the same end. In these, likewise, a connecting rod or link attaches one end of the lever to the fork. This connecting rod, however, is long, as long as the fork, in fact. In place of the long lever of the "'Xtra" a short one is used, which, jointed to the end of the connecting rod, travels straight to the crank end bearing, and then, bending sharply round into a U, bears a pedal at its other end. The action is very similar, though, if anything, scarcely so powerful as the other arrangement.

The **American Levers** are almost identical with the last, but are arranged with the object of driving a small wheel, the swinging rods being slightly shorter, and the pedal ends of the levers bent downwards to a much greater extent than with the "Devon." The joints to the swinging rods are on the ball and socket principle, so that an accident which bends either levers or cranks will not materially affect the running of the machine.

This concludes the list of lever motions. The other class of driving gear is generically known by the name of rotary action, in which the movement of the pedal is identical with that of the ordinary bicycle, the motive power being conveyed by means of ordinary cranks and pedals to

Chain Wheels fitted at some distance below the axle of the driving wheel. These chain wheels are of various kinds, each suited to the particular make of chain for which it is designed to work. To unmechanical readers I may simply call them cog wheels, though mechanically they are more properly termed chain wheels. They consist of iron wheels, either solid or spoked, with projections or teeth around their edges. Similar wheels are placed upon the axle, and the two united either by chains or gear wheels. The generic features of this class of driving gear are the possession of the rotary motion, which is favoured by some, and the power, by means of varying the sizes of the upper and lower chain wheels, to what is termed "gear up" or "gear down," that is to say, to cause the driving wheel to be propelled to a greater or less distance at each revolution of the pedal. All machines of this class are geared up, as, using very small wheels, fast pedalling would be necessitated were level or low gearing adopted. The gearing, too, with the majority is considerably higher than the sized wheels which would be used on an ordinary bicycle, such, for example, as 60in. being a common gearing, whereas few riders of the ordinary bicycle bestride a larger wheel than 54in. With this gearing up the foot motion is slower, but at each stroke more power is required, and one has, in choosing between the two varieties, to select between an easy, rapid foot motion and a slower motion in which the rider exerts more pressure upon the pedal at each stroke. Another point about the two principles is that, with many patterns of machine, trouble is bound to ensue with the bearings which carry the lower chain wheel, cranks and pedals. This I shall treat upon later on. Contrary to theory—which would indicate a considerable loss of power through the gearing—these geared-up machines do certainly run with remarkable speed and ease, and can climb hills with equal, or even better, facility than the ordinary.

Gear Wheels are used but by few, although they were the methods introduced (in the "Hall" safety) some years ago. In this the chain is removed, and between the two gear wheels a third is placed running upon a bearing attached to the fork. The advantage of variation in gearing is equally apparent with this method, which claims for its advantage over the chain machines that there is no stretching of the chain or possible chance of a breakage, so that no adjusting has to be done. Against it, it is urged that it is noisy and rather heavy, and necessitates a third bearing.

Burdess's Sterling Gear is a cog-wheel gear, but differs very much from the last described, insomuch that two wheels only are used, these being fitted with what are termed closed teeth. One

wheel is attached to the axle, the other to the cranks, and the action necessitated by this arrangement is the reverse of that in ordinary use—the feet being compelled to revolve backwards whilst the machine is propelled forwards. By this action a direct downward tread is obtained upon the pedals, and, the pressure being all behind the axle, the machine is rendered very much safer, and coppers almost impossible. To one, however, accustomed to the forward pedalling the motion is strange and unnatural. Doubtless a person learning and riding this motion only would get on well with it.

The Sun and Planet Gear is one of the simplest and prettiest mechanical machines in the market. In it a large toothed wheel is fitted to the axle. The crank extends an inch or so beyond the edge of this wheel. At the crank end a second crank is fitted, revolving in a bearing, and carrying on the other side a small toothed wheel which gears into the larger one. The pressure upon the pedal placed at the end of this secondary crank draws the large wheel round, and in the course of its travel the wheel is geared up to the extent of the added diameter of the smaller wheel, each wheel making one revolution; thus, if the smaller or planet wheel is one-fifth the diameter of the larger or sun wheel, and the driving wheel is 45 inches, the machine will be geared to 54in. The action of this gear is direct, straight, and powerful, and I only wonder it has not come more to the front.

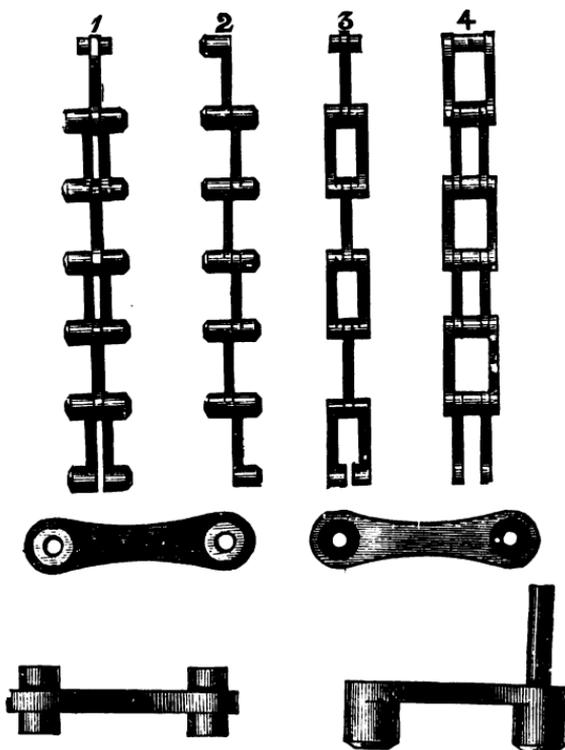
The Racoon Driving Gear is a combination of the lever and gear wheel movements. To the fork end, just above the bearings, a metal arm is attached, this curving slightly upwards and ending in a bearing for a large gear wheel which gears with a second and smaller toothed wheel upon the axle of the driving wheel. The lower part of the aforementioned arm runs forwards, taking much the same shape as the fore portions of the elongated "Facile" forks. At the extremity of this is a bearing forming the fulcrum for a lever, at the rear end of which the foot is placed upon a pedal in the usual manner, whilst the forward end is connected to the larger gear wheel beforementioned by means of a connecting rod attached, like the piston rod of an engine, to the side of the wheel. The action of this gear is by means of the lever and intermediate rod to draw the larger wheel round. This gear wheel communicates its motion to the smaller wheel, and through this to the driving wheel, and thus propels the machine at a higher rate of speed than the movement of the foot. As the lever action is very similar to that of the "Facile," the combination, generally speaking, might be termed a geared-up "Facile."

This about completes the driving motions adopted as yet upon bicycles, the arrangements described being, of course, fitted to each side of the wheel. There is one class, however, of machines in which this is not the case. In this class the driving wheel is placed behind, and the chain wheel carried midway between the front and back wheels. A single chain then is connected with the driving

wheel, and a pair of cranks are placed one on each side the chain wheel. This arrangement, however, in conjunction with several modifications in bearings, adjustments, &c., I shall describe fully later on.

The **Chains** by which these geared wheels are connected with each other are of several kinds, being the same as those used upon tricycles, this gearing up with chains and wheels being, in fact, adapted from the larger vehicle. The varieties briefly are as follows:—

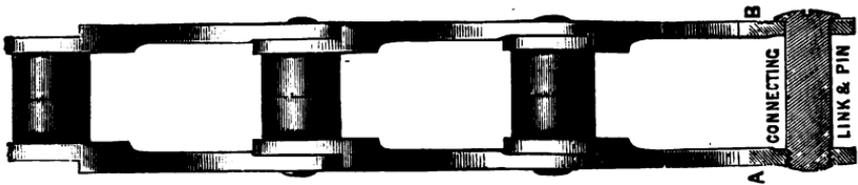
Reynolds's Chain, in which the links are composed of parallel side bars, and are arranged in alternate sets, the ends of the side bars of the narrow links fitting between the ends of the broader ones on each side of it. The ends of the broad links are connected by solid rivets, whilst those of the narrow ones are united by cylindrical end pieces through which the solid rivets of the first pass; thus, it will be seen that, instead of the side pieces of the links bearing with comparatively sharp edges on the connecting rivets, the two sets of links work together on a long parallel bearing, and wear is avoided, whilst, to reduce the wear from the teeth of the chain wheels to a minimum, further cylinders work on each connection and take the wear as the wheels go round.



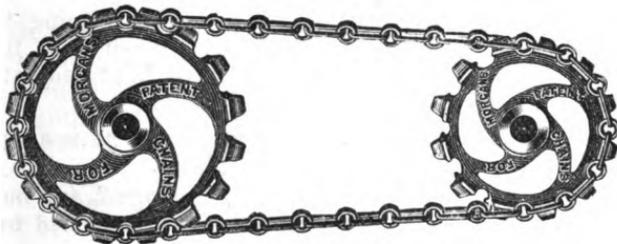
WARMAN'S NON-STRETCHING CHAINS.

Warman's Non-stretching Chains have as their guiding principle the construction of their links in such a manner that the pull or strain shall be taken by the solid link pieces instead of by the rivets or connections. As will be seen by the illustrations, each link forms three sides of a parallelogram, and in the No. 1, or leading pattern, two of these are placed back to back, a pin riveted through the projecting ends, and a single link of the pattern shown in the cut with side shoulders at each end placed alternately between each double link. A chain is thus formed having a number of side pieces projecting at regular intervals. For the use of this chain a special chain wheel is needed, this being formed with two parallel flanges on its periphery. The body of the chain sinks down between the flanges, and the side pieces drop into a series of hollows cut at regular intervals in these flanges, so that the chain is kept from coming off as well as being stronger. It is made in four patterns, these being different combinations of the two links of which the chain is composed.

The **Abingdon Works Co.'s Chain** is beautifully made throughout, and is constructed on sound mechanical principles. The side arms of the links are all made alike, consisting of flat lengths of metal, their ends slightly cut out in opposite directions, so that when the two are placed together the ends fit one over the other, and bring the main lengths of the side pieces in a strict line with each other. Each link is then connected by a cross-bar with revolving collar, which takes the wear of the gear-wheel.



THE ABINGDON CHAIN.



MORGAN'S PATENT CHAIN.

Morgan's Patent Chain is extremely light and elegant in appearance, and at the same time well made. It is one of the simplest chains in use, consisting of two species of links, one—the longer link—being a plain oval section oblong link, the other a short, smooth cylinder. These links are placed alternately, and the cylinders fit into rounded recesses on the chain wheels; the long links pass round the teeth, and a smooth draw is obtained. It has come largely into use lately, especially for racing machines, on account of its lightness.

The **Otto Driving Bands** are of thin flat steel, and drive off smooth band-wheels or drums. They are specially prepared in manufacture, so that they are not very liable to snap. They are the lightest things of the kind in the market.

Before leaving the question of chains, it might be well to touch upon some means of their adjustment, as, however well a chain may be made, it is always liable to a certain amount of stretch by the unavoidable amount of wear and strain, and it is a natural sequence that, as chain gear requires adjustment, there should be some method devised for obtaining this end. Quite a number of plans are on the market, the simplest of these being

The **Imperial**, adopted from the old open-fronted rear-steering tricycles. It simply consists in making the fork ends finish with a slot a couple of inches in length, attaching the bearing to a couple of bolts, passing these through the slot and fastening with nuts on the other side, adjusting the bearing, and with it the chain wheel, cranks and chain up and down in the slot as required.

The **Club Adjustment** places the lower gear on a dovetailed slide, working up and down in a correspondingly dovetailed slide piece at the bottom of the fork ends, the whole being secured when tight by a bolt and nut.

The **Rudge Method** makes the fork ends square, or, more properly, quadrilateral in section, and fits the bearing block round this, a lug in front carrying a set screw and pin, which, being tightened against the fork end, holds the whole secure when at its proper tension. This is one of the easiest in the market to adjust, though it is perhaps the easiest also to slacken. In the

Ajax Method a somewhat similar arrangement is adopted, but the fork ends keep their oval shape throughout.

The **Clip Side** is adapted on the "Challenge" and one or two other safeties. In these the crank bearings are attached to a split collar which encircles the fork ends. This collar carries a couple of lugs, through which a bolt and nut pass, by means of which the collar is tightened upon the fork end, and holds in any position required.

Edge's Plan makes the fork end round, but carries the lower gear on a straight round pin, which is passed up inside the fork end, and the whole secured by a nut.

The **Royal Mail Method** differs very materially from the others, and is one of the neatest in use. An eccentric is used, the lower gear being attached to this and placed in a ring at the end of the forks. By turning this eccentric round within the ring the chain may be adjusted with great nicety, and tightening a nut, the ring being closed round the eccentric, holds it secure and firm.

The **Kangaroo Method** differs from all others, in that the upper bearings and gear wheels are adjusted, and not the lower. The bearings in which the driving wheel, with its attached chain wheels, work are fitted at the end of slightly projecting lugs fitted rearwards, with split sides fitting round the circular forks of the "Kangaroo." Lugs and bolts tighten these sides round the forks and hold the bearings in any position required, sliding up and down the forks themselves to secure the necessary adjustment.

Having examined the various parts and accessories of the wheels and driving gear, we come to the medium of connection with the framework, viz.—

THE BEARINGS.

These are very important, and contain more varieties than any other part of the machine. They are, or rather ought to be, constructed of steel in all cases, and should be made as hard as possible. The great end sought for in bearings is to obtain the minimum amount of friction; for, the greater the friction, the greater the useless expenditure of power, and consequently harder work in propulsion. With more friction there is more wear; it is for this reason the bearings should be well hardened, and, as no bearing can run without friction, they should be readily tightened to compensate for the inevitable result. It must also be borne in mind that "simplicity is a virtue," as, the greater the complication, the more points of friction there are. Bearings may be divided into two great classes, viz., Simple and Compound, each with numerous subdivisions. Beginning, then, with the **SIMPLE**, they may be subdivided into three classes, viz., Plain, Coned, and Parallel.

Plain Bearings consist of two semi-circular surfaces of hardened steel, resembling the two halves of a cylinder about 1 in. in length; one half fitting on the top of the axle, the other below it. The upper part is a forging solid with the end of the fork, and is fitted with two projections, one on each side; the lower bearing is similar in shape, and is secured to the upper by means of two screws and nuts in the projections. With plain bearings there is less friction than with many other forms, they are also very simple; but their disadvantage is that they cannot be tightened when much worn with use. If, however, both surfaces are well fitted and deeply hardened, they will wear for a long time with very little detriment.

The next class, now rarely used, comprises

Coned Bearings, of which there are two varieties as regards the bearing itself, besides numerous methods of adjustment and fixing.

In the generality of coned bearings the axle is turned out in the centre so as to appear as if a hollow truncated cone had been slipped on at each end, the bearings being bevelled at their edges to fit these. This is the common kind; the other is just the reverse, the cones being turned *on* the spindle—*i.e.*, with the bases touching each other, and the bearings hollowed out conically to fit. The advantage of cones over plain bearings consists in their adjustability to compensate for wear, but there is much increase of friction. The second plan has several advantages over the first, *viz.*, that the cones being turned *on* the spindle instead of *into* it, make the axle stronger in place of weaker, whereas with the first plan the axle is liable to snap off at the bearing with a sharp blow. Also, the bearing being concave instead of convex, it can be kept well oiled with greater facility.

Ordinary conical bearings are usually adjusted and secured by means of a nut and cotter, by an eccentric, or by a screw at the bottom. The "eccentric" consists of a small steel rod secured to the ends of the bearing-keeps by screws fixed out of its centre; this, when turned by means of a pin set at right angles to it, gradually raises the lower bearing until sufficiently tight, when the whole is secured by tightening the nuts at the end. In the third method, the ends of the bearing-keeps are united by a small bar, through the centre of which a screw passes; this, when turned by a nut at the bottom, forces the lower half of the bearing into position, where it is secured by a lock-nut. This is a very good method, but little used; and I may here mention that all the varieties of coned bearings are now but little employed in manufacture, although large numbers are still in use about the country, and I fancy in a season or two this variety of bearing will, for front wheels, be one of the past.

The last division of simple bearings now claims our attention.

Parallel Bearings consist of a hardened steel cylinder some $1\frac{1}{2}$ in. or more in length, which fits the spindle exactly; both axle and bearings are finished with a surface as smooth as glass, and as hard as it is possible to make them. To prevent the ingress of dirt and grit, which would, of course, wear them away, the boss of the crank is hollowed out, as is also the flange of the hub, and into these recesses the bearing runs, fitting accurately. This class of bearing is simplicity itself, and presents about the least amount of friction of any, as, being long, it presents more surface, in consequence of which the weight is further distributed. Also, a drop of good lubricating oil between the two surfaces really receives all the friction up to a certain point, and the metal has no contact anywhere except at the ends, consequently, any friction that exists is caused by the presence of grit or dirt, or a failing in the supply of oil. The principle of this bearing is unique; but there are several methods of fixing them to the fork ends.

All should, however, no matter in what way held, be fitted to the fork ends with a hinge working sideways; as by this means the strain usually exerted upon them by pulling at the handles in hill-work is removed.

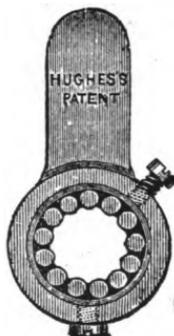
An objection to parallel bearings is that they cannot be adjusted for wear; but if accurately fitted and attended to well, they will wear an immense time, and if made detachable, can be renewed at any time for a shilling or two.

Coming now to **COMPOUND BEARINGS**, we find them to be subdivided into two classes—Rollers and Balls—of both of which there are several varieties; the former, however, like the cones, are rapidly falling out of popular estimation, and are but sparsely used by makers, the chief bearings in use now being balls.

The **Ordinary Roller Bearing** consists of a circular steel box, somewhat resembling an overgrown parallel bearing, the diameter of which is some quarter of an inch larger than the axle. This box is "packed" with a number of small rollers of hardened steel; these completely fill it, just leaving enough room for the axle, which touches every roller, and, in revolving, turns them all. There is perhaps more friction with this bearing than there is with any previously described, as the motion of the axle amongst the rollers imparts to each one a motion in the opposite direction; now, as the rollers touch one another, each one imparts to its neighbour a motion opposed to its own, so that there are two forces at work in opposite directions, and consequently much friction, with its inseparable companions, a loss of power and wear of material. This is theoretical. In practice they are found to run very easily on account of the axle working on a moving surface—*i.e.*, when the weight comes on a roller it revolves, and will, as it were, have nothing to do with the axle. They are of more use to heavy riders than to light weights, as their good qualities are only seen when a great weight is placed upon them. They have an advantage in giving but little trouble, except when worn, when they annoy one terribly; they are expensive, and although worth the price asked, if well made, on account of the time, care, and accuracy required in their manufacture, it is questionable whether they are proportionately worth it in use. To be good they must be well made and of good material, otherwise they are worse than useless, therefore cheap roller bearings should be avoided; this remark applies equally to their varieties as well as to Balls. In their ordinary form they have one great objection, *viz.*, they cannot be adjusted. To obviate this,

Adjustable Rollers have been introduced. In these the roller box is made in two pieces, something like the Sheffield plain bearing, so that when worn the two halves can be tightened. An objection to them is that the case cannot at all times be so perfectly circular as with the ordinary method, in consequence of which some of the rollers get more pressure than others, and they do not revolve so freely. This is, however, more theoretical than practical.

Hughes's Adjustable Rollers are in principle the same as the ordinary ones, but between the rollers and the box is fitted a split steel inner case. A screw at the side presses upon this and so adjusts the bearing, whilst another screw at the bottom allows of the egress of the spirits used in cleaning it out when dirty.



HUGHES'S ADJUSTABLE ROLLERS.

An objection to both these forms is the ease with which dust and grit are able to get in, by falling down between the roller box, crank, and hub of the machine. This is almost entirely obviated in

Plowright's Registered Dust-proof Bearing, in which the rollers are contained in a steel box, with collars at each end to secure the bearings, the whole being enclosed in an outer casing of steel; this runs into a recess in the flange of the hub, and so keeps the dust out in that direction. To prevent its ingress on the other side, a second steel casing is fitted over the outside of the first, which forms a cap and covers the boss of the crank. A lubricator is fitted, and at the bottom is a screw to allow of the bearings being washed out with paraffin now and then. It is a notable fact in their favour that one of the longest distances ever done on the road in one day was with them.

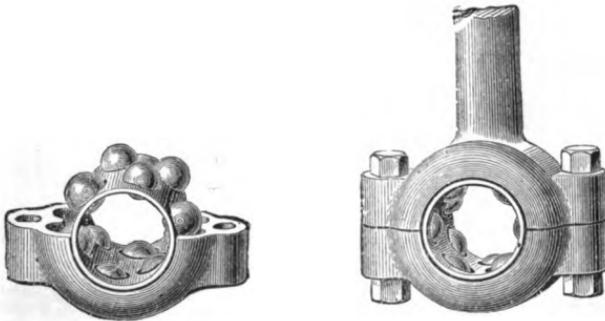
Another fault with the ordinary rollers is that when slightly worn they are apt to get twisted, when they hitch and drag, grinding away the surface of the roller box in double quick time. Many devices for overcoming this have been devised, but, owing to the fall in favour of roller bearings generally, have disappeared from the market. They will be found fully described in the last edition of this work.

The second and last division of the compound bearings are the popular and now almost universally used

Ball Bearings, of which there are a large number of slight varieties, but only two distinct types—viz., double and single. In principle, they introduce between the surfaces of the axle and the bearing case movable points, and by this means substitute a rolling friction for a sliding one. Many of them differ much in theory, and

should be bad from that point of view ; but in practice they have been found to be really advantageous, especially for heavy riders, and for hill work and racing purposes. Not the least advantage gained by their use is the very little oiling they require, as if once well oiled and kept free from dirt and dust they will run as much as 100 to 200 miles without further attention, to say nothing of the absence of the oily mess that used to be such a certain concomitant, soiling the rider's clothes, and getting about the machine, as it exuded copiously from the bearings and crank ends.

Humber's Bearings, or ordinary double balls, have won for themselves a good name during the past seven seasons. They are constructed in two parts, the upper one being either solid with or hinged to the fork, and the lower one secured to it by screws and nuts in the side flanges, as in the Sheffield plain bearing. Both these halves have two semi-circular grooves worked in them, which run completely round, and are distant about $\frac{1}{4}$ in. from each other, and the same distance from the outside of the case. The axle has two corresponding grooves turned in it, but rather shallower, and between the axle and bearing box is inserted a thin cylindrical collar, pierced alternately with ten circular holes, five being immediately between one pair of grooves, and the remaining five corresponding with the other. Into these holes small steel balls are inserted, which by this means are kept in their places and revolve in the grooves. The annexed illustrations show the arrangement as used by the

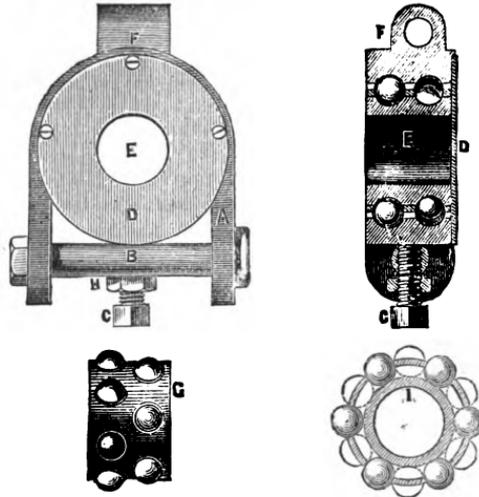


DOUBLE BALL BEARINGS.

Surrey Machinists' Company, Humber, Settle, and many others. They prove excellent in practice, and are very steady in running, the only difficulty about them being the adjustment, which is very slight, though as wear is also but little, this is not of such necessity as with some bearings.

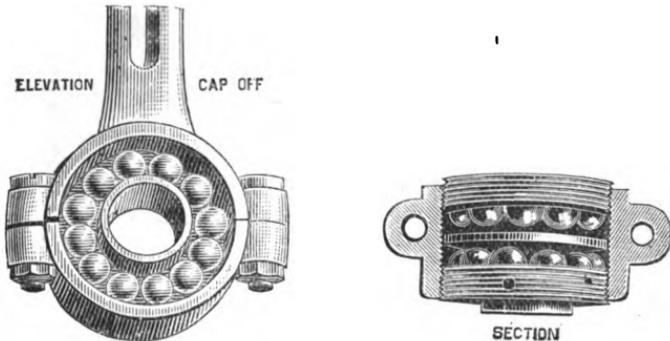
Hillman's Ball Bearings in principle are the same as Humber's, but are attached to the forks in a different manner. The fork ends are formed into a wide, deep \cap , or, in other words, are exactly similar to the old tuning-fork type of plain bearings ; the bearing halves are

fitted to this, and are easily adjustable from the bottom by a screw, as will be seen by the accompanying woodcuts.



BILLMAN'S ADJUSTABLE DOUBLE BALL BEARINGS.

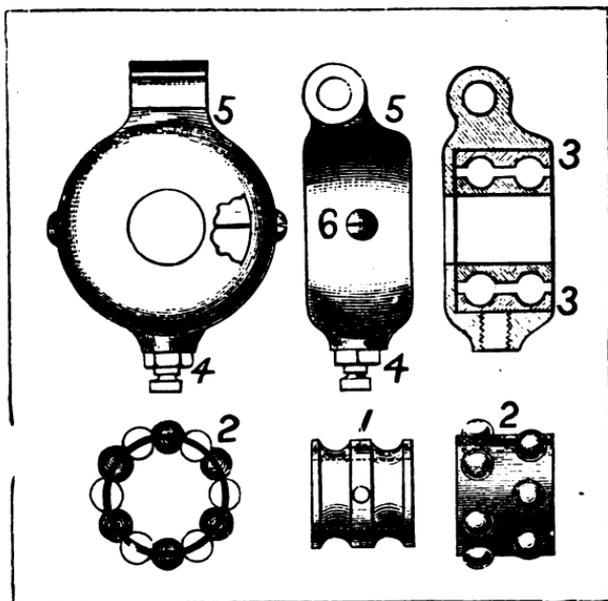
The Sandringham Dust-proof Ball Bearing is almost identical with Humber's, but has no separating collar, so that the balls—eight in each groove—in revolving touch each other as do ordinary rollers. By a neat arrangement of overlapping caps and flanges, very similar to those used on the roller bearing by the same makers, the dust is very fairly excluded.



THE CLUB DOUBLE BALL BEARINGS.

The Club Ball Bearing, like the last, is minus the cage; the axle has two raised grooves turned upon its surface, and the case is constructed with a deep vertical and central collar, which serves to keep the two sets of balls apart and separate in their respective grooves. The outer caps curve, so as to adjust the balls when necessary.

The Rapid Double Ball Bearings.—As in the ordinary double ball bearing, a doubly-grooved collar fits on the axle, and takes the wear, whilst the balls are placed alternately and kept apart by a steel collar. The outer case is made solid and uniform with a hollow lug at the base, and contains the upper and lower halves of the bearing, which are adjusted sideways by two screws, one on each side, and pushed upwards for adjustment by a nut and screw in the bottom lug. I believe they run very well, and they are certainly very neat and dust-proof.



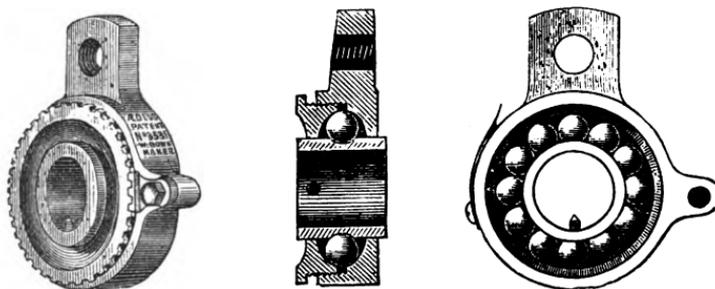
RAPID DOUBLE BALL BEARINGS.

Granger's and Singer's United Bearing combines double balls with rollers. Upon a cylindrical axle two flanges are turned, some half-an-inch apart, and between these a series of rollers of large diameter are placed; the interior of the case, like Palmer's, is parallel, and a row of balls is placed outside each flange, thus producing rollers between balls, adjustment being made by means of a lateral screw-cap. The balls do not touch the top of the bearing, and the rollers, therefore, take all the friction in that direction, whilst the balls do the same at the sides. In theory, this seems one of the most perfect of compound bearings, as there is only the friction of the rollers and balls against each other and the axle to contend against, both these being at the same time reduced as much as possible by a scientific proportion in the relative sizes of the various parts.

c

Single Balls are, as the name denotes, placed in a single line ; they are not separated by any collar, but are free to rotate against each other at pleasure. They are placed in grooved cases in either one or two parts, the latter—adjusted as with Humber's bearing—being the commonest of the unpatented varieties. Owing to the success and patronage accorded to the first two of the patented patterns, a number of imitations, differing in some slight degree from the originals, have sprung up. I shall, however, only treat of those possessing any points worthy of special notice.

Bown's Æolus Adjustable Ball Bearing.—The construction of this will be clearly seen by reference to the accompanying illustrations. A single row of balls is used, twelve in number, and the adjusting power of cones is made use of for adjustment, it being

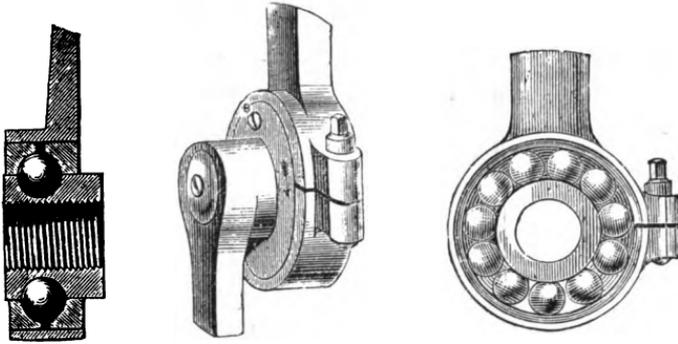


BOWN'S ÆOLUS ADJUSTABLE BALL BEARING.

constructed as follows :—On the axle a steel collar is secured, having two wedge-like projections left upon its outer circumference, which thus form together a conical groove, in which the balls are placed. The case is separated vertically, and both halves are coned outwards ; the outer, or adjustment half, is provided with a milled edge, and by screwing up this with the fingers the cones are tightened concentrically upon the balls with a great degree of nicety, and the adjustment plate is prevented from unscrewing by a bracket with a set of teeth, which fit into the indentations on the circumference of the adjusting case. Mr. Bown also makes a double variety identical with the single in principle, but having two rows in place of one, adjusted by the cap as in the above.

Rudge's Unequaled Ball Bearing is almost identical with Bown's. There are fewer balls, of a larger diameter, only nine being used, thus lessening the friction a little ; the adjustment plate is of steel, and is not milled, but is provided with a small pin, by which it may be turned as required, whilst by splitting the outer case on one side and providing it with a screw and lock-nut working in projecting lugs, a certain amount of side adjustment is obtained, in addition to that concentrically, thus making them capable of very great

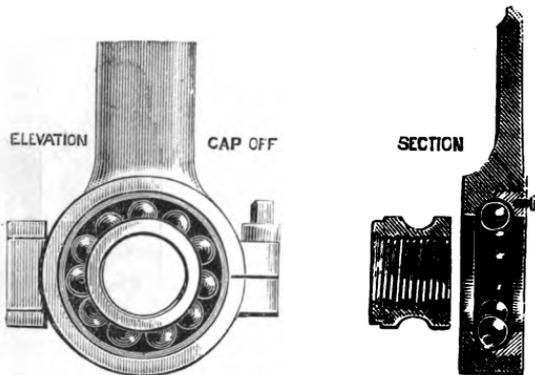
adjustability. In this bearing the cones have slightly concave surfaces, taking more the form of a groove than with Bown's.



RUDGE'S UNEQUALLED BALL BEARING.

Whitehouse's Ball Bearing may be termed a combination of Bown's and Rudge's, the interior being constructed on Rudge's pattern, the exterior on that of Bown, the case being, however, as it were, on its side, the securing bracket being at the side in place of on the top.

The **Stanley Ball Bearing** is provided with an adjustable sliding cone, which is separate from the outer screw-cap. This is forced on to the balls by screwing up the cap; this method provides for the more effectual exclusion of dust from the interior of the bearing.

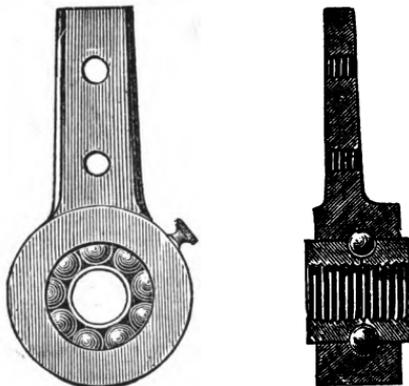


THE CLUB SINGLE BALL BEARING.

The **Club Single Ball Bearing** illustrated above has the groove cut on a collar which screws on to the axle. The case is in one solid piece, and there are two adjustments, one by screwing up an outer case, the other by side lugs with bolt and screw. It is well made, neat and simple.

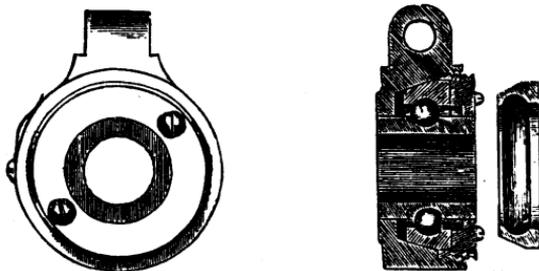
Hough's Cheap Ball Bearing is constructed mainly for cheapness, and therefore is remarkable for an excessive absence of com-

plication. As will be seen by reference to the accompanying cuts, it is of the single variety, and unadjustable. The case is made in one solid piece, with a groove to receive the balls turned out inside; the bush, which takes the wear upon the axle, is in two parts, being divided centrally. To affix the bearing, the inner half of the bush



HOUGH'S CHEAP BALL BEARING.

is screwed into its place on the axle; the bearing case is then put over it, and the balls inserted in their places, after which the other half of the bush is screwed on, and the whole is complete and ready for use. There is no means of adjustment, but it is cheaply made, and, being thoroughly hard, will wear a very long time before adjustment becomes requisite.



GREEN'S BEARING.

Green's Bearing has a case very similar to the previous ones, the balls being placed in grooves upon the axle. Inside the case a very strong flexible split steel ring is fixed. The inner surface of the case is coned slightly inwards, and the outer surface of the ring is coned to correspond, the inner surface being grooved to take the balls. A strong outer cap, with holes in its face, is turned with a suitable tool, and forces the split ring inwards, causing it to close until the proper adjustment is obtained.

Burdess's Patent Ball Bearing is, in reality, a double variety, though it takes a bearing only upon one row. The bearing box is deep, and the sides are turned with two concentric grooves in them, the inner one corresponding with the groove on the axle. Two sets of balls are used, one set working between and on the top of the other; the whole being packed close together. The object of this arrangement is to prevent the grinding friction of the balls, the intermediate balls transmitting a continuous motion throughout the whole. It is not yet in extensive use, but is, I believe, a perfect success.

All classes of double balls are now greatly in vogue, being much the steadier of the two.

Double ball bearings of the ordinary pattern are adjusted in some makes by removing a paper washer and screwing up tight again, and in others by procuring a new set of balls a size larger than the first.

This concludes our description of bearings for the driving wheel. We now come to those for

The **Back Wheel**, which should run none the less easily than those of the front one; but the greatest desideratum in bearings for this wheel is, that they should be easily, safely, and quickly adjusted in compensation for wear; as the rear wheel (being so much smaller than its fellow) revolves between two and three times as fast, consequently the friction is inevitably greater, and the wheel works loose on its bearings sooner. Also, the bearings, being so near the ground, are more accessible to dust and grit, so that they ought to be protected in some way from this enemy. There are in back wheel bearings the same classes as in those for the front, but fewer varieties; these differ somewhat in construction from their more important brethren, on account of the different position and use of the wheel. The plain and parallel bearings form but one class, which we will consider first.

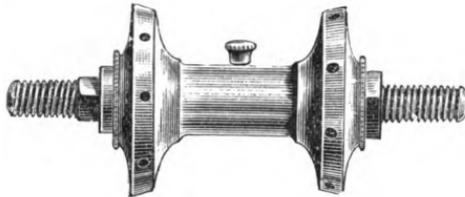
Plain Bearings.—These, the simplest and oldest, consist of a straight steel pin passing through and fitting accurately the centre of the back wheel hub, and secured in various ways by lock-nuts to the ends of the back fork. This variety is rarely used now, as, although it presents less friction than any other kind, there is no means of adjustment for wear, and it soon gets shaky. The objection is, however, entirely remedied in

The **Taper Back-wheel Pin**, with which, by making the pin slightly taper in place of parallel as before, with a very slight increase in friction, far better adjustability is obtained. Cones are, however, still very largely used for the back wheel—although balls are rapidly ousting them from popular favour—and are of several kinds, as follows:—

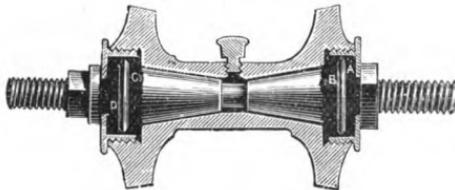
Double or Movable Cones consist, as in the first-mentioned bearing, of a steel pin passing through the centre of the hub; but instead of being straight, a truncated cone about 1 in. in length is

placed at each end, that on the right-hand side being turned solid on the pin itself, the other being loose and working on the pin, with a worm cut inside it. By screwing up this cone all side-shake can be taken up; it is provided with two flats for this purpose, and when all is as it should be, the whole is secured with lock-nuts on the outside of the fork-ends. There is more friction with these than with plain bearings, and one bad defect is peculiar to them, they are liable to fasten in working, that is, to screw up and become—wedge-like—so tight as to prevent the wheel revolving, when, if the rider is not careful, or if he is going fast, a fall is almost certain, to say nothing of the wearing of the tyre by its scraping along the ground. This is, however, happily not a frequent occurrence, and is mainly the result of inattention, bad fitting, or an insufficient quantity of oil, whilst by fitting the adjustable cone in such a way that the action of the wheel tends to unfasten it instead of to screw it up, the defect is obviated altogether.

Single or Fixed Cones differ from the double ones in that both are fixed, being made with square heads or bases, which fit into corresponding recesses in the fork-ends. The pin is an ordinary straight one, but rather smaller than usual; it passes through both cones, and is fastened on the outside with lock-nuts. To adjust the bearings the cones are drawn together by tightening the pin; they can never fasten, as being a fixture to the fork, it is impossible for them to twist.



(Elevation.)



(Section.)

THE CLUB DUST-PROOF CONES.

With the **Club Dust-proof Cones** the only difference, as far as the cones are concerned, is that they are longer and more tapering. The chief feature of the bearing is the excellent arrangement adopted for the exclusion of dust. The hub is somewhat deeply recessed to receive washers, or more properly, collars, which fit on

each end of the pin just behind the cones. These collars are provided with grooved edges, so that all dust before entering the bearing has to work up the sides of the collars, then into the grooves, and up again on the other sides. This plan in itself is almost sufficient to preserve the bearings effectually from dust, but in order to make more certain of it, felt washers, an eighth of an inch in thickness, are placed on each side of the collars, completely filling up the recesses in the hubs.

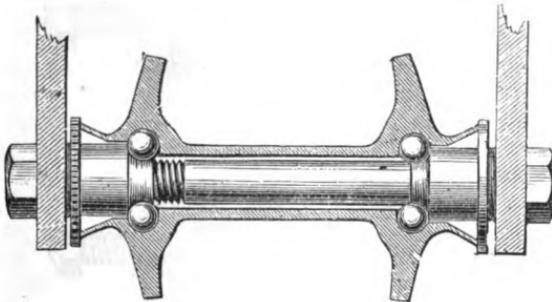
Roller bearings are now never used for back wheels, though at one time there were several varieties on the market. With ball bearings, however, the case is different, there being several varieties—differing, however, but very little from each other—this class of bearing bidding fair to become the universal bearing for the back wheel.

Bown's Back-wheel Balls are contained in the hub of the wheel, the case or interior of the hub being flatly coned, and a cone also being provided upon the back-wheel pin by which they are adjusted as with ordinary double cones. The annexed illustrations fully illustrate their construction and mode of adjustment.



BOWN'S BACK-WHEEL BEARINGS.

Rudge's Unequalled Back-wheel Balls are much the same in construction as his front bearings. The hub of the rear wheel is



RUDGE'S BACK-WHEEL BALLS.

recessed and hollowed out on each side, and in the grooves thus formed two sets of balls are placed. The wheel pin goes through these and is provided with hardened steel, slightly hollowed cones, by tightening up which the balls are adjusted. They run with great freedom, and are much used upon racing machines.

The **Stanley Back-wheel Balls** are practically the same in principle, but the cones are made loose, sliding upon a flat-sided

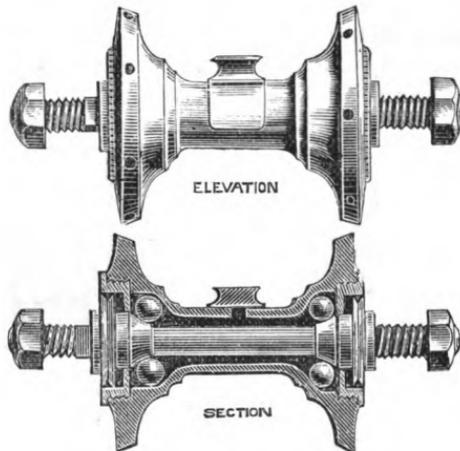
centre pin, and are adjusted by outer caps screwing up outside on the pin, much in the same manner as with those for the front wheel by the same firm. The balls are placed in boxes at the fork-ends, thus getting them further apart, and securing greater steadiness.

Whitehouse's Back-wheel Balls are contained some distance within the body of the hub, and at first sight one is apt to wonder how they came there, as the groove in the case encircles fully three parts of their circumferences. The mystery is, however, explained by the fact that they are first inserted in the grooved hub, and outer caps afterwards neatly fitted and screwed on. They are adjusted by cones upon the centre pin in the usual way.

In **Carver's Back-wheel Balls** a double row of very small balls is used, separated from each other by an alternately perforated collar, as in Humber's front-wheel bearings.

The **Atalanta Ball Bearing** has the cones, both upon the fork-ends and in the hub, hollow or "female," the balls being placed in the recess thus formed and adjusted by screwing the outer cone up as required, a very effective dust cap being at the same time brought into a groove round the hub face, thus effectually keeping out the dust.

The **Club Back-wheel Balls** here illustrated are also very neat and effective; the balls are placed in deep grooves or channels within the hubs, and the pin provided with very slight conical surfaces, which push them up for adjustment. The ball channels are of steel,



THE CLUB DUST-PROOF BACK-WHEEL BALLS

and project, thus leaving a chamber between the entrance to the ball grooves and the exterior of the hub, so that if any dirt gets in, it does not find its way to the bearings, but lodges in the recess, although the dust caps or covers pretty safely prevent the chance of any getting in.

Pick's Durable Ball Bearing for the back wheel is rather peculiar, the hub being very bulbous, and on the inside a cone is placed on each end of the pin, with the base inwards, the action of screwing up the outer nuts drawing these cones outwards, and so adjusting the balls.

Having dealt with the bearings as applied to the wheels, we find ourselves *vis-à-vis* with another portion of the machine on which bearings of some kind are a necessity—I refer to the crank ends and lower chain wheels of the newly-introduced and now popular “safeties,” or, more properly, geared-up dwarf bicycles. In the majority of these machines two chains are utilised, as before described, one on each side the driving wheel, and the crank and chain wheels on each side, being independent of each other, the bearings have to withstand a very different strain to that in other parts of the machine, for the strain of the thrust is all on one side of the bearing, without any counteracting strain, and as a consequence some very especial provision is requisite to overcome the mechanical difficulties of this class of bearing. In nearly all machines of this class the bearings are of the ball variety, but very variously arranged. The essential feature is width, and, consequently, a single line of balls is absolutely useless, although such a bearing is fitted on one or two of the “cheap” makes. The strain of ordinary use would pull such a bearing to pieces in a very few weeks, and the double ball variety, as used for ordinary bicycles, are not much better unless the two rows of balls are placed fully $1\frac{1}{2}$ in. apart and otherwise strengthened. Undoubtedly the best class of bearing for this particular purpose is that form of double ball bearing in which two sets of single balls are attached to the ends of a fork, and so a bearing line placed on each side the chain wheel. The several varieties of crank-wheel bearings are as follow:—

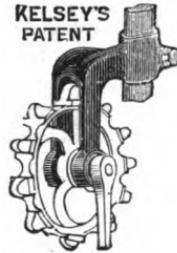
Bown's Single Ball Bearings are used in the same manner by some firms, but the arrangement is by no means satisfactory; it is out of all reason to imagine that a single line of ball bearings will stand the twist and side-play necessitated by the continuous heavy thrust of the crank from one side only, and machines fitted with these bearings are bound to give way sooner or later. The double ball, as above described, gives a longer and much firmer bearing. The “Speedycycle” and several other machines use simply a set of Bown's double ball bearings, having the chain wheel on one side and the crank on the other.

Rudge's Double Ball Bearings are used on many machines. They are similar to Bown's, and are identical with their single ball bearings described for front wheels, with the sole difference that there are two lines of balls in place of one, thus giving a wider and steadier bearing.

The Kangaroo Bearings.—These are simply double ball bearings of the usual type, the two lines of balls, however, being placed

1½ in. apart, so as to give steadiness and length to the bearing. They are adjustable by nuts at the side, and are a rigid attachment to the fork, the adjustment of the chain being taken, as previously described, by the upper bearing, so that there is little chance of side-play in the fork attachments.

Kelsey's Patent Duplex Bearing is a double one, being contained in a fork which runs down each side of the lower chain wheel. This gives an equal support upon each side, and is certainly the



KELSEY'S PATENT DUPLEX BEARING.

most effectual form of crank wheel bearing for the geared-up bicycle in the market. It is well made, strong, light and neat, and fulfils the requirements of the situation in the fullest possible manner.

The Challenge Crank-wheel Bearings.—These are double, consisting of two sets of ball bearings with side adjustment somewhat similar to Rudge's. They are placed one on each side the chain wheel and are held in a fork attached to the split clip previously described. Thus the crank is on one side and the chain wheel equally supported between a pair of bearings.

The **Ajax Crank Bearing** is, like Singer's, a double one, but it has this difference, that whilst the two bearings form a fork with the attachment to the fork proper, and are placed an inch and a half apart, the chain wheel is not placed between them, but on one side, the crank being on the other; thus the two bearings are between the wheel and crank. The bearings themselves are of the ordinary Humber-pattern variety, with top and bottom pieces adjusted by nuts and bolts.

Edge's Combination Chain Wheel and Crank.—Although I am describing this in connection with the bearings, it combines the wheel, crank, and bearing in one, so that the peculiarity does not exist in the bearing alone. As will be seen by the illustration, the fork end, or rather the bearing holder, is curved inwards, and the chain wheel and crank are made in one piece. This works upon a double coned pin, between which balls can be fitted if required, converting it into a double ball bearing. The pin passes through the end of the fork attachment, and the whole is then secured by a nut upon the outer end. Crank and chain wheel being in one, the whole arrangement is rendered stiff and firm, and a bearing is obtained

entirely from end to end, and friction, or rather strain, [certainly minimised to a very great extent.



EDGE'S COMBINATION CHAIN WHEEL AND CRANK.

All these bearings are used upon machines in which the front wheel is driven by chains; in some makes, however, the front wheel is the steerer and the rear wheel the one driven; in this case the cranks and chain wheel are placed between the two wheels and immediately beneath the rider. The bearings and gearing in this case are arranged as on most central-gear'd tricycles, and are what I shall term

Forked Bearings, consisting of two sets of Bown's, Rudge's, or Humber-pattern ball bearings, fitted at the extremities of the legs of a short fork attached to an adjusting clip sliding on the frame. The fork is just large enough to admit the chain wheel, which is placed either centrally or close to one side, so as to clear the wheel; the cranks are both placed in this case on the axle of the chain wheel, thus giving equal thrust to each side of the bearing. This class of bearing is certainly much steadier and more likely to last than either of the others, though it necessitates the use of a machine of a totally different type.

The wheels described, and the rather lengthy category of bearings gone through, we come to the second part of a machine, viz.,

THE FRAMEWORK.

This consists in the main of three parts—forks, backbone, and steering-gear, with numerous accessories and varieties.

FORKS (front).—These are the uprights on each side of the wheel which support the front end of the backbone, and by which the wheel is turned. In some few of the cheaper makes these are of solid iron, tapered from top to bottom and from the centres to the edges, but this class of fork is now almost obsolete and is never fitted to machines of any standing whatever, the universal fork being

The Hollow Fork, which was first introduced by J. C. Garrod (now in America), and has since become "the fork of the day," being almost universally adopted by all makers of any pretension through-

out the country. They are constructed of steel tubes, first tapered and then flattened; in many makes the edges are rounded—and in my opinion these are the strongest—but most makers now bring them to quite a fine edge, which, of course, makes them much neater in appearance. Their advantages over solid forks are that



HOLLOW FORK.

they are lighter and far more rigid, *i.e.*, that they do not give and bend so much when any strain is put upon them, consequently the bearings are not so liable to be crossed upon the axle, and hill work is rendered easier; also being hollow, they are quite in accordance with the well-known mechanical fact, that hollow metal, under certain conditions, is stronger than the same area of solid. Their modifications have now become very numerous, the principal of which are as follows:—

The **Diamond Fork** is of a hollow sided diamond section, wide in the centre and gradually hollowing to the edges, which are very slightly rounded.



THE SUPPORTED FORK.

The **Supported Fork** is identical with that in general use, but a flat piece of sheet steel is first fitted, and driven in centrally across the tube, and afterwards brazed in to make all secure. By this means the sides are supported, and prevented in some measure from bulging or becoming indented by a forcible blow.

The **Stanley Section** is that of a complete circle, the legs of the fork being formed of tapered tubes. This section is theoretically the most perfect on all points, and has been often tried, but so clumsy in appearance have the results proved, that they have not been adopted as a pattern until Messrs. Hydes and Wigfull succeeded in making a very neat attachment of them to a genuine "Stanley" head. In actual practice they fully agree with theory, being by far the stiffest forks I have yet come across.

The **D.H.F. or Double Hollow Fork** consists of two small round taper steel tubes united at the smaller ends by brazing, and gradually departing from each other until they reach the felloe of the wheel, where they are some inch or so apart; they then close slightly in again for another six inches, until they reach the handles, where they are finished off and fastened. Light, neat, and strong, it is difficult to imagine anything which could be possibly more rigid,

especially in a back and forward motion. In consequence of this and their great success, many imitations have of course sprung up, some bidding fair to rival their copy, the chief of these being

Fluted Forks, which consist of steel tubes, first slightly flattened,



FLUTED HOLLOW FORK.

and then indented centrally more or less on each side, thus presenting the appearance of two tubes united by a double web of steel.

The **Norwood Fork Section** may be termed a semi-fluted one. In external appearance it resembles an ordinary elliptical hollow fork, but the inner side has a depression, or fluting, extending centrally from top to bottom, to give strength.

With the forks of safeties several differences are noticeable, the divergencies being caused either by the object to be attained or by the peculiarity of the machine in other ways. The ordinary safety fork consists of a fork of the usual hollow oval variety, with little or no rake, the resemblance to the fork of an ordinary bicycle being retained until the bearings of the driving wheel are reached. when the forks are continued downwards below the bearing, either keeping the same shape or becoming round or quadrilateral in section, the bearings of the lower chain wheels and cranks fitting behind the fork ends. In some makes, in place of passing through the bearings directly, the forks pass down some $1\frac{1}{2}$ in. to 2 in. behind them, and are connected by a pair of projecting brackets. Speaking generally, the farther the fork is behind the bearing, or the greater the rake it possesses, the greater is the safety of the machine; and, on the other hand, the more nearly direct through the bearings it passes, the less rake, and the more upright the fork is the easier and steadier is the steering, at, of course, a proportionate loss of safety. Of the several varieties in this class of fork deserving of special mention I may note the following:—

The **Kangaroo Forks** consist of two round tubes, one on each side the wheel, converging together at the top to form a head of the open centre variety. They pass some 3 in. behind the bearings, which are attached to brackets adjustable up and down them, and terminate in the "Kangaroo" crank-wheel bearings previously described, and which are firmly attached to the fork-ends and not adjustable or movable up and down them, the chain adjustment being done by the upper bearings. In another variety of this fork a "Stanley" head is combined with the round forks, making a neater and somewhat lighter head.

The **Facile Forks** are of the ordinary type, but after leaving the bearings they curve forwards in nearly a quarter circle and carry at their ends bearing pins forming the fulcra of the "Facile" levers before described.

The **Challenge Safety Forks** are just the reverse. Instead of passing through the bearings, they are attached by brackets some 5in. or 6in. long, this giving immense safety by placing the back of the machine well to the rear. The forks, from their junction with the brackets, depart at an angle backwards, thus bringing the pedals almost directly beneath the rider, and rendering safety from headers still more certain.

The **'X'traordinary Forks** are identical with those on the ordinary bicycle, save that they have a very great rake—some 7in. to 9in.—and at their juncture with the head take such a bend as to place the steering centres, instead of in line with the forks, in a direct line with the point of contact of the driving wheel with the ground, this arrangement giving the maximum of rake (really placing the rider below the top of the wheel), and at the same time, by constructing a theoretical hinge from handles to ground, rendering the steering effective and easy.

The **Ajax Forks** are of a very broad section, elliptical in shape, and extend from handle-bar to crank bearings, passing through the bearings. They run right up to the handles and form an open head. They are very little tapered and are exceedingly stiff.

Leek's Patent Adjustable Forks are worked by Bayliss, Thomas & Co. and Starley Bros. In these the fork sides are terminated at the bearings, as in an ordinary bicycle. In place, however, of continuing downwards solidly, the continuations are separate pieces, and are fitted so as to swivel on the bearing pin of the driving wheel. The upper portions of the forks are provided with circular discs in which quadrant slots are cut. Nuts and bolts secure the upper ends of the fork continuations—which are carried some 1½ in. above their attachment to the bearings—to the discs, and they can be moved to any point within range of the slots. As the fork continuations and upper chain wheels have the same centres, it will be seen that they can be moved to any extent without affecting the tension of the chains. The gain by this invention is that, by slackening the nuts, the fork ends may be moved circularly backwards and upwards in such a manner as to decrease the distance between pedals and saddle, and thus the same machine may be readily adjusted to suit the varying length of leg of different riders, whilst, as the two sides of the fork may be moved independently, a nice adjustment can be made to suit the wants of those persons—and there are a few—who have one leg shorter than the other.

Hall's Patent Spring Attachment, or rather, connection between the forks and the bearings, may well be spoken of here. In it a short collar encircles the steering head, and from this collar a pair of secondary forks descend on the outside of the forks proper. These secondary forks serve to keep the proper ones upright and prevent side motion. The bearings are contained in a box

attached to the secondary fork, whilst the forks themselves rest upon spring and rubber buffers, or plungers, between which the bearings are situated. This takes the jar off the forks and frame to a surprising degree, and when lightly made and fitted to a special machine, should prove of very considerable benefit, especially with the small-wheeled safety class of bicycle.

The **Matchless Rubber Cushions** are designed to serve the same end, but do not do so so effectively, though they are lighter and neater than the last. The arrangement consists in fitting the bearing within an encircling ring or packing of rubber, enclosed in holders at the fork ends, the rubber being screwed up very tight to prevent any side-play of a detrimental nature. Oil-holes are provided carrying the lubricant into the bearings without its coming in contact with the rubber.

Back Forks are similar in construction to those of the front wheel. Instead of being upright and straight, they are more or less curved, and are set at an angle of from 15° to 45° with the perpendicular, according to the tastes of the manufacturer. Their office is, of course, to unite the back wheel with the backbone. They are chiefly made solid, but many are made hollow, the ordinary elliptical, semi-circular and fluted sections being represented.

The **Semi-tubular Back Fork** is constructed out of flat sheet-steel. This is first cut out by a stamp to the proper shape, and then with suitable dies pressed into shape, the upper end fitting inside the backbone end, and the sides forming wide, graceful semi-tubes, gradually tapering downwards and ending in neat curls of flat steel. In some varieties an indentation is run down the centre of the fork sides, thus causing it to partake somewhat of the fluted variety, whilst in another pattern the fork is made with an angle down the centre in place of the sides being curved. It is a neat, light, and withal strong pattern. Although there are comparatively few very especial patterns of the back fork in ordinary, there are several very curious arrangements and alterations of this portion of the machine, having as their object the lessening of vibration and jolting which, being transmitted to the spine of the rider, induces fatigue and lassitude.

Hall's Back-wheel Spring Bearings are similar in principle to those for the front wheel, but the secondary fork is dispensed with, the fork sides terminating in short prongs passing down—one above and the other below—the back wheel pin, and enclosed in rubber-packed cases attached to the pin.

The **Matchless Back-wheel Rubber Cushion** is, as its name denotes, a rubber cushion; the back forks end in rather large boxes, having slots in an upward direction. The wheel pin passes through these, and is embedded in the rubber, thus allowing of no "metallic connection." The slots keep it steady, and allow of a little more freedom than attainable by the simple use of rubber alone. They certainly do lessen vibration on very rough roads.

Porter's Wheel Cushions are somewhat similar in principle. Upon the ends of the fork a long vertical slot is made in metal attached for the purpose. The back-wheel pin slides in this, and is provided with a rubber buffer both above and below, the play being perfectly vertical. Through the front forks the power is transmitted from the handles to the axle of the driving wheel, for the purpose of guiding the machine, and therefore at the top of these is situated

THE STEERING GEAR,

which, like many parts of the framework, differs more or less with nearly every maker. The present season sees also the introduction, with some forms of the now numerous "Safety" bicycles, of a style of steering gear which is quite distinct, and which is in fact a combination of the steering gear proper with the forks and other additional parts. Of the regular type,

The **Ariel or Open Centre** plan derives its first name from the machine to which it was originally applied, and its second from the principle on which it works. In ordinary, the forks, instead of being united immediately above the wheel, are continued upwards in a straight line to the handles; at the place of their former union they are connected by a bar or bridge of iron, sometimes screwed to the sides of the fork, but more often now brazed to them; above this bridge the forks are again connected by another bridge in which there exists great diversity, scarcely two makers fitting it in the same manner; sometimes the handle-bar itself forms the bridge, the forks being screwed or brazed to it, but more often it is flat and projects in front, carrying suitable lugs for the reception of the handle-bar. When hollow forks are used with this kind of head, as is now invariably the case, these bridges are fitted to encircle the forks, and so avoid making a hole in the hollow metal, which would tend to weaken it. On the lower bridge, at its central point, is either a concave cone or raised centre (or point), and in the centre of the upper one a worm is cut, through which a set-screw works, carrying either a centre or inverted cone at its end; between these the backbone is held, the "spindle" of which consists of a straight pin, having a raised or depressed centre at either end, as the case may be. By means of the set-screw the steering may be tightened or slackened at will, and the whole secured by the use of a lock-nut on the top of the upper bridge. Much diversity of opinion exists as to whether the lower centre should be on the bridge or on the spindle of the backbone; both have their good and bad points, the chief of which are that, by having it on the bridge, *i.e.*, raised, no grit or dust can get in, and so soak up the oil and wear the centre away; in opposition to this, by having it on the spindle—which I think the better plan—the centres are kept better oiled, as the oil is contained in the concavity, and a greater distance obtained between the centres, by which means greater strength and rigidity are gained, consequently less wear. Regarding the upper centre, by having it on the spindle

itself, great rigidity is obtained, and the dust cannot get in ; but the oil is retained better by having it on the set-screw pointing downwards. Still, as all the weight rests on the bottom centre, it is that one which most requires constant lubrication. The advantages possessed by this principle are that, working on centres, very little friction is caused, and what there is can easily be compensated for by simply adjusting the set-screw. It never fastens or sets, very little oil is required, and that does not work out and so soil the clothes of the rider, unless he sits very close to the handles and too much of the lubricant is added.

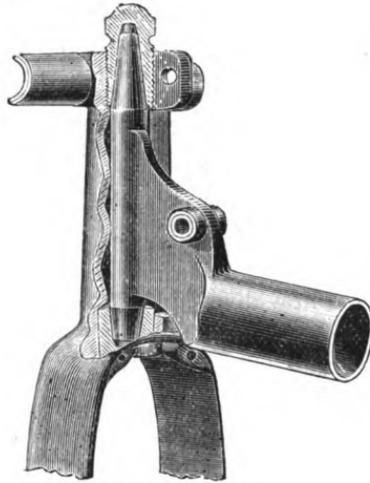
The Stanley, or Closed Centre Head, in its various forms, is by far the neatest in use, and is now the general favourite. Like all other good things, it has its imitations, improvements, and alterations—good, bad, and indifferent—and not being, in its general form, patented, is now used by most makers of any pretension. In reality, it is a combination of the best points of other classes, having the neat appearance of the now-disused socket steering, and at the same time working on the centre principle, consequently possessing its advantages. In its original and simple form as it exists on the "Stanley"—the makers of which machine first introduced it—it is constructed as follows:—The forks unite above the wheel as in the first described plan, and proceed upwards cylindrically for about 6in., tapering slightly from about $1\frac{1}{2}$ in. at its base to $1\frac{1}{4}$ in. at the top, where the handles are fixed in a line with the forks. This, in outward appearance, much resembles the old socket. In the back part of the "barrel" a slot is cut, and the interior hollowed out ; into this the spindle of the backbone is placed, and is adjusted by means of the set-screw and nut as before described. To secure the full amount of steerage the neck is flattened out vertically to some $\frac{1}{2}$ in. thickness, and, to keep the requisite strength, is made some 2in. to 3in. deep ; this enables the wheel to be turned with equal facility with the open-fronted or ordinary centre-steering gear, besides adding greatly to its appearance. This kind of steering is, perhaps, scarcely so strong as the open front, especially in some of the cheap makes. There are several modifications of this plan, the principal of which are—

The Humber Head, which is extremely neat, and is that now most generally adopted, so far as outward appearance goes. The cylindrical portion is some 4in. in length, and is surmounted by an oblong top with lugs projecting in front, through which the handles pass, which are thereby kept in an excellent position.

The Open Stanley Head is almost exactly similar to the "Humber," perhaps a little wider ; the slot for the reception of the backbone spindle is cut through, leaving the front open and showing the spindle. A few ounces are gained in weight by this means, but it possesses no other advantage, and is neither so strong nor so neat as the preceding one. It is but rarely used.

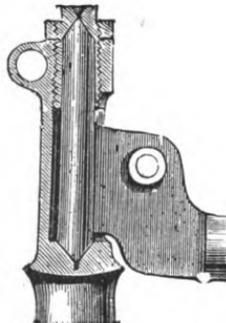
D

Jeffery's Head is also an American invention, and differs in several points from the ordinary. In the first place, the centres are long cones in place of centres proper, the bed in the bottom of the head and the set-screw at the top both fitting upon them from top to bottom of the cone. This gives a greater lateral bearing surface



JEFFERY'S HEAD.

to resist the tendency which most necks have to wear oval, and thus be loose at one point and tight in another. Another peculiar feature in the head is that it is split up from above the opening to the top, and provided with a couple of side lugs or wings, through which a bolt passes tightening the whole together, and thus preventing the set-screw from loosening, and, in other words, taking the place of the usual lock-nut. The centres extend right to the top of the set-screw and well above the handle-bar.

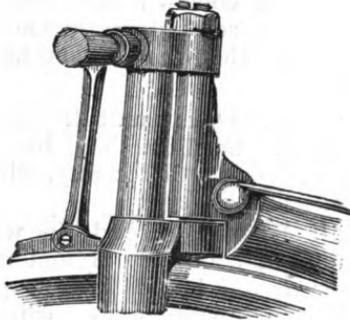


ANDREWS'S OR HILLMAN'S PATENT HEAD.

Andrews's or Hillman's Head has but an alteration in the

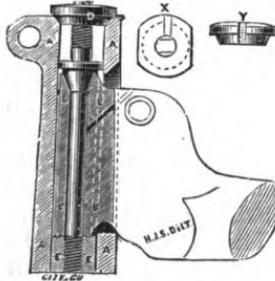
set-screw, which is hollowed out to nearly the top. The centres are both upon the spindle, and placed $4\frac{1}{2}$ in. apart, so that by this means, with a low handle and head, long centres can be used, thus giving, of course, increased steadiness and less liability to get loose and shaky.

The **Expert Columbia Head** is exteriorly an ordinary Humber-Stanley one, the only difference in its construction being that the centres and their corresponding cups and pins are, in place of being pointed, hemispherical.



THE AMERICAN HEAD.

The **American Head** is constructed on the principle of the hinge, a couple of lugs being carried out backwards top and bottom of the head, and the steering centres socketed thereto, being adjustable for wear with a lock-nut and set-screw at the top.



SWINDLEY'S PATENT CENTRAL PIN STEERING.

Swindley's Patent Central Pin Steering is externally one of the most approved "Humber" type; instead, however, of the neck ending in the usual centres, it is provided with a short shaft fitting the interior of the head. This shaft is flat, both upon the top and at the bottom, and through it is drilled a hole vertically; through this hole a pin passes, fitting in a centre at the bottom. The shaft takes a vertical bearing upon this pin, thus somewhat resembling the socket principle, and fitting flat upon the bottom of the head; a coned screw is brought down into the top to adjust for wear, and

take out all horizontal shake. From a lengthy use of it I can vouch for its being good, rigid, and easy in steering.

The **Cyclos Head**, like the last, brings some of the principle of the old socket into play, but it is a very different affair, and more nearly resembles the socket proper. The forks terminate, not in the usual barrel of the "Stanley" head, but in a long, solid pin, conical both at bottom and top, the latter going off into a point, or nearly so. The neck is long and deep, and is fitted with projecting lugs both at top and bottom, forming collars, which encircle the aforesaid pin at its coned parts, said collars being coned to correspond. A nut and lock-nut at the top, secured on the end of the central pin, serve to tighten and secure the whole. The handles are fitted as I shall presently describe.

Although for two or three years past ball bearings have occasionally been fitted to steering heads, nothing like a regular move has been made towards their use until recently, when several varieties have been introduced. These are

The **Stanley Ball Bearing Head**, in which the forks are surmounted by an upright solid pin, around the base of which a groove runs. In this groove a line of balls is placed, and the neck of the backbone ends in a large collar, which fits on over the pin and rests upon the balls, having a corresponding groove cut on its lower surface. A groove is also cut on its upper surface and balls placed therein, these being held in place by the top of the head and lug carrying the handle-bar, which are in one piece and fit over the top of the central pin, bearing upon the top row of balls and being kept adjusted by a couple of lock-nuts on the top of the head.

The **Speedwell Head** is shorter, and the handles set lower than in the last. The forks are, like the last, surmounted by an upright central pin, but around the lower half of this a deep cup is formed. The lower line of balls is placed in a groove in the lower part of this, and the collar in connection with the neck placed thereon with a second line of balls at the top. Here we find another difference: a flat cap overlaps the before-mentioned cup, and screws down upon it to adjust the balls. The top of the head and handle-lug fits on the top of this, and the whole is secured with a lock-nut on the top of the head. Like the last, it is made well and neatly.

Trigwell's Ball Bearing Head is exteriorly the counterpart of a well-proportioned "Humber," but the central pin, in place of working on centres, works on two lines of balls—top and bottom. It has been in extensive use, and proved itself a thorough success.

Smallwood's Ball Bearing Head brings two balls only into play. An ordinary "Stanley" head is used, but the centres of the spindle are replaced by small cups which, with similar ones on the set-screw and base-screw, hold a steel ball between them, these balls taking nearly the whole of the wear, and causing a very easy and

free adjustment, preventing the centres wearing oval, and saving the oil.

Before leaving the subject of heads, I may mention that nearly all the best machines now made are provided with neatly-fitting plates completely covering the opening of the "Stanley" head, and so effectively excluding dust and at the same time preventing the egress of the superfluous oil, which might soil the knickerbockers.

These are the principal types, each of which has numerous modifications; but, as the difference between them is very slight, it is not worth while describing them. Before describing the combination steering gear, I will proceed to treat of

HANDLE-BARS, in which very little difference exists. They consist of a bar of iron or steel, some 26in. and upwards in length, secured to the head piece in the manner described with that part of the machine. All are now fixed, *i.e.*, they do not revolve. In some heads the handles are made separate, in others they are brazed to it; but although by this latter means they are superlatively firm, they are rather awkward to straighten when bent.

Most handles are solid; but they are frequently made of hollow weldless steel tubing, by which a few ounces in weight is saved and the handle rendered stiffer. They should for common use in out-of-the-way parts of the country be made solid, as they are the parts most commonly bent in a fall, and a tube is rather a difficult matter to straighten, in most cases a new one being requisite.

Dropped Handles are simply long handle-bars, bent down from 1in. to 3in., either close to the head or at their ends—most usually at the latter place—their object being to place the handle very low and allow of better purchase for the arms, without, at the same time, either shortening the steering head and centres, or placing the handle-bar in the way of the legs.

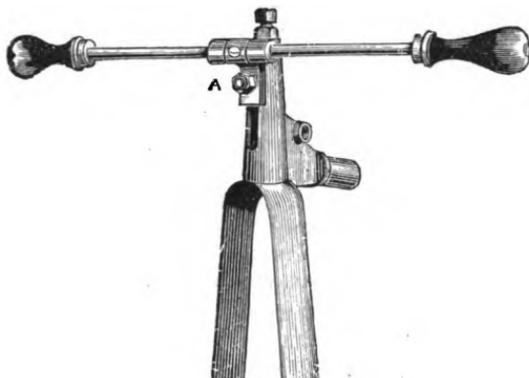
Cowhorn Handles have the same object in view, and are generally adopted with low heads, or to allow a rider to use a smaller machine than his full stretch. The handle-bars in this variety take a bend upwards from the head and sweep gracefully down on the outside to the handles, very much resembling the appearance of a buffalo's horns. A few specialities in handle-bars and brackets deserve notice.

The **Centaur Detachable Bracket** is simply and accurately fitted to the top of the upper bridge, and secured by means of the lock-nut. It can be taken off in a minute, and the handle straightened if bent. It is very clearly shown in the annexed illustration.



THE CENTAUR DETACHABLE BRACKET.

The **Royal Mail Adjustable Handle** is a plan to allow the handle to be adjusted two or three inches upwards or downwards, and, as will be seen by the illustration, is fitted to a "Stanley" head. The face of this latter is long and straight, with a slot cut from the top to about half-way down. The handle-bar is separate, and is affixed to a neat plate, fitting and sliding up and down the front of the head. This plate has a hole at its centre, through which a bolt



ROYAL MAIL ADJUSTABLE HANDLE.

passes, provided with a flat head placed inside the head of the machine; its outer end is fitted with a nut, by slackening which the handle is loosened from the head, and may be adjusted to any height within length of the slot, and made all secure by tightening the nut once more.

The Kangaroo Adjustable Handles.—These are exceedingly simple. The "Stanley" head is continued upwards above the opening in the neck in a straight barrel for an inch and a half or two inches higher than usual. The handle-bar is attached to a round socket fitting over this upper portion of the head. Held in place by a tightening nut, it may be raised or lowered upon the head to quite sufficient a degree as to give all the adjustment necessary in a handle-bar.

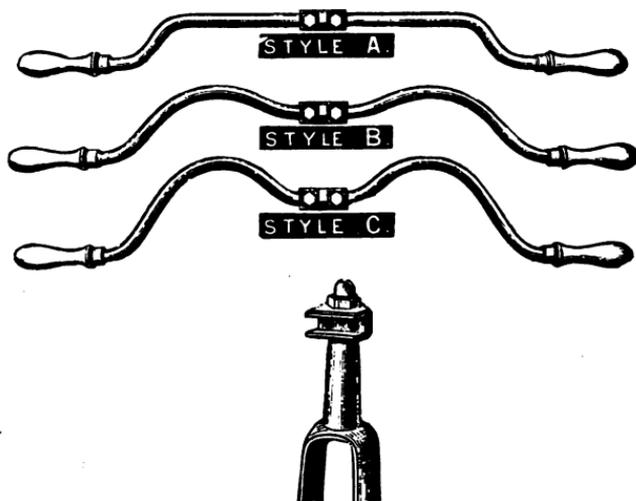
Bown's Swivelling Handles.—In these the upper portion of the head is made conical; the handle-lug fits over this, and is forced down by the lock-nut on the top of the head. A loop spring passes round the front and carries a pin which drops through a depending portion of the handle-lug, and into a socket in the front of the head. By slackening the lock-nut on the top and drawing the pin out of its socket, the handle-bar attachment is rendered loose, and the bar may be swivelled round in line with the machine.

The National Swivelling Handles.—The handle-bar in this variety is fitted loosely on a circular-topped head-stock, and a thumb screw and centre pin working in the front part drops into a hole in the head-stock, and keeps them in position. By slackening the

thumb screw the centre pin is released, and the handles may be turned round at right angles to their usual position, for ease of stowage.

The **Cyclos Swivelling Handle** swivels in line with the machine on slackening a nut. It passes through a lug attached to a cylinder fitting round the top of the central pin of the "Cyclos" head previously described, and is simple and strong.

Andrews's Sanspareil Handle-bar.—In this, as will be seen by the sketch, the handle-lug forms a grooved channel in front of the head. The handle-bar is made in three or four portions, and as each is made separately, they can be curved to an exact similarity. A solid centre-piece is brazed between the two ends and fits accurately the groove in the lug on the head. This centre-piece, as well



ANDREWS'S SANSPAREIL HANDLE-BAR.

as the lug, is pierced with a couple of holes, one just on each side the barrel of the head. Bolts are passed through these and secured with nuts, thus making the whole bar solid and firm. By removing these nuts and knocking out the pins the handle-bar can instantly be removed, and either a new style substituted, or a new bar in case of accident. The whole arrangement is simple and neat.

Palmer's New Rapid Detachable Handle-bar.—In this the handle-lug of the head is made to form a square-edged trough, and is provided with two pairs of lugs pierced with holes. The handle-bar is made in one continuous tube, the centre portion being pressed by a die into a shape which enables it to exactly fit the channel in the head. When tapped home by a few light touches of a hammer, a couple of cotters, or cross-pins, are dropped through the lugs and secured by lock-nuts on their lower ends. The advantage of this is,

that a few seconds only suffices to remove and replace the handle-bar, should it get bent or broken; the bar being in one continuous tube is firmer and stronger, there being no brazing or uniting in any way to be done. Bars of different shapes or lengths can thus be kept in stock by agents and fitted at once to suit the tastes of customers, for, as all are made to gauge, any bar will fit any head.

The Badger Detachable Handle-bar.—In this the head is made with the usual lug in front, but this lug is cut in half horizontally, so that it forms a long groove in which the handle-bar may rest. The head is cut off flush with this, but the centre pin is long and projects some $1\frac{1}{2}$ in. above the top. A piece of metal, corresponding in shape with what would be the upper half of the lug and the top of the head, is brazed to the handle-bar, and by placing the bar, with this attachment, on the top of the head, and fixing with the usual lock-nut on the top of the centre pin, the whole forms, what appears at first sight to be, a neat Humber-Stanley head of the usual type.

The Challenge Detachable Handle-bar is practically a revival of an old form introduced with the original "Challenge" so far back as 1876, but, of course, modified in manufacture to later ideas. The head is provided with side wings, or lugs, in place of the usual projecting one in front. These are each pierced with a hole, coned from front to back, and through these holes stout coned pins are passed, their front ends being provided with bosses, and their rear ends with a worm and nut. The bosses on the pins are pierced to hold the handle-bar which passes through them, and to which, when in position, the pins are brazed, thus making them permanent attachments to the handle-bar. By removing the nuts before mentioned it will be seen that the handle-bar, with its attachments, can be taken off or put on in a few minutes by the veriest amateur.

The Ajax Handle-bar.—In this the handle-bar is very long and of the most approved cowhorn shape, or, for the matter of that, to any shape desired. The front of the head is fitted with a lug much in the usual way, but in place of being pierced and the handle-bar passed through it, the bar is made in two pieces and the ends of the lug slotted. In these the handle-bars are pivoted, and when straight their ends meet in the centre. A conical hole is cut into the two ends, and a coned pin, with thumb-pieces or wings at top, and screwed end passes down and into a socket in the lug below, thus holding all firm. By removing this pin the handles are freed, and by pressing on the ends the two sides—or either of them—may be depressed so as to drop down in line with the forks, thus greatly economising space in narrow places, a consideration where a safety or other bicycle is used in preference to a tricycle, solely on account of limited accommodation. It is strong and rigid when in position and the pin screwed in.

Starley's Folding Handle-bar is likewise made in two halves. Each half ends in a broad circular disc, and a similar disc is fitted

to the front of the head. The two discs of the handle-bar halves are placed against this, and the whole secured by a bolt passing through the centre. The two handle discs have a quadrant slot cut upon them, and through these a bolt projecting from the upper portion of the head passes. By slackening the nut upon this bolt, either or both handles may be dropped down parallel by the fork sides at will, and being raised into position again, the tightening of the nut will keep them firm. This is an exceedingly simple arrangement, and also possesses an advantage which no other folding handle does, viz., that not only may they be folded down at the sides, but checked at any point between this and the horizontal, thus giving an adjustable handle for height at the same time.

The **Club Detachable Handle-bar**, like the last, is made in two pieces. Each end of the bar fits into an end of the usual lug in front of the head, and when in, a cross-pin or cotter passes through the lug and into a groove cut in the end of the bar, thus holding it firm, much in the same way as is done with the detachable crank and axle, the pin being secured with a nut when in. This is an excessively neat and light plan, and either half the bar may be quickly removed at will.



SINGER'S PATENT DETACHABLE HANDLE-BAR.

Singer's Patent Detachable Handle-bar, shown in the above sketch, is an improvement as much in a manufacturing point of view as in any other sense. With ordinary dropped handles, which are made in one piece, it is found necessary to bend them after they are fixed to the head, which is both awkward and tedious, besides the difficulty of getting both ends curved equally. As will be seen, this handle is bent in two parts, the longer of which can be fitted to the handle-lugs in the usual way, when the other, which is made to fit over it, can be put on and held fast by the cross pin shown in the illustration. By this method dropped handles can be kept in stock and fitted to any machine without delay or trouble.

Starley's Patent Universally Adjustable Handles have, as their speciality, complete adjustment, although a fixture to the head. The first eight inches on each side of the head is tubular, the ends being adjustable to grip tightly smaller solid six-inch rods, which fit within the tubes. This allows of a complete adjustment in length from 20in. upwards, whilst the solid ends are provided with screw clip sockets to hold the handles themselves, these being fitted on short rods bent at right angles to themselves. The handles may thus be raised or lowered three or four inches, as well as set at any

angle either forwards or backwards, or in any horizontal position to suit the natural fall of the hands upon them. They carry out most completely the idea of adjustability, and are of real practical utility.

The Badger Adjustable Handle.—This is somewhat similar to Starley's, but has not the extent of adjustability. The handle is fitted with a grip or jaw at one end, which fits over the extremity of the handle-bar, thus placing the handle at right angles to the bar. By loosening the grip the set of the handle can be altered at will, thus making it either perfectly level, or at any angle requisite, and it may be placed either in front or behind the bar.

The Rucker Adjustable Handle is somewhat similar, a straight bar being provided with a bent end carrying the handle, which can thus be placed at any point, either up or down, before or behind the head, as desired.

The Lillibridge Safety Handle-bar is an American invention intended to prevent headers, or, as they are known in this country, croppers. The handle-bar is attached to a peculiarly shaped lug in the front of the head, and is held in position by a couple of catches, one on each side. These catches are worked by levers running along the front of the handle-bar. It is well known that the reason a man falls on his head when having a cropper is that the handle-bars catch the thighs, and, acting as a lever, draw them back and force the head forward. This is the natural result of the fall of the body forward of the wheel. With the safety handle-bar, however, the thighs strike against the before-mentioned levers. These, on being pressed, release the catches holding the handle-bar to the head, and that portion of the machine is instantly free and comes off, the rider, as a rule, alighting on his feet with the handle-bar in his hands. Thumb pieces at the ends of the levers allow it to be removed instantly for use as a weapon of defence, or for the purpose of easy stowage.

Brown's Safety Handle-bar, likewise an American invention, is identical with the last in so far as the methods adopted are the same—that is, a couple of levers releasing catches on being pressed by the thighs. The bar, however, is straight, and the attachment slightly different and somewhat neater than in the former one, fitting more nearly around the top of the head than to a lug in the front of it.

The Matchless Non-vibrating Handles are designed to secure perfect isolation from metallic contact, and are constructed by fitting rather large boxes upon each end of the handle-lugs. These are packed with india-rubber rings, or washers, through which the handle-bar passes, the whole being screwed tight together with outer caps. The addition or subtraction from the number of washers increases, or otherwise, the rigidity as desired.

Passing now from heads, handle-bars, and the usual methods of steering the ordinary bicycle, we come to the several devices adopted

by the makers of many of the peculiar safety bicycles at present on the market, many of which have been introduced for the first time this season. The first and oldest of these is

The **American Star Steering**, which is adopted on the machine of that name, in which the little wheel goes first and effects the steering. The frame is of a V shape, departing from the centre of the large wheel. The ends of the arms, one just above the steering wheel, the other just in front of the rider, terminate in short cylindrical sockets connected by a straight tube setting at an angle of about 30° to the perpendicular. The steering-bar is enclosed in this. Its upper end projects some inches, and is fitted with the usual cross-bar or bicycle handles. The lower end attaches rigidly to the top of the forks of the front wheel, which are perpendicular, and a strong spiral spring, inserted between the base of the tube and the top of the forks, serves at the same time to lessen vibration, to keep the arrangement firm, and to control the steering and cause the front wheel to resume a straight position on the pressure on the handles being removed. Steering is effected by pressure on the handles, rather than by pulling them to or fro, as in the ordinary bicycle, and the little wheel also is caused to lean over to whichever side it is turned, and does not merely swivel on a pivot as do the other steering wheels of machines of this class.

The **Humber Safety Steering** somewhat resembles that of the "American Star." The handle-bars are attached to the upper end of a tube running straight with the steering forks, and sloping backwards to meet the rider. In place of the usual steering head the backbone ends with a tube, through which the steering rod runs. A strong spring keeps this tube and rod tight, but at its base a wedge-shaped connection is made between the two. The pressure of the spring always keeps the point at the bottom of the steering head, or rather tube, in the centre of the wedge-shaped hollow at the base of the steering rod, and thus the machine in line. Pressure upon the handles, however, turns the wheel and causes the wedge to rise against the sides of the cavity, thus comprising the spring, which, immediately upon the pressure of the handles being released, forces it back into its place again, thus causing the wheel to instantly re-assume a straight position. This method forms a most effectual steering controller.

The **Cunard Safety Steering** slightly resembles the previous one at first sight, and in so far as the steering head being replaced by a tube, thus forming a species of socket, it is identical. A strong spring is placed both above and below the head. To the back of the steering rod, just above the forks and below the socket, a curved bar is fitted provided with knobs. Beneath the backbone is a short tube enclosing a strong spring and a rod; this rod projects forwards and ends in a bar at right angles to it, and bearing against the knobs of the afore-mentioned curve. The spring keeps these two in strong

juxtaposition, this method acting as a steering controller, and keeping the wheel always straight, unless turned by pressure on the handles.

Pausey's Safety Steering.—In this, something like the "Humber," a tube carrying the handle-bar runs upwards and backwards from the top of the forks. The steering head consists of a couple of lugs attached to the steering tube, something in the same manner as Gorse's American head, the steering centres with them forming a hinge. On each side of this hinge a couple of short pins project from the sides of the steering tube, and these are connected by coiled springs with hooks on the backbone, thus forming a steering controller, and keeping the wheel in a straight line with the machine when unturned by motion of the handle.

The Bicyclette Steering.—In place of a steering head of the usual type, the centres with which the backbone terminates are pivoted between two lugs which project from the side of a long tube. This tube slopes backwards slightly from the pin upon which the steering wheel runs, this pin being attached to its lower end. Upwards it curves rearwards, and ends in the usual handle-bar. This gives a direct form of steering without an intermediate connecting gear.

The B.S.A. Steering Gear.—In this the rider is placed over the rear driving wheel and steers with a small independent front wheel. This is fitted in a Stanley head at the end of a horizontal backbone. At the other end of the backbone, just in front of the rider, an upright tube is carried, bearing at its top the usual bicycle handles. The lower part of this steering support is provided with two side pins, and the steering head is similarly fitted. Light connecting rods unite the two sets of pins, so that the turning of the steering handle effects the turning of the wheel through the medium of the connecting rods.

The Antelope Steering Gear.—In this machine the front wheel is used for steering and the rear one is the driver. These two are placed some distance apart, the front wheel being held in a fork placed at the end of a long horizontal bar connected with the framework of the two. Upon this bar an upright is fitted, in which slides the rod carrying the adjustable saddle and spring. From the top of this tube a short arm projects rearwards, bearing at its extremity a socket. In this socket a rod is fitted, the top of which curves backwards, and is there united with a second rod curved into a semicircle, the ends being provided with a couple of handles, the whole arrangement being so placed that the handles fall by the side of the rider. On each side of the steering head and upon each side of the tube carrying the handles a couple of short pins or arms are fitted, and these are united by light rods. By pulling forward one handle and pushing back the other the steering wheel is actuated and may be turned in any direction desirable. The advantage claimed for this is that there is nothing whatever before the rider, and to effect a

dismount, all that he has to do is to raise one foot over the wheel and to drop on one side.

Spence's Safety Steering Gear resembles that of the "B.S.A." at first sight, the handle-rod being connected with the steering head by means of a couple of light connecting rods. The handle support, however, instead of being a fixture to the backbone of the machine, swivels in a socket upon it and terminates in the fork which carries the chain wheels of the machine. I say chain wheels, for there are two, that is to say, two chains are used. The two wheels are some few inches apart, and centrally between them an universal joint is placed, by means of which the cranks are kept in line with the handle-bars, but are allowed free motion to and fro within the chain wheels, whilst still effecting their propulsion. The idea with this method is that with a machine with independent steering the rider works with feet and hands in unison, in the same way as he does on an ordinary bicycle, the hands thus pulling against the thrust of the feet, and the uncontrolled feeling of the comparatively free steering wheel checked and prevented.

From heads, handle-bars and steering-gear we travel on to

The **HANDLES** themselves, which are used with them all. At one time they were made of hard wood, usually ebony, box, or rose-wood, but these have now quite given way to horn and vulcanite, which, when polished, is beautifully smooth and soft, and, consequently, does not blister the hands, unless of an unsuitable size or shape. Some are made of ivory, which looks "grand" when new, but in time becomes discoloured and cracks, besides which it is very expensive. In shape the handles resemble those used on most machines, being round and bulbous at the extremities and some 4in. long; they are, in general, however, made much too small, and although the shape varies slightly with many makers, it is yet scarcely the thing.

Rubber Handles are, as their name implies, of solid rubber, the idea being to give a soft hold to the hands and at the same time mitigate the evil results of a fall to the handles. So far, so good, but as made at present they are an utter failure, for, being made in a mould, the ridge left in the middle chafes the hands worse than any wood, whilst the makers also seem desirous of further destroying their utility by putting their name and address on them in raised letters, and in failing to take off the original roughness before sending out to the British public.

Rubber Handle-caps, as sold by Dearlove and others, are an improvement on the last. They are hollow and fit over the ordinary handles, and are smooth in exterior surface.

Vulcanite and Soft Rubber Handles are constructed in a mould, and are formed with an inner core of soft rubber, the outer case or handle itself being vulcanite of the usual shape, and very much resembling horn. They have no nuts at the ends, and are

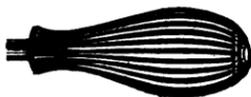
very good in that respect, being made to screw on to the handle-bar, a worm being moulded in the soft rubber inside for that purpose. The chief objection to them is that falls are apt to split them.

Spherical Handles are, as their name implies, spherical and resemble a cricket ball; in size are as near 2in. in diameter as possible. They are most comfortable, and give a much better grip than many others, as they allow the hands to be shifted into any position with equal comfort.

American Rubber Handles are like the above in shape, formed of a ball of rubber $2\frac{1}{2}$ in. in diameter, on a hard wood nucleus, by which they are screwed on to the handle-bar ends. They are, undoubtedly, of good shape and size, and are very soft and comfortable, but on runs of 30 miles and upwards the perspiration of the hands makes them perfectly clean, and then they draw the skin rather unpleasantly.

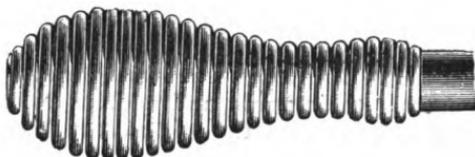
The **Victor Celluloid Handles** are an American invention, and are at present only used in that country. They are white, like ivory, and being moulded, and not restricted to the size of a bullock's horn, are made large and bulbous, so as to give a larger and more comfortable grip to the hands.

Kelsey's Ventilated Handles are made in both the pear and elliptical forms. They are constructed of steel, blocked into shape, and are made with longitudinal bars, as shown in the illustration.



KELSEY'S VENTILATED HANDLES.

They are beautifully cool to the hand, the air having free access to all parts, whilst they can be fitted by anyone to any handle-bar in a few minutes; are cheap, and being plated, set off a machine wonderfully in appearance.



THE GROSVENOR HANDLES.

The **Grosvenor Handles** are made of steel, in strips coiled very finely and closely together, so as to form a handle of the ordinary shape and size, but possessing a certain amount of spring in itself, as well also as slight ventilation between the coils. These remove much of the vibration felt on the hands when travelling over rough roads.

T Handles.—In these the handle, long and elliptical in shape, is fastened to the handle-bar centrally, forming thus with the handle-bar a T. They are in a good position for power, and place the hands in the most natural position possible. After a long experience with every shape of handle in use, I have come to the conclusion that this is by far the preferable, and, indeed, is the handle of the future.

Singer's T Handles are made of vulcanite, and have a long shank into which the end of the handle-bar screws. This makes the handle proper perfectly smooth from end to end.

Spade Handles are now being used by many riders on bicycles. They place the hand in the same position as do the T pattern. They are an adaptation from the tricycle, and are best described by saying they are the same as the typical tricycle handle, taking the form of a D, the straight portion being the handle, and the loop allowing room for the fingers.

The **Northern Sword Handle** is on the same principle, but in place of being semi-circular, the handle holders take more the shape of the guard of a sword handle, one side departing at right angles to the handle itself and the other curving to meet it. This design gives more room for the thumb, and in appearance, too, is to be preferred to the spade variety proper.

THE BACKBONE

serves the same duty in a bicycle as it does in an animal, viz., it connects the various parts one with another. It used to consist of a solid circular or oval iron bar, bent to the requisite shape; but it is now constructed of hollow steel or iron, the reason being that, by mechanical laws, hollow metal, under certain conditions, is far stronger than solid, as well as considerably lighter. The best, strongest, and lightest are of steel, and should be largest—from 1½ in. in diameter—immediately beneath the spring, where most strength is requisite; they should then taper gracefully, but slightly, downwards to the back fork, keeping at an equal distance from the wheel for about one-fifth of its circumference, and then proceed more or less perpendicularly to the back fork, according to the size of the rear wheel. In section, backbones are usually made circular, but in some makes are elliptical, thus giving greater strength in the direction where it is most needed, without increasing the bulk of the material used.

The **Fluted Backbone** is altogether of a different shape, being first ovalled, and then an indentation or fluting run down each side, this tending much to the general strengthening of the part. It is, however, but little used.

The **Diamond Section Backbone**, like the hollow fork of the same pattern, has a section resembling a hollow-sided diamond, the angles running along the top, bottom and sides. It is not very extensively used, and is neither very prepossessing in appearance nor pleasant to handle, whilst I cannot see that there is any gain in

strength by the change. The backbone is united to the neck and back fork by brazing and riveting. The neck proper I have previously described in speaking of the head and its varieties.

Hughes's Patent Neck is one of the flattened type, but is provided with a broad ledge, forming a rest for the spring, thus giving it increased steadiness, or allowing a very close-cut flat spring to be used with this class of neck.

The **Stanley Registered Neck**, though not prepossessing in appearance, is one of great strength. The backbone goes right to the end, and the neck springs out of the top of it like that of a small wooden horse. This gives stiffness and strength in the backbone, and prevents any possibility of twisting at the neck.

Smith's Weldless Backbone and Back Fork Combined is formed out of one length of weldless steel tube, one end of which, by careful manipulation, is brought into the most approved shape for a back fork, that being almost identical in appearance with the semi-tubular back fork before described, the tube being first sawn up and then worked to the proper shape. This forms a very light, neat and strong frame, without any brazing or riveting.

The **Cambrian Non-vibrating Backbone**.—In this the back fork is attached to a stout rod, which runs up inside the backbone end, and the two are connected by a strong coiled spring, upon which all the weight rests, the object being to do away with a great deal of the vibration usually experienced when travelling over rough roads.

THE SPRING,

as well as the backbone, is a very important part of a machine; for a bad spring renders riding extremely uncomfortable and unpleasant, sometimes even painful, a result too often set down as the fault of the machine itself, which consequently gets blamed for it. The *desiderata* in a spring are that it should be pliant, according to the weight of the rider—a spring pliant under 13st. would be terrifically stiff under 8st.—should be neat in appearance, simple in construction, and free from complication, as well as perfectly free from side-shake. There are many varieties of springs, their difference consisting either in the method of securing to the backbone in front, or in the mode of working and attachment behind. Taking first the after part of the springs in common use, we come to

The **Sliding Spring**.—This class of spring has as many modifications in shape as any part of the machine. It obtains its name on account of its *sliding* up and down the backbone, the end being suitably constructed for the purpose. In some cases it simply rests on the "bone," being made nearly flat at the end and slightly curved to fit the backbone; it is obvious that this on a rough road is apt to jump and rattle. To obviate this, many makers make a short slot in the flat, and at its lower end screw a nut and bolt into the backbone with a leather washer beneath; this keeps this end of the spring

free from side-shake and rattle, and allows of pretty free play, but for a heavy man the slot is sometimes found too short, and a sharp bump is felt when going over any sudden obstacle. It is vastly surpassed, both in appearance and ease, by

The **Hinged Clip**, in which the taper end of the spring is hinged to the centre of a steel clip passing about two-thirds round the backbone, fitting closely and sliding upon it; this holds everything very firm, and makes it impossible to shake or jar in the slightest, as well as giving an extremely easy seat, on account of the end of the spring having two points of "play," viz., by sliding up and down the backbone, and by the working of the hinge. It is very rarely used, however.

In the **Dovetailed Slide** the spring is hinged to a small block dovetailed to fit into an oblong metal block secured to the backbone. In this it slides up and down, and is neat, free in working, and free from side-shake.

The **Barrel Slide** consists of a short rod affixed to the top of the backbone, the spring end being hinged to a cover forming three parts of a cylinder, which fits the rod and slides upon it.

Settle's Spring Slide in outward appearance is exactly similar, but upon further inspection it is found that the rod is replaced by a semi-circular chamber, in which an accurately fitted block hinged to the spring tail slides, the opening in the top being covered, and dust excluded by a cap similar to the slide used in the last pattern. The flat base gives steadiness, and the chamber will hold a considerable quantity of oil, so that frequent oiling is rendered unnecessary.

The **Stanley Slide** consists of a small block of gun-metal secured to the backbone, and pierced with a long rectangular eye; this is lined with leather and holds the tail of the spring, which passes through and slides up and down in it. It is simple, neat, and effective, and is greatly in vogue, being in some cases made with the upper part separate, and adjustable by means of a screw at each end. It is now by far the most generally used of any.

The "**Stanley Improved**" Slide for the spring tail is very similar, but the spring, in place of sliding through a simple slot, slides in a slot cut through a roller which is fixed within a socket upon the backbone, and thus is enabled to turn a little and suit itself to any angle the spring tail is caused to take by the play of the spring, so that there is no jamming or cross-locking.

The **Humber Helical Spring** consists of a helical coil of flat spring steel, taking two complete turns. It is bolted to the backbone at one end, the other supporting a cross-bolt, upon which the spring tail rests, being forked for the purpose.

Carver's Spring Tail is also upon the helical plan, but the coil is not so great, and is fitted at the top of a gracefully-bent holder, which gives a much better finish to the whole affair. The spring

E

tail, too, is not immediately attached to the coil, but is provided with a shackle or link as a connection.

The **Shackle-tailed Spring** consists of a double link or shackle, one end of which is hinged to the backbone, whilst the other is likewise hinged to the spring tail, which is thus enabled to play freely, and give to any point included in the semicircle described by the shackle end to which it is fastened.



THE BRITISH CHALLENGE SPRING.

The **British Challenge Spring Tail** is hinged to the end of a double rod. Two short cylinders are bolted across the backbone, about an inch apart, and these are filled with rubber. Two bolts connect the double rod before mentioned, one passing through each cylinder, that piercing the rubber of the rearmost one doing so at a point very nearly at the top of the cylinder, whilst the forward one passes through at the bottom. By this a kind of lever spring is produced, with, as it were, two fulcra, both of which are not firm and solid, but supported upon rubber, which is subject to great compression, and whilst giving elasticity effects the severance at the spring end of metallic connection.

The **Victor Spring** rests upon a block of rubber at its tail, but, instead of proceeding straight to the head, it curves backwards, first forming a complete semicircle, and thus giving a longer spring and more elasticity.

The **Badger Spring Tail**.—In this the spring tail is hinged to the end of a rod which rests in and is borne by a stout coiled spring, fitted upright upon the backbone.

The **Kangaroo Spring** somewhat resembles the last, though without the coiled spring. The spring tail is supported upon a compound vertical rod, half of which is hollow, and works by means of a screw upon the other. Both top and bottom are hinged, and whilst the front of the spring may be placed in either one of four holes in the neck, and thus raised or lowered, the rear part, by taking off the lower portion, can be screwed in or out, and so raised or lowered as required, and either the whole spring raised or lowered bodily some three inches, or the front or back only adjusted as desired.

All these are differences only in the rearmost end of the spring. In order to gain as much elasticity as possible, in unison with neatness, compactness, and rigidity, the fitting of the front end of the spring has to be considered as well. They are, therefore, secured to the neck in several ways.

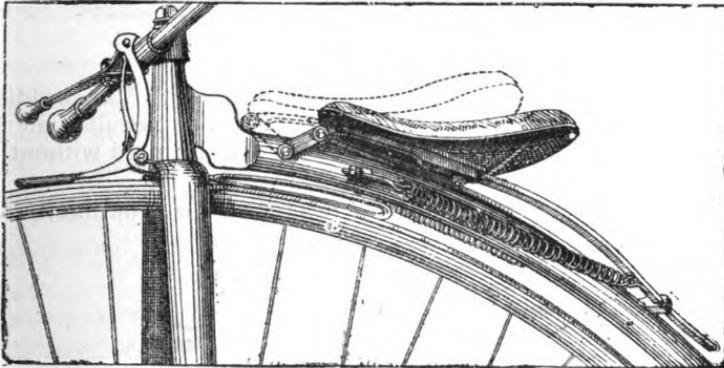
The **Bolted Spring** is the neatest in use, and is the favourite plan adopted on all light-class bicycles, and on most "Stanley" head machines. It has numerous modifications, but in general the front end of the spring is divided longitudinally for a short distance, fitting with a hinge-bolt on each side of the neck of the backbone, just behind the head. This gives it a fair amount of play, and allows of its being tightened should it work loose and get any side-shake. This plan for this style of spring is almost universally adopted.

The **Front Slide Spring** is a neat affair, being fitted with a joint behind, whilst it slides backwards and forwards, either through or upon two short pins projecting from the sides of the neck. It allows play in front, but in general is rather stiff otherwise.

The **Pilot Spring** belongs to this variety, but is an improvement upon those in common use. A slotted cylinder holds the spring end, and is in its turn held in a rubber seating within a second cylinder affixed to the neck of the machine. This gives rubber insulation, and forward play at the same time.

The **Shackle Spring** is fixed to a joint behind, and in front is provided with a pair of arms or links, being jointed to these, and these in their turn bolted to the neck. By this means play is obtained almost immediately beneath the rider. Two kinds are used, in one of which the spring rests *on* the link, and in the other is *suspended* from it.

In the **Atalanta Spring** the spring rests on the shackle, but the latter is placed in such a position as to be almost in a line with the spring, which rests, a couple of inches from the front, upon a short pedestal of indiarubber, which in reality takes all the play, whilst the shackles keep the springs steady and free from side-shake.

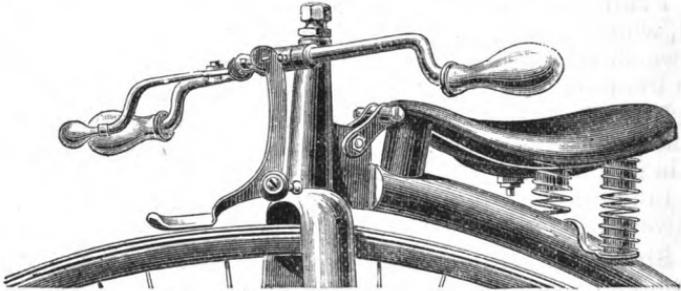


THE ARCHBISHOP SPRING.

The **Archbishop Spring** is in general outline an ordinary shackle-fronted one, but, unlike the rest of that class, the rearmost end is fitted in a "Stanley" slide, instead of being hinged as usual, whilst a couple of stout coil springs at the sides keep it forward. I have not tried it yet, but it is claimed to throw the rider back when meeting

obstacles, instead of forward and over the handles, also to be free from all jar and to possess many other advantages. Of compound springs, differing both in their front and rear fastenings, there are several.

The **Special Atalanta Spring** is identical in its front fastening with the "Atalanta" spring just now described, but its rear end is supported upon two stout vertical coiled springs, as shown in the annexed cut. The result should be a very comfortable one.



THE SPECIAL ATALANTA SPRING.

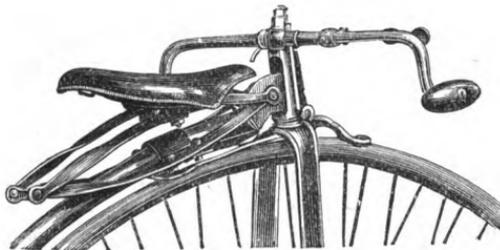
The **Premier Duplex Spring** is a double one. One broad spring is fitted by means of clips and "saddle" to the backbone, both ends curving upwards, the upturned ends supporting the second spring, which assumes the usual position, and is secured to the lower one



HILLMAN HERBERT & COOPER'S
PATENT DOUBLE ACTION SPRING.

by its ends being bent sharply over and inwards. The saddle is placed on the fore part of the upper spring. The peculiar method adopted in the fitting of this spring allows it to be fitted without the use of any pins or joints.

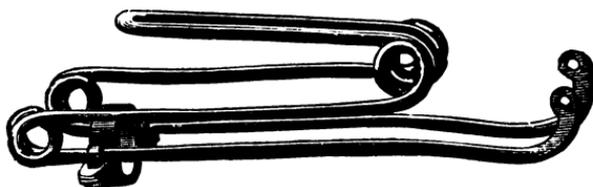
Ash's Leader Spring very much resembles this in outline, but, in-



ASH'S LEADER SPRING.

stead of being formed of two broad strips of spring steel, four narrow ones are used, which are placed two upon each side the backbone, and their ends bolted together with pins. This allows the ends to sink below the backbone, and the saddle to be attached to the centre of the arch, as the ellipse formed by the junction of the springs sets in a horizontal position. The maker fits springs also having only the front part arranged in this way, the rear end being bolted to the backbone.

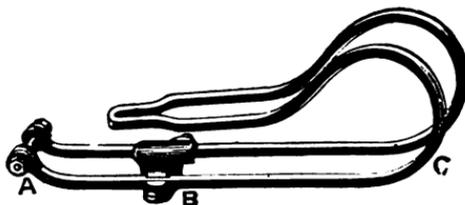
The **Arab Cradle Spring** is most unlike any of the previous ones. It is fastened by a bolt to the neck, and further secured in the middle by means of two hooks attached to a "saddle" fastened around the backbone, as shown in the illustration. The spring itself consists of a double length of wire or steel rod, which is held firm by the hooks, and then passes backwards a few inches, and, forming a loop or curl, proceeds forward to a couple of inches from the front ends, where it once more curls and turns, finishing up with a slight rise upwards at its rear end, as shown in the sketch. It is one of the most remarkable springs ever introduced, and, after lengthy trials of it, I can speak very highly of its practical qualities. To act in perfection, it must be properly selected for the weight of the rider, as, if constructed for a heavy man, it will almost pitch a light one over the handles, whilst if a heavy weight uses a light weight spring it "lets him down on the backbone," but when of the right strength it is



THE ARAB CRADLE SPRING.

extremely pleasant. It is for this reason the makers are so particular to ask the weight to be given when ordering.

The **Cambrian Adjustable Spring** is somewhat on the same principle. Constructed of a square steel bar, its shape is best seen by reference to the appended cut. It is bolted to the neck in the usual manner, and is also secured in a saddle round the backbone

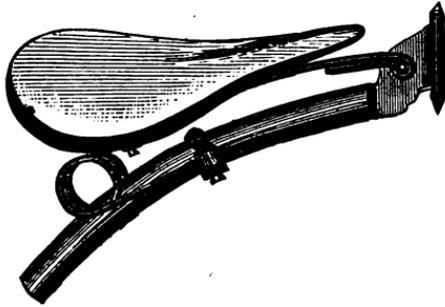


THE CAMBRIAN ADJUSTABLE SPRING.

like the last. Its chief feature, however, is that, by shifting the position of the holders **B**, it is rendered more or less pliant according as the holders are moved forward or backward, and by this means it may be adjusted to suit the weights of different riders.

The **Popular Spring** is almost identical. It is really a combination of the "Cambrian" and the "Arab," being, like the latter, constructed of round steel wire, with coils in place of large sweeping bends. In other respects, however, it is identical with the "Cambrian," being of the same general shape, and having a certain amount of adjustment by shifting the resting block fore or aft.

Harrington's New Arab may be briefly described as the one just spoken of turned upside down. The spring sides depart from the neck to the rear, where they coil downwards, and their ends fit into rocking holders carried at the sides of a saddle-plate on the backbone. This is a much stiffer spring than the "Arab" proper,



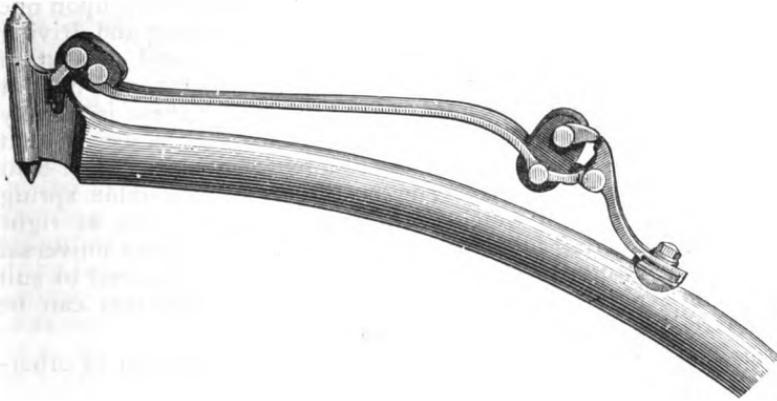
HARRINGTON'S NEW ARAB.

and I do not think it an improvement for rough road work. Nearly all the spring is obtained from the rocking action of the holders, and very little from the spring itself. It does away entirely with the slight side motion existent on the cradle proper, to which some riders object, but which I myself think rather an advantage than otherwise.

Hill's Patent Adjustable Spring is an American idea, and is a combination of the cradle and the **C** types as used on tricycles. The lower half of a cradle is used, and on the top of this a **J**-shaped piece of flat steel is fitted, and so arranged with a bolt and nut that it can slide to and fro on the top, thus securing all the advantages of the cradle with a certain amount of adjustability to compensate for the varying weights of riders.

The **Special Club Suspension Spring** is constructed as follows:—Both in front and behind, tail and head pieces are securely bolted to the backbone; these take the shape of the extremities of an ordinary spring, and are finished off with a species of hook underneath. To these hooks very stout rubber springs are attached, and the centre of the spring on which the saddle rests is suspended

thereon. The front end is provided with links as well, to procure immunity from side-shake. It is extremely pliant, and the rubber assists in rendering it a non-conductor of vibration.



THE SPECIAL CLUB SUSPENSION SPRING.

The **Matchless Spring** is constructed upon very similar lines. A bracket, or curved tail piece, is made fast to the backbone in the rear, and this is fitted with two side-lugs holding a link and a vertical rod depending from its upper extremity. This vertical rod holds a number of stout rubber buffers or rings, according to the weight of the rider, and upon these the spring tail rests, being held steady from side-shake by means of the link before mentioned. Much the same principle is carried out in front, a semi-circular bracket being attached to the neck, from the top of which a rod depends as before, supporting the forward end of the spring upon rubber rings. The chief difference in the principle of these two springs is that the last obtains its ease from the elasticity of rubber, whilst this one depends for the same commodity upon its compressibility.

The Salvo Adjusting Rod.—In place of fixing the spring directly upon the backbone, a wrinkle is copied from the tricycle, and the spring fitted upon the end of a short rod, which is bolted to the backbone and curves upwards and forwards some eight or ten inches. This method, of course, is adopted upon the safety, and it allows the whole spring to be adjusted to and fro in the same manner as the spring of a tricycle is shifted upon an Γ pin.

Singer's Spring Attachment is something the same, but the supporting rod takes the form of a V, the angle being towards the head of the machine. The upper arm carries the spring which, in this case, is supported on special carriers which drop from the supporting piece on each side, so that the spring—a cradle—does not raise the rider so much above the backbone as otherwise would be the case. The lower arm runs through a hole in a block attached to the backbone, and is kept in place by a side screw. By slackening

this, the carrier, with its attached spring and saddle, can be raised or lowered, and thus a certain amount of adjustment obtained to suit the varying heights of different riders.

Adjustable Spring Holders, besides these, are used upon one or two of the safety bicycles having independent steering and driving wheels. They are adaptations from the tricycle and consist of vertically-placed rods sliding up and down in a socket, and held at any height by a tightening screw. The spring with these is usually either the "Arab," in its form as constructed for tricycle use, or that known as the "S" spring, consisting of a length of spring steel bent to the form of the letter S. The best form of adjustable spring holder is the Γ pin, in which the top of the rod is bent at right angles, and the spring fitted on the bent top. This gives universal adjustability, for not only can the seat be raised or lowered to suit the varying length of leg of different riders, but the seat can be moved forwards or backwards to taste.

A no less important item in conducing to the comfort or otherwise of the rider is

THE SADDLE,

of which likewise there are several varieties. In ordinary it consists of an iron pear-shaped plate, narrow to almost pointedness in front, and spreading out behind to form the seat for the rider; this has over all a covering of leather—pigskin. In some cases nothing intervenes betwixt the leather cover and the saddle-plate, but usually it is more or less padded with horsehair or other soft material. The whole is supported by an oblong block of wood the width of the spring, some 2in. in thickness behind, and tapering to $\frac{1}{2}$ in. in front, in order to give the rider a raised or level seat on account of the usual backward slope of the spring to which it is fastened, and firmly secured from slipping by means of a couple of iron pins fixed into the saddle-plate, one on each side of the wooden block. These have a worm cut on their lower ends, on which a nut works, by means of which a flat bar beneath the spring, forming a connection between the pins, is tightened, and the whole secured.

All makers now use the same fastening, with the exception of the Coventry Machinists' Co., who shut the spring between two hinged flats, and secure with one nut at the side, thus allowing a machine to be built closer, there being no possibility of the nut touching the backbone when the rider is in the saddle. For comfort a saddle should not be too small; it will also be found more comfortable if tilted up behind a little. Some saddles are very nearly level, by which they are safer and easier to mount, as well as allowing the rider to slide well back in descending hills, but in general are not nearly so comfortable as those with a good tilt. This is the saddle in ordinary; now for the varieties.

The **Leni Wooden Saddle** is, as its name denotes, simply a wooden one. It consists of a piece of wood fashioned to the shape

of the saddle, though slightly wider than the usual run, narrower in the peak, and with slightly hollowed sides.

The **Web-seated Saddle** differs from the ordinary in that the iron plate, instead of being solid, has two—sometimes only one—elliptical holes cut in its centre, over which is stretched a piece of webbing supporting the padding and cover. This usually gives a more comfortable seat than the ordinary, but is not infallible.

The **Air Saddle** is simply a canvas-covered indiarubber air cushion, conformable in shape to the ordinary "pigskin;" a screw mouthpiece is fitted behind, by means of which it is blown out when secured to the top of an ordinary saddle, with straps or otherwise, according to its construction. It gives a nice soft seat, entirely preventing *soreness*, but has a tendency to produce *stiffness* instead. In the best the air bag is placed between the plate and the leather. Ordinary ones are fastened on to the top of the pigskin, and sometimes render it difficult to mount a high machine. They are also apt to stick, and so render a quick dismount awkward. Besides this, the air forcing the saddle so closely to the body makes the seat uncomfortable warm, especially in summer. It is very rarely seen now, and, though good, but little used.

Lamplugh and Brown's Suspension Saddle has quite monopolised the market of late. In its construction the wooden block is done away with, and a curved and corrugated metal plate takes its place; the usual iron saddle plate is entirely absent, the leather seat being stretched or suspended from the frame, which it touches

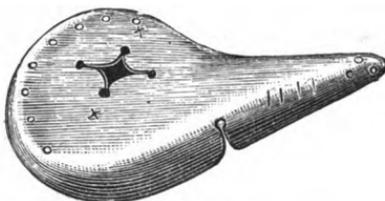


LAMPLUGH AND BROWN'S SUSPENSION SADDLE.

only behind and in front. It is thus enabled to yield at every point to the pressure of the thighs, and consequently does not chafe the rider in the slightest, whilst to obtain a cool seat it is made either with five eyelet-holes down the centre, or with a lacing of "white leather" in the middle. A larger form upon the same principle is made for tricycles, and I can highly recommend it for use on the bicycle to those who desire "something to sit upon," and I may mention I do not find it at all harder to mount and dismount, but rather the reverse.

Lamplugh's Long-distance Saddle is constructed with the saddle plate of the large tricycle variety, over which is stretched—L. and B.'s suspension principle—a piece of stout leather, without any padding at all of any kind, and provided with an elliptical hole

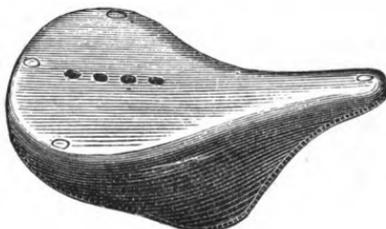
in the centre to secure a cool seat, and a cross cut on each side where the greatest pressure comes. It forms a happy medium



THE LONG-DISTANCE SADDLE.

between the usual bicycle variety and the large tricycle pattern, and is really most admirably adapted for long distance riding.

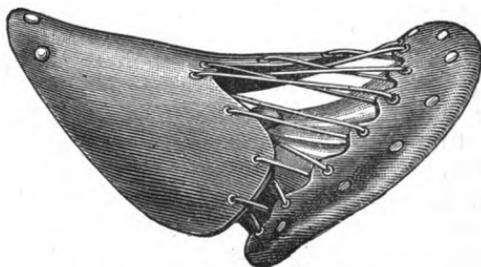
Brooks's Any Distance Saddle is almost identical in construction, but has a deeper flap at the sides, and is not cut through at all in this direction. An illustration is given below.



BROOKS'S ANY DISTANCE SADDLE.

Froude's Patent Safety Saddle is designed to provide a safe seat when descending steep hills, without the aid of springs or other shifting paraphernalia. It consists simply of an ordinary suspension saddle, having a secondary one affixed in the rear, upon which the rider can sit when descending hills; the idea naturally strikes one as being necessarily very clumsy, but it is neater than one would imagine.

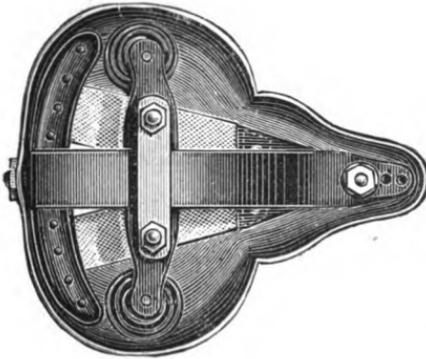
Nagel's Laced Saddle is a German invention. It is much of the usual shape, but the front portion and rear portion of the saddle



NAGEL'S LACED SADDLE.

are separate and some inches apart, the connection between them being made by strong leather laces drawn tight through a series of eyelet-holes in the leather. It is very comfortable when riding a machine well within one's powers, but scarcely so much so when fully stretched out. The chief point about it is its full ventilation.

Whitehouse's Combination Saddle, as will be seen by the annexed illustration, is a combination of the suspension and the web-seated principles. There is the usual longitudinal support or spring piece, to the back of which a slightly curved back piece is attached, this serving to hold the tension of two strips of webbing stretched from point to back diagonally.



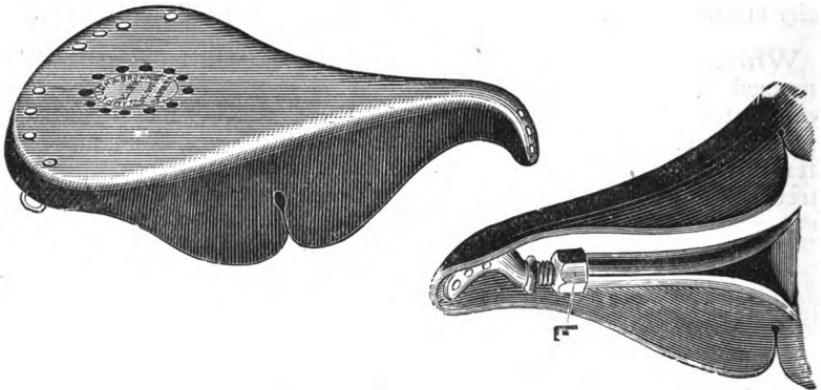
WHITEHOUSE'S COMBINATION SADDLE.

The **Victor Adjustable Saddle** is built upon the same principle as the long-distance suspension, consisting of stout leather stretched over a frame, but it has a feature in the tension of the leather being adjustable by means of a lacing of cord through a number of eyelet-holes pierced round the leather at the back, and a series of loops or staples fixed to the under side of the frame of the saddle, by which means the tension can be taken up at will should it require it. This is an American saddle.

Foster's Adjustable Tension Saddle has the same object in view. The saddle itself is supported by a couple of stout strips of webbing overlapping one another at the peak and departing from each other towards the back, where they are attached to a semi-circular frame, which frame is fastened to the longitudinal supporting portion of the frame by a couple of bolts and nuts, so that by screwing these inwards or outwards the plate carrying the back of the saddle leather is forced backwards and the tension adjusted as required.

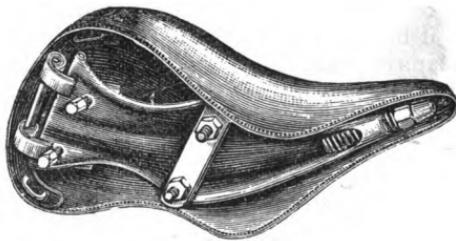
Lamplugh's Triple-tension Eclipse Saddle.—The "Eclipse" saddle is built very much upon the same lines as the long-distance,

but has a somewhat different shaped supporting frame, which is stronger and stiffer. The forepart of the saddle is riveted to a small flat plate, the front end of which holds a lug or screwed socket on



LAMPLUGH'S TRIPLE-TENSION ECLIPSE SADDLE.

its under side. In this a long screw or bolt works, and when screwed up it presses against a metal block fixed on the under side of the peak of the frame, and forces the forepart of the saddle to which it is attached away from the frame, thus increasing the tension to any degree requisite. This is termed the single tension, and a pair of similar screws are attached at the back of the saddle, one on each side, by tightening or slackening which either side of the leather, should one side stretch more than the other, can be readjusted.

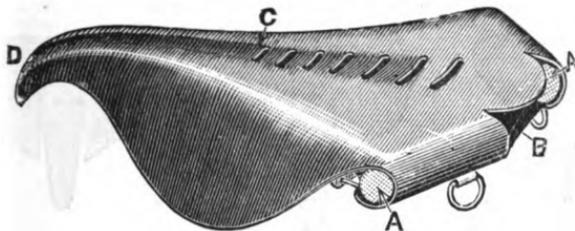


BROOKS'S LEVER TENSION SADDLE.

Brooks's Lever Tension Saddle somewhat resembles the last. The forepart of the frame is brought together and forms a narrow tube. To the under side of the peak of the leather a piece of metal is attached which forms the head of a long bolt. A nut is placed upon this bolt, and it is screwed down in the before-mentioned funnel or tube of the frame, so that by turning the nut the forepart of the saddle is forced forwards or backwards as requisite. The rear por-

tion of the saddle is made in a different manner, the back part of the leather is fastened to studs carrying a short cross-bar, to the ends of which a couple of coils of stout spring steel are attached. These springs make two or three coils round the bar, and are then brought forward and attached by means of screws to the rear end of the saddle frame. It will thus be seen that the saddle leather rests upon the frame through these springs, and thus has plenty of play in itself, the tension of either spring, or both, being adjusted by means of the screws to which they are attached. The centre is grooved to prevent perineal pressure, and altogether the saddle is a very comfortable one.

The **Buffer Saddle** is a further exemplification of the "Triple-tension Eclipse." The rear portion of the frame consists of a semi-hollow curved length of iron in which about a foot of indiarubber, the same as used for tyres, is held. The leather of the saddle is fastened to the base of this rear piece, and thus the weight is



THE BUFFER SADDLE.

stretched over the rubber. The front portion of the saddle bends downwards to avoid perineal pressure, and the sides are deep and well protect the leg. It has been introduced this season, and from all accounts is a great success, the introduction of the rubber deadening vibration to a wonderful extent.

The **Tubular Buffer Saddle** is a still further improvement upon the last. The frame differs materially from any in the market. To the usual screw-piece a length of tubing is attached, taking the place of the frame proper. This tube sets in line with the machine, and the two portions are bent at a slight angle to each other. By means of a screw at either end the covering of the saddle may be adjusted to and fro. To the rear end a second cross tube, slightly curved, attaches, to carry the back part of the saddle. This is not a firm fixture to the first tube, but works upon it, as it were, on a pivot, up and down. This is covered with rubber, and the leather is made to take the form of a V, the point fitting over the front end of the frame, whilst the two ends are sewn to form cylinders which slip over the ends of the rear supporting rod, and when in place are prevented from slipping off by a hook. The adjustable tension and suspension principles are fully embodied, whilst the rocking tends much to prevent soreness. The introduction of the rubber prevents

much of the vibration, and the quick and easy attachment of the saddle covering is not only a safeguard against the machine being stolen, but a sure preventive of a wet saddle.

Mason's Incomparable Saddle is likewise an adjustable one, but in a different direction. The back part of the saddle rests upon two coil springs, which thus give it considerable elasticity. A supporting plate or spring runs the whole length of the saddle, just beneath the leather, and at its extremity a stout bend is made at right angles. This bend or right angle piece is pierced with a number of holes, and works in a slide at the back of the saddle-plate. By means of a screw, the saddle back can be raised and kept at any height requisite, or according to the taste of the rider, who can thus have a flat saddle or one fully tilted at the back, as he wishes, or any degree between these two points.

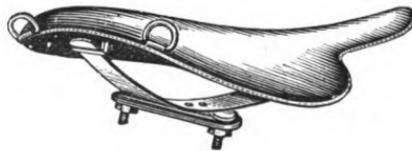
The **Storad** is a saddle made of spring steel. A first groundwork or rough frame is made of argatine, a non-rustable metal, upon which broad strips of thin-spring steel are attached in such a



THE STORAD.

way that their ends bent over present no cutting edge to the rider's leg, and take the general form of a seat or saddle. I have not tried them yet, but the idea is to make the seat of a very springy nature in itself.

In **Woolley's Spring Saddle**, the saddle itself, an ordinary plain one, is secured to the top of an inverted spring. This makes,

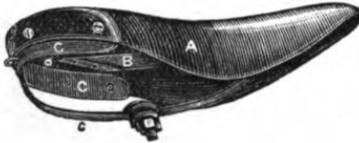


WOOLLEY'S SPRING SADDLE.

as it were, a double spring, and is very useful in a rough part of the country, particularly with heavy weights, and is especially adapted for use with a spring too stiff for comfortable riding with the ordinary saddle.

Warwick's Automatic Tension Saddle.—In this saddle the frame is extremely simple, consisting of an inverted spring dropping from the front to the bolt-holders, and then rising with a slight

curve, almost amounting to a curl, at the back, where it is firmly attached to a semi-circular end piece. The cover of the saddle is

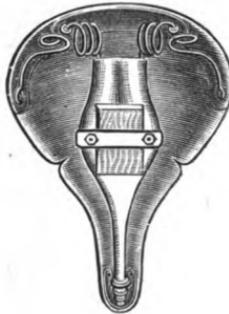


WARWICK'S AUTOMATIC TENSION SADDLE.

stretched from point to back, and the frame consisting of a spring, the tendency is one continual stretch, so that the tension is always retained, whilst the saddle itself contains a certain amount of spring. Those who have used it speak highly of it, and I can quite believe its possession of excellent qualities.

The remaining saddles, like Woolley's, practically combine the functions and manner of construction of both spring and saddle, many of them, however, in a much more marked degree. The majority of them are American inventions, due, doubtless, to the very bad roads which riders have to put up with in that country, where a very considerable amount of attention has of late been given to this spring and saddle question, and America at present can claim more novelties in this line than in any other in connection with cycle construction.

The **See-Saw Saddle** is constructed upon a novel principle, combining that of the cradle spring with the suspension saddle. The annexed illustration will show its construction better than a mere verbal description. Two wire coil springs support the rear end

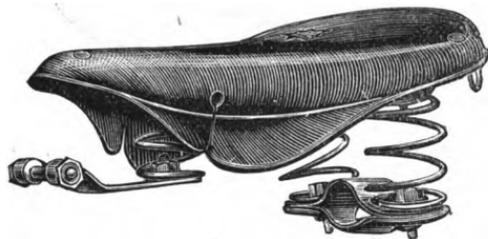


THE SEE-SAW SADDLE.

of the saddle, one doing duty for each side, whilst the tension is adjustable in the usual manner with a nut and screw in the front. This is an excellent saddle for use on rough roads or with a stiff spring, and is well made and comfortable. The peak is narrow, as it should be.

The **Brighton Saddle** is designed more particularly for use upon safety bicycles. The frame consists of a curved triangle of iron

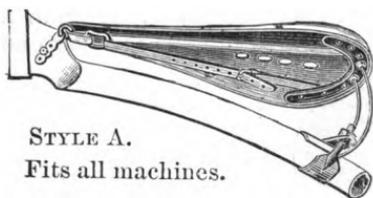
rods, the apex forming a long screw upon which, by means of a nut, the cover of the saddle may be stretched to any desired tension.



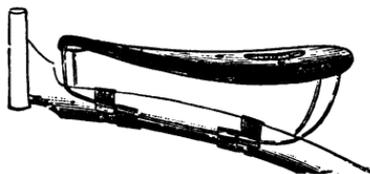
THE BRIGHTON SADDLE.

Two spiral springs support the rear end of the saddle, and a smaller one the front portion. This latter rests upon an attachment to the neck, whilst the two springs in the rear are supported by cross-bars which fit round the backbone and are bolted to it.

The **Duryea Saddle** is a combination of spring and saddle. At the back a couple of slightly curved spring rods are attached to the backbone and support a semi-circular iron frame, to which the rear portion of the saddle is fastened. The front portion of the leather ends in a strap which passes through a runner in a holder bolted to the neck of the machine. This strap is held by a buckle attached to the rear part of the frame beneath the saddle, and by its use any



STYLE A.
Fits all machines.



STYLE B.

THE DURYEA SADDLE.

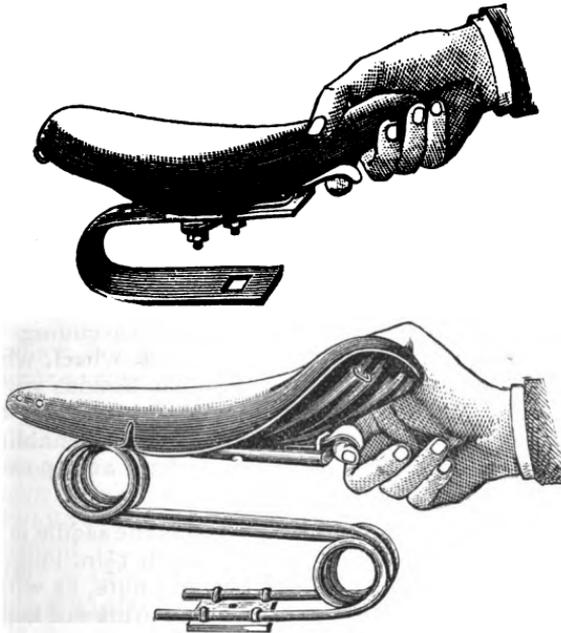
stretch can be taken up at will with very considerable ease and celerity. The saddle is light, and a full exemplification of the suspension principle, and as it appears to be the chief saddle used in the States, is evidently a thoroughly comfortable one. In another form the saddle is made with a second pair of spring supports in the front, which bolt to the backbone in place of the holder attached to the neck.

The **Perfect Hygienic Saddle** is another Yankee notion. A curved spring, somewhat like the tail end of that of the "Victor Excelsior," bolts to the backbone and supports the rear end of the saddle. A pair of similar ones of smaller shape are fitted one on each side the head, and supporting the front portion of the saddle, which is thus strapped between and rests upon the two springs before mentioned.

The **Cricket Saddle**, another American idea, is a combination of the cradle spring with the suspension saddle. Curved coiled wire springs at the back, like those of the cradle, support the rear portion of the saddle, the front being passed through a guide, as in the "Duryea," on the top of a second spring which runs along the backbone and curves upwards just behind the head; this, having a forward tension, tends to keep the leather tight from back to front. Either part is made detachable, the top is easily removed, and a new one can be put on without trouble, or the springs can be taken out and changed for others if unsuitable.

The **Adjustable Skeleton Saddle**.—In this a metal plate, forked with three prongs behind, supports the saddle. A curved back is provided with a number of slots, through which four leather straps pass, these straps running to the front and passing through a guide there; while tightening with a buckle beneath, the tension can be adjusted at will. The use of four straps only in place of a solid piece of leather makes the saddle well ventilated, and it gives to almost every motion of the rider.

Harrington's Saddle Clip is very simple, consisting, as may be seen by the sketch, of a light steel spring placed beneath the saddle, and provided at one end with a finger-piece or trigger, and a short knob or pin a couple of inches or so from its base. When used upon the cradle spring this pin, which is held down by the



HARRINGTON'S SADDLE CLIPS.

F

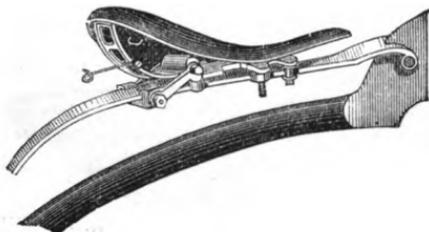
spring, fits into the loop formed by the end of the cradle, and thus holds the saddle in position; but for use on ordinary springs the saddle is attached to a slide which is bolted on to the spring in the same way as are the ordinary saddles, and has a small hole or socket at its rearmost end into which the pin drops. By pulling up the spring the saddle can be, with a good pull, instantly detached from the spring and as quickly replaced again. The clip is made to fit either before or behind the saddle, the latter type being the best suited for use upon bicycles.

The Lillibridge Adjustable Saddle.—This is also an American idea, and is supported in front by ratcheted brackets attached to the neck and adjustable by means of the ratchet either up or down. The leather covering is tightened by a strap, and is stretched from this front support to a curved frame at the back, which latter rests upon a couple of long curved springs. These latter are so constructed that, by moving them to or fro upon the backbone, the saddle may be adjusted for height at the back at will. There is very considerable and complete adjustability, and it should be a good article, though I have not tried it.

The Stanley Saddle Plate provides a means of attaching the saddle to the spring without using the rather awkward nuts underneath. It consists of a long, flat steel plate, forming quite a second spring; to this the saddle is attached, and the whole secured to the spring proper by a single nut, as the plate is provided with a slot at each end, working on buttons fixed on the top of the spring. It allows the saddle to be adjusted some two inches in an easy, neat, and efficacious manner, and also forms a second spring to assist, support, or even supplant the primary one in case of need. There is also a patent alteration in the mode of securing to the spring, which allows the saddle to be moved backwards and forwards on the spring at the will of the rider, without dismounting. The advantage of this is evident, for with the ordinary fixed saddle, in descending hills, the weight of the rider is thrown further forward and taken in a measure off the back wheel, just the opposite of what should be the case; by the use of a sliding saddle the rider is enabled to shift his seat several inches further back when descending hills, thus throwing his weight more fully on the back wheel, which consequently "drags" or acts slightly as a brake, besides giving a back wheel or ground brake more power, and, by shifting the weight further back from the centre of the front wheel, enabling one on that wheel to be used with greater safety and power. This apparatus is known as

The Centaur Movable Saddle.—In this the saddle is fixed upon a joint working upon two hinged arms, each 1½ in. long, the whole being fixed to an oblong frame with pins and nuts, as with ordinary saddles, for securing to the spring. These arms are kept forwards flat on the spring by a powerful concealed spring in their interior.

By leaning forward slightly, the front of the saddle is depressed a little and a purchase gained on the arms ; a backward pressure with the thighs then forces them back, causing their ends to describe



THE CENTAUR MOVABLE SADDLE.

semicircles of 3in. diameter, of course shifting the saddle back that distance. By raising the body again, the saddle is once more brought forward by means of the springs.

Jones's Saddle Roller is likewise an attachment to the saddle proper. This, in place of being bolted direct to the spring, rests upon a cross-shaped iron plate, the longer arms of which are turned up at their ends, and bolted to a hinge running lengthways beneath the saddle. The shorter arms support rubber pads, the result of this arrangement being that the saddle tilts slightly forward and to whichever side the rider leans, enabling him the better to reach his pedals, and somewhat preventing soreness. It is a good thing and well carried out.

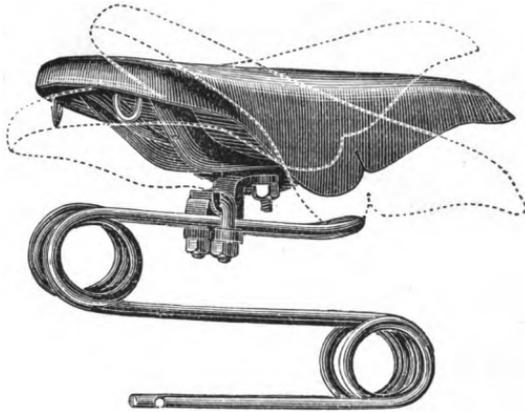
Carver's Non-slipping Saddle. Upon and across the spring a number of strips of steel wire are brazed, and the saddle-block grooved accordingly. These strips, fitting into the grooves, entirely prevent its slipping backwards if it by any means becomes loose, thus allowing the rider to dismount in safety and tighten up again, although the wires occasionally come off, in which case they act as "roller bearings" instead of hold-fasts. On the whole, however, it is a good idea.

The **Stanley Non-slipping Saddle** has a series of light grooves, or flutings, in the bottom of the saddle plate, which fit a corresponding set into which the middle of the spring is formed. It has a like object in view to the last, and carries it out most effectually.

Fox's Metallic Saddle Block.—In this metal takes the place of wood, the saddle block consisting of a strip of iron, which rests in front on the spring, goes horizontally backwards some 6in., bends sharply down to the spring, and is then continued another 2in. along it. The saddle is screwed on to the first portion, and, by means of two adjustment screws at the back, can be set at an angle, either flat for safety or tilted up behind for comfort.

Starley's Saddle Tilt is a very neat and ingenious device, and at the same time a most useful one. It consists of a sort of staple

with nuts and a cross-bar fastening it to the top of the spring. There is also a small S shaped strip of metal, the curved end of which passes under the afore-mentioned holder, whilst the other,



STARLEY'S SADDLE TILT.

which is flattened, serves for the attachment of the saddle in the usual manner. By slackening the nuts of the holder the position or tilt of the saddle may be altered to any desired degree, and retained in that position by once more tightening the nuts. The advantage of this is apparent at once, as much of the uncomfortableness of a saddle is often due to its being placed upon the spring at a slightly wrong angle, and with the exact adjustment of this, a saddle should prove far nearer perfection than it would be without it.

The next part of the machine is

THE STEP,

in which there is also some little variation. It is, of course, used for mounting and dismounting, and should be placed at just such a height that the rider can reach it easily from the ground, and also with equal facility from the saddle. Sometimes a double step is used, in which case the second is placed some 4in. to 6in. above the first, on the right-hand side of the machine. In the many low or safety types of bicycle that have come before the public during the present season, the step is variously placed according to the design of the machine. In those of the ordinary or "Kangaroo" pattern, however, much absurdity is, in many cases, shown in the placing of the step. It is put at the bottom of the backbone, just clearing the back wheel, and as this latter is larger than usual, the step is often quite as high as on an ordinary, whilst the saddle being so very much lower, the result is most awkward. The right position for the step on the safety is either on a dropped rod attached to the back fork, or made as a continuation of the back wheel pin, and certainly not

more than a foot from the ground. Ordinary steps are on the left, and are fixed to the backbone; they are of two kinds, the most ancient of which is

The **Circular Step**, consisting of a circular plate of iron about the size of a florin, flat, and roughened at the top. Sometimes the circle is made hollow and bolted straight to the backbone; this is a neater plan than the other, but by far the neatest and most generally used is

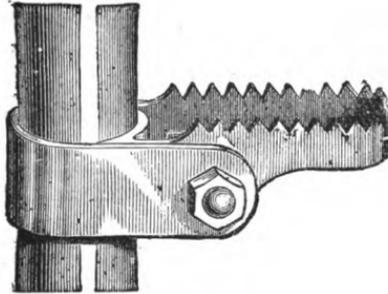
The **Saw Step**, which consists of a flat iron pin having its upper surface filed into teeth, as in a rat-trap or saw. It is very good, being neater and lighter, as well as giving a much safer and quicker footing than the former; it has numerous varieties, some having two bars side by side, and so on through many slight alterations in shape, the most usual and best resembling a gouge with serrated sides. In both these methods the step is fixed, so that, should it happen to be placed at an unsuitable height, nothing is left but to have a second step, or put up with the inconvenience. This is obviated in the adjustable steps, of which there are several.

Harwood's Detachable Safety Step.—This is a step of the saw variety, but the saw-teeth are not cut right through to the edges of the step, but form a serrated centre to it, the teeth also pointing inwards. This gives the roughening necessary to secure a firm hold, whilst the outer edges of the step being smooth, it is not likely to lacerate the clothes or limbs of the rider should he slip in mounting or dismounting, or in any other way come in contact with it. It is secured to the backbone by a circular clip, with cross-bolt and nut drawing it tight.

The **Acme Adjustable Step**, as its name implies, is adjustable to any height on the backbone. It consists of a ring of flexible steel, bearing the step on one side and divided on the other, the two ends being drawn together with a thumbscrew and nut. Its use is to form a readily-adjustable second step (which can, of course, as well as the first, be fixed at a suitable height on the backbone), the fixed one being placed very low down in order to decrease the number of hops to be taken in mounting. It answers its purpose well. Very similar is

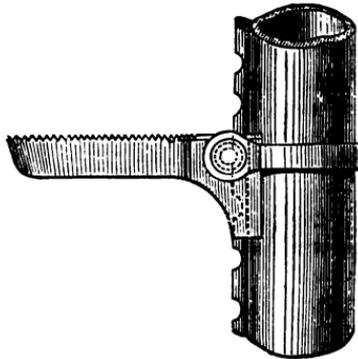
Hughes's Adjustable Step, consisting of a strip of sheet steel, thin in the centre, and bent round the backbone, around which it is tightened by a screw. The ends are saw-edged, and give a firm hold to the foot. The whole is neat, light, and readily adjustable.

Hillman's Adjustable Step consists of a waist or band of steel passing round the backbone and ending in two slots. Between the slotted ends a second portion fits, this taking the form of an oblong hollow serrated frame, curved on the interior so as to fit the backbone. A taper bolt and screw passing through the slots draw these two parts tight together, and hold it upon the backbone.



HILLMAN'S ADJUSTABLE STEP.

Rucker's Adjustable Step is somewhat similar in outward appearance to the last, but, as will be seen from the illustration, a strip of metal with horizontal slots is fastened to the backbone. The inner face of the step is made with a groove in which the strip fits,



RUCKER'S ADJUSTABLE STEP.

and the bolt, passing through one of the slots, binds the whole together, and makes it a matter of absolute impossibility for it to slip. There are five points of adjustment.

Jeffery's Rubber-clothed Adjustable Step is from America. The step is of the circular class, the foot-piece, however, being covered with a neat little cap of indiarubber. It rests upon a short



JEFFERY'S STEP.

stalk springing from a foot or block with square ends. On these squares the ends of a clip encircling the backbone fit, and are there

secured by screws. The foot is pierced with a hole at right angles to its length, and a screw passing through this jams the clip tight against the backbone, and holds the step in any position desirable upon it.

At one time there were quite a number of varieties in steps in use by various makers, and particulars concerning these are given in earlier editions of this work, but the simpler forms have survived, and the saw, in more or less modified forms, is now the most universal and almost the only one used.

BRAKES.

With the parts previously described a racing bicycle is complete, but to form a roadster, a brake of some sort is required if any touring is to be done or steep hills descended. Many riders do without them, but all who have had any experience now find a brake indispensable. From time to time a large number of varieties of the brake, some of the most complicated kind, have been introduced, but, with very few exceptions, they have disappeared from daily use before the merits of that known as the "Double-lever Spoon," which is now almost universally adopted as the brake *par excellence*. The points to be sought for in the selection of a brake are—1st, facility and rapidity of application; 2nd, great power; 3rd, capability of gradual and continued application; 4th, safety in use, or non-liability to throw the rider; 5th, simplicity; 6th, reliability, having no weak points; 7th, neatness and lightness. The last, however, is quite a secondary object, and, provided the other points are gained, should be left out of calculation entirely. In the use of the brake too much must not be expected of it, and it must be remembered that the object of a brake is not to pull the rider up sharply in the middle of a hill when going at 20 miles an hour or more—for such is impossible in combination with safety—but to check the impetus of the machine to such an extent that the control of it is not lost, and a dismount easily effected at any time. The first I shall describe is a natural one, and should be mastered by all riders, as a fall-back in case of the failure of, or for use in combination with, a mechanical brake. I refer to

Back Pedalling, which consists in applying the pressure on the ascending pedal, instead of the descending one, as in the act of propulsion. It requires a little practice to get into; but when learnt, a bicycle can be kept in hand down pretty stiff hills by its use. It has an advantage in being entirely independent of any mechanical contrivance, but in power is equal only to the strength and skill of the rider, and should his feet get jerked off the pedals, he has nothing to fall back upon. Of mechanical brakes there is now but one class, viz.—

Front Wheel Brakes, those acting on the rear wheel and upon the ground having quite gone out of fashion, never now being fitted by any maker, although, of course, in use upon antiquated machines.

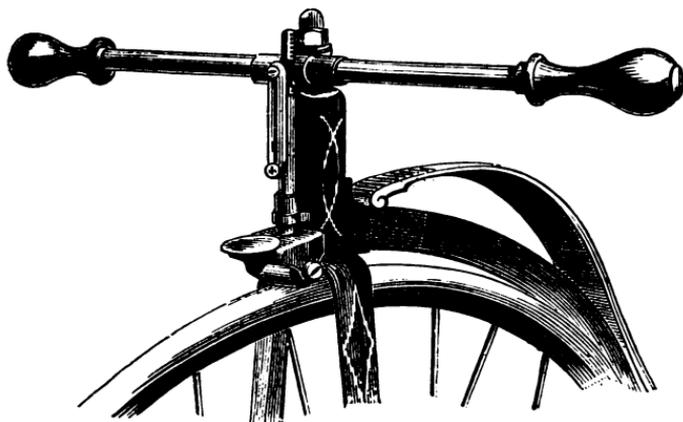
Front wheel brakes are applied in several ways, the medium of contact with the wheel being either a metal roller or a flat "spoon," the latter being the simplest and most powerful, whereas the former does not wear the rubber quite so much, which is about the only thing that can be said in its favour. These brakes, *in inexperienced hands*, are dangerous, as, unless caution is exercised in their gradual application, a "cropper" is almost a certainty—*i.e.*, with most of them. In using them the rider should always sit well back in his saddle, or, better still, make use of a shifting one, and apply the brake gently at first, gradually increasing the power in inverse proportion to the speed of the wheel, until the required slowness is obtained.

The Double-lever Spoon or "D.L.S." Brake.—This acts with a spoon on the wheel, said spoon forming the forearm of a bent lever pivoted just above the wheel; at the top, and placed along in front of the handles, there is a second but straight lever, having its fulcrum on the handle-bar close to the head. In action it is pulled towards the rider with the finger or fingers of the right hand, whereby the shorter arm of the horizontal lever is moved forwards, imparting a similar movement to the top of the lever, which of course forces the spoon at its other end downwards on to the wheel. It is very powerful, and can be applied with great nicety if required. As a rule, the horizontal lever is very unscientifically fitted, and in consequence, although a sudden application will throw the rider over the handles, the strain upon the wrist and fingers is so great that the descent of a long hill will render the hand almost powerless before getting half way down. This can be remedied by scientific fitting, the fulcrum being close to the head, and the handle extending almost to the end of the steering-bar. In one or two instances two horizontal levers are used, so that one hand can be relieved by the other when tired—an excellent arrangement. The construction of the spoon, too, should be carefully attended to, and it should have a bearing surface of *not less than* $2\frac{1}{2}$ in. on the rubber, so arranged that it shall touch evenly throughout, the heel of the spoon being about 1 in. from the front of the head. When accurately and scientifically fitted, the "D.L.S." brake is undoubtedly the best brake in use, and, as a matter of fact, the one or two varieties which follow are almost out of the market, so little are they now used. In them the power is applied by turning the handle itself, which is made to revolve for the purpose. Of these

Stassen's Eccentric Brake consists of a vertical rod placed in front of the steering-gear, with a roller at the bottom, worked up and down by means of an eccentric fixed on the handle.

Timberlake's Ratchet, or Rack-and-Pinion Brake, consists, as before, of a roller at the base of a vertical rod running through guides immediately in front of the steerage. The back of this is cogged, and the handle corresponds, so that by turning it either way

the brake is elevated or depressed accordingly. It is a great favourite with many of our metropolitan riders. The accompanying illustration gives a very good idea of it, and shows the rubber band in front by which it is kept up from off the wheel when not required for use.



TIMBERLAKE'S RATCHET, OR RACK-AND-PINION BRAKE.

Ash's Leader Brake is likewise applied by means of a ratchet, the brake rod sliding up and down within a cylinder fitted in front of the head. By means of a neat little catch, however, the brake may be released immediately at will, whilst, if desired, the handle may be left go, the brake remaining full on ; or, when the brake is not in use, the handle may be fixed, and so converted into a rigid handle. It is a most ingenious contrivance, being both powerful, safe, and useful.

These last are each provided with a guard or shield over the roller, as that article has an unpleasant knack of throwing the mud or dust in a beautiful cascade over the rider's head, face, and shoulders, and as they all require delicate application, should be used carefully by a beginner.

The next items, and very useful ones too, which, although now but rarely fitted to the ordinary bicycle, are being more and more used every day on machines of the Safety class, are

FOOTRESTS.

Many riders do without them in order to dispense with their weight ; this is, however, with most kinds, exceedingly trivial, and certainly does not counterbalance the amount of comfort obtained by their use. Some object to them as being in the way, but if neatly fitted they are not so ; others again do not care for their appearance, and they certainly do not, in general, improve the neat looks of a bicycle. Their object, as their name implies, is to provide a resting-place for the feet, when not required for the propulsion of the machine, and although they are now almost out of fashion, still anyone who

has done much touring will know their great use. If made detachable they can of course be taken off for ordinary "round about" riding. The class at one time most common on the ordinary bicycle, viz., toe-rests, or little projections on the fork sides, has now entirely disappeared, except in one or two of the independent steering safeties, in which the principle is carried out in a fuller manner.

As with the brakes, a natural plan is used by most riders now-a-days. This is, putting the **Legs over the Handles** and supporting them there. This, of course, can only be done on a machine with low handles, as now built. The advantages of this method are that, should the rider happen to meet with a spill, he most usually alights on his feet, clear of the machine; against it, it is urged that the weight of the legs, being placed over the front of the wheel, brings so much more weight on the wrong side of the axle, whereby that most undesirable event—a cropper—is more easily brought about. Some practice and a little confidence are required before the bicyclist can descend a hill in this manner, as the balance is so much harder to keep when the whole weight is right on the top of the machine, and no assistance is obtained from the legs.

It is at best, however, an uncomfortable method, and, in my opinion, based upon an extended experience of both plans, the use of footrests is vastly to be preferred.

Footrests proper have practically now no variations worth recording. They consist of rods of greater or lesser length, either straight or curved, for the sake of symmetry, attached either rigidly or by a nut and bolt—hence detachable—to the fork sides, or in safety bicycles to the bearing boxes of the front wheel, these rods having shorter ones, usually clothed with rubber, at their most forward ends, at right angles to themselves, thus forming broad, comfortable rests for the feet. Singer makes a detachable form for attachment to the forks of ordinary bicycles, but I believe no one else now caters specially for the wants of cyclists in this direction. As a rule, when properly fitted and of the right length, they are most comfortable, though too much weight should not be allowed to rest upon them, and the rider should sit well back upon his saddle, or otherwise too much weight will be thrown forward of the axle, the back wheel will be tipped up, and a possible cropper ensue.



ACCESSORIES.

Under this head come a large number of articles, both large and small, some of which, such as the wrench and oilcan—and, now that the bye-laws require them, lamps and bells—are necessities to every bicyclist, whilst others are of much use for special purposes, but can be done without by most riders, according to circumstances. Taking first the most important, we come to the

WRENCH, OR SPANNER.

In this we find great diversity. The use of the wrench is of course to keep the machine in order, by adjusting the various nuts and bolts with which it is kept together. The *desiderata* in a wrench are, that it should be light, neat, strong, both as regards power and construction, and that it should easily, quickly, and firmly bite all the nuts. There are two classes of wrench, viz., the adjustable and the unadjustable, each of which has numerous variations. Commencing with the latter, we come to

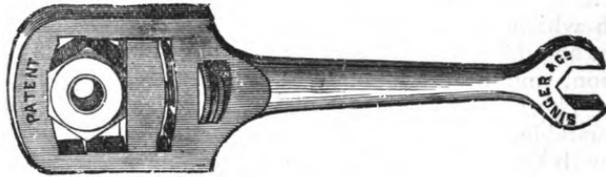
The **Flat Wrench**, which is made of a flat iron or steel plate, with holes cut either in the middle or on the sides and ends for the different sizes of nuts. They are usually made specially for the machine with which they are supplied, and will fit few nuts on any other; they are in general handy, neat and strong, and do not slip from the nut if properly made to fit. If well made, with holes for each size of nut, they are excellent; but very often a bicyclist will have one unfortunate nut on his machine with no corresponding recess on the spanner for it; or may be, one or two don't quite fit, in which case it is a continual worry and annoyance until a new wrench is procured.

The next class (adjustable wrenches) has rather more varieties, the commonest being

The **Screw Wrench**.—This consists of a stout rod, with a worm cut on its upper end, and surmounted by a flat hammer-head, with flat under surface. On this worm—which is flat or square-sided—another block slides up and down, being pushed into position by means of a separate screw beneath it. By shifting the position of the under piece the width of the spanner may be adjusted to fit any sized nut. The great objection is that it is wanting in firmness, and when the power is applied the jaws of the wrench are apt to open and slip off the nut, much to the detriment of the user's fingers and temper, besides spoiling the edges of the nut and taking a long time to adjust properly. There are several patterns of this kind of wrench in use, which differ but little from each other; and there are, besides, one or two specialities in wrenches which are worthy a separate description. The first of these is

The **Challenge Wrench**, of which an illustration is given. As will be seen, it consists of an oblong frame at the end of a hollow rod, within which a screw is worked up and down by means of a milled roller, as shown in the sketch; by working the screw up, a flat bar sliding in the frame is pressed against the side of the nut, the wrench having been first placed upon it. The whole article is neat, compact, well made and strong; it is 6in. in length, and has a small jaw cut on the smaller end for the adjustment of the smaller nuts in awkward positions. When once adjusted to the nut it is impossible for it to slip off, on account of its having a bearing all round. It takes any sized nut from 1½in., but cannot be used on

nuts in corners and other awkward positions, unless the small jaws on the end will fit them. So far, it is out and out the best wrench yet invented. It is not too heavy, but just heavy enough to be most



THE CHALLENGE WRENCH.

useful. I have had one in constant use for six years, and am never comfortable when riding without, for I always know it can be depended upon, which is more than can be said of the majority of wrenches.

Bown's Patent Wrench consists of a hollow shaft working for about two turns of the thread upon a short screw immediately below an upright "jaw." Upon this slides at right angles an angular second jaw, which is kept in its place by the shaft. In order to adjust it, the shaft is loosened as required, and the jaw-piece is enabled to work into position on a taper slide, being held in its place by once more re-tightening the shaft.

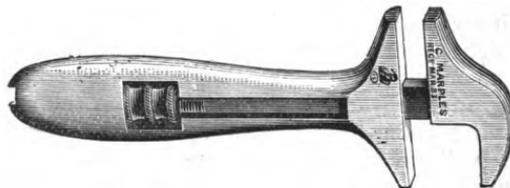
The **Yankee Wrench** is a very neat little affair, made entirely by machinery. It is made on the same lines as the ordinary screw wrenches, having a slot cut down one side of the body, in which a



THE YANKEE WRENCH.

slide, holding the upper jaw, works. Its chief merit is that, being well and accurately made, and properly hardened, it does not slip, although it is not quite long enough to obtain great power.

Turner, Naylor & Marples's Duplex Wrench is constructed on very much the same principle, and is almost identical with the last, the difference being that it has a double jaw, that is to say, jaws projecting on each side the metal, one side being cut away

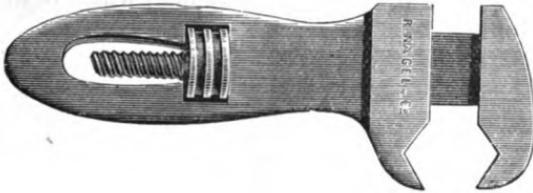


THE DUPLEX WRENCH.

some half inch, so there is always upon that side an opening of that width. The use of this is, that if a large nut has to be adjusted, the

wrench has not to be screwed out so far, whilst if a small one has to be effected the other side of the wrench can quickly grasp it.

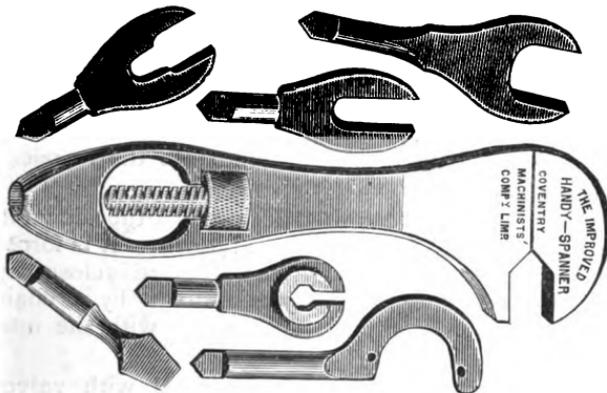
The **Lionmouth Wrench** is also upon the same lines so far as adjustment is concerned. In place, however, of the usual parallel faces to the grips or jaws, these latter are angular, being so arranged as to take the angles of a hexagonal nut, the effect being to grasp a nut upon four sides, or rather at two angles, in place of upon two sides



THE LIONMOUTH WRENCH.

only. This gives a firmer grip, and also makes it impossible for the wrench to overstrain and slip off, as the majority of open-jawed adjustable wrenches do when heavy pressure is applied. The only objection to its use is that it is not much good on any other than hexagonal nuts, though nuts of other shapes are not often used on the bicycle.

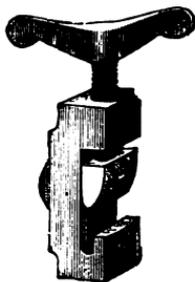
The **Improved Handy Wrench** of the Coventry Machinists' Co. is built much on the same lines, as far as the body of the wrench is concerned, and is adjustable to take the larger nuts, the smaller sizes being cut on separate pieces, as well as a screw-driver and several special tools, which all fit into a square socket on one end, and by that means can be easily inserted into awkward places. It is, as its name implies, extremely handy, but care must be taken not to lose any of the separate portions.



IMPROVED HANDY WRENCH.

Brazier's Direct Spoke Tightener is a neat little instrument, providing at once the handiest and most efficient means by which

these bugbears to beginners may be "laid hold of" and adjusted. It consists of a solid metal block, in shape resembling the half of a hollow square, with the outer edges rounded off, and a corrugated groove at the bottom angle of its inner surface. Through the back of the tool a slot is cut, by which a small wedge-shaped slide is secured, and the top is drilled and tapped; a thumb-screw working in the worm thus made forces the slide down upon the spoke—which is placed in the groove—and grips it fast, when it may be easily turned and adjusted.



BRAZIER'S DIRECT SPOKE TIGHTENER.

The next all-important article to the bicyclist is the

OILCAN.

This little article has very few variations. That most useful and in general use is the "Goodenough," and imitations of the same. It is made of tin, and is about the size of a large watch, thus fitting easily into the pocket or pouch; it is fitted with a brass nozzle $1\frac{1}{2}$ in. long, having a cap to screw on the end for the purpose of keeping the oil from coming out, and is also provided with a leather washer between it and the can itself for the same purpose. Both sides spring when pressed, by which means the oil is injected into the bearings. These are the best in use. Some of superior quality are made entirely of brass, whilst the chief alteration in other kinds is that of having short thick spouts, and with some only one side is made to spring; and quite recently, owing to a suggestion in *The Cyclist*, some have been made with a pin soldered into the nozzle, whereby the spout is prevented from clogging.

Price's Patent Telescopic Oilcan has a tube down its centre, into which the spout slides when pressed down. It is forced out by a spring, and when down out of sight the aperture is closed by a screw cap, which is attached to the body of the can by a chain. This makes the oilcan more compact, does away with the nozzle, and takes the spout out of the way.

Bown's Pneumatic Oilcan is provided with valves in the interior, preventing the escape of the oil until pressed; this admits of the entire abolition of the usual screw-cap on the end of the nozzle, which is apt to get lost, to fall down in the dust when using,

or even occasionally to work loose and allow the oleaginous contents of the can to emerge from its recesses and spread themselves over the interior of the valise or pocket.

The **King's Own Oiler** is of the usual shape, but the inside is supported by pieces of tin placed so that, whilst allowing the necessary spring of the sides to eject the oil, the sides are prevented from coming sufficiently far in to catch over and lose their spring, as is occasionally the case with ordinary cans. Another feature of the



THE KING'S OWN OILER.

can is that no top screw is used, there being in place thereof a small tap with which the flow of oil can be instantly turned on or off at will. This saves much time. It is, however, always well to have a pin handy to clean out the end of the spout, which is quite unprotected.

Leeson's Hinge-top Oilcan.—The body of this can is the same as those in ordinary use, but to the top is attached a fork hinged to the base of the spout, and passing over the top of the spout is there provided with a worm in which a screw works; the end of this



LEESON'S HINGE-TOP OILCAN.

screw, being hollow, fits over the top of the spout, and by unscrewing this and drawing down the hinge the can is ready for use. The

great advantages are that the top can never be lost, that the hinge when brought down at right angles to the spout forms a lever for tightly screwing it on, and that the nozzle end is always kept free from dust and dirt.

Price's New Patent Oilcan.—In this also the cap cannot be lost, but for the simple reason that there is none. The spout, which is of a rather larger diameter than usual, is parallel throughout its whole length, and is attached to a hollow nut with milled edges. This nut has a hole in one side which communicates with the top of



PRICE'S NEW PATENT OILCAN.

the spout, and a spring on the inside keeps the spout entirely closed. On screwing the spout downwards, that is to say, farther into the can, the hole in the side of the screw is exposed for the entry of the oil; but on reversing the action, and, as it were, unscrewing the can top, the hole in the screw is brought upwards between leather washers, which entirely prevent the ingress of the oil into the spout.

The Combination Oilcan.—This measures some 4in. × 3in. × 1in., and is designed as a combination of the several oily requisites. One end contains a supply of lamp oil, whilst the other holds in a side chamber with flexible sides a supply of lubricating oil, which is ejected into the bearings from a nozzle attached thereto. By the side of this an aperture opens into a chamber for matches, and another chamber is made to contain spare wick. It is neat and compact, and very useful.

The Salisbury Reservoir is an invaluable companion on a long tour—on the Continent especially—as it holds as much as half a dozen ordinary oilers, and fits nicely in the saddle valise. It is in shape very similar to an ordinary phial, being about 4in. long and 1in. in diameter, and fitted with a brass screw-cap and leather washer.

The King's Dram Flask is another useful article of same nature. It is a flat tin case, and holds in one end a supply of lamp

oil in a large compartment, and at the other is a dry compartment with hinged top to contain matches, and also a smaller store place for paraffin, provided with a rod and tuft of cotton wick with which to touch the lamp wick preparatory to lighting. This contrivance is an accessory to the lamp, and not to the oilcan as is the last.

LUBRICATORS,

being closely connected with the oilcan, come next. They are simply small reservoirs, and their use is to keep a supply of oil in juxtaposition to the bearings, so that on a long journey they may not require frequent oiling. Most machines have holes drilled through to the bearings for the application of oil, and some makers insert a screw or plug therein to keep out the dust. It is into these holes the lubricators are screwed. They are of several kinds, the neatest being

Cup Lubricators, which are quite artistically designed, being a small brass cup with a screw-cap, the whole in shape after the pattern of a low vase.

Pillar Lubricators are not nearly so neat or handsome, being simply short cylinders of brass with screw-caps. These both have a simple hole drilled through them downwards at the bottom, but

Spring-top Lubricators have their covers hinged to them, and pressed down tightly by small and neatly-fitted springs; they are A1, as with the ordinary ones it is rather a nuisance unscrewing and again putting on the tops, which operations, beside making the fingers generally dirty, occupy some little time, and the tops are liable to get lost.

Somewhat similar are

Bown's Spring-cap Lubricators, in which a hollow cap fits over the top of a pillar lubricator, being attached to the same by a coiled wire spring in the interior. In oiling up, the cap is lifted, the oil put in, and the cap allowed to resume its original position.

Even better still than these are

Valve Lubricators.—They consist of ordinary lubricators, with solid tops, which latter have small holes in their centres, large enough to admit the nozzle of the oilcan. Inside, short coiled springs force plugs upwards into the holes above, and so keep out the dust. To fill them, all that has to be done is to press down the plugs with the top of the oiler, and inject the oil into them.



THE RAPID LUBRICATOR.

The Rapid Lubricator, as will be seen by a reference to the

G

10000

illustration, is bulbous in shape. The top is screwed on, and has an aperture at one side to admit the nozzle of the oilcan, which aperture is kept closed, and only opened when requisite by a slight turn of the top. Whilst speaking of the oilcan, I must not forget to mention



CHALLIS'S POCKET OILCAN CASE.

Challis's Registered Oilcan Case, which is simply a useful pouch of leather, with flap and button, in which to carry the oilcan, if by necessity or inclination it be carried in the pocket.

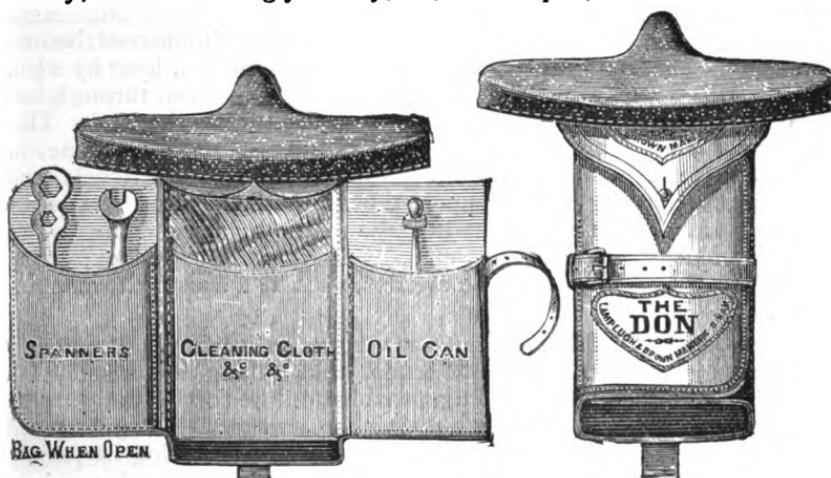
Another necessary is

THE SADDLE VALISE,

or pouch, in which the wrench, oilcan, and sundry odds and ends are carried. Of course, these articles *can* be stowed away in the pockets; but a pouch is so convenient and cheap that few do without it, as pockets stuffed full are extremely in the way, besides being untidy. It is also not over pleasant for the top of the oilcan to come off—as it does sometimes—and pour out its oleaginous contents into one's pocket. Valises are of several kinds—the best are made of good leather, with zin. side and bottom pieces, so as to enable them to hold a decent amount; they are fastened by a couple of straps and buckles to two staples fixed behind the saddle, so that they can be easily taken off if required. In some saddles—cheap ones, usually—the saddle pouch is sewn on the saddle itself, and consists simply of two flat pieces of leather, sewn together at the edges and fitted with flap cover; these are, however, far too small, as it is with much difficulty the oilcan and spanner can be stowed away, let alone other things. The most useful of the common kinds have wide side pieces, a pocket inside for the oilcan, and a spring fastening in place of the usual button and strap; but the best saddle valise of all is

The Don Tool Bag.—As will be seen by the accompanying sketches, it is composed of three sections of leather, each containing a pocket on the inner side. The central or main section holds the straps for attaching to the saddle, and also has a top flap or cover attached to it. The tools are each put into separate pockets, and

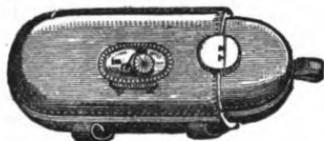
the two sides folded one over the other, the top flap being then brought down and a strap buckled round the whole. It is neat, roomy, and exceedingly handy, as, when open, the tools are "all



THE DON TOOL BAG.

there," and can be got at at once without difficulty. Another good valise is

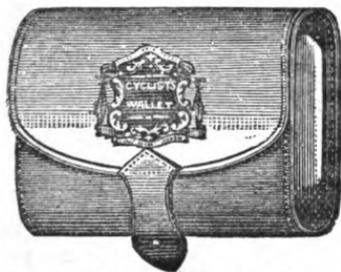
The **Handy Bag**, a very neat construction of stiff leather, much resembling an enlarged cigar case, and provided with separate



THE HANDY BAG.

receptacles for spanner and oilcan strapped sideways behind the saddle. It opens at one end, one case fitting inside the other, and the whole made secure with a spring fastening.

The **Cyclist's Wallet** is a very neat and useful appendage. It



THE CYCLIST'S WALLET

is somewhat larger than the usual run of saddle bags, and is made with stout stamped ends, so that it does not collapse. A pocket inside holds the oilcan, and it is made of only good leather, which is an extra recommendation.

Phillips's Handy Luggage-carrier is a very simple contrivance, consisting merely of a piece of stout leather some 8in. long by 2½in. wide, with a strap at its back and a couple more run through two holes at each end, so as to leave a loop projecting at the back. This loop passes over the handle-bar of a Humber-pattern machine, or over any convenient part of the frame of an ordinary tricycle, and the luggage being placed upon the leather, the side straps are tightened, and thus secure the luggage to the holder and the holder to the tricycle at the same time. It is very light and extremely useful for the carriage of small articles, such as a waistcoat, mackintosh, etc.

The **Barrel Valise** is another very useful variety. It consists of stout leather with two round ends, thus taking the shape of a barrel or cylinder, a flap being provided on the top for the purpose of packing; this is secured by a spring cap, and the whole is fastened to the saddle by straps. Bicyclists who do much touring frequently find it necessary to carry much more than can be stowed away in the small article above described, and in order to meet their wants, several expedients have been adopted, and various styles of bag introduced. These are as follow:—

The **Multum-in-Parvo**.—This useful bag, the invention of M. D. Rücker, of the London B.C., has now a great name, and may fairly take place as one of the best in use. It is made in two sizes (No. 1, 12in. × 7in. × 4in., and No. 2, 12in. × 6in. × 4in.), and is constructed of waterproof canvas with two straps below, by which it is fastened to the backbone and spring, and a pair of straps at the upper end, which buckle to the staples beneath the saddle. As, of course, a saddle pouch cannot be used as well, and it is scarcely advisable to pack the oiler, etc., inside with a change of clothes, both on account of the danger of spoiling those articles and because they are in constant requisition, a separate receptacle is therefore provided for them at the bottom. To "get inside," a strap is provided, fitted with buckle. It will contain a surprising quantity of clothes when carefully packed in; it fits on the backbone and spring-tail just behind the saddle. The points argued against it are that it is in the way in mounting and dismounting, and places the weight behind the rider; those for it, that it is neat, handy, and compact, and that it can be taken off bodily on stopping at an hotel. An accessory to this very useful appendage is

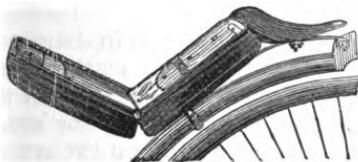
The **M.I.P. Holdfast**, a solid leather clip or clamp, which takes the place of the ordinary two upper straps, fitting on the backbone just below the spring. It is secured from loosening by a brass thumb-screw and bolt, and serves well to prevent the bag from slipping about, keeping it firm to the machine and taking much of the weight off the top straps.

Lamplugh & Brown's Serviceable Multum is neither more nor less than a "Multum-in-Parvo" of the pattern described, and fitted with the "M.I.P. Holdfast." Its speciality lies, not in the pattern, but in the quality of manufacture, all the straps being hand-sewn and backed, thus almost absolutely preventing the danger and annoyance caused with the ordinary "Multum" by the straps coming off. The back, too, is protected by a piece of real "butt" leather from wear upon the backbone, and a handle is also provided at its upper end, wherewith to carry it as a bag when off the machine.

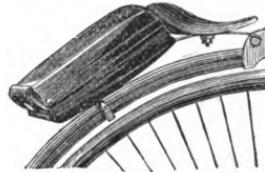
The **Saturday-to-Monday Bag** is simply a miniature of the "M.I.P.," and is intended for short tours, being especially suited to meet the wants of those who, being in business all the week, set off on Saturday from town, visiting friends at a distance, and returning to business on Monday morning.

The **Cambridge Bag** is, in reality, a combination of the "M.I.P." and "Saturday-to-Monday," and may be described as a "Saturday-to-Monday" bag sewn on to the lower end of a "Multum," with the usual double pocket for tools attached below all. Instead of straps at the top, it is provided with stout hooks, and one of the chief features is an attachment to the spring, the supporting wooden cross-bar at the back being cut away in the middle and a hinged brass bar fitted to fall across it and enclose the spring, the loose end being held fast by means of a thumb-screw and a bolt. This takes all the strain from the hooks, and keeps the bag beautifully steady and firm. The idea of the double bag is, of course, to provide more especially for long and Continental tours, for which it is admirably suited.

The **Clytie**, in outward shape and size, resembles the "M.I.P.," but instead of opening in the usual manner, it is constructed, as will be seen by reference to the annexed illustration, somewhat on the principle of a portmanteau, being hinged at the lower end and opening from top to bottom, and is well provided with pockets. It recommends itself for convenience of packing and getting at any article desired, as well as for its being provided with a lock and key, and made of black leather, which is easily washed and kept clean.



Opened.



Closed.

THE CLYTIE TOURIST'S BAG.

Spurrier's Bicycle and Hand Bag itself consists of a set of straps and a large sheet of waterproof cloth, in which the things taken are wrapped and strapped together into almost any sized parcel desired, the straps being made with a handle coming at the top, by which the bundle may be carried. The chief novelty about the affair

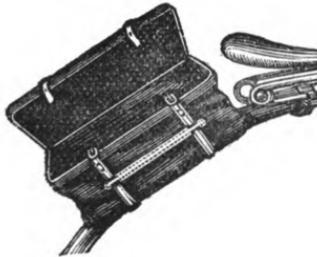
is the manner of attaching to the machine, and for this purpose two clips are fastened a foot apart upon the backbone, these being provided with flat broad hooks. A cross of flat steel is secured to the bottom of the bundle by passing the straps through suitable slots



SPURRIER'S BICYCLE AND HAND BAG.

therein, and this cross is provided with corresponding sockets into which the hooks fit. The luggage, therefore, may be attached to, or detached from, the bicycle in a second by merely slipping it off the hooks, where I may mention it is kept firm by the curve of the backbone and the spring of the supporting cross.

The **Fit-all** is a combination of the last two bags, being a bag on the principle of the "Clytie," fitted to the backbone like the last one,



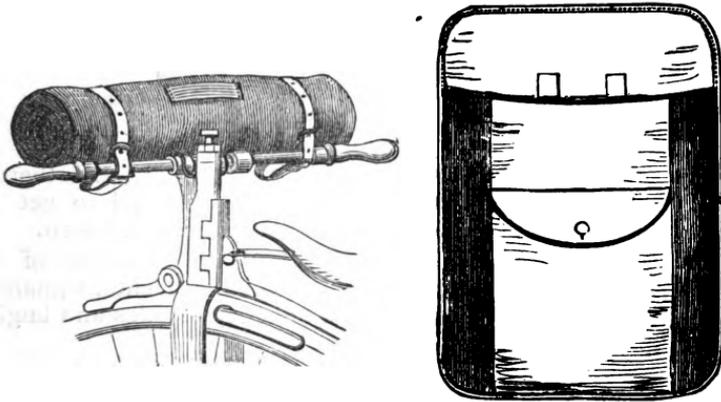
THE FIT-ALL BAG.

as well as being supplied with the necessary paraphernalia for use as a knapsack. For small quantities of luggage, the

Handle Bag is very neat; it is circular, about 4in. in diameter, and from 8in. to 12in. in length. It is made of solid leather, and straps to the handle-bar in front; it is opened by a flap on the circumference. It is neat and light, and well suited for small quantities of luggage, but it throws the weight a little on the wrong side, and is in the way of the rider's legs. This last is the most serious objection.

Clare's Tourist Bag is extremely simple in construction, consisting of a flat bag of a light waterproof material, somewhat resembling American cloth, 23in. \times 18in., one side of which is provided with a large calico pocket on the outside, with flap of the same material. When flatly packed, the bag with its contents is rolled up

and placed upon a light wire frame, attached to the lock-nut of the steering gear, the whole being kept in place above the handle-bar and frame by a couple of straps. By this means it is kept up away



THE TOURIST BAG.

from the legs of the rider, although it will not allow of "legs over handles." It is very light, weighing but a few ounces, and is extremely handy, as well as cheap.

Goy's Luggage-carrier consists of an oblong skeleton plate fitting on the head of the machine immediately above the handles, being secured by a clamp placed beneath the set-screw of the steering gear, which is screwed down well upon it. On the top of this the luggage is strapped. It places the weight neither in front nor behind, but over the centre of the wheel, and is very little in the way unless the baggage is bulky; besides which it is easily and quickly removed for the purpose of packing.

The Simplex Luggage-carrier.—In this a light flat frame is bolted by a clip to the bottom of the backbone, and extends horizontally above the back wheel, a couple of light stay rods attached to the back wheel pin supporting its rearmost end. This provides a ready means whereby luggage of any shape or quantity can be packed, though, of course, if much weight is there, it is all on the back wheel, and although rendering safety certain and croppers impossible, it naturally makes the driving heavier.

The Takeabout, or Universal Knapsack, is very simple, consisting of a sheet of thin grey waterproof cloth, 2ft. square; in this the things must be folded, and the bundle made small or large, according to circumstances. When this is done, a light "back," provided with four straps, is affixed to the bundle, and the whole buckled into a neat knapsack, having web shoulder straps, whilst the "back" is provided with cross pieces of cane, which allow a passage for the air between the knapsack and the rider's back, and

at the same time keep the whole shapely and stiff. It only weighs 10½ oz., whilst the price is moderate. I find in actual use one quite



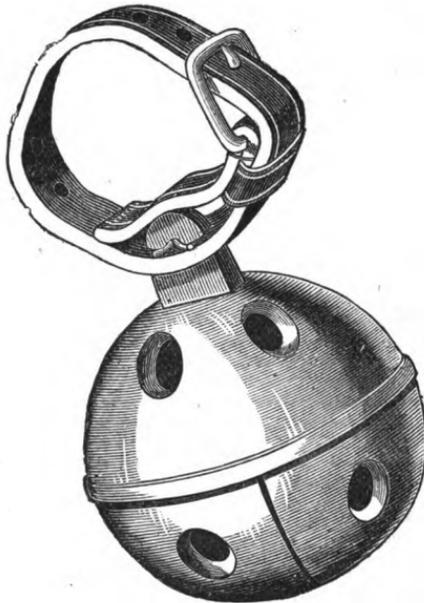
SPURRIER'S TAKEABOUT.

forgets its presence during the greater part of the ride, and there is none of that tiresome and dirty unstrapping needful to get the luggage detached from the machine before a rest can be taken.

In order to give pedestrians and others timely notice of the approach of the silent steed, and so prevent accidents, signals of various kinds are used. These consist of bells, whistles and bugles, and, for night riding, lamps. Taking

BELLS

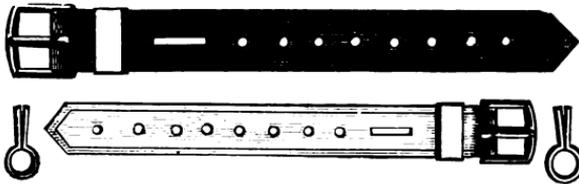
first, we find a numerous variety in use, of variable merit. They may be divided into two great classes, viz., continuous and silence-able, and as the bye-laws of the Local Government Board now require it, one of these must be used by all bicyclists. Happily, no especial pattern is specified, so one is enabled to take one's choice from the very large selection in the market.



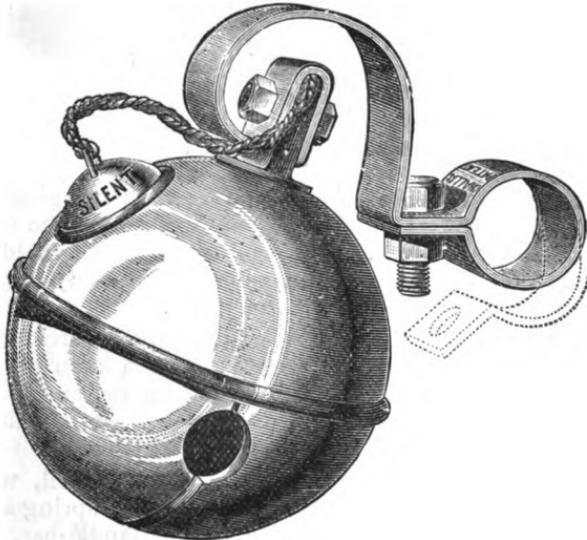
THE SPHERICAL BELL.

The **Spherical Bell** in general use is a small sphere, having a number of slits across its lower half, and enclosing an iron ball which rattles on being shaken. It is the same pattern as those used on sleighs, dog collars, &c. The loudest are those with a single division, every cross-cut decreasing the strength of the sound, but rendering it less harsh. On a long journey, its continued tinkling is extremely disagreeable and trying to the nerves. Some affix it to the step, others to the centre of the wheel; but the best place is on the handle or in the hand, as it can then be quickly silenced or put in the pocket.

Challis Bros'. Hard White Metal Bells are identical with the ordinary ones in construction, but are made of a hard white metal which looks like plated work, and emits a more mellow sound than the bronze. The makers also supply a very neat strap, at 3d., for affixing the bell to the handle-bar.



CHALLIS'S STRAP.



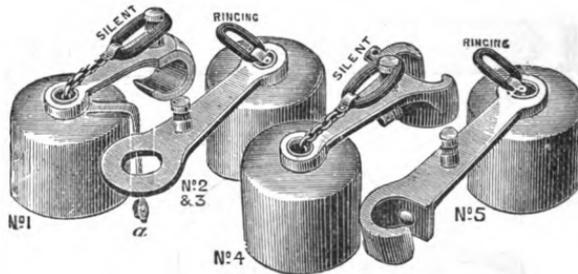
CHALLIS'S PATENT STOP BELL AND BRACKET.

Challis Bros'. White Metal Stop Bell is of the same shape, but one of the holes in the upper half of the sphere is fitted with a spring socket, into which the weight tightly and accurately fits.

The weight itself is provided with a cord and rubber spring, by which it is pulled into quietude and kept there, as shown in the annexed illustration. A touch of the finger then forces the ball again into the interior of the sphere, where it sounds forth its melodious notes *ad libitum*. The latest introduction is a zin. bell, which fully answers all the requirements of the bye-laws, and is a most useful instrument.

Messrs. Challis have also introduced a new bracket for the attachment of the bell to the machine in such a position that the best possible sound is got out of it when in action, and the full vibration of the handle-bar utilised.

The **Facile Stop Bell** is barrel-shaped, and has a hole at the top through which a short chain passes, attached to an indiarubber ring. This chain is fastened to the clapper of the bell, which is large for the size of the bell, and the whole is fixed to the frame in such a position as to bring the clapper almost in contact with the bell, in order that the slightest movement may sound it. When



THE FACILE STOP BELL.

silence is required the rubber ring is pulled, thus bringing the clapper tight up into a socket at the top, and by slipping the ring over a pin it is kept firmly in place. It is well and strongly made, gives a very pleasing loud and clear ring, does not seem likely to get out of order, and is absolutely silent when required.

The **Facile Finger Alarm** is a light spring strip bent down over the side of the bell and provided with a knob or striker at its lower end; all the functions of an alarm for emergencies are retained, making it a most perfect instrument. It is made with a special attachment suiting it to the handles of tricycles.

Harrison's Spring Stop Bell.—In this the bell, which is a spherical one, is fixed to the end of a bent piece of spring steel. The other end of this steel strip is fastened to the handle-bar, and from its point of attachment there a second strip of spring steel, bent in an opposite direction, is fastened. The other end of this second strip holds a short chain, to which is attached the hammer of the bell. A brass ring passes round the two steel strips; by pushing

this ring forward, the two strips of steel are brought together and the hammer is allowed to fall loosely in the interior of the bell,



HARRISON'S SPRING STOP BELL.

when, of course, it rattles ; but on drawing back the ring the steel springs part, and the chain being tightened, draws the weight into one of the holes in the side of the bell, through which the chain passes and keeps it firmly there in position.

The **Triplex Stop Bell** consists of a dome-shaped gong, the clapper being formed by a tripod suspended from its apex by a rod attached between the jaws of a loose piece of metal fitted at the top of the bell ; this, when placed upon end upon the flat top of the bell,



THE TRIPLEX STOP BELL.

draws the tripod clapper closely upwards and prevents it from rattling, but on pressing it down into a horizontal position the clapper is free, and there being three arms to it, the slightest movement will cause one or the other of them to touch the gong. The gong itself is fastened by means of a flexible holder to the screw fastening, which is so effected that it may be turned round to any angle to suit the angle or style of the handle-bar at will.

The **Hop-o'-my-Thumb Stop Bell** is an ingenious affair. A



*Ringin*g.



Silent.

THE HOP-O'-MY-THUMB STOP BELL.

long bracket is screwed on the handle-bar, having a socket at each end. In this socket a short stout rod works, being kept tight by a steel spring at the bottom. At one end of this rod an open-mouthed bell is fixed, and at the other a small deeply milled wheel or roller. By turning the bell mouth upwards the bell is rendered silent, and by turning it down it is allowed to ring, and may, by means of the thumb on the milled wheel, be kept in rapid motion. Its sound, however, might be louder, and this could easily be assured by having a larger bell.

Gongs are used similar to those for shop doors, tables, electric bells, &c. These are fastened on the handles, and fitted with a loose spring hammer, by pressing which, and again releasing it, the bell is rung—of course at the will of the rider only. They are neat, and give a good sound. Very handy and cheap forms of this pattern are

 The **Butterfly Alarum** and **Harrison's 1/6 Gong**, which very



BUTTERFLY ALARUM.

much resemble each other, are simple in construction, cheap, and easily and quickly fitted to the machine.

The **Imperial Lever Alarum** is likewise a single note gong. It has two especial features, one being that the hammer is internal and worked by means of a lever handle, which pushes it back to a certain distance, and then, releasing it, allows it to rebound against the bell. Its other and best feature is that of fitting the gong upon a square-headed staff instead of round, as is usually the case; this arrangement preventing the shaking to pieces, which is such a common and, indeed, the only great fault with all gongs.

Riley's Handsworth Alarum is somewhat similar to the last, striking a single note by means of a lever, the inner end of which hooks hold of the hammer end and draws it forward to a certain point, when it releases it and causes a note to be struck. I have had one in constant use some nine months, and have found no tendency whatever in it to shake to pieces.



STORMONT'S PATENT CHIME BICYCLE ALARUM.

Stormont's Alarum is a neat and effective contrivance of two gongs, placed opposite one another, on the same vertical staff. It is worked by pressing a button at the top, which in its descent works two catches and spring hammers, concealed in the interior in such a

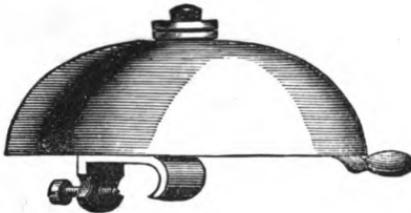
manner that one press on the button produces no less than six different soundings. Whilst perfectly silent when not required, it can in a moment at will be caused to make a terrific din, even when almost standing still; in such case, for instance, as waiting behind a cart in a narrow street for it to make room to pass.

Harrison's Alarum is one of the best in use, and is somewhat akin to the last. It consists of a single or double gong, provided with a semi-circular rack, inside which works a hammer. It screws on the handle, and by pressing a small finger-plate the rack is caused to move its whole length, thus producing about a dozen sharp and rapid beats of the hammer upon the gong. It is also made to strike upon its return to position, where it is forced by means of a spring; thus the rider can produce some twenty or more distinct peals by a single pressure of the finger. The objection to this is that the "whirr" made by the working of the ratchet dulls and confuses the sound of the gong. Harrison's latest is a large double gong some 4in. in diameter. It strikes loudly and clearly, and I have not found it show any tendency to come to pieces or get out of order.



HARRISON'S ALARUMS.

Snell's Big Ben Alarum is a single note gong of great power and depth of tone. On the cross-bar, within the bell, a mouse-trap



SNELL'S BIG BEN ALARUM.

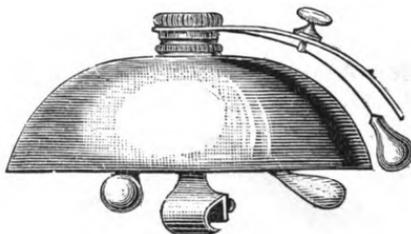
or coiled spring is placed, and two brass wires placed in connection with it, one carrying a heavy ball, whilst the other is cranked out and bent so as to form a handle, the pressure and release of which produces one loud, clear note.

Challis's Two-beat Gong.—In the interior of the gong an arc of wire is pivoted centrally. To each end of the wire a knob or hammer is attached, and a central projection rests against the end of a lever which is held firm by a spring and projects on the outside of the bell. This lever is actuated by the finger, and on being removed presses forward a piece against which it rests, thus forcing one hammer against the side of the bell, and on being released it springs

back, and the under spring of the wire drives the other hammer against the other side of the bell, thus two distinct beats are made with each touch of the finger.

Bown's New Handle Alarm.—This is constructed for use with handles of the spade variety. The horn handle is divided into two halves, the front one of which revolves upon the steel holder, and has fastened to it, just on the outside of the fork of the handle, a small brass cog-wheel or ratchet-wheel. The bell itself is screwed to the front of the handle, and this ratchet-wheel is so arranged as to engage its teeth with a small catch projecting from the side of the bell. On turning the horn portion of the handle around with the hand the cog-wheel is revolved, and as many beats are made upon the bell as the number of teeth that pass the catch. It is very useful, as it may be sounded at any time without removing the hand in any way from the handle, and is always ready for instant use.

The Combination Bell.—This is a single-stroke alarm, fitted with a spring arrangement at the top consisting of a projecting arm and slide, which supports on its under side a light spring carrying a clapper. By slackening the screw of the slide and running it to or fro in the grooved arm, the clapper may be held up and prevented from touching the bell, or let down and allowed free play, when the



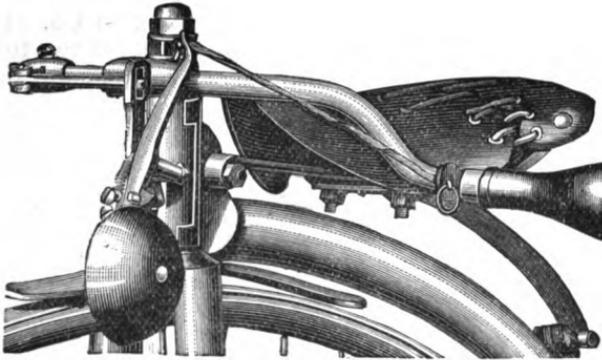
THE COMBINATION BELL.

noise it produces very closely resembles that of an electric bell. In this bell, therefore, the cyclist has both a gong alarm and the continuous style combined.

The **Clock Alarm** is fixed upon a clockwork arrangement, which, when wound up, will work the hammer at a furious rate for two or three minutes. It is put in action by pressing a button or lever, and continues ringing as long as the pressure is maintained.

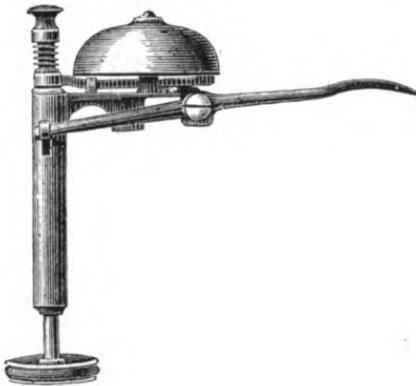
Nagel's Alarm is a most powerful one. It is of a gong shape, very large, and is struck by a hammer, which is actuated by pulling a string, thus forcing a small connection against the spokes, each of which in passing produces a distinct sound. About 1,500 strokes per minute is the average, and the sound can be heard at a considerable distance. The string, or rather leather, is attached to a ring just inside the handle end, so is always at hand, and the bell

can be instantly put into operation. It is fastened to the upright of the brake-lever.



NAGEL'S ALARUM.

The **Stanley Alarum** is on a somewhat similar principle. A rod depends at the side of the head, bearing a milled wheel at its lower end, and a revolving hinged hammer immediately above it. This hammer is arranged to strike a gong, which is fixed on a small bracket on the side of the rod. A strong spring forces the rod downwards, and brings the milled wheel against the tyre, causing a tremendous row. When not required it is pulled up by a species of



THE STANLEY ALARUM.

hook at the top, and held in a socket. It is also made to apply by means of a lever, somewhat after the style of a lever brake, as shown in the above sketch.

WHISTLES, BUGLES, AND HORNS

need be scarcely more than mentioned, any good whistle with a clear, loud note being suitable, and I will only describe one variety which has been introduced especially for cyclists' use. This is

The **Caliope Whistle**, first adopted by the Boston Bi.C., U.S.A., introduced into this country by Frank Weston's touring party, and now imported by Bayliss, Thomas and Co. It consists of a double whistle, one mouth-piece at the head of two tubes of dissimilar length, the blowing of which gives a loud, harsh, and peculiar sound.



THE CALIOPE WHISTLE.

Bugles and Horns are, of course, of various sizes, patterns, tones, and prices, and are sold at most musical instrument depôts. During the past few seasons the matter of providing specially for the requirements of bicyclists in this respect has been gone into with a considerable amount of energy by Messrs. Keat and Sons, Kohler and Sons, and a few others. The former have given us the "Buglet"



THE BUGLET.

and the "Bicycle Bugle"—the first of which is illustrated above—in both of which the bell is made oval instead of round, in order to fit close to the side of the rider without inconvenience. The latter firm have also given the cycling world a very complete instrument in "The" Bugle at 25s., which is a miniature of the Army Regulation Bugle; it is complete with cord and tassel, and all the bugle-calls may be blown upon it. Amongst horns, the best is a miniature of the ordinary post-horn, and gives a good, clear note. They are mostly used on club runs, as signals for mounting and dismounting, slackening speed, etc. An objection to their universal use is that bicyclists using them are often too fond of "blowing their own trumpets," and as they require some amount of skill to blow well, their sound in the hands of inexperienced performers is far from melodious, causing derision rather than respect. On a journey their weight is against them. In their favour it may be said that they

prove more effective than any other kind of signal, as people, who would take no notice of a whistle or bell, will very quickly look about them at the sound of a bugle.

LAMPS

are extremely useful to those who ride at night, besides which they are, as well as bells, now made compulsory in most districts. They are of numerous shapes and sizes, qualities and prices.

In order to ensure a good light, they should be so constructed as not to be blown out by the wind, and also to be proof against sudden jerks caused by the unevenness of the road; they should also give a clear flame, without smoke, and ought to throw the light well forward and over as large a space as possible, besides being neat in appearance and compact in size. To describe all the slight differences in detail between most of them would be useless; the best only, therefore, I will mention, and would here remark that it is useless to spend money on a cheap (?) lamp, as the majority of them give but a poor light or go out on the least provocation, to say nothing of the danger of their falling to pieces, and causing a bad and dangerous fall.

Head Lamps are usually hooked on by a flexible handle to a small bracket fastened to the front of the head by the lock-nut of the steering gear. This class of lamp is coming much more into favour than formerly, and is especially of use on the small-wheeled type of machine, with which the smallness of the wheel prevents the insertion of anything so large as a lamp between the spokes. Amongst the best are:—

The **King of the Road Head Lamp**, as constructed for this season, is a large coffin-shaped lamp, built on the same general lines as the hub lamp of the same name. In place, however, of the hinged front and cylinder for encircling the axle, the front is hinged only from just above the glass, whilst the method of attachment is by means of a rubber-clothed clip with side wings, through which a



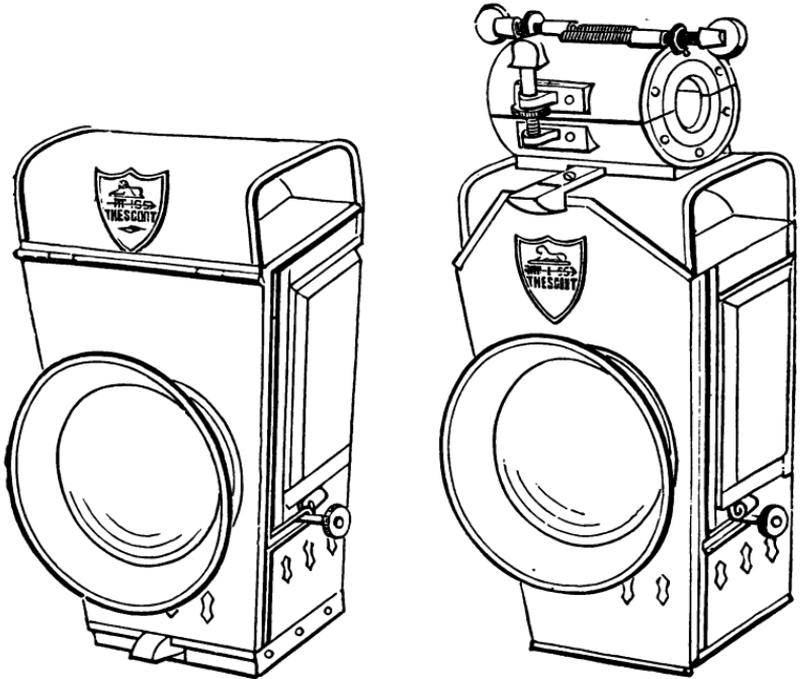
THE KING OF THE ROAD HEAD LAMP.

screw passes, the tightening or otherwise of this giving an amount of adjustment which is very desirable, enabling the lamp to be secured firmly and tightly upon the bracket, and also allowing a

H

little variation in the size of the bracket. The side lights are constructed of thick plate glass projecting from the sides, and having the front portions bevelled away; this has the effect of causing the glass to be intensely illuminated, shining like two brilliant stars in the rear. The lamp throughout is thoroughly well made in every respect, reliable, and gives an excellent light.

Hopkins's Stannic Enamel Lamps.—These are made both as hub and head lamps, the former being very much of the usual shape, save that the door fastens at the top and is hinged at the bottom, and that the halves of the cylinder are adjusted and secured by means of a bolt and nut, as shown in the illustration. Both head

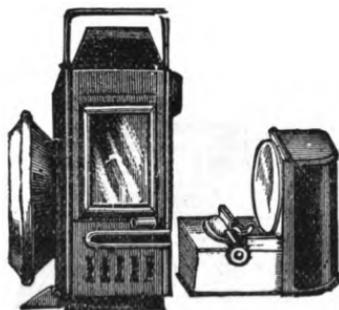


HOPKINS'S STANNIC ENAMEL LAMP.

and hub are of the general shape, but a feature in their construction is that both side lights are very large and of white glass, whilst the front is a bull's-eye, the same as that used for policemen's lanterns. The most distinguishing feature of the lamp, however, is the finishing of it, which is done in blue enamel, with a leather-like surface. This, together with plated edges, gives the lamp a remarkably fine appearance, and it is easily recognised from the others at a glance.

Fisher's Long-distance Lamp.—The main feature of this

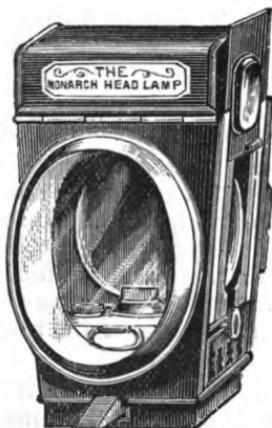
exists in the reservoir, which is upon the same principle as the water fountains used for chickens in poultry farms. The reservoir forms a back to the lamp, running right up to the top, and when this is filled, it keeps the supply just at the right height until the oil is exhausted. In consequence of the reservoir thus being two or three times the size of the ordinary ones, it will last a very much



FISHER'S LONG-DISTANCE LAMP.

longer time, burning, when fully filled, 48 hours without intermission. This is practically sufficient to last out a whole tour of ordinary proportions, with one filling.

The **Monarch Head Lamp** is an ordinarily well-made lamp with coloured side lights, plate-glass front, spring door fastener and wind-up burner. The leading feature in its construction is the provision of a small aperture on the left side, on a level with the



THE MONARCH HEAD LAMP.

wick, through which a match (lighted by striking on a roughened plate fixed below) can be thrust and the lamp lit without opening

the door and exposing the flame to the wind on a boisterous day.

The **Unique Head Lamp** may be termed a "King of the Road" upside down. The general coffin-like shape of the lamps now in use is owing to their being in the first place constructed with a view to their use as hub lamps, and thus the sides of the lamp have had to taper with the angle of the spokes. For a head lamp, however, this is quite unnecessary, and in the "Unique" the smaller portions are at the top, whilst the under portion, being very large, holds a much larger oil reservoir, this being at least double the size of those



THE UNIQUE HEAD LAMP.

in ordinary use; and another point about it is, that when off the machine, it is firm to stand anywhere without danger of being upset.

The Dioptric Lamp.—The chief feature of this consists in the reflector and front glass, both of which are formed in concentric circles of corrugations, the effect being to throw a very dazzling light which can be seen at a great distance. In other respects, the lamp has side window for lighting, wind-up burner, &c., &c.

As a general thing, head lamps are very handy to light and clean, and quickly detached for either of these purposes. Also, being high up on the fore part of the machine, they are seen with clearness by pedestrians and others, and they throw the light well ahead. They have their objections in that, in case of a fall, they are almost sure to get smashed, and they are also sometimes in the way, and besides send forth a not too pleasant odour if the rider lean much over the handles. To obviate these defects,

Hub Lamps have been introduced. In interior construction they are in general similar to those above, but, instead of being hung by the handle from the top of the steering gear, they are suspended in the interior of the wheel. The best way of doing this is by fixing them to a leather-lined split cylinder, the two halves of which are hinged together on one side, and fastened securely on the other when

fixed to the axle of the driving wheel. Some are suspended by padded hooks, but this method is one to be deprecated on account of their liability to swing off or wear through, when of course, by dropping into the wheel, they cause a sudden, unexpected, and often dangerous fall. Another plan is to fit the lamp to the axle by a hinged top, which is much better than hooks, but not so good as the cylinder, as the heat will sometimes cause the top to come unsoldered, and thus cause a fall; and on that account all hub lamps should be very carefully made, with a view to the prevention of such an untoward occurrence, and every part should be rivetted together. Objections to hub lamps in general are that they usually swing to and fro on rough roads to such an extent as to try the eyes exceedingly in following the continually changing light, whilst it also prevents obstacles being easily seen. The shadow cast by the rim is another objection, though a slight one, and the difficulty of fitting and lighting may also be urged against them. In their favour it may be said that they are at the same time out of the way and safe from damage in the event of a fall; that they are not so unsightly as head lamps, and show a strong light immediately in front of the wheel. Each of the afore-mentioned head lamps is made in hub form as well. The "cheap" varieties I will not here describe, as they are, as a general rule, worthless, and it is far cheaper, actually, to buy a decent lamp for 8s. or 10s. than to pay 4s. 6d. for one of no use whatever, and dangerous into the bargain. Of the better class hub lamps,

The **King of the Road** has set an example that has very extensively been followed in being really large. The leading features of most lamps now-a-days, viz., wind-up burner, detachable reflector, hinged front with clip at the bottom, and sliding side light for convenience of lighting, were all first introduced on the "King of the Road," and, as may be imagined, these features remain prominent in the lamps; and it has further been very considerably improved in fitting the catch-piece of the door to the bottom of the lamp in



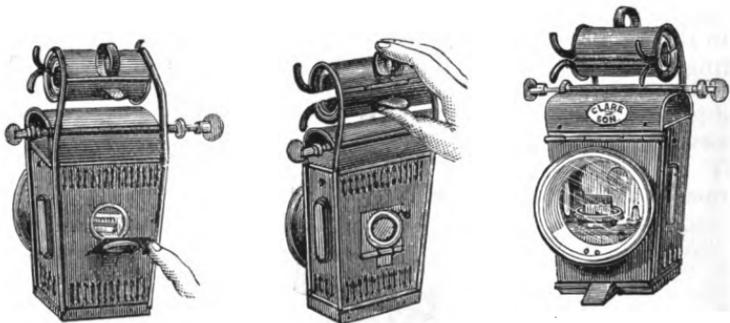
THE KING OF THE ROAD.

such a way that the reservoir can be inserted without having to keep the catch pressed down, and also so as to allow of a larger reservoir being used, nearly half-a-pint of oil being now its capacity. The

reservoir, too, is provided with a sliding oil-hole, through which it can be filled without the troublesome and dirty necessity of unscrewing the wick chamber. A further improvement consists in fitting a tube to the front of the lamp, which tube has a screw top, the latter being attached to a short pin, the end of which is provided with a tuft of cotton wick, the object of which arrangement is, the tube being filled with paraffin to touch the top of the wick, and so facilitate lighting by causing instant ignition. It is also provided with steel runners and bearings, which entirely obviate the necessity of check-rods. A single broad wick is used in place of the two that were at one time made use of, and the lamp gives a magnificent light, burns steadily, and also possesses an important feature in all the parts being rivetted together with copper rivets, no solder being used in its construction, thus making it perfectly safe when being placed inside a wheel. Although so large it is readily inserted within the wheel, as, being divided centrally, it opens out into a long flat lamp which easily passes between the spokes.

Salsbury's Invincible Lamp is built upon the same general outline as other good lamps and is thoroughly well made throughout. Its especial features consist of a rubber-packed handle-piece and side lights of glass cut in the form of a prism, so as to throw the light not only sideways, but to reflect it backwards as well. By the use of these side lights, too, the reflector is enabled to be made not only larger but without the usual hole in the centre for showing a rear light. This lamp has Salsbury's wick holder and all the points of a good lamp.

Clare's Perfected Guiding Star, as will be seen by reference to the illustrations, has several peculiarities; it is, in the first place,



CLARE'S PERFECTED GUIDING STAR.

hung from the bottom by stout wires passing right over the axle. The next peculiarity is the back light, which opens easily, and shuts with a spiral spring, neatly fastened immediately below. Just inside

the door is a small rough piece of metal on which to strike the match, which can then be inserted through the hole in the reflector, and thus the wick can be lighted in the roughest weather. The reflector is removable, and the reservoir is stated to hold sufficient oil to supply a $\frac{3}{4}$ in. wick for seven hours.

Cooper's Inextinguishable Hub Lamp is likewise suspended from the bottom, and, indeed, was the first one to be so made. As will be seen by the illustration, it is secured to the axle with a cylindrical fastening, this being kept from opening by two wire bolts, which turn down and cross and interlock each other. From this depend four straight rods, two on each side, running in slides on the sides of the lamp, and kept from slipping out by the catches at their ends. These serve as guides, keeping the lamp in a vertical position. It is suspended and fastened to the cylinder by two spiral springs held in cylinders on each side of the lamp, to the bottom of which they are fastened. This method allows the lamp to be free from the vibration caused by an uneven road, the lamp remaining stationary



COOPER'S INEXTINGUISHABLE HUB LAMP.

whilst the wheel jumps up and down. I have used one of these, and find it—true to its name—“inextinguishable,” being unaffected alike by road or wind. It is made in two patterns, one having a single, the other a double wick; the latter, being a much larger lamp, has the springs and guides placed within the body of the lamp.

The **Eclipse Lamp** of Messrs. Neale and Bourne is constructed much upon the same principle, though with some improvements. The lamp in the first place may be described as being thoroughly well made throughout, all parts being copper rivetted and clamped, with a deep and large oil reservoir. The body of the lamp is suspended from the axle cylinder by two strong spiral springs, working in polished brass cylinders in the fore part of the sides of the lamp, these cylinders being lined with rubber and otherwise so constructed as to make the lamp perfectly silent in action.



THE ECLIPSE HUB LAMP.

The **Reliance Inextinguishable Hub Lamp**, like the two last, is suspended from the bottom by rods down the sides. These, however, run some inches below the body of the lamp, and then unite by a cross bar, to which one end of a finely-tempered steel spring is fastened, the other being bolted to the bottom of the lamp, which rests on it, as shown in the illustrations. Another peculiarity is in the fastening to the axle, the two halves of the cylinder being provided with parallel lips at their edges, over which a hollow spring clip fastens. The front of the lamp is hinged at the bottom,

*Open.**Closed.*

THE RELIANCE INEXTINGUISHABLE LAMP.

shutting upwards, and fastening with a spring at the top. It is, I believe, strong and serviceable, and is made in two sizes.

The **Queen of Lamps**, as will be seen from the illustrations, is of neat shape, having circular base with four legs upon which to rest when out of the wheel, and oval glass to front, with plate-glass side lights. The front opens downwards to pass between the spokes, and the suspended cylinder is secured by a spring catch, the two halves being forced together by a "mouse-trap spring." The chief

feature of the lamp, however, is the suspension of the body from the cylindrical top by means of four springs, which are best seen by reference to the accompanying illustrations.



Closed.

THE QUEEN OF LAMPS.



Open.

The "**Won't Go Out**" Lamp is another by the same firm. Its chief especial feature is the mode of fastening to the hub. To effect this the usual barrel fastening with side leathers is used, but attached in a different way, being hinged at the top and sprung together by powerful springs. To detach it, all that has to be done is to press the two wire loops at the top together. The body of the lamp is suspended from the barrel by two coiled wire springs, and the door opens sideways at the back. In point of manufacture it is very well made, and gives a good light. A very useful attachment to all common lamps is

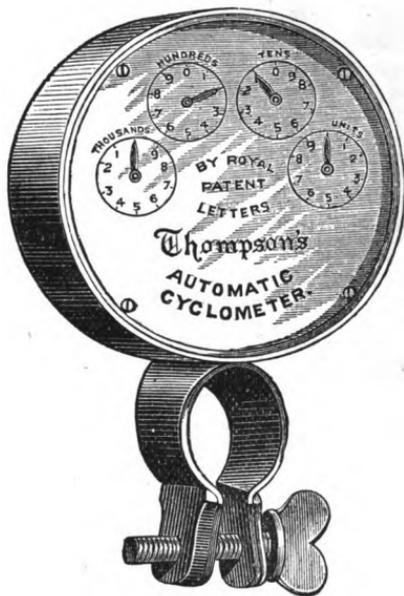
Salsbury's Patent Wick Holder, consisting of a long staple of pin wire with pointed ends. This passes through the wick and also through holes in the wick channel, and its purpose is to prevent the vibration causing the wick to slip down and disappear in the oil-chamber.

I will now describe the varieties of another class of instrument, which may be reckoned as luxuries rather than necessities. I refer to

DISTANCE REGISTERS,

of which there are several in the market. They are, of course, in connection with the driving wheel, and are very useful to those who desire to know the exact distances travelled by them. Some give the distance in number of revolutions, in which case they are suitable for any sized wheel, requiring only a little calculation to find the exact distance run. Others again record the distance in miles and furlongs, when, of course, the length of the journey can be seen at once; these require to be specially made to size of wheel.

Thompson's Cyclometer, of which an illustration is given, shows either revolutions or miles and yards, as preferred, and is so constructed that a train of wheels, contained in a case, is set in motion by a weight, which remains stationary whilst the case and mechanism revolve, being attached to the axle of the driving wheel inside by means of a flexible steel band and thumb-screw. It is a neat and strong instrument, impervious to dust or wet, well out of the way, and tells the distance accurately.



THOMPSON'S CYCLOMETER.

Johnson's Road Measure is another neat little instrument. It consists, as before, of a train of wheels, with dial plates showing either distance or revolutions; these are set in motion by a ball, which runs in a groove round the instrument; this ball remains stationary whilst the body of the instrument is carried round by the wheel. At one point in the groove, four cross arms are so arranged

that one of them is always across the channel, so that the ball coming in contact with it moves it forward, drawing the next one after it to undergo the same operation ; by this means motion is imparted to the leading wheel, and the whole set in action. It is secured to the interior of the driving wheel by means of two straps, one of which, passing round the instrument itself, also encircles the axle, whilst the other is strapped round two of the spokes. It is extremely neat, out of the way, well protected, and a good indicator.

Stanton's Bicycle Log outwardly much resembles Thompson's, with the exception of having but one hand in place of four. It is fixed to the axle in the interior of the driving wheel, and the clips for that purpose are so constructed as to fit any diameter of axle. The single face shows the distance in miles, the motive power being obtained by means of a falling plate and arms, so constructed that it is impossible for it to repeat or fail to act by any jerk of the



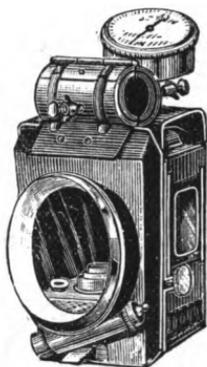
STANTON'S BICYCLE LOG.

machine. The hand can be turned to zero at starting, so that, at the end of a journey, the distance run can be told at a glance ; this is an advantage, as all other registers, with the exception of Wilkinson's, require a reading to be taken before starting and another on stopping, and the difference of the two found for the distance run.

The **Miles Distance Recorder** is another instrument for the same purpose ; it is secured to the axle of the driving wheel in such a manner that the case revolves round a fixed projection, or catch, and so sets the works in motion. It is neat, handy, and accurate.

Underwood's Odometer is both cheaply and simply constructed. It is circular, and screws on to the axle between the hub flanges. It marks the miles on one dial, in tens on another, and in hundreds on a third dial. A falling plate actuates a toothed wheel, which gears with another, showing at once the miles, and on the axle of this an eccentric works which marks the hundreds on the dial plate. It is sold at a very cheap figure, and is certainly the best at its price in the market.

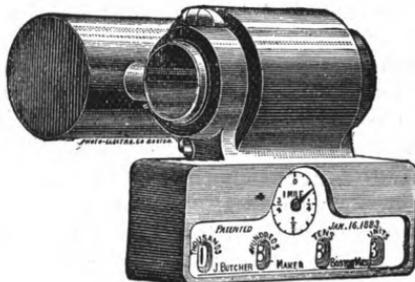
Hernu's Cyclometer is so constructed as to be used in connection with a hub lamp. To the top of the lamp the cyclometer is fixed. This is of no very special design in itself, consisting, as usual, of a train of wheels in connection with dial plates. It is, however, set in motion in a very different way to any other. Upon the axle is secured a metal casing, which has upon its outside a worm rather



HERNU'S CYCLOMETER.

narrow and deep. The main wheel of the cyclometer is cut with angular teeth, into which the worm on the axle works. Every turn of the wheel is calculated to move forward the main wheel of the cyclometer one tooth, and thus an accurate record is kept. It is most reliable, as of course there can be no over-running or failing to act, every movement must be recorded, either forwards or backwards. The only objection that can possibly be urged against it is the trouble of fixing the worm pieces, etc., though doubtless this will be overcome by increased simplicity.

The **Butcher Cyclometer**, an American invention, is a beautifully made article. It fixes on the axle, working upon steel runners, which are first fitted on and then the body of the instrument attached. The dial plate is long and contains four dials, one marking the



THE BUTCHER CYCLOMETER.

miles in sixteenths, the next registering miles up to ten, the next hundreds, and the fourth thousands, thus giving a direct registering

power of 9,999 miles straight away. Motive power is obtained by a weight which hangs suspended beneath the axle. This weight is easily detachable, and in its place a specially-constructed hub lamp may be attached at will in a few seconds. The instrument registers whether the machine travels backwards or forwards, and the dial plate can be seen from the saddle. I have found it to register accurately save in a heavy rain-storm, when the leathers with which it is fitted wetting caused it to jamb and revolve with the wheel. This, however, may be a fault in the way this particular instrument is fitted on my wheel.

Lamson's Cyclometer, another American idea, is attached to a spoke and operated by a neat cam on the inside of the right fork, which works a lever on the back of the cyclometer. On the end of the lever is a small rubber-covered roller, so that the action is noiseless, and the cam arrangement is such that the little roller does not project between the spokes far enough to hit the fork, and is entirely out of the way. It is by its position kept clear of a hub lamp. In shape it is like a watch, with broad holder in place of the ring. It measures one mile in $\frac{1}{4}$ ths, and then on a series of four other dials registers up to 9,999 miles, as does the last.

Another useful accessory to the bicycle is the

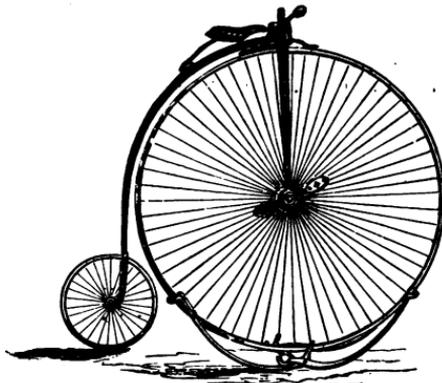
STAND,

Or Support, of which there are several varieties, all with the same object in view, viz., the keeping of the machine in an upright position when not in use. The simplest way of all is, of course, to allow it to rest against a wall as nearly upright as possible. This plan is objected to on account of the liability of the handles to get scratched if the wall is rough, and should the latter be papered or smoothly plastered, more or less damage to it is inevitable unless a pad is made to fit the end of the handle, and care is exercised in using it in all cases.

A very simple way, and an excellent one into the bargain, is—where practicable—to suspend the machine by the handles, either to a beam or other suitable article. This may be done in two ways, either by passing a stout cord over the beam, and joining the ends at such a height that, when the loop so formed is passed over the handles, the front wheel hangs about an inch from the ground; or by means of a single cord secured to the ceiling, and having an oblong piece of wood or iron attached to the lower end; this has a slot cut half-way across its other extremity, and when passed round the handles, and the slot hitched to the cord above, will elevate the machine to any required height at a moment's notice. By suspending the machine, it is kept upright, and is also much more easily cleaned and attended to, the wheels revolving freely when required. Where this is not practicable, another good way is to procure a couple of stout screw eyes from the nearest ironmonger, and screw them into the floor some eighteen inches apart, and to each of these attach a stout cord, having a wood or metal clip, as described above,

at its other end. By passing these over the handles of the machine, and straining each cord tight by means of the clip, a bicycle can be kept most securely in an upright position. The whole apparatus does not cost a shilling, but it has this drawback, in some cases, that the bicycle "stall" cannot be shifted from one place to another without unscrewing the eyes, and making fresh holes in the floor. Very similar in principle to this is

Harrison's Bicycle Stand, consisting of an iron triangular frame, two corners of which are perforated with a hole, through which two stout cords are attached, each one fitted with the metal clip described above; the other corner is furnished with a raised semi-circular groove, the outer edges of which are about an inch apart, and a similar groove is affixed in the centre of the opposite side. Into these grooves the front wheel fits, and the cords being passed over the handles on each side, and tightened, keep the machine safely upright. This stand is also now provided with a couple of hook-like projections, so that, by turning the bicycle upside down, placing the handle-bar against these, and arranging the cords tightly around the ends of the back-wheel pin, the machine may be kept in an upright position on its back, thus allowing much greater facilities for cleaning the wheels and bearings. It is a neat apparatus, and is very useful where the machine cannot safely or conveniently be suspended, and also for supporting it in the open air, as at race meetings, &c.



WICKSTEED'S BICYCLE STAND.

Wicksteed's Bicycle Stand is at the same time the latest and best out in this line, its charm consisting in its neatness, simplicity, and effectiveness combined. It consists of two light triangular frames of iron rod bent into arcs of a circle, and hinged together by their bases, the sides projecting slightly beyond their junction, forming hooks or loops, whilst the apex of each triangle is depressed into a U shape. When placed on the ground in ordinary position the two frames take the shape of an unstrung bow, and by wheeling

the machine on to it, the wheel falls naturally into the two U-shaped depressions, causing the frame to rise on each side and support the wheel, and with it, of course, the machine. By doubling the frames back upon each other the handles may be placed in the central hooks, whilst the backbone, just below the spring, rests in one of the U's, and the machine may be thus held very firmly for the better cleansing of spokes and bearings.

Porter's Simplex Stand consists of a metal base secured to the floor by two screws. This forms a pedestal, upon which a stout rod departs vertically, ending in a hook. In this latter the fork is held, and the machine thus kept upright.

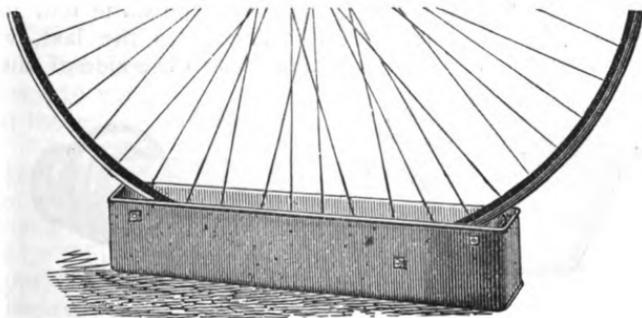
Beach's Stand consists of an oblong frame with four uprights, two at each end. These uprights are placed in pairs opposite each other, two being long and two short, whilst all are adjustable. They are provided with sockets or cups, which hold the machine up by the bearings, thus allowing either wheel to be "spun" for adjustment and cleaning purposes at will.

The **Coventry Machinists' Stand** consists of a brass pedestal screwed to the floor, and fitted with two screw clips sliding up and down it. These clips hold the rim of the front wheel in two places, and keep the machine very firm, but it is a fixture to one place and cannot be moved without damage to the floor, whilst a forcible blow to the machine, when supported thus, would be very likely to cause serious injury to the wheel. It is, however, essentially a stand for exhibition purposes rather than for private use.

SUNDRIES.

Besides these articles already described, there are several other specialities for bicycle riders' use, of which I may mention the following :—

Starley's Wheel Washer, consisting of an oblong box provided with rollers running from side to side a few inches from each end,



STARLEY'S WHEEL WASHER.

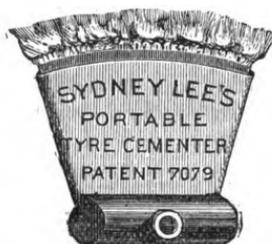
and also with two pairs of circular brushes fixed, face outwards, upon the inner sides of the box. To use it the wheel is placed in

the box, resting upon the rollers, and the box filled with water. On turning the wheel the brushes rub against the sides of the rim, and so clean it in double quick time. It must be remembered that the rims get dirty quickest, and take as long as any portion to thoroughly clean, so that the saving in time is something considerable.

Phillips's Tyre Binders consist of a coil of steel wire, which, when placed around a loose tyre and the rim, hold the two together, and keep the tyre from coming off.

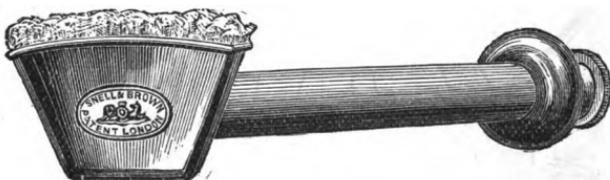
Rudge's Tyre Clips answer the same purpose, but are neater and more easily put on, and are carried in less space. They consist of strips of spring steel, $\frac{1}{2}$ in. broad, bent into about four-fifths of a circle, with the two ends bent inwards sharply. They are put on from beneath, and, bearing against the rim, hold the tyre with the bent ends. These little things are but 1d. each, and are very useful.

Lee's Patent Tyre Heater is a neat yet simple and handy little contrivance. A circular, or rather barrel-shaped, reservoir is fitted with side pieces, much resembling a butterfly's wings. This holds the wick, the reservoir being filled with methylated spirit.



When lit, a long, slightly curved flame is produced, which may be held beneath the rim for the purpose of heating the cement, and so re-securing the tyre should it become loose. It occupies but small space, and can consequently be easily carried with the other tools.

Snell and Brown's Tyre Heater has the same end in view. As will be seen by the illustration, it resembles the last, with the addition of a handle. This handle screws to the side of the wick-



SNELL AND BROWN'S TYRE HEATER.

holder, and forms the spirit reservoir, a cap screwing on and keeping the spirit from escaping when the heater is not in use. It is a most useful and practical contrivance.

SECTION IA.

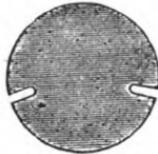
SINCE the compilation and preparation of Section I. in 1885 a large number of novelties in detail have been introduced, especially in the construction of the safety bicycle, which has undergone many important changes. These will be found in the following pages, in order to correspond with the several departments of the previous section. Commencing, therefore, as before, with the

TYRES, we find many novel forms introduced, the first being

Warman's Tyre, which is made with a flat outer surface of grey, hardish rubber, the surface of which is cut into a series of circles with sharp edges, forming a rough grip to prevent slipping on a greasy road.

Grout's Cogged Tyre is another invention to the same end. It consists in forming the outer surface of the rubber into a number of teeth like those of a cog wheel, the claim for it being that it saves vibration by passing over many small obstacles, and also prevents slipping by the number of edges presented to the road surface. The grooves in the tyre are cut diagonally.

Fox's Patent Grip Tyre is round in section, but has two deep grooves, one on each side, cut lengthways in its surface to take



FOX'S PATENT GRIP TYRE.

the jaws of the "grip" rim. From experience I can say it shows no tendency to come out when in use, though there is a tendency to chip at the edges and for the edges of the rim to cut into the rubber.

Moseley's Non-detachable Tyre is made with an under-seating of hard vulcanite, the properties of which are, that whilst it becomes pliant when heated, it is absolutely rigid and immovable when cold. This vulcanite forms a thin surface on the under part of the tyre, the other portion being of the usual soft rubber. To apply it the tyre is put into hot water, and when sufficiently warm is placed in the rim, which it must exactly fit. On cooling, the hard rubber forms an absolutely immovable ring within the rim, and—I speak from experience—it is quite impossible for the tyre to come out. If, however, to repair a spoke or for other causes, it has to be removed, the re-application of heat will once more render it pliant.

Hancock's Corded Tyre is on the same principle as the last. In place of a single seating of hard rubber on the outside of the tyre, two separate lengths are placed within the rubber, a method which is claimed to be preferable to the last as being less liable to breakage of the vulcanite, and, moreover, being more pliant.

Otto's Corrugated Wired Tyres.—The tyre is made with a small hole running lengthways through it. Through this a wire is passed, this wire, however, being slightly corrugated. The ends of the wire are united by an interlocking of the corrugation, the tyre being compressed on to the wheel; this allows a greater length of rubber being placed around it than would by itself suffice to form the circle. The ends of the rubber being united by a cement prevents the moisture getting inside and rusting the wire. Tyres put on in this manner are absolutely secure, and it is computed that the corrugation of the wire prevents the sawing action which takes place with the old straight wire, and thus the tendency to cut through the rubber, which was a strong objection to the old form, is done away with. It has had about six months' trial, and so far appears perfectly satisfactory. By the end of the season, however, it will be firmly established whether or no theory is borne out in practice. For my own part I am inclined to think it will be.

Starley's Patent Tyre Fastening.—This is a tyre of the wired description, the rubber being made with a hole in the centre, through which a wire passes. The rim is specially made, having at one part two channels, carried from the interior to the exterior, the one crossing the other; the wire passes through the tyre, and the ends are run through the two holes in the rim and there secured by a couple of nuts, this, of course, preventing the removal of the tyre.

Hancock's Tyre Fastening, like the last, consists in placing metal within the rubber, but in this, however, instead of a wire, a flat length of steel is used, thin and yielding, but firm, the two ends of which are drawn together, and there clipped firmly within the tyre.

Stephenson's Tyre Fastening.—This patent consists in placing a number of short strips of steel at intervals in the rubber, either placing them there in the process of manufacture, or, in the case of an old tyre, inserting them in slits made in the tyre. Screws then pass through the rim and into the contained metal holders. Of course, it will readily be understood that a tyre thus fastened cannot come off.

The speciality of these last tyres, as will be seen, is their non-detachability from the rim.

Warwick's New Section Hollow Rims.—These are made,



WARWICK'S HOLLOW RIM.

unlike the old pattern, with metal thickened at the bottom, the joining of the steel taking place at the top instead of at the bottom of the rim.

Warwick's Fluted Rim is best understood by a glance at the annexed illustration. The sides are fluted deeply and sharply,



WARWICK'S FLUTED RIM.

a method which, whilst strengthening it considerably, renders the polishing and keeping clean a matter of some difficulty.

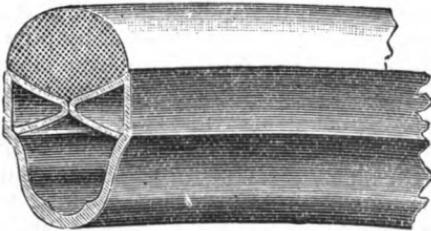
Warwick's Grip Rim.—This, made upon Fox's patent, is now constructed, as in the accompanying illustration, in hollow form as



WARWICK'S GRIP RIM.

well as solid, the patent consisting in the formation of a flange upon each side of the rim, which flange fits into the grooves mentioned as being present in the tyre before named.

Bown's Hollow Rim is made especially for use with the "Victor" tyre, and is flat at the top, or nearly so. The rim is



BOWN'S INFLEXIBLE HOLLOW RIM.

made in one piece, but is stayed in the centre, the sides being brought up and bent round until they meet, and then sharply bent back upon themselves until they bear in a slight corrugation made in the sides to support them; this gives a stayed rim, as well as uses less rubber, and places that which is used in the best position to be of use.

Renouf's Rim, specially constructed for use with piano wire spokes, is made with a double flange along the bottom on the out-

side, which flange is pierced at regular intervals and fitted with keys or tighteners, to which the wires are attached, and by which they are drawn tight.

SPOKES.—**Clarke's Derby Spokes** are fastened at the rim, and are made of very fine piano wire. The rim is hollow, and a small hole is drilled in it to admit the wire, which is then passed round and secured to a short pin attached to a nut which is on the outside of the rim close to the spoke. By tightening this nut the spoke is drawn upwards and tension brought to bear upon it, no thread whatever being cut upon the wire. This makes a very light wheel, and also a very stiff one.

Renouf's Spokes are similar to the last in being made of the finest piano wire; they are, however, tightened by twisting round a pin or key, and pass on to this key between the two flanges of Renouf's rim previously described. Like the last, a very light wheel is the result, the spokes complete weighing but four or five ounces.

The **Regent Detachable Spokes** are headed and butted at the hub and adjusted by pipe nuts at the rim. The holes in the hub, which are drilled plain and not threaded, are the size of the butt or thickened portion of the spokes, and have longitudinal slots in them which allow the thin part of the wire to pass in or out, but not the butted portion. The slots for the spokes are cut in the sides of the hub flanges, and the spokes are inserted and then drawn up into place, and may be readily removed when slackened at the rim. A neat plated cap covers in the face of the flange in which the slots are cut.

The **Regent Back Wheel Spokes.**—For these the holes in the hub are drilled parallel with the axle (instead of radially), as if for a laced wheel. The spokes are headed at the hub, the heads lying inside the flanges, and the spokes then turn at right angles and go direct to the rim, where they are adjusted by pipe nuts. They are really direct spokes fixed in the same manner as single tangent ones.

Direct Tangent Spokes.—For these the hub flange is made thicker than with the usual side inserted tangent spokes, and the spokes setting at a tangent to it are screwed direct in the edge of the flange in place of the side. Each set of spokes goes in in the opposite direction, and the two sets are placed as close together as it is possible to get them. This form is very neat, and probably as strong as any other.

Rayner & Rogers's Spring Spokes.—In these the spokes run straight from the rim to the hub, but in the centre of each a break in the continuity of the straight line is made, the spokes being curled into a short helical spring of three or four turns, the idea being that the hub, and consequently the weight of the rider, rests upon a series of springs which give as they come round, and thus reduce vibration.

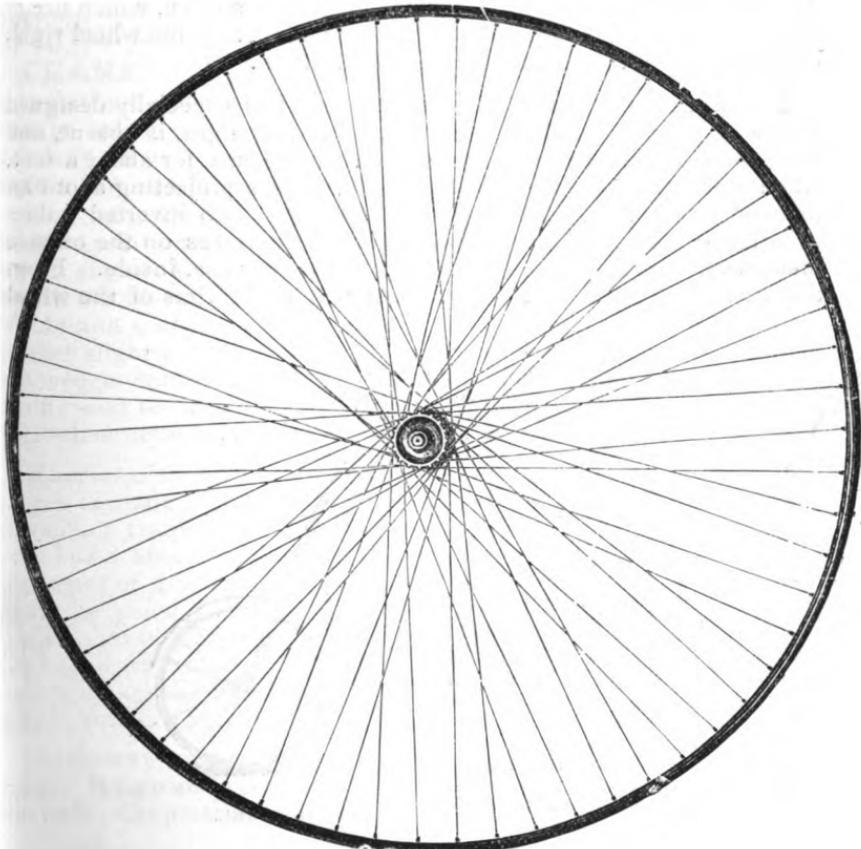
WHEELS.—**Dunkley's Wheel** practically has no hub flanges at all, save a very slight collar upon the axle. The spokes are

very thick, and are merely passed round the axle and tightened at the two ends in the rim, the spokes, when the wheel is complete, being soldered together round the hubs to prevent them loosening. This wheel is cheaply and roughly made, and is more especially designed for perambulator wheels and general cheap work.

The **New Rapid Wheel** is still constructed upon the same plan as described on page 14, but the spokes, in place of being headed sideways into the hub, are headed into small studs which are fitted into and project from the faces of the hub flanges, this method giving a perfectly straight spoke, and obviating the necessity of a band.

The **Sparkbrook Wheel** is very similar in so far that the spokes are set at a true tangent. Instead, however, of fastening at the sides, they are run into the head of the flange, which is lapped over to permit of the heads coming through on the other side. The holes through which they pass are graduated so that the head of the spoke and the spoke itself set very nearly in a direct line, and there is no sharp bend.

Robinson and Price's Wheel, like the last, has all spokes at



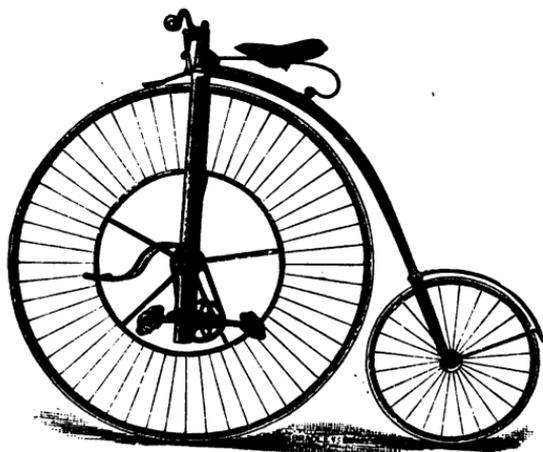
ROBINSON & PRICE'S WHEEL.

a true tangent. Instead, however, of fastening directly into the hub a number of flat studs are screwed in around the hub flange, each stud is pierced with two holes, one tapering in one direction, the other in the other, and each side thus holds the ends of two spokes, which pull in contrary directions, and in an absolutely direct line, there being no bend whatever in the spokes, and at the same time absolute tangentiality.

Rayner & Rogers's Moving Hub Wheel.—In this the spokes are made of flattened steel wire bent in the form of an elongated **S** or double curve, from which it will be seen that the spokes are longer than the distance from the rim to the hub, the consequence being that a certain amount of play or "give" exists in the wheel itself, the spokes practically acting as a series of springs.

Parr's Rigid Wheel is practically the resuscitation of an old idea, this being neither more nor less than the "Superb" wheel of 1878, the arrangement consisting in placing a pair of spokes upon the inside of the hubs tangentially to bear the driving strain direct from hub to rim, thus relieving the side spokes, which are of the direct variety, of all cross strain, and rendering the wheel rigid, easily adjusted, and light without complication.

The **Excelsior Narrow Tread Wheel** is especially designed for dwarf bicycles. The usual hub, with its flanges, is absent, and from the centre of the axle five stout tubes depart for about a foot, when their ends are crossed by short **T** pieces projecting about an inch on either side. These **T** pieces support two inverted felloes or rings of rim steel, having their convex surfaces on the outside instead of, as when used for their legitimate purpose, inside. From these rims spokes depart in the usual way to the rims of the wheel



THE EXCELSIOR NARROW TREAD WHEEL.

proper, which hold the rubbers. This makes an exceedingly strong wheel, though possibly a pound or so heavier than usual; the gain is in the width of tread, for the chain wheels and bearings, both upper and lower, are carried within the recess thus formed in the wheel, and the width of tread therefore is no more, if, indeed, nearly so much, as on an ordinary, which is a distinct gain with the front wheel driving type of safety upon which this wheel is used.

Rimmon, Clayton & Co.'s Binding Ring for spokes consists of a large ring of spoke wire, which is placed against the wheel when made up, and is then lashed with fine wire firmly to each spoke, the lashings being secured with solder when complete. This tends to check the vibration of the individual spokes, and to hold the wheel firmly together, at the same time preventing damage to the rider should a spoke happen to break, by holding the loose end firmly, and not allowing it to fly out from the wheel.

Binding Rings in ordinary have been used by several makers, as a rule differing slightly from the last, the rings being of finer wire, and in place of being lashed to each spoke by separate wires, the ring itself is looped around each spoke as it passes it, the looping being then secured either by solder or a wire ring.

CRANKS.—Smith's Angular Detachable Crank.—The chief peculiarity about this is the fitting the crank on to the extremity of a square axle-end instead of the latter being round as usual. The crank is secured with a key, and the angular fixing of course makes it very firm, the whole strain not coming on the key.

Renouf's Detachable Crank.—The peculiarity in this consists in the construction of the crank-key, which, in place of being the usual slightly tapered piece of metal driven in between the crank and the axle-end, consists of a wedge placed with its base on the inside and fitted with a thread at the other end; this thread projecting slightly is provided with a nut, and this being turned draws the wedge outwards, and thus tightens the two parts, making a strong and secure junction, and at the same time one easily detachable when occasion requires.

Harrison's Adjustable Throw Crank.—In this the crank proper is made with a sort of jaw at its outer end, and a small secondary crank fitted thereto; this carries the pedal, and to it is attached a short hinged bar sliding up and down in a curved slot, the result of this arrangement being that when pressure is placed upon the pedal the secondary crank is thrown forward, and thus the amount of leverage increased on the forward stroke, whilst on the backward stroke the crank is shortened, being brought back to its original position by means of a spring, the rider thus getting a long crank for the forward thrust and a short one for the recovery.

Holloway's Spring Crank is designed with the same object in view. It is constructed of spring steel, and curves into a loop at the end. On pressure being applied the loop opens out, thus taking

the pedal farther away from the axle and lengthening the leverage. The greater the pressure the greater the leverage, and on pressure being removed, as in the upward stroke, the crank returns to its normal position.

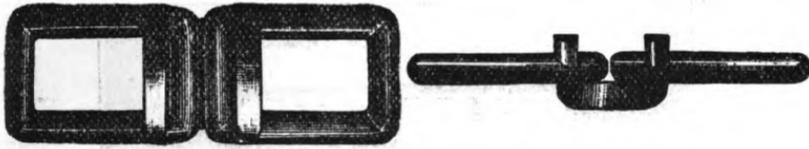
The **Invincible Expanding Crank** works somewhat upon the eccentric principle. To the crank proper, just above the attachment to the axle, a pin is placed upon which an eccentric works, this eccentric being attached to a short rod and worked by a tangent screw upon a third rod placed at the side. The end of the crank, with the ends of the two before-mentioned rods, are connected by a short bar. The pedal is attached so as to gear with a screw on the third rod, and by pressing the toe inward a catch throws the screw into gear, with the result that the eccentric before mentioned is worked, and as the pedal turns the support winds gradually inwards or outwards, some seven or eight turns of the pedal sufficing to cause it to pass from one extreme to the other. This gives an automatically increased throw of about one and a half inches, whilst any intermediate point can be attained by simply releasing the pressure upon the clutch. The arrangement, though slightly complicated, is most perfect in its action, and there appears to be very little, if anything, to get wrong, as there are no stops or other things to get out of order if not worked right, but the action is simply in and out.

PEDALS.—The '**Xtraordinary Adjustable Throw Pedals.**'—These pedals are fitted to the levers, before described, of the "**Xtraordinary Challenge.**" The arrangement consists in placing the pedals upon the end of a three-inch rod, which is hinged to the pin usually supporting the pedal. For heavy work and hill-climbing the pedal is brought back to its fullest extent, thus giving a leverage of some three inches longer than the lever. For light work and fast pedalling a touch of the toe will cause the pedal to move forward in a semicircle, and take a position as far short of the supporting pin as it was hitherto beyond it; the arrangement is most simple, and is of no difficulty whatever to use.

CHAINS.—**Morgan's Patent Connecting Link** is used for the Morgan chain previously described. It takes the general form of one of the long links of the chain; at one end, however, it is hinged together, whilst the two parts of the other close one against the other like a jaw. The link can be opened with the fingers, and instantly inserted into the two round links of the chain end, and upon pressure being applied, the leverage caused by the pressure upon the projecting end of the hinged side draws the open ends tightly together, the grip increasing with the resistance. This is a very handy thing to have when using the Morgan chain, as not only by its means can the chain be taken off instantly for cleaning or changing gear, but in case of breakage of a link the chain can be joined up again without delay.

Appleby's Patent Chain somewhat resembles the Morgan, being composed of long rectangular links and short circular ones.

The circular links, however, are enlarged upon one side to the full width of the chain, and are there cut through, leaving an opening



APPLEBY'S PATENT CHAIN.

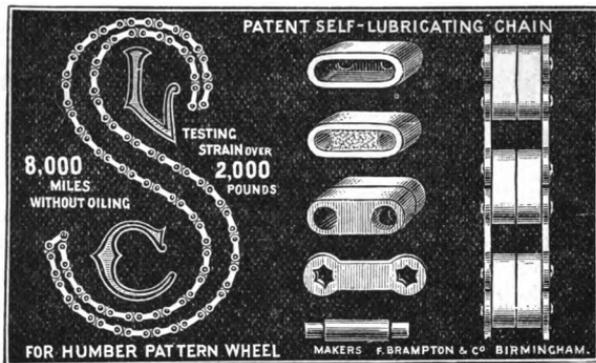
through which the long links, when turned lengthways, may be passed and detached. By this means every link in the chain is detachable from each other, and, with a couple of spare links, a breakage can be quickly repaired without the use of tools.

Goodby's Patent Chain somewhat resembles the last in general appearance, but the long links and the circular ones are united, each link being a combination of the two, the long link being attached to one end of a circular open link, not, however, as in the Appleby, spreading out upwards to the full width of the chain, but, like the Morgan circular link, being the same width the whole way round. Like the last, this chain has the advantage of every link being detachable without the use of tools.

Edge's Patent Chain is another variety having the same easy detachment feature. This is very different, however, in shape, more resembling the old type of chain originally used upon cycles. Each link consists of long side-bars, a connecting pin and a roller upon it. The feature, however, consists in constructing the side bars with a slot throughout their entire length, this slot slightly opening in the middle just sufficient to allow of the insertion of the ends of the connecting pin. These pins are formed with an outer collar at each end, and the edges of the side links drop into the grooves between the collar and the body of the pin. Upon inserting the collars in the centre of the slot the connecting pins are run down to the ends of the links, and the chain is complete. Owing to the parts coming adrift so readily it is rather a difficult chain to handle when apart from the machine, but, when once on, the tension keeps the whole firm and tight, the chain having to be slackened some half inch or more before it can be parted.

The **Abingdon-Humber Chain** is constructed of a series of close-set links, composed of centre pieces in longitudinal section like that of a fluted fork, the enlarged ends each being hollowed to take the bearing of a cross pin which runs through it. These cross pins hold the extremities of short straight side pieces, which thus set end to end in a direct line and do not overlap in any way. The chain requires very small teeth, is close fitting and very neat, and was first identified with the "Humber" machine, but is now very largely used, being placed on the open market by the Abingdon Works Co., who make it.

The **S.L.C.**, or **Self-lubricating Chain**, is a neat design in chains somewhat after the pattern of the last. The centre links,



however, are hollow, and are filled with a solid lubricant of the plumbago type, the result being that, whilst no oil is required, the joints and connecting pins of the chain are always kept lubricated, and as very little of this is required, the lubricant contained by the links will practically last out the chain.

The **Eureka Chain** in general appearance is almost precisely similar in pattern to the last named. Its specialty, however, consists not in the filling of the links with lubricant, but in the construction of the links themselves, which are made out of flat steel stamped in such a way as to correct the grain of the metal, and, neatly dovetailed together, to form the complete link. It is a light and cheap pattern.

The **Humber Triangular Chain**.—In this the hollows between the teeth of the chain wheel are deep and sharply cut, the portions of the chain which drop into them being triangular, or, more properly, heart-shaped to fit. Side-bar connecting links, much on the usual plan but slightly curved, join up the chain, which is but little used as yet.

CHAIN ADJUSTMENTS.—Chains upon rear-driving safeties are adjusted by somewhat different methods to those described for the adjustment of chains upon the front-driving or dwarf-type of safety. Of these there are several styles, the chief being as follows:—

The **Slotted Fork-end Adjustment**.—In this the ends of the fork which holds the driving wheel are slotted some two inches or so. The wheel-pin is held in these slots by means of outer nuts, which clench firmly the sides when tight. The adjustment is simple, consisting merely of slackening the nuts and then pulling the wheel back till the chain is tight, once more tightening the nuts. Care must be taken while doing this to pull the wheel dead true, as one is very apt to draw it out of line, which will result in damage to the chain and gear wheels, and cause the two wheels not to track together.

Front Stay Adjustment is the fitting the front stay of the cross

frame which connects the crank bracket with the backbone just below the neck with a screw, and by means of this drawing the lower vertical tube forwards, and with it the bracket and chain. In this the amount of adjustment permissible is dependent on the distance the tube will spring without breaking. I don't like it.

The Hinged Bracket Adjustment.—In this the bracket carrying the lower chain wheel is hinged to the end of the supporting tube, and connected to the other and front tube or rear portion of the frame by means of a short connecting rod with a screw at the other end; the tightening or loosening of this rod drawing the chain-wheel in its bracket to or fro as may be required.

The New Rapid Chain Adjustment is an amplification of the same principle. The machine is of the cross type, but the connecting tube, in place of being a rigid one, is fitted with a hinge on the under side of the backbone, where it joins the other part of the machine. The front stay, which braces the front bracket to the fore part of the backbone, is used as an adjusting rod, and the adjustment is made by the springing of the whole tube.

The Globe Chain Adjustment.—In this, too, the bracket is hinged at the top. The adjustment is obtained, however, by a somewhat different method. To the end of the tube carrying the bracket is attached a short arm, having at its end a socket having an internal worm cut in it. In this a screw works with a milled head, and this screw swivels in a socket in a short cross-piece, the ends of which are connected by short rods with the crank bearings. It will thus be seen that by screwing the screw outwards the arm is carried in a similar direction, drawing the lower end of the bracket with it, and thus tightening the chain.

The Invincible Eccentric Chain Adjustment consists in fitting the chain wheel on an eccentric, the turning of which naturally draws the chain tighter. It is a neat, simple, and efficacious method.

Screw Adjustment is good and simple, but requires a slight alteration in shape of the bracket from the usual style. The bracket carrying the crank axle and chain wheel is fitted on a sleeve which fits upon the end of a tube projecting forwards from the shoulders of the rear forks. The top of this tube is slotted, and a pin passes through the slot and through the sleeve, being finished off outwardly with a nut and fastening inwardly to a slide piece fitting the interior of the tube, which slide piece has a screwed end projecting from the free end of the tube and fitted with a nut. By slackening the nut on the sleeve and turning the nut at the end of the tube the chain may be easily adjusted.

DRIVING GEAR.—The **Sanspareil Lever Driving Gear** is a species of combination of the "Facile" and "Xtraordinary" principles. A pair of stout footrests are carried forward from the fork-ends just above the bearings. From the ends of these, short connecting rods are hinged, and similar ones are attached to the

crank-ends. The ends of these two connecting rods are attached to levers having at their rearmost extremity an adjustable pedal as in the "Xtraordinary." The result of this is that with the lever action a more rotary movement of the foot is obtained than when the forward end of the lever is rigidly attached to the fork extremity.

Renouf's Driving Gear is a combination of the "Facile" lever motion and the ordinary chain gearing. It consists in fitting a chain wheel above the driving wheel, and driving this by a pair of "Facile" levers, the driven chain wheel in its turn gearing up the driving wheel by means of the usual chain connection.

The **Devil Lever Gear** is practically a lever with a swinging fulcrum. It is applied to a large-wheeled bicycle of the ordinary pattern. The forks are carried downwards and forwards as in the "Facile," and at their extremities bearing springs are fitted for short swinging rods, which attach at their upper extremities to the foremost ends of a couple of levers which carry pedals at their rearmost extremities, and attach directly a little forward of their centres to the pins on the crank ends. This gives a vertical oval foot motion, and yet enables the rider to drive a big wheel, if he so pleases, whilst keeping his driving weight well behind the centre.

Mills's Pentograph Gear claims with a lever action no dead point and a circular pedal motion. It is rather a curious arrangement, reminding one somewhat of the diagonal basement of a regiment of toy troops. A short arm projects from the fork side some foot or so above the bearings. To the end of this a long connecting rod is hinged, to the lower end of which the forward end of a lever, having at its rear extremity the pedal, is attached, and the crank end connected with it by a link. Thus far the arrangement is somewhat similar to the "Sanspareil" lever gear, but a second connecting link is attached from the crank end to the middle of the first-mentioned rod, the diamond-shaped frame thus formed opening and closing as the pedal is worked, and producing a circular motion.

Scantlebury's Driving Gear is another lever motion. The fork end is continued forward like that of the "Facile," and a lever attached to it in a somewhat similar way. Instead, however, of this lever being continued rearwards beyond its connection by a link with the crank end it ceases there, and the link which connects it with the end of the crank takes the form of a stout bar, upon which a pedal slides up and down, being adjustable to allow for the different lengths of the riders' legs.

The Relief Lever Gear.—In this the lever is short and fitted to its end with a small geared quadrant. A similar one gears with this and works on a pivot at the end of a short rod, this being connected by a connecting rod with a crank on the driving wheel. The up and down motion of the lever induces a rocking motion between the two quadrants, the second quadrant actuating the driving crank. An elaboration of this gear is also fitted with a double arm at the end of

the foot lever, each provided with a cog wheel raking or gearing with a fixed semi-circular roller attached to the fork end, and by the raking movement working a quadrant driving over a clutch-box attached to the driving wheel.

The **Rucker Tandem Safety Driving Gear** is, like Renouf's, a combination of the lever with the chain. This machine, which carries a rider in front as well as behind the driving wheel, is geared up in the usual manner for an ordinary "Kangaroo" type safety. In order, however, to allow both riders to actuate the driving gear a tube is hinged to the top of the forks, and within this tube a sliding rod fitted, this running between two rollers fitted at the end of the tube and attached to the crank end as well as to the horizontal lever, which carries at each end a pair of adjustable pedals. The result of this is that the horizontal lever remains nearly at the same angle, but revolves with the crank, both riders thus doing their share of the propulsion, the connecting-rod sliding up and down within the tube before mentioned, which rocks with an oscillating motion to and fro as the crank passes the vertical.

The **Geared Facile Driving Gear**.—This is a combination of the "Facile" and the "Sun and Planet" gears. The ordinary "Facile" levers are used, but in place of being connected directly to the cranks, they work cranks attached to a free through axle and having a small planet wheel at their extremity, which planet wheel, gearing with a cog wheel attached to the hub of the driving wheel, has the effect of gearing it up. The result is a retention of the powerful downward motion of the "Facile" levers, with a gearing-up arrangement which obviates the necessity of the fast pedalling required with a small direct driving wheel.

The **Globe Safety Driving Gear** is a combination of levers, chains, and ratchets. The fork ends are prolonged downwards with a slightly forward projection to their extremities. The levers are hinged, carrying pedals at their rearmost ends. The levers are carried forward beyond the fork extremities, and a grooved semi-circular frame attached, forming an arc around the fulcrum. To each end of this arc a light chain is attached, and to a point some three or four inches to the rear of the fulcrum a third. These chains work around drums which are attached to the hub of the driving wheel, the two chains attached to the ends of the semicircle serving, the one to drive the machine forward, which it does by means of ratchets within the hub, the other to draw the ratchet collar back again, whilst the third chain, which acts on a separate drum attached to a loose through axle, has the effect of drawing up the lever on the other side, the pressure of one foot therefore elevating the other, as with a crank motion.

The **Quick-cycle Driving Gear** is somewhat similar, in being a combination of levers and ratchets. Like the last, the fork end is prolonged, and the lever attached bearing the pedal. It also has a similar groove worked at its end, carrying a chain which works upon a drum attached to the through loose axle, which draws up one lever

by the depression of the other. The driving, however, is performed by two spur wheels, a large one and a small one. The lever is attached to a clutch which acts eccentrically upon the inner side of the larger and lower spur wheel, the pressure of the foot causing the wheel to be gripped by the lever end, and thus drawn round in a reverse direction, this consequently propelling the driving wheel, which is geared to it by a smaller spur wheel, forward.

The Claviger Driving-gear is a new combination in various forms of levers and gear wheels. The underlying principle of the whole, however, may briefly be described as that of a lever with a movable fulcrum. The several combinations and methods of construction are illustrated and described below in the words of the inventor:—

THE HANGER CLAVIGER.—Fig. 1 represents the proportions of this movement as used in "B" machine. Figs. 2 and 3 represent the movement as adapted to "D" machine. Fig. 2 is an elevation, and fig. 3 a plan view. The dotted lines represent the figure described by the centre of the pedal during a complete movement. Fig. 2 represents the parts in position for the commencement of the stroke, and fig. 1 shows the movement at mid-stroke. Referring now to figs. 2 and 3: The arrangement consists of a bracket brazed at one end into the lower end of the fork side, and carrying at the other end a stud, which is the fixed axis of the hanger claviger. The latter consists of a rod called the clavis rod, and a rod or link called the restraining arm. The two rods are attached to each other by a pivot. The joints are coned, and though the oscillation on these joints is very slight the cones allow of adjustment for wear and prevent rattle. The clavis rod is slotted at the end in order to allow the pedal to be adjusted to vary the length of stroke; the other end terminates in a boss, in which is cut a rectangular slot. There is also a small spur pinion, provided with a boss or projection on one side, which fits into the slot in the end of the clavis rod. A spur wheel is also rigidly fixed to the axle of the driving-wheel by coned screws, so that it may be easily taken off for cleaning the parts behind. The bracket is recessed and drilled, and forms a knuckle joint for the bearing case. Between the spur wheel and the bearing case is a slotted radius arm, which is mounted loosely on a hardened steel bush or sleeve attached to the spur wheel, and to the axle of the driving wheel. A spindle having a fixed collar is clamped in position in the slot of the radius arm. The spur pinion is mounted upon the spindle, and is free to revolve upon it. The boss or projection of the spur pinion is passed through the slot in the end of the clavis rod, and secured in position by a washer and nut. The spur pinion is thus tied to the axle, and is held in gear with the spur wheel, while it is prevented from turning upon its own axis. When the pedals are operated the spur pinion makes half a revolution round the spur wheel for each stroke, and supposing the same tooth in the pinion remained engaged between the same two teeth in the wheel during the movement the driving wheel would be moved

through half a revolution. But the pinion is locked to the clavis rod, and at the end of the stroke half the teeth in the pinion have been engaged with the teeth in the wheel, and the latter has been advanced to that extent more than half a revolution. Hence,

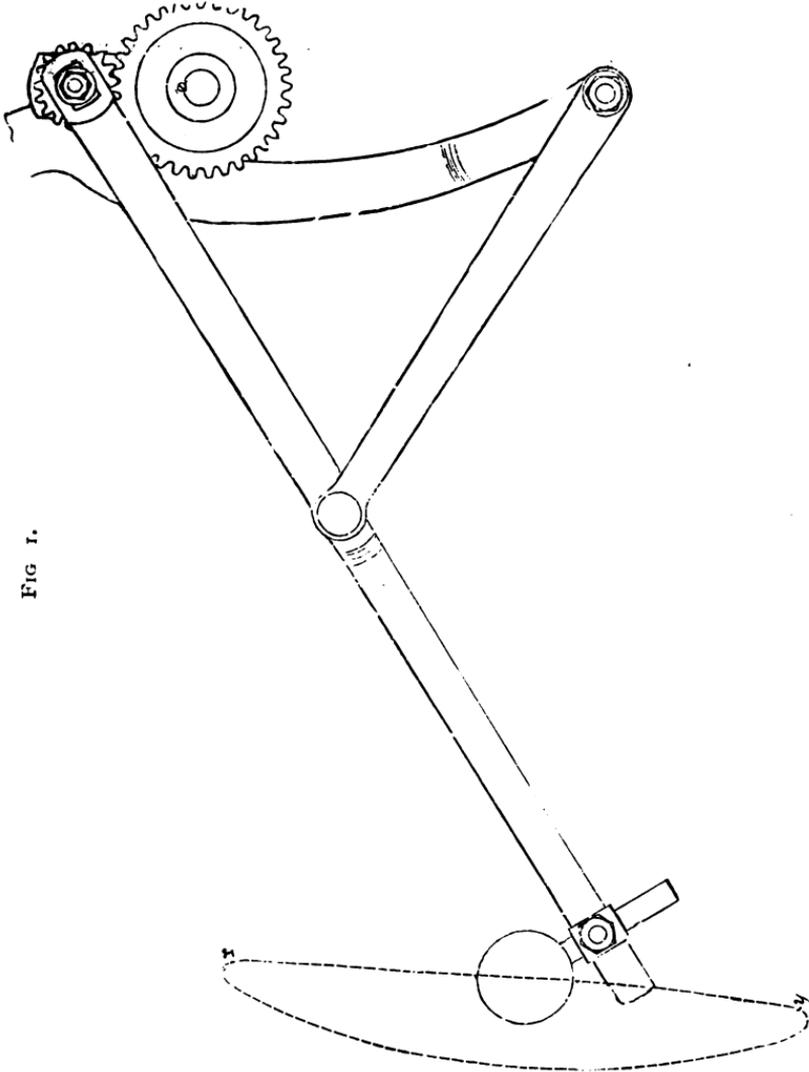


FIG 1.

if the spur wheel and pinion have each the same number of teeth, the driving wheel will make one revolution instead of a half at each stroke of the pedal.

It will be seen from the foregoing description that by loosening the nuts by which they are secured the spur pinion or planet wheel

may be readily taken out, and another with more or fewer teeth substituted, a supply of planet wheels of different diameters being conveniently carried in the tool-bag. If the movement in the proportions shown in fig. 1 were to be directly connected with a crank so as to make even gearing, the return stroke would be inconveniently more rapid than the down stroke, as the latter would then

FIG. 2.

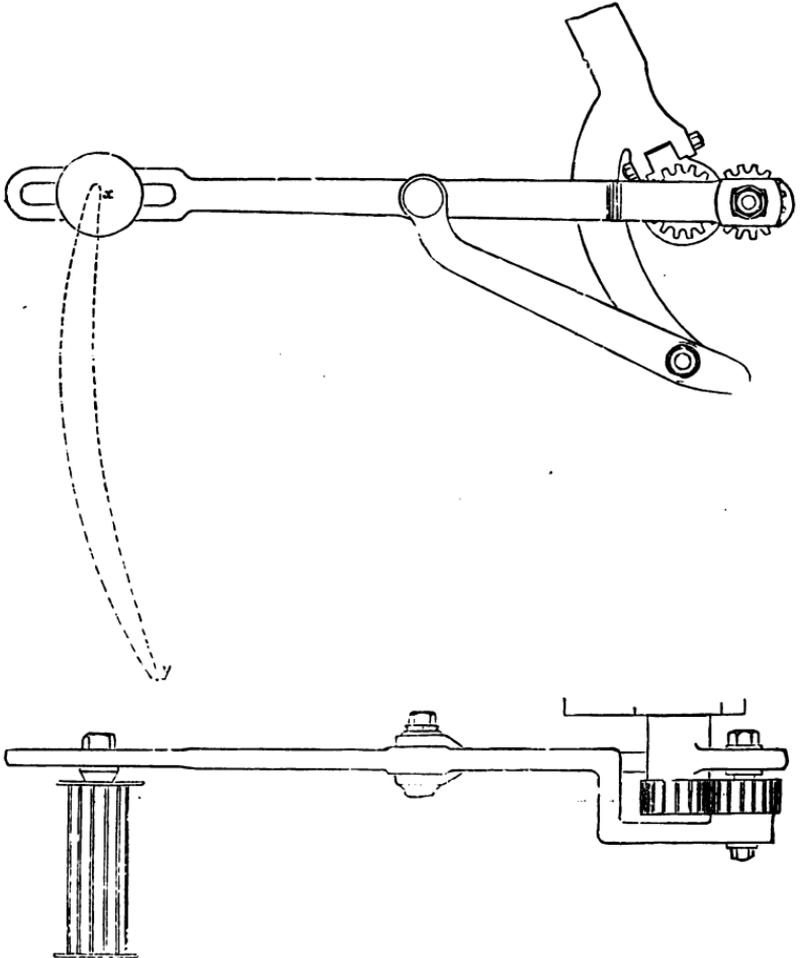


FIG. 3.

turn the crank more than half a revolution. The effect of the sun and planet gear in connection with it is exactly the reverse, the result being that the up and down movement of the pedals is equalised. The larger the planet wheel the more nearly equal they are brought. The nearer the fixed axis S is brought to the axis of

the driving wheel the greater the ratio between the velocity of the down and up strokes. In this way a nice adjustment of the movement may be obtained to suit any size of driving wheel, and an average of four or five different-sized planet wheels; and by arranging for the return to be slightly quicker than the down stroke the two dead points may be thrown into the return stroke. This is shown in fig. 1 and fig. 2, the dead points are at the turns of the loop, while the commencement and termination of the downward stroke are at x and y respectively, a short distance inside the turns, and thus the dead points are overcome. Fig. 1 shows the movement adapted to a driving wheel of about 36 inches, and fig. 2 about 30 inches. The variation of force in this movement is less than with a rotary pedal. At the commencement of the stroke the power is transmitted for an indefinitely short distance by leverage alone, the clavis rod acting as lever, and turning slightly upon the fulcrum. As the stroke proceeds the leverage gradually diminishes, while the force transmitted by direct thrust gradually increases until at mid-stroke these two operations of the force are exactly equal. The process is reversed for the remaining half, and at the end for an indefinitely short distance the power is transmitted by direct thrust alone. For the thrust part of the stroke the pivot acts as guide, and is moved along the proper position for this function by the rod turning upon the fixed axis.

THE ROLLER CLAVIGER.—Fig. 4 represents a bent roller claviger of the first kind, for operating the front wheel of a bicycle, in combination with two spur wheels in direct gear. It will be seen from the figure that there is a fixed bracket springing outwards, forwards and downwards from the lower end of the fork side (into which it is firmly pinned and brazed). The lower end of the part which forms a continuation of the fork side terminates in a knuckle joint, and carries the bearings for the driving wheel axle. Slightly forward of this the bracket has a projection or fork at each side, each terminating in a knuckle joint, and carrying bearings which support the ends of a short spindle, to which the crank is rigidly attached. The backward face of the bracket for about half the length at the lower part is broader, and is finished with a flat surface. This forms a guide for the roller which bears against it. The crank spindle and the axle of the driving wheel have each a spur wheel rigidly fixed to them, and the centres are arranged so that these two spur wheels gear together. The clavis rod is bent, and carries a roller on a stud near the centre. The movement represented is the normal form of this kind of claviger—that is, a line drawn from the centre of the pedal to the centre of the roller is equal to a line drawn from the centre of the roller to the centre of the crank pin, and both lines, being in the same plane, make a right angle at the centre of the roller; also the centre of the roller moves in a straight line, which, if produced, would pass through the projection of the centre of the crank spindle. The length of the stroke is exactly equal to two sides of a square inscribed within the crank pin circle, so that with a crank of five inches in length the stroke is a little over fourteen inches. K

The position shown in the figure is just after the commencement of the downward stroke. The dotted lines and numerals indicate the relative positions of the crank pin and pedal centres at equal intervals of time during the movement. It will be seen that the

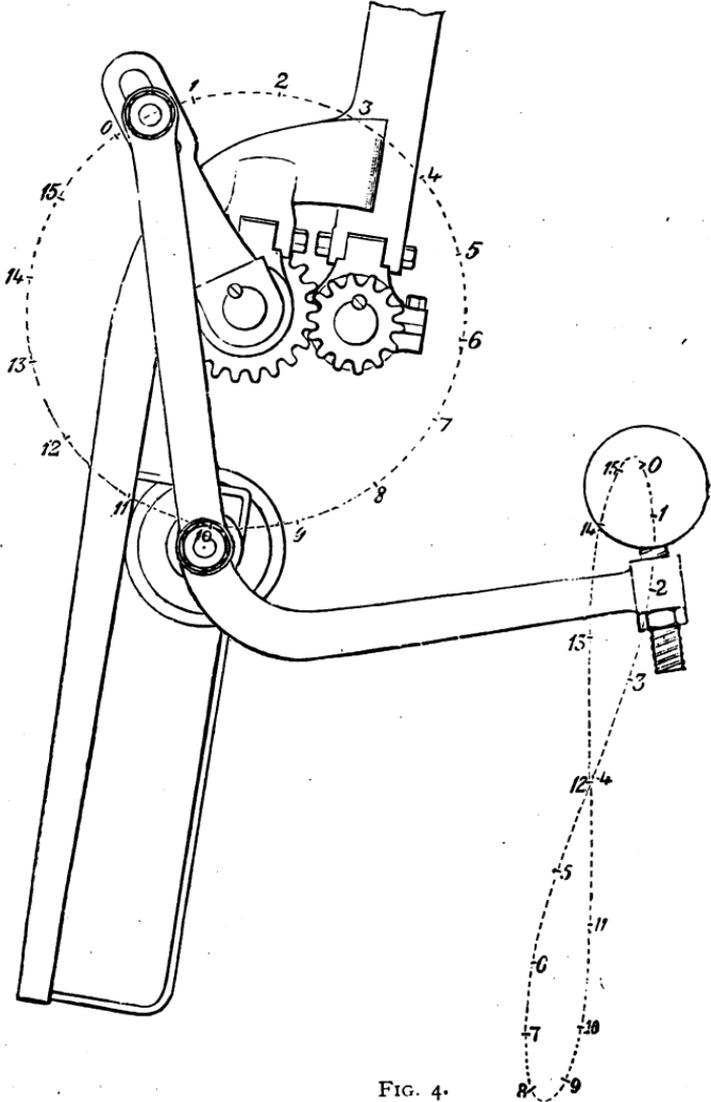


FIG. 4.

figure described by the pedal is similar to an elongated figure 8, but it cannot be distinguished by the operator from a direct up and down motion.

During a complete revolution of the crank the roller moves up

and down the guide a distance each way equal to the diameter of the crank pin circle. The directions of the motion of the roller and of the pedal do not coincide as to time, the roller being a quarter of a stroke behind the pedal. The stress of the pressure is against the bracket, in a direction perpendicular to its bearing face throughout the movement, both down and up. Unlike the hanger claviger, previously described, the two operations of the force (by leverage and by direct thrust) are not combined throughout the stroke. The stroke for the half revolution commences at the position marked 0. From 0 to 2 it is effected by leverage alone, the rod and stud turning inside the roller, the latter acting as fulcrum. From 6 to 8, the corresponding distance towards the termination of the stroke, the power is transmitted by direct thrust, the roller acting as guide. During the centre of the stroke from 2 to 6, these two methods, by which the force is transmitted, are blended in the exact proportions required. The crank pin is adjustable, so as to allow of a stroke from 9 to 13 inches. It has very deep double ball bearings (3 inches from centre to centre) in a boss at the end of the clavis rod. The pedal is also adjustable vertically, as shown. The roller has double ball bearings. It is covered by a $\frac{1}{2}$ in. round rubber tyre. The roller is prevented from jolting about by a wire fastened into the bracket and passed over a groove in the roller, and just clear of touching it.

THE ROLLER CLAVIGER No. 2.—This may be described as a roller claviger of the second kind. The general description preceding applies equally to this. The roller moves in a horizontal direction,

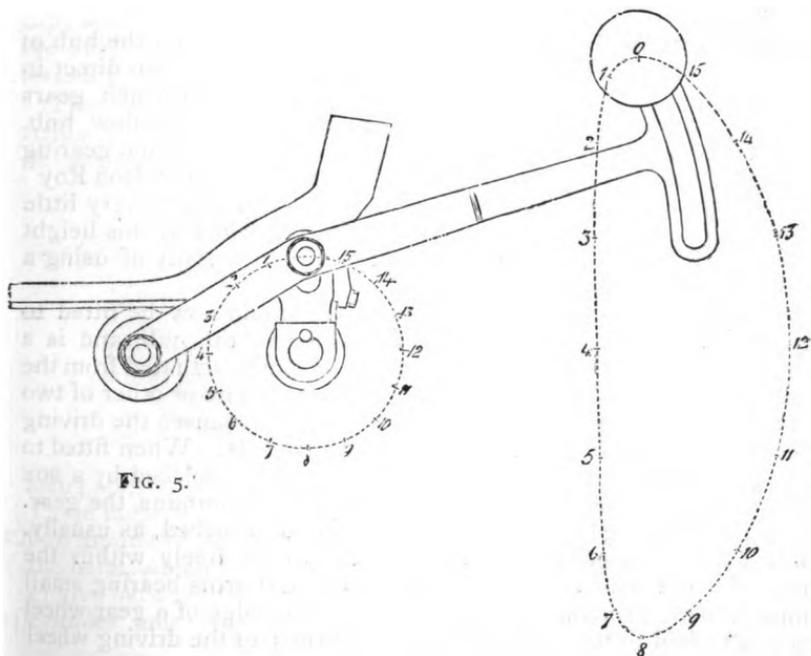


FIG. 5.

and is, in time, half a stroke behind the pedal. The power is, however, mainly transmitted by leverage, the vertical element in the motion being so transmitted, and the horizontal by direct thrust. The variation of force is the same as in the rotary pedal motion, and the dead points are at the turn. The crank pin has a deep bearing in the boss of the clavis rod. Double ball bearings are fitted to both joints. The clavis rod is bent laterally, so as to narrow the tread. The rod terminates at the pedal end in a slotted arc, and allows the pedal to be adjusted vertically to suit the rider. It is shown arranged for a bicycle running even, having a large driving wheel.

The Shellard Driving Gear.—This is of the usual chain and wheel type, its only speciality consisting in the single chain being used with a front driving wheel, the crank bearings and chain wheel being attached to a short backbone which follows the driving wheel, thus placing the driving gear immediately beneath the rider and between the two wheels, as upon the "Rover" type. The frame is very considerably altered to admit of this.

The Courier Gear is the exact reverse, the machine upon which it is applied being a rear-driver and two chains being used, the cranks and chain wheels being attached to that portion of the frame which connects the two wheels together.

Hunnable's Two-speed Gear for bicycles consists in placing upon the inside of the fork two different-sized spur wheels, which gear into similar wheels of reversed sizes attached to the hub of the driving wheel, either the wheel being driven direct or very slightly geared up by a transmission of the power through the train of wheels thus fitted.

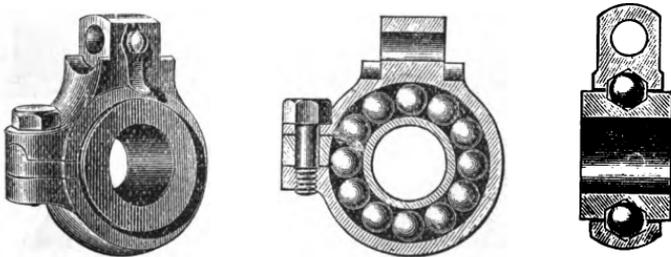
Keen's Speed Gear.—This is an arrangement within the hub of an ordinary bicycle whereby it may be geared up, yet driven direct in the usual manner. It consists of an eccentric wheel which gears externally with the internal teeth of the inside of the hollow hub. These teeth are fitted with rollers to lessen friction, and the gearing is somewhat on the same principle as that applied to the "Rob Roy" tricycle some years ago. Very little weight is added, and very little friction is engendered, and whilst a man is restricted by his height to his size of wheel, he can gear up without the necessity of using a low wheel, which many object to.

The Crypto-dynamic Two-speed Gear can now be fitted to bicycles of almost any type. It is contained in the hub, and is a combination of gear wheels with a striker or clutch actuated from the handle-bar in such a way as to connect either one or other of two separate trains of wheels which, by their action, causes the driving wheel to rotate at one or other of two given speeds. When fitted to a bicycle the flange of the hub upon one side is replaced by a box of the same diameter or thereabouts, which box contains the gear. When the Crypto gear is fitted, the axle is not attached, as usually, firmly to the flanges of the hubs, but revolves freely within the hubs. To the axle is attached a series of short arms bearing small pinion wheels, which act upon the teeth on the edge of a gear wheel that is attached to the side of the box, and thus to the driving wheel

itself. The gear is put into action by means of a finger or lever, which is fitted at the handle-bar with a short arm and set of notches or fixed positions into which it can be placed. By placing it in the first of these positions the gear is brought into play; in the second notch the clutch which puts the gear into action is withdrawn, and the pedals are left free to revolve of their own accord, thus allowing the wheel to run freely downhill, the pedals being used as foot-rests. In the third position the clutch pin throws the axle and the hub of the driving wheel into rigid connection with each other, thus driving the machine exactly as an ordinary bicycle, the direct force of the rider being transmitted through the cranks and axle to the driving wheel. In large-wheeled machines the action of the gear is arranged to reduce the speed for hill-climbing purposes, whilst in machines of the smaller variety, such as the Crypto 'Xtra, the gear, when thrown into action, acts in the reverse direction, gearing the machine up, so that with a 40in. driving wheel the machine can be driven direct as a 40in. for hill work, or when either going downhill or upon a good piece of level road the gear can be thrown in and the machine driven geared to 60in. The weight of the gearing added to the machine is about five or six pounds.

BEARINGS.—The *Sanspareil Conical Roller Bearings*.—In this bearing rollers are made use of in place of balls, but they are so arranged that a side adjustment is obtainable, the bearing box being fitted with a ring or collar, pierced alternately upon its sides sufficiently to admit the insertion of a number of short conical rollers, which set at right angles to each other and work in the angle formed by the groove in the axle. The adjustment is obtained by an outer milled cap, secured by a catch piece fitting into a number of holes upon the outer face of the cap, and secured between the lugs at the side, for, as in Rudge's bearings, there is adjustment at the side as well.

The **B.S.A. Ball Bearing**, made by the Birmingham Small Arms Co., is of the single variety. The case is made—as will be seen by reference to the annexed illustration—in one piece,



THE B.S.A. BALL BEARING.

being split at one side and provided with a couple of projecting lugs. These lugs when free are about $\frac{1}{8}$ of an inch apart, and are pierced longitudinally with a round hole large enough to admit when open the balls, which are inserted through this space until they fill the groove between the axle and the bearing box. A plug which fits the cylinder hole and fits into the space between the lugs is then

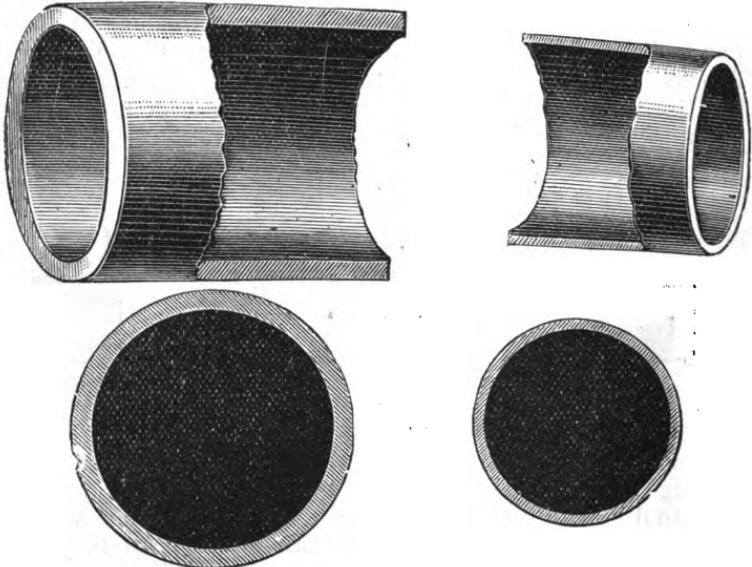
inserted, and the bearing tightened by drawing the lugs together by means of a bolt and nut. The bearing is simplicity itself, and is now very much in use, being generally considered a good article.

Bown's Ball Bearing Hub for front wheels of safety bicycles of the dwarf or "Kangaroo" type is a very neat construction. The balls are contained in recessed bearings well inside the hub, the flanges of which are stamped out of thin steel, and are so constructed as to form in themselves the chain wheels. The hub itself is upon the same general principle as the back wheel hubs of Bown's make, the wheel running upon a fixed axle, and not, as in some makes, the axle fixed to the wheel and running in the bearings attached to the forks.

The **Howe Bearing Attachment** is on the principle of the swivel, the fork ends being formed into a short fork, the extremities of which carry pins which form pivots upon which the circular bearing box works, thus allowing the bearing to accommodate itself to any inequality or bend that may by any chance exist in the axle.

Bown's Crank Brackets are the same as that previously described as Edge's patent, but very much simplified and fitted with ball bearings instead of cones. The fork extension for this is so made as to curve inwards, and the bearings, chain wheel, and crank, which are practically one, are secured to the fork end by means of a bolt and slot, and can be put on and adjusted as easily as can a pedal on an ordinary machine. They are very neat and give a much narrower tread than most other arrangements.

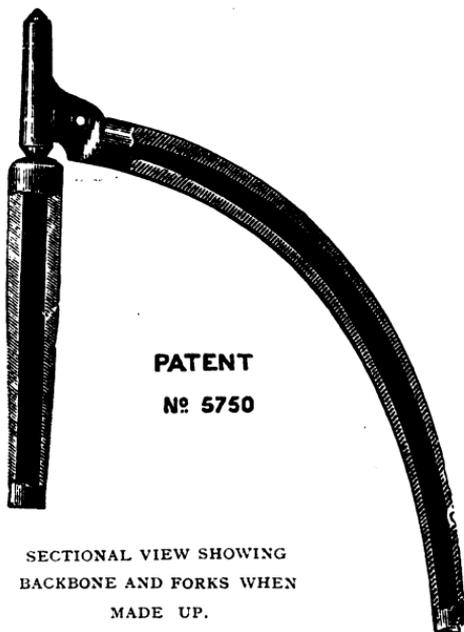
BACKBONE AND FORKS.—**Warwick's Perfection Backbone** is destined ere long to become universal. It is as yet



PERFECTION BACKBONE.
SECTIONAL AND END VIEWS SHOWING NECK END AND BACK FORK END.

quite a new introduction. As will be seen by a glance at the annexed engraving, the tube is not only tapered in diameter from front to back, but the thickness of the metal is likewise tapered, with the result that there is a great gain in strength where wanted, and a saving in weight as well.

Warwick's Perfection Forks are constructed on the same principle as the Perfection backbone, and are equally good. In them



SECTIONAL VIEW SHOWING
BACKBONE AND FORKS WHEN
MADE UP.

PERFECTION FORKS.

the metal is tapered as well as the tube, leaving the shoulders of the forks, where the great strain comes, large and thick, whilst the ends are small and thin.

Wiggins's Non-vibrating Front Forks for ordinary bicycles. This is a very simple arrangement. The head is fitted to slide on a pin, and the backbone, being built with considerable clearance, is supported by a 12in. flat spring resting on the fork shoulders at one end and bolted to the backbone just at the rear of the saddle, the spring taking the entire weight of the rider.

Weekes's Variable Rake is fitted to an ordinary bicycle, and has for its object the imparting to it of certain safety qualities for night-riding and hill-climbing. The arrangement consists in providing a double back fork, one being a firm attachment to the backbone in the usual way. This is slightly shorter than would be required were it used, in the ordinary manner, and in place of attaching to the back wheel pin, the ends fix on to bolts in the sides of the

second fork at an inch or so from its attachment to the back wheel pin. This second fork fits underneath the first, and is free to work up and down and revolve upon the back wheel pin; its free end being attached to, and supported by, a stout cord, which passes up through the backbone and round a drum attached to the handle-bar immediately in front of the head. By winding this cord up or down the secondary fork is raised or lowered as the case may be, the result being that the backbone is also raised or lowered to a somewhat less extent, and consequently the rake altered to a considerable degree. A stop is provided at the handle, or, rather, a series of stops, which enables the rider to fix the brake at any point he desires, so that he can ride upon the level or uphill with an absolutely perpendicular fork, whilst for descending hills he can have any rake required by the gradient. A stop is provided also at the bottom so that, should by any chance the cord break, no harm would accrue, and the rider would but have to continue his journey with a full rake until he could join up again. The alteration of the rake is made without any trouble whilst the rider is in the saddle, and the whole arrangement is simple in the extreme.

Shellard's Adjustable Forks are so arranged as to be adjustable for rake—an arrangement which permits the alteration of the gearing by using another chain wheel and still retaining the same length of chain. The adjustment is simple, merely consisting in bolting the fork heads to the sides of the neck, and allowing them a certain amount of play upon the loosening of the attaching nuts.

The Regent Fork Extension and Chain Adjustment.—In this the fork extension terminates in a broad, deep square-edged thread, and the crank bracket is attached to a loop with a D-shaped hole fitting on to the fork extension, which is flattened to accommodate itself to the D hole. A stout nut top and bottom of this permits its being raised or lowered at will, and the size and strength of the thread makes the whole very firm and reliable.

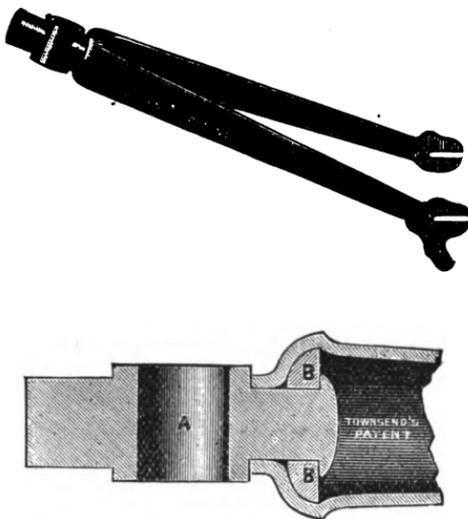
Hemsworth's Fork Extension, in place of continuing straight down to the crank bearings, is attached above the wheel bearings, and then, making a curve around them, drops downwards and carries the crank bracket on its rear. It is a neat and taking form of fork, though I can hardly see the gain in the arrangement; it doubtless is merely a peculiarity of build.

The Badger Adjustable Fork Extension, like Leek's patent, is fitted to a dwarf safety, with the object of not interfering with the stretch of the chain when altering the reach of the machine to suit the heights of various riders. The arrangement adopted is simply the fork extension being separate from the fork proper, and attached to the bearing by means of a nut, its upper end being formed with catches or pins which fit into holes arranged to correspond, somewhat in the same manner, but on a coarser scale, as the fastening of a Bown's ball bearing, the extension being held at any angle according to the hole in which the catch pins are placed, the tightening of the nut keeping the two firmly together, and thus rendering all firm and secure.

Front Forks on Safeties of the rear-driving description are, in the majority of cases, very similar in construction to the ordinary bicycle, save that they are usually semi-circular in section and very broad at the bottom. They slope off at a considerable angle from the perpendicular, and, in place of the short steering head, are terminated by a long, hollow steering-post, on which a T shaped handle-bar is fixed, being adjustable several inches up and down to suit the different heights and length of arm of the riders.

Curved Forks are precisely similar to these, with the exception of curving forward at the bottom in place of running straight to the head of the steering wheel. Theoretically they are preferable to the straight forks, and certainly, when the machine is not in motion, it is much more manageable when so fitted; but as soon as it is propelled, the straight fork appears to show its superiority in a straighter steering.

Townsend's Safety Hollow Back Fork is of the shell or semi-tubular variety, and, like the rest, is stamped out of sheet steel. The speciality, however, consists in stamping out of the same piece of



TOWNSEND'S SAFETY HOLLOW BACK FORKS.

metal the slotted ends and the step, and in fitting a prepared end for attachment to the backbone and cross tube of the cross frame, the combination saving 4lbs. in weight, and saving the manufacturer the cost of the fitting and brazing of five joints.

ANTI-VIBRATION GEAR.—Rudge's Spring Forks.—The construction of these will best be seen by a glance at the annexed illustration. The fork sides are hinged in the middle, and to each half an arm is attached. The two arms depart from their common centre at nearly right angles, and their extremities are connected by a strong

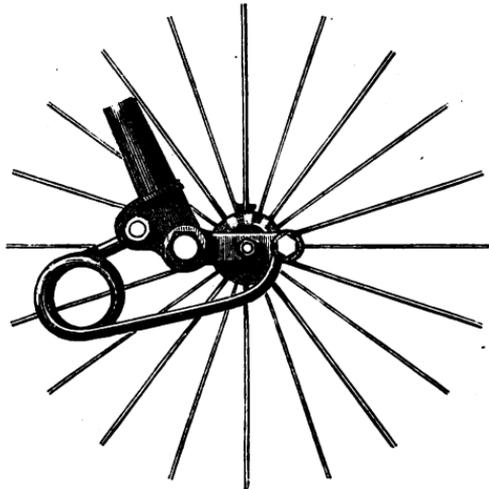


RUDGE'S SPRING FORK.

spiral spring. As a result, all the weight placed on the forks is borne by the springs, which give to every obstacle.

The **Badger Non-vibrating Back Forks** are intended to reduce vibration to a minimum, it being a well-known fact that most of the vibration upon a bicycle comes from the back wheel. The principle is that of a hinge and spring, the forks being jointed to the end of the backbone, and the weight of the front portion of the machine supported upon them through the medium of the spring, which thus allows the weight of the rider to play freely up and down.

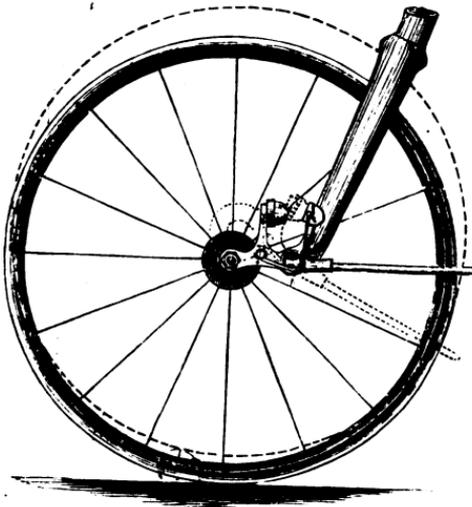
Harrington's Vibration Check.—This is for attachment to



HARRINGTON'S VIBRATION CHECK.

the forks of any form of safety bicycle except those to the front wheel of a "Kangaroo"-pattern machine. Its construction will best be understood by a glance at the annexed illustration. It will be seen that it consists of a single coil of stout spring wire, one end being attached to the fork, and the other to the extremity of a short lever which is attached to the wheel pin. The whole weight is thus supported upon the spring, which gives to every obstacle it meets with.

The **Will-o'-the-Wisp Anti-vibrator** is a contrivance for the same purpose, and may be attached either to the steering wheels of rear-driving safeties or the back wheels of bicycles and dwarfs. Like the last, the principle is a single coil of stout steel wire arranged as in the annexed illustration. The fork ends attach to



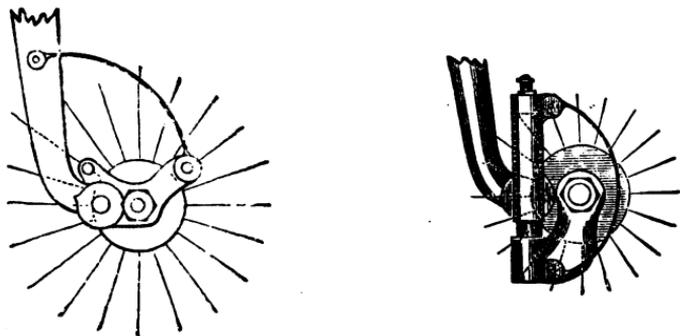
THE WILL-O'-THE-WISP ANTI-VIBRATOR.

one arm of a lever, and rest upon the spring. A side arm projects upwards from the lever which is attached to the wheel pin, and bears at its top a button or pad of rubber against which the fork brings up should the spring be greater than usual. The springs on each side are kept stiff and firm by a continuation or fork of strong wire, which passes round at the back of the wheel and unites them.

Wiggins's Non-vibrating Gear is a combination of C springs and guides. It is fitted to the back wheel of a bicycle in the following manner:—The back fork ends turn sharply at right angles and end in tubular sockets, which, in place of fitting to the ends of the wheel pin, work on two upright rods which form the sides of a vertical fork attached to the ends and resting upon the back wheel pin. This serves to keep the whole arrangement rigid, and vibration is taken up by means of three C or bow springs, a small one on the top of the vertical fork, the other two resting, at one end, on the ends

of the back wheel pin, and curving round, supporting the horizontal portions of the back fork ends on their upper sides.

The **Bradford Anti-vibrating Springs** are somewhat similar, but have the advantage of requiring no alteration of machine, so they can be applied to any machine already in use. The fork ends are removed from the wheel pin and attached to the side of an upright tube, whilst the wheel pin fastens to a short right-angled



THE BRADFORD ANTI-VIBRATING SPRINGS.

casting which depends from it and turns rearwards. The lower end of this is exactly beneath the aforementioned tube, and is attached to a rod which runs up it, and is encircled by a spiral spring. A bow of flat spring steel curves round from top to bottom of the whole arrangement as shown in the illustration and takes all the vibration.

The **Raleigh Anti-vibrator** is fitted to the front wheel of a rear-driving safety. To the top of the front fork a bracket is attached, on which is a stout short pin encircled with a strong, coiled spring. The upper portion of the steering-post, to which the rest of the frame is attached, is provided with another lug and guide piece, and rests upon this, the weight of the front part of the machine being wholly taken by the spring.

FRAMES.—**Griffiths's Loop Frame** for dwarf safeties consists in carrying the fork extensions rearwards, until they meet immediately behind the driving wheel, thus forming the two forks of one tube, an arrangement which gives great firmness and steadiness to the driving mechanism.

Safety Frames.—The form of safeties, especially the modern introduction—the rear-driving, or “Rover” pattern, differs in almost every machine, the stereotyped pattern of the ordinary bicycle being unattainable as yet. Still, however, matters have pretty generally worked themselves down into two or three types, which are run upon, with slight changes in detail, by every maker in the trade. Of these, perhaps, the simplest is

The Cross Frame.—In this the form is simple in the extreme. It consists of the usual sloping steering post and front forks which

may be said to be common to all rear-drivers. The main frame or backbone consists of a tube running from the neck straight back to the back wheel, which is held in an ordinary straight fork, this latter being in continuation of the straight backbone before mentioned. At the junction of the fork and backbone a second tube crosses the first at right angles, or nearly so, to it, the lower end making a slight curve backwards and bearing at its lower end the connection and gearing for the cranks, whilst the upper end is hollow and contains a sliding seat pillar. Some special forms of this type may be noted in the

Psycho Stayed Frame.—This is precisely the same as the ordinary type, but in place of having a small stay rod running from the crank attachment to the backbone, just below the neck it is provided with two light stay wires from the neck of the backbone to the top of the tube carrying the seat pillar, another pair running from this point to the hub of the driving wheel, thus forming a parallelogram of light stays bracing together the extremities of the cross.

The Mud-guard Frame is a variation of the cross pattern, the alteration consisting in making the mud-guard—which usually consists of a strip of light steel encircling the back wheel—of stout tube, and causing the lower end of it to carry the crank bearings, whilst a short bracket is attached some few inches above its junction with the backbone for the purpose of carrying the adjustable seat pillar. This type is used upon the “Premier” chiefly.

The Eureka Frame has ordinarily the mud-guard forming a portion of the main frame, whilst another difference consists in forming the backbone and forks out of two straight tubes which run side by side, converging to the neck, and are united by a bridge in the centre to strengthen them, this forming a very strong frame, and being almost precisely the same in construction as the forks of the “Duplex Excelsior” ordinary bicycle.

The New Rapid Safety Frame is of the ordinary cross type, with the exception that the lower portion of the frame which carries the crank bracket is hinged at its junction with the backbone, this method of construction allowing it to be pulled forward by the front stay for the purpose of the adjustment of the chains without any strain upon the tube.

The Invincible Single Tube Frame is also of the cross variety, but its peculiarity consists in doing away with forks to both wheels, the frame consisting, in place of the backbone and fork of one long, straight, tapered tube, which runs up one side of the back wheel only, the attachment of the pin to the head of the tube being made exceptionally strong. A similar arrangement is carried out with the front wheel, the steering post and fork being one straight tube, which, however, is fitted upon the opposite side of the wheel to that upon which the frame of the back wheel is attached. This, of course, is simplicity itself, and I see no reason why it should not be strong enough.

The **Parallelogram Frame** is the older, and most probably the stronger, form of frame adopted upon safety bicycles. In it two pairs of forks are attached to the back wheel, one dropping slightly from the handles and carrying at its crown the chain wheel and crank bearings, the other taking an angle of about 50 degrees and carrying at its summit a socket in which the seat pillar is fixed. From this point a more or less curved tube runs to the neck or steering post, and from the crank bracket another tube is carried, curving to clear the front wheel and ending at the steering post, either uniting with the upper tube in one point or separated from it some few inches, the latter being stronger.

The **Sparkbrook Frame** is perhaps stronger than any, though scarcely so good-looking. In it the two forks are fitted to the back wheel as in the previous style. The backbone which connects the two wheels is straight and nearly horizontal, curving up sharply at the back, where it unites with the top forks to form the socket for the seat pillar. From this, at a point a few inches from the rearmost end, a third fork is attached, which descends to the crank bearing and holding the bracket and gearing firm, making a very strong combination indeed.

Singer's and Starley's Combination Frame somewhat combines the features of both styles in general use. In them the double forks for the back wheel are used. These are light and united by a tube which follows the shape of the wheel like the tube in the mud-guard frame. The backbone takes the angle which it does in the cross variety, and is united to the middle of the before-mentioned curved tube. A small curved bracket at the top of the frame carries the seat pillar, the crank bracket being fitted at the bottom extremity.

Spring Frames.—With the object of reducing vibration, which with a smaller wheel is naturally rather more present than with a large one, several special frames have been introduced. They are distinguished from anti-vibrators or apparatus which may be attached to any machine, and have for their special features the absorption of vibration in the frame itself. This object is more or less effected in the several varieties of spring frames, which may be described as follows :—

The Olympia Spring Frame.—This is of the cross form, but the straight backbone is hinged to the rear portion of the frame immediately in front of the junction of the cross tube. The stay which usually braces the crank-bracket end of the cross tube to the front portion of the backbone is provided at its upper end with a hook, by which it is attached to a strong coiled spring fastened to the under portion of the backbone, just under the neck. The result of this arrangement is that, when the weight of the rider is upon the machine, the spring is brought into play, and the frame is only held in proper position by the spring, consequently, when any greater obstacle than usual is met by the front wheel, it enables it to rise, and the spring giving well, the vibration ensuing is not transmitted to the body of the rider.

The Whippet Spring Frame.—This also in general features partakes more of the cross type than any other variety. Several points of novelty exist, which may be noted as follows :—The backbone and sloping forks to the front wheel form a rigid connection between the two wheels in the usual manner. The cross tube, however, is supported at the bottom by a strong coiled spring, much in the same way as the last, whilst the top end is held up by a link attached to the backbone just in front of the attachment of the before-mentioned spring. A stout tube joins the top of the cross tube to the top of the handle-post, which is connected with the head of the steering forks by a triple-jointed pair of links, which allow several inches play before the lower end of the handle-bar and upper end of the forks could be brought together. The result of this arrangement is that, not only is a certain portion of the vibration removed, but the whole body—seat, pedals and handle-bars—are supported upon springs, and while so supported are rigid with each other, so that the give of any one part does not affect its relative position with the other portions of the machine, which should, for the comfort and power of the rider, remain constant in their relation to each other. This is one of the most successful forms of spring frames, and has, indeed, given rise to the introduction of them all.

The Roamer Spring Frame.—This, like the last described, keeps the saddle, pedals, and handles constant in their relation with each other, and gives them all the benefit of the anti-vibratory arrangement. The frame is like that of an ordinary "Rover," but slightly shorter, and the steering-post, in place of being a rigid connection with the top of the steering-forks, ends abruptly. At the top and bottom of this a link is fitted some three or four inches in length. These links attach, one to the top of the steering-forks, the other to the extremity of a secondary steering-post to which they are attached. A simple single-coil spring is placed between the two steering-posts, which serves to support the parts in their proper relation to each other, yet allows them to give to every contact of the front wheel with an obstacle.

The Invicta Spring Frame.—This is fitted to a safety of the cross frame type, but the backbone is cut off at its junction with the vertical piece, which has the saddle at its upper extremity and the pedals and appurtenances at its lower. This piece so cut off is attached by means of a joint to the vertical piece at a few inches from the saddle, and then terminates as usual at the axis of the rear driving wheel. A spiral spring is attached by one end to the middle of this back fork and at the other end to the crank bracket, which is also jointed. Attached to the jointed bracket is a stay rod which runs up to the axle of the driving wheel, by which arrangement the chain is always kept at its proper tension. When the rider mounts the machine, the spring is stretched and the jointed crank bracket is pushed forward. It will be thus manifest that the rider is placed on an elastic frame, but the relative position of the seat, handle-bar and crank is unaffected. The construction is simple, no extra frame or weight being added,

and vibration, both on the seat and handle-bar, is overcome. No saddle spring is used or required. It will be seen that in both this and the last two the tension of the chain is not interfered with in any way, the motion of the frame being around the centre of the driving wheel.

Guest's Spring Frame.—In this the main frame is horizontal and carried almost directly in a line between the bearings of the two wheels of a rear-driving safety. The seat pillar is vertical, and attached to the frame immediately above the crank bearings. The handle-post, too, is also vertical and firmly brazed to the seat pillar, being placed a few inches in front of it. The forks are horizontal, as described in the account of Guest's steering gear. The forepart of the machine is, however, hinged or jointed to the rear portion, the joint being at the crank bearings, and a strong single coil of stout steel wire is fitted in the angle formed by the horizontal and vertical portion of the frame. Upon this comes the whole strain and weight of the rider, the result of the arrangement being that the rider gets several inches play up and down with his whole weight, seat, pedals, handles and all, and the wheels are practically forced to rise over obstacles without affecting each other, or in any great extent the rider.

The Ærola Spring Swing Frame.—In this machine the backbone is horizontal, whilst the forks holding the rear wheel slope upwards at an angle of about 60 degrees. A bracket depends from the backbone at its junction with the forks—which are carried for a few inches horizontally before dropping down to the wheel centres. To this bracket is attached a tube which carries at its lower end the crank bearings and chain wheel, whilst its upper end is continued to form a straight rod something like the cross framed machines. This upright tube, therefore, is free to swing upon its central bearings. It is held in position by a stout spring attached to a short cross pin, which connects the two sides of the fork at its base. Both pedals and saddle, therefore, swing to and fro in unison. In order to get over the difficulty of keeping a tight chain with such freedom of swing, two chains are used, and two sets of chain wheels. One chain connects the crank wheel with a cog wheel on the pin upon which the upright tube works. A second cog wheel is attached to this one, and geared by a chain to the driving wheel. This arrangement gives a swing frame which allows the rider to please himself as to his exact position, and gives to every obstacle.

Jones's Swing Frame.—In this the frame is somewhat similar to the Ærola, having horizontal backbone and highly sloping forks; nearly horizontal lower forks, however, are fitted, which carry the crank brackets and bearings. To this an upright fork is hinged, which rises over the backbone and crosses at its top the seat pillar. This is held by a strong spring attached to the top of the upright forks. It will be seen that the seat of the rider swings round with the pedals, and the arrangement is designed with the object of enabling the rider to get well over his work for hill-climbing, and in fact to be always exactly vertical upon every gradient.

STEERING HEADS.—Socket Steering.—This to riders of a dozen years since is nothing new, but though it had gone out entirely upon ordinary bicycles, the construction of the rear-driving safeties with long steering head caused it to be reintroduced. In it the backbone of the machine attaches to a long tube, within which the steering-post passes, the bottom of the tube or socket working upon the shoulders of the forks. There is no method of adjustment, as a rule, for wear, and unless kept well oiled, it is apt to work dry, and then becomes very stiff. If properly attended to, however, few varieties of steering gear for this style of machine are better, as the steering is firmer and safer, and the working out of the oil on the sides of the forks is not the objection it was upon ordinary machines, where the legs of the rider were continually in contact with the forks.

Hinge Steering upon rear-driving safeties is becoming very popular. In this the steering-post is carried straight up, and a couple of lugs project rearwards about five inches apart. These lugs bear steel-hardened cup centres. The backbone ends in the pointed centre spindle common to the ordinary bicycle which fits both the cups, and is adjusted in the same way as an ordinary bicycle head by means of a set-screw and lock-nut on the top. Steady enough when the machine is being driven, it allows the front wheel to flap about in a very helpless sort of manner when not at work, giving the idea that the steering would be very difficult, which, however, it is not.

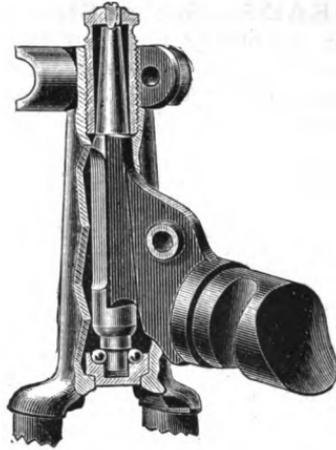
Dearlove's Ball Bearing Head.—This is very simple, and consists merely in attaching two of Bown's Æolus ball bearings to the neck, making the head of the forks a solid pin instead of a barrel, and passing this pin or steering-post through the before-mentioned ball bearings, one of which fits close down on the shoulder of the fork, and the other some four inches above it. It will be readily understood that this makes a very simple yet rigid steering.

Warwick's Ball Bearing Head.—This is an adaptation of the old socket form of steering, the head being formed with a central pin or steering-post enclosed by a tube attached to the end of the backbone, a line of balls being fitted at the top and bottom, and an adjustment made by a screw at the top.

The **New Rapid Ball Bearing Head** is a combination of the centre and the ball bearing. All the weight, and consequently friction, coming upon the bottom centre, that one is replaced by a cup bearing upon a ring of balls, the top centre being retained as upon ordinary machines. This is simple and fully effective.

The **American Champion Ball Bearing Head** is somewhat similar to the above, having balls at the bottom only. Its construction can best be seen by a glance at the annexed illustration, from which it will be seen that the steel centre piece at the base is grooved to hold a line of balls, the base of the spindle being hollowed out so as to rest upon them, whilst upwards it ends in a long tapered top, which takes all the lateral wear, whilst exact adjustment is

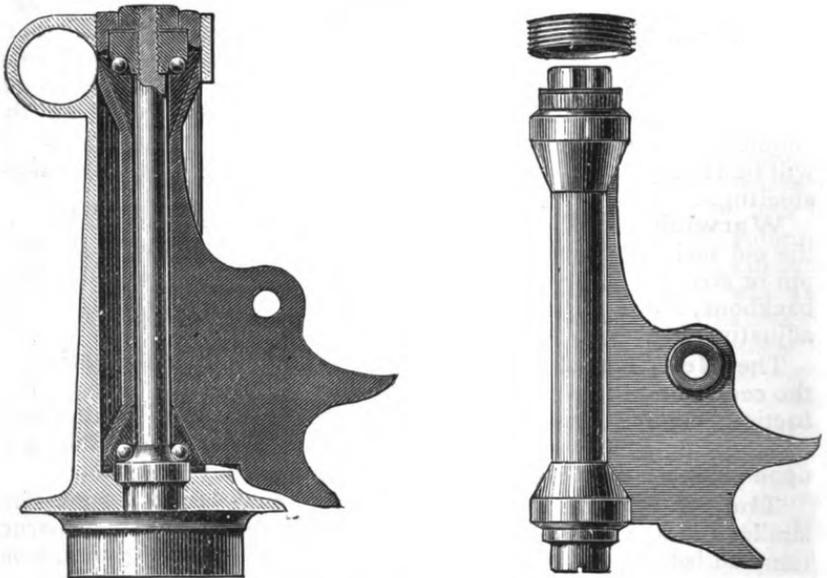
L



THE AMERICAN CHAMPION BALL BEARING HEAD.

borne by an additional centring pivot above the ordinary central screw.

The Abingdon Ball Bearing Neck.—Unlike the other ball bearing heads, the introduction of the balls is made in the neck. The arrangement will be better understood by a glance at the annexed illustration, whilst it may be briefly described as the

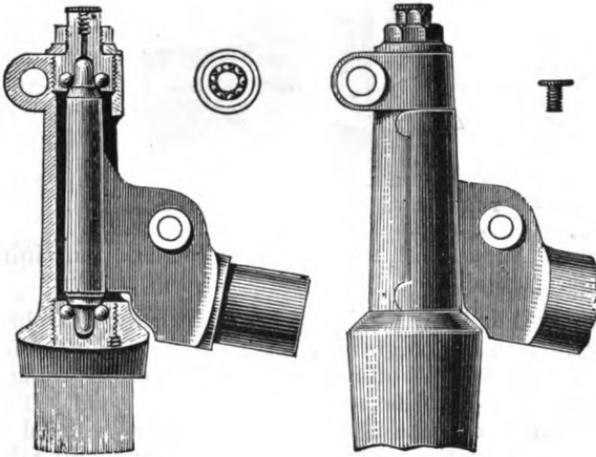


THE ABINGDON BALL BEARING NECK.

same system that is adopted in ball pedals. In fact, it is just attaching the centre pin of a ball bearing pedal to the end of the

backbone, and inserting it in the head. In other words, the neck or spindle is made hollow, slightly curving out at the top and bottom, to form a ball channel, and a pin with curved ends passes through from top to bottom, the balls being adjusted by the before-mentioned cones.

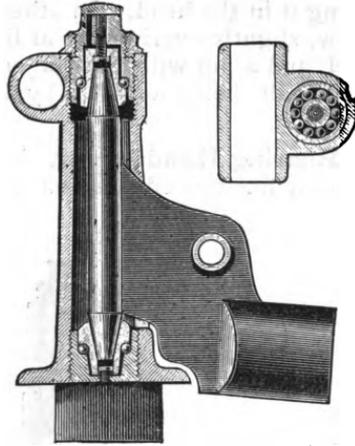
♣ **Trigwell's Ball Bearing Head** is most simple, yet most effective, and its introduction has tended to produce a revolution in the



TRIGWELL'S BALL BEARING HEAD.

system of steering gear for ordinary bicycles, of which we have yet seen but the commencement. The spindle of the backbone, in place of ending in points, as usual, has the two extremities worked into rounded shoulders or grooves, whilst in the bottom of the head a cup, grooved to correspond, is fitted, and the fixing screw at the top has also a groove on its lower face. In the channels formed by these double groovings, lines of steel balls are placed, the adjustment of the head being done in the usual manner by the set pin at the top. The annexed illustration shows the arrangement, which provides a head at once extremely rigid and firm and wonderfully free in steering.

Trigwell's No. 2 Ball Bearing Head acts on the same principle as the last, but the neck is formed in much the usual manner, and the balls are contained in the top and bottom settings of the head. This method is simpler, and enables machines in ordinary use to be converted without alteration to neck, and with but little meddling with the head, all that is requisite being to replace the usual hardened steel cup centre in the bottom with the ball cup,



TRIGWELL'S NO. 2 BALL BEARING HEAD.

and the top set-screw with the corresponding one containing the top line of balls.

The **Invincible Ball Bearing Head** is somewhat like the last. The neck is finished slightly taper with flat ends, which fit into tapered sockets top and bottom. The balls are very small, and are contained in the top and bottom fittings of the head. The head is so free that, although the neck is not in any way fixed to the top and bottom parts of the ball cases, the friction is all taken by the balls, the neck setting into its place at once without fixing of any kind.

The **Queen of the West Ball Bearing Head** possesses a speciality both in the construction of the head itself as well as in the fitting of the ball bearings. The head is one of the strongest and simplest in use, and is not constructed, as usually, out of a stamping. It is formed of a length of weldless steel tube. This length of tube is contracted at the top to give it an inner thickening to take the screw which adjusts the top centres. At the bottom it is expanded to form the shoulders of the forks. Front and back are, of course, cut away here. A bottom plate with sides curved in the opposite direction of the curving of the fork shoulders is then fitted across the opening at the bottom of the tube, the curved sides of this bottom plate and of the shoulders forming the stumps for the attachment of the fork sides. Upon the bottom plate is rested a centre cup, grooved to take a line of balls, and the upper portion of the neck also works in a line of balls, which are held in place by means of a spring ring within the interior of the adjustment screw at the top. The lug, which crosses the handle-bars, fits over the contracted portion at the top. The centre pin is made of steel fitted in an iron neck, and the opening of the head is covered in by a dust-guard. The arrangement is very strong, and good in every way.

HANDLES.—The Columbia Double-grip Handles.—

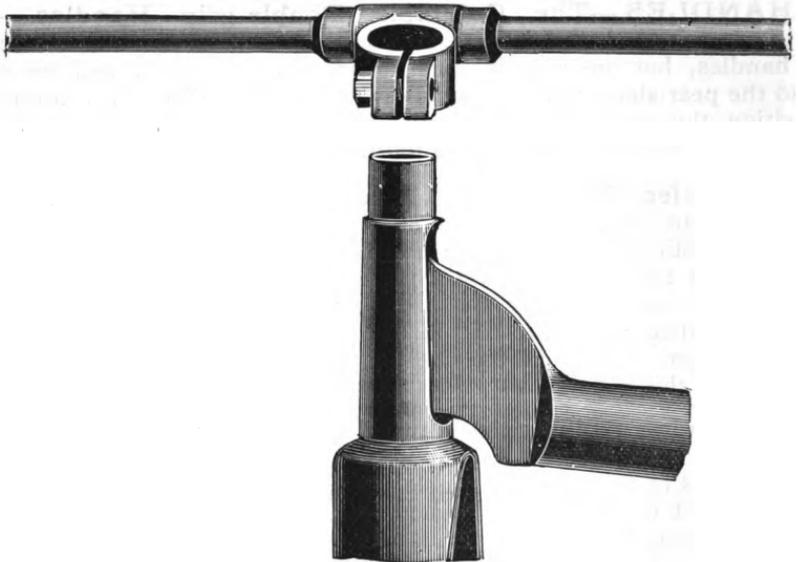
These are formed of vulcanite, and take the form at the ends of the T handles, but one side is constructed so as to merge as it were into the pear-shaped variety, thus giving the T handles with, in one position, the grip of the pear kind, enabling the rider to change the position of his hands when on a journey.

The **Perfect Fit Handle** is the strangest yet produced. It is an American idea, and may be likened to a conch shell, having a large smooth resting-place for the palm of the hand, and a grip aperture at the corner for the thumb and rest for the wrist. Its construction is so peculiar that it cannot be explained better without the assistance of an illustration, which, however, I am unable to present to my readers in the present volume. It is not yet introduced into this country.

The **Rudge Adjustable Handle Grip**.—In this a handle of the spade variety is used, and it is attached to the end of the handle-bars by means of a double joint, thus giving the user the power to set the handles in, practically, any position he likes—one joint allowing the grip to be passed round and round the bars, and set in any intermediate position; the other giving a motion at right angles to it, so that the set of the handle grips can be adjusted with the greatest nicety.

BARS.—The Club Detachable Handle-bar.—In this the bar is divided centrally, and the two ends meet in the middle of the lug on the front of the head. Each end of the lug is pierced with a taper hole, which just intrudes upon, and crosses downwards, the horizontal hole in which the handle-bar rests. The bars are nicked with a slight groove, and a couple of taper pins drop in from the top and, fitting the holes, set into the grooves on the bars, and hold them firm. The pins are held secure by nuts below, and by removing the nuts and tapping the pins out, either half of the bar can be removed at once without trouble. It is one of the simplest methods of detachment in the market.

The **Coventry Imperial Detachable and Swivelling Handle-bar**.—In this the top of the head is turned down to form a socket, upon which the lug upon the handle-bars fits exactly. This lug has wings, and is split, a screw passing through these wings drawing the two halves together and binding the lug firmly upon the head. It will be readily seen that, by taking off the lock nut of the head and loosening the binding screw, the handle-bars may be taken right off, whilst by slightly loosening the lock nut and binding screw only they can be swivelled round at right angles to their



THE COVENTRY IMPERIAL DETACHABLE AND SWIVELLING HANDLE-BAR.

usual position, so as to set in a line with the backbone for ease of stowage.

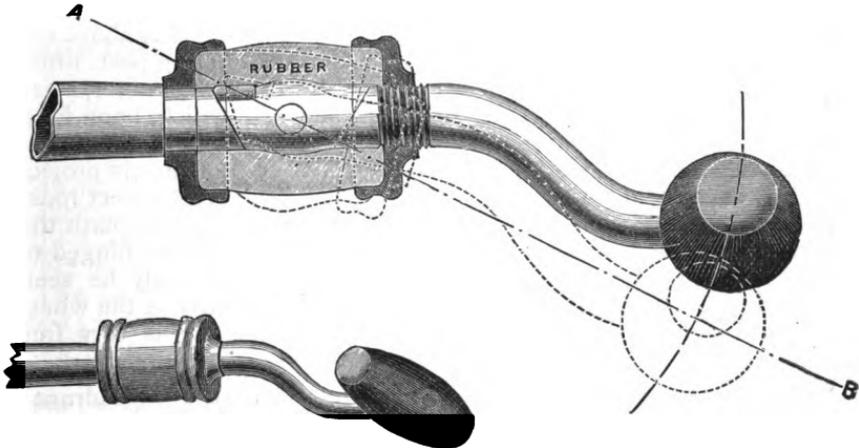
The Rudge Folding Handle-bar.—This is designed with the object of setting the bar to suit the taste of the rider so far as its distance in front of him is concerned, whilst also useful as a means of easy package and stowage. To the top of the steering-post or head a semi-circular frame is attached, bearing a slot running in a circle around the head. The handle-bars are each hinged, and to each a bolt is attached, passing upwards through the slot and provided with a stout nut. By loosening either or both nuts either or both handle-bars can be moved around upon its axis to any desired degree, the tightening of the nut at once securing it in place.

Starley's Folding Handle-bar.—In this the two handle-bars are fitted upon hinges, one on each side of the head. In front of the head a flat straight slide, some six inches in length, projects, having four holes pierced in it, in which a pin drops. This pin is acted upon by a lever, and is attached to a block which slides to and fro upon the before-mentioned sliding bar. From this block two short arms or connecting-links depart at an angle, and are connected to each handle-bar. On drawing the pin out of a hole by means of the lever, and a slight pressure upon the handles, the bars are moved forward, the ends describing arcs of circles. This is very easily done when riding, and as the catch may be dropped into either one of four holes the handles can be shifted forward to four positions, the last bringing the ends nearly a foot farther in front than before, and it enables a perfectly straight arm to be used for hill-climbing ;

whilst for work upon the level, or down hill, the handles may be brought back to the original position in a line with the head. Besides this, by taking the sliding pin right off the sliding bar, the two handle-bars may be brought together, thus setting directly in line with the backbone, and forming no obstruction whatever to the machine being packed in a very close space.

Singer's Detachable Rubber Insulated Handle-bar.—In this the handle-bar is carried in a lug hinged in front of the head. This lug is finished off with a hinged socket, the hinge being at the top, whilst the bottom is united with the main portion of the head by means of wings and a connecting bolt. This socket is hollowed out to take a circular pad of rubber. The handle-bar fits within this rubber pad, and when the lug is screwed firmly up, as there are two lugs through which the bar passes, the handle-bar is firm and rigid, yet secured from all metallic contact with the head by means of the rubber insulators. Of course, it will be seen also that it is readily removable for any purpose required.

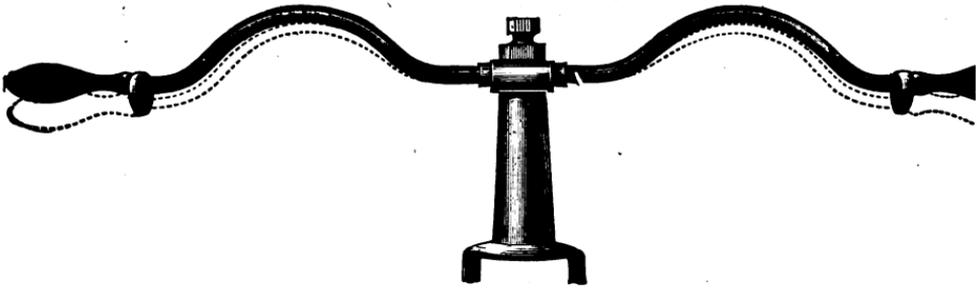
The Regent Non-vibrating Handle-bar.—In this the bar is jointed at each end, and the piece bearing the handle-grip hinged in such a way as to have a free motion downwards, but to lock rigidly



THE REGENT NON-VIBRATING HANDLE-BAR.

when pulled up as in hill-climbing. The two ends of the joint are provided with milled cups in which a piece of thick rubber tube is inserted, and the cups being screwed towards each other, the rubber is compressed and the ends of the joint thus take a bearing against the rubber, the result being a very soft, easy motion, giving to all jolts, and greatly minimising vibration.

The Coventry Imperial Anti-vibrating Handle-bar.—In this the bars are double as it were, the handle-bars proper, which appear to the eye at first to differ in no way from those in ordinary use, being mere shells. They contain handle-bars of similar shape,



THE COVENTRY IMPERIAL ANTI-VIBRATING HANDLE-BARS.

but made of spring steel. The handle grips are attached to these spring bars, and they move up and down within the above-mentioned shells. The ends of the shell are provided with deep ending rings, which limit the downward action of the spring bars.

STEERING GEAR.—The **Quadrant Safety Steering.**—To those who are acquainted with the construction of the “Quadrant” tricycle this needs no further description, but to those who are not so, the following description will be clear. Instead of the usual forks, the frame is formed not unlike the broad prongs of a hayfork. This is attached horizontally to the frame at a point some few inches above the ground. At this point of attachment an upright steering-post, fitted with bicycle handles, is attached. The ends of the prongs or forks are furnished with quadrant guides or slides, between which, upon long grooved slide pieces, boxes work which carry the ends of a straight pin upon which the steering wheel runs. The ends of the pin project slightly beyond the quadrant, and to them are attached connect rods. To the bottom of the steering-post before-mentioned underneath the frame a cross-bar is fitted. The ends of this cross-bar are hinged to the before-mentioned connecting rods, and it will readily be seen that any movement of the handle bars is communicated to the wheel which is turned in its guides. This method of steering is very free from vibration, but is not quite so free in action as the direct fork.

Guest's Steering Gear somewhat resembles the “Quadrant” in one particular—namely, the vertical steering-post upon the wheel. The forks, too, are horizontal, but they are V shaped, and attached at the apex of the triangle to the foot of the steering-post. Another V fork is placed higher up, making an angle of about 45° with the first, and attached to the upper portion of the steering-post. Any movement of the handle-bar is communicated direct to the front wheel. The action, however, of this steering gear is practically a double one, as any movement turning the front wheel in one direction must necessarily turn the back wheel in the opposite direction, which makes it very sensitive.

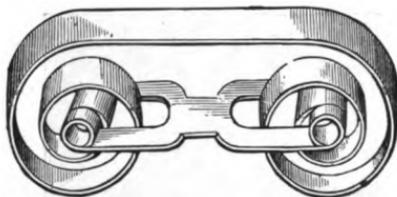
The **Ecclesfield Double Steering** is designed for use upon an ordinary bicycle. In it the back wheel, in place of being attached to the end of a simple backbone, is fitted on the end of a bone

which runs at a slight angle upwards to nearly the level of the height of the front wheel. Here it terminates in a Stanley head, and the end of the backbone, which is nearly horizontal, is provided with centres which fit the head referred to. The front portion of the backbone ends in centres in the usual manner. From the sides of the forks short pins or arms project, and smaller ones are attached to the sides of the steering head of the back wheel. These two pairs of arms are connected by light rods crossing each other centrally, the action of the mechanism producing a double form of steering, turning one wheel in each direction.

The **Premier Double Steering**, introduced upon a tandem safety, is slightly different in its action, but has the same effect, causing both wheels to turn in different directions. Both wheels work in forks with steering heads and a short connecting backbone between them. From the rear part of the front fork a flat arm projects, carrying at its end an arm or pin, and running immediately beneath the backbone. The front of the forks of the rear wheel is provided with a similar arm, ending, however, in a short slot, the two arms being just so long as to overlap each other a couple of inches. The action of these in steering will readily be seen by the observant reader, and, as may easily be imagined, the steering is very quick and sensitive.

SPRINGS.—**Parr's Split Plate Spring.**—This takes the form of what is known as the "Humber" coil spring, but its mode of fixing to the backbone and under arrangements are different. The spring plate is split, or in two halves, united at the two ends and spreading out so as to sit one upon each side of the backbone, thus allowing the saddle to come down almost as far as to touch the backbone and yet giving plenty of freedom of movement in a downward direction, an arrangement which permits of the rider using a larger machine than he could with the ordinary spring in use.

The **Double Scroll Spring**, known in the trade as "Salter's No. 15," is like two back ends of a Humber scroll spring joined; a short flat spring takes the saddle, the two ends bolting to the centres of strong scrolls, which are attached to each end of a metal base fitted for attaching to the seat pillar. This is a very free and easy

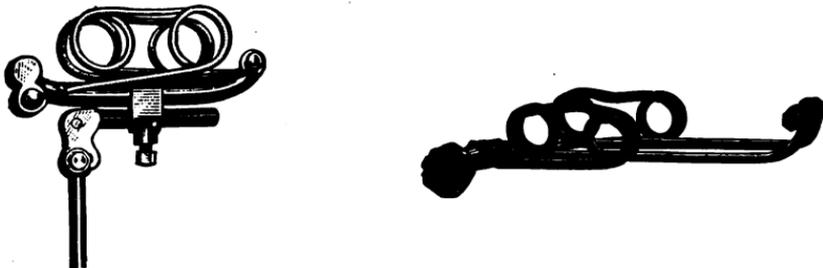


THE DOUBLE SCROLL SPRING.

spring, and well suited for use on rough roads. It is suitable for use on the rear-driving type of safety bicycle only.

Harrington's Double-action Cradle Spring.—This is formed, like the cradle proper, of stout steel wire bent into coils. The two

sides of the spring are attached to each side of the ends of a metal frame, from whence they pass towards each other, forming into coils

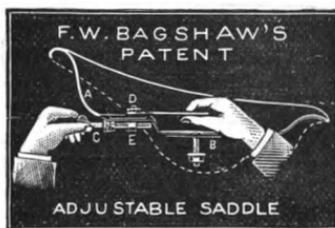


HARRINGTON'S DOUBLE-ACTION CRADLE SPRING.

and joining in the centre, one pair of ends being attached to a swinging link bolted to one end of the aforementioned frame. The whole makes a most compact spring with an even and direct up and down movement, the two coils pulling against each other. The illustration shows the spring fitted to the top of a jointed T seat pillar, as used on safety bicycles.

SADDLES.—**Brooks's Climax Saddle** is constructed somewhat upon the suspension principles, that is to say, so far as the suspension from front to back of the leather top is concerned. The back of the saddle is supported upon two small rollers and a rubber buffer. This rubber buffer forms a frame with side wings upon which the rollers work, the frame being seated in rubber. The portion of the frame in front to which the forepart of the saddle is attached is also rubber padded. The special construction of this saddle allows it to sway from side to side with every stroke, giving a greater reach and more power to the rider, and lessening the chance of friction. It is a compact and well-made saddle, and the top is provided with the registered cutting for the prevention of perineal pressure, spoken of before; this being now introduced into all Messrs. Brooks's saddles.

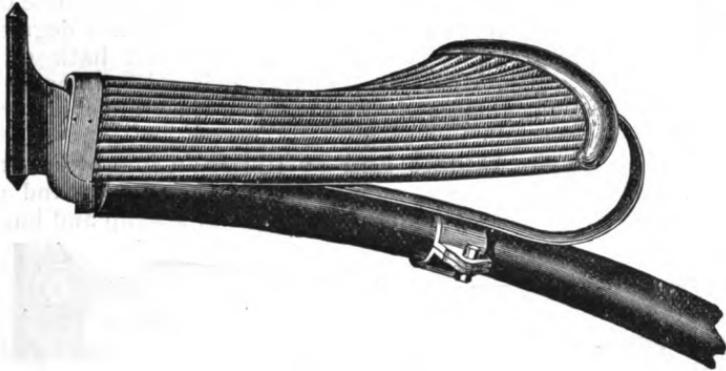
Bagshaw's Patent Adjustable Saddle.—This saddle consists of a fluted steel frame with leather covering, the frame of which



is in two parts, A and B, and are attached at the rear by means of a short stud E, which passes through a slot in the under plate B, also through a small hole in plate A, and are both held together

by lock-nut D. At the rear of under plate B is an adjusting screw C, which screws into the head of stud E by turning the adjusting screw C either backwards or forwards. The top plate A is moved along the carriage or sliding plane of the under plate B and the required tension of the saddle is obtained.

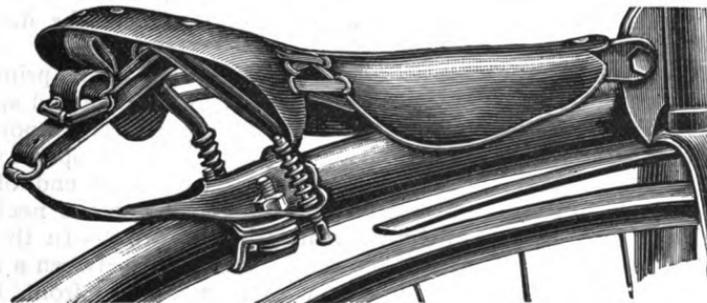
Lamplugh's Record Saddle.—This is a considerable novelty, and a departure from the usual type. Its construction will be best understood by a glance at the annexed illustration, from which it



THE RECORD SADDLE

will be seen that it consists of a metal frame, over which lengthwise are stretched a number of small closely coiled springs upon which the rider sits, thus getting full ventilation and a spring in the saddle itself. Messrs. Lamplugh and Brown, the makers, sell it both in this form, and also fitted with a leather cover provided with deep flaps, which drop down at the sides and serve to keep the rim of the wheel from the legs of the rider.

Nagel's Cyclops Saddle.—In this the laced seating is used as described upon page 76. The forepart of the seating is attached

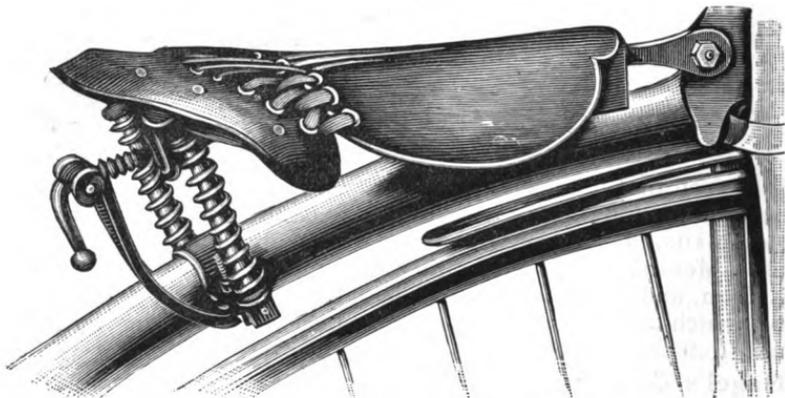


NAGEL'S CYCLOPS SADDLE.

to the sides of the neck by a metal clasp and bolt. The back of the saddle rests upon two light perpendicular rods, one upon each side.

These rods fit into sockets upon the metal frame, which is built to the backbone, and they are surrounded by light coil springs. From the centre of the metal frame just mentioned an arm or bracket projects backwards provided with a loop at its extremity. Through this loop a strap passes fastened to the centre of the back of the saddle and bearing upon a ring of rubber. It will be seen that the back of the saddle rests upon the upright springs before mentioned, and has a little free side play, whilst the tension of the saddle, which is gained in the first place by bolting the metal plate at a suitable position on the backbone, may be taken up or let down to any degree by tightening or loosening the strap, which draws the back of the saddle rearwards. The especial use of this saddle is to enable the rider to get very much closer to the backbone than he could when using the ordinary saddle and spring.

Nagel's Excelsior Saddle and Spring is an improvement on the last. It has the laced seat supported on spiral springs and pins at the back, but in place of being tightened with a strap and buckle,



NAGEL'S EXCELSIOR SADDLE AND SPRING.

the rear portion is drawn backwards by a screw, which is always ready for use, and cannot slacken. The adjusting may be done in a few seconds at a moment's notice.

The Anglo-American Saddle is built upon the principle adopted so largely in America of combining the saddle and spring in one. The rear end of the saddle is supported directly upon the springs, which take the form of two single coil large loops of wire, which fasten on to the backbone by a clip. The front end of the saddle is held in position by a suitable arrangement on the neck.

Palmer and Townsend's Combination Saddle.—In this, as with Yankee kinds, a light leather seat is stretched between a front attachment and back semi-circular wire frame. The front, however, in place of attaching rigidly to the neck, is provided with a couple of side coiled springs, whilst the back is fitted with two longer ones, finishing off in the usual clip for attaching to the backbone. This is a very comfortable frame, and of the type likely ere long to become universal for the ordinary bicycle.

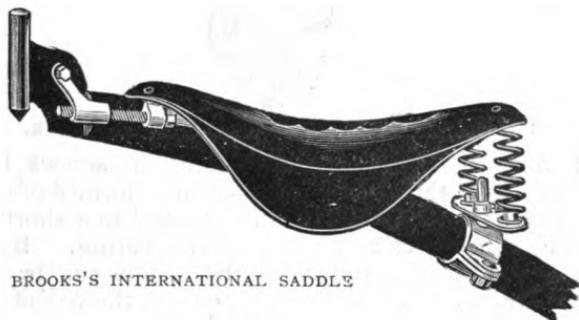
Townsend's Combination Saddle and Spring.—The illustrations appended hereto show the construction of this in patterns as intended for ordinary bicycles, and also tricycles and safeties. In the ordinary pattern it consists of a well-shaped leather seat stayed by a wire at the back, and supported in front upon wire coils which attach to the neck in the usual way. At the back the wire frame ends off in two coil springs, each taking some four or five turns and attaching to a clip which fastens on to the backbone. In



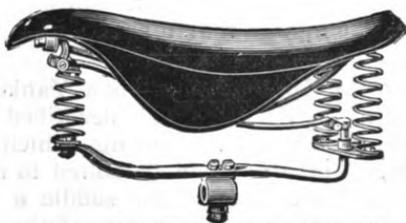
TOWNSEND'S COMBINATION SADDLE AND SPRING.

the pattern for safeties and tricycles the upper wires are the same, but the wire is carried in such a manner as to support the front upon a sort of V-spring, the whole attaching to a solid frame which fits upon the L or other pin. Its great feature is that such a length of wire is used that the spring is very great, and a rider of almost any weight can use the same spring with comfort.

Brooks's International Saddle and Spring will be best understood by a glance at the annexed illustrations, which show its construction for use on ordinary and dwarf bicycles (b. 70), and on seat-pillared machines (b. 80). In the first case, the front of the



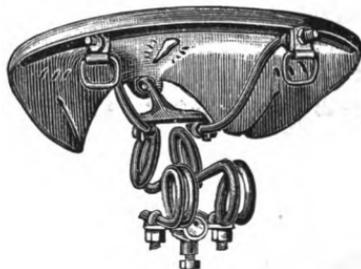
BROOKS'S INTERNATIONAL SADDLE



BROOKS'S INTERNATIONAL SADDLE.

saddle is supported by two screwed rods, which pass into sockets suspended from the usual spring holes in the neck, this arrangement only just clearing the backbone, and thus allowing a larger machine to be ridden, and the tension of the seat to be taken up by the screws. The back end is supported on two spiral springs, which rest on a cross-bar. This cross-bar fits centrally on an upright pin fixed on the clips, by which it is fastened to the backbone and the rear end of the saddle springs, and all may be adjusted up and down on the pin some two inches, thus altering the pitch of the saddle at will. When constructed for seat pillar use, the front end is supported on a spiral spring of the same length as those at the back, and the back adjusted as before, whilst the frame is strengthened by cross wires back and front, and the leather tightened by a screw in the front. Another feature of the saddle, which is a first-class one in every way, is the cutting of the top in a peculiar manner with a view to avoid all chance of perineal pressure.

Harrington's Combination Spring and Saddle.—This is the latest of the combined arrangements of saddle and spring, and undoubtedly one of the best. The construction of the cradle spring—I do not refer to the double-action, the original style—is too well known to need further description, and the uninitiated will find it on page 71. In this combination the loop at the back is divided,



HARRINGTON'S COMBINATION SPRING AND SADDLE.

and the two sides bend outwards, ending in screws holding the frame of the back of the saddle, which latter is formed of one well cut piece of leather. The front of this is attached to a short rod which is fastened by screw eyes to the top of the spring. By means of the screws at the back the tension of the saddle can be adjusted as it gives with wear, and the combination gives the use of a saddle of this nature with the well-known cradle spring, the combination being very considerably lighter than a cradle spring and a saddle of the ordinary kind.

The Hinge Cradle Spring.—This is a Yankee notion, and is really an adaptation of the Cricket saddle described on page 83. In it the seat is stretched between the spring, which forms thus the frame of the saddle. The front end is bolted to the backbone and curved upwards, raising the front of the saddle a good height over the backbone. Immediately in the centre of the saddle the under

frame is hinged with an under swinging hinge or pair of arms, to the lower ends of which are swung the forward ends of the double coil springs, which at their upward-pointing extremities support the rear of the saddle, which is also held in position by a strong strap fastened lower down the backbone. This arrangement allows of the saddle being tilted backwards or forwards to suit the exact position required by the rider, and can be regulated in height, length, tension, pitch, and shape.

Saddle Flaps.—These are formed of one good piece of strong, good common leather, fitted to form a deep flap some six inches in depth on each side of the forepart of the saddle, the connecting piece forming a tongue, which fits on the top of the spring and is held by the grip of the saddle upon it. The use of these flaps obviates, to a great extent, the necessity of a mud-guard, and protects the legs of the rider from contact with the wheel, and also from the mud thrown up by it, being more especially useful in the latter case, that is, in taking the place of a mud-guard.

Wiggins's Adjustable Saddle Tilt.—The machine upon which this is used requires no spring in the ordinary place, so the saddle is fastened to a flat length of metal like the flat part of a Humber spring, but possessing no elastic properties. To the rear end of this is hinged a curved iron, which passes through a loop upon the backbone. A locking nut is fitted in the top of this loop, and when screwed down holds the tilt in any position required. As will be readily seen, the movement of the curved portion of the frame through the loop raises or lowers the rear end of the saddle plate.

STEPS.—**Rudge's Adjustable Safety Step.**—One of the greatest faults in the construction of the safety bicycle of the dwarf type variety is the fitting of the step in an unsuitable position, very many being fitted quite as high as upon the ordinary machines, with the result that the rider drops down heavily upon the saddle, or flies over the handles if not careful. The proper position for a step on this kind of machine is but a few inches above the ground; and Rudge's safety step is designed with a view of suiting the requirements of each individual rider. A depending rod is attached to the backbone at its junction with the rear forks, and upon this rod slides up and down a step of the saw kind, which is held in position by a bolt at the back, and can be moved up or down a distance of several inches.

The **Ideal Step**, like that described on page 88, is an American production, and combines rubber with metal. It is attached to the backbone by a loop and screw, and the step portion consists of a hollow saw step of the usual pattern, but provided with a rubber inset, which prevents the foot slipping.

BRAKES.—The **Hinged Plunger Brake**, as ordinarily fitted to a number of machines of the rear-driving safety class consists of a brake rod running down in front of the steering-post, this being displaced by pulling up a grip lever set beneath the handle-bar. Its

lower end is hinged to the middle of a spoon, the head of which is hinged to the front of the arch of the forks. It will be seen that the power applied is somewhat reduced by the method in which the application of the spoon to the wheel is made.

The Direct Plunger Brake.—In this the brake runs in front of the steering-post, and is fitted with an ordinary grip lever at the top, which lever acts as in the hinged plunger brake by being pulled up, thus forcing the brake rod down. The brake rod passes through a socket or guide in the front of the steering-post just above the wheel, and carries a short straight brake-piece at its base, forcing this directly and evenly upon the rubber when brought into action with a powerful and certain grip.

The Globe Plunger Brake.—In this the brake acts upon the front wheel of a rear-driving safety. The steering-post is hollow, down which a plunger bearing a brake spoon at its base passes. This is kept off the wheel by a spring, and the top end of the plunger is fitted with a circular top which forms a finish to the top of the steering-post. The handle-bar, which is set slightly back, is hollow and straight. Through the bar runs a rod. One end of this rod is fitted with a grip lever which lays snugly under the handle grip, which sets at an angle to the bar. The other end in the centre of the handle-bar bears a short bent arm or finger, which presses upon the before-mentioned top of the plunger. Upon pulling up the handle grip the top of the plunger is pressed down, and the brake thus brought into contact with the wheel with a very powerful action.

Rudge's Lever Band Brake.—This is applied to the front wheel of a rear-driving safety. To those acquainted with tricycle construction it needs little or no description. A narrow disc or flange is attached to the hub of the steering wheel, forming a brake drum, and around this a steel leather-lined strap passes. One end of this is attached to the forks, the other being united to a steel rod, which passes down the forks and steering post to the front of the handle-bar, where it is actuated by a grip lever. The pulling up of this lever draws upwards the free end of the strap and tightens the band upon the wheel. It is immensely powerful, and will stop a machine dead in a yard or two.

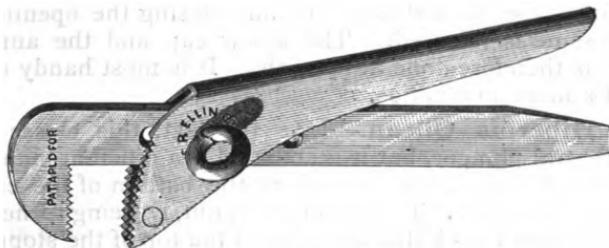
Nagel's Brake Lock is a very ingenious contrivance. A small light metal casting is screwed to the front of the head, and between it and the vertical brake lever. This consists of a box, in which an eccentric works, being turned by a key. To lock the machine the key is turned, bringing the eccentric forward, and by its means jaming the lever forwards, and pressing the spoon on the wheel, locking the wheel fast. The key taken out, the machine must be lifted to be removed—a task few bicycle thieves would attempt.

Striffler's Brake-holder.—This is a short strap with a ring at one end and loop at other, and a finely corrugated metal covering to the strap at the ring end. There is also a small spring lever clutch piece which holds the strap firmly in one direction, unless the lever

is raised. This is fastened to the brake-lever, and the loop of the strap fits on the handle-bar. The strap passes through the catch piece, passing round it first. To apply the brake the ring on the strap is pulled and not the handle of the lever. The catch holds it in position wherever left, which will be found a great boon on long and tedious descents, and by raising the lever of the catch the strap is at once released and the brake is free. It will also serve to lock the machine when leaving it anywhere.

WRENCHES.—**Bauer's Grip Wrench** is really a tube wrench, although it answers well for cycling purposes. It is made of steel in two pieces, one fitting upon the top of the other. Each piece has a jaw, which is slightly curved, and edged with fine teeth. The lower portion of the wrench finishes in a screwdriver, and is provided with a series of three holes, into which a pin attached to the extremity of the smaller piece fits. The range of the wrench takes any nut up to an inch or thereabouts, and by inserting the pin in a fresh hole a nut that is just too large to be grasped by the wrench when in the previous position is held firmly. The action of the wrench is to grasp the nut by the pressure put upon the wrench, it really being a self-grasping wrench—the greater the power applied the more firmly the nut being held. The only objection urged against it is that it has a tendency to take off the sharp corners of the nut, but as it firmly grips the nut whether round or hexagonal, this does not much matter, unless the ordinary wrench is required to be used afterwards. For its size and weight it is extremely strong, and there is nothing to get out of order.

Ellin's Grip Wrench is precisely similar to the last in principle, and differs from it in the construction of the mouth or gripping-jaw. This, in place of fitting on the side of the main portion, is formed



ELLIN'S GRIP WRENCH.

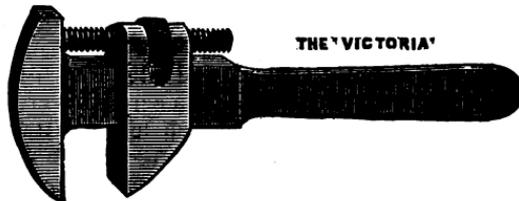
from a V-shaped piece of sheet steel, bent over so as to enclose the main shaft within it, the extremities of the V uniting to form a serrated jaw. There are, as in the last, four holes for adjustment, and the movable piece is held to either of these by a loop-headed screw pin.

Starley's Cyclists' Wrench is an adjustable one. It is pressed out of sheet steel and bent to form a hollow handle, and brazed up with strong lower jaw. This hollow handle is formed with a back rising a good inch above the top of the lower jaw, so that the slide piece

M

and upper jaw are supported right to the top when open to take the largest nut on a machine. It is light, yet wonderfully strong, and as the jaws are hardened, and the whole supported, there is no give with the heaviest pressure. It is one of the best adjustable wrenches yet produced.

The Victoria Spanner.—This is an adjustable wrench of handy form and good quality. Its construction may be gleaned by a glance at the annexed illustration, from which it will be seen that the

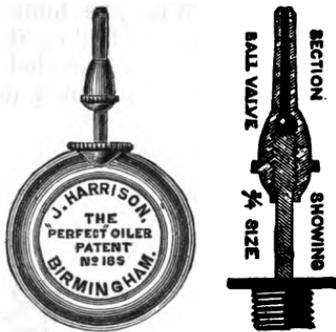


wrench is fitted with a head forming the top of a jaw, the lower jaw sliding upon a good square-cut pillar. The adjustment of the jaws is made by a screw at the back worked by a milled nut.

OILCANS.—The **Climax Oiler** is one of the most ingenious on the market. It is of the usual shape exteriorly. Inside, a rod is soldered across at a point a little out of the centre. To the middle of this rod a tiny bell-crank lever is fitted, one end of which is attached to the centre of the side of the tin. The other end works a rod which passes up through the spout, and is kept by a spring forced up so that its extremity completely fills the opening. The act of pressing the side of the can works the lever, and thus, whilst ejecting the oil in the usual way, draws the rod end out of the hole and thus permits the oil to escape, the rod returning and closing the opening immediately pressure is released. The screw cap and the annoyance of losing it is therefore done away with. It is most handy and always ready at a moment's notice.

The Hibernia Oilcan.—Like the last, this closes the spout with a central plunger, but it is actuated in a different manner. The plunger is a fixture, and runs from the bottom of the can straight up through the spout. The top of the spout, by being turned, is raised or lowered, and thus either brought off the top of the stopper and the oil ejected in the usual manner, or two or three turns of the nozzle bring it firmly down on the top of the plunger, which firmly and completely closes the orifice. The can itself is made of brass, and is well and neatly constructed.

The **Perfect Oiler**, like the last, does away with the cap. The nozzle is made in two parts, an upper and a lower. The upper one is bulbous at the junction, and screws on to the top of the lower, and a small steel ball fits between the ends of the lower and main nozzle. When screwed down, the ball completely fills both ends of the opening, and prevents the outflow of the oil. A half-turn of the



top, however, suffices to free the obstruction, and permit of the egress of the oil.

The **Kensington Oiler** is provided with a top which cannot be lost, it being attached to the oilcan itself. The top is fastened to the base of the nozzle by means of a coiled spring which encircles the nozzle, the lower end of the spring being fastened to its base and the upper end to the cap. To use the oiler the cap is pulled upwards, pressed slightly to one side, and then released, when the

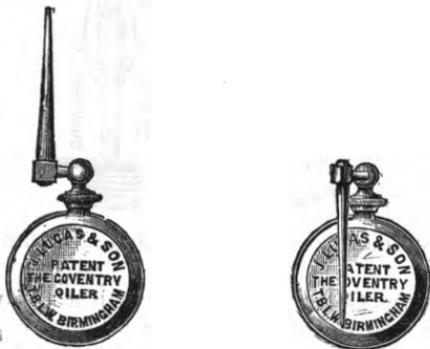


spring draws it half-way down the side of the nozzle, the end of this portion of the can being free for the egress of the oil. By simply pulling up and drawing into position, the cap drops into its place at once, and is pressed firmly upon the top of the nozzle by the spring, and thus prevents the oil oozing out.

The **Paradox Oiler** is somewhat on the same principle as the last. It has the same object in view, which it effects by attaching the top to a short straight length of spring steel hinged to the base of the nozzle. There is sufficient spring in the attachment to permit of the top being drawn off, when it drops down at the side of the can, leaving the end of the nozzle free.

The **Coventry Oiler** is a large and useful instrument. The nozzle is long, and is fitted at the side of the can much in the same position as the bayonet fits to the muzzle of a gun. The nozzle is

so fitted that it can, when not in use, be folded down to fit at the side of the can, and the action of so folding it completely turns off the oil, the inside of the nozzle being provided at the joint with a cap which, on the end piece being turned down, slides over the

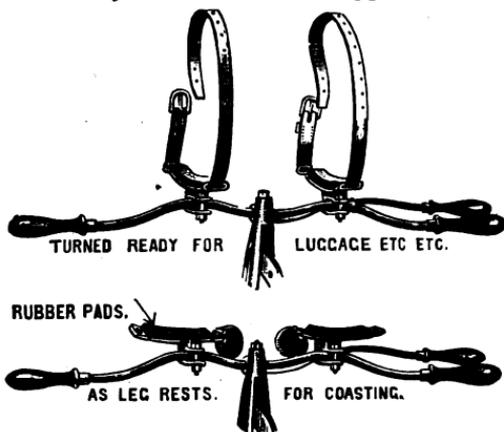


opening, thus preventing the escape of any oil from the can. The action of unfolding it and placing it in position for use causes this cover to slide on one side again, thus turning on the oil automatically. It will thus be seen that no top is required.

LUGGAGE-CARRIERS.—Brooks's Luggage-carrier for the ordinary bicycle is in three forms. It consists of a curved wire frame with a shelf at the bottom. To this frame the Multum or other package is strapped, and the whole fastened to the backbone by gripping a tongue at the top of the frame, behind the saddle and spring, the lower portion of the frame being formed with a loop which fits over the backbone (No. 3), by means of a hinge clip which passes over the backbone fixed at the top (No. 4), or, best of all, by means of two hinge clips, one above and the other below, both fitting round the backbone and thus securing the frame firmly to it.

Lamplugh's Folding Luggage-carrier is one of the best contrivances ever placed on the market for carrying luggage upon the ordinary. It consists of two pairs of double spring arms. These are bolted by suitable clips around the backbone and screwed firmly up so as to be a permanent fixture. The two sets are placed some fifteen inches apart, and when not in use the arms are folded so that they lie close to one another upon the backbone, and are thus completely out of the way. When intended for use they are opened outwards, closing into position with a spring. They then set at right angles with the backbone, and thus form a firm frame. Each end of the arm is slotted, and the M.I.P. bag which is supplied with them is provided at the back with strong steel straps, the ends of which just fit into the slots. It is put on by slightly bending the bag and springing the steels into the slots, a strap then being finally passed round the bag and backbone to prevent the possibility of any outward spring loosening the hold.

Lamplugh's Handle-bar Carrier.—This, for a lighter form of luggage, is undoubtedly one of the best appliances on the market.



LAMPLUGH'S HANDLE-BAR CARRIER.

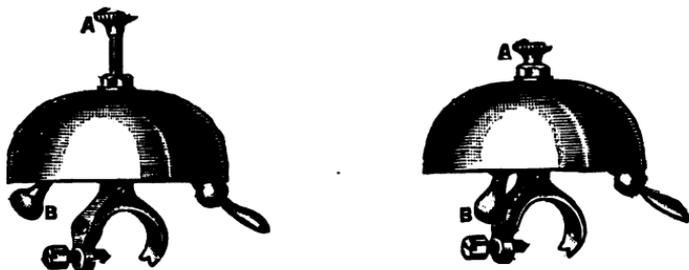
As will be seen by the sketch, the appliance consists of two short, slightly curved metal cross pieces which are bolted to the handle-bar. These are lined with rubber and carry straps. The goods to be carried are wrapped into the form of an oblong package and laid upon the carriers, the strap passing round and securing it firmly to the frame formed by the carrier. They are secured to the handle-bar so as to be a permanence, and are then always ready for use when required. When not in use for luggage-carrying the straps are neatly rolled up and the cross pieces sprung at right angles to their previous position, thus setting in line with the handle-bar and forming a rubber-covered rest for the legs when coasting or riding legs over.

The Nicholson Luggage Carrier fits on the top of the handle-bar by means of screw bolts. It is a light metal frame semi-circular in section, and forming a long hollow trough, in which the clothes to be carried are placed after being made up into a roll, and the whole is kept firmly in place by straps, as shown in the engraving herewith. It is selling well on the American markets.



THE NICHOLSON LUGGAGE CARRIER.

BELLS.—**Lucas's Combined Bell.**—This is a bell of the gong variety, and has a single stroke lever fitted in the usual manner. To the centre of the bell, however, a frame is attached, and within this



LUCAS'S COMBINED BELL.

frame a plunger works, actuated by a button on the end of a rod projecting vertically from the centre of the bell. The action of this plunger is to free or hold tight a swing button, and by simply depressing the plunger the clapper is freed and the bell becomes a continuous alarum at once, for use when riding through crowded streets. By pulling up the plunger it is firmly held in position again, and the bell once more becomes silent. The arrangement is one of the firmest and most simple in use, and its instantaneous action is a great advantage.

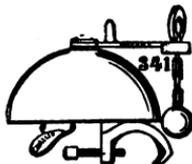
Challis's Climax Spring Bracket for bells of the spherical type is simply an inverted conical spiral spring, secured at its base to the



CHALLIS'S CLIMAX SPRING BRACKET.

under side of the securing rod, and fastened at the other to the top of the "tinkler."

Challis's Ringing Attachment is intended to convert a bell of the gong variety into a continuous alarum of the tintinnabulating kind. It is a bracket or arm secured to the central pin of the gong,



CHALLIS'S RINGING ATTACHMENT.

and having a hole at its extremity, through which a small chain passes, with a ball at one end and a rubber loop at the other ; this latter being drawn up and hitched over a suitable projection when the bell is required to be silent, and allowed to hang free when noise is wanted.

LAMPS.—The **Facilitater Lamp.**—This lamp is a soundly constructed, good looking affair, and has for its speciality the construction of the oil reservoir in two compartments—a large one and a smaller one—both of which are provided with wick chambers and wind-up arrangements to them. The wick chambers abut on each other, and when turned up the two wicks touch. The smaller chamber is filled with paraffin, the larger with the usual burning oil. The rapidity with which paraffin lights, and the slowness with which the ordinary oil does the same, is well known. By the use of this arrangement the lamp may be lit at a touch, and the burning paraffined wick will light up the other in due time, when it is turned down, having performed its work. This will be found extremely useful in windy weather.

The **Mikado Lamp** is a sound, well-constructed lamp of the usual "head" variety, with Salsbury's patent reflecting side prisms, wide wick. wind-up burner, and shade over the front. Its speciality exists in the spring back ; the socket by which it is fastened to the bracket being attached to the body of the lamp by a parallel frame of flat hinged metal, a spiral spring passing from the top back corner to the lower front corner, and causing it to give to the jar of the machine, and keep alight on a bad road.

The **Cock of the Walk Hub Lamp** is of the usual kind, so far as burning arrangements are concerned. The front hinges at the top, and opens right out in line with the body, for convenience in passing into the wheel. The front section of the axle clip is a fixture to the top of the body of the lamp, the other hinging to it, and worked lever-like by the free projecting end of the folding front, so that, as the front is closed down, the clip closes round the axle, and is locked securely by the shutting in of the door.

Salsbury's Non-vibrating Lamp.—In this the body of the lamp is the same as Salsbury's well-known head lamp. The back of the lamp, however, is connected to its socket by the following device : The socket is attached at the base of a strip of metal, the upper end of which is hinged to the top of the lamp, whilst the lower extremity is supported from the base of the lamp by a three-turn coil of light spring wire, against which the body of the lamp works when vibration is produced by the machine. It also has the credit of being perfectly satisfactory in action.

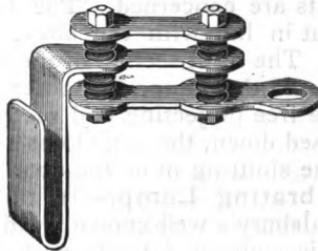
Lucas's Non-vibrating King of the Road Lamp is specially built with a view of meeting the requirements of the greater vibration experienced upon the numerous forms of safety bicycles, and especially the rear-driving type now so much in use. The body of the lamp possesses all Lucas's well-known arrangements, and the lamp itself is a well constructed affair of the head-lamp variety. In place,

however, of attaching rigidly to the bracket, it is secured to the body of the lamp by a couple of links of indiarubber, whilst a strong spiral spring crosses the oblong frame thus formed diagonally and supports the weight of the lamp. The arrangement is perfectly satisfactory in action, and the roughest roads may be traversed without its going out if properly trimmed.

Millar's Bell Rock Lamp is very similar in construction. Leather is used in place of indiarubber, and the diagonal spring is formed of a strong rubber band in place of the spiral spring used on the King of the Road. It is a very good lamp, and is provided with Phillips's patent adjustable socket at the back, by which it may be adjusted to any sized lamp bracket. This consists in forming the bracket with a sliding piece at the side worked by a screw, so that the width of the bracket may be fitted to a nicety. The front of the lamp is also provided with a shade which throws the light upon the ground somewhat.

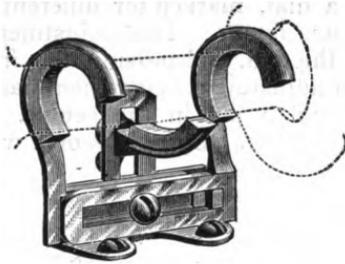
Snell and Brown's Safety Lamp Bracket is intended to fulfil the same object. The lamp hanger and the loop that fits over the lamp iron, which is usually fixed on the machine, are both attached to oblong plates, which are separated from each other a couple of inches, and united by strong spiral springs at the four corners, together with a fifth of large diameter in the centre.

Fisher's Non-vibrating Lamp Bracket is designed for use with any form of head lamp. Its construction may best be gleaned by a glance at the annexed illustration, from which it will be seen that it consists of three lengths of flat steel. The lower one is provided with a loop for attaching to the head of the bicycle, or a clasp



for securing to the frame of the safety. The upper piece terminates in a bracket by which the lamp can be fixed to it. Between these two the third is placed, the three strips being supported by indiarubber rings, held in place by short rods which pass freely through holes in the central portion of the frame, and intercept the vibration between the machine and lamp.

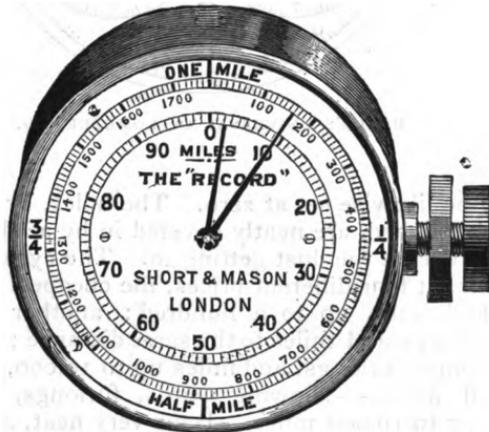
The **American Lamp Attachment** is depicted in the accompanying illustration, and consists of a pair of hooks by which the lamp is hung upon the axles. These are attached to each end of a slotted arm, which allows them to be adjusted sideways to take the full length of axle, and thus act as guides for keeping the palm in the centre of the wheel as well as supporting the lamp itself. A



THE AMERICAN LAMP ATTACHMENT.

third slot is fitted at right angles to the other two, and in this a third hook slides, being adjusted by thumb-screws at the back. This fits up underneath the axle, which is thus held by three hooks, an arrangement which is simple, yet firm and easily adjusted.

CYCLOMETERS.—The **Record Cyclometer.**—This is a circular instrument, showing on its face the miles up to one hundred with one hand, and registering the mile with the other in divisions of 50 yards. It is attached to the axle by a double nut and collar, which fits to the back of the instrument. To its side is attached a

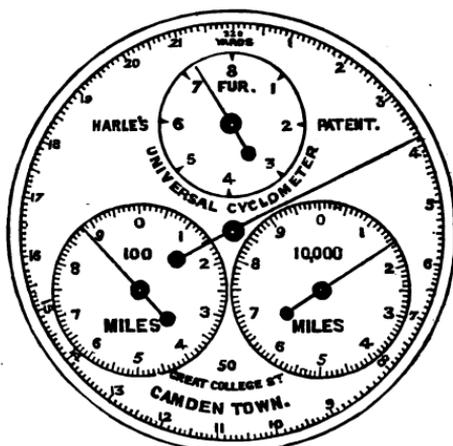


THE RECORD CYCLOMETER.

milled pin with a lock nut, by turning which the cyclometer may be adjusted to any sized wheel. The front is covered by a glass cap, which is readily detached, and the hands set to zero. It is cheap, strong, easily attached, the hands quickly adjusted, and fairly accurate. Weight (complete) 110z. It is, however, too large to be got in the 30in. wheel of a rear-driving safety.

Harle's Universal Cyclometer.—The especial feature of this cyclometer is its adjustability. It attaches to the spokes by means of a screw bolt at the back, and fits inside the wheel. Its actuating movement, like most cyclometers, is a revolving weight, which is very closely and neatly fitted inside the instrument. Upon the back

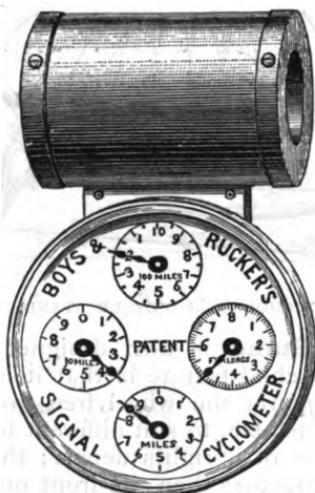
of the instrument is a dial, marked for different-sized wheels, and provided with an index finger. The adjustment is obtained by loosening the plate of the dial, and moving the index finger to the size required, the exact adjustment being then made after testing by means of a watch key and a pin in the centre, a very little turn being required for the purpose. By means of a watch key, too, the



HARLE'S UNIVERSAL CYCLOMETER, NO. I.

hands may be likewise set at zero. The holes, by which the adjusting pins are reached, are neatly covered in by a sliding cap, which effectively prevents the dust getting in. The cyclometer is made in four patterns, at four different prices, the cheapest registering yards, furlongs, and miles up to a hundred; another showing quarter-furlongs, furlongs and miles to the same distance; a further registers quarter-furlongs, furlongs, and miles up to 10,000, the best pattern—illustrated above—showing yards, furlongs, and miles, and measuring up to 10,000 miles. It is very neat, and made in best style, weighs but 5 ozs., and can be adjusted with the greatest nicety.

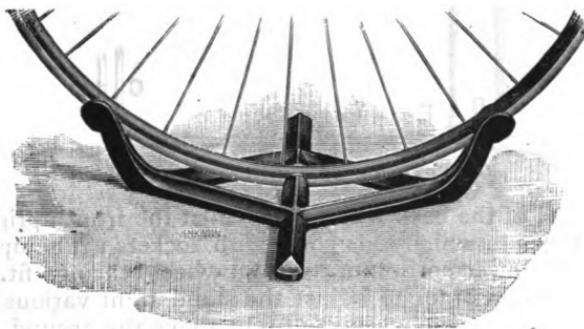
The Signal Cyclometer.—This instrument bases its claim to recognition upon the fact of its action being positive, not being dependent in any way upon any mechanism that can get out of order. It is so constructed that every turn of the axle must be registered upon the instrument, which is fitted to a barrel encircling a screw which is attached to the axle and revolves with it. This screw pushing a lever to and fro sideways as it revolves, thus sets in motion the line of wheels which work the hands of the instrument. Another feature, too, is the attachment of a bell of the gong kind, which is struck by a hammer at the completion of each



THE SIGNAL CYCLOMETER.

mile—an arrangement which gives the traveller audible notice of his progress.

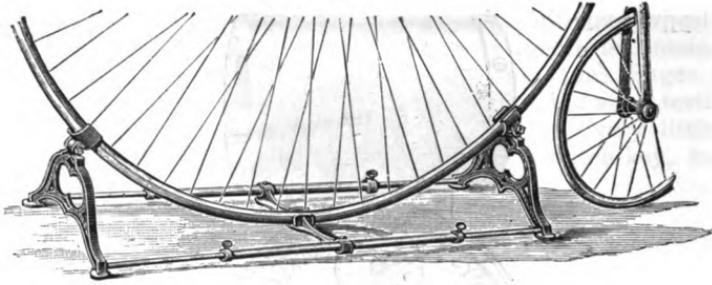
STANDS.—**Starley's Safety Stand** is a simple contrivance for holding safety bicycles of the rear-driving type upright in a show-room or hall, and preventing the scratching of walls with the handle ends. As will be seen by the annexed sketch, it consists of



STARLEY'S SAFETY STAND.

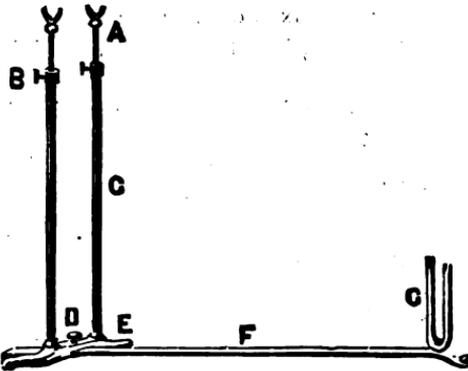
a simple casting so fitted as to hold the front wheel tight by the rim. All that has to be done to use it is to place the machine upon it, and there is no screwing or adjusting of any kind required.

Nicholson's Bicycle Stand is very similar in construction, but of larger size and more ornamental nature. It is an American invention, and is designed for use with the ordinary bicycle, grasping the driving wheel at the bottom, and supporting it in an upright position. Its appearance may be gleaned by glancing at the annexed cut.



NICHOLSON'S BICYCLE STAND.

Beach's Bicycle Stand is also designed for use with the ordinary machine. Its chief feature is that it is adjustable to any size machine and supports the wheel free from the ground. It consists of a frame, adjustable, to suit different lengths of machines. From each end a couple of uprights depart; those at the rear end are shorter and closer together than the front ones; these rear ones



BEACH'S BICYCLE STAND.

support the end of the back wheel pin, whilst the front uprights take the form of tubes in which rods slide, with sockets at the upper end, upon which the lower portion of the front wheel bearings fit. These rods are movable in order to adjust the stand to fit various sizes in machines, supporting the wheels entirely above the ground.

The **Dayton Stand and Camp Stool** is another Transatlantic invention. It is "built" of wood, forming a neat camp-stool. By placing the reverse side up, spreading the legs apart, and placing in position a couple of short supports which prop up the ends, it forms a stand in which the driving wheel of any machine may be held securely, the rim fitting in interstices cut in the cross bars of the legs of the stool.

The **American Wall Bracket** for supporting bicycles in show-rooms and other places is a very neat device. A small ornamental bracket is screwed to the wall, and upon this is hinged a tube.

Within the tube a rod slides which terminates in a loop. The telescopic arrangement allows it to be adjusted to suit any length of handle-bar or size of machine, and the hinged attachment allows of its being folded down close to the wall when not in use, and also permits it to support any height of machine. In use it holds the bicycle upright by means of the loop which fits over the centre pin on the top of the head; and thus keeps the machine in the position required.

Smith's Home Trainer is an instrument by means of which riding can be done without progression. It is a strong, heavy metal stand supporting in bearings a heavy iron wheel with cranks and pedals attached. To the upper portion of the stand an adjustable handle-bar, and also adjustable spring and saddle, fit in the same

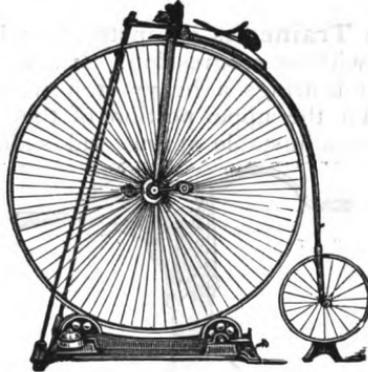


SMITH'S HOME TRAINER.

relative position as on the bicycle, and these may be adjusted to suit the requirements of individual riders. The apparatus is provided with a brake, by which any amount of power may be put on the wheel, and thus the work can be rendered harder or easier as desired. An indicator with a bell is also fitted, by which the rider may know the computed number of miles he has covered. It has been found very useful for practising fast-peddalling, and is used by many racing men.

The **Buffalo Home Trainer** is a very similar instrument in construction, but is made in America. Its chief difference from the British type is that the upright is made lighter and that the driving wheel and cranks are in one, taking the form of a double drum, one upon each side of the stand. The outer surface of these have slots cut into them into which the pedals are fitted.

Walton & Vaughan's Stand and Home Trainer Combined.—This is a metal frame long and low, and furnished with a roller at each end. Between these rollers the front wheel of the bicycle is placed, the rear wheel being supported level with it upon a small projection provided for the purpose. To the front of the frame are fixed side wings from which long rods project upwards, converging to a point at which they attach to a V piece in which the head of the



WALTON AND VAUGHAN'S STAND AND HOME TRAINER.

machine fits, and is held firmly there. Upon mounting the machine in this position, the rider can pedal away to his heart's content. There is a brake fitted to one of the rollers which checks its action, and thus makes the work harder if required, and an indicator denotes the mileage. It is not so suitable for fast-peddalling as the other type, but places the rider upon the same machine he uses for ordinary riding, and is of more use when heavy work is required.

MISCELLANEOUS ACCESSORIES.—**Butler's Spoke Brush** is a useful accessory in the shape of a tapering brush which will fit into the spaces between the closest spokes, and clean the wheel both quicker and better than tinkering about with a cloth.

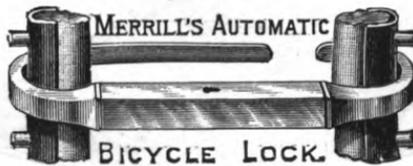
Butler's Waterproof Saddle-cover is, as its name denotes, a waterproof saddle-cover. It is made of very thin waterproofed silk, and can be rolled up and put in the waistcoat pocket when not in use. Its object is to cover the saddle when leaving the machine in the rain, and so keep a dry seat, as a wet one is most uncomfortable, and even dangerous.

The Cyclists' Trousers Fasteners are small hooks of steel wire, with double points bent round pointing towards each other. There is a central coil to give a firm hold to the fingers. Their use is to hold the trousers close round the ankle when riding in them, and they are put on by folding the trouser leg over in a neat fold and fastening the hook across, when the two points pull against each other, and they cannot come undone. They are of steel; hardened, tempered, and japanned to prevent rust.

The American Handy Hooks are for the same purpose, and are "built" in three pieces, viz., two hooks of the same shape as the ends of the last, and a length of coiled spring, to each end of which a hook is swivelled. The stretch obtained by the spring effectually prevents their coming out. They are got up in good style, and sent out nickel-plated and carded in pairs.

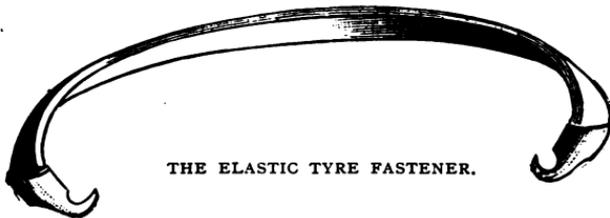
Gossamer Waterproofs, specially constructed for the use of cyclists, are sold, consisting of cape and jacket with waterproof cap cover, and either full-length leggings or short ones coming just below the knee, which I consider preferable, as they are instantly put on, whereas the long ones take several minutes to get on and button up, and are very close and uncomfortable even then. As a rule, the jacket will be found preferable to the cape for tricycling purposes, but the cape, which is made in many forms to suit all tastes, is fully suitable for the requirements of the bicyclist. The best waterproofs are the sun-cured Gossamer sold by Swan and Edgar.

Merrill's Automatic Bicycle Lock is a Yankee invention. It is a double J forming a nearly complete loop, one half telescopic within the other. To apply it it is opened out and hooked round the rims of the two wheels at the point they are nearest each other



and then shut to. It will be seen that a machine thus locked is "tied hand and foot," for neither wheel will revolve, and it must be bodily carried for removal. It is a neat, simple, effective and handy instrument.

The Elastic Tyre Band is a length of about 8in. of flat elastic, furnished at each end with a small metal hook. To use it, one hook is forced over the edge of the rim at one end of the loose portion of



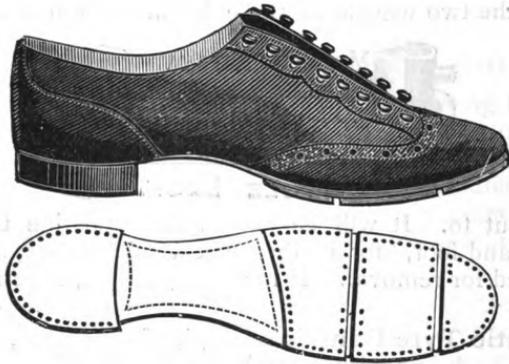
the tyre. The band is then passed tightly round the rim and loose part of the tyre, and the other hook pressed over the rim edge on the other side. It is also useful as a trouser holder and for many other purposes.

The Challenge Crank Extension consists of a single short piece of metal with two screws for attachment to the slot in the end

of the crank, and having a hole at the end through which the pedal pin passes. It furnishes a ready means of obtaining an extra long crank without the trouble of removing the crank and resecuring a longer one. By its means a crank may be lengthened an inch and a half, and it is a very useful contrivance in these days of long cranks.

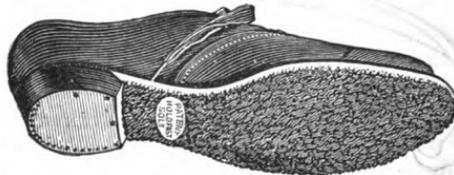
Halliwell's Cyclist's Shoe is made of very pliant leather, and can be bent about in any direction. In pattern it resembles the running shoe, being low and laced to the toe, where is found the peculiarity adapting it so well for bicyclists' use, for the toe is not only ventilated, but very slightly "puffed," so as to allow the toes plenty of room and to spare. They are most comfortable in use, and admirably fulfil the purpose for which they are intended.

Pile's Perfecta Shoe has its speciality in a length of spring steel between the sole, so as to give a springy but firm waist to the foot; it is also cut down to the toe so that it may be unlaced and opened to its full length for better purposes of drying when thoroughly wet through, and being well made makes a good shoe, irrespective of its adaptability for cycling.



PILE'S PERFECTA SHOE.

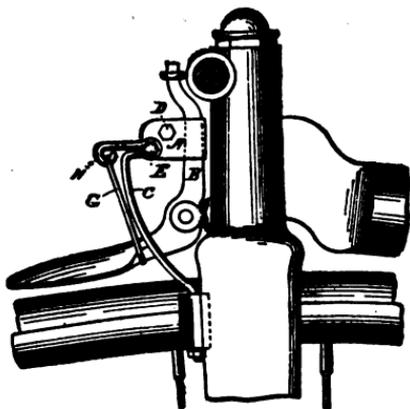
The **Holdfast Cycling Shoe** has for its speciality the attachment of an indiarubber sole to the upper part of the shoe. This is



THE HOLDFAST CYCLING SHOE.

of a soft, spongy character, which gives a better grip upon the pedals than the ordinary smooth leather sole. Like the last, it opens right down to the toe.

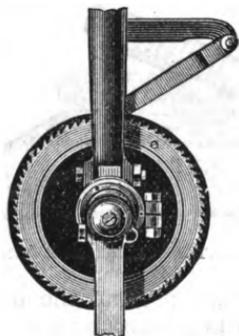
Foote's Anti-header is a Yankee invention. It consists of a light wooden roller fitted in a light wire fork attached to the brake lever.



FOOTE'S ANTI-HEADER.

When running in the ordinary way, the roller revolves upon the top of the rubber, but upon the slightest inclination of the wheel to revolve backwards, or of the frame and forks to go faster than the wheel, it immediately jams with the frame, thus locking the wheel and forks together for the instant, and checking the forward motion of the frame, but instantly releasing it upon the wheel and frame recovering their true balance. The use of this is to prevent headers or croppers, and although it is not altogether proof against them, it has the effect of preventing many which might otherwise occur.

Fisher's Non-cropper is another invention to the same end. This consists in fitting a disc or flange to the hub of the driving wheel, upon the edge of which the milled head of a short loose arm rests. This arm is fitted so that when running forwards it merely



FISHER'S NON-CROPPER.

rests upon the edge of the flange, whilst upon any backward tendency of the wheel, or forward motion of the frame, it immediately jams fast together with the same result as that above described. When

N

fitted to a new machine a collar is attached to the flange of the hub, but when fitted to a machine in use a very neat attachment is made which screws on to the crank with the same result.

The **Magic Match Striker** is a most handy little instrument, and very useful in a high wind. It consists of a tube, trough and plunger. A wax vesta being placed in the trough, the end of the tube



THE MAGIC MATCH STRIKER.

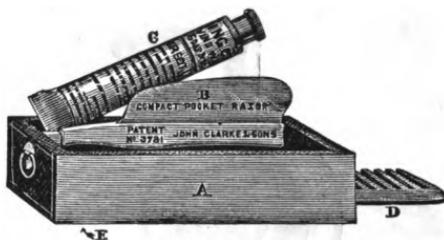
is placed inside the lamp and the window closed. Pressure on the plunger then forces the match through the tube, holds it fast by the end, and lights it instantaneously.

Lucas's Trouser Clip.—This, as shown in the illustration, is



composed of a single strip of strong spring steel, bent over to form a clip. To use it the trouser is folded, and the spring being opened is put on from the bottom, gripping the folds, the natural tension of the spring holding them in position.

The **Cyclist's Pocket Dressing Case** is the most compact thing of the kind ever introduced. It consists of a neat case, measuring only $4\frac{3}{8}$ in. \times $1\frac{1}{2}$ in. \times $1\frac{1}{4}$ in., and contains a telescopic patent razor, which, though small, is really preferable to the large razor ordinarily used for shaving purposes; the outside of the razor



THE CYCLIST'S POCKET DRESSING CASE.

case is formed into two straps, and the under side, being hollow, holds a nickel comb, and is flanked by a looking-glass, whilst in the cavity in which the razor fits, a toothbrush and a tube of shaving cream find a resting-place; so that altogether one has, in a capacity small enough to go into the waistcoat pocket, a complete toilet outfit, with which he may be independent of anyone, or even of civilisation, for the time being.

Lucas's Friend-in-Need Tyre Fastener.—This is an eye-letted strip of leather and a piece of copper wire passed through the



eyelets. Its use is to secure a loose tyre, which it does well; the leather being passed over the tyre and the wire twisted together under the rim.



SEND FOR
NEW CIRCULAR

OR
Photographic Specialities

FREE ON APPLICATION.

NO CYCLIST SHOULD BE WITHOUT

Shew's 'Eclipse' Hand Apparatus,

For Groups, Landscapes, Street Scenes, &c., &c. No stand required.
No Footing. For plates 4 1/2 x 3 1/2 size closed 6 x 4 1/2 x 1 1/2; weight only 12 ounces. For picture 6 1/2 x 4 1/2, weight 22 ounces. Particulars on application to

J. F. SHEW & Co.,
88, Newman St.,
LONDON, W.



SECTION II.

THE BICYCLES OF TO-DAY & THEIR CONSTRUCTION.

ORDINARY BICYCLES.

WHEN first introducing the earlier editions of the "Indispensable" I arranged the machines in alphabetical order, according to the towns in which they were manufactured. This system had some advantages, but I have decided in the present edition to adopt the system followed in the "Tricyclists' Indispensable" and the "Safety Handbook," and take all machines in strict alphabetical order, dividing them only into two classes, viz., ordinary and safety. The first class, therefore, to be dealt with will be the ordinary bicycles, the machines with which cycling grew into prominence, and of which there are still a very large quantity made, although the outgrowth of later years—the safety bicycle—is now being very extensively manufactured, as will be seen in the subsequent chapter.

Speaking generally of the trade, I may here briefly remark that the chief seat of manufacture is still situated in Coventry, and so far as I can see it is likely to remain there, the manufacturers in this city, having been first in the trade, possess sufficient enterprise and ability to keep their productions well up with the times, and for thoroughly good work and skilful ingenuity can hold their own with their younger competitors. In this city there are over a dozen firms, who employ between them nearly four thousand hands. The four largest manufacturers in Coventry of cycles are the Coventry Machinists' Co., Rudge and Co., Singer and Co., and Hillman, Herbert and Cooper, all of these, with the exception of Singer and Co., being limited liability companies. These have been engaged in the manufacture of bicycles since the first introduction of the machine, and they each employ about five hundred workpeople. In naming them I have placed them in order of age, as it would be an invidious distinction and practically impossible task to arrange them either in order of merit or size. Many of the other houses, such as Bayliss, Thomas and Co., who have been established in the trade quite as long as those previously mentioned, have very large and extensive works, employ a great number of workmen, and turn out a large quantity of machines in the course of the year. At one time the machines built in Coventry were strong and heavy, and,

although well finished, there was nothing remarkable in them in this respect. The machines of to-day, however, vary through almost every grade, and some of the finest and best finished work on the market is turned out of Coventry, whilst from the various makers' lists it is possible to select machines of whatever grade may be desired, both as to quality, finish, style and price, though, as a general thing, the great majority of machines turned out here are of a sound, reliable and first-class order.

In point of size it is difficult to say what town ranks next to Coventry in the trade, though, if we take into consideration the manufacturers who are engaged in the assistant trades—that is to say, the manufacture of stampings and parts in the rough, bearings, saddles, bags, &c., &c.—Birmingham undoubtedly comes next. In Birmingham the great majority of the sundries connected with the cycling trade are manufactured. Nearly the whole of the saddles, valises and luggage-carriers are here made; also the great majority of the bells, wrenches, and lamps, and from Birmingham, too, the manufacturers, not only of Coventry, but of the world, obtain their supplies of material in the rough. In point of actual manufacture, the largest firm engaged in the direct trade in this town is the St. George's Engineering Co., who have made wonderful strides within the last few years, and whose machines can favourably compare with any in the market. The Quadrant Tricycle Co. are chiefly engaged in the manufacture of the three-wheeler, but place a safety in the market, which is described later on. Andrews and Co., Limited, is another house of age and note here, and for the most part the other makers, although varying in class from the first ranks downwards, are of a smaller nature.

Wolverhampton has probably more manufacturers of the complete machines than Birmingham. The qualities of its manufactures have, during the past few years, very considerably improved, though it is still the principal seat of the manufacture of the commoner class of goods. At one time there was scarcely a manufacturer of any size in Wolverhampton, but a large number of the very small makers, employing on the average a man and a boy or thereabouts. This class, although still existent, is rapidly giving way to more settled and firmly-established traders, and amongst the largest and best known may be mentioned Devey & Co., Joseph Bates, the Cunard Co., Henry Clarke, Barratt, and Parkyn. Although Coventry is competing very strongly with Wolverhampton for the export trade, the latter still holds its own in this class of business, especially with the cheaper line of goods.

Nottingham still remains in the first ranks as regards quality, the name of Humber & Co., so long connected with this town, being still to the fore, and, indeed, occupying a foremost position in the trade at large, and the quality of the machines made there is of a high order. This firm is now a limited liability company.

London has always contributed a fair number of manufacturers to the list of traders, and in this matter it retains about the same

position it has always occupied, the largest and best-known firms being Ellis and Co., Trigwell, Watson & Co., the Surrey Machinists' Co., Linley & Biggs, &c. There are still, as there always have been, a considerable number of large factors, ostensible manufacturers, who deal in machines built specially to their order, and most of the Coventry houses have their city depôts on Holborn Viaduct.

Of other towns, Glasgow, Biggleswade, Sheffield, St. Albans, Bedford, Manchester, Liverpool, &c., each contribute their quota to the number, and the trade generally is, at the moment of writing, in the most prosperous condition. Indeed, the amount of business done during the manufacturing season of 1887 has been unprecedented in the annals of the cycling trade. This should reassure those who have asserted that cycling has had its day, and I would here state that it is the opinion of experts generally that both the pastime of cycling and the manufacture of the machines are yet but in their infancy.

NON-VIBRATION IN CYCLES

A positive solution of this difficulty is found in

Wiggins' Non-vibrating Bicycles & Tricycles.

They give the rider absolute freedom from all shocks and jars, and have the ease and buoyancy of the spring carriage. The principle of the patent can be applied to all existing machines at a nominal cost. Estimates on application.

TRADE MARK (Registered).

MANUFACTURED		BY THE
GOSPELOAK		CYCLE CO.,
LONDON AND		WOLVERHAMPTON.

Please address all Orders and Enquiries to the

London Branch : 675, Commercial Road East, London, E.

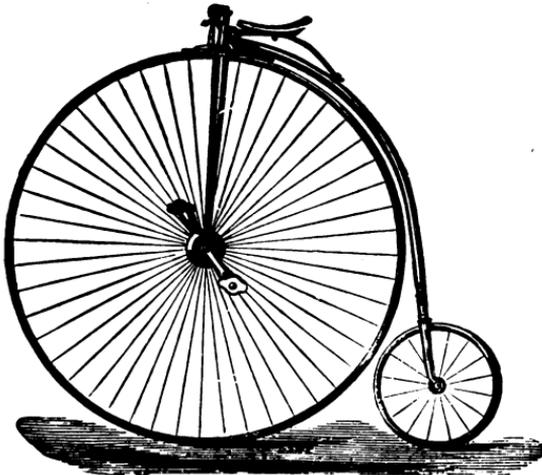
Note.—Their Trade Mark is "Non-vibration," and this their Machines absolutely Secure.

EXPLANATION.—In the following pages the several different standard patterns of machines of the various manufacturers are briefly specified. Few words of explanation are wanted, but the description of each machine will give the reader its exact specification. For the sake of space abbreviations are used in places, thus:—G.M. hubs stands for gun-metal hubs; D.L.S. signifies double lever spoon, being the ordinary pattern of front-wheel brake; W.G., in the description of the backbone, refers to the size as measured by the Birmingham Wire Gauge. In giving the numbers and size of the rims and spokes the first numbers mentioned relate to the front wheel and the latter to the back wheel. The measurement of the hubs is the diameter of the flanges, and the length of the axle is taken over all. Width of tread is the distance from centre to centre of the pedals. In the handle measurement the first figures refer to their length and the second to the height of the grips or ends above the wheel. The first figures in the backbone measurement give the outside diameter of the tube in its thickest part, whilst the second refers to the thickness of the tube itself, the numbers going up as the thickness of the metal decreases. The prices are those of machines as specified, but it may be understood that in nearly every case machines can be built to order with variations from standard specifications as desired, at prices varying according to the alterations, any variation, of course, having to be paid for as an *extra*. The specifications are in every case based upon the build of a 50in. machine.

AI ECLIPSE.

JAMES BEACH, 145, East Reach, Taunton.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 60 and 20 No 11 direct spokes. 16in. back wheel. $4\frac{3}{4}$ in. G.M. hubs. $9\frac{3}{4}$ in. axle. Detachable cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, $14\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Fluted hollow front and back forks. Stanley head, $4\frac{3}{4}$ in. centres.



THE AI ECLIPSE,

Pear-shaped horn handles, dropped bars, 26in. \times 3 $\frac{1}{2}$ in. Elliptical weldless steel backbone. Humber scroll spring. Brooks's lever tension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 39lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	13	10	0	52in.	14	10	0
50in.	14	0	0	54in.	15	0	0

Sent out with bright plated handle-bar, head, hubs, cranks and spokes; rest enamelled black.

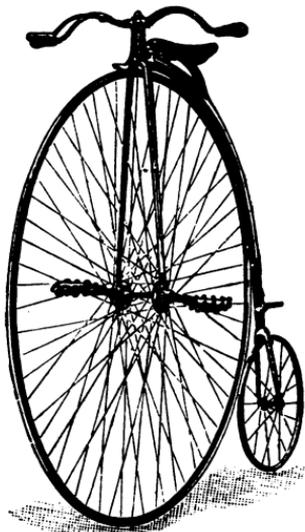
Extras. Plating all over except rims, 30/- Ball pedals, 10/-.

Remarks. A strong and reliable roadster. A really cheap article.

APOLLO.

SINGER & Co., Challenge Works, Alma Street, Coventry.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in Otto's corrugated wired tyres. Warwick's hollow rims. 62 and 20 No. 13 true tangent spokes. $17\frac{1}{2}$ in. back wheel. $3\frac{3}{4}$ in. steel hubs. $8\frac{1}{2}$ in. axle. Detachable cranks, 4in. to $5\frac{1}{2}$ in. throw. Rubber ball pedals, $12\frac{1}{2}$ in. tread. Double ball bearings to front, balls to back wheel. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn



THE APOLLO.

handles, 28in. detachable hollow cowhorn bars. $1\frac{1}{2}$ in. elliptical 16 W.G. weldless steel backbone. Bolted sliding spring. Eclipse saddle. Saw step. D.L.S. brake. Leg-guard. Spanner and oilcan. Weight 38lbs.

Specialties. Otto's wired tyres (page 132). Singer's detachable handle-bars (page 59). "Matchless" rubber-cushioned handle-bar—extra (page 60).

PRICE.

48in. to 56in. £18 10s.

Sent out with plated handle-bar, head, spring, pedals and brake; rest enamelled black.

Extras. "Matchless" handle-bar, 15/- All plated except rims and spokes, 50/- Ball head, 20/- "Challenge" ball pedals, 6/- Valise, 1/6.

Remarks. A very fine light roadster. Soundly built and highly finished, and altogether as fine a mount as there is on the market. (See advertisement.)

ARTISAN'S.

WARMAN & Co., West Orchard, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 50 and 18 No. 10 direct spokes. 17in. back wheel. 3in. brass hubs. 9in. axle. Cranks, 5 $\frac{1}{2}$ in. to 6in. throw. Rat-trap plain pedals, 14in. tread. Double ball bearings to front, cones to back wheel. Solid forks. Stanley head, 6in. centres. Pear-shaped horn handles, dropped bars, 26in. x 6in. 1 $\frac{3}{4}$ in. 16 W.G. weldless steel backbone. Bolted shackle spring. L.D. suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 45lbs.

PRICE.

48in. to 54in. £9 10s.

Sent out with bright hubs, cranks and spokes; rest painted.

Extras. Valise, 1/6. Lamp, 5/-. Gong, 1/-.

Remarks. Strong, heavy and cheap. Will bear knocking about.

ASHTON.

ASHTON BROS., 13 & 15, London Road, Clapton, London.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. No. 12 direct spokes. 16in. back wheel. 4in. G.M. hubs. 8 $\frac{1}{2}$ in. axle. Cranks, 6in. throw. Rubber ball pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 28in. cowhorn bars. 1 $\frac{3}{4}$ in. 16 W.G. weldless steel backbone. Bolted Humber scroll spring. Buffer saddle. Saw step. D.L.S. brake. Spanners and oilcan. Weight 38lbs.

PRICES.

				£	s.	d.					£	s.	d.		
48in.	12	0	0	|	52in.	}	12	12	0
50in.	12	12	0	|	54in.				

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled black.

Remarks. A good, light roadster. Strong and cheap.

ASHTON No. 2.

ASHTON BROS., 13 & 15, London Road, Clapton, London.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. No. 12 direct spokes. 16in. back wheel. 4in. G.M. hubs. 8 $\frac{1}{2}$ in. axle. Cranks, 6in. throw. Rubber ball pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and solid back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 28in. dropped bars. 1 $\frac{3}{4}$ in. 15 W.G. steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 44lbs.

PRICE.

48in. to 54in. £10 10s.

Sent out with bright handle-bar, head, hubs and cranks; rest enamelled black.

Remarks. A strong, substantial article.

AUTO.

GEORGE HUGHES, Tempest Works, Temple Street, Wolverhampton.

Description. $\frac{7}{8}$ in and $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. 84 and 32 No. 12 direct spokes. 16in. back wheel. 4in. G.M. hubs. 9in. axle. Cranks 5 $\frac{1}{2}$ in. throw. Rubber ball pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, cowhorn bars 28in x 4 $\frac{1}{2}$ in. 1 $\frac{3}{4}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 38lbs.

PRICES.

				£	s.	d.								
48in.	}	11	4	0	|	52in.	..	..	..	11	4	0
50in.						54in.	..	..	..	11	16	0

Sent out with plated handle-bar, head, hubs, and cranks; rest enamelled black.
Remarks. A fair article at a moderate figure.

BARWELL.

J. BARWELL & Co., 159, Great Hampton Row, St. George's, Birmingham.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. patent tyres. Crescent rims. 80 and 24 No. 13 direct spokes. 16in. back wheel. $3\frac{1}{2}$ in. patent clamp G.M. hubs. 8in. axle. Cranks $5\frac{1}{2}$ in. throw. Rubber ball pedals, 12in. tread. Barwell ball bearings to front, dust-proof balls to back wheel. Hollow front and semi-hollow back forks. Trigwell's patent ball bearing head. Pear-shaped horn handles, hollow cowhorn bars 3oin. \times 5in. $1\frac{3}{4}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Long-distance Eclipse saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 36lbs.

Specialties. Clamp wheel (page 13). New registered ball bearings. Patent rubbers.

PRICES.

				£	s.	d.								
48in.	14	10	0	|	52in.	..	..	..	15	0	0
50in.	14	15	0		54in.	..	..	..	15	5	0

Sent out with plated handle-bar, head, hubs, cranks, &c.; rest enamelled black.
Remarks. One of the best machines on the road. Is largely used in the Midlands. Light, neat, strong, and with narrow tread.

BARWELL SPECIAL LIGHT ROADSTER.

J. BARWELL & Co., 159, Great Hampton Row, St. George's, Birmingham.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. moulded red tyres. Crescent rims. 72 and 24 No. 12 direct spokes. 16in. back wheel. $3\frac{3}{4}$ in. clamped G.M. hubs. 8in. axle. Cranks $5\frac{1}{2}$ in. throw. Rubber ball pedals, 12in. tread. Registered ball bearings to front, balls to back wheel. Hollow front and semi-hollow back forks. Trigwell's patent ball bearing head. T horn handles, hollow cowhorn bars, 3oin. \times 5in. $1\frac{3}{4}$ in. 17 W.G. weldless steel backbone. Humber scroll spring. Long-distance Eclipse saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 32lbs.

Specialties. Clamp wheel (page 13). Registered ball bearings.

PRICES.

				£	s.	d.								
48in.	14	10	0	|	52in.	..	..	..	15	0	0
50in.	14	15	0		54in.	..	..	..	15	5	0

Sent out with plated handle-bar, head, hubs, cranks, &c.; rest enamelled black.
Remarks. Specially designed for use on good roads. Well-built, strong, light and fast.

BEDFORD.

G. WOOTTON, Gwyn Street, Bedford.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. non-slipping tyres. Warwick's hollow rims. 60 and 20 No. 13 direct spokes. 16in. back wheel. $3\frac{1}{2}$ in. G.M. hubs. 8in. axle. Detachable cranks, 5in. to 6in. throw. Rat-trap ball pedals, $12\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 27in. dropped bars. $1\frac{3}{4}$ in. 18 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

PRICES.

				£	s.	d.								
48in.	12	12	0	|	52in.	..	..	..	13	10	0
50in.	13	0	0		54in.	..	..	..	14	0	0

Sent out with plated handle-bar, head and spring; rest enamelled black.
Remarks. A strong machine of good design.

BIRKBECK.

C. SNOW, Birkbeck Cycle Works, Birkbeck Road, Kingsland, London, E.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 60 and 20 No. 12 direct spokes. 17in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. Detachable cranks, $5\frac{1}{2}$ in. throw. Rubber ball pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. T horn handles, 28in. dropped bars. $1\frac{1}{2}$ in. 16 W.G. weldless steel backbone. Bolted shackle spring. Buffer saddle. Special saw step. D.L.S. brake. Leg-guard. Valise, bell, spanner and oilcan. Weight 38lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	14	0	0	52in.	15	0	0
50in.	14	10	0	54in.	15	10	0

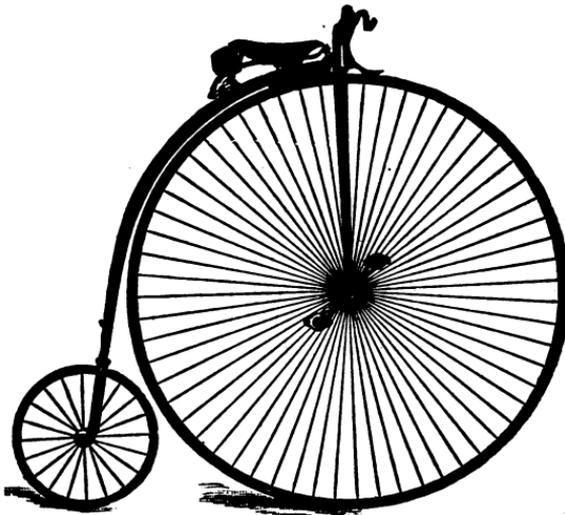
Sent out with plated handle-bar, head, brake, cranks, and fittings; rest enamelled black.

Remarks. A very fair article and worth the price asked.

BRITISH CHALLENGE.

SINGER & Co., Challenge Works, Alma Street, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. Otto's corrugated wired tyres. Crescent rims. 60 and 20 No. 12 butt-ended direct spokes. $17\frac{1}{2}$ in. back wheel. 5in. steel hubs. 9in. axle. Detachable cranks, 4in to $5\frac{3}{8}$ in. throw. Rubber ball pedals, 14in. tread. Double ball bearings to front, balls to back wheel. Fluted hollow front and back forks. Stanley head, 5in. centres. Pear-shaped horn handles.



THE BRITISH CHALLENGE.

28in. detachable cowhorn bars. $1\frac{3}{8}$ in. elliptical 15 W.G. weldless steel backbone. British Challenge rubber-cushioned spring. Eclipse long-distance saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 40lbs.

Specialties. Otto's wired tyres (*page 132*). Challenge detachable handle-bar (*page 59*). Matchless rubber-cushioned handle-bar, extra (*page 60*). Challenge pedals at option (*page 18*). British Challenge rubber Buffer spring (*page 68*).

PRICE.

48in. to 54in. £16

Sent out with plated handle-bar, head, hubs, cranks, pedals and spokes; rest enamelled black.

Extras. All plated except rims, 60/-. Matchless handle-bar, 15/-. Challenge ball pedals, 6/-. Lamp, 12/6. Bell, 2/6. Valise, 1/6. Crate, 2/6.

Remarks. A machine which has been six years before the public, and is consequently thoroughly tested in every detail and thoroughly reliable. A capital strong roadster. (*See advertisement*).

BOY'S CAMBRIAN.

MORRIS BROS., Cardiff.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. non-slipping tyres. Crescent rims. 40 and 14 No. 12 direct spokes. 12in. back wheel. 3in. G.M. hubs. Fixed cranks. Rubber plain pedals. Parallel bearings to front, cones to back wheel. Solid forks. Stanley head. Pear-shaped horn handles. $1\frac{1}{2}$ in. lap-welded steel backbone. Bolted sliding spring. Pigskin saddle. Saw step. Valise, spanners and oilcan.

PRICE.

40in. £5 10s.

Sent out painted in two colours.

Remarks. A good knock-about article for boys from 8 to 14.

CAMBRIAN No. 1.

MORRIS BROS., Crockherbtown, Cardiff.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 60 and 20 No. 12 direct spokes. 17in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 9in. axle. Cranks 5in. to 6 $\frac{1}{2}$ in. throw. Rubber plain pedals, 13in. tread. Plain bearings to front, cones to back wheel. Solid forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 27in. dropped bars. $1\frac{3}{8}$ in. 15 W.G. lap-welded steel backbone. Humber scroll spring. Long-distance saddle. Saw step. D.L.S. brake. Free-ended leg-guard. Valise, spanner. and oilcan. Weight 43lbs.

PRICE.

48in. to 54in. £7

Sent out with plated handle-bar, brake and spring, bright hubs; rest painted in three colours.

Extras. Balls to front wheel, 20s.; to back wheel, 10s.

Remarks. A strong, cheap machine for common work.

CAMBRIAN No. 2.

MORRIS BROS., Crockherbtown, Cardiff.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 60 and 20 No. 12 direct spokes. 17in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 9in. axle. Detachable cranks, 5in. to 6 $\frac{1}{2}$ in. throw. Rubber plain pedals, 13in. tread. Ball bearings to front, cones to back wheel. Solid forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 27in. dropped bars. $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Cambrian spring. Long distance suspension saddle. Saw step. D.L.S. brake. Free-ended leg-guard. Valise, spanners and oilcan. Weight 42lbs.

Specialties. Cambrian spring (*page 71*).

PRICE.

48in. to 54in. £11

Sent out with plated handle-bar, head, brake, hubs, cranks, and spring; rest painted in three colours.

Extras. Balls to back wheel, 10s.

Remarks. A sound article.

CAMBRIAN No. 3.

MORRIS BROS., Crockherbtown, Cardiff.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 60 and 20 No. 12 direct spokes. 17in. back wheel. 4 $\frac{1}{2}$ in. G.M. hubs. 9in. axle. Detachable cranks, 5in. to 6 $\frac{1}{2}$ in. throw. Rubber plain pedals, 13in. tread. Ball bearings to both wheels. Hollow front and solid back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, 27in. cowhorn bars. 1 $\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Cambrian spring. Long distance suspension saddle. Saw step. D.L.S. brake. Free-ended leg-guard. Valise, spanner and oilcan. Weight 40lbs.

Specialties. Cambrian spring (page 71).

PRICE.

48in. to 54in. £13 13s.

Sent out with plated handle-bar, head, brake, hubs, cranks, pedals, and spring; rest painted in three colours.

Remarks. A very good machine for all-round road work.

CAMBRIAN RACER.

MORRIS BROS., Cardiff.

Description. $\frac{3}{4}$ in. and $\frac{7}{8}$ in. red tyres. Warwick's hollow rims. 60 and 20 No 17 laced spokes. 15in. back wheel. 2 $\frac{3}{8}$ in. steel hubs. 7 $\frac{1}{2}$ in. axle. Cranks 4 $\frac{1}{2}$ in. to 5 $\frac{1}{2}$ in. throw. Rat-trap ball pedals, 11 $\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head. T horn handles, 26in. hollow cowhorn bars. 20 W.G. weldless steel backbone. Gem racing saddle. Spanner and oilcan. Weight 20lbs.

PRICE.

48in. to 58in. £18 10s.

Sent out with plated handle-bar, cranks, and pedals; rest painted black.

Remarks. Has been a very successful machine on Welsh and West of England paths.

CARVER.

JAMES CARVER, Alfred Street Mills, Nottingham.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Crescent rims. 68 and 24 No. 14 direct spokes. 17in. back wheel. G.M. hubs. 6in. axle. Cranks 6in. throw. Rubber ball pedals, 12in. tread. Double ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 3 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. hollow dropped bars. 1 $\frac{1}{2}$ in. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 38lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	13	15	0	52in.	14	5	0
50in.	14	0	0	54in.	14	10	0

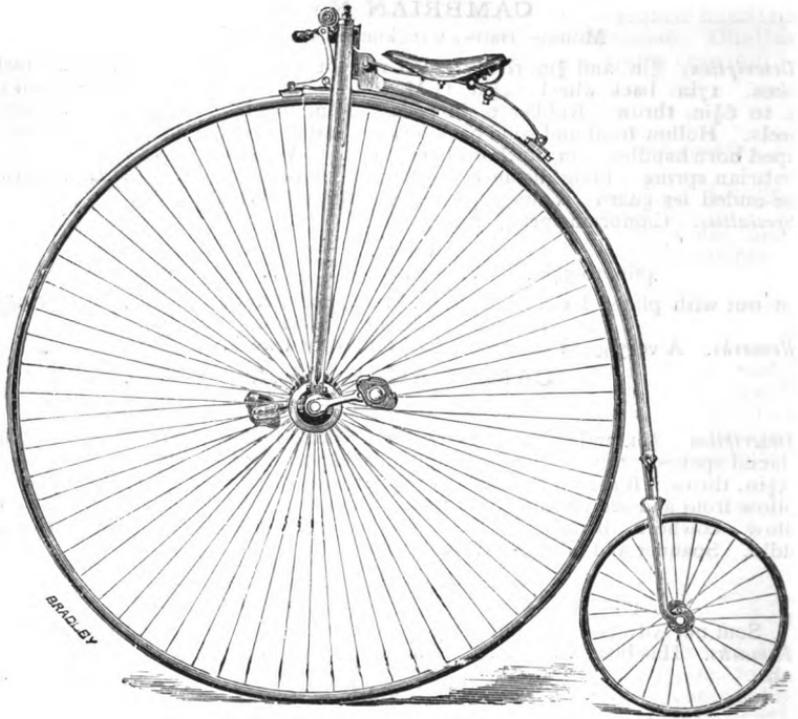
Sent out with plated handle-bar, cranks and pedals; rest enamelled in two colours.

Remarks. One of the soundest and best finished machines in the market. A capital roadster. May be had with hollow spokes if desired. The price is exceedingly moderate when quality is considered.

CENTAUR D.F.H.F.

CENTAUR CYCLE CO., West Orchard, Coventry.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 56 and 24 Nos. 9 and 12 butt-ended direct spokes. 18in. back wheel. 3in. G.M. hubs. 9in. axle. Detachable cranks, 5in. throw. Rubber coned pedals. Æolus ball bearings to both wheels. Double fluted hollow front and oval hollow back forks. Open centre head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, 26in. dropped bars. 1 $\frac{3}{8}$ in. 15 W.G. steel backbone. Humber scroll spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Spanner and oilcan. Weight 38lbs.



THE CENTAUR D.F.H.F.

Specialties. D.F.H. forks (*page 47*).

PRICES.

	£	s.	d.		£	s.	d.
48in.	15	0	0	52in.	16	0	0
50in.	15	10	0	54in.	16	10	0

Sent out with bright handle-bar, head, hubs and cranks; rest enamelled black.

Extras. Plated bright parts, 25/-. Ball pedals, 20/-.

Remarks. A good, sound, serviceable machine at a reasonable figure.

CHALLENGE.

SINGER & Co., Challenge Works, Alma Street, Coventry.

Description. $\frac{3}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 60 and 20 No. 12 butt-ended direct spokes. 17 $\frac{1}{2}$ in. back wheel. 5in. steel hubs. 8 $\frac{1}{2}$ in. axle. Detachable cranks, 4in. to 5 $\frac{1}{2}$ in. throw. Rubber coned pedals, 13 $\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 28in. detachable cowhorn bars. 1 $\frac{1}{8}$ in. 15 W.G. weldless steel backbone. Bolted sliding spring. Eclipse saddle. Saw step. D.L.S. brake. Leg-guard. Spanner and oilcan. Weight 42lbs.

Specialties. Otto's corrugated wired tyres—extra (*page 132*). Challenge pedals—extra (*page 18*). Challenge detachable handle-bar (*page 59*). Matchless rubber-cushioned handle-bar—extra (*page 60*).

PRICE.

48in. to 54in £13 10s.

Sent out with plated handle-bar, head, hubs, spring, pedals and spokes; rest enamelled black.



THE CHALLENGE.

Extras. Ball pedals, 15/- Challenge pedals, 6/- Otto tyres, 5/- Matchless handle-bar, 15/- Valise, 1/6. All plated except rims, 50/-.

Remarks. A very good machine for the money. (See advertisement.)

CHALLENGE No. 2.

SINGER & Co., Challenge Works, Alma Street, Coventry.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 60 and 20 No. 12 butt-ended direct spokes. 17 $\frac{1}{2}$ in. back wheel. 5in. G.M. hubs. 9 $\frac{3}{4}$ in. axle. Detachable cranks, 4in. to 5 $\frac{3}{8}$ in. throw. Rubber coned pedals, 14in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 28in. detachable cowhorn bars. 1 $\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Bolted sliding spring. Eclipse saddle. Saw step. D.L.S. brake. Leg-guard. Spanner and oilcan. Weight 44lbs.

Specialties. Otto's corrugated wired tyres—extra (page 132). Challenge detachable handle-bars (page 59). Challenge pedals—extra (page 18).

PRICE.

48in. to 54in. £10 10s.

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest enamelled black,

Extras. Ball pedals, 15/- Challenge pedals, 4/- Otto corrugated wired tyres, 10/-.

Remarks. One of the best of the cheap machines. (See advertisement.)

CHAMPION.

A. MARKHAM, Railway Approach, Shepherd's Bush, London.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 50 and 18 No. 11 direct spokes. 16in. back wheel. 3in. G.M. hubs. 8 $\frac{1}{2}$ in. axle. Detachable cranks, 16in. throw. Rubber plain pedals, 13 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and back forks. Stanley head. Pear-shaped horn handles, bars 24in. x 6in. 1 $\frac{1}{2}$ in. steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanner and oilcan. Weight 44lbs.

PRICES.

48in. to 50in. ..	..	..	..	..	..	£9 10s.
52in. to 54in. ..	..	..	..	..	..	£10 10s.

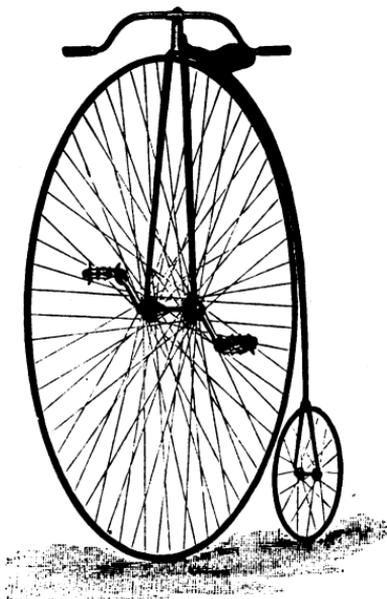
Sent out with bright handle-bar, head, hubs, cranks, and spokes ; rest painted.

Remarks. A strong article at a reasonable figure.

CLUB RACER.

COVENTRY MACHINISTS' Co., LIMITED, Cheylesmore, Coventry.

Description. $\frac{3}{4}$ in. moulded red tyres. Club hollow rims. 64 and 20 No. 15 true tangent direct spokes. 16in. back wheel. Steel hubs. Cranks, 5in. throw. Rat-trap ball pedals, 12in. tread. Club single ball bearings to both wheels. Hollow front and back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn



THE CLUB RACER.

handles, 26in. cowhorn bars. 18 $\frac{1}{2}$ in. elliptical 18 W.G. weldless steel backbone. Suspension racing saddle. Spanners and oilcan. Weight 22lbs.

Specialties. Club hollow rim (*page* 9). Club ball bearings (*pages* 34 and 37).

PRICE.

48in. to 58in.	£19 10s.
-------------------	----	----	----	----	----	----------

Sent out with plated handle-bar, head, hubs and cranks ; rest enamelled black.

Remarks. Beautifully made. Fast, strong, and light. Has made several records, and is one of the best racers of the day. (*See advertisement.*)

CLUB SEMI-RACER.

COVENTRY MACHINISTS' Co., LIMITED, Cheylesmore, Coventry.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Club hollow rims. 64 and 20 No. 13 true tangent spokes. 16in. back wheel. Steel hubs. Cranks, 5in. throw. Rat-trap coned pedals, 13in. tread. Club single ball bearings to both wheels. Hollow front and back forks. Stanley head, 5in. centres. Pear-shaped horn handles, Club detachable hollow 26in. cowhorn bars. 18 $\frac{1}{2}$ in. elliptical 17 W.G.

weldless steel backbone. Rubber cushioned sliding spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Open leg-guard. Spanners and oilcan. Weight 35lbs.

Specialties. Club hollow felloes (page 9). Club ball bearings (pages 34 and 37). Club detachable handle-bar (page 167). Spring.

PRICES.

				£	s.	d.					£	s.	d.	
48in.	17	0	0	|	52in.	..	..	..	18	0	0
50in.	17	10	0	|	54in.	..	..	..	18	10	0

Sent out with plated handle-bar, head, hubs, cranks, and spokes, rest enamelled black.

Remarks. A finely-constructed machine, eminently suitable for light road work and occasional grass racing. (See advertisement.)

COGENT No. 1.

HENRY CLARKE, Darlington Street, Wolverhampton.

Description. 3/4 in. and 5/8 in. non-slipping tyres. Warwick's hollow rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. 4 1/2 in. G.M. hubs. 10 1/2 in. axle. Detachable cranks, 5 1/2 in. throw. Rat-trap ball pedals, 14 1/2 in. tread. Æolus ball bearings to



COGENT NO. 1.

o

both wheels. Hollow front and back forks. Stanley head, 4½ in. centres. Pear-shaped horn handles, 28 in. cowhorn bars. 1½ in. 16 W.G. weldless steel backbone. Humber scroll spring. L.D. suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan, lamp and bell. Weight 35 lbs.

PRICE.

48 in. to 54 in. £13

Sent out with plated handle-bar, head, hubs, cranks, &c.; rest enamelled in two colours.

Remarks. A fully complete, neatly built light roadster. (See advertisement.)

COGENT No. 2.

H. CLARKE, Darlington Street, Wolverhampton.

Description. 7 in. and 3 in. non-slipping tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16 in. back wheel. 4½ in. G.M. hubs. 10½ in. axle. Detachable cranks, 5½ in. throw. Rubber coned pedals, 14½ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4½ in. centres. Pear-shaped horn handles, 28 in. cowhorn bars. 1½ in. 14 W.G. steel backbone. Humber scroll spring. Goold's Universal saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan, lamp and bell. Weight 38 lbs.

PRICE.

48 in. to 54 in. £9.

Sent out with bright handle-bar, head, hubs, cranks, &c.; rest enamelled black.

Extras. Ball pedals, 15/- Bright parts plated, 15/-

Remarks. Worth the money. (See advertisement.)

COGENT No. 3.

H. CLARKE, Darlington Street, Wolverhampton.

Description. 7 in. and 3 in. non-slipping tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16 in. back wheel. 4½ in. G.M. hubs. 10½ in. axle. Detachable cranks, 5½ in. throw. Rubber coned pedals, 14½ in. tread. B.S.A. ball bearings to front, cones to back wheel. Hollow front and solid back forks. Stanley head, 4½ in. centres. Pear-shaped horn handles, 27 in. cowhorn bars. 1½ in. 14 W.G. weldless steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan, lamp and bell. Weight 42 lbs.

PRICE.

48 in. to 54 in. £7.

Sent out with bright handle-bar, head, hubs, cranks, &c.; rest painted in two colours.

Extras. Bright parts plated, 10/- Balls to back wheel, 10/-

Remarks. Sound and strong. (See advertisement.)

COGENT No. 4.

H. CLARKE, Darlington Street, Wolverhampton.

Description. 7 in. and 3 in. non-slipping tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16 in. back wheel. 4½ in. G.M. hubs. 10½ in. axle. Cranks, 5½ in. throw. Rubber coned pedals, 14½ in. tread. Ball bearings to front, cones to back wheel. Solid forks. Stanley head, 4½ in. centres. Pear-shaped horn handles, 26 in. cowhorn bars. 1½ in. 13 W.G. lap-welded iron backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan, lamp and bell. Weight 42 lbs.

PRICE.

48 in. to 54 in. £5 10s.

Sent out with bright handle-bar, head, hubs, cranks and pedals; rest painted in two colours.

Extras. Balls to back wheel, 10/- Plated bright parts, 15/-

Remarks. A cheap mount. (See advertisement.)

COGENT No. 5.

H. CLARKE, Darlington Street, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. non-slipping tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. $10\frac{1}{2}$ in. axle. Cranks, $5\frac{1}{2}$ throw. Rat-trap coned pedals, $14\frac{1}{2}$ in. tread. Roller bearings to



THE COGENT NO. 5.

front, cones to back wheel. Solid forks. Stanley head, $4\frac{1}{2}$ centres. Pear-shaped horn handles, 26in. cowhorn bars. $1\frac{5}{8}$ in. 13 W.G. lap-welded iron backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan and bell. Weight 42lbs.

PRICE.

48in. to 54in. £4 10s.

Sent out with bright handle-bar, head, hubs, cranks; rest painted in two colours.

Remarks. One of the lowest priced machines in the market (*See advertisement*).

COGENT No. 8.

HENRY CLARKE, Darlington Street, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. non-slipping tyres. Crescent rims. No. 11 direct spokes. 14in. back wheel. G.M. hubs. Fixed cranks. Rat-trap plain pedals,

12in. tread. Roller bearings to front, cones to back wheel. Solid forks. Stanley head, 4in. centres. Pear-shaped horn handles, 24in. cowhorn bars. 1½in. iron backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Leg-guard. Valise, bell, spanner and oilcan.

PRICES.

	£	s.	d.		£	s.	d.
30in.	3	0	0	34in.	3	10	0
32in.	3	5	0	36in.	3	15	0
38in.					£4.		

Sent out with bright handle-bar, head, hubs, cranks, and spring; rest painted in two colours.

Remarks. Built for boys' use, and a cheap machine withal. (See advertisement.)

COGENT RACER.

H. CLARKE, Darlington Street, Wolverhampton.

Description. ½in. and ⅞in. red tyres. Warwick's hollow rims. 60 and 20 No. 14 direct spokes. 16in. back wheel. 3½in. G.M. hubs. 10in. axle. Cranks, 5in. throw. Rat-trap ball pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and back forks. Stanley head, 4½in. centres. Pear-shaped horn handles, 29in. cowhorn bars. 1½in. 18 W.G. weldless steel backbone. Racing saddle. Weight 22lbs.

PRICE.

48in. to 58in. £15.

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled black.

Remarks. A genuine and moderately priced machine. (See advertisement.)

COLONIAL.

W. ANDREWS, LIMITED, 21, Victoria Road, Aston, Birmingham.

Description. 1in. and ⅞in. moulded red tyres. Crescent rims. 60 and 20 No. 10 butt-ended direct spokes. 17in. back wheel. 5in. G.M. hubs. 9in. axle. Detachable cranks, 6in. throw. Rubber ball pedals, 12in. tread. Double ball bearings to front, balls to back wheel. Hollow front and semi-hollow back forks, 3in. rake. Andrews's head, 5in. centres. Pear-shaped horn handles, 28in. dropped detachable bars. 1½in. elliptical 15 W.G. weldless steel backbone. Bolted shackle spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Open leg-guard. Valise, spanner and oilcan. Weight 43lbs.

Specialties. Andrews's detachable handle-bars (page 57). Sanspareil spring.

PRICES.

	£	s.	d.		£	s.	d.
48in.	17	0	0	52in.	17	10	0
50in.	17	5	0	54in.	17	15	0

Sent out with plated handle-bar, head, spring, hubs and cranks; rest enamelled black.

Extras. Hollow rims, 20/-; cradle spring, 7/6; plating, except rims, 63/-; Lining in two colours, 10/-.

Remarks. A strongly built and thoroughly reliable roadster, especially designed and suitable for colonial work and use on rough roads. (See advertisement.)

COMMERCIAL No. 1.

A. ROBINSON, Hospital Street, Wolverhampton.

Description. ½in. and ⅞in. red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. 3½in. G.M. hubs. 11in. axle. Cranks, 4½in. to 5½in. throw. Rubber coned pedals, 15in. tread. Double ball bearings to front, balls to back wheel. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. Pear-shaped horn handles, 26in. cowhorn bars. 1½in. steel backbone. Bolted sliding spring. Pigskin saddle. Adjustable saw step. D.L.S. brake. Valise, bell, spanners and oilcan. Weight 38lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	6	0	0	52in.	6	10	0
50in.	6	5	0	54in.	6	15	0

Sent out with bright handle-bar, head, hubs, cranks, and spokes ; rest enamelled black.

Extras. Plated bright parts, 15/. All plated, 30/-.

COMMERCIAL No. 2.

A. ROBINSON, Hospital Street, Wolverhampton.

Description. 3/4in. and 7/8in. red tyres. Crescent rims. 60 and 20 No. 1 direct spokes. 16in. back wheel. 3 1/4in. G.M. hubs. 1 1/2in. axle. Cranks, 4 1/2in. to 5 1/2in. throw. Rat-trap coned pedals, 15in. tread. Sheffield T plain bearings to front, cones to back wheel. Solid forks. Stanley head, 4 1/2in. centres. Pear-shaped horn handles, 26in. bars. 1 1/2in. backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Valise, bell, spanner and oilcan. Weight 45lbs.

PRICE.

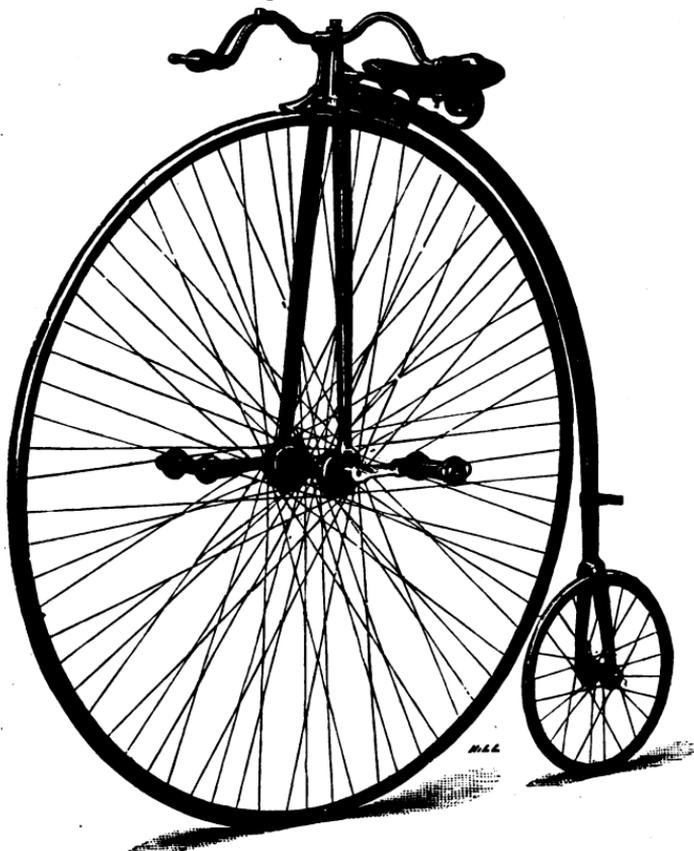
48in. to 54in. £4 10s.

Sent out painted in two colours.

Extras. Balls to front wheel, 10/-.

COVENTRY IMPERIAL No. 0.

HUMBER & Co., LIMITED, Imperial Works, White Friars' Lane, Coventry.



THE COVENTRY IMPERIAL NO. 0.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. 72 and 24 No. 15 laced spokes. 18in. back wheel. $4\frac{1}{2}$ in. steel hubs. $9\frac{1}{2}$ in. axle. Detachable cranks, $6\frac{1}{2}$ in. throw. Rubber coned pedals, $14\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{3}{4}$ in. centres. Pear-shaped horn handles. hollow cowhorn bars, 28in. x 3in. $1\frac{3}{4}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight, 38lbs.

PRICE.

48in. to 54in. £18 10s.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Ball pedals, 20/- All plated, 40/-.

Remarks. A good-looking machine. Well finished and taking. (See advertisement.)

COVENTRY IMPERIAL No. 3.

HUMBER & Co., LIMITED, Imperial Works, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 60 No. 11 and 20 No. 12. direct tinned spokes. 16in. back wheel. $3\frac{1}{2}$ in. G.M. hubs. $9\frac{1}{2}$ in. axle. Cranks, 6in. throw. Rubber coned pedals, $14\frac{1}{2}$ in. tread. Plain bearings to front, cones to back wheel. Solid forks. Stanley head, $4\frac{1}{4}$ in. centres. Pear-shaped horn handles, 26in. cowhorn bars. $1\frac{3}{4}$ in. 14 W.G. iron backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 42lbs.

PRICE.

48in. to 54in. £7.

Sent out with plated handle-bar, head, cranks and spring; rest enamelled black

Extras. Ball bearings to front wheel, 20/-; to back wheel, 20/-

Remarks. Largely supplied to dealers and shippers. The spokes are plated with tin. (See advertisement.)

COVENTRY IMPERIAL No. 6.

HUMBER & Co., LIMITED, Imperial Works, White Friars' Lane, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 72 and 24 No. 12 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. $9\frac{1}{2}$ in. axle. Cranks, $6\frac{1}{2}$ in. throw. Rubber coned pedals, $14\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow fluted front and solid back forks. Stanley head, 5in. centres. Pear-shaped horn handles, cowhorn bars, 28in. x 3in. $1\frac{3}{4}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £11 10s.

Sent out with plated handle-bar, head, hubs, cranks and fittings; rest enamelled black.

Extras. Ball pedals, 20/-.

Remarks. A strong article. Considerable Continental trade is done with this machine, shippers and foreign dealers being supplied in large quantities. (See advertisement.)

COVENTRY TRIUMPH No. 1.

WARMAN & Co., West Orchard, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 50 and 18 No. 10 direct spokes. 18in. back wheel. 3in. G.M. hubs. 9in. axle. Cranks, $5\frac{1}{2}$ in. to 6in. throw. Rubber plain pedals, 14in. tread. Double ball bearings to front, cones to back wheel. Hollow front and semi-hollow back forks. Stanley head, $5\frac{1}{2}$ in. centres. Pear-shaped horn handles, cowhorn bars, 26in. 6in. $1\frac{3}{4}$ in. 16 W.G. weldless steel backbone. Bolted scroll shackle spring. L.D. suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 42lbs.

PRICES.

			£	s.	d.				£	s.	d.
48in.	::	::	13	0	0	|	52in.	::	13	10	0
50in.	::	::					54in.	::			

Sent out with plated handle-bar, hubs, cranks and pedals ; rest enamelled black.
Extras. Valise, 1/6. Lamp, 7/6. Gong, 1/6.
Remarks. A strong, cheap machine, fit for general rough work.

CUNARD.

CUNARD CYCLE Co., LIMITED, Wolverhampton.

Description. 3in. and 3in. moulded red tyres. Warwick's hollow rims. 60 and 20 No. 12 direct spokes. 17in. back wheel. 4in. steel hubs. 8½in. axle. Detachable cranks, 4½in. to 7in. throw. Rubber ball pedals. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. Pear-shaped horn handles, cowhorn bars, 28in. x 2in. Weldless steel backbone. Humber scroll spring. Brooks's saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanner, and oilcan. Weight 39lbs.

PRICE.

48in. to 54in. £16.
 Sent out with plated handle-bar, head, hubs, cranks and spring ; rest enamelled black.
Remarks. This machine is also built to order as light roadster and racer with correspondingly lighter details throughout. A good machine in each form.

DART.

J. E. HOLLOWAY, Lambeth House, 157 & 159, Westminster Bridge Road, London, S.E.

Description. 3in. best red tyres. Warwick's hollow rims. 40 and 18 No. 13 butt-ended direct spokes. 17in. back wheel. 4in. steel hubs. Detachable cranks, 5in. to 6in. throw. Rubber cone pedals. Æolus ball bearings to both wheels. Hollow forks. Stanley head, 4½in. centre. Spade horn handles, dropped bars. Elliptical weldless steel backbone. Arab cradle spring. Brooks's L.D. saddle. Saw step. D.L.S. brake. Leg-guard. Spanner and oilcan. Weight 38lbs.

Specialties. Holloway's patent moving hub wheel (*addenda*).

PRICE.

All sizes £16 16s.
 Sent out with plated handle-bar, head, hubs, brake, spring, axle, and cranks ; rest enamelled black.

Extras. Ball pedals, 20/-

Remarks. A light and good roadster. This machine is built by Hillman, Herbert & Cooper, to the order of Mr. Holloway, the especial feature being the wheel, in which the driving strain is entirely removed from the spokes, and the power conveyed direct to the rim.

DART RACER.

J. E. HOLLOWAY, 157, Westminster Bridge Road, London, S.E.

Description. 3in. red tyres. Warwick's hollow rims. 30 and 16 No. 13 butt-ended direct spokes with rigid arrangement. 16in. back wheel. Steel hubs. Loose axle. Cranks, 5½in. throw. Rat-trap ball pedals, 12½in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Spade horn handles, 28in. hollow cowhorn bars. 18in. elliptical 20 W.G. weldless steel backbone. Racing saddle. Spanner and oilcan. Weight 20lbs.

Specialties. Holloway's moving hub wheel (*addenda*).

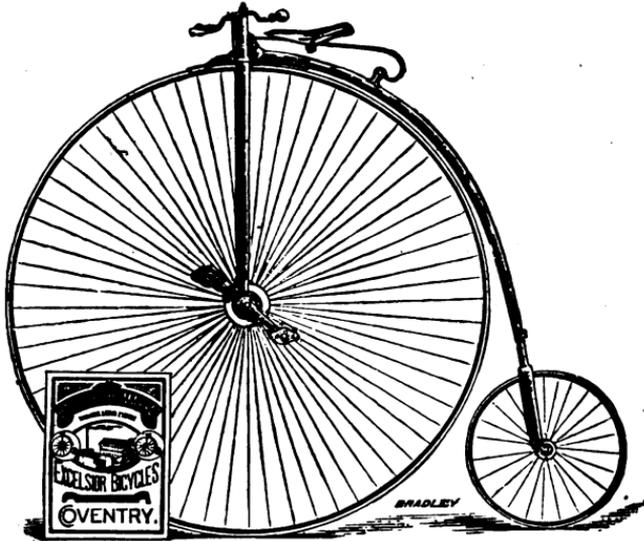
PRICE.

All sizes £18.
 Sent out with plated handle-bar, head, hubs, and cranks ; rest enamelled black.
Remarks. A very rigid machine for its weight.

D.E.H.F. EXCELSIOR.

BAYLISS, THOMAS & Co., Lower Ford Street, Coventry.

Description. 1in. and 3/4in. red tyres. Crescent rims. 68 and 24 No. 13 butt-ended direct spokes. 18in. back wheel. Steel hubs. Detachable cranks, 5 1/2in. to 6 1/2in. throw. Rubber coned pedals, 13in. tread. Double ball bearings to front, balls to back wheel. Hollow fluted front and back forks. Duplex open head, 4 1/2in.



THE D.E.H.F. EXCELSIOR.

centres. Large pear-shaped horn handles, 28in. cowhorn bars. 1 1/2in. 15 W.G. weldless steel backbone. Victor spring. Brooks's tension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 44lbs.

Specialties. Victor spring (page 68). Duplex open head.

PRICES.

				£	s.	d.					£	s.	d.	
48in.	16	0	0	|	52in.	..	..	..	17	0	0
50in.	16	10	0	|	54in.	..	..	..	17	10	0

Sent out with plated handle-bar, head, hubs, cranks, step and spring; rest enamelled in two colours.

Extras. Ball pedals, 15/-.

Remarks. Built specially strong for export, it forms one of the best heavy roadsters on the market for rough roads, and is largely used both in Ireland and America. (See advertisement.)

DEMO.

GEORGE HUGHES, Temple Works, Temple Street, Wolverhampton.

Description. 3/4in. and 3in. red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. 4 1/2in. G.M. hubs. 9in. axle. Cranks, 5 1/2in. throw. Rubber coned pedals, 14in. tread. Plain bearings to front, cones to back wheel. Solid front and back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 28in. x 4 1/2in. bars. 1 1/2in. lapwelded iron backbone. Bolted sliding spring. Pigskin saddle. Saw step. Valise, spanner and oilcan. Weight 44lbs.

PRICES.

48in., 50in. and 52in.	..	£4	|	54in.	£4	5s.
------------------------	----	----	--	-------	----	----	----	----	-----

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest painted in two colours.

Extras. Ball bearings, 6/6. Dropped handles, 3/-.

Remarks. As good as one can expect for the money.

DERBY RACER.

E. C. CLARKE, I, Friar Gate, Derby.

Description. $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. 60 and 24 No. 20 Clarke's piano-wire tangent spokes. 16in. back wheel. $4\frac{1}{2}$ in. steel hubs. 8in. axle. Cranks, 5in. to $5\frac{1}{2}$ in. throw. Rat-trap ball pedals, 10 $\frac{1}{2}$ in. tread. Rudge's ball bearings to both wheels. Hollow front and back forks. Stanley ball-bearing head. T horn handles, dropped bars, 30in. x 6in. 1 $\frac{3}{8}$ in. 20 W.G. weldless steel backbone. Racing saddle. Spanner and oilcan. Weight 17lbs.

Specialties. Clarke's patent spokes (page 134). Clarke's ball-bearing head.

PRICE.

48in. to 54in. £18.

Sent out with plated handle-bar, head and cranks; rest enamelled black.

Remarks. A very finely-built machine, light, fast, and likely to make a name for itself as it becomes wider known.

DERBY ROADSTER.

E. C. CLARKE, I, Friar Gate, Derby.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Crescent rims. 72 and 24 No. 12 direct spokes. 16in. back wheel. 4in. G.M. hubs. 9in. axle. Cranks, 5in. to $5\frac{1}{2}$ in. throw. Rubber plain pedals, 12in. tread. Æolus ball bearings to both wheels. Hollow front and back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 30in. x 6in. dropped bars. 1 $\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Humber screw-spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Spanner and oilcan. Weight 40lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	10	0	0	52in.	12	0	0
50in.	11	0	0	54in.	12	12	0

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest enamelled black.

Remarks. A strongly-built article. Well worth the price asked.

D.H.F.

HILLMAN, HERBERT & COOPER, LIMITED, Premier Works, Coventry.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. non-slipping tyres. Crescent rims. 64 and 20 No. 12 direct spokes. 16in. back wheel. $3\frac{3}{4}$ in. G.M. hubs. Cranks, $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Non-slipping rubber plain pedals, 14in. tread. Ball bearings to both wheels. Hollow front and solid back forks. Open centre head, 5in. centres. Pear-shaped horn handles, 26in. dropped bars. 1 $\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Bolted sliding spring. Long-distance suspension saddle. Hillman's adjustable saw step. D.L.S. brake. Leg-guard. Spanner and oilcan. Weight 42lbs.

Specialties. Double hollow forks (page 46). Hillman's adjustable step (page 87).

PRICES.

	£	s.	d.		£	s.	d.
48in.	16	0	0	52in.	17	0	0
50in.	16	10	0	54in.	17	10	0

Sent out with plated handle-bar, head, hubs, cranks, bearings, spring, step and spokes; rest enamelled black.

Extras. Cradle spring, 7s. 6d. Lining in colours, 5s.; in gold, 10s.

Remarks. This machine is well known to all old riders. It was the most popular machine of the day at its introduction some five or six years since, and is a good, strong roadster now. (See advertisement.)

DON.

MIDLAND CYCLE Co., Bell Street, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. red tyres. Crescent rims. 60 and 20 No. 13 direct spokes. 17in. back wheel. $3\frac{3}{8}$ in. G.M. hubs. $8\frac{1}{2}$ in. axle. Cranks 5in. throw. Rubber ball pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, Cowhorn bars, 26in. \times $1\frac{1}{4}$ in. $1\frac{3}{8}$ in. 16 W.G. lap welded steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 38lbs.

PRICE.

48in. to 54in. £10
Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled black.

Extras. Hollow rims, 20/- $\frac{7}{8}$ in. tyres, 5/-

Remarks. Worth the money. (See advertisement.)

DON RACER No. 1.

MIDLAND CYCLE Co., Bell Street, Wolverhampton.

Description. $\frac{1}{2}$ in. and $\frac{3}{8}$ in. moulded black tyres. Warwick's hollow rims. 60 and 20 No. 14 direct spokes. 17in. back wheel. $2\frac{1}{2}$ in. steel hubs. 8in. axle. Cranks 5in. throw. Rat-trap ball pedals, 12in. tread. Rudge's ball bearings to both wheels. Hollow front and semi-hollow back forks. Abingdon ball head. T horn handles 26in. dropped hollow bars, 1in. below wheel. $1\frac{3}{8}$ in. elliptical 19 W.G. weldless steel backbone. Racing saddle. Spanners and oilcan. Weight 22lbs.

PRICE.

48in. to 54in. £18.
Sent out with plated handle-bar, hubs, cranks and nuts; rest enamelled black.

Remarks. A first-class article, with every latest improvement. (See advertisement.)

DON RACER No. 2.

MIDLAND CYCLE Co., Bell Street, Wolverhampton.

Description. $\frac{1}{2}$ in. and $\frac{3}{8}$ in. red tyres. Warwick's hollow rims. 60 and 20 No. 14 direct spokes. 17in. back wheel. $2\frac{1}{2}$ in. G.M. hubs. 8in. axle. Cranks 5in. throw. front and semi-hollow back forks. Stanley head, 4in. centres. T horn handles, 26in. dropped bars. $1\frac{3}{8}$ in. elliptical 19 W.G. weldless steel backbone. Racing saddle. Spanners and oilcan. Weight 24lbs.

PRICE.

48in. to 54in. £12.
Sent out with plated handle-bar, head, hubs, cranks and nuts; rest enamelled black.

Remarks. A good machine for those who cannot afford a more expensive article. (See advertisement.)

DREADNOUGHT.

F. J. RODGERS, Southwark Cycle Works, Bermondsey Street, London.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 17in. back wheel. $3\frac{1}{2}$ in. G.M. hubs. 9in. axle. Detachable cranks, 6in. throw. Rubber ball pedals, 14in. tread. Æolus ball bearings to both

wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. T horn handles, 27in. x 2½in. hollow cowhorn bars. 1½in. Warwick's Perfection 14 x 18 W.G. weldless steel backbone. Humber scroll spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 39lbs.

PRICE.

48in. to 54in. £10 10s.

Sent out with plated handle-bar, head, cranks and pedals; rest enamelled black.

Remarks. A very fair article, and worth the price asked.

EASTHOPE LIGHT ROADSTER.

MIDLAND CYCLE CO., Bell Street, Wolverhampton.

Description. ¾in. and 5in. moulded black tyres. Warwick's hollow rims. 60 and 20 No. 13 direct phosphor bronze spokes. 17in. back wheel. 3½in. G.M. hubs, 8½in. axle. Cranks 5in. throw. Rubber ball pedals, 13in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Abingdon ball head. T horn handles, dropped, bars 26in. x 1½in. 1½in. Elliptical 18 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 32lbs.

PRICE.

48in. to 54in. £18

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled black.

Remarks. A good article for a light roadster. (See advertisement.)

ELECTRIC.

F. W. BAGSHAW & SONS, Sheffield Cycle Works, Hillfoot, Sheffield.

Description. 7in. and ¾in. red tyres. Crescent rims. 64 and 20 No. 11 direct spokes. 17in. back wheel. 5in. G.M. hubs. 9in. axle. Detachable cranks, 4in. to 5½in. throw. Rubber ball pedals. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, cowhorn bars, 28in. x 2½in. 1½in. 16 W.G. weldless steel backbone. Bolted shackle spring. Bagshaw's patent adjustable saddle. Saw step, D.L.S. brake. Valise, spanners, and oilcan. Weight 40lbs.

Specialties. Bagshaw's patent hub (page 13). Bagshaw's shackle spring. Bagshaw's patent adjustable saddle (page 172).

PRICES.

				£	s.					£	s.	
48in.	10	10	|	52in.	..	..	..	12	0
50in.	11	0	|	54in.	..	..	..	12	10

Sent out with plated handle-bar, hubs, cranks, and bearings; rest japanned in two colours.

Remarks. Soundly built and carefully constructed, with several detail specialties in construction.

EMPEROR.

DENNE & Co., East Kent Cycle Works, Sittingbourne.

Description. 7in. and ¾in. moulded red tyres. Crescent rims. 72 and 24 No. 12 direct spokes. 16½in. back wheel. 5in. G.M. hubs. 9in. axle. Cranks, 5in. to 6in. throw. Rubber plain pedals, 14in. tread. Æolus ball bearings to front, cones to back wheel. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. Pear-shaped horn handles, dropped bars, 28in. x 4½in. 1½in. steel backbone. Arab cradle spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan, lamp and bell. Weight 45lbs.

PRICE.

48in. to 56in. £9 10s.

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest japanned black.

Extras. Balls to back wheel, 10/-

Remarks. A cheap, strong roadster. May be had on easy terms by paying £2 down, and the balance at 15/- a month.

EMPEROR No. 2.

DENNE & Co., Sittingbourne.

Description. 7in. and 3in. red tyres. Crescent rims. 72 and 24 No. 11 direct spokes. 16in. back wheel. 3½in. G.M. hubs. 9in. axle. Cranks, 5½in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to front, cones to back wheel. Hollow front and semi-hollow back forks. Andrews's Stanley head, 4½in. centres. Pear-shaped horn handles, dropped bars, 28in. x 4½in. 1½in. steel backbone. Humber scroll spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan, lamp and bell. Weight 45lbs.

PRICE.

48in. to 54in. £8 10s.

Sent out with bright handle-bar, head, hubs and cranks; rest painted in two colours.

Extras. Æolus ball bearings to back wheel, 10/-.

Remarks. A substantial roadster. Is sold on easy terms at £2 down, and 15/- per month after payments.

ESSENTIAL.

W. GWINNETT & Co., 5, St. John's Square, Wolverhampton.

Description. 7in. and 3in. red tyres. Crescent rims. 60 and 20 No. 10 direct spokes. 20in. back wheel. 4½in. G.M. hubs. 8in. axle. Cranks, 6in. throw. Rubber coned pedals, 12½in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. Pear-shaped horn handles, 28in. cowhorn bars. 1½in. 16 W.G. weldless steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 37lbs.

PRICE.

48in. to 50in. £9 | 52in. to 54in. £10

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Remarks. A very fair article for the money.

EXCELSIOR No. 1.

BAYLISS, THOMAS & Co., Excelsior Works, Lower Ford Street, Coventry.

Description. 1½in. and 3in. moulded red tyres. Crescent rims. 60 and 24 No. 11 direct spokes. 18in. back wheel. 4in. G.M. hubs. 9in. axle. Cranks, 6in. throw. Rubber coned pedals, 14in. tread. Double ball bearings to front, balls to back wheel. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. Pear-shaped horn handles, 28in. detachable cowhorn bars. 1½in. 15 W.G. weldless steel backbone. Bolted sliding spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £12 10s.

Sent out with plated handle-bar, head, hubs, cranks, brake, spring and spokes; rest enamelled black.

Extras. Ball pedals, 20/-.

Remarks. A thoroughly strong roadster of good appearance. May be relied upon as a good machine, and cheap at its price. (See advertisement.)

EXCELSIOR No. 2.

BAYLISS, THOMAS & Co., Excelsior Works, Lower Ford Street, Coventry.

Description. 1½in. and 3in. red tyres. Crescent rims. 60 and 24 No. 11

direct spokes, 18in. back wheel. 4in. G.M. hubs. 9in. axle. Cranks, 6in. throw. Rubber plain pedals, 14in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 3½in. centres. Pear-shaped horn handles, 26in. detachable cowhorn bars. 1½in. steel backbone. Bolted sliding spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 42lbs.

PRICE.

48in. to 54in. £10.

Sent out with plated handle-bar, head, hubs, cranks, brake, and spring; rest enamelled black.

Remarks. A very good article for the money. (See advertisement.)

EXCELSIOR No. 3.

BAYLISS, THOMAS & Co., Excelsior Works, Lower Ford Street, Coventry.

Description. 1½in. and ¾in. red tyres. Crescent rims. 60 and 24 No. 11 direct spokes, 18in. back wheel. 4in. G.M. hubs. 9in. axle. Cranks, 6in. throw. Rubber plain pedals, 14in. tread. Ball bearings to front, cones to back wheel. Hollow front and semi-hollow back forks. Stanley head, 3½in. centres. Pear-shaped horn handles, 26in. detachable cowhorn bars. 1½in. steel backbone. Bolted sliding spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 42lbs.

PRICE.

48in. to 54in. £8.

Sent out with handle-bar, head, hubs, cranks, and spokes; rest enamelled black.

Remarks. A very cheap article, and no alterations will be made from standard pattern. (See advertisement.)

EXPRESS No. 2.

HUMBER & Co., LIMITED, The Ashes, Great Brickkiln Street, Wolverhampton.

Description. ¾in. and ¾in. red tyres. Crescent rims. 52 and 20 No. 10 direct spokes. 16in. back wheel. 5in. G.M. hubs. 9½in. axle. Cranks, 5½in. throw. Rubber plain pedals, 13in. tread. Parallel bearings to front, cones to back wheel. Solid forks. Stanley head, 5in. centres. Pear-shaped horn handles, 26in. cowhorn bars. 1½in. 14 W.G. backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Valise, spanners, and oilcan. Weight 45lbs.

PRICE.

48in. to 54in. £4 10s.

Sent out either all bright or painted in two colours.

Extras. All plated, 40s. Half-plated, 20s. Ball bearings to front wheel, 13s.

Remarks. Commonly known as "The Working Man's Friend." A strong plain mount. (See advertisement.)

EXPRESS SEMI-RACER.

HUMBER & Co., LIMITED, The Ashes, Great Brickkiln Street, Wolverhampton.

Description. ¾in. and ¾in. moulded red tyres. Warwick's hollow rims. 60 and 20 No. 13 direct spokes. 16in. back wheels. 3½in. G.M. hubs. 9½in. axle. Detachable cranks, 5in. to 6in. throw. Rubber plain pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and back forks. Stanley head, 5in. centres. T horn handles, cowhorn bars, 27in. x 5in. 1½in. 15 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Valise, spanners, oilcan and bell. Weight 34lbs.

PRICE.

48in. to 54in. £10.

Sent out with plated handle-bar, head, hubs, and cranks; rest enamelled black

Extras. Ball pedals, 12s. 6d.

Remarks. As good a £10 worth as there is in the market. (See advertisement.)

EXTRA SPECIAL EXPRESS.

HUMBER & Co., LIMITED, The Ashes, Great Brickkiln Street, Wolverhampton.

Description. ¾in. and ¾in. non-slipping tyres. Crescent rims. 60 and 20 No.

11 direct spokes. 16in. back wheel. 5in. G.M. hubs. 9 $\frac{1}{2}$ in. axle. Detachable cranks, 5in. to 6in. throw. Rubber ball pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and back forks. Stanley head, 5in. centres. T horn handles, cowhorn bars, 27in. x 5in. 1 $\frac{3}{8}$ in. elliptical 15 W.G. weldless steel backbone. Double-action Arab cradle spring. Rubber Buffer saddle. Adjustable saw step. D.L.S. brake. Valise, spanners and oilcan. Weight 42lbs.

PRICES.

£ s. d.				£ s. d.									
48in.	12	5	0	52in.	..	..	..	12	15	0
50in.	12	10	0	54in.	..	..	..	13	0	0

Sent out all plated except rims, which are enamelled black.

Extras. Hollow rims, 10/-

Remarks. Really good value for the money. A strong and reliable roadster of good appearance. (See advertisement.)

EXTRA SPECIAL TIMBERLAKE.

THOMAS TIMBERLAKE & Co., 39, King Street, Maidenhead, Berks.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red wire coupled tyres. Warwick's hollow rims. 60 and 20 No. 13 tangent spokes. 16in. back wheel. 4in. steel hubs. 8 $\frac{1}{2}$ in. axle. Detachable cranks, 5in. to 5 $\frac{1}{2}$ in. throw. Rubber ball pedals, 12 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, hollow cowhorn bars, 28in. x 2 $\frac{1}{2}$ in. 1 $\frac{3}{8}$ elliptical 16 W.G. weldless steel backbone. Bolted rubber buffer spring. Eclipse saddle. Saw step. D.L.S. brake. Ball-ended leg-guard. Spanner and oilcan. Weight 36lbs.

Specialties. Wire coupled tyres. Non-vibrating spring.

PRICES.

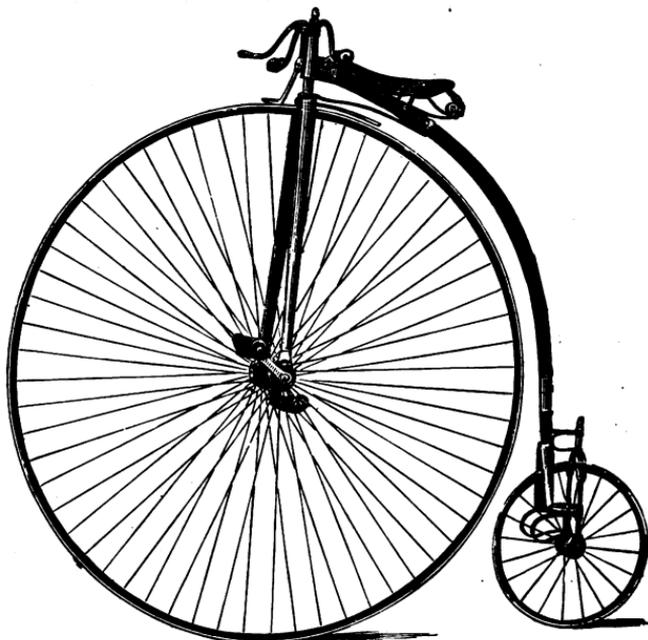
£ s. d.				£ s. d.									
48in.	15	10	0	52in.	..	..	..	16	10	0
50in.	16	0	0	54in.	..	..	..	17	0	0

Sent out with plated handle-bar, head, cranks, and spring; rest enamelled black.

Remarks. A capital machine. Not too heavy, but just light enough. (See advertisement.)

FALCON No. 1.

GOSPEL OAK CYCLE Co., 677, Commercial Road East, London, E.



THE FALCON NO. 1.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Crescent rims. 60 and 20 No. 11 butt-ended direct spokes. 16in. back wheel. 2in. G.M. hubs. 8in. axle. Detachable cranks, $6\frac{1}{2}$ in. throw. Rat-trap ball pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and back forks. Wiggin's socket and pin steering. Pear-shaped horn handles, 26in. cowhorn bars. $1\frac{3}{4}$ in. 15 W.G. weldless steel backbone. Gospel Oak non-vibrating springs. Wiggin's adjustable saddle-tilt. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 43lbs.

Specialties. Gospel Oak non-vibrators to both wheels (*page 157*). Wiggin's adjustable saddle-tilt and saddle, extra (*page 177*). Wiggin's socket and pin steering.

PRICE.

48in. to 54in. £15.

Sent out with plated handle-bar, hubs and cranks; rest enamelled black.

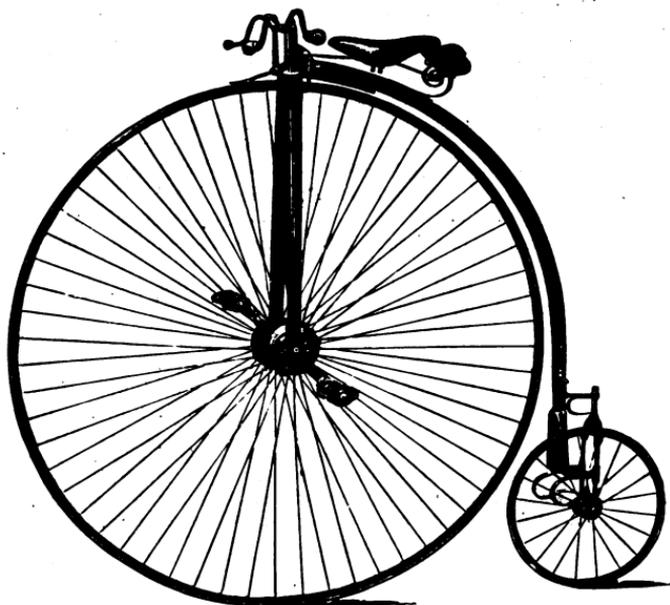
Extras. Wiggin's patent adjustable saddle-tilt and saddle, 20/-.

Remarks. A strongly-built machine with very fine and effective anti-vibration arrangements. Especially intended for use on very rough roads. (*See advertisement.*)

FALCON No. 2.

GOSPEL OAK Co., 675, Commercial Road East, London.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Crescent rims. 60 and 20 No. 11 butt-ended direct spokes. 16in. back wheel. 5in. G.M. hubs. 8in. axle. Detachable cranks, $6\frac{1}{2}$ in. throw. Rat-trap ball pedals, 14in. tread. Æolus ball



THE FALCON NO. 2.

bearings to both wheels. Hollow front and back forks. Gospel Oak anti-vibrators. Stanley head, $3\frac{3}{4}$ in. centres. Pear-shaped horn handles. 26in. dropped bars. $1\frac{3}{4}$ in. 14 W.G. weldless steel backbone. Humber scroll spring. Buffer saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 41lbs.

Specialties. Gospel Oak non-vibrating gear to back wheel (*page 157*). Wiggin's patent adjustable saddle-tilt, extra (*page 177*).

PRICE.

48in. to 54in. £14.

Sent out with plated handle-bar, brake and hubs; rest enamelled black.

Extras. Patent saddle and tilt, 20/-.*Remarks.* A good, strong machine of ordinary build, but with the non-vibrating springs where most wanted, viz., back wheel. (See advertisement.)

FLY RACER.

FLY CYCLE Co., St. Stephen's Place, Norwich.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. moulded red tyres. Warwick's hollow rims. 60 and 20 No. 15 tangent spokes. 16in. back wheel. $3\frac{1}{2}$ in. steel hubs. 8in. axle. Cranks, 5in. throw. Rat-trap ball pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 26in. cowhorn bars. $1\frac{3}{8}$ in. elliptical 20 W.G. weldless steel backbone. Racing saddle. Spanners and oilcan. Weight 19lbs.

PRICE.

48in. to 54in. £16 16s.

Sent out with plated handle-bar, head, cranks and pedals, spokes; rest enamelled black.

Extras. Ball head, 10/-.*Remarks.* A very decent article, used a good deal in the Eastern Counties.

FLY ROADSTER.

FLY CYCLE Co., St. Stephen's Place, Norwich.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. non-slipping tyres. Crescent rims. 60 and 20 No. 12 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. Cranks, $4\frac{1}{2}$ in. to 6in. throw. Rubber plain pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 26in. cowhorn bars. $1\frac{3}{8}$ in. elliptical 16 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Valise, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £15 15s.

Sent out with plated handle-bar, head, hubs, cranks, and spring; rest enamelled black.

Extras. Ball head, 10s. Ball pedals, 10s. Hollow rims, 20s.*Remarks.* A substantial and good-looking machine.

FOX.

T. Fox, Kent Street Works, Leicester.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. moulded red tyres. Warwick's hollow rims. 60 and 24 No. 12 direct spokes. 16in. back wheel. $3\frac{1}{2}$ in. G.M. hubs. $10\frac{1}{2}$ in. axle. Cranks, 6in. throw. Rubber ball pedals, $14\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Ball head. Pear-shaped horn handles, 30in. \times $1\frac{1}{2}$ in. hollow dropped bars. $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Buffer saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 32lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	14	10	0	52in.	15	10	0
50in.	15	0	0	54in.	16	0	0

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Remarks. A good light roadster.

FOX No. 2.

T. Fox, Kent Street Works, Leicester.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. red tyres. Crescent rims. 60 and 24 No. 11 direct spokes. 16in. back wheel. $3\frac{3}{8}$ in. G.M. hubs. $10\frac{1}{2}$ in. axle. Cranks, 6in. throw. Rubber coned pedals, $14\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow

front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 30in. x 1½in. dropped bars. 1½in. 16 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Adjustable saw step. Leg-guard. Valise, spanner and oilcan. Weight 40lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	10	0	0	52in.	10	10	0
50in.	10	10	0	54in.			

Sent out with plated handle-bar, head, hubs and spring; rest enamelled black.

Extras. Brake, 10/-

Remarks. A fair article.

HERCULES.

HOWE MACHINE CO., LIMITED, Bridgeton, Glasgow.

Description. ½in. and ¾in. red tyres. Crescent rims. 58 and 20 No. 11 direct spokes. 16in. back wheel. 3½in. G.M. hubs. 8½in. axle. Cranks, 5½in. throw. Rubber coned pedals, 13in. tread. Ball bearings to front, cones to back wheel. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 28in. x 3in. cowhorn bars. 1½in. 15 W.G. backbone. Bolted sliding spring. Long-distance saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanner and oilcan. Weight 40lbs.

PRICE.

48in. to 54in.	£8	10s.
------------------------	----	------

Sent out with plated handle-bar, brake, head, hubs, cranks, pedals and spring; rest enamelled black.

Extras. Ball pedals, 20/-

Remarks. This machine is very largely built for the export trade, and is also supplied in quantity to dealers. (See advertisement.)

HUMBER.

HUMBER & Co., Beeston, Notts.

Description. ½in. and 5/8in. moulded red tyres. Crescent rims. 70 and 18 No. 12 direct spokes. 18in. back wheel. 3½in. G.M. hubs. 9in. axle. Cranks, 5½in. throw. Plain rubber pedals, 13in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 3in. centres. Pear-shaped horn handles, 28in. dropped bars. 1½in. elliptical 16 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Free-ended leg-guard. Three spanners and oilcan. Weight 28lbs.

PRICE.

48in. to 54in.	£17	10s.
------------------------	-----	------

Sent out with bright handle-bar, hubs and cranks; rest enamelled in two colours.

Extras. Plated handle-bar and cranks, 10/- Plated hubs, 5/- Trigwell's ball head, 12/6.

Remarks. Finely finished, and thoroughly well built. One of the best machines on the market. (See advertisement.)

HUMBER RACER.

HUMBER & Co., Beeston, Notts.

Description. ¾in. and ½in. moulded red tyres. Warwick's hollow rims. 70 and 20 No. 15 direct piano wire spokes. 16in. back wheel. G.M. hubs. Fixed cranks, 4½in. to 5½in. throw. Rat-trap plain pedals, 12½in. tread. Ball bearings to both wheels. Hollow front and back forks. Trigwell's ball bearing head. T horn handles, 28in. x ¾in. dropped bars. 1½in. 19 W.G. weldless steel backbone. Racing saddle, spanners, and oilcan. Weight 21lb.

Specialties. Trigwell's ball bearing head (when ordered) page 166.

PRICE.

48in. to 58in.	£18.
------------------------	------

Sent out with bright handle-bar, cranks, &c.; rest japanned black.

Extras. Plated bright parts, 10/- Ditto and hubs, 20/- Ball pedals, 20/-

Remarks. One of the fastest racers of the day. Most of the amateur championships have been won upon it, and it holds many records. (See advertisement.)

HUMBER RACER.

MARRIOTT AND COOPER, 65A, Holborn Viaduct, London.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. red tyres. Warwick's hollow rims. 70 and 20 No. 15 tangent spokes. 16in. back wheel. $2\frac{1}{2}$ in. steel hubs. $8\frac{1}{2}$ in. axle. Cranks, $4\frac{1}{2}$ in. to 5in. throw. Rat-trap ball pedals, 13in. tread. Rudge's ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. T horn handles, 28in. hollow dropped bars. $1\frac{3}{8}$ in. elliptical 20 W.G. weldless steel backbone. Gem racing saddle. Spanners and oilcan. Weight 21lbs.

PRICE.

48in. to 56in. £20

Sent out with plated handle-bar, head, hubs, cranks, and nuts; rest enamelled black.

Remarks. Quite a number of records have been made on this machine, and in 1886 the five miles championship fell to a rider of one.

HUMBER ROADSTER.

MARRIOTT & COOPER, 65A, Holborn Viaduct, London.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Crescent rims. 16 and 20 No. 13 direct spokes. 16in. back wheel. G.M. hubs. Cranks, $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Rubber ball pedals, 13in. tread. Rudge's ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles. Hollow dropped bars, 28in. x 3in. $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. L.D. suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £19

Sent out with plated handle-bar, head, hubs, cranks, and springs; rest enamelled black.

Extras. Hollow rims, 20/-

Remarks. A first-class machine. Strong, well finished, and good. A light roadster is built, scaling 35lbs., for work on good roads.

IMPERIAL INVICTA.

CLEAVER & Co., Kent Works, 2 to 8, William Street, Sittingbourne.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. moulded red tyres. Crescent rims. 60 and 24 No. 12 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. $9\frac{1}{2}$ in. axle. Cranks, 5in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow fluted front and semi-hollow back forks. Stanley head, 4in. centres. T horn handles, 28in. cowhorn bars. $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Hub lamp, valise, spanners, oilcan and bell. Weight 38lbs.

PRICES.

48in. to 50in. £9 15s. | 52in. to 54in. £10.

Sent out enamelled black.

Extras. Cradle spring, 6/- Hollow rims, 10/6. Ball pedals, 12/6. Hollow handle-bars, 2/6.

Remarks. A sound, neatly-built article. 5% is allowed for cash, or the machine may be had on the easy purchase system. (See advertisement.)

IMPROVED BRITISH MAIL.

THOMAS SMITH & SONS, Saltley Mills, Adderley Road, Birmingham.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. moulded tyres. Crescent rims. 66 and 20 No. 11 direct spokes. 16in. back wheel. Steel hubs. Detachable cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, cowhorn bars, 28in. x $2\frac{1}{2}$ in. $1\frac{3}{8}$ in. elliptical 16 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanner and oilcan. Weight 42lbs.

PRICES.

48in.	} £12 12 0	52in.	} £13 2 0
50in.		54in. .. .. .		13 12 0

Sent out with bright handle-bar, head, spring, hubs, brake, cranks, fittings and spokes; rest enamelled black.

Extras. Hollow rims, 40/- Ball pedals, 25/- Bright parts plated, 30/- All plated save rims, 60/-

Remarks. A soundly-constructed, good article, largely supplied wholesale to the trade.

IMPROVED TIMBERLAKE.

THOS. TIMBERLAKE & Co., 39, King Street, Maidenhead, Berks.

Description. 1½in. and 5⁄8in. wire coupled red tyres. Crescent rims. 60 No. 11 and 20 No. 12 direct spokes. 16in. back wheel. 4in. G.M. hubs. 10½in. axle. Cranks, 5in. throw. Rat-trap plain pedals, 14½in. tread. Ball bearings to front, cones to back wheel. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. Pear-shaped horn handles, bars 26in. x 4½in. 1½in. 15 W.G. steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Ball-ended leg-guard. Valise, spanners and oilcan. Weight 42lbs.

Specialties. Timberlake's wire coupled tyres (*addenda*).

PRICES.

	£	s.	d.		£	s.	d.
48in.	10	10	0	52in.	11	2	0
50in.	10	16	0	54in.	11	8	0

Sent out with bright handle-bar, head, hubs, cranks, &c.; rest enamelled in two colours.

Extras. Bright parts plated, 20/- All plated, 80/- Balls to back wheel, 10/- Ball pedals, 15/- Gold lining, 7/6.

Remarks. A serviceable and medium priced article. (*See advertisement*.)

INVINCIBLE ROADSTER.

SURREY MACHINISTS' Co., LIMITED, 128 and 129, Great Suffolk Street, Borough, London, S.E.

Description. 1in. and ¾in. moulded red tyres. D.S.H. rims. 60 and 32 tangent spokes. 17in. back wheel. 4in. steel hubs. 7½in. axle. Detachable cranks, 5½in. to 6in. throw. Rubber plain pedals, 11½in. tread. Double ball bearings to front, balls to back wheel. Hollow front and back forks. Invincible ball bearing head, 4½in. centres. Pear-shaped horn handles, hollow cowhorn bars, 28in. x 2½in. 1½in. 16 W.G. weldless steel backbone. Humber scroll spring. L.D. suspension saddle. Leg-guard. Valise, spanners and oilcan. Weight 34lbs.

Specialties. D.S.H. rims (*page 9*). Invincible expanding cranks—extra (*page 138*). Invincible ball bearing head (*page 166*).

PRICE.

48in. to 54in. £18 10s.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Ball pedals, 20/- Brake, 10/6. Adjustable step, 4/6.

Remarks. A splendid roadster in every way. Light and yet strong, with plenty of rubber to save the machine and lessen vibration. (*See advertisement*.)

INVINCIBLE SEMI-ROADSTER.

SURREY MACHINISTS' Co., LIMITED, 128 and 129, Great Suffolk Street, Borough, London, S.E.

Description. ¾in. moulded red tyres. D.S.H. rims. 60 and 32 No. 15 direct spokes. 16in. back wheel. 2½in. steel hubs. 7½in. axle. Cranks, 5½in. to 6in. throw. Rat-trap ball pedals, 11½in. tread. Double ball bearings to front, balls to back wheel. Hollow front and back forks. Invincible ball bearing head, 4½in. centres. Pear-shaped horn handles, 28in. hollow cowhorn bars. 1½in. 18 W.G.

weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. Valise, spanners and oilcan. Weight 28lbs.

Specialties. D.S.H. rims (page 9). Invincible automatic cranks—extra (page 138). Invincible ball bearing head (page 166).

PRICE.

48in. to 54in. £19.

Sent out with plated handle-bar, head, cranks, and spring; rest enamelled black.

Extras. Brake, 10/6.

Remarks. A splendid article for general light road work, with occasional racing. Light, stiff, and fast. (See advertisement.)

INVINCIBLE RACER.

SURREY MACHINISTS' CO., LIMITED, 128 and 129, Great Suffolk Street, Borough, London, S.E.

Description. $\frac{3}{8}$ in. and $\frac{1}{8}$ in. best grey tyres. D.S.H. rims. 50 and 24 No. 15 direct spokes. 16in. back wheel. 2 $\frac{1}{2}$ in. steel hubs. 7 $\frac{1}{2}$ in. axle. Cranks, 5 $\frac{1}{2}$ in. to 6in. throw. Rat-trap ball pedals, 12 $\frac{1}{2}$ in. tread. Double ball bearings to front, balls to back wheel. Hollow front and back forks. Invincible ball bearing head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, hollow cowhorn bars, 28in. x 1 $\frac{1}{2}$ in. 1 $\frac{3}{8}$ in. elliptical 18 W.G. weldless steel backbone. Racing saddle, valise, spanners and oilcan. Weight 22lbs. (56in.)

Specialties. D.S.H. rims (page 9). Invincible ball bearing head (page 166).

PRICE.

All sizes £19.

Sent out with plated handle-bar, cranks and pedals; rest enamelled black.

Remarks. As fine a racer as there is on the path, and one which has made many records, notably those by the late Dr. H. L. Cortis. (See advertisement.)

IVEL ROADSTER.

D. ALBONE, Ivel Cycle Works, Biggleswade.

Description. 7in. and 3in. moulded red tyres. Crescent rims. 60 and 20 No. 13 direct spokes. 16in. back wheel. 5in. G.M. hubs. 9in. axle. Detachable cranks, 6in. throw. Rubber plain pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, cowhorn bars, 28in. x 3in. 1 $\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Brooks's semi-racing saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £13 10s.

Sent out enamelled in two colours.

Extras. Ball pedals, 15/- Half-plated, 20/-

Remarks. Sound and strong, built by a practical rider. (See advertisement.)

IVEL LIGHT ROADSTER.

D. ALBONE, Ivel Cycle Works, Biggleswade.

Description. 3in. and 3in. moulded red tyres. Warwick's hollow rims. 50 and 20 No. 13 direct spokes. 16in. back wheel. 4 $\frac{1}{2}$ in. G.M. hubs. 8 $\frac{1}{2}$ in. axle. Detachable cranks, 6in. throw. Rat-trap ball pedals, 12 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, hollow cowhorn bars, 28in. x 2 $\frac{1}{2}$ in. 1 $\frac{3}{8}$ in. 17 W.G. weldless steel backbone. Humber scroll spring. Buffer saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 34lbs.

PRICE.

48in. to 54in. £17 10s.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled in two colours.

Remarks. A good and genuine article. Fit for use on good roads and grass courses. (See advertisement.)

IVEL RACER.

D. ALBONE, Ivel Cycle Works, Biggleswade, Beds.

Description. ½in. and ¾in. moulded red tyres. Warwick's hollow rims. 50 No. 14 and 18 No. 15 tangent spokes. 16in. back wheel. 2½in. G.M. hubs. 7½in. axle. Detachable cranks, 6in. throw. Rat-trap ball pedals, 11½in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. Elliptical cork handles, cowhorn bars, 28in × 1½in. 1½in. 19 W.G. weldless steel backbone. Gem racing saddle. Spanners and oilcan. Weight 21lbs.

PRICE.

48in. to 58in. £17 10s.
Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled black.

Remarks. A really sound and well-made article at a moderate figure, and has figured very prominently for many years on Eastern Counties tracks. (See advertisement.)

JUBILEE TENSION.

W. H. J. GROUT, 7, Watson Street, Stoke Newington Green, London, N.

Description. ¾in. moulded red tyres. Warwick's hollow rims. 56 and 24 direct spokes. 20in. back wheel. 3½in. G.M. hubs. 9in. axle. Detachable cranks, 6in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, hollow cowhorn bars, 28in. × 2in. 1½in. elliptical 15 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Ball-ended leg-guard. Valise, bell, spanner and oilcan. Weight 39lbs.

Specialties. Spring non-vibrating handles.

PRICES.

	£	s.	d.		£	s.	d.
48in.	14	10	0	52in.	15	0	0
50in.	15	0	0	54in.	15	0	0

Sent out with plated handle-bar, brake and cranks; rest enamelled black.

Extras. Ball pedals, 20/-.

Remarks. A good machine. Mr. Grout is one of the oldest makers in the trade. The spring handles work from a joint at the junction of the grips with the bar ends, and whilst giving freely in a downward direction are rigid upwards for hill-climbing.

KING OF CLUBS.

COVENTRY MACHINISTS' CO., LIMITED, Cheylesmore, Coventry.

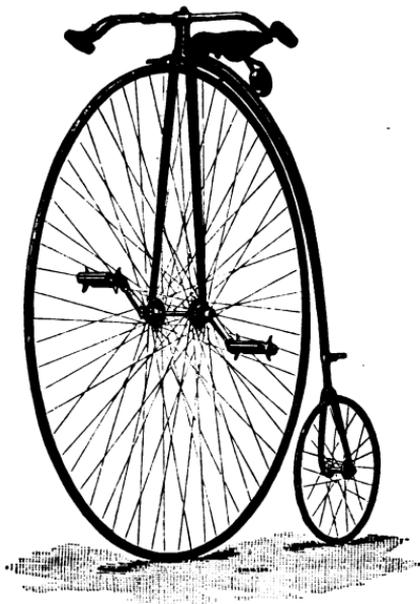
Description. ¾in. and ½in. moulded red tyres. Club hollow front rims, crescent back. 64 and 24 No. 14 direct tangent spokes. 18in. back wheel. Steel hubs. Detachable cranks, 5½in. throw. Rubber ball pedals, 13in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Elliptical horn handles, 26in. detachable hollow cowhorn bars. 1½in. 16 W.G. weldless steel backbone. Club spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, plated spanners and oilcan. Weight 38lbs.

Specialties. Club direct tangent spokes (page 134). Club hollow felloes (page 9). Club detachable handle-bars (page 167). Club spring. Club single ball bearings (page 37).

PRICE.

48in. to 54in. £18 10s.
Sent out with plated handle-bar, head, spring, hubs and cranks; rest enamelled black.

Extras. Ball bearing head, 10s.



THE KING OF CLUBS.

Remarks. One of the finest machines of the day. Not too light, but just light enough. Strong, highly finished, and reliable. (See advertisement.)

KING OF THE ROAD.

METROPOLITAN MACHINISTS' CO., 75, Bishopsgate Street Without, London, E.C.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. Direct spokes. 16in. back wheel. Steel hubs. Detachable cranks, $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Rubber ball pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 26in. cowhorn bars. Steel backbone. Humber scroll spring. Long distance suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 38lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	12	5	0	52in.	12	15	0
50in.	12	10	0	54in.	13	0	0

Sent out with plated handle-bar, head and cranks; rest enamelled in two colours.

Extras. Hollow rims, 21/- Non-slipping tyres, 7/6.

Remarks. A neat and taking mount. 15% off for cash.

KING OF THE ROAD.

DENNE & Co., East Kent Cycle Works, Sittingbourne.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 72 and 24 No. 12 direct spokes. 16 $\frac{1}{2}$ in. back wheel. 5in. G.M. hubs. 9in. axle. Cranks, 6in. throw. Rubber plain pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, dropped bars, 28in. x $4\frac{1}{2}$ in. 1 $\frac{3}{4}$ in. weldless steel backbone. Arab cradle spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan and lamp. Weight 42lbs.

PRICE.

48in. to 56in. £11 11s.

Sent out with bright cranks and spokes; rest japanned black.

Extras. Plated bright parts, 21/- Ball pedals, 15/- Hollow rims, 10/-

Remarks. A sound, cheap article. Supplied on easy terms if wished.

KING OF THE ROAD TANGENT.

METROPOLITAN MACHINISTS' CO., LIMITED, 75, Bishopsgate Street Without, London.

Description. 7/8in. and 7/4in. moulded red tyres. Warwick's hollow rims. Piano wire laced spokes. 16in. back wheel. Steel hubs. Detachable cranks, 6in. throw. Rat-trap ball pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, hollow cowhorn bars. Elliptical weldless steel backbone. Arab cradle spring. Triple-tension Eclipse saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanner, oilcan, lamp and gong. Weight 36lbs.

PRICES.

				£	s.	d.					£	s.	d.
48in.	..	..	..	} 15	0	0	52in.	..	..	..	15	5	0
50in.	..	..	..				54in.	..	..	..	15	10	0

Sent out with plated handle-bar, head, hubs, and cranks; rest enamelled in colours.

Extras. T handles, 5/- Ball bearing head, 20/- Detachable handle-bars, 7/6 All plated, 50/-.

Remarks. A light and taking machine. 15% discount for cash.

KING SEMI-ROADSTER.

DENNE & Co., East Kent Cycle Works, Sittingbourne.

Description. 7/4in. and 7/8in. non-slipping tyres. Crescent rims. 60 and 20 No. 12 direct spokes. 16in. back wheel. 3 1/2in. G.M. hubs. 9in. axle. Cranks, 5in. to 6in. throw. Rat-trap plain pedals, 13 1/2in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 1/2in. centres. Pear-shaped horn handles, 28in. x 4 3/4in. hollow cowhorn bars. 1 3/8in. steel backbone. Humber scroll spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Valise, spanners and oilcan. Weight 32lbs.

PRICE.

48in. to 54in. £11 11s.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled black.

Extras. Ball pedals, 15s. Hollow rims, 10s.

Remarks. A light, neat roadster for good roads and grass tracks.

LACED SPOKE SPECIAL CAMBRIAN.

MORRIS BROS., Crockherbtown, Cardiff.

Description. 7/8in. and 7/4in. moulded red tyres. Warwick's hollow rims. 80 and 20 No. 15 laced spokes. 17in. back wheel. 3 1/2in. steel hubs. 9in. axle. Detachable cranks, 5in. to 6in. throw. Rat-trap ball pedals, 13in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 1/2in. centres. Pear-shaped horn handles, 27in. dropped bars. 1 3/8in. 16 W.G. weldless steel backbone. Cambrian spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Ball-ended leg-guard. Valise, spanners and oilcan. Weight 35lbs.

Specialties. Cambrian spring (page 71).

PRICE.

48in. to 54in. £18.

Sent out with plated handle-bar, head, spring, brake, cranks and pedals; rest painted in three colours.

Remarks. A really good roadster. Light and strong.

MANCHESTER EXPRESS No. 1.

T. CLARKE, 180, Stockport Road, Manchester.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. patent safety red tyres. Clarke's patent safety rims. 64 and 20 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 9in. axle. Detachable cranks, $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Rubber ball pedals, $13\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Clarke's ball-bearing Stanley head. Spade horn handles, cowhorn bars, 28in. x 5in. Elliptical 15 W.G. weldless steel backbone. Humber scroll spring. Eclipse saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 39lbs.

Specialties. Clarke's patent safety rims and tyres (*pages 6 and 8*). Clarke's ball bearing head.

PRICE.

48in. to 54in. £10.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled in two colours.

Remarks. A sound, strong article, though scarcely so highly finished as the "Special."

MANCHESTER EXPRESS No. 2.

T. CLARKE, 180, Stockport Road, Manchester.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. patent safety red tyres. Clarke's patent safety rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 9in. axle. Detachable cranks, $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Rubber coned pedals, $13\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, cowhorn bars, 28in. x 5in. $1\frac{3}{8}$ in. lap-welded steel backbone. Bolted sliding spring. L.D. suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

Specialties. Clarke's patent safety rims and tyres (*pages 6 and 8*).

PRICE.

48in. to 54in. £8 5s.

Sent out with plated handle-bar, head, spring and brake; rest enamelled in two colours.

Extras. All plated, 50/-

Remarks. Worth the money.

MANCHESTER EXPRESS No. 3.

T. CLARKE, 180, Stockport Road, Manchester.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 9in. axle. Cranks, $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Ball bearings to both wheels. Hollow front and solid back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. x 5in. cowhorn bars. $1\frac{3}{8}$ in. backbone. Bolted sliding spring. L.D. suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

Specialties. Clarke's patent rims and rubbers—extra (*pages 6 and 8*).

PRICE.

48in. to 54in. £6 15s.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled in two colours.

Extras. Clarke's patent rims and rubbers, 5/-.

Remarks. A cheap machine.

MANCHESTER EXPRESS No. 4.

T. CLARKE, 180, Stockport Road, Manchester.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 56 and 18 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 9in. axle. Cranks, 5in. to $5\frac{1}{2}$ in. throw. Rubber-coned pedals, 14in. tread. Ball bearings to front, cones to back wheel. Solid forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped

horn handles, cowhorn bars, 27in. × 5in. 1¹/₈in. backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £5 10s.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled black.

Remarks. A cheap machine.

MANCHESTER EXPRESS No. 5.

T. CLARKE, 180, Stockport Road, Manchester.

Description. 3¹/₂in. and 5¹/₈in. red tyres. Crescent rims. Direct spokes. 16in. back wheel. 4¹/₂in. G.M. hubs. 9in. axle. Cranks, 5in. to 5¹/₂in. throw. Rubber plain pedals, 14in. tread. Sheffield T plain bearings to front, cones to back wheel. Solid forks. Stanley head, 4¹/₂in. centres. Pear-shaped horn handles, straight bars, 27in. × 5in. 1¹/₈in. backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 44lbs.

PRICE.

48in. to 54in. £4 10s.

Sent out with bright handle-bar, head, hubs and cranks; rest japanned black.

Extras. Cowhorn handle-bars, 2s. 6d.

MANCHESTER SPECIAL EXPRESS.

T. CLARKE, 180, Stockport Road, Manchester.

Description. 3¹/₂in. and 3¹/₄in. Clarke's patent red tyres. Clarke's patent safety rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. 4¹/₂in. G.M. hubs. 9in. axle. Detachable cranks, 4¹/₂in. to 5¹/₂in. throw. Rubber ball pedals, 13¹/₂in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Clarke's ball bearing Stanley head. Spade horn handles, cowhorn bars, 28in. × 4¹/₂in. 1³/₈in. elliptical 15 W.G. weldless steel backbone. Arab cradle spring. Buffer suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 38lbs.

Specialties. Clarke's patent tyres (page 6). Clarke's patent safety rims (page 8). Clarke's ball bearing head.

PRICE.

48in. to 54in. £12 10s.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled in two colours.

Extras. All plated, 50/-

Remarks. Mr. Clarke's leading pattern, and a really good article. The ball bearing head is a great advantage.

MAZEPPA IMPROVED.

METROPOLITAN MACHINISTS' Co., 75, Bishopsgate Street Without, London, E.C.

Description. 3¹/₂in. and 5¹/₈in. red tyres. Crescent rims. Direct spokes. 16in. back wheel. G.M. hubs. Cranks, 5¹/₂in. throw. Rubber coned pedals. B.S.A. ball bearings to front, cones to back wheel. Solid forks. Stanley head. Pear-shaped horn handles, 26in. cowhorn bars. Iron backbone. Humber scroll spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 41lbs.

PRICES.

		£	s.	d.			£	s.	d.
48in...	..	7	0	0	52in.	..	7	5	0
50in...	..				54in.	..	7	10	0

Sent out with bright handle-bar and brake; rest enamelled black.

Extras. Balls to back wheel, 10/- Ball pedals, 10/- Hollow forks, 10/-

Remarks. 15⁰/₁₀₀ off for cash.

MAZEPPA No. 2.

METROPOLITAN MACHINISTS' CO., LIMITED, 75, Bishopsgate Street Without, London, E.C.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. red tyres. Crescent rims. Direct spokes. 16in. back wheel. G.M. hubs. Fixed cranks. Rubber coned pedals, 14in. tread. Æolus ball bearings to front, cones to back wheel. Solid forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, cowhorn bars. Steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 42lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	} 6	0	0	52in.	6	10	0
50in.				54in.	6	12	6

Remarks. 15⁰/₁₀ off for cash.

MINIATURE CHALLENGE.

SINGER & Co., Challenge Works, Alma Street, Coventry.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. red tyres. Crescent rims. 40 and 16 No. 12 butt-ended direct spokes. 14in. back wheel. $3\frac{1}{2}$ in. steel hubs. 9in. axle. Detachable cranks, 4in. to 5in. throw. Rubber coned pedals, 14in. tread. Parallel bearings to front, cones to back wheel. Solid back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 24in. cowhorn bars. $1\frac{1}{2}$ in. 15 W.G. weldless steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 34lbs.

PRICES.

	£	s.	d.		£	s.	d.
38in.	} 6	15	0	42in.	} 7	0	0
40in.				44in.			

Sent out with bright spring; rest enamelled black.

Extras. Ball bearings to front wheel, 15/-; to back wheel, 10/-. Valise, 1/-.
Crate, 2/6.

Remarks. A good, strong machine for boys' use and just fit for the work. (*See advertisement.*)

MOORGATE No. 6.

COOPER, KITCHEN & Co., Tower Chambers, Moorgate Street, London.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. black tyres. Warwick's hollow rims. 72 and 24 No. 12 true tangent spokes. 16in. back wheel. $4\frac{1}{2}$ in. steel hubs. 9in. axle. Detachable cranks, 6in. throw. Rubber ball pedals, 14in. tread. Ball bearings to both wheels. Hollow front and back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, cowhorn bars, 29in. x 4in. $1\frac{3}{8}$ in. 18 W.G. weldless steel backbone. Humber scroll spring. Eclipse saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, bell, spanners, oilcan, lamp and gong. Weight 36lbs.

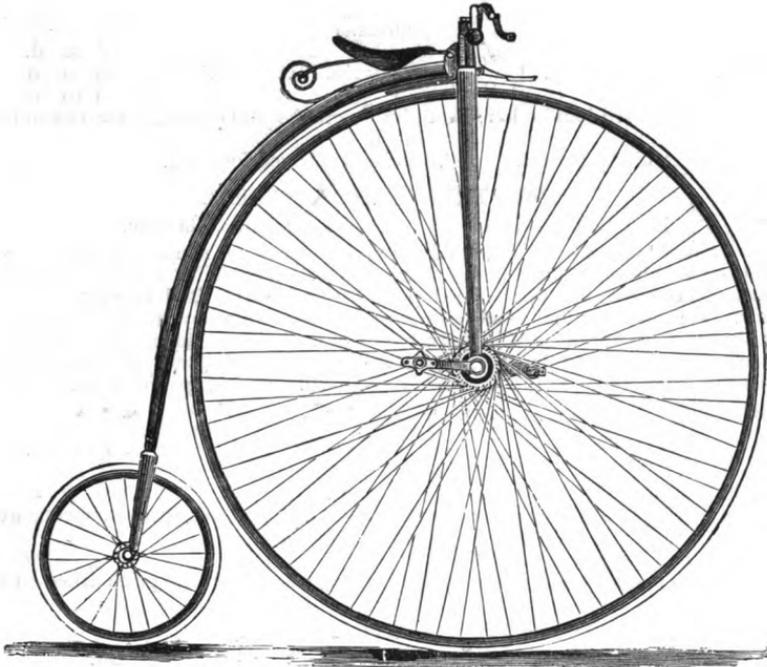
PRICES.

	£	s.	d.		£	s.	d.
48in.	} 17	10	0	52in.	17	10	0
50in.				54in.	18	0	0

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. All plated, 63/-.

Remarks. Built with a true tangent wheel. A fine machine.



THE MOORGATE NO. 6.

MOORGATE No. 7.

COOPER, KITCHEN & Co., Tower Chambers, Moorgate Street, London.

Description. 3/4 in. and 3/4 in. black tyres. Crescent rims. 58 and 20 No. 11 doubly butt-ended direct spokes. 16 in. back wheel. 3 in. G.M. hubs. 9 in. axle. Cranks, 6 in. throw. Rubber coned pedals, 14 in. tread. Æolus ball bearings to both wheels. Hollow front and back forks. Stanley head, 4 1/2 in. centres. Pear-shaped horn handles, hollow cowhorn bars, 28 in. x 3 1/2 in. 18 in. 18 W.G. weldless steel backbone. Humber scroll spring. Eclipse saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan, lamp and gong. Weight 38 lbs.

PRICES.

	£	s.	d.		£	s.	d.	
48 in.	}	14	10	0	52 in.	14	10	0
50 in.					54 in.	15	0	0

Sent out with plated handle-bar, head, hubs, cranks and spokes; rest enamelled black in Harrington's enamel.

Extras. Ball pedals, 15/- All plated, 63/-

Remarks. A good-looking and serviceable article. 10 % is allowed off the above prices for cash.

MOORGATE No. 8.

COOPER, KITCHEN & Co., Tower Chambers, Moorgate Street, London.

Description. 3/4 in. and 3/4 in. red tyres. Crescent rims. 58 and 20 No. 11 direct spokes. 16 in. back wheel. 3 in. G.M. hubs. 9 in. axle. Cranks, 6 in. throw. Rubber coned pedals, 14 in. tread. Æolus ball bearings to front, cones to back wheel. Hollow front and semi-hollow back forks. Stanley head, 4 in. centres. Pear-shaped horn handles, 26 in. cowhorn bars. 18 in. steel backbone. Bolted sliding spring. L.D. suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan, lamp and bell. Weight 42 lbs.

PRICES.

				£	s.	d.					£	s.	d.	
48in.	9	0	0	|	52in.	..	..	..	9	0	0
50in.					54in.	..	..	..	9	10	0

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Remarks. A cheap mount. 10% discount allowed for cash.

NEW HOWE ROADSTER.

HOWE MACHINE CO., LIMITED, Bridgeton, Glasgow.

Description. 7/8 in. and 3/4 in. moulded red tyres. Crescent rims. 58 and 20 No. 11 butt-ended direct spokes. 16in. back wheel. 3 1/4 in. G.M. hubs. 8 3/8 in. axle. Cranks, 5 1/4 in. throw. Rubber coned pedals, 13in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles. Cowhorn bars, 28in. x 3in. 1 3/8 in. 16 W.G. weldless steel backbone. Bolted Humber scroll spring. Long-distance Eclipse saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 39lbs.

PRICES.

				£	s.	d.					£	s.	d.	
48in.	14	10	0	|	52in.	..	..	..	15	10	0
50in.	15	0	0		54in.	..	..	..	16	0	0

Sent out with plated handle-bar, head, brake, hubs, cranks, pedals, spring and nuts; rest enamelled black.

Extras. Ball pedals, 20/- . All plated, 50/-

Remarks. This is a strong, well-built roadster, well worth the price asked. (See advertisement.)

NEW RAPID RACER.

ST. GEORGE'S ENGINEERING CO., Pope Street, Birmingham.

Description. 3/4 in. and 3/8 in. moulded black tyres. Warwick's hollow rims. 84 and 28 No. 16 New Rapid true tangent spokes. 16in. back wheel. 3 1/4 in. steel hubs. 7in. axle. Cranks 5 1/2 in. throw. Rat-trap ball pedals, 11in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, hollow cowhorn bars, 30in. x 2in. 1 1/2 in. 20 W.G. weldless steel backbone. Racing saddle. Spanner and oilcan. Weight 23lbs.

Specialties. New Rapid true tangent wheel (page 135).

PRICE.

48in. to 54in. £18 10s.

Sent out with plated handle-bar, hubs, cranks and nuts; rest enamelled black.

Remarks. Built by a practical racing man, and has proved itself to be a fast and sound machine of the first class. (See advertisement.)

NEW RAPID LIGHT ROADSTER.

ST. GEORGE'S ENGINEERING CO., Pope Street, Birmingham.

Description. 1 1/8 in. and 1 1/4 in. moulded black tyres. Warwick's hollow rims. 84 and 28 No. 15 New Rapid true tangent spokes. 17in. back wheel. 4 1/4 in. steel hubs. 7 1/2 in. axle. Cranks 6in. throw. Rubber ball pedals, 11 1/4 in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles. Hollow cowhorn bars, 30in. by 3in. 1 1/2 in. weldless steel backbone. Palmer and Townsend's combination spring and saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanner, and oilcan. Weight 34lbs.

Specialties. New Rapid true tangent wheel (page 135). Palmer and Townsend's combination saddle and spring (page 174). Palmer's detachable handle-bar—extra (page 57).

PRICE.

48in. to 54in. £18

Sent out with plated handle-bar, brake, hubs, cranks, nuts, and spring; rest enamelled in two colours.

Extras. Detachable handle-bars, 5/-.

Remarks. Built interchangeable throughout. A machine of the finest quality of material and workmanship, and one of the best light roadsters on the market. (See advertisement.)

NEW RAPID ROADSTER.

ST. GEORGE'S ENGINEERING CO., Pope Street, Birmingham.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded black tyres. Warwick's hollow rims. 84 and 28 No. 15 New Rapid true tangent spokes. 17in. back wheel. $5\frac{1}{2}$ in. steel hubs. $8\frac{1}{2}$ in. axle. Detachable cranks, 5in. to 6in. throw. Rubber ball pedals, 12 $\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles. Hollow cow-horn bars, 30in. x 3in. $1\frac{3}{8}$ in. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanner, and oilcan. Weight 39lbs.

Specialties. New Rapid true tangent wheel (page 135). Palmer and Townsend's combination saddle and spring—extra (page 174). Palmer's detachable handle-bar—extra (page 57).

PRICE.

48in. to 54in. £17 10s.

Sent out with plated handle-bar, brake, nuts, hubs, cranks, and spring; rest enamelled in two colours.

Extras. Detachable handle-bars, 5/-. Combination saddle and spring, 7/6.

Remarks. A machine of the highest class. Built on the interchangeable principle, and a very rigid machine. It at present holds the fifty miles road record for ordinary bicycles. (See advertisement.)

NORTHAMPTON ROADSTER.

E. GADSBY, 24, Bearward Street, Northampton.

Description. $\frac{3}{4}$ in. and $\frac{7}{8}$ in. red tyres. Warwick's hollow rims. 60 No. 11 and 20 No. 12 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 5in. axle. Detachable cranks, $5\frac{1}{2}$ in. to 6in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to front, cones to back wheel. Hollow front and semi-hollow back forks. Stanley head. Pear-shaped handles, 27in. x $7\frac{3}{4}$ in. cowhorn bars. $1\frac{1}{8}$ in. 14 W.G. weldless steel backbone. Bolted sliding spring. Hog-skin saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 30lbs.

PRICES.

		£	s.	d.		£	s.	d.
48in.	}	12	0	0	52in.	12	10	0
50in.					54in. .. .. .				13	0	0

Sent out with plated handle-bar, head, hubs and cranks; rest japanned black

Extras. Ball pedals, 18/-.

Remarks. A very fair light roadster. Good value for money.

NORTHAMPTON RACER.

E. GADSBY, 24, Bearward Street, Northampton.

Description. $\frac{7}{8}$ in. and $\frac{1}{2}$ in. red tyres. Warwick's hollow rims. 62 No. 14 and 20 No. 24 direct spokes. 15in. back wheel. $3\frac{1}{2}$ in. G.M. hubs. $4\frac{1}{2}$ in. axle. Cranks, 5in. throw. Rat-trap ball pedals, 12 $\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow front and back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles. 26in. x 7in. cowhorn bars. $1\frac{1}{8}$ in. 18 W.G. weldless steel backbone. Racing saddle. Spanner and oilcan. Weight 20lbs.

PRICES.

		£	s.	d.		£	s.	d.
48in.	}	15	0	0	52in.	16	0	0
50in.					54in. .. .. .				16	10	0

Sent out with plated handle-bar, hubs, cranks and pedals; rest enamelled.

Remarks. A neat, reliable article at a moderate figure.

NORTHERN No. 1.

NORTH OF ENGLAND CYCLE Co., High Bridge, Newcastle-on-Tyne.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 56 No. 12 and 24 No. 13 direct spokes. 17in. back wheel. $2\frac{1}{4}$ in. G.M. hubs. Detachable cranks, $5\frac{1}{2}$ in. to 6in. throw. Rubber ball pedals, $12\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Ball-bearing head. Pear-shaped horn handles, 3oin. cowhorn bars. $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Buffer saddle. Saw step. D.L.S. brake. Leg-guard. Valise, bell, spanners and oilcan. Weight 38lbs.

PRICES.

				£ s. d.					£ s. d.	
48in.	}	17	10	0	|	52in.	}	18	0	0
50in. .. .. .	}				|	54in.	}			

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled in two colours.

Remarks. A well-built, strong and good-looking roadster; up to any work or weight.

NORTHERN No. 2.

NORTH OF ENGLAND CYCLE Co., High Bridge, Newcastle-on-Tyne.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 56 No. 12 and 24 No. 13 direct spokes. 17in. back wheel. 3in. G.M. hubs. Cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, 13in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 3oin. cowhorn bars. $1\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Humber scroll spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanner, oilcan, bell and lamp. Weight 40lbs.

PRICE.

48in. to 54in.	}	12
------------------------	---	----

Sent out with plated handle-bar, hubs, cranks and spring; rest enamelled black.

Remarks. A good, sound article.

NORTHERN No. 3.

NORTH OF ENGLAND CYCLE Co., High Bridge, Newcastle-on-Tyne.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 56 No. 12 and 24 No. 13 direct spokes. 17in. back wheel. 3in. G.M. hubs. Cranks, $5\frac{1}{2}$ in. throw. Rat-trap plain pedals, 13in. tread. Ball bearings to front, cones to back wheel. Solid forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 3oin. cowhorn bars. $1\frac{3}{8}$ in. 16 W.G. steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 44lbs.

PRICE.

48in. to 54in.	}	8
------------------------	---	---

Sent out enamelled all over black.

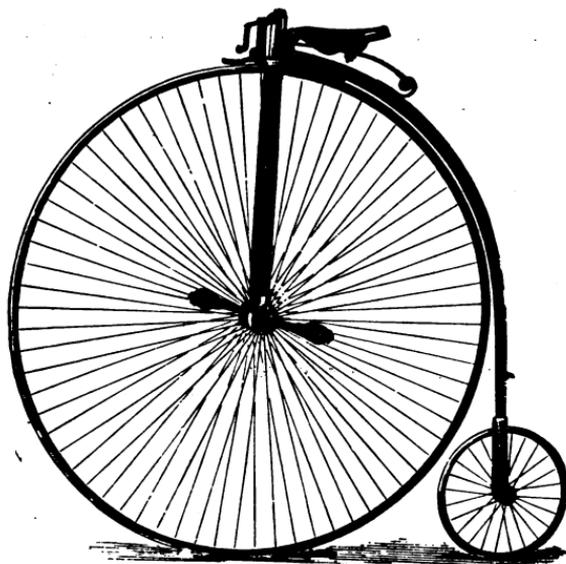
Extras. Bell, 1/- Valise, 1/-

Remarks. Built specially to meet the requirements of export trade.

OLYMPIC No. 1.

FRANK H. PARKYN, Green Lane, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 64 and 24 No. 12 direct spokes. 16in. back wheel. $3\frac{1}{4}$ in. G.M. hubs. $9\frac{1}{2}$ in. axle. Detachable cranks, 6in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, $27\frac{1}{2}$ in. \times $3\frac{1}{2}$ in. cowhorn bars. $1\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Double-action-cradle spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 39lbs.



OLYMPIC NO. 1.

PRICE.

48in. to 54in. £12.

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled in two colours.

Extras. Ball pedals, 20/-. Plated all over, except rims, 20/-.

Remarks. A good-looking article, and fair value for money.

OLYMPIC No. 2.

FRANK H. PARKYN, Green Lane, Wolverhampton.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 64 and 24 No. 11 direct spokes. 16in. back wheel. $3\frac{1}{4}$ in. G.M. hubs. $9\frac{1}{2}$ in. axle. Detachable cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and solid back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 27in. x 4in. cowhorn bars. 18in. 15 W.G. steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £8.

Sent out with plated handle-bar, spring, hubs, cranks and pedals; rest enamelled black.

Remarks. Strong and worth the price asked for it.

OLYMPIC No. 3.

FRANK H. PARKYN, Green Lane, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{7}{8}$ in. red tyres. Crescent rims. 64 and 24 No. 11 direct spokes. 16in. back wheel. $3\frac{1}{4}$ in. G.M. hubs. $9\frac{1}{2}$ in. axle. Detachable cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to front, cones to back wheel. Hollow front and solid back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 27in. cowhorn bars. 18in. 14 W.G. steel backbone. Bolted scroll spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £7.

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest enamelled black.

Extras. Plated bright parts, 15/- Balls to back wheel, 10/- Hollow back forks, 5/-

OLYMPIC No. 4.

FRANK H. PARKYN, Green Lane, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. red tyres. Crescent rims. 64 and 20 No. 11 direct spokes. 16in. back wheel. $3\frac{1}{2}$ in. G.M. hubs. 10in. axle. Cranks, $5\frac{1}{2}$ in. throw. Rat-trap coned pedals, $14\frac{1}{2}$ in. tread. Sheffield T plain bearings to front, cones to back wheel. Solid forks. Stanley head, 4in. centres. Pear-shaped horn handles, 27in. cowhorn bars. $1\frac{3}{8}$ in. 14 W.G. iron backbone. Bolted sliding spring. Padded saddle. Saw step. D.L.S. brake, Leg-guard. Valise, spanners and oilcan. Weight 45lbs.

PRICE.

48in. to 54in. £4 10s.

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest enamelled black.

Extras. Plated bright parts, 15/- Ball bearings to front wheel, 12/- Balls to back wheel, 10/-

ORIGINAL UNIVERSAL SPECIAL.

TOMES & BEARD, Universal Cycle Works, Heath Town, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. red tyres. Warwick's hollow rims. 72 and 22 No. 11 direct spokes. 16in. back wheel. $3\frac{1}{2}$ in. G.M. hubs. $9\frac{1}{2}$ in. axle. Detachable cranks, $5\frac{1}{2}$ in. throw. Rubber ball pedals, $13\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, hollow cowhorn bar, 30in. x 3in. $1\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Bolted Humber scroll spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Bell, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £10.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled black with gold lines.

Remarks. Cheap at the price; has been before the public now many years, having been originally made by Griffiths & Sons, from whom its present makers took over the business.

PARR.

J. PARR, 61, Friar Gate, Leicester.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. No. 12 direct spokes. 17in. back wheel. 3in. G.M. hubs. $8\frac{1}{2}$ in. axle. Cranks, $5\frac{1}{2}$ in. throw. Rubber plain pedals, 14in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, hollow bent back cowhorn bars, 28in. x 1in. $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Parr's split plate spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.*Specialties.* Parr's split plate spring (page 171). Parr's rigid wheel (page 136).

PRICES.

		£	s.	d.			£	s.	d.
48in.	.. .. .	15	5	0	52in.	.. .. .	16	5	0
50in.	.. .. .	15	15	0	54in.	.. .. .	16	15	0

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Ball pedals, 12/6. Plated all over, 40/-*Remarks.* A soundly-constructed reliable roadster. Mr. Parr has been in the trade from its infancy and knows how to build a machine.

PEEPING TOM

SAMUEL LLOYD, Great Hampton Works, Church Lane, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 9in. axle. Cranks, 5in. to $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearing to both wheels. Diamond section, hollow front and semi-hollow back forks. Stanley head. Pear-shaped horn handles, 28in. dropped bars. Elliptical 15 W.G. weldless steel backbone. Bolted sliding spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Valise, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £10.

Sent out painted in two colours.

Extras. Ball pedals, 18/- All plated except rims, 30/- Half-plated, 20/-

Remarks. A sound article, which has now been on the market four seasons and is much favoured in the export trade.

PEERLESS No. 1.

SAMUEL GOODBY AND SON, Bolt Works, Merridale Street, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 10in. axle. Cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Double ball bearings to front, Æolus balls to back wheel. Hollow front and back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 30in. cowhorn bars. $1\frac{1}{2}$ in. steel backbone. Humber scroll spring. L.D. suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £9.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled in two colours.

Extras. Plated all over, 25/-.

Remarks. At its price a good machine.

PEERLESS No. 2.

SAMUEL GOODBY & SON, Merridale Street, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 10in. axle. Fixed cranks. Rubber coned pedals, 14in. tread. Ball bearings to front, plain pin to back wheels. Hollow front and solid back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 30in. cowhorn bars. $1\frac{1}{2}$ in. steel backbone. Humber scroll spring. L.D. suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £6 10s.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled in two colours.

Remarks. A strong, ordinary, plain mount.

PEERLESS No. 3.

SAMUEL GOODBY & SON, Merridale Street, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 10in. axle. Cranks, $5\frac{1}{2}$ in. throw. Rat-trap coned pedals, 15in. tread. Plain T bearings to both wheels. Solid forks. Stanley head, 4in. centres. Pear-shaped horn handles, cowhorn bars. $1\frac{1}{2}$ in. iron backbone. Scroll spring. Pigskin saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanner and oilcan. Weight 44lbs.

PRICE.

All sizes £4 10s.

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest painted in two colours.

Remarks. A cheap machine, and certainly worth the money for rough work.

PILOT A1.

HICKLING & Co., Maidenhead.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. red tyres. Crescent rims. Direct spokes. 16in. back wheel. G.M. hubs. Cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head. Pear-shaped horn handles, 27in. dropped bars. Steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £11 11s.

Sent out with bright handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Plated bright parts, 20/- Ball pedals, 20/- 1in. tyres, 10/- Cradle spring, 5/-.

Remarks. A very good article for the price.

PILOT No. 0.

HICKLING & Co., Maidenhead.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. red tyres. Crescent rims. Direct spokes. 16in. back wheel. Steel hubs. Cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Double ball bearings to front, cones to back wheel. Hollow front and solid back forks. Stanley head. Pear-shaped horn handles, 27in. dropped bars. Steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 42lbs.

PRICE.

48in. to 54in. £8 8s.

Sent out with bright handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Bright parts plated, 21/- Ball pedals, 20/-

Remarks. Strong and cheap.

PILOT RACER.

HICKLING & Co., Maidenhead.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. moulded red tyres. Warwick's hollow rims. Laced spokes. 16in. back wheel. Steel hubs. Cranks, 5in. throw. Rat-trap plain pedals, 13in. tread. Ball bearings to both wheels. Hollow front and back forks. Stanley head. Pear-shaped horn handles, 28in. hollow cowhorn bars. $1\frac{3}{8}$ in. elliptical 18 W.G. weldless steel backbone. Racing suspension saddle. Spanners and oilcan. Weight 22lbs.

PRICE.

48in. to 58in. £18.

Sent out enamelled black all over.

Extras. Ball pedals, 20/- Plated head, handle-bar and hubs, 10/-

Remarks. A nicely-built and rigid machine.

PILOT LIGHT ROADSTER.

HICKLING & Co., Maidenhead.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. non-slipping tyres. Warwick's hollow rims. Laced spokes. 16in. back wheel. Steel hubs. Cranks, $5\frac{1}{2}$ in. throw. Rat-trap coned pedals, 13 $\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow front and back forks. Stanley head. Pear-shaped horn handles, 27in. hollow cowhorn bars. $1\frac{3}{8}$ in. elliptical 16 W.G. weldless steel backbone. Pilot sliding spring. L.D. suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 33lbs.

Specialties. Pilot spring (page 69).

PRICE.

48in. to 56in. £18 10s.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Plated spokes and frame, £4 Ball pedals, 20/- Cradle spring, 5/-
Gold lining, 15/-

Remarks. A strong, light roadster.

PILOT ROADSTER.

HICKLING & Co., Maidenhead.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. wired red tyres. Warwick's hollow rims. Direct spokes. 17in. back wheel. G.M. hubs. Cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Ball bearings to both wheels. Hollow front and back forks. Stanley head. Pear-shaped horn handles, 27in. cowhorn bars. Weldless steel backbone. Pilot sliding spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 38lbs.

Specialties. Wired tyres. Pilot spring (page 69).

PRICE.

48in. to 56in. £18 10s.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Plated backbone and forks, 50/- Plated hubs and spokes, 30/-
Lining in colours, 7/6 Gold lining, 15/- 1in. tyres, 10/- Ball pedals, 20/- Arab
cradle spring, 5/-

Remarks. A good, strong roadster, and very safe tyres.

PIONEER RACER.

PAUSEY & Co., Pioneer Works, Clapham, London, S.W.

Description. $\frac{3}{4}$ in. best black tyres. Warwick's hollow rims. Butt-ended Pioneer tangent spokes. 15in. back wheel. Steel hubs. Cranks, $5\frac{1}{2}$ in. throw. Rat-trap plain pedals, 10in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. T horn handles, 28in. cowhorn bars. $1\frac{3}{4}$ in. elliptical 18 W.G. weldless steel backbone. Racing saddle. Spanner and oilcan. Weight 20lbs.

Specialties. Pioneer tangent wheel, (page 14).

PRICE.

All sizes £18.

Sent out with plated handle-bar, head and cranks; rest enamelled black.

Extras. Hollow handle-bars, 7/6 Ball pedals, 20/- Ball head, 12/6.

Remarks. A really good article. Frequently seen on the London path. (See advertisement.)

PIONEER SEMI-RACER.

PAUSEY & Co., Pioneer Works, Clapham, London, S.W.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. best black tyres. Warwick's hollow rims. Pioneer tangent spokes. 16in. back wheel. $3\frac{1}{2}$ in. G.M. hubs. 9in. axle. Cranks, 6in. throw. Rat-trap coned pedals, 11in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. T horn handles, 26in. dropped bars. $1\frac{3}{4}$ in. elliptical weldless steel backbone. Humber scroll spring. L.D. suspension saddle. Adjustable saw step. D.L.S. brake. Valve, spanners and oilcan. Weight 28 $\frac{1}{2}$ lbs.

Specialties. Pioneer tangent wheel (page 14).

PRICE.

All sizes £18.

Sent out with plated handle-bar, hubs and cranks; rest enamelled black.

Extras. Ball pedals, 20/- Additional plating, 20/- Ball head, 12/6.

Remarks. A capital article for light road work and grass racing. (See advertisement.)

PIONEER ROADSTER.

PAUSEY AND Co., Pioneer Works, Clapham, London, S.W.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 60 and 20 No.

12 butt-ended direct spokes. 16in. back wheel. 4in. G.M. hubs. 9 $\frac{1}{2}$ in. axle. Detachable cranks, 6in. throw. Rubber coned pedals, 12in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. Pear shaped horn handles, cowhorn bars. 1 $\frac{3}{8}$ in. elliptical weldless steel backbone. Humber scroll spring. L.D. suspension saddle. Saw step. D.L.S. brake. Valise, spanners and oilcan. Weight 41lbs.

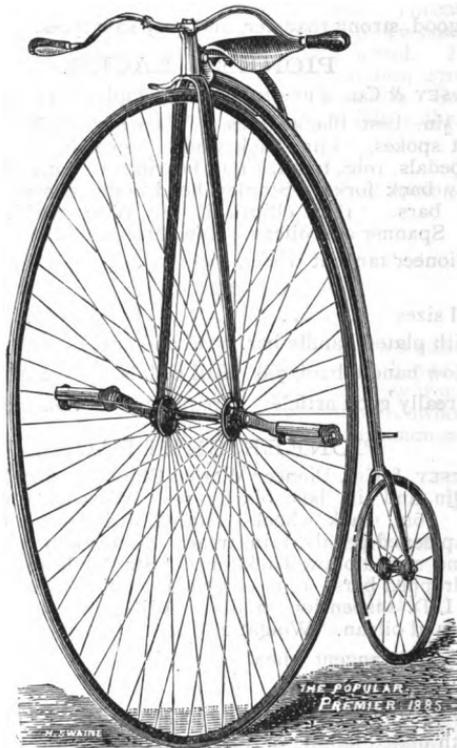
PRICE.

All sizes £17.
 Sent out with plated handle-bar, head and cranks; rest painted in two colours.
Extras. Plating all over, 6os. Hollow rims, 25s. Ball pedals, 2os. Ball bearing head, 12s. 6d. Enamelling, 5s.
Remarks. A strong, serviceable and reliable roadster. Can be conscientiously recommended. (See advertisement.)

POPULAR PREMIER.

HILLMAN, HERBERT AND COOPER, LIMITED, Premier Works, Coventry.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. non-slipping tyres. Crescent rims. 64 and 16 No. 12 direct spokes. 17in. back wheel. G.M. hubs. Cranks, 4 $\frac{1}{2}$ in. to 5 $\frac{1}{2}$ in. throw. Rubber plain pedals, 14in. tread. Ball bearings to both wheels. Hollow front



THE POPULAR PREMIER.

and solid back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. cowhorn bars. 1 $\frac{3}{8}$ in. 15 W.G. steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £12 12s.

Sent out with plated handle-bar, head, brake, hubs, cranks, pedals and spring ; rest enamelled black.

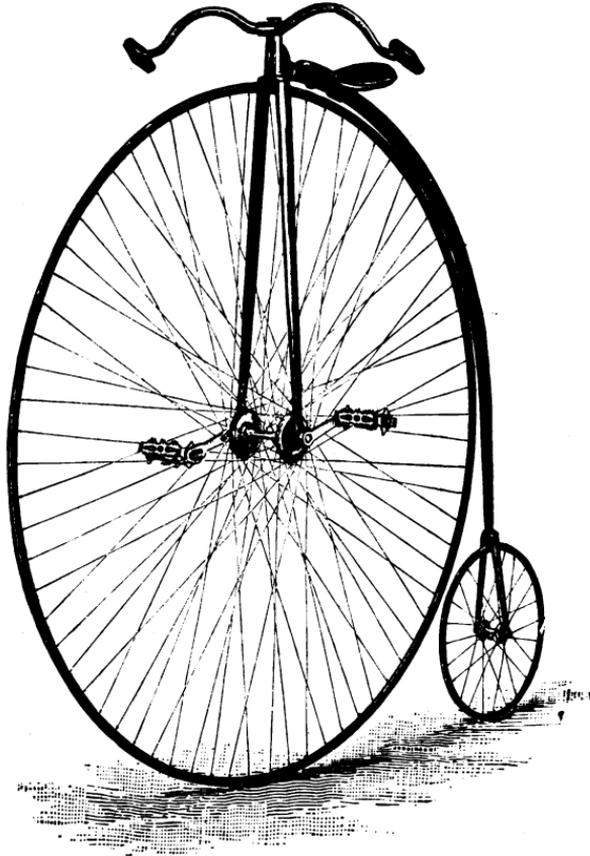
Extras. All plated save rims, 50/- Balls pedals, 20/- Cradle spring, 7/6. Enamelling in colours, 5/- ; in gold, 10/-

Remarks. True to its name. (See advertisement.)

PREMIER RACER.

HILLMAN, HERBERT AND COOPER, LIMITED, Premier Works, Coventry.

Description. ½in. and ¾in. red tyres. Warwick's hollow rims to front wheel. crescent to back. 74 and 20 No. 15 tangent spokes. 16in. back wheel. 3½in. steel hubs. Cranks, 5in. to 5½in. throw. Rat-trap ball pedals, 12½in. tread.



THE PREMIER RACER.

Ball bearings to both wheels. Hollow front and semi-hollow back forks. Backbone and back fork in one. Stanley head, 4½in. centres. T horn handles, 27in. hollow cowhorn bars. 1¾in. elliptical 19 W.G. weldless steel backbone. Brooks's Gem racing saddle. Spanners and oilcan. Weight 23lbs.

Specialties. Backbone and back fork in one.

PRICE.

All sizes £18.

Sent out with plated handle-bar, head, hubs and cranks ; rest enamelled black.

Remarks. One of the finest racers now on the market. The 1886 fifty miles championship was won upon one, and the 25 miles record broken on the same machine. Strong, and really fast. (*See advertisement.*)

QUEEN OF THE WEST TOURIST.

QUEEN OF THE WEST CYCLE CO., Newark Street, Bath.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. Hancock's non-slipping tyres. Warwick's hollow rims. 64 and 20 No. 13 special laced spokes. 16in. back wheel. 5in. steel hubs. 8 $\frac{1}{2}$ in. axle. Detachable cranks, 5in. to 6in. throw. Rubber ball pedals, 13 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Queen of the West ball bearing head, 5in. centres. T horn handles, 28in. x 3in. hollow cowhorn bars. Warwick's Perfection weldless steel backbone. Arab cradle spring. Buffer saddle. Saw step. D.L.S. brake. Ball-ended leg-guard. Valise, spanners and oilcan. Weight 38lbs.

Specialties. Queen of the West ball bearing tubular head (*page 166*). Special spokes.

PRICE.

48in. to 54in. £18 18s.

Sent out with plated handle-bar, head, brake, hubs, cranks, pedals and bearings; rest enamelled black.

Extras. Detachable handle-bars, 10/6. Improved back wheel bearings, 10/- Unbreakable spokes, 10/6.

Remarks. A really good machine. Firmly and carefully built, and good all work in all weathers.

QUEEN OF THE WEST ROADSTER.

QUEEN OF THE WEST CYCLE CO., LIMITED, Newark Street, Bath.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. Hancock's non-slipping tyres. Warwick's hollow rims. 64 and 20 No. 14 laced spokes. 16in. back wheel. 3 $\frac{1}{2}$ in. steel hubs. 8 $\frac{1}{2}$ in. axle. Detachable cranks, 4 $\frac{1}{2}$ in. to 5 $\frac{1}{2}$ in. throw. Rubber ball pedals, 13 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. T horn handles, 27in. x 3in. hollow cowhorn bars. 16 W.G. weldless steel backbone. Bolted sliding spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Ball-ended leg-guard. Valise, spanner and oilcan. Weight 33lbs.

Specialties. Special construction of wheel. Queen of the West ball bearing head—extra (*page 166*).

PRICE.

48in. to 54in. £16 16s.

Sent out with plated handle-bar, head, hubs, cranks and brake; rest enamelled black.

Extras. Queen of the West tubular ball bearing head, 20/- Unbreakable spokes, 10/-.

Remarks. Soundly and conscientiously built; it is a good machine.

RALEIGH RACER.

WOODHEAD, ANGOIS & ELLIS, Russell Street, Nottingham.

Description. $\frac{1}{2}$ in. moulded red tyres. Warwick's hollow rims. Laced spokes. 16in. back wheel. Steel hubs. Cranks, 5 $\frac{1}{2}$ in. throw. Rat-trap ball pedals, 12 $\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 28in. hollow cowhorn bars. 1 $\frac{3}{8}$ in. 19 W.G. weldless steel backbone. Racing saddle. Spanners and oilcan. Weight 24lbs.

PRICE.

All sizes £15 10s.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled black.

Remarks. A well-built mount, and really cheap. Strong enough for grass work. (*See advertisement.*)

RALEIGH LIGHT ROADSTER.

WOODHEAD, ANGOIS & ELLIS, Russell Street, Nottingham.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Warwick's hollow rims. 54 and 20 No. 13 direct spokes. 16in. back wheel. $3\frac{1}{2}$ in. G.M. hubs. 8in. axle. Cranks, $5\frac{1}{2}$ in. throw. Rat-trap ball pedals, 12 $\frac{1}{2}$ in. tread. Adjustable ball bearings ($\frac{1}{2}$ in. balls) to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. T horn handles, 27in. hollow cowhorn bars. 1 $\frac{3}{8}$ in. 18 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Adjustable saw step. Three spanners and oilcan. Weight 27lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	13	10	0	52in.	14	0	0
50in.	13	15	0	54in.	14	15	0

Sent out with plated handle-bar, head, cranks, &c. ; rest enamelled black.

Extras. Plated hubs, 10/-

Remarks. All frictional parts are thoroughly hardened, and the makers make a speciality of carrying out the special instructions of customers. This is well worth its price. (See advertisement.)

RALEIGH ROADSTER.

WOODHEAD, ANGOIS & ELLIS, Russell Street, Nottingham.

Description. $\frac{3}{4}$ in. and $1\frac{1}{8}$ in. moulded red tyres. Crescent rims. 56 and 20 No. 12 direct spokes. 16in. back wheel. $3\frac{3}{4}$ in. G.M. hubs. 9in. axle. Cranks 6in. throw. Non-slipping rubber plain pedals, 13 $\frac{1}{2}$ in. tread. Ball bearings ($\frac{1}{2}$ in. balls) to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 28in. cowhorn bars. 1 $\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Brooks's long-distance saddle. Saw step. D.L.S. brake. Leg-guard. Valise, three spanners and oilcan. Weight 39lbs.

Specialties. Ball bearings and brake fitting.

PRICES.

	£	s.	d.		£	s.	d.
48in.	12	0	0	52in.	12	10	0
50in.	12	5	0	54in.	12	15	0

Sent out with plated handle-bar, cranks, brake and nuts ; rest enamelled black,

Extras. Hollow rims, 20/- . Ball pedals, 18/- . Plated hubs and axles, 10/- .

Remarks. A strong, sound roadster at a remarkably moderate figure. (See advertisement.)

REGENT RACER.

TRIGWELL, WATSON & CO., Regent Works, 146, Brixton Hill, London.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. black tyres. Warwick's hollow rims. 70 and 18 No. 15 butt-ended direct front, and laced back spokes. 16in. back wheel. 2 $\frac{3}{4}$ in. steel hubs. 8in. axle. Cranks, 6in. throw. Rat-trap ball pedals, 12in. tread. Æolus special-pattern ball bearings to both wheels. Hollow front and semi-hollow back forks. Trigwell's patent No. 1 ball bearing head. Pear-shaped T horn handles, 27in. dropped hollow bars. 1 $\frac{3}{8}$ in. elliptical 18 W.G. weldless steel backbone. Brooks's Little Gem saddle. Spanners and oilcan. Weight 20 $\frac{1}{2}$ lbs.

Specialties. Trigwell's patent ball bearing head (page 165). Regent back wheel spokes (page 134).

PRICE.

48in. to 58in. £18.

Sent out with plated handle-bar, cranks and fittings ; rest enamelled black.

Remarks. A very fine and fast machine. The 1886 25 miles championship was won upon one. (See advertisement.)



THE REGENT RACER.

REGENT ROADSTER.

TRIGWELL, WATSON & Co., Regent Works, Brixton Hill, London.

Description. $1\frac{3}{4}$ in. and $1\frac{1}{4}$ in. moulded black tyres. Warwick's hollow rims. 64 and 20 No. 14 butt-ended direct detachable spokes. 17in. back wheel. 3in. steel hubs. 8in. axle. Cranks, $5\frac{1}{2}$ in. throw. Rubber plain pedals, 13in. tread. Special pattern Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Trigwell's patent No. 2 ball bearing head. T horn handles, 26in. \times $2\frac{3}{4}$ in. dropped hollow detachable bars. 13in. elliptical 15 W.G. weldless steel backbone. Humber scroll spring. Long-distance Eclipse saddle. Saw step. D.L.S. brake. Ball-ended leg-guard. Spanners and needle oilcan. Weight 36lbs.

Specialties. Trigwell's patent ball bearing head (*page* 165). Detachable spokes and patent back spokes (*page* 134).

PRICE.

48in. to 54in. £18 10s.

Sent out with plated handle-bar, cranks and fittings; rest enamelled black.

Extras. Ball pedals, 15/-; detachable cranks, 2/6. Without hollow rims, 10/- less.

Remarks. A well-built, easy-going and very rigid machine; makes as fine a light roadster as one could wish to have. (*See advertisement.*)



THE REGENT ROADSTER.

R & P.

ROBINSON & PRICE, Pembroke Place, Liverpool.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red grip tyres. Warwick's hollow grip rims. 64 No. 13 and 20 No. 15 R. & P. direct tangent spokes. 17in. back wheel. $4\frac{1}{2}$ in. steel hubs. $8\frac{1}{2}$ in. axle. Detachable cranks, 6in. throw. Rubber ball pedals, 12in. tread. Æolus ball bearings to both wheels. Warwick's Perfection hollow front and semi-hollow back forks. Stanley head, $4\frac{3}{4}$ in. centres. T horn handles, 28in. cowhorn bars. Warwick's Perfection elliptical steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Open leg-guard. Valise, spanners and oilcan. Weight 35lbs.

Specialties. R. & P. rigid wheel (page 135).

PRICE.

48in. to 54in. £18.

Sent out with bright handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Ball bearing head, 15/-. Cradle spring, 5/-.

Remarks. One of the most comfortable machines in the market, and a well-built, fast and strong machine withal. More rides of 200 miles and upwards in twenty-four hours have been accomplished on this machine than on any other make of ordinary bicycle, and it at present holds the twenty-four hours' record for ordinary bicycles. It is a great favourite amongst the north-west riders. Special machines are built for special purposes. (See advertisement.)



THE R. & P.

REGO.

GEORGE HUGHES, Temple Works, Temple Street, Wolverhampton.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 72 and 24 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. 9in. axle. Detachable cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, cowhorn bars, 28in. by $4\frac{1}{2}$ in. $1\frac{3}{8}$ in. elliptical lap-welded steel backbone. Humber scroll spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 40lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in. :: :: ::	6	8	0	52in. :: :: ::	6	8	0
50in. :: :: ::				54in. :: :: ::				6	16	0

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest enamelled in two colours.

Extras. Ball pedals, 12/- Half-plated, 9/7.

Remarks. Fair value for money.

RELIANCE ROADSTER.

T. WALKER, Reliance Works, St. Luke's Street, Derby.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. 66 and 20 No. 13 direct spokes. 16in. back wheel. 3in. G.M. hubs. $8\frac{1}{2}$ in. axle. Cranks, $5\frac{1}{2}$ in. throw. Rubber ball pedals, $14\frac{1}{2}$ in. tread. Æolus ball bearings to

both wheels. Hollow front and back forks. Stanley head, 4½in. centres. T horn handles, dropped bars, 28in. × 2½in. 1½in. weldless steel backbone. Humber scroll spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Valise, spanner and oilcan. Weight 36lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	12	0	0	52in.	13	0	0
50in.	12	10	0	54in.	13	10	0

Sent out with bright handle-bar, head, cranks and spring; rest enamelled black
Extras. Plated bright parts, 20/-
Remarks. A fair article; worth the money asked.

RELIANCE RACER.

T. WALKER, Reliance Works, St. Luke's Street, Derby.

Description. ½in. and ¾in. moulded red tyres. Warwick's hollow rims. 66 and 20 No. 15 direct spokes. 16in. back wheel. 2½in. Delta metal hubs. 8in. axle. Cranks, 5½in. throw. Rat-trap ball pedals, 13½in. tread. Æolus ball bearings to both wheel. Hollow front and back forks. Stanley head, 4in. centres. T horn handles, hollow cowhorn bars, 28in. × 2in. 1½in. weldless steel backbone. Brooks's Little Gem saddle. Spanner and oilcan. Weight 27lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	12	10	0	52in.	13	10	0
50in.	13	0	0	54in.	14	0	0

Sent out with bright handle-bar, head, cranks and pedals; rest enamelled black
Extras. Plated bright parts, 20/-

RIVAL.

WARMAN & Co., West Orchard, Coventry.

Description. ½in. and ¾in. moulded red tyres. Crescent rims. 60 and 24 No. 12 direct spokes. 17in. back wheel. 3in. G.M. hubs. 9in. axle. Detachable cranks, 5½in. to 6in. throw. Rubber coned pedals, 13½in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5½in. centres. Pear-shaped horn handles, hollow cowhorn bars, 27in. × 5½in. 1½in. 16 W.G. weldless steel backbone. Arab cradle spring. L.D. suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 38½lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in. }	15	10	0	52in.	16	0	0
50in. }	15	10	0	54in.	16	10	0

Sent out with plated handle-bar, head, hubs, cranks and brake; rest enamelled black.

Extras. Valise, 1/6. Lamp, 10/6. Bell, 2/-.

Remarks. A sound, strong article, forming a good roadster for light and fairly heavy work.

ROYAL PREMIER.

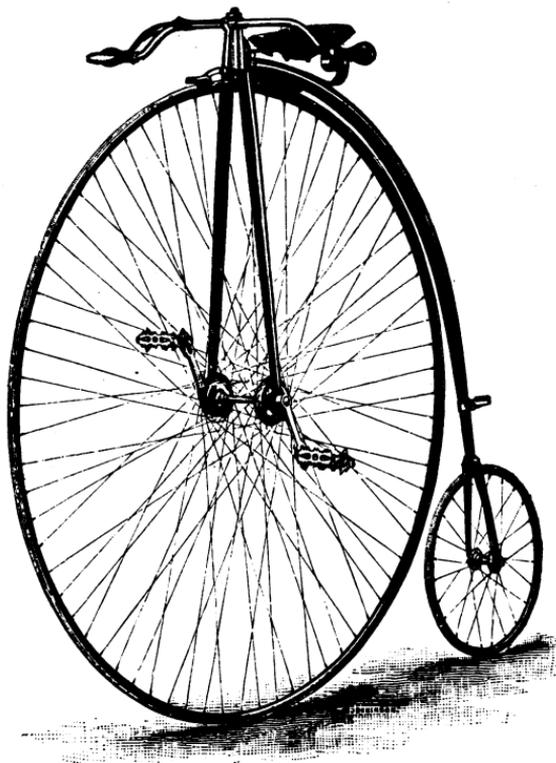
HILLMAN, HERBERT & COOPER, LIMITED, Premier Works, Coventry.

Description. ½in. and ¾in. moulded red tyres. Warwick's hollow rims. No. 14 tangent spokes. 16in. back wheel. 4in. steel hubs. Cranks 4½in. to 5½in. throw. Rubber ball pedals, 13½in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, dropped 28in. hollow bars. 1½in. elliptical 19 W.G. weldless steel backbone. Humber scroll spring. Semi-racing saddle. Hillman's adjustable saw step. D.L.S. brake. Spanners and oilcan. Weight 31lbs.

Specialties. Pattern of ball bearings. Hillman's adjustable step (page 87).

PRICES.

		£	s.	d.			£	s.	d.
48in. and 50in.	..	17	10	0	52in. and 54in.	..	18	0	0
Sent out with plated handle-bar, head, hubs, brake, cranks, spring and pedals ; rest enamelled black.									
<i>Extras.</i> Enamelled in colours, 5/- ; in gold, 10/- . Cradle spring, 7/6.									



THE ROYAL PREMIER.

Remarks. This was the first machine ever supplied to Royalty, Prince Albert Victor having one in 1879. It has been improved to date, and is now a first-class light roadster of the most approved pattern. (*See advertisement*).

ROYAL MAIL RACER.

ROYAL MACHINE MANUFACTURING CO., LIMITED, Herbert Road, Small Heath, Birmingham.

Description. $\frac{1}{2}$ in. moulded red tyres. Warwick's hollow rims. Direct spokes. 17in. back wheel. 4in. G.M. hubs. Cranks 5in. throw. Rat-trap ball pedals, 13in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, cowhorn bars, 28in. \times 1 $\frac{1}{2}$ in. 1 $\frac{1}{8}$ in. elliptical 18 W.G. weldless steel backbone. Racing saddle. Spanners and oilcan. Weight 23lbs.

PRICE.

Any size £20.
Sent out with plated handle-bar, head, and cranks ; rest enamelled in colours.
Remarks. A light, well-built machine.

ROYAL MAIL ROADSTER.

ROYAL MACHINE MANUFACTURING CO., LIMITED, Herbert Road, Small Heath, Birmingham.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. No. 11 and 13 direct spokes. 17in. back wheel. 4in. G.M. hubs. $7\frac{1}{2}$ in. axle. Cranks, 5in. throw. Rubber coned pedals, 13in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 28in. x 3in. cowhorn bars. $1\frac{3}{8}$ in. elliptical 16 W.G. weldless steel backbone. Bolted shackle spring. L.D. suspension saddle. Saw step. D.L.S. brake. Spanners and oilcan. Weight 38lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	15	0	0	52in.	15	5	0
50in.				54in.	15	10	0

Sent out with bright handle-bar, head, hubs, cranks and brake; rest enamelled and lined in gold.

Remarks. A thoroughly good machine, and up to all kinds of road work.

ROYAL MAIL No. 2.

ROYAL MACHINE MANUFACTURING CO., LIMITED, Herbert Road, Small Heath, Birmingham.

Description. $\frac{7}{8}$ in. and $\frac{5}{8}$ in. red tyres. Crescent rims. Direct spokes. 17in. back wheel. 4in. G.M. hubs. 8in. axle. Cranks, 5in. throw. Rubber coned pedals, 14in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 28in. x 2in. cowhorn bars. $1\frac{3}{8}$ in. 16 W.G. steel backbone. Bolted shackle spring. L.D. suspension saddle. Saw step. D.L.S. brake. Spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £12.

Sent out with bright handle-bar, head, cranks and spokes; rest enamelled in colours.

Remarks. A sound article at a moderate figure.

RUDGE RACER.

D. RUDGE & Co., LIMITED, Spon Street, Coventry.

Description. $\frac{3}{4}$ in. moulded red tyres. Rudge's hollow rolled rims. Tangent spokes. 16in. back wheel. $3\frac{3}{4}$ in. steel hubs. 8in. axle. Cranks, $5\frac{1}{2}$ in. throw. Rat-trap ball pedals, $12\frac{1}{2}$ in. tread. Rudge's ball bearings to both wheels. Hollow front, and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, cowhorn bars, 30in. by 1in. $1\frac{3}{8}$ in. elliptical 20 W.G. weldless steel backbone and back fork in one. Racing saddle. Spanners and oilcan. Weight 22lbs.

Specialties. Rudge's unequalled ball bearings (*pages* 20, 36 and 41). Backbone and back fork in one.

PRICE.

48in. to 58in. £18 10s.

Sent out with plated handle-bar, head, hubs, cranks and nuts; rest enamelled black in Harrington's enamel.

Remarks. One of the finest and fastest racers on the path. More world's professional championships have been won on it than on any other, and it is the machine ridden by champion Howell in all his races.



THE RUDGE RACER.

RUDGE ROADSTER No. 1.

RUDGE & Co., LIMITED, Spon Street, Coventry.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Rudge's hollow rims. 60 and 20 butt-ended tangent spokes. 17in. back wheel. 4in. steel hubs. $8\frac{1}{2}$ in. axle. Detachable cranks, $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Rubber ball pedals, 13in. tread. Rudge's unequalled ball bearings to both wheels. Hollow front and back forks. Stanley head, $4\frac{3}{4}$ in. centres. Pear-shaped horn handles, 28in. \times $2\frac{3}{4}$ in., hollow detachable cowhorn bars. $1\frac{3}{8}$ in. weldless steel backbone. Bolted sliding spring. Adjustable tension suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan and duster. Weight 34lbs.

Specialties. Rudge's unequalled ball bearings (*pages* 36 and 41). Rudge's hollow rims. Rudge detachable handle-bar (*page* 168). Construction of wheels.

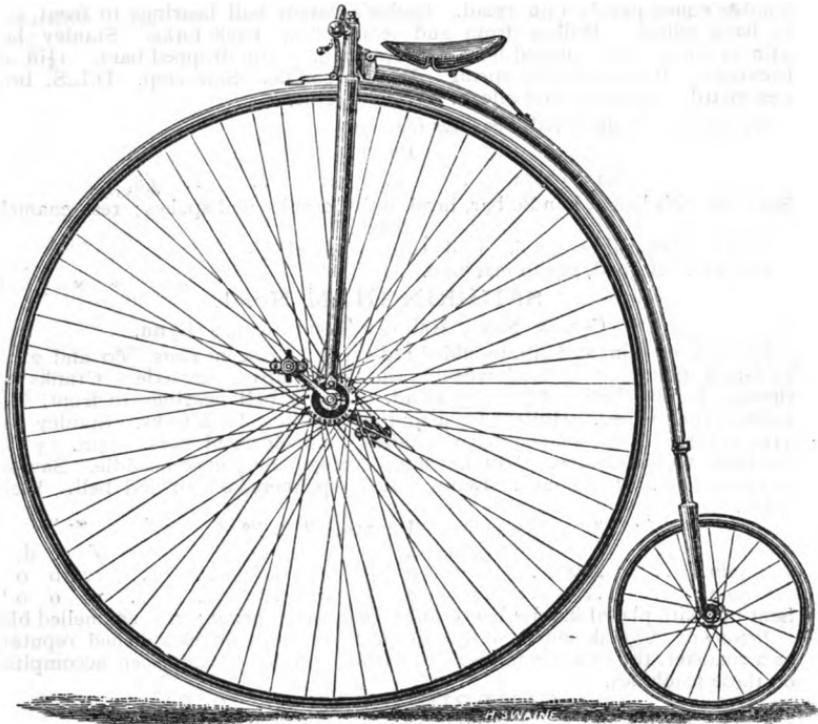
PRICE.

48in. to 54in. £18 10s.

Sent out with plated handle-bar, head, hubs, cranks, pedals and spring; rest enamelled black.

Extras. Cradle spring, 7/6. Lined gold leaf, 5/- Plated frame, 60/- Plated all over except spokes, 80/- Tubular Buffer saddle, 5/- Combined spring and saddle, 5/-

Remarks. This is a machine of the very best class, a finely finished, fast, and good-looking light roadster. The spokes are butted at the hubs and strengthened at the rims with pipe nuts. One of the best machines in the market.



THE RUDGE ROADSTER NO. 1.

RUDGE No. 2.

RUDGE & Co., LIMITED, Spon Street, Coventry.

Description. 3/4 in. and 5/8 in. moulded red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 17 in. back wheel. 4 1/4 in. G.M. hubs. 8 1/2 in. axle. Cranks 4 1/4 in. to 6 in. throw. Rubber plain pedals, 13 in. tread. Rudge's patent ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 1/4 in. centres. Pear-shaped horn handles, 26 in. x 3 in., cowhorn bars. 1 3/4 in. 15 W.G. weldless steel backbone. Bolted sliding spring. Brooks's tension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan and duster. Weight 38 lbs.

Specialties. Rudge's patent ball bearings (pages 36 and 41).

PRICE.

48 in. to 54 in. £12.

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled in two colours.

Extras. Ball pedals, 20/- Detachable cranks, 5/- Cradle spring, 7/6. Gold-lined, 5/- Suspension saddle, 5/6.

Remarks. One of the best machines in the market at its price, and wonderfully good value for money.

RUDGE No. 3.

RUDGE & Co., LIMITED, Spon Street, Coventry.

Description. 3/4 in. red tyres. Crescent rims. 60 and 20 direct spokes. 17 in. back wheel. 4 1/4 in. G.M. hubs. 8 1/2 in. axle. Cranks 4 1/4 in. to 5 1/4 in. throw.

Rubber coned pedals, 13in. tread. Rudge's patent ball bearings to front, cones to back wheel. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. Pear-shaped horn handles, 26in. × 3in. dropped bars. 1½in. steel backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 42lbs.

Specialties. Rudge's ball bearings (page 36).

PRICE.

48in. to 54in. £8.

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest enamelled black.

Extras. 7in. rubbers, 7/6. Balls to back wheel, 5/-

Remarks. A good, cheap machine.

SANDRINGHAM No. 1.

J. Cox & Sons, Railway Road, King's Lynn.

Description. 7in. and 3in. moulded red tyres. Crescent rims. 60 and 24 No. 12 direct spokes. 17in. back wheel. 4in. G.M. hubs. 9in. axle. Cranks 5½in. throw. Rubber ball pedals, 13in. tread. Double ball bearings to front, Æolus balls to back wheel. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. Pear-shaped horn handles, 26in. dropped bars. 1½in. 15 W.G. weldless steel backbone. Humber scroll spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Lamp, valise, spanners, oilcan and bell. Weight 38lbs.

PRICES.

	£	s.	d.		£	s.	d.	
48in.	11	10	0	|	52in.	12	10	0
50in.	12	0	0	|	54in.	13	0	0

Sent out with plated handle-bar, cranks, brake and spring; rest enamelled black.

Remarks. A good, sound, well-built machine, with an established reputation as a roadster, the first 200 miles rides within 24 hours having been accomplished on these machines.

SANDRINGHAM No. 2.

J. Cox & Sons, Railway Road, King's Lynn.

Description. 7in. and 3in. moulded red tyres. Crescent rims. 54 No. 11 and 20 No. 12 nipple tension spokes. 17in. back wheel. 3½in. steel hubs. 9in. axle. Cranks 5½in. throw. Rubber plain pedals, 13½in. tread. Single ball bearings to front, cones to back wheel. Solid forks. Stanley head, 4in. centres. Pear-shaped horn handles, 24in. dropped bars. 1½in. 14 W.G. steel backbone. Bolted sliding spring. Pigskin saddle. Saw step. Leg-guard. Valise, spanners and oilcan. Weight 44lbs.

PRICES.

	£	s.	d.		£	s.	d.	
48in.	6	10	0	|	52in.	7	10	0
50in.	7	0	0	|	54in.	8	0	0

Sent out with bright handle-bar, head, hubs, cranks, and spring; rest painted in two colours.

Extras. Brake, 10/- Balls to back wheel, 10/-

Remarks. A strong machine for the working classes.

SANSPAREIL LIGHT ROADSTER.

W. ANDREWS, LIMITED, 21, Victoria Road, Aston, Birmingham.

Description. 7in. and 3in. moulded red tyres. Warwick's hollow rims. 64 and 24 No. 14 tangent spokes. 17in. back wheel. 3in. steel hubs. 7½in. axle. Cranks 5½in. throw. Rat-trap ball pedals, 11½in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Andrews's head, 4½in. centres. Pear-shaped horn handles, detachable 28in. cowhorn bars. 1½in. oval Perfection 17 W.G. weldless steel backbone. Sanspareil spring. Record spring saddle. Adjustable saw step. D.L.S. brake. Ball-ended leg-guard. Valise, spanners and oilcan. Weight 34lbs.

Specialties. Andrews's detachable handle-bars (page 57). Sanspareil shackle spring.

PRICES.

	£	s.	d.		£	s.	d.
48in.	17	5	0	52in.	17	15	0
50in.	17	10	0	54in.	18	0	0

Sent out with plated handle-bar, head, hubs, and cranks ; rest enamelled.

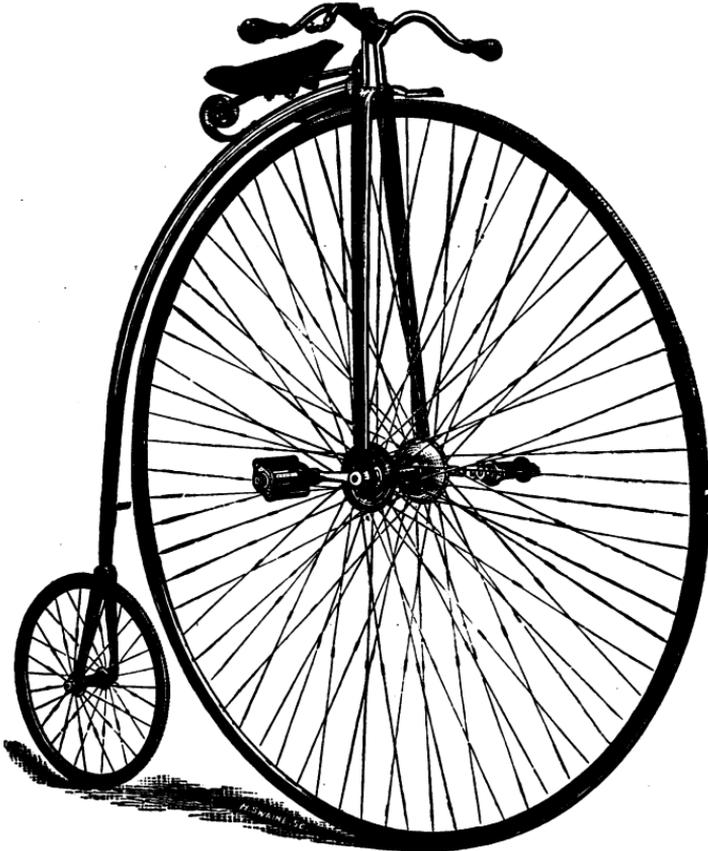
Extras. Plating all over, except rims and spokes, 50/- Lining in two colours, 10/-

Remarks. A first-class and fast machine, closely and narrowly built, and well adapted for light work and fast riders.

SANSPAREIL ROADSTER.

W. ANDREWS, LIMITED, 21, Victoria Road, Aston, Birmingham.

Description. 7/8 in. and 3/4 in. moulded red tyres. Crescent rims. 72 and 24 No. 14 duplex tangent spokes. 17 in. back wheel. 5 in. steel hubs. 8 in. axle. Detachable cranks, 5 in. to 5 3/4 in. throw. Rubber plain pedals, 11 1/2 in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Andrews's



THE SANSPAREIL ROADSTER.

head, 4 3/4 in. centres. Pear-shaped horn handles, detachable bars. 1 3/8 in. elliptical Perfection 16 W.G. weldless steel backbone. Humber scroll spring. Record

R

spring saddle. Saw step. D.L.S. brake. Ball-ended leg-guard Valise, spanners and oilcan. Weight 40lbs.

Specialties. Andrews's duplex spokes (page 12). Andrews's detachable handle-bars (page 57). Sanspareil spring.

PRICES.

	£	s.	d.		£	s.	d.
48in.	15	10	0	52in.	16	0	0
50in.	15	15	0	54in.	16	5	0

Sent out with plated handle-bar, head, hubs, and cranks; rest enamelled black
Extras. Hollow rims, 20/- Ball pedals, 15/- Plating all over except rims. 63/- Lining in two colours, 10/-

Remarks. A first-class, strong and substantial article, up to any amount of all-round road work. The detachable handle-bars are a great advantage, enabling any size or shape of bar to be fitted at will. The hubs are deeply recessed to secure a very narrow tread.

SANSPAREIL No. 2.

W. ANDREWS, LIMITED, 21, Victoria Road, Aston, Birmingham.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. gr-y tyres. Crescent rims. 60 and 20 direct spokes. 17in. back wheel. G.M. hubs. Cranks 5in. to 6in. throw. Rubber plain pedals, 13in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Andrews's head, 5in. centres. Pear-shaped horn handles, solid bars 26in. x 5in. 1 $\frac{3}{4}$ in. elliptical 15 W.G. weldless steel backbone. Humber scroll spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanner and oilcan. Weight 43lbs.

PRICE.

All sizes £12.

Sent out with bright handle-bar, head, cranks, and spring: plated hubs, and rest japanned black.

Extras. Ball pedals, 15/- Cradle spring, 7/6. Detachable cranks, 5/-.

Remarks. A strong, cheap machine.

SANSPAREIL RACER.

W. ANDREWS, LIMITED, Victoria Works, Aston, Birmingham.

Description. $\frac{1}{2}$ in. moulded red tyres. Warwick's hollow rims. Tangent spokes. 16in. back wheel. Steel hubs. Cranks 4 $\frac{1}{2}$ in. to 5in. throw. Rat-trap ball pedals, 11 $\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Andrews's head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. x 2in. cowhorn bars. 1 $\frac{3}{4}$ in. 18 W.G. weldless steel backbone. Racing saddle. Spanner and oilcan. Weight 20lbs.

PRICE.

Any size £18.

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled black.

Remarks. A first-class racer in every way. Has been very successful upon the path, especially in the Midlands.

SHAKESPEARE.

D. CARTER, Shakespeare Cycle Works, Stratford-on-Avon.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. red tyres. Crescent rims. 60 and 24 No. 12 butt-ended direct spokes. 17in. back wheel. G.M. hubs. Detachable cranks, 5in. throw. Rubber coned pedals, 14 $\frac{1}{2}$ in. tread. Double ball bearings to front, balls to back wheel. Hollow front and back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. dropped bars. 1 $\frac{3}{4}$ in. 16 W.G. weldless steel backbone. Bolted sliding spring. L.D. suspension saddle.

Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan, lamp, and bell. Weight 38lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	10	0	0	52in.	10	10	0
50in.	10	5	0	54in.	10	15	0

Sent out with plated handle-bar, head, hubs, cranks, etc.; rest painted in colours.

Extras. Ball pedals, 20/-

Remarks. A good, plain ordinary machine, without any special feature.

SHAKESPEARE T.H.F.

D. CARTER, Shakespeare Cycle Works, Stratford-on-Avon.

Description.— $\frac{3}{4}$ in. and $\frac{3}{8}$ in. moulded red tyres. Crescent rims. 60 and 24 No. 14 direct spokes. 17in. back wheel. Steel hubs. Detachable cranks, 5in. throw. Rubber coned pedals, 14 $\frac{1}{2}$ in. tread. Ball bearings to both wheels. Triple hollow front and fluted hollow back forks. Open centre head, 4 $\frac{3}{4}$ in. centres. Pear-shaped horn handles, 28in. bars. 1 $\frac{3}{8}$ in. elliptical 16 W.G. weldless steel backbone. Humber scroll spring. L.D. suspension saddle. Adjustable saw step. D.L.S. brake. Leg guard. Valise, spanners and oilcan. Lamp and bell. Weight 39lbs.

Specialties. Triple hollow forks. (Addenda.)

PRICES.

	£	s.	d.		£	s.	d.
48in.	12	10	0	52in.	13	0	0
50in.	12	15	0	54in.	13	5	0

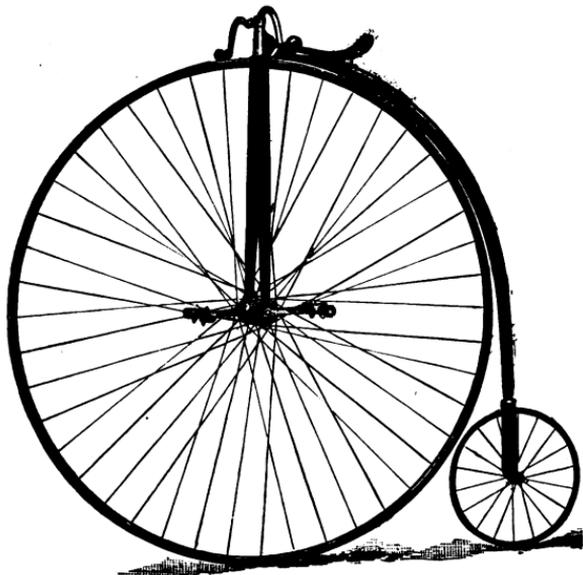
Sent out with plated handle-bar, head, hubs, cranks, &c.; rest enamelled in colours.

Remarks. A good strong roadster, with immensely strong forks.

SINGER'S RACING CHALLENGE.

SINGER & Co., Challenge Works, Alma Street, Coventry.

Description. $\frac{1}{2}$ in. and $\frac{3}{8}$ in. Otto's corrugated wired tyres. Warwick's hollow rims. 62 true tangent and 20 direct spokes. 16in. back wheel. 2 $\frac{3}{4}$ in. steel hubs. 8in. axle. Cranks 4 $\frac{1}{2}$ in. to 5 $\frac{1}{2}$ in. throw. Rat-trap ball pedals, 13in. tread. Double



SINGER'S RACING CHALLENGE.

ball bearings to front, balls to back wheel. Hollow front and semi-hollow back forks. Stanley head, 5in centres. T horn handles, 28in. hollow cowhorn bars. 1½in. elliptical 18 W.G. weldless steel backbone. Pigskin racing saddle. Spanner and oilcan. Weight 23lbs.

Specialties. Otto's corrugated wired tyres (*page 132*).

PRICE.

48in. to 54in. £18 10s.

Sent out with plated handle-bar, head and pedals; rest enamelled black.

Extras. Ball bearing head, 20/- Larger sizes, 5/- per inch.

Remarks. A very fine machine. One of the firmest and most rigid in the market. N.B.—Makers' amateurs are warned off, as Messrs. Singer pay no one to ride their machines. (*See advertisement.*)

SPARKBROOK TANGENT.

SPARKBROOK MANUFACTURING CO., LIMITED, Much Park Street, Coventry.

Description. ½in. non-slipping tyres. Warwick's hollow rims. 64 and 20 No. 15 Sparkbrook tangent spokes. 17in. back wheel. 3½in. steel hubs. 8½in. axle. Fixed cranks, 6in. throw. Rubber ball pedals, 13in. tread. Ball bearings to



THE SPARKBROOK TANGENT.

both wheels. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. T horn handles, hollow cowhorn bars, 28in. × 3½in. 1½in. 16 W.G. weldless steel backbone Anglo-American combined spring and saddle. Hillman's adjustable saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 33lbs.

Specialties. Sparkbrook tangent wheel (*page 135*).

PRICE.

48in. to 54in. £17 10s.

Sent out with plated handle-bar, head, hubs, cranks and brake; rest enamelled black.

Extras. 7/8in. tyres, 10/-. Plated hubs, 10/-. Adjustable handle-bar and cranks, 10/-.

Remarks. One of the best machines in the market. A fine light roadster in every way. (See advertisement.)

SPARKBROOK DIRECT-SPOKE.

SPARKBROOK MANUFACTURING Co., LTD, Much Park Street, Coventry.

Description. 7/8in. and 7/4in. non-slipping tyres Crescent rims. 64 and 20 No. 14 direct spokes. 17in. back wheel. 3 1/2in. G.M. hubs. 8 1/2in. axle. Cranks 6in. throw. Rubber ball pedals, 13in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 1/2in. centres. T horn handles, 28in. x 3 1/2in. hollow cowhorn bars. 1 3/4in. 16 W.G. weldless steel backbone. Humber scroll spring. L.D. suspension saddle. Hillman's adjustable saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 39lbs.

PRICE.

48in. to 54in. £16 10s.

Sent out with plated handle-bar, head, brake, cranks, and pedals; rest enamelled black.

Extras. Plated hubs, 10/- Adjustable handle-bar and cranks, 10/-

Remarks. A first-class all-round roadster. (See advertisement.)

SPECIAL CAMBRIAN.

MORRIS BROS., Cardiff.

Description. 7/8in. and 7/4in. non-slipping tyres. Warwick's hollow rims. 60 and 20 No. 12 direct spokes. 17in. back wheel. 4 1/2in. G.M. hubs. 8 3/4in. axle. Detachable cranks, 3 3/4in. to 5in. throw. Rubber ball pedals, 13 1/2in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4 1/2in. centres. Hancock's non-vibrating handles, 26in. hollow cowhorn bars. 1 3/4in. 16 W.G. weldless steel backbone. Cambrian spring. L.D. suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 37lbs.

Specialties. Cambrian spring (page 71).

PRICE.

48in. to 54in. £17 10s.

Sent out with plated handle-bar, head, hubs, cranks, &c.; rest painted in any colours.

Extras. Laced spokes, 20/-.

Remarks. A really good machine. It is much used and appreciated in the South Welsh district.

SPECIAL CHAMPION.

H. MARKHAM, 345, Edgware Road, London.

Description. 7/8in. and 7/4in. red tyres. Warwick's hollow rims. 60 and 20 No. 18 laced spokes. 17in. back wheel. 4in. steel hubs, 7in axle. Cranks 5in. throw. Rat-trap ball pedals, 12 3/4in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5 1/2in. centres. T horn handles. 1 1/2in. 17 W.G. weldless steel backbone. Arab cradle spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Leg guard. Valise, spanner, oilcan and lamp. Weight, 32lbs.

PRICE.

48in. to 54in. £16 16s.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled in two colours.

Remarks. A neatly-built light roadster.

SPECIAL COGENT.

HENRY CLARKE, Darlington Street, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. non-slipping tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. $10\frac{1}{2}$ in. axle. Detachable cranks, $5\frac{1}{2}$ in. throw. Rat-trap coned pedals, $14\frac{1}{2}$ in. tread. Æolus ball bearings to front, cones to back wheel. Hollow front and solid back forks. Stanley head $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 27in. cowhorn bars. $1\frac{1}{8}$ in. 13 W.G. backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Leg guard. Valise, spanners, oilcan, and bell. Weight 43lbs.

PRICE.

48in. to 54in. £6 10s.

Sent out with plated handle-bar, head, brake, and spring; cranks, hubs, and pedals bright; rest enamelled in two colours.

Extras. Balls to back wheel, 10/- Hollow back fork, 4/-

Remarks. At its price there are few superior. (See advertisement.)

SPECIAL COGENT No. 7.

H. CLARKE, Darlington Street, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. non-slipping tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. Cranks $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to front, cones to back wheel. Hollow front and solid back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. cowhorn bars. $1\frac{3}{8}$ in. 14 W.G. charcoal iron backbone. Bolted sliding spring. Long distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, bell, spanner and oilcan. Weight 44lbs.

PRICE.

48in. to 54in. £6 10s.

Sent out with bright cranks, pedals and hubs, and plated handle-bar, head, brake and spring; rest enamelled black.

Extras. Æolus balls to back wheel, 10/-. Hollow back forks, 5/-. T handles, 2/-

Remarks. A new introduction for 1887. Strong, and of good appearance. (See advertisement.)

SPECIAL COMMERCIAL.

A. ROBINSON, Hospital Street, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. $3\frac{3}{4}$ in. G.M. hubs, 11in. axle. Cranks $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Rubber ball pedals, 15in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 26in. cowhorn bars. $1\frac{3}{8}$ in. steel backbone. Bolted sliding spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Valise, lamp, bell, spoke tightener, spanner and oilcan. Weight 38lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	10	10	0	52in.	11	0	0
50in.	10	15	0	54in.	11	5	0

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest enamelled black.

Extras. Bright parts plated, 15/- All plated, 30/-

Remarks. Fair value for money.

SPECIAL EXPRESS.

HUMBER & Co., LIMITED, The Ashes, Brickkiln Street, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. moulded red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. 5in. G.M. hubs. $9\frac{1}{2}$ in. axle. Detachable cranks, 5in. to 6in. throw. Rubber coned pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 27in. hollow cowhorn bars. $1\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan and bell. Weight 42lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	7	15	0	52in.	8	5	0
50in.	8	0	0	54in.	8	10	0

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest painted in two colours.

Extras. All-plated, 40/- Ball pedals, 12/6 Plated bright parts, 20/- Hollow rims, 10/-

Remarks. Good value for money. A sound machine; one of the best machines at its price in the market. (See advertisement.)

SPECIAL INVICTA.

CLEAVER & Co., Kent Works, 2 to 8, William Street, Sittingbourne.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 60 and 24 No. 11 direct spokes. 15in. back wheel. $4\frac{1}{2}$ in. G.M. hubs, $9\frac{1}{2}$ in. axle. Cranks, 5in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front, semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, dropped bars, 28in. x $2\frac{1}{2}$ in. $1\frac{3}{8}$ in. 16 W.G. steel backbone. Humber scroll spring. Brooks's long-distance saddle. Saw step. D.L.S. brake. Leg-guard. Valise, hub lamp, spanners, oilcan and bell. Weight 38lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	7	15	0	52in.	8	0	0
50in.	8	0	0	54in.	8	0	0

Sent out with bright handle-bar, head, hubs, cranks and spring; rest painted in two colours.

Extras. Cradle spring, 6/- Hollow rims, 10/- Ball pedals, 12/6 Hollow handle-bars, 2/6.

Remarks. A very fine article for the money. (See advertisement.)

SPECIAL MAZEPPA.

METROPOLITAN MACHINISTS' Co., LIMITED, 75, Bishopsgate Street Without, London, E.C.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. Direct spokes. 16in. back wheel. G.M. hubs. Fixed cranks. Rubber coned pedals, 14in. tread. B.S.A. ball bearings to front, Æolus balls to back wheel. Hollow front and solid back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, cowhorn bars. Elliptical weldless steel backbone. Humber scroll spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 39lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	9	10	0	52in.	9	15	0
50in.				54in.	10	0	0

Sent out with plated handle-bar, head and hubs; rest enamelled.

Extras. Ball pedals, 10/- Ball bearing head, 20/- T handles, 5/-

Remarks. 15 ⁰/₁₀ off for cash. (See advertisement.)

SPECIAL TIMBERLAKE.

THOMAS TIMBERLAKE & Co., 39, King Street, Maidenhead, Berks.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red wire coupled tyres. Crescent rims. 72 and 24 No. 12 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs. $8\frac{1}{2}$ in. axle. Detachable cranks, $5\frac{1}{2}$ in. throw. Rubber plain pedals, $12\frac{3}{4}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. x 3in. cowhorn bars. $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Bolted rubber buffer spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Ball-ended leg-guard. Spanner and oilcan. Weight 40lbs.

Specialties. Wire coupled tyres. (Addenda.) Non-vibrating spring.

		PRICES.					PRICES.		
		£	s.	d.			£	s.	d.
48in.	.. .. .	13	10	0	52in.	.. .. .	14	14	0
50in.	.. .. .	14	2	0	54in.	.. .. .	15	6	0

Sent out with bright handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Bright parts plated, 25/-. Ball pedals, 20/-.

Remarks. A strong, serviceable roadster, suitable for all-round work. (See advertisement.)

SPECIAL TIMBERLAKE SEMI-RACER.

THOMAS TIMBERLAKE & Co., 39, King Street, Maidenhead.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. moulded red wire coupled tyres. Warwick's hollow rims. 48 and 20 No. 14 tangent spokes. 16in. back wheel. $3\frac{1}{2}$ in. steel hubs, $8\frac{1}{2}$ in. axle. Cranks, $5\frac{1}{2}$ in. throw. Rat-trap ball pedals, $12\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, hollow cowhorn bars, 28in. x 2in. $1\frac{1}{2}$ in. elliptical 18 W.G. weldless steel backbone. Bolted sliding spring. Brooks's semi-racing saddle. Adjustable saw step. Ball-ended leg-guard. Spanner and oilcan. Weight 28lbs.

Specialties. Wire coupled tyres. (Addenda.)

PRICE.

48in. to 54in. £18 10s.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Remarks. A finely-built machine for general light work on good roads. (See advertisement.)

SPECIAL TIMBERLAKE RACER.

T. TIMBERLAKE & Co., King Street, and Queen Street, Maidenhead.

Description. $\frac{1}{2}$ in. and $\frac{1}{2}$ in. red wired tyres. Warwick's hollow rims. 48 and 20 No. 13 tangent spokes. 16in. back wheel. $3\frac{1}{2}$ in. steel hubs. Hollow axle. Cranks, $5\frac{1}{2}$ in. throw. Rat-trap ball pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, hollow cowhorn bars, 28in. x 1in. $1\frac{3}{8}$ in. elliptical 18 W.G. weldless steel backbone. Brooks's racing saddle. Spanners and oilcan. Weight 20lbs.

Specialties. Wired tyres. (Addenda.)

PRICE.

All sizes £18.

Sent out with plated handle-bar, head, cranks and pedals; rest enamelled black.

Remarks. A genuinely-built article, and one that will do its owner good service. (See advertisement.)

SPECIAL WHITMORE No. 1.

SAMUEL LLOYD, Great Hampton Works, Church Lane, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 60 and 20 No. 12 direct spokes. 16in. back wheel. $4\frac{1}{2}$ in. G.M. hubs, 9in. axle. Cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, 14in. tread. Ball bearings to front, cones to back wheel. Hollow front and solid back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 28in. bars. $1\frac{3}{8}$ in. lap-welded steel backbone. Bolted sliding spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Valise, spanners and oilcan. Weight 38lbs.

PRICE.

48in. to 54in. £8 5s.

Sent out with bright handle-bar, hubs, cranks and spring; rest painted in two colours.

Extras. Æolus ball bearings to both wheels, 25/- Half-plated, 20/- Full plated, 30/-

Remarks. A plain, strong mount.

SPEEDWELL.

GUEST & BARROW, 279 and 280, Broad Street, Birmingham.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Crescent rims. No. 11 direct spokes. 16in. back wheel. 4in. G.M. hubs, 10in. axle. Detachable cranks, 6in. throw. Rubber coned pedals, 14in. tread. Ball bearings to both wheels. Hollow front and back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 26in. cowhorn bars. $1\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Humber scroll spring. L.D. suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 38lbs.

PRICES.

				£	s.	d.					£	s.	d.	
48in.	::	::	::	10	10	0	|	52in.	::	::	::	10	10	0
50in.	::	::	::					54in.	::	::	::	11	0	0

Sent out with plated handle-bar, head, cranks and spring; rest enamelled in two colours.

Extras. Ball pedals, 15/- Hollow handle-bars, 2/6. T handles, 2/6

Remarks. A neat and very decent article.

SPIDER RACER.

HOWE MACHINE CO., LIMITED, Bridgeton, Glasgow.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Warwick's hollow rims. 56 and 20 No. 15 tangent spokes. 16in. back wheel. $3\frac{3}{8}$ in. steel hubs. 8in. axle. Cranks, 5in. throw. Rat-trap ball pedals, 11in. tread. Ball bearings to both wheels. Hollow front and back forks. Stanley head, 4in. centres. T horn handles, hollow dropped bars, 30in. x 1in. $1\frac{3}{8}$ in. 20 W.G. weldless steel backbone. Racing saddle. Spanners and oilcan. Weight 20lbs.

PRICE.

All sizes £18 18s.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled black.

Extras. All plated, 60/-.

Remarks. A well-built machine; used a good deal on Continental racing paths. (See advertisement.)

SPIDER ROADSTER.

HOWE MACHINE CO., LD., Bridgeton, Glasgow.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. 72 and 24 No. 13 tangent spokes. 16in. back wheel. 4in. steel hubs. 8 $\frac{1}{2}$ in. axle. Detachable cranks, $5\frac{1}{2}$ in. throw. Rubber coned pedals, $12\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, cowhorn bars, 28in. x 3in. $1\frac{3}{8}$ in. elliptical 18 W.G. weldless steel backbone. Bolted Humber scroll spring. Long-distance Eclipse saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 37lbs.

PRICES.

48in. to 52in.	£17 10s.	|	54in.	£18
----------------	-------	----------	--	-------------	-------	-----

Sent out with plated handle-bar, head, hubs, cranks, step, spring, brake, leg-guard, pedals and nuts; rest enamelled black.

Extras. Ball pedals, 20/- Plated all over, 60/-

Remarks. A very fine machine in every way, also built as a light roadster, weighing 32lbs., with $\frac{3}{4}$ in. and $\frac{5}{8}$ in. rubbers. (See advertisement.)

STANLEY.

HYDES & WIGFULL, Stanley Bicycle Works, Sheffield.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 60 and 20 No. 12 direct spokes. 17in. back wheel. $4\frac{3}{8}$ in. G.M. hubs, 9 $\frac{1}{2}$ in. axle. Detachable cranks, 5in. to 6in. throw. Rubber plain pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, cowhorn bars, 26in. x 5in. $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Arab cradle spring. Long-distance suspension saddle. Oval saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 40lbs.

Specialties. The original Stanley head. Stanley spokes—extra (page 12). Stanley round hollow forks—extra (page 46). Stanley ball bearing head—extra (page 54).

PRICE.

48in. to 54in. £10 10s.
Sent out with bright handle-bar, head, hubs and cranks; rest japanned in two colours.

Extras. Special Stanley spokes, 13/6. Stanley round hollow forks, 10/- Stanley ball bearing head, 25/- Ball pedals, 15/- Bright parts polished, 5/- Plated, 15/- Plated all over except rims, 40/-

Remarks. One of the oldest machines on the market. A sound and really good roadster. Fit for all kinds of road work.

STANLEY EXCELSIOR.

BAYLISS, THOMAS & Co, Lower Ford Street, Coventry.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. non-slipping tyres. Crescent rims. 68 and 24 No. 13 butt-ended direct spokes. 18in. back wheel. Steel hubs. Fixed cranks, 5in. to 6in. throw. Rubber coned pedals, 13in. tread. Double ball bearings to front, balls to back wheel. Hollow fluted front and back forks. Stanley head, 4in. centres, with oil shield. T horn handles, 28in. cowhorn bars. 1 $\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Victor spring. Brooks's B20 saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 36lbs.

Specialties. Victor spring (page 68). Recessed hubs and thick-ended spokes screwed right through.

PRICES.

48in.	£15 10 0	|	£52in.	16 10 0
50in.	16 0 0		54in.	17 0 0

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled in two colours.

Remarks. A very similar machine to the Victor by the same makers, but built with the Stanley head, which makes it a bit neater to some eyes. (See advertisement.)

STASSEN.

S. STASSEN & SON, 251, Euston Road, London.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. non-slipping tyres. Crescent rims. 64 and 24 No. 12 direct spokes. 16in. back wheel. 4in. G.M. hubs. 9in. axle. Cranks 6in. throw. Rubber plain pedals, 14in. tread. Ball bearings to both wheels. Hollow front and back forks. Stanley head, 3 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. hollow cowhorn bars. 1 $\frac{3}{8}$ in. 14 W.G. weldless steel backbone. Arab cradle spring. Eclipse suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 42lbs.

PRICE.

48in. to 54in. £12 10s.
Sent out with bright handle-bar and hubs; rest enamelled black.

Extras. Ball pedals, 15s.

Remarks. The "sturdy Stassen" has for years been a well known roadster. Strong, well built and reliable. A really cheap machine at the money.

STERLING.

BURDESS & TOWNSEND, Holyhead Road, Coventry.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. G.M. hubs. Detachable cranks, 6in. throw. Rubber ball pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 30in. cowhorn bars. 1 $\frac{3}{4}$ in. 15 W.G. weldless steel backbone. Arab cradle spring. Nagel's laced saddle. Saw step. D.L.S. brake. Leg-guard. Spanner. Weight 36lbs.

PRICES.

48in.	£	s.	d.	52in.	£	s.	d.
50in.	15	0	0	54in.	16	15	0
	15	7	6		16	0	0

Sent out with plated handle-bar; rest enamelled.

Remarks. A decent article.

TEMPEST No. 1.

JOSEPH BATES, Tempest Works, Wolverhampton.

Description. $\frac{3}{8}$ in. and $\frac{1}{2}$ in. moulded red tyres. Crescent rims. 60 and 20 No. 13 laced spokes. 16in. back wheel. $3\frac{1}{2}$ in. steel hubs, 9in. axle. Detachable cranks, 5in. to 6in. throw. Rat-trap ball pedals, 12 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Elliptical horn handles, 28in. x 3in. cowhorn bars. 1 $\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Arab cradle spring. L.D. suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, lamp, bell, spanners and oilcan. Weight 38lbs.

PRICE.

48in. to 54in. £11 10s.

Sent out with plated handle-bar, head and cranks; rest enamelled black.

Remarks. A sound, good-looking machine. Mr. Bates is the successor to Mr. Lewis (deceased), one of the pioneers of the trade, so long connected with the Tempest Works.

TEMPEST No. 2.

JOSEPH BATES, Tempest Works, Wolverhampton.

Description. $\frac{3}{8}$ in. and $\frac{1}{2}$ in. red tyres. Crescent rims. 60 and 20 No. 12 direct spokes. 16in. back wheel. $3\frac{1}{2}$ in. G.M. hubs, 9in. axle. Cranks, 5 $\frac{1}{2}$ in. throw. Rubber plain pedals, 14in. tread. B.S.A. ball bearings to front, Æolus balls to back wheel. Hollow front and semi-hollow back forks. Stanley head. Pear-shaped horn handles, 28in. dropped bars. 1 $\frac{3}{8}$ in. steel backbone. Humber scroll spring. L.D. suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanner and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £7 10s.

Sent out with bright handle-bar, head, hubs, cranks and spring; rest japanned black.

Extras. Bright parts plated, 17/6.

Remarks. Good value for money. A machine which finds much favour with dealers and exporters.

TEMPEST No. 3.

JOSEPH BATES, Tempest Works, Wolverhampton.

Description. $\frac{3}{8}$ in. and $\frac{1}{2}$ in. red tyres. Crescent rims. 60 and 20 No. 11 direct spokes. 16in. back wheel. 3in. G.M. hubs, 9in. axle. Cranks, 6in. throw. Rubber coned pedals, 14in. tread. Plain bearings to front, cones to back wheel. Solid forks. Stanley head, 3 $\frac{3}{8}$ in. centres. Pear-shaped horn handles, 26in. dropped bars. 1 $\frac{3}{8}$ in. 14 W.G. steel backbone. Humber scroll spring. Web-seated saddle. Saw step. D.L.S. brake. Valise, spanner and oilcan. Weight 44lbs.

PRICE.

48in. to 54in. £5.

Sent out with bright handle-bar, head, hubs, cranks and spring; rest painted in two colours.

TOURIST No. 1.

BEDFORD CYCLE CO., St. Paul's Square, Bedford.

Description. $\frac{3}{8}$ in. Otto's wired tyres. Warwick's hollow rims. 56 and 24 No. 13 direct spokes. 18in. back wheel. $4\frac{1}{2}$ in. G.M. hubs, 7 $\frac{1}{2}$ in. axle. Cranks, 6in. throw. Victor square rubber ball pedals, 12in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Abingdon ball bearing head. Pear-shaped horn handles, 27in. x 2 $\frac{1}{2}$ in. cowhorn bars. 1 $\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Eclipse saddle. Saw step. D.L.S. brake. Leg-guard. Bell, spanner and oilcan. Weight 35lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	17	0	0	52in.	17	10	0
50in.				54in.	18	0	0

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled in two colours.

Remarks. A finely designed and very complete machine, with narrow tread; fit for good riders on good roads.

TOURIST No. 2.

BEDFORD CYCLE Co., St. Paul's Square, Bedford.

Description. $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 56 and 24 No. 13 direct spokes. 18in. back wheel. $4\frac{1}{2}$ in. G.M. hubs, $7\frac{1}{2}$ in. axle. Cranks, 6in. throw. Victor square rubber coned pedals, 12in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 27in. \times $2\frac{1}{2}$ in. cowhorn bars. $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Bell, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £14.

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled black.

Remarks. A good, sound article.

TRAVERS No. 1.

W. TRAVERS & Co., York Terrace, Clapham Station, London.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. moulded red tyres. Warwick's hollow rims. 64 and 20 No. 13 butt-ended true tangent spokes. 16in. back wheel. $4\frac{1}{2}$ in. steel hubs. 7in. axle. Cranks, 5in. to 6in. throw. Rat-trap plain pedals, 11 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. T horn handles, 28in. hollow cowhorn bars. $1\frac{3}{8}$ in. elliptical 16 W.G. weldless steel backbone. Bolted Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Valise, spanners and oilcan. Weight 35lbs.

PRICE.

48in. to 54in. £17 10s.

Sent out with bright handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Plated bright parts, 20/- Ball pedals, 15/-

Remarks. A really well-built, strong and fast light roadster. Well suited for fast work on good roads.

TRAVERS No. 2.

W. TRAVERS & Co., York Terrace, Clapham Station, London.

Description. $\frac{3}{4}$ in. and $\frac{5}{8}$ in. red tyres. Crescent rims. 64 and 20 No. 12 tangent spokes. 16in. back wheel. $4\frac{1}{2}$ in. steel hubs. $7\frac{1}{2}$ in. axle. Cranks, 5in. to 6in. throw. Rubber coned pedals, 12in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, $4\frac{1}{2}$ in. centres. T horn handles, 26in. cowhorn bars. $1\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Bolted Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Valise, spanners and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £12 10s.

Sent out with bright handle-bar, head, hubs, cranks, and spring; rest enamelled black.

Extras. Plated bright parts, 20/- Ball pedals, 15/-

Remarks. A strong, plain, cheap machine.

TRAVERS RACER.

W. TRAVERS & Co., York Terrace, Clapham Station, London.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. moulded red tyres. Warwick's hollow rims. 64 and 20 No. 16 butt-ended true tangent spokes. 15in. back wheel. $4\frac{1}{2}$ in. steel hubs. $6\frac{3}{4}$ in. axle. Cranks, $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Rat-trap plain pedals, 11in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. T cork handles, 28in. hollow cowhorn bars level with rim. $1\frac{3}{4}$ in. elliptical 20 W.G. weldless steel backbone in one piece with back fork. Gem racing saddle. Spanner and oilcan. Weight 15 $\frac{1}{2}$ lbs.

PRICE.

48in. to 54in. £17 10s.

Sent out with bright handle-bar, cranks and nuts; rest enamelled black.

Extras. Plating bright parts, 20/-. Ball pedals, 15/-.

Remarks. Mr. Travers is a practical racing man, and frequently rides his own machines to victory. This is one of the lightest machines on the market.

UNIVERSAL No. 1.

S. GRIFFITHS & SONS, Clyde Works, Heath Town, Wolverhampton.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. non-slipping tyres. D.S.H. rims. 60 and 20 No. 12 direct spokes. 17in. back wheel. G.M. hubs. Detachable cranks, 5in. to 6in. throw. Rubber ball pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. T horn handles, 28in. hollow cowhorn bars. $1\frac{3}{4}$ in. 16 W.G. weldless steel backbone. Bolted Humber scroll spring. Suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, lamp, bell, spanner and oilcan. Weight 38lbs.

PRICE.

48in. to 54in. £12.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest japanned black.

Remarks. A most complete machine for the money.

UNIVERSAL No. 2.

S. GRIFFITHS & SONS, Clyde Works, Heath Town, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. red tyres, Crescent rims. 60 and 20 No. 11 direct spokes. 17in. back wheel. G.M. hubs. Cranks, 6in. throw. Rubber coned pedals, 14in. tread. Ball bearings to front, cones to back wheel. Solid forks. Stanley head, 4in. centres. Pear-shaped horn handles. 28in. dropped bars. $1\frac{3}{4}$ in. 15 W.G. steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Bell, spanner and oilcan. Weight 43lbs.

PRICE.

48in. to 54in. £6.

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest japanned in two colours.

Extras. Hollow forks, 10/-. Æolus ball bearings to front wheel, 10/-; ditto to back, 10/-. Half-plated, 20/-.

UNIVERSAL CLUB No. 1.

COVENTRY MACHINISTS' CO., LIMITED, Cheylesmore, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 56 and 20 No. 13 direct spokes. 16in. back wheel. Steel hubs. Cranks, 5in. throw. Rubber coned pedals, 14in. tread. Ball bearings to both wheels. Hollow front and back forks. Stanley head, 5in. centres. Pear-shaped horn handles, Club detachable 26in. cowhorn bars. $1\frac{3}{4}$ in. 15 W.G. steel backbone. Bolted sliding spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 45lbs.

Specialties. Club detachable handle-bars (*page 167*).

PRICE.

48in. to 54in. £13.

Sent out with plated hubs; spokes enamelled; and rest painted in two colours.

Remarks. A strong, durable roadster, up to all kinds of heavy work. (*See advertisement.*)

UNIVERSAL CLUB No. 2.

COVENTRY MACHINISTS' Co., LTD., Cheylesmore, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 56 and 20 No. 13 direct spokes. 16in. back wheel. Steel hubs. Cranks, 5in. throw. Rubber coned pedals, 14in. tread. Ball bearings to both wheels. Hollow front and back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 26in. cowhorn bars. $1\frac{3}{8}$ in. 15 W.G. steel backbone. Bolted sliding spring. L.D. suspension saddle. Saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 45lbs.

PRICES.

	£	s.	d.		£	s.	d.		£
48in.	}	52in. ..	..	..	..	10
50in.		54in. ..	..	..	..	10

Sent out painted in two colours.

Remarks. First-class value for money. (See advertisement.)

UNIVERSAL CLUB No. 3.

COVENTRY MACHINISTS' Co., LTD., Cheylesmore, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 56 and 20 No. 10 direct spokes. 16in. back wheel. Steel hubs. Cranks, 5in. throw. Rubber coned pedals, 14in. tread. Ball bearings to both wheels. Solid forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 26in. cowhorn bars. Steel backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Spanners and oilcan. Weight 48lbs.

PRICE.

All sizes £8.

Sent out painted in two colours.

Remarks. A cheap knockabout article. No deviation is made from standard pattern. (See advertisement.)

UNIVERSAL PREMIER No. 1.

HILLMAN, HERBERT & COOPER, LIMITED, Premier Works, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. grey tyres. Crescent rims. 64 and 16 No. 12 direct spokes. 17in. back wheel. G.M. hubs. Cranks, $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Rubber plain pedals, $14\frac{1}{2}$ in. tread. Ball bearings to front, cones to back wheel. Solid forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. dropped bars. $1\frac{3}{8}$ in. 14 W.G. iron backbone. Bolted sliding spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Spanner and oilcan. Weight 45lbs.

PRICE.

48in. to 54in. £8.

Sent out with bright handle-bar, head, brake, hubs, cranks, pedals and spring rest enamelled black.

Remarks. Largely supplied to dealers and shippers. (See advertisement.)

UNIVERSAL PREMIER No. 2.

HILLMAN, HERBERT & COOPER, LIMITED, Premier Works, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 64 and 16 No. 12 direct spokes. 17in. back wheel. G.M. hubs. Cranks, $4\frac{1}{2}$ in. to $5\frac{1}{2}$ in. throw. Rubber plain pedals, $14\frac{1}{2}$ in. tread. Ball bearings to both wheels. Hollow fork and solid back forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. dropped bars. $1\frac{3}{8}$ in. 14 W.G. iron backbone. Bolted sliding spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Spanner and oilcan. Weight 44lbs.



THE UNIVERSAL PREMIER NO. 2.

PRICE.

48in. to 54in. £10.

Sent out with dull-plated handle-bar, head, brake, hubs, cranks, pedals and spring; rest enamelled black.

Remarks.—Built largely for export and the trade. Good value for money. (*See advertisement.*)

UNIVERSAL SPECIAL.

S. GRIFFITHS & SONS, Clyde Works, Heath Town, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{3}{8}$ in. moulded red tyres. Crescent rims. 72 and 24 No. 12 direct spokes. 17in. back wheel. G.M. hubs. Cranks, 5in. to 6in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. T horn handles, 28in. cowhorn bars. 18in. 15 W.G. weldless steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanner and oilcan. Weight 40lbs.

PRICE.

48in. to 54in. £10.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Remarks. A fair article for the money.

UNIVERSAL TIMBERLAKE.

T. TIMBERLAKE & Co., 39, King Street, Maidenhead, Berks.

Description. $1\frac{1}{8}$ in. and $\frac{3}{8}$ in. non-slipping tyres. Crescent rims. 48 and 20 No. 11 direct spokes. 16in. back wheel. $3\frac{1}{2}$ in. G.M. hubs, $10\frac{1}{2}$ in. axle. Cranks, 5in. throw. Rubber plain pedals, $14\frac{1}{2}$ in. tread. Plain bearings to front, cones to back wheel. Solid forks. Stanley head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, bars, 24in. \times $4\frac{1}{2}$ in. $1\frac{1}{2}$ in. steel backbone. Bolted sliding spring. Pigskin saddle. Saw step. D.L.S. brake. Ball-ended leg-guard. Valise, spanners and oilcan. Weight 44lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	8	8	0	52in.	8	16	0
50in.	8	12	0	54in.	9	0	0

Sent out with bright handle-bar, head, hubs, cranks, &c.; rest painted in two colours.

Extras. Bright parts plated, 20/- All-plated, 80/- Lined in gold, 7/6.

Remarks. A strong, plain machine, suitable for rough country work. (See advertisement.)

VICTORIA.

NATHANIEL DAVIES, 21, Sherbourne Place, Cheltenham.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 54 and 24 No 11 direct spokes-15in. back wheel. 4in. G.M. hubs. 9in. axle. Cranks, 5in. throw. Rubber coned pedals, 14in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. T horn handles, 28in. \times $4\frac{1}{2}$ in. cowhorn bars. $1\frac{3}{8}$ in. 15 W.G. steel backbone. Bolted Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, bell, spanners and oilcan. Weight 48lbs.

PRICES.

	£	s.	d.		£	s.	d.
48in.	8	8	0	52in.	10	10	0
50in.	9	9	0	54in.	11	11	0

Sent out with bright handle-bar, head, hubs, cranks and spring; rest painted in two colours.

Extras. Ball pedals, 10/-.

Remarks. A strong, plainly-finished article at a moderate figure.

VICTOR EXCELSIOR.

BAYLISS, THOMAS & Co., Excelsior Works, Lower Ford Street, Coventry.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 68 and 24 No. 13 butt-ended direct spokes. 18in. back wheel. Steel hubs. Detachable cranks, 5in. to 6in. throw. Rubber coned pedals, 13in. tread. Double ball bearings to front, balls to back wheel. Fluted hollow front and back forks. Duplex open head, $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. hollow cowhorn bars. $1\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Bolted Victor spring. Brooks's saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 36lbs.

Specialties. Victor spring (page 68). Duplex open head.

PRICES.

	£	s.	d.		£	s.	d.
48in.	15	10	0	52in.	16	10	0
50in.	16	0	0	54in.	17	0	0

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled in two colours.

Remarks.—One of the most thorough roadsters running. Strongly built, reliable and substantial, and withal neat. (See advertisement.)



THE VICTOR EXCELSIOR.

VICTOR EXCELSIOR RACER.

BAYLISS, THOMAS & Co., Lower Ford Street, Coventry.

Description. $\frac{1}{8}$ in. and $\frac{3}{8}$ in. grey tyres. Warwick's hollow rims, No. 15 true tangent spokes. 16in. back wheel. Steel hubs. Cranks, 5in. to 6in. throw. Rat-trap ball pedals, 12in. tread. Ball bearings to both wheels. Hollow fluted front and back forks. Stanley head, 4in. centres. T horn handles, 28in. hollow cowhorn bars. $1\frac{3}{8}$ in. elliptical 17 W.G. weldless steel backbone. Racing saddle. Spanners and oilcan. Weight 21lbs.

PRICE.

48in. to 58in. £18.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled black.

Remarks. Built specially for racing purposes, with very tangential spokes. (See advertisement.)

VICTOR LIGHT ROADSTER.

BAYLISS, THOMAS & Co., Excelsior Works, Lower Ford Street, Coventry.

Description. $\frac{3}{8}$ in. and $\frac{1}{2}$ in. best grey tyres. Warwick's hollow rims. 64 and 24 No. 13 tangent spokes. 18in. back wheel. $3\frac{1}{2}$ in. steel hubs, $7\frac{1}{2}$ in. axle. Cranks, 5in. throw. Rat-trap ball pedals, 12in. tread. Æolus ball bearings to both wheels. Hollow front, and semi-hollow back forks. Open head, $4\frac{1}{2}$ in. centres. T horn handles, 28in. hollow cowhorn bars. $1\frac{3}{8}$ in. elliptical 16 W.G. weldless steel backbone. Bolted sliding spring. Brooks's B20 saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 30lbs.

S



THE VICTOR LIGHT ROADSTER.

PRICE.

48in. to 54in. £18.
 Sent out with plated handle-bar, head, hubs, cranks, spring and spokes; rest enamelled in two colours.

Remarks. A very fine machine in every way. Admirably suited for fast road work in the hands of good riders, and for occasional racing. (See advertisement.)

WHITEHALL.

J. P. DALBY, Whitehall Tricycle Works, Leeds.

Description. $\frac{3}{4}$ in. and $\frac{2}{3}$ in. moulded red tyres. Crescent rims. 64 and 24 No. 12 direct spokes. 17in. back wheel. 4 $\frac{1}{2}$ in. G.M. hubs. 8in. axle Cranks, 5 $\frac{1}{2}$ in. throw. Rubber plain pedals, 12 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped horn handles, cowhorn bars, 26in. x 4in. 1 $\frac{3}{8}$ in. elliptical 15 W.G. weldless steel backbone. Bolted sliding spring. Eclipse saddle. Saw step. D.L.S. brake. Free-ended leg-guard. Spanner and oilcan. Weight 42lbs.

PRICES.

48in.	£10 10 0	52in.	£11 0 0
50in.	10 15 0	54in.	11 5 0

Sent out with bright hubs, plated head and brake; rest painted in three colours.
Extras. Ball pedals, 15/-. Hollow rims, 15/-. Plated hubs, cranks and pedals 20/-. Cradle spring, 5/-

Remarks. Soundly built, with a view to use on rough Yorkshire roads.

WHITMORE No. 2.

SAMUEL LLOYD, Great Hampton Works, Church Lane, Wolverhampton.

Description. 7/8 in. and 3/4 in. red tyres. Crescent rims. 60 and 20 No. 10 direct spokes. 16 in. back wheel. 4 1/2 in. G.M. hubs, 9 in. axle. Cranks, 5 1/2 in. throw. Rat-trap plain pedals, 14 in. tread. Ball bearings to front, cones to back wheel. Solid forks. Stanley head, 4 in. centres. Pear-shaped horn handles, 28 in. bars. 1 3/4 in. backbone. Bolted sliding spring. Web-seated saddle. Saw step. Valise, bell, spanner and oilcan. Weight 42 lbs.

PRICE.

48 in. to 54 in. £6 15s.

Sent out all bright.

WHITMORE No. 3.

SAMUEL LLOYD, Great Hampton Works, Church Lane, Wolverhampton.

Description. 7/8 in. and 3/4 in. red tyres. Crescent rims. Direct spokes. 16 in. back wheel. 4 1/2 in. G.M. hubs, 9 in. axle. Cranks, 5 1/2 in. throw. Rat-trap plain pedals, 14 in. tread. Plain Sheffield T bearings to front, cones to back wheel. Solid forks. Stanley head, 4 in. centres. Pear-shaped ebony handles, 28 in. bars. 1 3/4 in. backbone. Bolted sliding spring. Pigskin saddle. Saw step. Valise, bell, spanner and oilcan. Weight 44 lbs.

PRICE.

48 in. to 54 in. £5 10s.

Sent out all bright, or painted in two colours.

WILL-O'-THE-WISP.

FRANK HUCKLEBRIDGE, 4, Lower Sloane Street, Chelsea, London.

Description. 7/8 in. and 3/4 in. moulded red tyres. Crescent rims. 64 and 20 No. 12 direct spokes. 16 in. back wheel. 4 1/2 in. steel hubs, 8 1/2 in. axle. Detachable cranks, 5 in. throw. Rubber plain pedals, 12 1/2 in. tread. Æolus ball bearings to both wheels. Hollow front and back forks. Stanley head, 4 1/2 in. centres. T horn handles. Dropped bars, 26 in. x 3 in. 1 3/4 in. x 1 1/4 in. elliptical 17 W.G. weldless steel backbone. Double-action cradle spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Valise, spanners and oilcan. Weight 38 lbs.

Specialties. Will-o'-the-Wisp non-vibrators—extra (page 157).

PRICES.

48 in.	£15 5 0	|	52 in.	£15 15 0
50 in.	15 10 0	|	54 in.	16 0 0

Sent out with plated handle-bar, head, fork ends, cranks and pedals; rest enamelled in Harrington's enamel.

Extras. Ball pedals, 20/- Will-o'-the-Wisp non-vibrators to back wheel, 15/-.

Remarks. A sound, well-built and reliable article.

WILL-O'-THE-WISP LIGHT ROADSTER.

FRANK HUCKLEBRIDGE, 4, Lower Sloane Street, Chelsea, London.

Description. 7/8 in. and 3/4 in. moulded red tyres. Warwick's hollow rims. 64 and 20 No. 14 laced spokes. 16 in. back wheel. 4 1/2 in. steel hubs, 7 1/2 in. axle. Detachable cranks, 5 in. throw. Rat-trap ball pedals, 12 in. tread. Æolus ball bearings to both wheels. Hollow front and back forks. Stanley head, 4 1/2 in. centres. T horn handles, dropped hollow bars, 26 in. x 3 in. 1 3/4 in. x 1 1/4 in. elliptical 18 W.G. weldless steel backbone. Bolted sliding spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Valise, spanners and oilcan. Weight 30 lbs.

Specialties. Will-o'-the-Wisp non-vibrators—extra (page 157).

PRICES.

48 in.	£17 10 0	|	52 in.	£18 0 0
50 in.	17 15 0	|	54 in.	18 5 0

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled black in Harrington's enamel.

Extras. Will-o'-the-Wisp non-vibrators to back wheel, 15/-.

Remarks. A capital light roadster for good riders on good roads. Any other saddle and spring may be had at same price, but they would add slightly to the weight.

WULFRUNA No. 1.

JOHN BARRATT, St. John's Square, Wolverhampton.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. moulded red tyres. Warwick's hollow rims. 56 and 20 No. 13 tangent spokes. 16in. back wheel. 4in. steel hubs, 8in. axle. Detachable cranks, 5in. to 5 $\frac{1}{2}$ in. throw. Rubber ball pedals, 12 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Trigwell's ball bearing head. T horn handles, 26in. cowhorn bars. 1 $\frac{3}{4}$ in. 17 W.G. weldless steel backbone. Arab cradle spring. Lever tension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, bell, spanner and oilcan. Weight 34lbs.

PRICES.

£ s. d.				£ s. d.			
48in. .. .. .	.. .. .	.. .. .	.. .. .	52in. .. .. .	.. .. .	.. .. .	.. .. .
50in. .. .. .	.. .. .	.. .. .	.. .. .	54in. .. .. .	.. .. .	.. .. .	.. .. .
} 13 10 0				} 14 0 0			

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled black.

Remarks. A really good machine. Very well built, good looking and neat. It forms a good light roadster, and is excellent value for the money. (See advertisement.)

WULFRUNA No. 2.

JOHN BARRATT, St. John's Square, Wolverhampton.

Description. $\frac{7}{8}$ in. and $\frac{3}{4}$ in. red tyres. Crescent rims. 56 and 20 No. 12 direct spokes. 16in. back wheel. 4in. G.M. hubs, 8 $\frac{1}{2}$ in. axle. Cranks, 5 $\frac{1}{2}$ in. throw. Rat-trap coned pedals, 13in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Stanley head, 3 $\frac{3}{4}$ in. centres. T horn handles, 26in. dropped bars. 1 $\frac{3}{4}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Valise, bell, spanner and oilcan. Weight 38lbs.

PRICES.

48in. to 50in.	£8 10s. | 52in. to 54in.	£9.
------------------------	----------------------------------	-----

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

Extras. Ball bearing head, 20/- Ball pedals, 20/-*Remarks.* A sound machine, worth the price asked. (See advertisement.)**WULFRUNA RACER.**

JOHN BARRATT, St. John's Square, Wolverhampton.

Description. $\frac{1}{2}$ in. grey tyres. Warwick's hollow rims. 48 and 20 No. 14 tangent spokes. 16in. back wheel. 3 $\frac{1}{2}$ in. steel hubs, 7 $\frac{3}{4}$ in. axle. Cranks, 5 $\frac{1}{2}$ in. throw. Rat-trap ball pedals, 11 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow back forks. Trigwell's ball bearing head. T horn handles. 26in. hollow cowhorn bars. 1 $\frac{3}{4}$ in. elliptical 18 W.G. weldless steel backbone. Little Gem racing saddle. Spanner and oilcan. Weight 21lbs.

PRICE.

Any size	£13.
------------------	------

Sent out with plated handle-bar, cranks and nuts; rest enamelled black.

Remarks. A good article for the purpose, built by a practical racing man. Mr. Barratt himself races on one, and the machine is used by many professional riders on the Wolverhampton path. (See advertisement.)

YOUTH'S TIMBERLAKE.

T. TIMBERLAKE & Co., 39, King Street, Maidenhead.

Description. $\frac{3}{4}$ in. and $\frac{1}{2}$ in. red tyres. Crescent rims. Direct spokes. 14in. back wheel. G.M. hubs. Cranks, 4 $\frac{1}{2}$ in. to 5in. throw. Rubber plain pedals. Plain bearings to front, cones to back wheel. Solid forks. Stanley head. Pear-shaped horn handles, 20in. bars. Iron backbone. Bolted sliding spring. Pigskin saddle. Saw step. Spanners and oilcan. Weight 36lbs.

PRICE.

40in.	£5 10s.
---------------	---------

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest painted in two colours.

Remarks. A strongly-built article just fit for boys' rough and tumble work. (See advertisement.)

'NEW RAPID' CYCLES

if our machines were not the **very best made** they would not be so extensively imitated. We made our True Tangent Wheel, in 1884, and were awarded a **Gold Medal** for it at the Inventions Exhibition, London, 1885. At that time there was not another True Tangent Wheel in the market. Since then nearly all makers, large and small, have found it necessary to follow us, and have placed inferior imitations on the market, but the **"NEW RAPID"** still leads, and others follow



"Imitation is the most sincere form of flattery."

~~~~~  
**SEND FOR 1887 LISTS.**

**ST. GEORGE'S ENGINEERING CO.,**  
**Pope Street, Birmingham.**

ADVERTISEMENTS.

BY  
SPECIAL WARRANT OF  
APPOINTMENT



TO  
HER MAJESTY  
THE QUEEN.

ROYAL  
SALVO.

Central-gear  
SALVO.

INVALID  
SALVO.



PSYCHO  
SAFETY.

ROYAL  
PSYCHO.

PSYCHO  
TANDEM  
(Convertible).



EDINBURGH EXHIBITION, 1886, "PSYCHO" SAFETY BICYCLE OBTAINED GOLD MEDAL  
(HIGHEST AWARD.)

ILLUSTRATED CATALOGUES FREE.

TELEGRAPHIC ADDRESSES { "SALVO," COVENTRY.  
"PSYCHO," LONDON.

**STARLEY BROS.,**  
**St. John's Works, Coventry.**

LONDON } 21, HOLBORN VIADUCT.  
133, HAMMERSMITH ROAD.

## SECTION II A.

## SAFETY BICYCLES.

WHEN I issued the last edition of this work in 1882, I included a chapter of a few pages only devoted to "Peculiar Bicycles." The Peculiar Bicycles of 1882 have grown into the "Safeties" of to-day, no longer, however, considered "peculiar," as their rapid growth in public favour has made them as common to the eye as the ordinary machine. The rapid rise in popular estimation has naturally stimulated production, and this has been done to an enormous extent, as will be seen by reference to the following pages, in which nearly as many different patterns of the new machine will be found described as of the bicycle proper in the previous pages. In describing the machines the same terms and abbreviations are used as in the descriptions of the ordinary, but for the especial points of the safety bicycle the following explanations are necessary:—

The letters F.D. or R.D. after the name of the machine classifies it at once as either a front-driver or a rear-driven machine, *i.e.*, roughly speaking, as a "Kangaroo" type or "Rover" type safety.

The gearing given is usually the medium of the three standard gears which most makers have, and the intending purchaser may understand that all makers will gear higher or lower as may be desired if specially requested to do so. When the word "curved" is used in connection with the forks it relates only to the front ones. The detachability of the majority of the handle-bars consists in removing from the steering-post the upright pillar, handles and all, and not detachability of the bars alone. When two numbers are given relating to the spokes, the first refers to the front wheel, the second to the back, and when one number only is given, both in spokes and tyres, both wheels may be taken to be similarly equipped. It may be understood by the intending purchaser that most makers will, at slight extra charges in most cases, make desired alterations in detail to order.

## ALBEMARLE No. 1.—F.D.

HOWE MACHINE CO., LD., Bridgeton, Glasgow.

*Description.* 7in. and 7in. moulded red tyres. Crescent rims. 40 and 20 No. 11 butt-ended direct spokes. 27in. G.M. hubs. Cranks, 6½in. throw. Rubber coned pedals, 11in. tread. 38in. driving wheel geared to 52in. 20in. back wheel. Front wheel drives with chain gear. Ball bearings to crank wheels. Morgan's chains. Nut and screw adjustment. Ball bearings to both

wheels. Steering like ordinary bicycle. Forks pass through bearings. 3in. rake. Round hollow front and semi-hollow back forks. Open centre head, 4in. centres. Pear-shaped horn handles, 28in. adjustable detachable cowhorn bars. 1½in. 15 W.G. weldless steel backbone. Bolted scroll spring. Long-distance Eclipse saddle. Circular step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 44lbs.

Price, £17.

Sent out with plated handle-bar, head, hubs, cranks and spokes; rest enamelled in two colours.

*Extras.* Ball pedals, 20/-. Foot rests, 10/-. All plated, 60/-.

*Remarks.* A good machine of its class. (See advertisement.)

### ALBEMARLE No. 2.—R.D.

HOWE MACHINE CO., LD., Bridgeton, Glasgow.

*Description.* ¾in. moulded red tyres. Crescent rims. 32 and 40 No. 13 tangent spokes. 3½in. steel hubs. Detachable cranks, 6in. throw. Rubber coned pedals, 11in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. S.L. chain, front stay adjustment. Ball



THE ALBEMARLE NO. 2.

bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 27½in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 15 W.G. weldless steel tube. Hollow straight seat pillar with split lug adjustment. Spring-fronted scroll spring. Long distance Eclipse saddle. Saw step. Pull-up lever hinged-plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, oilcan. Weight 48lbs.

Price .. .. . £20.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Hollow rims, 20/-. Ball pedals, 20/-.

*Remarks.* A neatly built, nicely finished machine, built on popular lines. (See advertisement.)

**ALBION No. 1.—F.D.**

WARMAN &amp; Co., West Orchard, Coventry.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 36 and 20 No. 11 direct spokes.  $3\frac{1}{2}$ in. steel hubs. Cranks  $6\frac{1}{2}$ in. throw. Rubber ball pedals, 14in. tread. 36in. driving wheel geared to 54in. 20in. back wheel. Front wheel drives with chain gear. Double ball bearings to crank wheels. Renolds's chains, slot and bolt adjustment. Ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings. 3in. rake. Hollow front and semi-hollow back forks. Stanley head,  $6\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. cowhorn bars.  $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Humber scroll spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Mud-guard over back wheel. Valise, spanners and oilcan. Weight 41lbs.

Price .. .. . £16 16s.

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled in two colours

*Remarks:* A good machine of its class.

**ALBION No. 2.—F.D.**

WARMAN &amp; Co., West Orchard, Coventry.

*Description.*  $\frac{3}{4}$ in. red tyres. Crescent rims. 36 and 20 No. 11 direct spokes.  $3\frac{1}{2}$ in. iron hubs. Cranks  $6\frac{1}{2}$ in. throw. Rubber plain pedals, 14in. tread. 36in. driving wheel geared to 54in. 20in. back wheel. Front wheel drives with chain gear. Plain bearings to crank wheels. Renolds's chains, slot and bolt adjustment. Plain bearings to driving wheel, cones to back. Steering like ordinary bicycle. Forks pass through bearings. 3in. rake. Hollow front and solid back forks. Stanley head,  $6\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. cowhorn bars.  $1\frac{3}{8}$ in. 16 W.G. steel backbone. Bolted sliding spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 44lbs.

Price .. .. . £11.

Sent out with plated handle-bar, head, hubs, cranks and pedals; rest enamelled black.

**ANTELOPE.—R.D.**

THOMAS TIMBERLAKE &amp; Co., King Street, Maidenhead, Berks.

*Description.*  $\frac{3}{4}$ in. moulded red wire-coupled tyres. Crescent rims. Direct spokes. G.M. hubs. Fixed cranks, 6in. throw. Rubber plain pedals. 36in. driving wheel geared to 56in. 20in. steerer. Rear wheel drives with chain gear. Abingdon chain, hinged bracket adjustment. Æolus ball bearings to both wheels and cranks. Antelope link steering. Semi-hollow front and hollow back forks. Stanley head,  $3\frac{1}{2}$ in. centres. Pear-shaped handle-grips, bars bent round behind and at side of rider, hollow, detachable and adjustable. Species of cross frame of  $1\frac{1}{2}$ in. 16 W.G. weldless steel tube. Hollow straight seat-pillar, with side bolt adjustment. Townsend's combination spring and saddle. Spoon brake on back wheel. Mud-guards over both wheels. Spanner and oilcan. Weight 40lbs.

*Specialties.* Antelope patent steering (page 62). Wire-coupled tyres.

Price .. .. . £17 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks and pedals; rest enamelled.

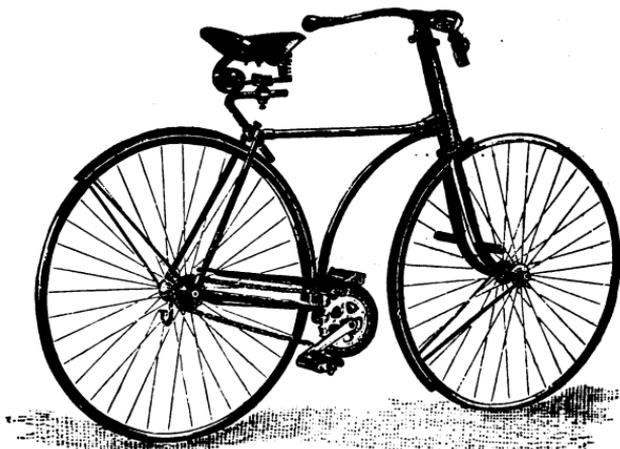
*Remarks.* The special feature of this machine is that it has an entirely open front, there being no cross bar in front of the rider. Mounting is done from the front, with a push off from one foot. (See advertisement.)

**APOLLO.—R.D.**

SINGER &amp; Co., Challenge Works, Alma Street, Coventry.

*Description.*  $\frac{3}{4}$ in. Otto's corrugated wired tyres. Crescent rims. 36 No. 12 butt-ended direct spokes.  $2\frac{3}{8}$ in. steel hubs. Detachable cranks,  $5\frac{1}{2}$ in. to  $6\frac{1}{2}$ in.

throw. Rubber coned pedals, 12in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, screw adjustment. Double ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. Socket head. Elliptical handle grips. 30in. bent back, hollow, detachable, adjustable bars. Parallelogram frame of weldless steel tube.  $\Gamma$  seat pillar, with side bolt



THE APOLLO.

adjustment. Townsend's combination spring and saddle. Circular step. Pull-up lever hinged plunger spoon brake on front wheel. Mud-guards over both wheels and chain. Foot-rests on fork sides. Spanner and oilcan. Weight 48lbs.

*Specialties.* Otto's corrugated wired tyres (*page 132.*) Crank bearings. Challenge pedals, extra (*page 18.*)

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, spokes, hubs, cranks, and pedals; rest enamelled black.

*Extras.* Ball pedals, 15/-. Challenge pedals, 6/-. Cradle spring, 6/.  $\frac{3}{4}$ in. tyres, 7/6 per wheel.

*Remarks.* A capital hill-climber, very strong, and runs with ease and freedom. It is made with either muchly curved or straight forks, but from experience I recommend the latter, as being the easier to steer. (*See advertisement.*)

### ASHTON.—R.D.

ASHTON BROS., 13 and 15, London Road, Clapton, London.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. Direct spokes. Steel hubs. Fixed cranks, 6 $\frac{1}{2}$ in. throw. Rubber ball pedals. 30in. driving wheel geared to 52in. 30in. steerer. Rear wheel drives with chain gear. S. L. chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. American hinged head, 5in. centres. Elliptical handle-grips, 30in. bent back hollow, detachable, adjustable bars. Cross frame of 1 $\frac{1}{2}$ in. weldless steel tube. Hollow straight seat pillar with split lug adjustment. Townsend's combination spring and saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Spanner and oilcan. Weight 47lbs.

Price .. .. . £16.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks and pedals; rest enamelled black.

**BEDFORD.—R.D.**

G. WOOTTON, Gwyn Street, Bedford.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. 34 No. 13 and 40 No. 12 direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Detachable cranks, 6in. throw. Rat-trap ball pedals,  $10\frac{1}{2}$ in. tread. 30in. driving wheel geared to 58in. 30in. steerer. Rear wheel drives with chain gear. S.L. chain, slot and screw adjustment. Æolus ball bearings to both wheels, parallel to cranks. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. Stanley head. Pear-shaped handle-grips, 3in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{3}{4}$ in. 18 W.G. weldless steel tube. Hollow straight seat pillar with split lug adjustment. Spring-fronted scroll spring. Long-distance suspension saddle. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 35lbs.

Price .. .. . £15.

Sent out with plated handle-bar, head, spring, and cranks; rest painted in two colours.

*Remarks.* A light machine of the popular type, built for fast work on good roads.

**BERRYMEAD.—R.D.**

THOS. R. DIX, Churchfield Road, Acton, London, W.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. Direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Detachable cranks,  $6\frac{1}{2}$ in. throw. Rubber plain pedals,  $11\frac{1}{2}$ in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted fork end and screw adjustment, Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. 16 W.G. weldless steel tube. [ seat pillar with side bolt adjustment. Townsend's combination spring and saddle. Round step. Pull-up lever plunger spoon brake on front wheel. Mud-guards over both wheels and chain. Lamp bracket. Spanner and oilcan. Weight 35lbs.

*Specialties.* Items in general construction.

Price .. .. . £17 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 15/-

*Remarks.* A thoroughly well-built machine in every way, with many individual points of peculiarity in its construction. A good machine of its type, and may be relied on.

**BICYCLETTE.—R.D.**

D. RUDGE &amp; CO., LIMITED, Spon Street Works, Coventry.

*Description.*  $\frac{3}{4}$ in. and  $\frac{7}{8}$ in. moulded red tyres. Crescent rims. 36 and 40 No. 12 direct spokes.  $2\frac{1}{2}$ in. steel hubs. Detachable cranks,  $4\frac{1}{2}$ in. to 6in. throw. Rubber plain pedals. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, hinged bracket adjustment. Rudge's ball bearings to both wheels and cranks. Direct steering, sloping steering post. Curved semi-hollow front and back forks. American hinged head, 7in. centres. Pear-shaped handle-grips, 30in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. steel tube. Hollow straight seat pillar with slot and bolt adjustment. Spring-fronted scroll spring. Lever tension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, duster, spanner and oilcan. Weight 46lbs.

*Specialties.* Special patent form of chain adjustment. Rudge's folding handle-bar (page 168). Rudge's spring forks—extra (page 155.) Rudge's ball bearings (pages 36 and 41).

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.



THE BICYCLETTE.

*Extras.* Ball pedals, 20/-. Spring fork, 10/-. Hollow rims, 20/-.

*Remarks.* A machine of fine build and first-class finish. Strong and easy running. The folding handle-bar enables it to be stowed away in a very small space.

#### BIRKBECK.—R.D.

CHAS. SNOW, Birkbeck Cycle Works, Birkbeck Road, Kingsland, London, E.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 36 No. 12 direct spokes. G.M. hubs. Detachable cranks,  $6\frac{1}{2}$ in. throw. Rubber ball pedals, 12in. tread. 30in. driving wheel geared to 56in. 32in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, front stay adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. American hinged head, 5in. centres. Elliptical handle-grips, 30in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{4}$ in. 14 W.G. weldless steel tube. Hollow straight seat pillar, with split lug adjustment. Arab cradle spring. Buffer saddle. Saw step. Double-lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, and oilcan. Weight 46lbs.

Price .. .. . £16 10s.

Sent out with plated handle-bar, stay rods, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Remarks.* This machine is built on the popular lines, and the frame is provided with three strengthening stays.

#### BRITISH MAIL.—R.D.

THOS. SMITH & SONS, LD., Saltley Mills, Adderley Road, Birmingham.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 40 No. 12 direct spokes.  $2\frac{3}{8}$ in. G.M. hubs. Detachable cranks,  $6\frac{1}{2}$ in. throw. Rubber coned pedals. 30in. driving wheel geared to 54in., 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain. Slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct-steering sloping steering post. Hollow front and back forks. American hinged head, 5in. centres. Elliptical

handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 16 W.G. weldless steel tube. Hollow  $\Gamma$  seat pillar with side bolt adjustment. Arab cradle spring. Long-distance suspension saddle. Saw step. Pull-up lever hinged plunger spoon brake on front wheel. Mud-guards over both wheels and chain. Valise, spanner and oilcan. Weight 50lbs.

Price .. .. . £16 16s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, chain, wheel, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/-.

*Remarks.* A good, sound article, supplied wholesale to many dealers, both in England and the Continent.

#### BRITISH STAR.—R.D.

GUEST & BARROW, Speedwell Works, 277-8-9 and 80, Broad Street, Birmingham.

*Description.* ¾in. non-slipping tyres. Crescent rims. No. 11 direct spokes. G.M. hubs. Detachable cranks. Rubber coned pedals. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Guest's direct steering, vertical steering post. Hollow front and back forks American hinged head, 5in. centres. Pear-shaped handle-grips, 29in. curved detachable, adjustable bars. Guest's spring frame. Hollow  $\Gamma$  seat pillar, with side bolt adjustment. Long-distance suspension saddle. Saw step. Double lever hand brake on back wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 48lbs.

*Specialties.* Non-vibrating spring frame (*page 162*). Special steering gear (*page 170*).

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Remarks.* A machine with strong points of its own, the frame working on a spring, which reduces vibration considerably, thus making it admirably adapted for use on rough roads.

#### BROOKES No. 1.—R.D.

J. & H. BROOKES, Cape Works, near Birmingham.



THE BROOKES NO. 1.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 40 No. 12 butt-ended direct spokes.  $2\frac{1}{2}$ in. steel hubs. Fixed cranks,  $5\frac{1}{2}$ in. to 7in. throw. Rubber plain pedals, 12in. tread. 30in. driving wheel geared to 54in. 32in. steerer. Rear wheel drives with chain gear. Renolds's Humber-pattern chain, Globe hinged bracket adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 4in. centres. Elliptical handle-grips, 24in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. 15 W.G. weldless steel tube. Hollow straight seat pillar with side bolt adjustment. Double scroll spring. Suspension saddle. Saw step. Globe concealed plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 36lbs.

*Specialties.* Globe chain adjustment (*page* 141.) Globe concealed plunger brake (*page* 178).

Price .. .. . £16.

Sent out with plated handle-bar, brake fittings, seat pillar, spring, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/-

*Remarks.* A good machine, with several special features in its construction. The chain is easily adjusted, and the brake very neat and powerful. Built as a racer it holds many records. (*See advertisement.*)

### BROOKES No. 2.—R.D.

J. & H. BROOKES, Cape Works, near Birmingham.

*Description.*  $\frac{3}{4}$ in. grey tyres. Crescent rims. 40 No. 12 butt-ended direct spokes.  $2\frac{1}{2}$ in. steel hubs. Fixed cranks,  $5\frac{1}{2}$ in. to 7in. throw. Rubber plain pedals. 30in. driving wheel geared to 54in. 32in. steerer. Rear wheel drives with chain gear. Renolds's Humber pattern chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 4in. centres. Elliptical handle-grips, 24in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. 15 W.G. weldless steel tube. Hollow straight seat pillar with side bolt adjustment. Spring-fronted scroll spring. Suspension saddle. Saw step. Globe concealed plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 40lbs.

*Specialties.* Globe concealed brake (*page* 178).

Price .. .. . £13 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, spring, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/-

*Remarks.* A capital machine at its price. Plainer in finish than the No. 1. (*See advertisement.*)

### CAMBRIAN DWARF No. 1.—F.D.

MORRIS BROS., Crockherbtown, Cardiff.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 48 and 24 No. 12 direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Detachable cranks, 5in. to  $6\frac{1}{2}$ in. throw. Rubber plain pedals,  $13\frac{1}{2}$ in. tread. 36in. driving wheel geared to 54in. 20in. back wheel. Front wheel drives with chain gear. Bown's (Edge's patent) bearings to crank wheels. S.L. chains. Slot and bolt adjustment. Æolus ball bearings to both wheels and cranks. Steering like ordinary bicycle. 3in. rake. Hollow front and semi-hollow back forks. Stanley head,  $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 27in. cowhorn bars.  $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Cambrian spring. Long-distance suspension saddle. Circular step. D.L.S. brake. Mud-guard to back wheel. Leg-guard. Valise, spanners and oilcan. Weight 50lbs.

*Specialties.* Cambrian spring (*page* 71).

Price .. .. . £17.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest painted in three colours.

*Extras.* Ball pedals, 12/6.

*Remarks.* A soundly constructed machine.



THE CAMBRIAN DWARF

**CAMBRIAN DWARF No. 2.—F.D.**

MORRIS BROS., Crockherbtown, Cardiff.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 48 and 24 No. 12 direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Detachable cranks, 5in. to  $6\frac{1}{2}$ in. throw. Rubber plain pedals,  $13\frac{1}{2}$ in. tread. 36in. driving wheel geared to 54in. 20in. back wheel. Front wheel drives with chain gear. Bown's (Edge's patent) ball bearings to crank wheels. S.L. chains. Slot and bolt adjustment. Ball bearings to both wheels and cranks. Steering like ordinary bicycle. 3in. rake. Solid forks. Stanley head,  $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 27in. cowhorn bars.  $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Cambrian spring. L.D. suspension saddle. Circular step. D.L.S. brake. Mud-guard to back wheel. Leg-guard. Valise, spanners and oilcan. Weight 53lbs.

*Specialties.* Cambrian spring page 71).

Price .. .. . £14.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest painted in three colours.

*Remarks.* Very strong.

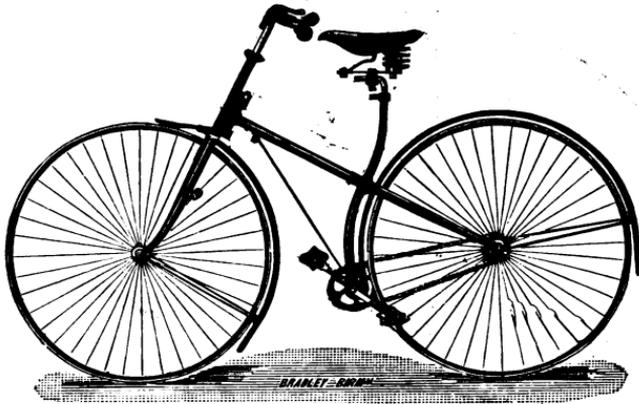
**CAMBRIAN No. 1.—R.D.**

MORRIS BROS., Crockherbtown, Cardiff.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 40 No. 12 direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Fixed cranks, 5in. to  $6\frac{1}{2}$ in. throw. Rubber plain pedals, 12in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. S.L. chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. American hinged head,  $5\frac{1}{2}$ in. centres. Pear-shaped handle-grips, 27in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{3}{8}$ in. 16 W. G. weldless steel tube. Hollow  $\Gamma$  seat pillar with side bolt adjust-

ment. Cambrian spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 45lbs.

*Specialties.* Cambrian spring (page 71).



THE CAMBRIAN,

Price .. .. . £17 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks, and pedals; rest painted in three colours.

*Remarks.* A strong, soundly-built article of the most popular type.

### CAMBRIAN No. 2.—R.D.

MORRIS BROS., Crockherbtown, Cardiff.

*Description.*  $\frac{3}{4}$ in. red tyres. Crescent rims. 40 No. 12 direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Fixed cranks, 5in. to  $6\frac{1}{2}$ in. throw. Rubber plain pedals. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. S. L. chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Solid curved front and solid back forks. American hinged head,  $5\frac{1}{2}$ in. centres. Pear-shaped handle-grips, 27in. bent back, detachable, adjustable bars. Cross frame of  $1\frac{3}{4}$ in. 16 W. G. steel tube. Hollow  $\Gamma$  seat pillar with side bolt adjustment. Cambrian spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 50lbs.

*Specialties.* Cambrian spring (page 71).

Price .. .. . £15.

Sent out with plated handle-bar and seat pillar; rest painted in two colours.

### CARVER.—R.D.

JAMES CARVER, Alfred Street Mills, Nottingham.

*Description.*  $\frac{3}{4}$ in. non-slipping tyres. Warwick's hollow rims. 40 No. 14 direct spokes. G.M. hubs. Fixed cranks, 6in. throw. Rubber ball pedals. 30in. driving wheel geared to 58in. 30in. steerer. Rear wheel drives with chain gear. Carver Abingdon-style chain. Slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 6in. centres. Elliptical handle-grips, 28in. bent back, hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. No. 14 W. G. steel tube. Hollow seat pillar with slot and bolt adjustment. Townsend's combination spring and saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Bell, spanner and oilcan. Weight 41lbs.

Price .. .. . £17 10s.

Sent out with plated handle-bar and pedals; rest enamelled in colours.

*Extras.* Lamp, 12/6.

*Remarks.* Finely made and finished. All parts of machine made on the premises. A good machine of the popular type.

### CENTRAL OTTO.

E. C. F. OTTO, 48, Hatton Garden, London.

*Description.* This machine differs so entirely from every other cycle, it cannot be described in the same brief manner. Its two wheels—46in. to 56in. to order, 7in. Otto's corrugated wire tyres, crescent rims, 60 No. 14 butt-ended direct spokes, 3½in. phosphor bronze hubs—are arranged side by side like the carrying wheels of a tricycle, and not in line like those of other bicycles. These wheels are mounted on the ends of a long axle, which is divided in the centre and the two portions connected by Otto's patent spring clutch contained in a box around which a chain—Abingdon—passes, by which the power is conveyed from the cranks. The frame is of weldless steel tube, and consists of a bridge supported by the axle and carrying a stout tube forwards, on which the crank bracket is fixed, a light curved tube forming a safety tilt-rod at the back and side lugs carrying the steering handles, which are like those of a tricycle of the side-steering type, and the seat is supported on an upright pillar, adjustable for height. Both wheels are driven by the driving gear, 6in. cranks being used, with rubber coned pedals, and geared to 56in. or any height ordered. Ball bearings are fitted to the axle and cranks, and the steering is done by turning the respective steering handle towards the side the rider wishes to go, which movement disconnects partly or wholly one wheel from the other, thus for the moment causing the machine to be driven by one wheel only, with the result that the wheel which is driven drives round the other which is unpropelled. The handles are horn, of the spade variety, the Otto special spring and saddle are fitted, and both wheels are fitted with brakes applied by finger grips on each handle. Mud-guards are fitted over the frontal bone and crank bracket, and machine sent out with spanners to fit, and with steering gear, seat-spring, cranks and pedals plated and the rest enamelled. The weight of the specially light pattern is 55 lbs. of the heavier form 75lbs.

Price .. .. . £25 4s.

*Extras.* Hollow rims, 21/-; ball pedals, 10/6.

*Remarks.* The whole machine is unique and a speciality in itself. The balance to be learned is a forward and backward one and not a side one. It is wonderfully free from vibration, there being no little wheel. The new pattern above described differs vastly from the original machine described in my previous edition, is but half the weight, and is much simpler, whilst not the least important improvement that has been made is the new steering gear, which does not require the brake to be brought into play for steering purposes, and consequently back pedalling downhill does not affect the steering. The distinctive name of "Dicycle" has been given this style of machine to distinguish it from the bicycle as commonly understood. (*See advertisement for illustration.*)

### CHARM.—R.D.

W. H. J. GROUT, 7, Watson Street, Stoke Newington Green, London, N.

*Description.* ¾in. moulded red tyres. Warwick's hollow rims. 36 No. 12 direct spokes. 3in. G.M. hubs. Detachable cranks, 7in. throw. Rubber coned pedals. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slide and bolt adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Automatic steering. Hollow curved front and hollow back forks. American hinged head, 5in. centres. Elliptical handle-grips, 28in. bent back, adjustable bars. Cross frame of 1½in. 14 W.G. weldless steel tube. Hollow straight seat pillar, with split lug adjustment. Arab cradle spring. Long-distance suspension saddle

T

Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Bell, valise, spanner and oilcan. Weight, 46lbs.

Price .. .. . £16 16s.

Sent out with plated handle-bar, brake fittings, and cranks; rest enamelled black.

*Extras.* Ball pedals, 20/- Non-vibrating handles, 10/-

*Remarks.* Mr. Grout is one of the oldest makers in the trade, and knows how to build a machine.

### CLAVIGER B.—R.D.

CLAVIGER CYCLE CO., New Bridge Street, Mary Street, Strangeways, Manchester.

*Description.* Moulded red tyres. Crescent rims. 24 and 46 No. 12 direct spokes. 3½in. G.M. hubs. Cylindrical rubber pedals, adjustable horizontally and vertically. 36in. driving wheel with gearing adjustable from 48in. to 60in. 22in. steerer. Rear wheel drives with Claviger levers and sun and planet gear. Ball bearings to both wheels. Direct steering, sloping steering post. Semi-



THE CLAVIGER B.

hollow front and hollow back forks. Tubular head, 10in. raked centres. Pear-shaped handle-grips, 27in. bent back hollow, detachable, adjustable bars. Special frame of 1½in. 15 W.G. weldless steel tube. Arab cradle spring. Long-distance suspension saddle. Round step. Double lever spoon brake on rear wheel. Mud-guards over both wheels. Spare set of planet wheels. Footrests. Valise, spanner and oilcan. Weight 48lbs.

*Specialties.* Claviger driving gear (*page 144*). Steering, frame and general design.

Price .. .. . £21.

Sent out with plated handle-bar, brake fittings, and pedals; rest enamelled in two colours.

*Extras.* Different sizes of planet wheels, 15/- per set.

*Remarks.* This is a peculiar machine, with many points of special construction. It is well built of good material, and has an undeniably powerful driving action with no dead point on the downward stroke. (*See advertisement.*)

**CLAVIGER D No. 2.—R.D.**

CLAVIGER CYCLE CO., New Bridge Street, Mary Street, Strangeways, Manchester.

*Description.* Moulded red tyres. Crescent rims. 30 No. 12 direct spokes. 3½in. G.M. hubs. Double rubber rocking pedals, 12in. tread. 34in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with Claviger levers and sun and planet gear. Ball bearings to both wheels, and ball sockets to all joints.



THE CLAVIGER D NO. 2.

Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. American hinged head, 6in. centres. Pear-shaped handle-grips, 27in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 15 W.G. weldless steel tube, minus usual lower chain wheel and crank bracket and tube. seat pillar with side bolt adjustment. Townsend's combination spring and saddle. Two steps. Double lever spoon brake on front wheel. Mud-guards over both wheels. Footrests. Valise, spanner and oilcan. Weight 48lbs.

*Specialties.* Claviger driving gear (page 144).

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, cranks and pedals; rest enamelled in two colours.

*Remarks.* A machine of simple build, with peculiar and powerful driving action, and recommended by the makers to novices who have not got used to the rotary foot motion. Soundly constructed and reliable. (See advertisement.)

**CLAVIGER D No. 3.—R.D.**

CLAVIGER CYCLE CO., LIMITED, New Bridge Street, Mary Street, Strangeways, Manchester.

*Description.*—Moulded red tyres. Crescent rims. 30 and 36 No. 12 direct spokes. 3½in. G.M. hubs. Double rubber rocking pedals, 12in. tread. 30in. driving wheel geared to 56 and 60in. 30in. steerer. Rear wheel drives with Claviger lever and sun and planet gear. Ball bearings to both wheels. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. American hinged head, 6in. centres. Pear-shaped handle-grips, 27in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 15 W.G. weldless steel tube, minus usual lower portion. seat pillar, with side bolt adjustment. Townsend's combination spring and saddle. Round step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Footrests. One change of gear. Valise, spanner, and oilcan. Weight 46lbs.

*Specialties.*—Claviger driving gear (page 144).

Price .. .. . £19 10s.

Sent out with plated handle-bar, brake fittings, cranks, and pedals; rest enamelled in two colours.

*Remarks.* A crank and one gear wheel are carried by each of the rear forks, and the spur wheels gear with spur wheels on the driving wheel axle. The pedals move the opposite way round to those on Claviger D No. 2. This machine is recommended to those who have already learnt the ordinary rotary motion. A very powerful backward stroke may be made along the lower loop of the pedal orbit, in addition to and following after the powerful downward stroke. (*See advertisement.*)

### CLAVIGER F.

CLAVIGER CYCLE CO., LIMITED, New Bridge Street, Mary Street, Strangeways, Manchester.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. non-slipping tyres. Warwick's hollow rims. Direct spokes.  $3\frac{1}{2}$ in. G.M. hubs. 10in. axle. Detachable cranks. Double rubber rocking pedals, with vertical adjustment, 11in. tread. 50in. driving wheel. 22in. back wheel. Front wheel drives with Claviger lever gear. Hollow levers. Ball bearings to both wheels. Steering like ordinary bicycle. Hollow front and semi-hollow back forks. Stanley head, ball centres. Elliptical horn handles,



THE CLAVIGER F.

27in. hollow cowhorn bars. Warwick's new tapered weldless steel backbone. Townsend's combination spring and saddle. Saw step. D.L.S. brake. Mud-guard on back wheel. Leg-guard. Valise, spanners, and oilcan. Weight, 46lbs. *Specialties.* Roller Claviger driving gear (*page 147*).

#### PRICES.

44in. to 50in. .. .. £20 | 52in. to 60in. .. .. £21  
Sent out with plated handle-bar, head, hubs, cranks, and spring; rest enamelled black.

*Remarks.* The pedal orbit is elliptical, without dead points, and within the wheel base. The main part of the stroke is in a straight line, almost vertically under the rider, but allowing for all the ankle action that can be put in at ordinary speed. The velocity of the pedal is so much less than that of the ordinary rotary as to give the impression that the machine is geared up. A "special" quality of the same machine, equally well made, but differing in the fittings, is built at £15 and £16. (*See advertisement.*)

### COGENT No. 18.—R.D.

HENRY CLARKE, Darlington Street, Wolverhampton.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. grey tyres. Crescent rims. 40 No. 11 direct spokes. G.M. hubs. Fixed cranks, 6in. to  $6\frac{1}{2}$ in. throw. Rubber coned pedals. 30in.

driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Reliance chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. American hinged head, with ball cupped centres. Elliptical handle-grips, 30in. bent back detachable, adjustable bars. Cross frame of 14



THE COGENT NO. 18.

W.G. steel tube. Hollow straight seat pillar, with side bolt adjustment. S spring. Long-distance suspension saddle. Sawstep. Double lever spoon brake on front wheel. Mud-guards over both wheels. Bell, valise, footrests, lamp bracket, spanner and oilcan. Weight 42lbs.

*Specialties.* Ball centre steering.

Price .. .. . £12 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks, pedals, and nuts; rest enamelled black.

*Extras.* Ball pedals, 20/-

*Remarks.* A very good article for the money. (See advertisement.)

### COMMERCIAL.—F.D.

A. ROBINSON, Hospital Street, Wolverhampton.

*Description.*  $\frac{3}{4}$ in. and  $\frac{1}{2}$ in. red tyres. Crescent rims. 52 and 20 No. 11 direct spokes.  $\frac{3}{4}$ in. G.M. hubs. 11in. axle. Cranks  $\frac{4}{8}$ in. to  $\frac{5}{8}$ in. throw. Rubber ball pedals, 15in. tread. 40in. driving wheel geared to 52in. 18in. back wheel. Front wheel drives with chain gear. Ball bearings to crank wheels. Morgan's chains. Ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings. 3in. rake. Hollow front and back forks. Stanley head,  $\frac{4}{8}$ in. centres. Pear-shaped horn handles, 26in. cowhorn bars.  $1\frac{1}{2}$ in. steel backbone. Bolted sliding spring. Suspension saddle. Saw step. D.L.S. brake. Leg-guard. Valise, lamp, spanner, spoke-tightener and oilcan. Weight 46lbs.

Price .. .. . £12.

Sent out with bright handle-bar, head, hubs and cranks; rest enamelled black.

*Extras.* Bright parts plated, 20/-

*Remarks.* An ordinary dwarf.

### COURIER.—R.D.

MAYNARD HARRIS & Co., 127, Leadenhall Street, London.

*Description.*  $\frac{3}{4}$ in. grey tyres. Crescent rims. 40 and 20 direct spokes. Steel hubs. Detachable cranks, 5in. to  $6\frac{1}{2}$ in. throw. Rubber coned pedals. 36in. driving wheel geared to 60in. 27in. steerer. Rear wheel drives with chain gear. Abingdon chain, slot and bolt adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Curved solid front and hollow back forks. Socket head. Elliptical handle-grips, dropped and bent back adjustable bars. Frame, as illustration, of rin. steel tube. Double seat pillar, with side bolt adjustment. Arab cradle spring. Suspension saddle. Saw step.

Double lever spoon brake on back wheel. Mud-guards over both wheels. Valise spanner, and oilcan. Weight 45lbs.

*Specialties.* Frame. Position of rider and general plan of machine. Jones's swing frame, extra (*page 162*).



THE COURIER.

Price .. .. . £20.

Sent out with plated handle-bar, brake fittings, hubs, and pedals; rest enamelled black.

*Extras.* Ball pedals, 21/-. Swing frame, 50/-.

*Remarks.* The rider is placed well over the driving wheel, and there is very little weight on the steerer. When fitted with the swing frame the best points of the machine are brought out, and the weight utilised to the utmost for driving.

#### COVENTRY IMPERIAL No. 8.—F.D.

HUMBER & Co., LIMITED, Imperial Works, Whitefriars Lane, Coventry.

*Description.*  $1\frac{1}{8}$ in. and  $\frac{3}{4}$ in. red tyres. Crescent rims. 48 and 20 No. 12 direct spokes.  $3\frac{1}{4}$ in. G.M. hubs. Cranks  $6\frac{1}{4}$ in. throw. Rubber coned pedals,  $12\frac{1}{4}$ in. tread. 36in. driving wheel geared to 52in. 18in. back wheel. Front wheel drives with chain gear. Parallel bearings to crank wheels. Morgan's chains, slot and bolt adjustment. Ball bearings to driving wheel, cones to back. Steering like ordinary bicycle. Solid forks. Stanley head, 4in. centres. Pear-shaped horn handles, 25in. cowhorn bars.  $1\frac{3}{8}$ in. 14 W.G. steel backbone. Bolted scroll spring. L.D. suspension saddle. Saw step. D.L.S. brake. Mud-guard to back wheel. Leg-guard. Valise, spanners, and oilcan. Weight 44lbs.

Price .. .. . £10.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled black.

*Extras.* Ball pedals, 20/-.

*Remarks.* Built in large quantities for the trade and Continental markets. Strong, plain, and worth the price asked. (*See advertisement.*)

#### COVENTRY IMPERIAL No. 9.—R.D.

HUMBER & Co., LIMITED, Imperial Works, Whitefriars Lane, Coventry.

*Description.*  $1\frac{1}{8}$ in. moulded red tyres. Crescent rims. 44 No. 12 direct spokes.  $3\frac{1}{4}$ in. G.M. hubs. Detachable cranks,  $6\frac{1}{4}$ in. throw. Rubber coned pedals. 32in. driving wheel geared to 52in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and back forks, and parallel oval hollow forks to support crank bracket. American hinged head, 5in. centres. Pear-shaped handle-grips, 25in. bent back hollow, detach-

able, adjustable bars. Cross frame of 1 $\frac{3}{8}$ in. 16 W.G. weldless steel tube.  $\Gamma$  seat pillar, with side bolt adjustment. Spring-fronted scroll spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, and oilcan. Weight 47lbs.

*Specialties.* Frame.



THE COVENTRY IMPERIAL NO. 9.

Price .. .. . £18.  
Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/-

*Remarks.* A well-finished, good-looking article. (See advertisement.)

#### COVENTRY IMPERIAL No. 11.—R.D.

HUMBER & Co., LIMITED, Imperial Works, Coventry.

*Description.* 1 $\frac{3}{8}$ in. moulded red tyres. Crescent rims. 44 and 42 No 11 direct spokes. 3 $\frac{1}{2}$ in. G.M. hubs. Fixed cranks, 6 $\frac{1}{2}$ in. throw. Rubber coned pedals, 11 $\frac{1}{2}$ in. tread. 30in. driving wheel geared to 52in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels, parallel to cranks. Direct steering, sloping steering post. Solid front and back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 26in. bent back detachable, adjustable bars. Cross frame of 1 $\frac{3}{8}$ in. 16 W.G. steel tube.  $\Gamma$  seat pillar, with side bolt adjustment. Rubber cushioned elliptical spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, and oilcan. Weight 48lbs.

Price .. .. . £13 10s.  
Sent out with plated handle-bar, brake fittings, seat pillar, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/-

*Remarks.* Specially built to supply a cheap market, and sold in quantity to dealers and shippers. (See advertisement.)

**CRYPTO 'XTRAORDINARY.**

SINGER &amp; Co., Challenge Works, Alma Street, Coventry.

*Description.*  $\frac{3}{4}$ in. and  $\frac{3}{8}$ in. Otto's corrugated wired tyres. Crescent rims. 60 and 20 No. 12 butt-ended direct spokes.  $\frac{1}{2}$ in. steel hollow hubs. Detachable cranks. 'Xtra rubber coned pedals,  $10\frac{1}{2}$ in. tread.  $\frac{1}{2}$ in. driving wheel geared to 60in. 22in. back wheel. Front wheel drives with lever gear. 'Xtraordinary levers. Crypto gear. Ball bearings to both wheels. 'Xtra steering, like ordinary bicycle. 7in. rake. Hollow front and back forks. 'Xtra Stanley head, 5in. centres. Pear-shaped horn handles, 28in. cowhorn bars.  $1\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Arab cradle spring. Eclipse saddle. Circular step. D.L.S. brake. Leg-guard. Valise, spanners, and oilcan. Weight, 40in., 46lbs.

*Specialties.* Otto wired tyres (page 132). 'Xtra levers (page 23). 'Xtra pedals (page 19). 'Xtra steering. Crypto-dynamic two-speed gear (page 150).

Price .. .. . £25.

Sent out with plated handle-bar, head, hubs, cranks, and spokes; rest enamelled black.

*Extras.* All plated except rims, £4. Plated levers, 20/-. Plated pedal fittings, 5/-. Mud-guard to back wheel, 5/-.

*Remarks.* A capital little machine. Will go over anything. The Crypto gear can be thrown into action by a touch, gearing the machine to 60in., or it may, for hill work, heavy roads, and head winds, be driven direct as 40in., whilst, when descending hills, the gear can be thrown out and, the pedals remaining stationary, may be used as footrests. (See advertisement.)

**CUNARD.—R.D.**

CUNARD CYCLE CO., LTD., Wolverhampton.

*Description.*— $\frac{3}{4}$ in. grey tyres. Crescent rims. Direct spokes. G.M. hubs. Fixed cranks,  $6\frac{1}{2}$ in. throw. Rubber coned pedals. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, screw adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of steel tube. Hollow seat pillar, with clip adjustment. Double scroll spring. Brooks's suspension saddle. Saw step. Double lever spoon brake on front wheel. Valise, spanner, and oilcan. Weight 48lbs.

Price .. .. . £18

Sent out with plated handle-bar, seat pillar, hubs, cranks, and nuts; rest enamelled black.

*Extras.* Hollow rims, 20/-. Ball pedals, 20/-.

**DON RACER.—R.D.**

MIDLAND CYCLE Co., Bell Street, Wolverhampton.

*Description.*  $\frac{3}{4}$ in. black tyres. Warwick's hollow rims. 36 No. 14 direct spokes. 2in. G.M. hubs. Fixed cranks, 6in. throw. Rat-trap ball pedals, 12in. tread. 30in. driving wheel, geared to 64in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Curved semi-hollow front and back forks. Abingdon ball bearing head. T handle grips, 28in. bent back hollow bars. Cross frame of  $1\frac{1}{2}$ in. 20 W.G. weldless steel tube. Hollow straight seat pillar, with split lug adjustment. Racing saddle. Spanner and oilcan. Weight 26lbs.

Price .. .. . £20.

Sent out with plated handle-bar, hubs, cranks, and pedals; rest enamelled black.

*Remarks.* Built with care and neatness. (See advertisement.)

**DREADNOUGHT.—R.D.**

F. J. RODGERS, Bermondsey Street, London, S.E.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 32 and 44 No. 11 direct spokes. G.M. hubs. Detachable cranks, 6in. to 7in. throw. Rubber ball pedals. 30in. driving wheel, geared to 60in. 32in. steerer. Rear wheel drives

with chain gear. S.L. chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and hollow back forks. American hinged head, 5½ in. centres. Pear-shaped handle-grips, 27 in. bent back hollow, detachable, adjust-



#### THE DREADNOUGHT.

able bars. Cross frame of 1½ in. 16 W.G. steel tube. Hollow straight seat pillar, with split-lug adjustment. Salter's No. 15 double scroll spring. Lever tension saddle. Saw step. Double-lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 47 lbs.

Price .. .. . £13 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Remarks.* A machine of sound construction, but not high finish. Worth the price asked.

#### EUREKA.—R.D.

BAYLISS, THOMAS & Co., Excelsior Works, Coventry.



THE EUREKA.

*Description.*  $\frac{3}{4}$ in. combination tyres. Crescent rims. Butt-ended direct spokes.  $3\frac{1}{2}$ in. steel hubs. Fixed cranks, 7in. throw. Rubber coned pedals, 11in. tread. 30in. driving wheel, geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, screw adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. American hinged head, 5in. centres. Pear-shaped handle grips, 28in. bent back hollow, detachable, adjustable bars. Duplex frame of oval weldless steel tube.  $\Gamma$  seat pillar, with side bolt adjustment. International spring. Brooks's saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 40lbs.

*Specialties.* Duplex combination frame (*page* 159).

Price .. .. . £18

Sent out with plated handle-bar, part of front forks, brake fittings, hubs, cranks and pedals; rest enamelled black.

*Extras.*  $\frac{3}{4}$ in. rubbers, 10/- Ball pedals, 12/6.

*Remarks.* One of the strongest roadsters of this type made. A1 for all-round road work and touring. (*See advertisement.*)

### EXPRESS.—F.D.

HUMBER AND CO., LTD. The Ashes, Great Brickkiln Street, Wolverhampton.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 40 and 20 No. 11 direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Detachable cranks, 6in. throw. Rubber plain pedals, 14in. tread. 36in. driving wheel, geared to 52in. 20in. back wheel. Front wheel drives with chain gear. Kelsey's brackets and B.S.A. ball bearings to crank wheels. Abingdon chains, bolt and slide adjustment. Æolus ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings,  $2\frac{1}{2}$ in. rake. Hollow front and semi-hollow back forks. Stanley head,  $4\frac{1}{2}$ in. centres. Pear-shaped horn handles, 27in. cowhorn bars.  $1\frac{1}{2}$ in. 15 W.G. weldless steel backbone. Bolted scroll spring. Long-distance suspension saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Valise, bell, spanners and oilcan. Weight 42lbs.

Price .. .. . £12 10s.

Sent out enamelled in two colours.

*Extras.* Half-plated, 15/- All plated except rims, 30/- Ball pedals, 15/-

*Remarks.* Excellent value for money. A very fair machine of its class. (*See advertisement.*)

### EXTRA SPECIAL FACILE.—F.D.

ELLIS & CO., LIMITED, 47, Farringdon Road, London.

*Description.*  $\frac{3}{4}$ in. and  $\frac{5}{8}$ in. moulded red tyres. Warwick's hollow rims. 64 and 24 No. 15 laced spokes.  $2\frac{1}{2}$ in. steel hubs. Detachable cranks, 3in. throw. Facile rubber pedals,  $9\frac{1}{2}$ in. tread. 42in. driving wheel, 22in. back wheel. Front wheel drives with Facile lever gear. B.S.A. ball bearings to driving wheel, Æolus balls to back. Steering like ordinary bicycle. Curved forks pass through bearings. Hollow front and semi-hollow back forks. Abingdon ball bearing head. Pear-shaped horn handles, 27in. dropped bars.  $1\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Townsend's combination spring and saddle. Saw step. D.L.S. brake. Leg-guard. Weight 36lbs.

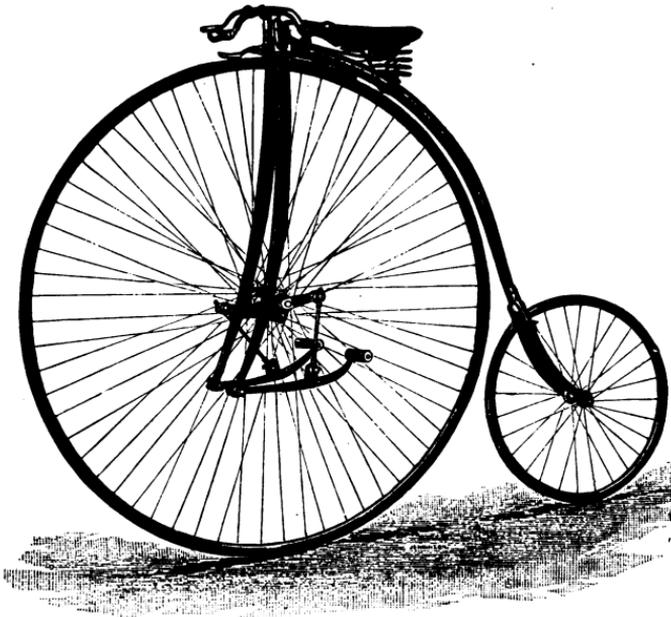
*Specialties.* Facile lever gear (*page* 22). Abingdon ball head (*page* 164).

Price .. .. . £19.

Sent out enamelled black.

*Extras.* Plated fittings, 15/-. Detachable handle-bars, 5/-. Mud-guard to back wheel, 5/-. Leg-rests, 5/-.

*Remarks.* A very fine machine of its class, and a splendid hill-climber; the ever action being very powerful. Can be thoroughly relied on. (*See advertisement.*)



EXTRA SPECIAL FACILE.

**FACILE.—F.D.**

ELLIS & Co., LIMITED, 47, Farringdon Road, London.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 50 No. 11 and 24 No. 12 direct spokes.  $2\frac{3}{4}$ in. G.M. hubs. Cranks, 3in. throw. Facile rubber pedals, 11in. tread. 42in. driving wheel, 22in. back wheel. Front wheel drives with Facile lever gear. Double ball bearings to driving wheel, Æolus balls to back. Steering like ordinary bicycle. Forks pass through bearings. Hollow front and solid back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 26in. dropped bars.  $1\frac{1}{2}$ in. 15 W.G. weldless steel backbone. Bolted sliding spring. Long-distance suspension saddle. Circular step.  $\frac{1}{2}$  D.L.S. brake. Leg-guard. Weight 45lbs.

*Specialties.* Facile lever gear (page 22). Facile pedals (page 19).

Price .. .. . £10 10s.

Sent out enamelled black.

*Extras.* Lining in colour, 5/- . Leg-rests, 5/- . Mud-guard, 5/-.

*Remarks.* The original Facile. Strong and durable, and really a cheap machine. (See advertisement.)

**FALCON No. 3.—R.D.**

GOSPEL OAK Co., 675, Commercial Road East, London.

*Description.*  $\frac{7}{8}$ in. moulded red tyres. Warwick's hollow rims. 32 No. 11 direct spokes.  $2\frac{3}{4}$ in. G.M. hubs. Detachable cranks,  $5\frac{1}{4}$ in. to  $6\frac{1}{4}$ in. throw. Rubber ball pedals, 12in. tread. 30in. driving wheel, geared to 56in. 32in. steerer. Rear wheel drives with chain gear. Abingdon Humber chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct-steering, sloping steering post. Hollow curved front and back forks. Socket head. Pear-shaped handle-grips. 27in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. 14 W.G. weldless steel tube. Straight seat pillar, with side bolt adjustment. Wiggin's patent anti-vibration spring. Long-distance suspension saddle and tilt. Saw step. Double lever spoon brake on front wheel. Mud-guards over both heels. Valise, spanner and oilcan. Weight 49lbs.

*Specialties.* Wiggin's anti-vibrating gear (page 157). Wiggin's patent saddle and tilt, extra (page 177).

Price .. .. . £20.

Sent out with plated handle-bar, seat pillar, cranks and pedals; rest enamelled black.

*Extras.* Wiggin's patent saddle and tilt, 20/-

*Remarks.* This machine is fitted with anti-vibration springs to both wheels, and is especially designed for use on very rough roads. It is strongly built. (See advertisement.)

### FLY.—R.D.

FLY CYCLE Co., St. Stephen's Place, Norwich.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims 30 and 36 No. 12 direct spokes. Steel hubs. Fixed cranks, 6in. throw. Rubber plain pedals, 10 $\frac{1}{2}$ in. tread. 30in. driving wheel, geared to 52in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct-steering, sloping steering post. Semi-hollow front and back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 26in. bent back, detachable, adjustable bars. Cross frame of 1 $\frac{1}{2}$ in. steel tube.  $\Gamma$  seat pillar with side bolt adjustment. Townsend's combination spring and saddle. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 46lbs.

Price .. .. . £16 16s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks and pedals; rest enamelled black.

*Extras.* Hollow rims, 10/- Ball head, 10/- Ball pedals, 10/-

*Remarks.* Built on the popular lines.

### FLY RACER.—R.D.

FLY CYCLE Co., St. Stephen's Place, Norwich.

*Description.*  $\frac{3}{8}$ in. red tyres. Warwick's hollow rims. 24 and 36 tangent spokes. Steel hubs. Fixed cranks, 6in. throw. Rat-trap ball pedals, 10 $\frac{1}{2}$ in. tread. 30in. driving wheel geared to 60in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 26in. bent back hollow, detachable, adjustable bars. Cross frame of weldless steel tube. Hollow straight seat-pillar with split-lug adjustment. Racing saddle. Spanner and oilcan. Weight 25lbs.

Price .. .. . £16 16s.

Sent out with plated handle-bar, seat-pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Ball head, 10/-

### FOX.—R.D.

T. Fox, Kent Street Works, Leicester.

*Description.*  $\frac{3}{4}$ in. red tyres. Crescent rims. 48 No. 11 direct spokes. G.M. hubs. Detachable cranks, 6 $\frac{1}{2}$ in. throw. Rubber coned pedals, 10 $\frac{1}{2}$ in. tread. 32in. driving wheel geared to 52in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain. Screw adjustment. Ball bearings to both wheels and cranks. Direct steering. Sloping steering-post. Hollow front and back forks. Abingdon ball bearing head. Pear-shaped handle grips, 30in. dropped detachable bars. Cross frame of 1 $\frac{1}{2}$ in. No. 16 W.G. steel tube. Hollow straight seat pillar with clamp and nut adjustment. Arab cradle spring. Buffer saddle. Adjustable saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 45lbs.

PRICE .. .. . £16.

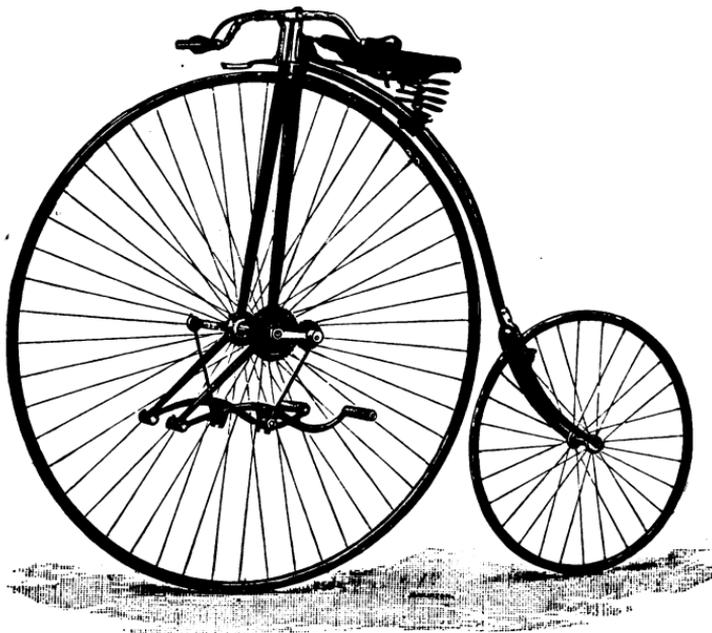
Sent out with plated handle-bar, hubs, cranks and pedals; rest enamelled black.

*Remarks.* Built on the popular lines.

**GEARED FACILE.—F.D.**

ELLIS & Co., LIMITED, 47, Farringdon Road, London.

*Description.* 7/8 in. and 3/4 in. moulded red tyres. Warwick's hollow rims. 50 and 24 No. 12 direct spokes. 2 3/8 in. G.M. hubs, 9 in. axle. Detachable cranks, 3 in. throw. Facile rubber pedals, 8 in. tread. 40 in. driving wheel, geared to 60 in. 22 in. back wheel. Front wheel drives with Facile lever gear. Ball bearings to lever joints. Ball bearings to both wheels. Steering like ordinary bicycle.



THE GEARED FACILE.

Forks pass through bearings, 3 in. rake. Hollow front and semi-hollow back forks. Abingdon ball bearing head. Pear-shaped horn handles 27 in. hollow dropped bars. 1 3/8 in. 16 W.G. weldless steel backbone. Townsend's combination spring and saddle. Saw step. D.L.S. brake. Leg-guard. Weight 40 lbs.

*Specialties.* Facile lever driving gear (*page 22*). Abingdon ball bearing head (*page 164*). Facile gearing (*page 143*).

Price .. .. . £19.

Sent out enamelled black.

*Extras.* Mud-guard to back wheel, 5/- Leg-rests, 5/- Plated fittings, 15/-.

*Remarks.* A fine machine, and although a new introduction, has been proved to be possessed of great speed. It has, perhaps, more balls in its construction than any other bicycle in the world, for no less than 247 are used in each machine. (*See advertisement.*)

**GLOBE.—F.D.**

J. & H. BROOKES, Cape Works, Birmingham.

*Description.* 7/8 in. and 3/4 in. non-slipping tyres. Crescent rims. 40 and 20 No. 12 direct spokes. 2 3/8 in. steel hubs. 7 1/2 in. axle. Cranks, 5 1/2 in. throw. Rubber coned pedals, 13 in. tread. 38 in. driving wheel, geared to 54 in. 20 in. back wheel. Front wheel drives with chain gear. Broad double ball bearings to crank wheels. Reynolds's chains. Clip and bolt adjustment. Ball bearings to driving wheel, balls to back. Steering like ordinary bicycle. Forks pass through

bearings. 2in. rake. Hollow forks. Stanley head, 3 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. cowhorn bars. 1 $\frac{1}{2}$ in. 16 W.G. weldless steel backbone. Bolted scroll spring. L.D. suspension saddle. Saw step, 15in. off ground. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 39lbs.

*Specialties.* Patent spring handle-bar—extra.

Price .. .. . £15 10s.

Sent out with plated handle-bar, head, hubs, and cranks; rest enamelled in two colours.

*Extras.* Patent spring handle-bar to prevent vibration, 20/-

*Remarks.* A carefully-built machine of the dwarf variety, with broad bottom bearings, rendering it firm and steady in running. (See advertisement.)

### HARVARD.—F.D.

BAYLISS, THOMAS & Co., Excelsior Works, Lower Ford Street, Coventry.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 48 and 24 No. 13 butt-ended direct spokes. Steel hubs. Cranks, 5 $\frac{1}{2}$ in. to 6 $\frac{1}{2}$ in. throw. Rubber coned pedals, 13in. tread. 38in. driving wheel, geared to 54in. 18in. back wheel. Front wheel drives with chain gear. Ball bearings to crank wheels.



THE HARVARD.

Abingdon chains, bolt and slide adjustment. Double ball bearings to driving wheel, balls to back. Steering like ordinary bicycle. Forks pass through bearings, 3in. rake. Hollow front and back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. Pear-shaped horn handles, 28in. cowhorn bars. 1 $\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Victor rubber cushioned spring. Brooks's saddle. Adjustable saw step. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 43lbs.

*Specialties.* Patent adjustable forks (page 48). Folding handle-bar, extra Victor spring (page 68).

Price .. .. . £18

Sent out with plated handle-bar, head, hubs, cranks, spring and step; rest enamelled black.

*Remarks.* A machine of sound construction, good finish, and neat appearance, and is adjustable to any sized rider. (See advertisement.)

### HOMO.—F.D.

GEO. HUGHES, Temple Works, Temple Street, Wolverhampton.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 48 and 20 No. 11 direct spokes. 3in. G.M. hubs, 7 $\frac{1}{2}$ in. axle. Detachable cranks, 5 $\frac{1}{2}$ in. throw.

Rubber-coned pedals, 10½ in. tread. 38 in. driving wheel geared to 52 in. 16 in. back wheel. Front wheel drives with chain gear. Ball bearings to crank wheels. Morgan's chains, bolt and slot adjustment. Ball bearings to driving wheel, balls to back. Steering like ordinary bicycle. Forks pass through bearings, 1½ in. rake. Hollow front forks. Stanley head, 4 in. centres. Pear-shaped horn handles, 28 in. cowhorn bars. 1½ in. 14 W.G. steel backbone. Scroll spring. Suspension saddle. Adjustable saw step, 20 in. above ground. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 42 lbs.

Price .. .. . £9 12s.

Sent out with bright handle-bar, head, hubs, cranks and spokes; rest enamelled in colours.

*Extras.* Plated bright parts, 9/- Ball pedals, 12/-

*Remarks.* One of the lowest-priced dwarfs in the market.

### HUMBER.—R.D.

HUMBER & Co., LIMITED, Beeston, Notts.

*Description.* ½ in. moulded red tyres. Warwick's hollow rims. 30 No. 13 direct spokes. 3 in. G.M. hubs. Fixed cranks, 6 in. to 7 in. throw. Plain rubber pedals, 12 in. throw. 30 in. driving wheel geared to 56 in. 30 in. steerer. Rear wheel drives with chain gear. Abingdon Humber chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post.



THE HUMBER.

Hollow straight front and back forks. Socket head. Elliptical handle-grips. 27 in. bent back hollow, detachable, adjustable bars. Parallelogram frame of 1½ in. weldless steel tube. Hollow straight seat pillar with slot and bolt adjustment. Spring-fronted scroll spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on rear wheel. Mud-guards over both wheels. Spanner and oilcan. Weight 42 lbs.

*Specialties.* Pattern of frame. Anti-vibration spring over front wheel. Brake on rear wheel.

Price .. .. . £20.

Sent out with plated handle-bar, seat pillar, hubs, cranks, nuts and bolts; rest enamelled in two colours.

*Remarks.* A very finely-built machine of good material and high finish. It was with one of these machines Mr. Rucker astonished the Duke of Cambridge in the Easter (1887) volunteer manoeuvres. It is also built with 24in. front wheel if preferred. (*See advertisement.*)

### HUMBER.—R.D.

MARRIOTT & COOPER, 65, Holborn Viaduct, London, E.C.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. Direct spokes. G.M. hubs. Detachable cranks, 6 $\frac{1}{2}$ in. throw. Rubber plain pedals, 12in. tread. 28in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon Humber chain. Hinged bracket adjustment. Rudge's ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of weldless steel tube. Hollow straight seat pillar, with screw adjustment. Spring-fronted scroll spring. Eclipse tension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Lamp bracket, valise, spanner and oilcan. Weight 45lbs.

Price .. .. . £19  
Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled in two colours.

*Extras.* Ball pedals, 20/-. Hollow rims, 20/-.

*Remarks.* A good machine of its type; well built, and finely finished.

### INVICTA No. 1.—F.D.

CLEAVER & CO., Kent Cycle Works, 2 to 8, William Street, Sittingbourne.

*Description.*  $\frac{3}{4}$ in. and  $\frac{1}{2}$ in. moulded red tyres. Crescent rims. 44 and 26 No. 11 direct spokes. 2 $\frac{1}{2}$ in. G.M. hubs. Detachable cranks, 6in. throw. Rubber coned pedals, 15in. tread. 38in. driving wheel geared to 56in. 22in. back wheel. Front wheel drives with chain gear. Æolus ball bearings to crank wheels. Abingdon chains, slot and bolt adjustment. Æolus ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings, 3in. rake. Hollow front and semi-hollow back forks. Stanley head, 4 $\frac{1}{2}$ in. centres. T horn handles, 28in. cowhorn bars. 1 $\frac{3}{8}$ in. 16 W.G. weldless steel backbone. Bolted scroll spring. Brooks's long-distance saddle. Saw step. D.L.S. brake. Mud-guard on back wheel. Leg-guard. Valise, spanner and oilcan. Weight 43lbs.

Price .. .. . £12 10s.  
Sent out with plated handle-bar, brake, hubs, cranks and spring; rest enamelled black.

*Extras.* Ball pedals, 12/6.

*Remarks.* 5% allowed for cash, or machine may be purchased on the easy term system. It is fair value for the price asked. (*See advertisement.*)

### INVICTA No. 2.—R.D.

CLEAVER & CO., Kent Cycle Works, 2 to 8, William Street, Sittingbourne.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 40 No. 11 direct spokes. 2 $\frac{1}{2}$ in. G.M. hubs. Detachable cranks, 6in. throw. Rubber coned pedals, 13in. tread. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels, cones to cranks. Direct steering, sloping steering post. Hollow front and semi-hollow back forks. American hinged head, 5in. centres. Elliptical handle-grips, 28in. bent back, detachable, adjustable bars. Cross frame of 1 $\frac{1}{2}$ in. 16 W.G. weldless steel tube. Straight seat pillar with side bolt adjustment. Arab cradle spring. Brooks's long-distance saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Head lamp. Bell, valise, spanner and oilcan. Weight 47lbs.

Price .. .. . £13 10s.  
Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Balls to crank axle, 20/- Ball pedals, 12/6.

*Remarks.* This is a fair article, and may be bought on the easy purchase system. (See advertisement.)

### INVICTA SPRING FRAME.—R.D.

MOORE & CO., 402, Kennington Park Corner, London, S.E.

*Description.*  $\frac{3}{4}$ in. moulded tyres. Crescent rims. 36in. No. 11 direct spokes. 3in. G.M. hubs. Detachable cranks, 6 $\frac{1}{2}$ in. throw. Rubber ball pedals. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both



THE INVICTA SPRING FRAME.

wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. American hinged head, 5 $\frac{1}{2}$ in. centres. Elliptical handle-grips, 26in. bent back, detachable, adjustable bars. Invicta spring frame of weldless steel tube. Straight seat pillar with side bolt adjustment. No spring. Long-distance Eclipse saddle. Saw step. Pull-up lever hinged spoon brake on front wheel. Mud-guards over both wheels and chain. Spanner and oilcan. Weight 50lbs.

*Specialties.* Invicta spring frame (page 161).

Price .. .. . £20

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, crank and pedals; rest enamelled black.

*Remarks.* Built of best materials and of good finish. The spring frame supports the whole body on springs, and thus minimises vibration and jolting on a rough or bad road. Forms an admirable roadster.

### INVINCIBLE.—R.D.

SURREY MACHINISTS' CO., LIMITED, 128, Great Suffolk Street, London, S.E.

*Description.*  $\frac{7}{8}$ in. moulded black tyres. D.S.H. rims. No. 13 tangent spokes. Steel hubs. Cranks, 6 $\frac{1}{2}$ in. throw. Rubber plain pedals. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Ball bearings to crank wheels. Abingdon chain, eccentric adjustment. Ball bearings to both wheels. Direct sloped steering post. Forks to front wheel and Invincible single tube side frame to back wheel. Invincible ball-bearing head. Pear-shaped horn handles, 28in. detachable, adjustable, hollow bent back bars. 1 $\frac{1}{2}$ in. 16 W.G. weldless steel backbone. Cross frame. Hollow  $\Gamma$  seat pillar. Double coil spring. Long - distance suspension saddle. Adjustable step. D.L.S. plunger brake. Mud-guards. Valise, spanners and oilcan. Weight 42lbs.

*Specialties.* Invincible D.S.H. rims (page 9). Invincible eccentric chain adjustment (page 141). Invincible single tube side frame (page 159). Invincible ball-bearing head (page 166).

Price .. .. . £20.

Sent out with plated handle-bar and cranks; rest enamelled black.

*Extras.* Plated ball pedals, 20/-

*Remarks.* A very light-running and rigid article, with firm and easy steering. Can be relied upon for good workmanship and material. (See advertisement.)



THE INVINCIBLE R.D.

**INVINCIBLE SEMI-ROADSTER.—R.D.**

SURREY MACHINISTS' CO., LIMITED, 128, Great Suffolk Street, Borough, London, S.E.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. D.S.H. rims. No. 15 tangent spokes.  $2\frac{1}{2}$ in. steel hubs. Fixed cranks,  $5\frac{1}{2}$ in. to  $6\frac{1}{2}$ in. throw. Rubber ball pedals, 12in. tread. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, Invincible eccentric adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front forks and continuous side frame to back wheel. Invincible ball bearing head. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross type frame of  $1\frac{1}{2}$ in. 16 W.G. weldless steel tube. Hollow straight seat pillar with slot and bolt adjustment. Double scroll spring. Long-distance saddle. Adjustable saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels and chain. Valise, spanner and oilcan. Weight 36lbs.

*Specialties.* D.S.H. rims (*page* 9). Eccentric chain adjustment (*page* 141). Invincible ball-bearing head (*page* 166). Invincible side frame (*page* 159).

Price .. .. . £20.

Sent out with plated handle-bar, brake fittings, seat pillar, cranks and pedals; rest enamelled black.

*Remarks.* A very fine and fast mount, with many special features in its construction. (*See advertisement.*)

**IVEL No. 1.—R.D.**

DAN ALBONE, Ivel Cycle Works, Biggleswade.

*Description.*  $\frac{3}{4}$ in. red tyres. Crescent rims. 32 No. 13 and 32 No. 12 direct spokes. G.M. hubs. Detachable cranks,  $5\frac{1}{2}$ in. to 7in. throw. Rubber plain pedals, 12in. tread. 30in. driving-wheel geared to 56in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head,  $4\frac{1}{2}$ in. centres. Pear-shaped handle grips, 33in. bent back bars. Cross frame of  $1\frac{1}{2}$ in. 15 W.G. weldless steel tube. Hollow straight seat pillar with split lug adjustment. Salter's No. 15 double scroll spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, lamp-bracket and oilcan. Weight 46lbs.

*Specialties.* Convertible—with extra wheel—into "Anfield Ivel" tricycle.

Price .. .. . £16.

Sent out with plated seat pillar, cranks and pedals; rest enamelled black.

*Extras.* Luggage-carrier, 10s. Extra wheel and axle for converting into tricycle, £10.

*Remarks.* The cheapest pattern made by this now celebrated maker. A sound, strong and reliable article. (See advertisement.)

### IVEL No. 2.—R.D.

DAN ALBONE, Ivel Cycle Works, Biggleswade.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 32 No. 13 and 32 No. 12 direct spokes. G.M. hubs. Detachable cranks,  $5\frac{1}{2}$ in. to 7in. throw. Rubber ball pedals, 12in. tread. 30in. driving wheel geared to 56in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering-post. Hollow front and back forks. American hinged head,  $4\frac{1}{2}$ in. centres. Elliptical handle grips, 33in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{4}$ in. 15 W.G. weldless steel tube. Hollow straight seat pillar



THE IVEL NO. 2.

with split lug adjustment. Salter's No. 15 double scroll spring. Brooks's semi-racing saddle. Saw step. Pull-up lever plunger spoon brake on front wheel. Mud-guards over both wheels and chain. Valise, spanner, lamp bracket and oilcan. Weight 46lbs.

*Specialties.* Convertible into "Anfield Ivel" tricycle with extra wheel.

Price .. .. . £17 10s.

Send out with plated handle-bar, brake fittings, seat pillar, hubs, cranks, pedals and nuts; rest enamelled black.

*Extras.* Stay between crank shaft and back fork ends, 10/- Hollow rims, 10/- Victor square rubber pedals, 5/- Luggage-carrier, 10/- Ball bearing head, 20/- Wheel and axle for converting into tricycle, £10.

*Remarks.* Albone's chief pattern. A thorough roadster, and one of the easiest steerers in the market. Was the first machine of this type to be steered without hands. (See advertisement.)

### IRISH IVEL No. 3.—R.D.

DAN ALBONE, Ivel Cycle Works, Biggleswade.

*Description.*  $\frac{3}{4}$ in. and  $\frac{7}{8}$ in. moulded red tyres. Crescent rims. 32 No. 12 and 32 No. 11 direct spokes. G.M. hubs. Detachable cranks,  $5\frac{1}{2}$ in. to 7in. throw. Rubber ball pedals, 12in. tread. 30in. driving wheel geared to 52in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering-post. Hollow front and back forks. American hinged head,  $4\frac{1}{2}$ in. centres. Elliptical handle-grips, 33in. bent back hollow, detachable, bars. Cross frame of  $1\frac{1}{4}$ in. 14 W.G. weldless steel tube. Hollow straight seat pillar, with split lug adjustment. Double action Arab cradle spring. Brooks's semi-racing saddle. Saw step. Pull-up lever plunger spoon brake on front wheel. Mud-guards over both wheels and chain. Valise, spanner, lamp bracket and oilcan. Weight 52 $\frac{1}{2}$ lbs.

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks, pedals and nuts; rest enamelled black.

*Extras.* Hollow rims, 10/- Victor square rubber pedals, 5/- Luggage-carrier, 10/- Ball bearing head, 20/-

*Remarks.* A similar machine to the No. 2, but built extra strong throughout for use by heavy weights and on bad roads. The crank bracket and rear wheel are trussed by a compression stay. (See advertisement.)

#### IVEL SEMI-RACER No. 4.—R.D.

DAN ALBONE, Ivel Cycle Works, Biggleswade.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. 32 No. 13 direct spokes. G.M. hubs. Detachable cranks,  $5\frac{1}{2}$ in. to 7in. throw. Rat-trap ball pedals, 12in. tread. 30in. driving wheel geared to 60in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. American hinged head,  $4\frac{1}{2}$ in. centres. Elliptical handle-grips. 33in. horn bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. 17 W.G. weldless steel tube. Hollow straight seat pillar, with split-lug adjustment. Salter's No. 15 double scroll spring. Brooks's semi-racing saddle. Saw step. Valise, spanner, lamp-bracket and oilcan. Weight 35lbs.

*Specialties.* Convertible into tricycle with extra wheel.

Price .. .. . £18

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks, pedals and nuts; rest enamelled black.

*Extras.* Stay between crank bracket and back fork ends, 10/- Victor rubber pedals, 5s. Ball head, 20s. Wheel and axle for converting into tricycle, £10.

*Remarks.* A very fast and easy running mount. It was on one of these Mr. G. P. Mills, Albone's partner, rode 295 miles in 24 hours, and also secured the fifty miles road record. It is specially built for fast work on good roads by good riders. (See advertisement.)

#### JOHN KEEN.—R.D.

JEWEL CYCLE CO., 5, Holborn Viaduct, London.

*Description.*  $\frac{3}{4}$ in. grey tyres. Crescent rims. Direct spokes. G.M. hubs. Fixed cranks, 6in. throw. Rubber plain pedals. 30in. driving wheel geared to 55in. 30in. steerer. Rear wheel drives with chain gear. Adjustable chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and single hollow back fork. American hinged head, 5in. centres. Pear-shaped handle-grips, 28in. curved back hollow, detachable, adjustable bars. Special frame. Hollow straight seat pillar, with side bolt adjustment. International spring and saddle. Double lever spoon brake on front wheel. Mud-guards over both wheels. Weight 37lbs.

*Specialties.* The frame is without curves of any kind. The driving wheel is carried by a single fork in a direct line with the chain and crank bracket, from which the frame is continued in a straight line to the steering head. The seat pillar is carried by the single back fork.

Price .. .. . £18

Sent out with plated handle-bar, cranks and nuts; rest enamelled black.

*Extras.* Ball pedals, 20s. Cradle spring, 10s.

*Remarks.* Designed and invented by John Keen, the veteran professional ex-champion of the world.

#### JUBILEE.—R.D.

HUMBER & CO., LIMITED, The Ashes, Great Brickkiln Street, Wolverhampton.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 30 No. 10 direct spokes.  $2\frac{1}{2}$ in. steel hubs. Detachable cranks, 6in. throw. Rubber plain pedals, 13in. tread. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and back forks. Socket head. Pear-shaped handle grips,

28in. bent back, detachable, adjustable bars. Cross frame of 1½in. steel tube. T seat pillar, with split-lug adjustment. Spring fronted scroll spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, bell, spanner, and oilcan. Weight 45lbs.

Price .. .. . £14

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 12/6.

*Remarks.* Messrs. Humber & Co. (late Devey & Co.) have always given extra good value for money, and this pattern is no exception to the rule. (See advertisement.)

### KANGAROO No. 1.—F.D.

HILLMAN, HERBERT & COOPER, LD., Premier Works, Coventry.

*Description.* 7⁄8in. and 3⁄4in. non-slipping tyres. Crescent rims. 50 and 24 No. 12 butt-ended direct spokes. Steel hubs. Cranks, 5in. to 6in. throw. Non-slipping rubber plain pedals. 36in. driving wheel geared to 54in. 22in. back wheel. Front wheel drives with chain gear. Kangaroo ball bearings to crank wheels. Abingdon hardened chains, Kangaroo adjustment. Hillman's ball bearings to driving wheels, balls to back. Steering like ordinary bicycle. Forks pass 2½in. behind bearings. Hollow front and solid back forks. Stanley head, 5in. centres. Pear-shaped horn handles, 28in. dropped hollow, adjustable, detachable bars. 1¾in. 17 W.G. weldless steel backbone. Bolted adjustable Kangaroo spring. L.D. suspension saddle. Circular step. Projecting footrests. D.L.S. brake. Mud-guard over chain. Leg-guard. Spanners and oilcan. Weight 44lbs.

*Specialties.* Kangaroo crank bearings (page 43). Kangaroo chain adjustment (page 29). Hillman's ball bearings (page 33). Kangaroo adjustable handles (page 56). Kangaroo adjustable spring (page 68).

Price .. .. . £18

Sent out with plated handle-bar, head, hubs, cranks, brake and spring; rest enamelled black.

*Extras.* Ball pedals, 20/- Hollow rims, 21/- 1in. and 7⁄8in. tyres, 7/6. Mud-guard to back wheel, 7/6. All plated except rims, 60/-

*Remarks.* The precursor of all machines of this type, and the first machine to fairly get among the road records. Undoubtedly a fine machine in every way. (See advertisement.)

### KANGAROO No. 2.—F.D.

HILLMAN, HERBERT & COOPER, LIMITED, Premier Works, Coventry.

*Description.* 3⁄4in. and 7⁄8in. non-slipping tyres. Warwick's hollow rims. 50 and 24 No. 14 butt ended direct spokes. Steel hubs. Cranks, 5in. to 6in. throw. Rat-trap ball pedals. 36in. driving wheel geared to 54in. 22in. back wheel. Front wheel drives with chain gear. Kangaroo ball bearings to crank wheels. Abingdon hardened chains, Kangaroo adjustment. Hillman's ball bearings to driving wheel, balls to back. Steering like ordinary bicycle. Forks pass 2½in. behind bearings. Hollow front and solid back forks. Stanley head, 4½in. centres. T horn handles. 27in. hollow cowhorn bars. 1¾in. elliptical 18 W.G. weldless steel backbone. Bolted adjustable Kangaroo spring. Brooks's semi-racing saddle. D.L.S. brake. Mud-guard over chain. Spanners and oilcan. Weight 36lbs.

*Specialties.* Kangaroo crank bearings (page 43). Kangaroo chain adjustment (page 29). Hillman's ball bearings (page 33). Kangaroo adjustable spring (page 68).

Price .. .. . £20.

Sent out with plated handle-bar, head, hubs, cranks and spring; rest enamelled black.

*Extras.* Footrests and step, 10/-. Mud-guard to back wheel, 10/-. All plated except rims, 60/-.

*Remarks.* A very fine machine. Built specially for fast road work on good roads by good riders. (See advertisement.)



THE KANGAROO NO. 2.

KANGAROO No. 3 (Second Grade).—F.D.  
HILLMAN, HERBERT & COOPER, LIMITED, Premier Works, Coventry.



THE KANGAROO NO. 3.

*Description.*  $\frac{3}{4}$ in. and  $\frac{1}{2}$ in. grey tyres. Crescent rims. 50 and 24 No. 12 butt-ended direct spokes. Steel hubs. Cranks, 5in. to 6in. throw. Rubber plain pedals. 36in. driving wheel geared to 54in. 22in. back wheel. Front wheel drives with chain gear. Kangaroo ball bearings to crank wheels. Abingdon chains, Kangaroo adjustment. Hillman's ball bearings to driving wheel, cones to back. Steering like ordinary bicycle. Forks pass  $2\frac{1}{4}$ in. behind bearings. Hollow front and solid back forks. Stanley head,  $4\frac{1}{4}$ in. centres. Pear-shaped horn handles, 27in. dropped bent back, detachable bars.  $1\frac{3}{4}$ in. 14 W.G. wrought iron backbone. Bolted scroll spring. Footrests. Suspension saddle. Circular step. D L.S. brake. Mud-guards over chains. Leg-guard. Spanners and oilcan. Weight 48lbs.

*Specialties.* Kangaroo crank bearings (page 43). Kangaroo chain adjustment (page 29). Hillman's ball bearings (page 33).

Price .. .. . £15.

Sent out with bright handle-bar, head, hubs, cranks and spring; rest enamelled black.

*Extras.* Balls to back wheel, 10/-.

*Remarks.* A strong machine at a cheaper price, and generally lower quality in material and finish than the No. 1. (See advertisement.)

### KANGAROO RACER.—F.D.

HILLMAN, HERBERT & COOPER, LIMITED, Premier Works, Coventry.

*Description.*  $\frac{1}{2}$ in. and  $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims to front, crescent to back. 50 and 24 No. 15 direct spokes, adjusted at rim. Steel hubs. Cranks,  $5\frac{1}{2}$ in. to 6in. throw. Rat-trap ball pedals. 40in. driving wheel geared to 60in. 16in. back wheel. Front wheel drives with chain gear. Kangaroo ball bearings to crank wheels. Abingdon hardened chains, Kangaroo adjustment. Ball bearings to both wheels. Steering like ordinary bicycle. Forks pass 2in. behind bearings. Hollow front and semi-hollow back forks. Stanley head,  $4\frac{1}{2}$ in. centres. T horn handles, 27in. hollow cowhorn bars.  $1\frac{3}{4}$ in. elliptical 19 W.G. weldless steel backbone in one with back fork. Racing saddle. Spanners and oilcan. Weight 23lbs.

*Specialties.* Kangaroo crank bearings (page 43). Kangaroo chain adjustment (page 29).

Price .. .. . £20.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled black.

*Remarks.* One of the finest racers of this type of machine on the path. Nearly all the path records have been broken at one time or another by riders of it. Undoubtedly a very fast machine. (See advertisement.)

### KEAR.—R.D.

H. E. KEAR, 1, 2, and 3, Redcross Street, Bristol.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 32 No. 12 direct spokes. 3in. G.M. hubs. Detachable cranks, 6in. throw. Rubber ball pedals, 11in. tread. 30in. driving wheel geared to 56in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. American hinged head, 5in. centres. Elliptical handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. 18 W.G. weldless steel tube. Hollow seat pillar, with split-lug adjustment. Townsend's combination spring and saddle. Saw step. Double lever spoon brake on front wheel. Detachable mud-guards over both wheels, Valise, spanner and oilcan. Weight 40lbs.

Price .. .. . £14.

Sent out with plated handle-bar, brake fittings, seat pillar, cranks and pedals; rest painted in two colours.

*Extras.* Hollow rims and tangent wheels, 20s.

*Remarks.* A sound, well-built machine of the popular type. Semi-racers or racers to same pattern are built to order. No malleable iron is used in its construction, and all machines are warranted for twelve months.

**KELSEY.—F.D.**

KELSEY &amp; KELSEY, Birmingham.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 44 and 20 direct spokes. G.M. hubs. Fixed cranks, 6 $\frac{1}{2}$ in. throw. Rubber plain pedals, 10in. tread. 38in. driving wheel geared to 52in. 20in. back wheel. Front wheel drives with chain gear. Kelsey's duplex bearings to crank wheels. Abingdon chains, split-lug and bolt adjustment. B.S.A. ball bearings to driving wheel, balls to back wheel and cranks. Steering like ordinary bicycle. Forks pass through bearings. Hollow front and back forks. Stanley head, 6in. centres. Kelsey's pear-shaped ventilated handles. 30in. cowhorn bars. Weldless steel backbone. Illston's patent spring. Suspension saddle. Circular step, 16in. above ground. D.L.S. brake. Leg-guard. Spanners and oilcan. Weight 42lbs.

*Specialties.* Kelsey's duplex bearings (page 44). Kelsey's ventilated handles (page 64).

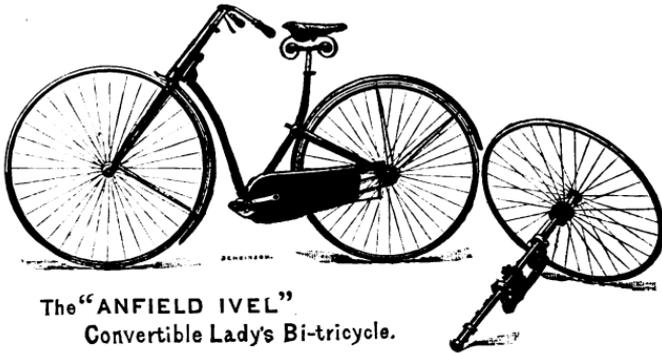
Price .. .. . £15 15s.  
Sent out with plated handle-bar, head, cranks and pedals; rest enamelled black, with gold lines.

*Remarks.* A very easy-running machine of the dwarf variety; the parallel bearings rendering the driving gear stiff and firm. Is well made, and, taken all round, a good article.

**LADY'S IVEL.—R.D.**

DAN ALBONE, Ivel Cycle Works, Biggleswade.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 32 No. 13 and 32 No. 12 direct spokes. G.M. hubs. Detachable cranks, 5 $\frac{1}{2}$ in. to 7in throw. Rubber ball pedals, 12in. tread. 30in. driving wheel geared to 52in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping



The "ANFIELD IVEL"  
Convertible Lady's Bi-tricycle.

**THE LADY'S IVEL.**

steering post. Semi-hollow front and hollow back forks. American hinged head, 4 $\frac{1}{2}$ in. centres. Elliptical handle-grips, 28in. bent back hollow, detachable, adjustable bars. Special frame of 1 $\frac{1}{2}$ in. 15 W.G. weldless steel tube. Hollow straight seat pillar, with split lug adjustment. Salter's No. 15 double scroll spring. Brooks's semi-racing saddle. Saw step. Pull-up lever plunger spoon brake on front wheel. Mud-guards over both wheels and chain. Valise, spanner, lamp bracket, and oilcan. Weight 47lbs.

*Specialties.* Special frame, convertible into tricycle.

Price .. .. . £17 10s.  
Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks, pedals, and nuts; rest enamelled black.

*Extras.* Stay between crank shaft and back fork ends, 10/-. Hollow rims, 10/-. Victor square rubber pedals, 5/-. Luggage-carrier, 10/-. Ball head, 20/-. Converting gear, £10.

*Remarks.* The only lady's bicycle at present on the market. The frame is dropped low in front, permitting free access from the side, and not disarranging the dress. The machine is also convertible easily into a tricycle at will by the addition of a third wheel and axle. (*See advertisement.*)

### MAZEPPA No 1.—F.D.

METROPOLITAN MACHINISTS' Co., LTD., 75, Bishopsgate Street Without, London, E.C.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. Direct spokes. Bown's Æolus ball-bearing hubs. Cranks  $5\frac{1}{2}$ in. throw. Rubber ball pedals. 36in. driving wheel geared to 52in. 19in. back wheel. Front wheel drives with chain gear. Edge's patent bearings to crank wheels. Morgan's chains, bolt and slot adjustment. Ball bearings to driving wheel, balls to back. Steering



like ordinary bicycle. Forks 2in. behind bearings. Hollow front and semi hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 28in cowhorn bars. Weldless steel backbone. Arab cradle spring. L.D. suspension saddle. Circular step. D.L.S. brake. Leg-guard. Valise, spanners, oilcan, lamp, and bell. Weight 40lbs.

Price .. .. . £14.  
Sent out with plated handle-bar, head, hubs, and cranks; rest enamelled black.

*Remarks.* A very presentable machine at a moderate figure, off which 10 per cent. discount for cash is allowed. (*See advertisement.*)

### MAZEPPA No. 2.—F.D.

METROPOLITAN MACHINISTS' Co., LTD., 75, Bishopsgate Street Without, London, E.C.

*Description.*  $\frac{3}{4}$ in. and  $\frac{5}{8}$ in. moulded red tyres. Crescent rims. Direct spokes. Bown's Æolus ball-bearing hubs. Fixed cranks, 6in. throw. Rubber coned pedals, 12in. tread. 36in. driving wheel geared to 54in. 18in. back wheel. Front wheel drives with chain gear. Edge's patent bearings to crank wheels. Morgan's chains, slot and bolt adjustment. Æolus ball bearings to driving wheel, cones to back. Steering like ordinary bicycle. Forks pass through bearings. Hollow front and solid back forks. Stanley head. Pear-shaped horn handles, 26in. cowhorn bars. Weldless steel backbone. Scroll spring. Suspension saddle. Circular step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 44lbs.

Price .. .. . £10.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled.

*Extras.* Ball pedals, 10/- Footrests, 7/6.

*Remarks.* 10 <sup>0</sup>/<sub>10</sub> discount for cash. (See advertisement.)

#### MOORGATE No. 5.—R.D.

COOPER, KITCHEN & Co., 4, Finsbury Pavement, Moorgate Street, London, E.C.

*Description.*— $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 32 and 40 No. 13 tangent spokes.  $3\frac{1}{2}$ in. steel hubs. Detachable cranks, 6in. throw. Rubber coned pedals, 11in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. S.L. chain, front stay adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and hollow back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 28in. bent back, hollow, detachable, adjustable bars. Cross frame of  $1\frac{3}{8}$ in. 15 W.G. weldless steel tube. Hollow straight seat pillar, with split lug adjustment. Spring-fronted scroll spring. Long-distance Eclipse saddle. Round step. Pull-up lever hinged plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, oilcan, lamp, and bell. Weight 48lbs.

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Hollow rims, 30/- Ball pedals 15/-

*Remarks.* A neat-looking article, with fine wheels.

#### MOORGATE DWARF No. 5.—F.D.

COOPER, KITCHEN & Co., 4, Finsbury Pavement, Moorgate Street, London.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 40 and 20 No. 11 butt-ended direct spokes. 2 $\frac{7}{8}$ in. G.M. hubs. Cranks 6 $\frac{1}{2}$ in. throw. Rubber coned pedals, 11in. tread. 38in. driving wheel geared to 54in. 20in. back wheel. Front wheel drives with chain gear. Ball bearings to crank wheels. Morgan's chains, slot and bolt adjustment. Ball bearings to both wheels. Steering like ordinary bicycle. Hollow front and semi-hollow back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 28in. adjustable, detachable cowhorn bars. 1 $\frac{1}{4}$ in. 15 W.G. weldless steel backbone. Bolted scroll spring. L.D. Eclipse saddle. Circular step. D.L.S. brake. Mud-guard on back wheel. Leg-guard, valise, spanners, and oilcan. Weight 44lbs.

Price .. .. . £15.

Sent out with plated handle-bar, head, hubs, cranks, brake, and spring; rest enamelled black.

*Extras.* Ball pedals, 15/- Footrests, 7/6. All plated, 60/-.

*Remarks.* A very fair article for the money. 10 per cent. is deducted for cash.

#### NEW NORTHERN.—R.D.

NORTH OF ENGLAND CYCLE Co., High Bridge, Newcastle-on-Tyne.

*Description.*  $\frac{3}{4}$ in. and  $\frac{7}{8}$ in. moulded red tyres. Crescent rims. Direct spokes. G.M. hubs. Fixed cranks, 6in. throw. Rubber plain pedals. 30in. driving wheel geared to 56in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 5in. centres. Elliptical handle-grips, 30in. bent back hollow, detachable, adjustable bars. Stayed cross frame of 1 $\frac{1}{4}$ in. 15 W.G. weldless steel tube. Straight seat pillar with side bolt adjustment. Arab cradle spring. Suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, bell, and spanner. Weight 44lbs.

Price .. .. . £15.

Sent out with plated handle-bar, hubs, cranks, and nuts; rest enamelled in two colours.

*Remarks.* A good machine at a fair price.

#### NEW NORTHERN No. 2.—R.D.

NORTH OF ENGLAND CYCLE Co., High Bridge, Newcastle-on-Tyne.

*Description.*  $\frac{3}{4}$ in. and  $\frac{7}{8}$ in. red tyres. Crescent rims. Direct spokes. G.M. hubs. Fixed cranks, 6in. throw. Rubber plain pedals. 30in. driving wheel

geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 5in. centres. Elliptical handle-grips, 30in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 15 W.G. steel tube. Straight seat pillar with side bolt adjustment. Arab cradle spring. Suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, and oilcan. Weight 45lbs.

Price .. .. . £12.  
Sent out enamelled black.

*Remarks.* A similar machine in detail to the No. 1, but plainer in finish throughout.

### NEW RAPID.—R.D.

ST. GEORGE'S ENGINEERING Co., Pope Street, Birmingham.

*Description.* ½in. moulded black tyres. Crescent rims. 60 true tangent spokes. 4½in. steel hubs. Detachable cranks, 6½in. throw. Square rubber ball pedals. 30in. driving wheel geared to 57in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, New Rapid adjustment. Æolus ball bearings to both wheels, special balls to cranks. Direct steering, sloping steering post. Hollow front and back forks. Socket head. Large pear-shaped handle-grips, 27in. bent back hollow, detachable, adjustable bars. Cross frame of weldless steel tube. Straight seat pillar with side bolt adjustment. Townsend's combination spring and saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, and oilcan. Weight 46lbs.

*Specialties.* New Rapid chain adjustment (*page 141*).

Price .. .. . £18 18s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Hollow rims, 25/-.

*Remarks.* Thoroughly well built throughout. A good machine. (*See advertisement.*)

### OLYMPIA.—R.D.

MIDLAND CYCLE Co., Bell Street, Wolverhampton.

*Description.* ½in. moulded red tyres. Crescent rims. 36 No. 13 direct spokes. 2½in. G.M. hubs. Fixed cranks, 7in. throw. Rubber ball pedals, 12½in. tread 30in. driving wheel geared to 60in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. American hinged head, 4½in. centres. Elliptical handle-grips, 28in. bent back hollow, adjustable bars. Olympia spring cross frame of 1½in. 16 W.G. weldless steel tube. Hollow straight seat pillar with slot and bolt adjustment. Spring-fronted scroll spring. Long distance suspension saddle. Saw step. Pull-up lever hinged plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, and oilcan. Weight 46lbs.

*Specialties.* Olympia spring frame (*page 160*).

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Hollow rims, 15/-; Ball bearing head, 20/-.

*Remarks.* A strongly built machine, with spring frame, making it wonderfully easy and comfortable over rough roads. The spring arrangement does not, like most others, interfere with the action of the brake. (*See advertisement.*)

### OLYMPIC No. 1.—R.D.

FRANK H. PARKYN, Green Lane, Wolverhampton.

*Description.* ½in. moulded red tyres. Crescent rims. 40 No. 11 direct spokes. G.M. hubs. Detachable cranks, 6½in. throw. Rubber coned pedals, 12in. tread 30in. driving wheel geared to 53in. 30in. steerer. Rear wheel drives with chain gear. Renolds's Humber-pattern chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post.

Curved semi-hollow front and hollow back forks. American hinged head,  $4\frac{1}{2}$  in. centres. Elliptical handle-grips, 27 in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$  in. 15 W.G. weldless steel tube. Hollow seat pillar



THE OLYMPIC NO. 1.

with slot and pin adjustment. Spring-fronted C spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Weight 43 lbs.

Price .. .. . £12 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/-; lining in colour, 2/6.

*Remarks.* A strong article, well worth the price asked.

#### OLYMPIC No. 2.—R.D.

FRANK H. PARKYN, Green Lane, Wolverhampton.

*Description.*  $\frac{3}{4}$  in. red tyres. Crescent rims. 40 No. 11 direct spokes. Iron hubs. Fixed cranks, 6 in. throw. Rubber coned pedals. 30 in. driving wheel geared to 53 in. 30 in. steerer. Rear wheel drives with chain gear, Renold's chain, slotted fork end adjustment. Coned bearings to both wheels and parallel to cranks. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. American hinged head,  $4\frac{1}{2}$  in. centres. Pear-shaped handle-grips, 27 in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$  in. 15 W.G. steel tube. Hollow seat pillar, with slot and bolt adjustment. Spring-fronted C spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Weight 45 lbs.

Price .. .. . £9 10s.

Sent out with bright handle-bar, brake fittings, seat pillar, hubs, spring, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/- Lining in colour, 2/6. Ball bearings, 30/- Plated bright parts, 18/-.

*Remarks.* A plain mount at a plain price.

**PARR.—R.D.**

J. PARR, 61, Friar Gate, Leicester.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. No. 12 direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Fixed cranks, 6in. throw. Rubber coned pedals. 30in. driving wheel geared to 53in. 30in. steerer. Rear wheel drives with chain gear. Renolds's chain, hinged bracket adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and double back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 27in. curved back hollow, detachable, adjustable bars. Parallelogram frame of 1in. steel tube. Hollow straight seat-pillar, with side bolt adjustment. Double scroll spring. Eclipse saddle. Saw step. Double lever spoon brake on front wheel. Foot-rests on fork sides. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 44lbs.

Price .. .. . £16.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 12/6.*Remarks.* A machine of sound construction.**PIONEER.—R.D.**

PAUSEY &amp; Co., Pioneer Works, Park Road, Clapham, London.

*Description.*  $\frac{3}{4}$ in. moulded black tyres. Crescent rims. 48 Pioneer tangent spokes. Steel hubs. Fixed cranks,  $6\frac{1}{2}$ in. throw. Rubber coned pedals. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and semi-hollow back forks. Socket head. Pear-shaped handle-grips, 28in. bent back hollow adjustable bars. Cross frame, with four sets of stay rods.  $\Gamma$  seat pillar with side bolt adjustment. Double action Arab cradle spring. Long-distance Eclipse saddle. Saw step. Double lever hinged plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 35lbs.

*Specialties.* Pioneer tangent wheels (page 14). Pioneer curved forks.

Price .. .. . £17 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, cranks and pedals; rest painted black.

*Extras.* Hollow rims, 25/-. Enamelling, 5/-. Plated all over, 60/-. Ball pedals, 20/-. Ball head, 12/6.

*Remarks.* A well-built and very strong machine, with all the points of the cross frame braced together with light stays. It is built to correspond with a tricycle made by the firm, so that by removing the back wheel and adding an axle and another wheel, it may be converted into a three-wheeler or the reverse. (See advertisement.)

**PREMIER RACER.—R.D.**

HILLMAN, HERBERT &amp; COOPER, LIMITED, Premier Works, Coventry.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. 32 and 40 No. 15 tangent spokes. Steel hubs. Detachable cranks,  $5\frac{1}{2}$ in. to 6in. throw. Rat-trap ball pedals. 30in. driving wheel geared to 66in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, front stay adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. American hinged head, 5in. centres. Spade handle-grips, 30in. bent back hollow bars. Cross frame of  $1\frac{3}{4}$ in. 19 W.G. oval weldless steel tube.  $\Gamma$  seat pillar, with side bolt adjustment. Brooks's racing saddle. Spanner and oilcan. Weight 29lbs.

Price .. .. . £20

Sent out with plated handle-bar, seat pillar, hubs, cranks and chain; rest enamelled black.

*Remarks.* A very fast machine. Several records were broken on it last year, and it has been taken as the model for most other racing machines of this pattern. (See advertisement.)

**PREMIER ROADSTER.—R.D.**

HILLMAN, HERBERT & COOPER, LIMITED, Premier Works, Coventry.

*Description.*  $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 32 and 40 No. 12 direct spokes. Steel hubs. Detachable cranks, 5in. to 6in. throw. Rubber pedals. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, front stay adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front



THE PREMIER ROADSTER.

and back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Premier mud-guard frame of  $1\frac{3}{8}$ in. 16 W.G. weldless steel tube.  $\Gamma$  seat pillar, with side bolt adjustment. Double-action elliptical spring. Long-distance suspension saddle. Circular step. Pull-up lever hinged plunger spoon-brake on front wheel. Mud-guards over both wheels and chain. Spanner and oilcan. Weight 46lbs.

*Specialties.* Premier mud-guard frame (page 159). General design. D.A. spring (page 70).

Price .. .. . £18  
Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks, and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/-

*Remarks.* This machine has perhaps been more copied than any other of its type. It makes a good roadster. (See advertisement.)

**PREMIER SEMI-RACER.—R.D.**

HILLMAN, HERBERT & COOPER, LIMITED, Premier Works, Coventry.

*Description.*  $\frac{5}{8}$ in. moulded red tyres. Warwick's hollow rims. 32 and 40 No. 15 tangent spokes. Steel hubs. Detachable cranks, 5in. to 6in. throw. Rat-trap ball pedals. 30in. driving wheel geared to 60in. 30in. steerer. Rear

wheel drives with chain gear. Abingdon chain, front stay adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 30in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 19 W.G. weldless steel tube.  $\Gamma$  seat pillar, with side bolt adjustment. Arab cradle spring. Brooks's semi-racing saddle. Saw step. Pull-up lever hinged plunger spoon brake on front wheel. Mud-guards over chain. Spanner and oilcan. Weight 36lbs.

Price .. .. . £20.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Remarks.* A very fine machine, built especially for fast road riders on good roads. (See advertisement.)

### PSYCHO.—R.D.

STARLEY BROS., St. John's Works, Queen's Road, Coventry.

*Description.* 3½in. and 5in. moulded grey tyres. Crescent rims. 40 No. 13 and 40 No. 12 butt-ended direct spokes. Steel hubs. Detachable cranks, 6½in. throw. Rubber coned pedals, 12in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain. Slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. American



THE PSYCHO.

hinged head, 4½in. centres. Elliptical handle-grips, 27in. bent back hollow, detachable, adjustable swivelling bars. Well-stayed cross frame of 1½in. 14 W.G. weldless steel tube.  $\Gamma$  seat pillar with side bolt adjustment. Brooks's International spring saddle. Saw step. Pull-up lever direct plunger spoon brake on front wheel. Mud-guards over both wheels and chain. Lamp bracket. Spanner and oilcan. Weight 41lbs.

*Specialties.* Starley's swivelling handle-bar (page 168).

Price .. .. . £18 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled in two colours.

*Extras.* Ball pedals, 20/- . 7/8 in. tyres. Extra stays and strength for heavy riders and bad roads, 20/-.

*Remarks.* One of the strongest and firmest machines on the market, and at the same time finely finished. A first-class machine in every way. (*See advertisement.*)

### QUADRANT.—R.D.

QUADRANT TRICYCLE CO., Sheepcote Street, Birmingham.

*Description.* 7/8 in. and 3/4 in. non-slipping tyres. Crescent rims. 46 No. 15 butt-ended direct spokes to each wheel. 2 1/4 in steel hubs. 8 in. axle. Cranks, 5 in. to 6 in. throw. Rubber ball pedals, 12 in tread. 32 in. driving wheel geared to 54 in. 26 in. steering wheel. Rear wheel drives with chain gear. Ball bearings to crank wheels. S.L. chain, slot adjustment. Ball bearings to both wheels. Quadrant steering. Pear-shaped horn handles, 27 in. hollow cowhorn bars. Quadrant frame. 7 seat pillar. Arab cradle spring. Suspension saddle. Step on hub. Lever band brake on crank shaft. Mud-guards front and back. Spanners and oilcan. Weight 58 lbs.

*Specialties.* Quadrant frame and steering (*addenda*). Band brake on crank shaft.

Price . . . . . £20

Sent out with plated handle-bar, 7 pin, pedals and cranks; rest enamelled black.

*Remarks.* This machine possesses wonderful immunity from vibration, and is an excellent hill-climber. The steering is somewhat different from the ordinary style, and requires a little practice to be steady with it at first. It is well and soundly built throughout. (*See advertisement.*)

### QUEEN OF THE WEST.

QUEEN OF THE WEST CYCLE CO., LIMITED, Newark Street, Bath.

*Description.* 3/4 in. Hancock's non-slipping tyres. Warwick's hollow rims. 40 No. 13 laced spokes. 3 in. steel hubs. Detachable cranks, 5 1/2 in. to 6 1/2 in. throw. Rubber ball pedals. 32 in. driving wheel geared to 56 in. 26 in. carrying wheel. Either wheel drives as desired with chain gear, Abingdon chain. Special adjustment. Ball bearings to both wheels and cranks. Double steering, hollow front and back forks. Special ball-jointed head. T handle-grips. 28 in. cowhorn detachable, adjustable bars. Special frame. Arab cradle spring. Buffer saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan.

*Specialties.* Double steering. Dual driving and general design.

Price . . . . . £20.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks and pedals; rest enamelled black.

*Remarks.* This machine is, at the moment of writing—June 15th—incomplete, but the above is a rough outline of what its construction will be. It will be seen that there are quite a number of special features about it.

### R. & P.—R.D.

ROBINSON & PRICE, Pembroke Place, Liverpool.

*Description.* 3/4 in. moulded red tyres. Warwick's hollow rims. No. 15 R. & P. direct true tangent spokes. 2 1/4 in. steel hubs. Detachable cranks, 6 1/2 in. throw. Rubber ball pedals, 10 in. tread. 30 in. driving wheel geared to 60 in. 30 in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. American hinged head, 5 in. centres T handle grips, 28 in. bent back hollow, detachable, adjustable bars. Cross frame of 1 3/4 in. weldless steel tube, stayed fore and aft. 7 seat pillar, with split-lug adjustment. Arab cradle spring. Long-distance suspension saddle. Saw step. Pull-up lever plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 41 lbs.

*Specialties.* R. & P. tangent wheel (*page 135*).

Price . . . . . £20

Sent out with plated handle-bar, brake fittings, seat pillar, spring, cranks, and pedals; rest enamelled.

*Extras.* Ball head, 15/-

*Remarks.* Has already secured two 200 miles performances this season, and thus proved itself a capital long-distance machine. Well built, strong and neat. A fine machine. (See advertisement.)



### RACING INVINCIBLE.—R.D.

SURREY MACHINISTS' CO, LIMITED.

*Description.*  $\frac{5}{8}$ in. moulded red tyres. D.S.H. rims. No. 15 tangent spokes.  $2\frac{1}{2}$ in. steel hubs. Fixed cranks,  $5\frac{1}{2}$ in. to  $6\frac{1}{2}$ in. throw. Rat-trap ball pedals, 12in. tread. 30in. driving wheel geared to 60in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, Invincible eccentric adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. No forks. Invincible ball bearing head. Pear-shaped handle grips, 28in. bent back hollow bars. Invincible frame of  $1\frac{1}{2}$ in. 16 W.G. weldless steel tube. Hollow straight seat pillar with side bolt adjustment. Racing saddle. Valise, spanner and oilcan. Weight 25lbs.

*Specialties.* D.S.H. rims (page 9). Invincible ball bearing head (page 166). Invincible frame (page 159). Eccentric chain adjustment (page 141).

Price .. .. . £20 10s.

Sent out with plated handle-bar, seat pillar, cranks and pedals; rest enamelled black.

*Remarks.* A very fine machine for racing purposes. Light, rigid, strong and fast. (See advertisement).

### RACING IVEL No. 5.—R.D.

DAN ALBONE, Ivel Cycle Works, Biggleswade.

*Description.*  $\frac{3}{8}$ in. and  $\frac{1}{2}$ in. moulded red tyres. Warwick's hollow rims. 36 No. 15 tangent spokes. Steel hubs. Detachable cranks, 6in. to 7in. throw. Rat-trap ball pedals, 12in. tread. 30in. driving wheel geared to 66in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head,  $4\frac{1}{2}$ in. centres. Elliptical cork handle grips, 33in. bent back hollow bars.

W

Cross frame of  $1\frac{1}{2}$ in. 20 W.G. weldless steel tube, stayed fore and aft. Hollow straight seat pillar, with split-lug adjustment. Brooks's semi-racing saddle. Spanner and oilcan. Weight 23lbs.

*Specialties.* Convertible into tricycle.

Price .. .. . £18.

Sent out with plated handle-bar, seat pillar, cranks and pedals; rest enamelled black.

*Extras.* Ball head, 20/- Spare wheel and axle for converting into tricycle, £10.

*Remarks.* A very fast machine. Up to May 1st the only one in use held a record of four "firsts" out of four races. (See advertisement.)

### RALEIGH No. 1.—R.D.

WOODHEAD, ANGOIS & ELLIS, Russell Street, Nottingham.

*Description.*  $\frac{3}{8}$ in. moulded red tyres. Crescent rims. 38in. and 44in. No. 13 direct spokes.  $3\frac{3}{8}$ in. iron hubs. Fixed cranks, 6in. to 7in. throw. Non-slipping rubber plain pedals. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. S.L. chain, slotted fork end and screw adjustment. Ball bearings ( $\frac{1}{4}$ in. balls) to both wheels and cranks. Direct steering.



THE RALEIGH.

sloping steering post. Curved semi-hollow front and hollow back forks. Adjustable socket head. Pear-shaped handle grips, 27in. bent back hollow, detachable, adjustable bars. Parallelogram frame of weldless steel tube. Hollow straight seat pillar with side bolt adjustment. Salter's No. 15 double scroll spring. Brooks's long-distance saddle. Pull-up lever plunger spoon brake on front wheel. Mud-guards over both wheels. Footrests on fork sides. Valise, spanner and oilcan. Weight 48lbs.

*Specialties.* Patent anti-vibration arrangement to front wheel (page 158). Crank bracket. Adjustable steering socket.

Price] .. .. . £18

Sent out with plated handle-bar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/-; Hollow rims, 20/-

*Remarks.* A thoroughly good and well-built roadster. Can be conscientiously recommended. (See advertisement.)

### RALEIGH No. 2.—R.D.

WOODHEAD, ANGOIS & ELLIS, Russell Street, Nottingham.

*Description.*  $\frac{3}{8}$ in. red tyres. Crescent rims. 38 and 44 No. 12 direct spokes.  $3\frac{3}{8}$ in. iron hubs. Fixed cranks, 6in. throw. Non-slipping rubber plain pedals. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain

gear. Abingdon Humber chain, slotted fork end and screw adjustment. Ball bearings ( $\frac{1}{2}$ in. balls) to both wheels and cranks. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. Adjustable socket head. Elliptical handle-grips, 27in. bent back hollow, detachable, adjustable bars. Well-stayed cross frame of  $1\frac{1}{2}$ in. 16 W.G. weldless steel tube. Hollow straight seat pillar, with split-lug adjustment. Salter's No. 15 double scroll spring. Long-distance suspension saddle. Saw step. Double lever plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 48lbs.

*Specialties.* Adjustable steering socket. Anti-vibration gear to front wheel. Crank bracket constructed solid with the frame.

Price .. .. . £14 10s.

Sent out with plated handle-bar, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/-. Plated hubs, 10/-.

*Remarks.* A good, strong roadster. (See advertisement.)

### RALEIGH RACER.—R.D.

WOODHEAD, ANGOIS & ELLIS, Russell Street, Nottingham.

*Description.*  $\frac{1}{2}$ in. moulded red tyres. Warwick's hollow rims. 38 and 44 No. 15 direct spokes.  $3\frac{3}{8}$ in. steel hubs. Fixed cranks,  $6\frac{1}{2}$ in. throw. Rat-trap ball pedals. 30in. driving wheel geared to 60in. 30in. steerer. Rear wheel drives with chain gear. S.L. chain, slotted fork end and screw adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. Adjustable socket head. Elliptical handle grips, 28in. bent back hollow, detachable, adjustable bars. Parallelogram frame of weldless steel tube. Hollow straight seat pillar with split lug adjustment. Racing saddle. Spanner and oilcan. Weight 28lbs.

*Specialties.* Adjustable steering socket. Crank bracket.

Price .. .. . £18.

Sent out with plated handle-bar, seat pillar, cranks and pedals; rest enamelled black.

*Remarks.* Light, rigid and fast. (See advertisement.)

### REGENT.—R.D.

TRIGWELL, WATSON & Co., Regent Cycle Works, Brixton Hill, London, S.W.



THE REGENT.

*Description.*  $\frac{3}{4}$ in. and  $\frac{3}{4}$ in. black tyres. Crescent rims. 36 and 40 No. 13 direct spokes. G.M. hubs. Fixed cranks,  $6\frac{1}{2}$ in. throw. Rat-trap plain pedals, 12in. tread. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end and set screw adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. Trigwell's patent ball-bearing head. Elliptical handle-grips, 27in. bent back hollow, non-vibrating, detachable, adjustable bars. Double stayed cross frame of weldless steel tube.  $\Gamma$  seat pillar with split lug adjustment. Townsend's combination spring and saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels and chain. Spanner and oilcan. Weight 40lbs.

*Specialties.* Trigwell's No. 2 ball bearing head (*page* 165). Trigwell's patent non-vibrating handle-bars (*page* 169).

Price .. .. . £18 10s.

Sent out with plated handle-bar, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 15/- Detachable cranks, 2/6.

*Remarks.* A first-class machine in every way, with many good constructional special features. (*See advertisement.*)

### RELIANCE.—R.D.

T. WALKER, St. Luke's Street, Derby.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 40 No. 12 direct spokes. G.M. hubs. Fixed cranks,  $5\frac{1}{2}$ in. to  $6\frac{1}{2}$ in. throw. Rubber ball pedals,  $10\frac{1}{2}$ in. tread. 30in. driving wheel geared to 52in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. American hinged head,  $5\frac{1}{2}$ in. centres. Pear-shaped handle-grips, 28in. bent back adjustable bars. Cross frame of  $1\frac{3}{4}$ in. steel tube.  $\Gamma$  seat pillar with split-lug adjustment. Arab cradle spring. Brooks's saddle. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 60lbs.

Price .. .. . £13.

Sent out with bright handle-bar, seat pillar, cranks and pedals; rest enamelled black.

*Extras.* Plated bright parts, 20/-.

*Remarks.* A very stout, strong article.

### REYNARD.—R.D.

TOMES & BEARD, Universal Cycle Works, Heath Town, Wolverhampton.

*Description.*  $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 36in. No. 12 direct spokes. 2 $\frac{1}{2}$ in. G.M. hubs. Detachable cranks, 6in. throw. Rubber ball pedals. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Curved semi-hollow front and back forks. American hinged head,  $5\frac{1}{2}$ in. centres. Pear-shaped handle-grips, 36in. bent back adjustable bars. Cross frame of 1in. 11 W.G. weldless steel tube. Hollow straight seat pillar with split lug adjustment. Salter's No. 15 double scroll spring. Long distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 47lbs.

Price .. .. . £15.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black and lined gold.

*Remarks.* A very fair article.



THE REYNARD.

## RIVAL No. 1.—R.D.

WARMER &amp; Co., West Orchard, Coventry.

*Description.* 27 in. moulded red tyres. Crescent rims. 32 No. 11 direct spokes. 27 in. G.M. hubs. Fixed tanks, 6 in. to 7½ in. throw. Rubber ball pedals, 12 in.



THE RIVAL NO. 1.

tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 9in. centres. Pear-shaped handle-grips. 29in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 16 W.G. weldless steel tube. ⌈ seat pillar with side bolt adjustment. Salter's No. 15 double scroll spring. Long distance suspension saddle. Round step. Double lever spoon brake on front wheel. Mud-guards over both wheels and chain. Spanner and oilcan. Weight 45lbs.

Price .. .. . £16 16s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Remarks.* Strongly built and fairly finished on popular lines.

### RIVAL No. 2.—R.D.

WARMAN & Co., West Orchard, Coventry.

*Description.* ¾in. moulded red tyres. Crescent rims. 32 No. 11 direct spokes. 2½in. steel hubs. Fixed cranks, 6in. to 7½in. throw. Rubber plain pedals, 12in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Renolds's chain, slotted fork end adjustment. Coned bearings to both wheels, plain to cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 8in. centres. Pear-shaped handle-grips, 29in. bent back detachable, adjustable bars. Cross frame of 1½in. 16 W.G. weldless steel tube. ⌈ seat pillar with side bolt adjustment. Salter's No. 15 double scroll spring. Long distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Spanner and oilcan. Weight 49lbs.

Price .. .. . £11.

Sent out with bright handle-bar, brake fittings, seat pillar, hubs, spring, cranks and pedals; rest enamelled black.

*Extras.* Plated bright parts, 10/-.

*Remarks.* A plain machine. Supplied in quantity to dealers and the trade.

### ROVER.—R.D.

STARLEY & SUTTON, Meteor Works, West Orchard, Coventry.

*Description.* ¾in. and 7⁄8in. moulded red tyres. Crescent rims. 36 No. 11 and 36 No. 12 direct spokes. Steel hubs. Detachable cranks, 6in. to 7in. throw. Rubber coned pedals. 30in. driving wheel geared to 54in. 32in. steerer. Rear wheel drives with chain gear. Humber type chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow straight front and back forks. American hinged head, 5½in. centres. Elliptical handle-grips, 30in. bent back, hollow, detachable, adjustable bars. Parallelogram frame of 1½in. 14 W.G. weldless steel tube. ⌈ seat pillar, with side bolt adjustment. Double-action Arab cradle spring. Long-distance suspension saddle. Round step. Pull-up lever hinged plunger spoon brake on front wheel. Mud-guards over both wheels. Spanner and oilcan. Weight 50lbs.

*Specialties.* Frame and general design.

Price .. .. . £20.

Sent out with plated handle-bar, brake fittings, seat-pillar, hubs, cranks and pedals; rest enamelled in two colours.

*Extras.* Swivelling handles for storage, 20/- Ball pedals, 15/- Hollow rims, 20/- Luggage-carrier, 14/6. 1in. tyres, 20/-

*Remarks.* This is the pioneer of this now universally popular style of machine. It led the way and others followed, and the makers have the benefit of a longer experience than any other. It is a thoroughly reliable and very strong roadster, and will be built to order either as a light roadster or racer at same price.



THE ROVER.

## ROVER No. 2.—R.D.

STARLEY &amp; SUTTON, Meteor Works, West Orchard, Coventry.

*Description.*  $\frac{3}{4}$ in. and  $\frac{5}{8}$ in. moulded red tyres. Crescent rims. 36 No. 12 and 36 No. 11 direct spokes. Steel hubs. Detachable cranks, 6in. to 7in. throw. Rubber coned pedals. 30in. driving wheel geared to 54in. 32in. steerer. Rear wheel drives with chain gear. Humber-pattern chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 5 $\frac{1}{2}$ in. centres. Elliptical handle-grips, 30in. bent back, hollow, detachable, adjustable bars. Combination frame of 1 $\frac{1}{4}$ in. 14 W.G. weldless steel tube. T seat pillar with side bolt adjustment. International spring and saddle. Step. Pull-up lever hinged plunger spoon brake on front wheel. Mud-guards over both wheels. Spanner and oilcan. Weight 50lbs.

*Specialties.* Combination frame (page 160).

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Hollow rims, 20/-  $\frac{3}{4}$ in. tyres, 10/- Ball pedals, 15/-

*Remarks.* A similar machine to the Rover proper, but with a different style frame and somewhat cheaper in construction, but a strong, substantial machine.



THE ROVER NO. 2.

**RUDGE SAFETY.—F.D.**

D. RUDGE &amp; Co., LD., Spon Street Works, Coventry.

*Description.*  $\frac{3}{4}$ in. and  $\frac{5}{8}$ in. moulded red tyres. Crescent rims. 40 and 20 direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Detachable cranks,  $4\frac{1}{2}$ in. to 6in. throw.



THE RUDGE.

Rubber coned pedals, 13in. tread. 38in. driving wheel geared to 57in. 17in. back wheel. Front wheel drives with chain gear. Rudge's patent ball bearings to crank wheels. Abingdon chains, Rudge's bolt and slide adjustment. Rudge's ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings. 2½in. rake. Hollow front and back forks. Stanley head, 4½in. centres. Pear-shaped horn handles. 26in. hollow, detachable cowhorn bars. 1½in. weldless steel backbone. Bolted sliding spring. Lever tension saddle. Rudge's adjustable saw step. D.L.S. brake. Mud-guard to back wheel. Leg-guard. Valise, duster, spanners and oilcan. Weight 42lbs.

*Specialties.* Rudge's ball bearings (page 36). Rudge's chain adjustment (page 28). Rudge's folding handle-bars (page 168). Rudge's adjustable step (page 177).

Price .. .. . £17 10s.

Sent out with plated handle-bar, head, cranks, and spring; rest enamelled two colours.

*Extras.* Ball pedals, 20/- . Hollow rims, 20/- . Cradle spring, 7/6.

*Remarks.* A finely finished, fast, and well-built machine.

### SANDRINGHAM.—F.D.

J. COX & SON, Railway Road, King's Lynn.

*Description.* ½in. and ¾in. moulded red tyres. Crescent rims. 50 and 24 No. 12 direct spokes. 3½in. G.M. hubs. Cranks 6½in. throw. Rubber plain pedals, 12½in. tread. 30in. driving wheel geared to 54in. 18in. back wheel. Front wheel drives with chain gear. Æolus ball bearings to crank wheels. Morgan's chains, bolt and slot adjustment. Æolus ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings. 2½in. rake. Hollow front and semi-hollow back forks. Stanley head, 4½in. centres. Pear-shaped horn handles, 25in. cowhorn bars. 1½in. 15 W.G. weldless steel backbone. See-saw spring saddle. Saw step. D.L.S. brake. Leg-guard, lamp, bell, valise, spanners and oilcan. Weight 43lbs.

Price .. .. . £13 10s.

Sent out with plated handle-bar and cranks; rest painted in two colours.

*Extras.* Ball pedals, 10/-

*Remarks.* A plain machine, worth the price asked.

### SANSPAREIL.—R.D.

WILLIAM ANDREWS, Limited, Victoria Cycle Works, Aston, Birmingham.

*Description.* ¾in. moulded red tyres. Crescent rims. 36 No. 12 direct spokes. 2¾in. steel hubs. Detachable cranks, 6in. throw. Rubber coned pedals. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, hinged bracket adjustment. Ball bearings to both driving wheels, cones to steerer and cranks. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 14 W.G. weldless steel tube. Straight seat pillar with side bolt adjustment. S spring. Record saddle. Saw step. Direct action spoon brake on front wheel. Mud-guards over both wheels and chain. Spanner and oilcan. Weight 42lbs.

*Specialties.* Direct action spoon brake. Hardened steel gear to back wheel.

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks, and pedals; rest enamelled black.

*Extras.* Hollow rims, 20/- ½in. tyres, 7/6. 1in. tyres, 15/- . Ball pedals, 15/- .

*Remarks.* A well-built, nicely finished, and good all-round machine of a popular type.

### SANSPAREIL LEVER.—F.D.

W. ANDREWS, Limited, 21, Victoria Road, Aston, Birmingham.

*Description.* ¾in. and ¾in. moulded red tyres. Crescent rims. 50 and 24 No. 12 direct spokes. 5in. G.M. hubs. 8in. axle. Fixed cranks. Rubber coned

pedals, 40in. driving wheel geared level. 22in. back wheel. Front wheel drives with Andrews's lever gear. Ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings. 2in. rake. Hollow front and semi-hollow back forks. Andrews's Stanley head, 4½in. centres. Pear-shaped horn handles, 28in. detachable, hollow cowhorn bars. 1½in. elliptical 16 W.G. weldless steel backbone. Bolted Sanspareil shackle spring. L.D. suspension saddle. Saw step, 14in. off ground. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 45lbs.

*Specialties.* Andrews's lever driving gear (page 141). Andrews's detachable handle-bars (page 57). Andrews's head (page 52). Sanspareil shackle spring.

Price .. .. . £17 10s.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled in two colours.

*Extras.* Hollow rims, 20/- Ball pedals, 15/- All plated except rims, 63/-.

*Remarks.* A lever-driven machine in which the foot motion very nearly approaches the rotary. The machine is well built and strong.

### SCARBOROUGH.—F.D.

JOSEPH BATES, Tempest Works, Wolverhampton.

*Description.* 7in. and 4in. moulded red tyres. Crescent rims. 44 and 20 No. 12 direct spokes. 3in. steel hubs. Cranks 6in. throw. Rubber ball pedals, 14in. tread. 36in. driving wheel geared to 54in. 18in. back wheel. Front wheel drives with chain gear. Kelsey's patent ball bearing bracket to crank wheels. Appleby chains, bolt and slide adjustment. Æolus ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings. 2½in. rake. Hollow front and back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 28in. cowhorn bars. 1½in. 15 W.G. weldless steel backbone. Arab cradle spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Mud-guard to back wheel. Leg-guard. Valise, spanners and oilcan. Weight 49lbs.

Price .. .. . £16.

Sent out with plated handle-bar, head hubs, and cranks; rest enamelled in two colours.

*Remarks.* A strong, substantial roadster, and a good machine of its class.

### SHAKESPEARE.—R.D.

D. CARTER & Co., Shakespeare Cycle Works, Stratford-on-Avon.

*Description.* 3in. red tyres. Crescent rims. 40 No. 14 and 44 No. 12 direct spokes. 2½in. G.M. hubs. Detachable cranks, 6in. throw. Rubber coned pedals, 11in. tread. 32in. driving wheel geared to 52in. 30in. steerer. Rear wheel drives with chain gear. S.L. chain, set screw and slotted crank bracket adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 28in. bent back detachable, adjustable bars. Cross frame of 1½in. steel tube. 1 seat pillar, with side bolt adjustment. S spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Bell, valise, spanner and oilcan. Weight 50lbs.

Price .. .. . £10 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 10/- King of the Road lamp, 10/. Cradle spring, 5/-

*Remarks.* A soundly built but not highly finished article.

### SINGER.—R.D.

SINGER & Co., Challenge Works, Alma Street, Coventry.

*Description.* 3in. Otto's corrugated wire tyres. Crescent rims. 36 No. 12 butt-ended direct spokes. 2½in. steel hubs. Detachable cranks, 5½in. to 6½in. throw. Rubber coned pedals, 12in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering,

sloping steering post. Hollow front and back forks. American hinged head



5in. centres. Elliptical handle-grips, 30in. bent back hollow, detachable, adjustable bars. Singer's frame of  $1\frac{1}{4}$ in. 15 W.G. weldless steel tube.  $\Gamma$  seat pillar with side bolt adjustment. Townsend's combination spring and saddle. Circular step. Pull-up lever hinged plunger spoon brake on front wheel. Mud-guards over both wheels and chain. Spanner and oilcan. Weight 46lbs.

*Specialties.* Otto's corrugated-wired tyres (page 132). Challenge pedals—extra (page 18). Singer's frame (page 160).

Price .. .. . £17 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

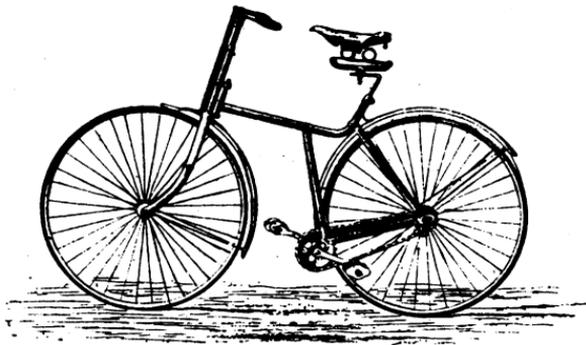
*Extras.* Ball pedals, 15/- Hollow rims, 20/- Challenge pedals, 6/- Cradle spring, 6/-  $\frac{3}{4}$ in. tyres, 7/6 each wheel. Valise, 1/6. Crate, 2/6.

*Remarks.* The latest introduction of the firm with a new and special frame, forming a good intermediary between the cross and parallelogram, having the strength of the one and the good looks of the other; one of the most comfortably positioned machines in the market. (See advertisement).

### SPARKBROOK.—R.D.

SPARKBROOK MANUFACTURING Co., LIMITED, Much Park Street, Coventry.

*Description.*  $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 36 No. 12 direct spokes. Steel hubs. Fixed cranks, 6in. throw. Rubber plain pedals, 12in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork end adjustment. Ball bearings to both wheels



THE SPARKBROOK.

and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. American hinged head, 5in. centres. Elliptical handle-grips, 26in. bent back hollow, detachable, adjustable bars. Sparkbrook frame of 1½in. 14 W.G. weldless steel tube.  $\Gamma$  seat-pillar, with split lug adjustment. Double action Arab cradle spring. Buffer saddle. Circular saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Spanner and oil-can. Weight 47lbs.

*Specialties.* Sparkbrook frame (page 160).

Price .. .. . £18.

Sent out with plated handle-bar, seat pillar, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/- Hollow rims and tangent spokes, 20/-.

*Remarks.* A substantially-built, strong roadster, a thoroughly good machine in every way, with a specially strong and well-designed frame. (See advertisement.)

### SPECIAL FACILE.—F.D.

ELLIS & Co., LTD., 47, Farringdon Road, London.

*Description.* 7in. and 3in. moulded red tyres. Crescent rims. 50 and 24 No. 12 direct spokes. 2½in. G.M. hubs, 9in. axle. Detachable cranks, 3in. throw. Facile rubber pedals, 11in. tread. 42in. driving wheel. 22in. back wheel. Front wheel drives with Facile lever gear. B.S.A. ball bearings to driving wheel,



THE SPECIAL FACILE.

Æolus balls to back. Steering like ordinary bicycle. Curved forks pass through bearings. Hollow front and solid back forks. Stanley head, 4in. centres. Pear-shaped horn handles, 26in. dropped bars. 1½in. 16 W.G. weldless steel backbone. Townsend's combination spring and saddle. Circular step. D.L.S. brake. Leg-guard. Weight 42lbs.

*Specialties.* Facile lever gear (page 22).

Price .. .. . £15.

Sent out enamelled black.

*Extras.* Mud-guard, 5/- Leg-rests, 5/- Plated parts, 15/- Lining in colours, 5/-

*Remarks.* A strong, substantial roadster, fit for any sort of work. For pure ease and running not to be surpassed. (See advertisement.)

**SPECIAL ROVER.—R.D.**

STARLEY & SUTTON, Meteor Works, West Orchard, Coventry.

*Description.*  $\frac{3}{4}$ in. and  $\frac{7}{8}$ in. moulded red tyres. Crescent rims 34 No. 12 and 36 No. 11 direct spokes. Steel hubs. Detachable cranks, 6in. to 7in. throw. Rubber coned pedals, 11in. tread. 30in. driving wheel geared to 54in. 32in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted



THE SPECIAL ROVER.

fork-end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering-post. Roamer spring connection. Straight semi-hollow front and back forks. Socket head. Elliptical handle-grips, 30in. bent back hollow, adjustable bars. Parallelogram frame of  $1\frac{1}{4}$ in. 14 W.G. weldless steel tube.  $\Gamma$  seat pillar, with side bolt adjustment. Double-action Arab cradle spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on back wheel. Footrests on front forks. Mud-guards over both wheels. Spanner and oilcan. Weight 56lbs.

*Specialties.*—Roamer spring front (page 161).

Price . . . . . £21 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, cranks and pedals rest enamelled black.

*Extras.* Hollow rims, 20/-  $\frac{7}{8}$ in. tyres, 10/- Ball pedals, 15/-

*Remarks.* Exceptionally suitable for those who desire comfort in travelling and freedom from vibration, the spring front absorbing all the jar from the front wheel.

### STASSEN.—R.D.

J. STASSEN & SON, 251, Euston Road, London.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. Direct spokes. G.M. hubs. Fixed cranks, 6in. throw. Rubber plain pedals, 12in. throw. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, hinged bracket adjustment. Ball bearings to both wheels.



THE STASSEN.

and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. Ball-bearing head. Pear-shaped handle-grips, 30in. bent back hollow, detachable, adjustable bars. Parallelogram frame of weldless steel tube.  $\uparrow$  seat pillar, with side bolt adjustment. International spring and saddle. Saw step. Double lever spoon brake on rear wheel. Mud-guards over both wheels. Spanners. Weight 45lbs.

*Specialties.* Brake application to back wheel.

Price .. .. . £14.

Sent out with plated handle-bar, seat pillar, cranks and pedals; rest enamelled black.

*Remarks.*—Thoroughly well-built and strong, with the brake in the right place.

### SURPRISE DART.—R.D.

J. E. HOLLOWAY, 157, Westminster Bridge Road, London, S.E.

*Description.*  $\frac{3}{4}$ in. grey tyres. Warwick's hollow rims. 24 No. 12 butt-ended direct spokes. 4in. steel hubs. Fixed cranks, 6in. throw. Rubber coned pedals. Two 28in. driving wheels geared to 52in. 30in. steerer. Rear wheels drive with chain gear. Abingdon chain, forked crank bracket, screw adjustment. Æolus ball bearings to all three wheels and cranks. Direct steering, sloping steering post. Hollow curved front forks. Socket head. Elliptical handle-grips, 26in. bent back hollow, detachable, adjustable bars. Holloway's patent hanging frame of weldless steel tube. Hollow seat pillar with side bolt adjustment. Arab cradle spring. Brooks's long-distance saddle. Saw step. Double lever spoon brake on front wheel. Spanner and oilcan. Weight 56lbs.

*Specialties.* Holloway's patent moving hub wheel (*Addenda*). Holloway's hanging frame. General design.

Price .. .. . £21.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 20/-.

*Remarks.* This is a very peculiar machine, as may be seen by a glance at the engraving. It is really a tricycle, but the two back wheels are but 6in. apart,

and revolve together as one. The object of this arrangement is to permit of the machine standing by itself for mounting, dismounting, or sitting still—of course when on a level road.

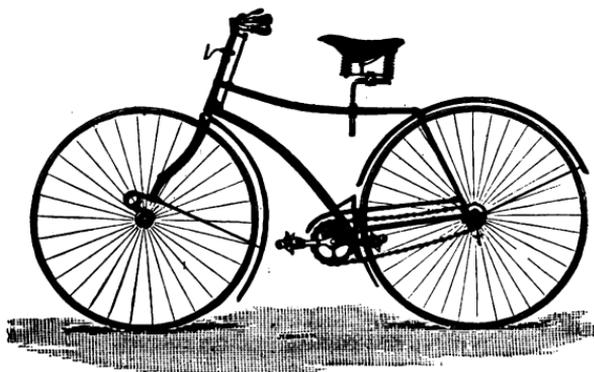


THE SURPRISE DART.

**SWIFT No. 1.—R.D.**

COVENTRY MACHINISTS' Co., LIMITED, Cheylesmore, Coventry.

*Description.*  $\frac{3}{4}$ in. non-slipping tyres. Crescent rims. 36 and 40 No. 12 direct spokes. Steel hubs. Detachable cranks,  $6\frac{1}{2}$ in. throw. Rubber coned pedals. 30in. driving wheel geared to 57in. 30in. steerer. Rear wheel drives with chain



THE SWIFT SAFETY.

gear. Abingdon chain, bolt and slide adjustment. Club ball bearings to both wheels and cranks. Direct steering, sloping steering post. Solid curved front

and hollow back forks, with anti-vibration springs. Socket head. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Parallelogram frame of 1½in. 14 W.G. weldless steel tube. ▮ seat pillar with side bolt adjustment. Club triple coil spring. Long-distance suspension saddle. Round step. Double lever spoon brake on back wheel. Mud-guards over both wheels and chain. Spanner and oilcan. Weight 49lbs.

Specialties. Club ball bearings (page 40). Club anti-vibration springs (*Addenda*). Club triple coil spring.

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

Extras. Ball pedals, 20/-. Hollow rims, 20/-. ½in. tyres, 17/6. All plated except rims, 60/-.

Remarks. A first-class machine in every way; strong, easy-going and finely finished. It may be had if desired at the same charge without the springs to the front wheel, in which case it is fitted with spoon brake on the front wheel. (*See advertisement.*)

### SWIFT No. 2.—R.D.

COVENTRY MACHINISTS' Co., LIMITED, Cheylesmore, Coventry.

Description. ½in. moulded red tyres. Crescent rims. 36 and 40 No. 12 direct spokes. Steel hubs. Detachable cranks, 6½in. throw. Rubber coned pedals. 30in. driving wheel geared to 57in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, bolt and slide adjustment. Club ball bearings to both wheels and cranks. Direct steering, sloping steering post. Curved solid front



THE SWIFT NO. 2.

and hollow back forks. American hinged head, 5in. centres. Elliptical handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 14 W.G. weldless steel tube. Hollow straight seat pillar, with split lug adjustment and slide top. Club triple coil spring. Long-distance suspension saddle. Saw step. Pull-up lever hinged plunger spoon brake on front wheel. Mud-guards over both wheels and chain. Spanner and oilcan. Weight 46lbs.

Specialties. Club ball bearings (pages 34 & 40). Club triple coil spring.

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest painted in three colours.

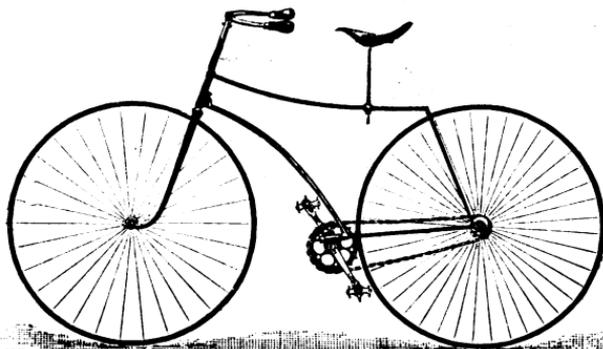
Extras. Ball pedals, 20/-. Hollow rims, 20/-. All plated except rims, 60/-.

Remarks. A highly finished first grade machine of the popular style and construction. (*See advertisement.*)

**SWIFT RACER.—R.D.**

COVENTRY MACHINISTS' CO., LIMITED, Cheylesmore, Coventry.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Club hollow rims. 36 and 40 No. 14 direct spokes. Steel hubs. Fixed cranks,  $6\frac{1}{2}$ in. throw. Rat-trap ball pedals. 30in. driving wheel geared to 66in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain. Bolt and slide adjustment. Club ball bearings



THE SWIFT RACER.

to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. Socket head. Pear shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Parallelogram frame of 1in. weldless steel tube. Hollow straight seat pillar with side bolt adjustment. Racing saddle. Spanner and oilcan. Weight 25lbs.

*Specialties.* Club hollow felloes (page 9). Club ball bearings (pages 34 & 40).

Price .. .. . £20.

Sent out with plated handle-bar, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Remarks.* True to its name. A fine machine. (See advertisement.)

**TEMPEST.—F.D.**

JOSEPH BATES, Tempest Works, Wolverhampton.

*Description.*  $\frac{3}{4}$ in. and  $\frac{1}{2}$ in. moulded red tyres. Crescent rims. 44 and 20 No. 12 direct spokes. 3in. steel hubs. Detachable cranks, 6in. throw. Rubber ball pedals, 14in. tread. 36in. driving wheel geared to 54in. 18in. back wheel. Front wheel drives with chain gear. Bown's patent brackets and ball bearings to crank wheels. S.L. chains. Bolt and slot adjustment. Æolus ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings. 2 $\frac{1}{2}$ in. rake. Hollow front and semi-hollow back forks. Stanley head, 4 $\frac{3}{4}$ in. centres. Pear-shaped horn handles, 23in. cowhorn bars. 1 $\frac{3}{4}$ in. 15 W.G. weldless steel backbone. Arab cradle spring. Long-distance suspension saddle. Saw step. D.L.S. brake. Leg-guard. Mud-guard over rear wheel. Lamp, bell, valise, spanners and oilcan. Weight 48lbs.

Price .. .. . £16.

Sent out with plated handle-bar, head, hubs, cranks and spokes; rest enamelled in two colours.

*Remarks.* A machine equal in quality to the Scarborough, by the same maker, but differing somewhat in detail.

**TEMPO.—R.D.**

GEO. HUGHES, Temple Street, Wolverhampton.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 36 and 20 No. 11 direct spokes. 2 $\frac{1}{2}$ in. G.M. hubs. Fixed cranks, 6in. throw. Rubber coned pedals. 12in. tread. 30in. driving wheel geared to 52in. 30in. steerer. Rear wheel drives with chain gear. Own make of chain, slotted fork-end adjustment. Ball

X

bearings to both wheels and cranks. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. American hinged head. Pear-shaped handle-grips, 28in. bent back detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. 14 W.G. weldless steel tube. Straight seat pillar with split lug adjustment. Spring-fronted scroll spring. Suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Spanner and oilcan. Weight 46lbs.

Price .. .. . £10.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 12/-.

*Remarks.* A cheap machine.

### THAUMATURGY.—R.D.

F. W. BAGSHAW & SONS, Sheffield Cycle Works, Hillfoot, Sheffield.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims, 36 No. 12 and 36 No. 11 direct spokes.  $2\frac{1}{2}$ in. iron hubs. Detachable cranks, 6in. throw. Rubber ball pedals, 10 $\frac{1}{2}$ in throw. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Morgan's chain, screw adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. Spring socket head. Pear-shaped handle-grips, 26in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. 16 W.G. weldless steel tube. Hollow straight seat pillar with side bolt adjustment. Spring-fronted scroll spring. Bagshaw's patent adjustable saddle. Round step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 46lbs.

*Specialties.* Bagshaw's patent adjustable saddle (*page 172*). Spring socket head.

Price .. .. . £16.

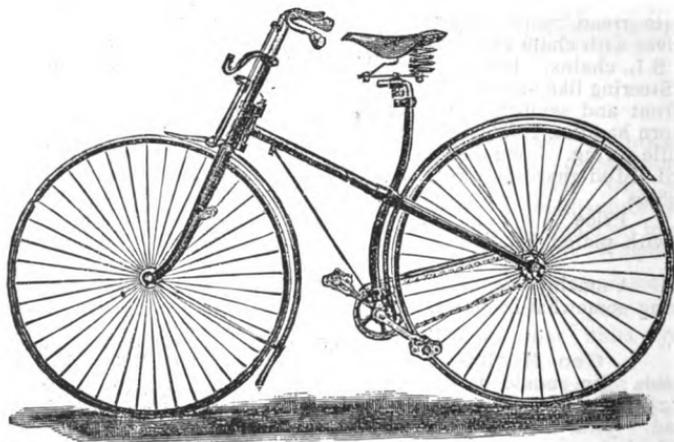
Sent out with plated handle-bar, brake fittings, hubs and cranks; rest japanned in two colours.

*Remarks.* Soundly constructed. The makers have been long in the trade, and know how to build a machine.

### TIMBERLAKE.—R.D.

THOMAS TIMBERLAKE & Co., 39, King Street, Maidenhead, Berks.

*Description.*  $\frac{3}{4}$ in. moulded red wire-coupled tyres. Crescent rims, 30 and 36 No. 12 direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Detachable cranks, 6 $\frac{1}{2}$ in. throw. Rubber plain pedals, 12in. thro $\omega$ . 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, screw and D



THE TIMBERLAKE.

slide adjustment. Æolus ball bearings to both wheels. Balls to cranks. Direct steering, sloping steering post. Hollow front and back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. 16 W.G. weldless steel tube.  $\Gamma$  seat pillar with side bolt adjustment. Townsend's combination spring and saddle. Round step. Double lever spoon brake on front wheel. Mud-guards over both wheels and chain. Spanner and oilcan. Weight 35lbs.

*Specialties.* Wire-coupled tyres (*Addenda*). Chain adjustment.

Price .. .. . £17 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks, nuts and pedals; rest enamelled black.

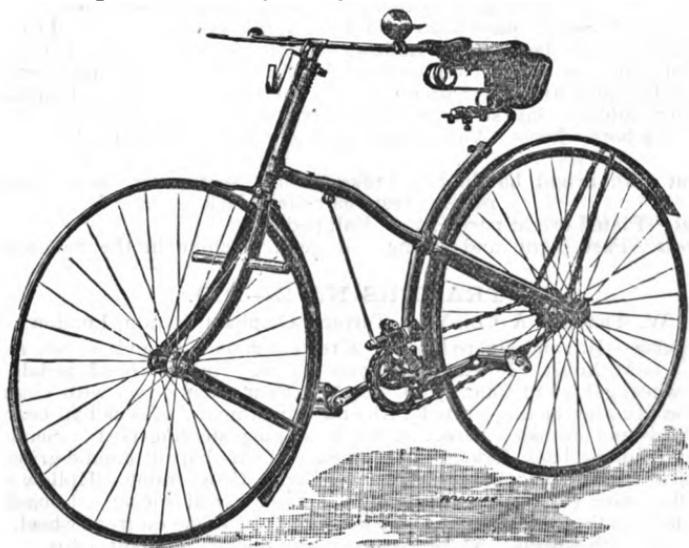
*Extras.* Ball pedals, 20/-.

*Remarks.* A machine with many special features in its construction. Well made, light and strong. (*See advertisement.*)

### TORPEDO.—R.D.

JOSEPH BATES, Tempest Street, Wolverhampton.

*Description.*  $\frac{3}{8}$ in. moulded red tyres. Crescent rims. 32 No. 12 direct spokes. 3in. G.M. hubs. Fixed cranks,  $5\frac{1}{2}$ in. to 7in. throw. Rubber plain pedals. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. S.L. chain, screw adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. Socket head. Pear-shaped handle-grips, 28in. bent back detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. steel tube.  $\Gamma$  seat pillar with side bolt adjustment. Arab



THE TORPEDO.

cradle spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, and oilcan. Weight 43lbs.

Price .. .. . £13 15s.

Sent out with plated handle-bar, brake fittings, seat pillar, cranks and pedals; rest enamelled black.

*Remarks.* A good machine of its type at a very moderate price.

**TOURIST.—R.D.**

BEDFORD CYCLE CO., St. Paul's Square, Bedford.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 44 No. 13 and 44 No. 12 direct spokes. 3in. G.M. hubs. Fixed cranks,  $\frac{5}{8}$ in. to 7in. throw. Rubber coned pedals. 30in. driving wheel geared to 54in. 32in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted fork-end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. American hinged head, 5in. centres. Pear-shaped handle-grips, 27in. bent back hollow, detachable, adjustable bars. Cross frame.  $\Gamma$  seat pillar with side bolt adjustment. Arab cradle spring. Long-distance suspension saddle. Saw step. Double lever plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 48lbs.

Price .. .. . £15.  
Sent out with plated handle-bar, brake fittings, seat pillar and nuts; rest enamelled black.

*Extras.* Ball pedals, 15/-.

*Remarks.* A soundly constructed, neat machine.

**TRAVERS No. 1.—R.D.**

W. TRAVERS &amp; Co., York Terrace, Clapham Station, London.

*Description.*  $\frac{5}{8}$ in. and  $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. 32 and 40 No. 13 butt-ended tangent spokes. Steel hubs. Fixed cranks, 7in. throw. Rat-trap plain pedals. 30in. driving wheel geared to 60in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted fork-end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and back forks. Socket head. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{4}$ in. 16 W.G. weldless steel tube. Hollow straight seat pillar with side bolt adjustment. Salter's No. 15 double scroll spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 38lbs.

Price .. .. . £17 10s.  
Sent out with bright handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Plated bright parts, 20/- Ball pedals, 15/-.

*Remarks.* Fast, light, and strong. A good machine in the hands of good riders.

**TRAVERS No. 2.—R.D.**

W. TRAVERS &amp; Co., York Terrace, Clapham Station, London.

*Description.*— $\frac{5}{8}$ in. and  $\frac{3}{4}$ in. red tyres. Crescent rims. 30 and 40 No. 12 direct spokes. G.M. hubs. Fixed cranks, 7in. throw. Rubber coned pedals. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted fork-end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. Socket head. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame. Hollow straight seat pillar with side bolt adjustment. Double scroll spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner, and oilcan. Weight 45lbs.

Price .. .. . £12 10s.  
Sent out with bright handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Plated bright parts, 20/- Ball pedals, 15/-

*Remarks.* A sound machine of ordinary construction.

**TRAVERS RACER.—R.D.**

W. TRAVERS &amp; Co., York Terrace, Clapham Station, London.

*Description.*  $\frac{3}{8}$ in. and  $\frac{1}{2}$ in. moulded red tyres. Warwick's hollow rims. 32in. and 40in. No. 16 butt-ended tangent spokes. Steel hubs. Fixed cranks, 7in.

throw. Rat-trap plain pedals, 10in. throw. 30in. driving-wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork-end adjustment. Æolus ball bearings to both wheels and cranks. Direct-steering, sloping steering post. Semi-hollow front and Townsend's back forks. Socket head. Elliptical cork handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 18 W.G. weldless steel tube. Hollow straight seat pillar with split lug adjustment. Racing saddle. Spanner and oilcan. Weight 24lbs.

Price .. .. . £17 10s.

Sent out with bright handle-bar, seat pillar, hubs, and cranks; rest enamelled black.

*Extras.* Plated bright parts, 20/- . Ball pedals, 15/-.

*Remarks.* Very strong and rigid for its weight. A good machine for its purpose.

### TURNER No. 1.—R.D.

TURNER BROS., Cycle Works, St. Alban's, Herts.

*Description.* ¾in. moulded red tyres. Crescent rims. 40 No. 13 and 40 No. 11 direct spokes. 2½in. steel hubs. Detachable cranks, 6in. to 7in. throw. Rubber coned pedals, 11in. tread. 30in. driving-wheel geared to 57in. 32in. steerer. Rear wheel drives with chain gear. S.L. chain. slotted fork-end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and hollow back forks. Turner's patent hinged head, 5in. centres. Pear-shaped handle-grips, 29in. bent back hollow, detachable, adjustable bars. Well stayed cross-frame of 1½in. 16 W.G. weldless steel tube. Hollow straight seat-pillar with split lug adjustment. Salter's No. 15 double scroll spring. Brooks's semi-racing saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 45lbs.

*Specialties.* Turner's bent steering centres.

Price .. .. . £16 10s.

Sent out with plated handle-bar, brake fittings, seat pillar, cranks, and pedals; rest enamelled black.

*Remarks.*—The principal feature of this machine is the patent steering-head, the centres being so arranged that they run in a direct line with the pivot or place of contact with ground of the front wheel. The frame is tied both fore and aft, making it perfectly rigid.

### TURNER No. 2.—R.D.

TURNER BROS., Cycle Works, St. Alban's, Herts.

*Description.* ¾in. moulded red tyres. Warwick's hollow rims. 40 No. 13 and 40 No. 11 direct spokes. 2½in. G.M. hubs. Detachable cranks, 7in. throw. Rat-trap ball pedals. 30in. driving-wheel geared to 57in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork-end adjustment. Ball bearings to both wheels and cranks. Direct steering; sloping steering post. Semi-hollow front and hollow back forks. American hinged head with Turner's patent centres. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of 1½in. 16 W.G. weldless steel tube. Hollow straight seat pillar with side bolt adjustment. Salter's No. 15 double scroll spring. Brooks's semi-racing saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 46lbs.

*Specialties.* Turner's patent steering centres.

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Remarks.* A good and easy steering article. The steering centres are sloped in a direct line with the point of contact of the front wheel with the ground.

## UNIVERSAL.—R.D.

S. GRIFFITHS &amp; SONS, Clyde Works, Heath Town, Wolverhampton.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 36 No. 10 direct spokes. G.M. hubs. Fixed cranks, 6in. throw. Rubber coned pedals. 32in. driving wheel geared to 52in. 32in. steerer. Rear wheel drives with chain gear. Abingdon chain, front stay adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and back forks. American hinged head, 5in. centres. Elliptical handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. steel tube. Straight seat pillar, with side bolt adjustment. Double scroll spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 50lbs

Price .. .. . £15.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks and pedals; rest enamelled black.

*Extras.* Ball pedals, 15/-

*Remarks.* A fair article, with the weight placed well over the back wheel.

## VICTORIA.—R.D.

MIDLAND CYCLE CO., Bell Street, Wolverhampton.

*Description.*  $\frac{3}{4}$ in. red tyres. Crescent rims. 36 No. 13 direct spokes.  $2\frac{3}{8}$ in. G.M. hubs. Fixed cranks, 7in. throw. Rubber ball pedals,  $12\frac{1}{2}$ in. tread. 30in. driving wheel, geared to 60in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted fork end adjustment. Ball bearings to both wheels and cranks. Direct steering, sloping steering post. Curved semi-hollow front and hollow back forks. American hinged head,  $4\frac{1}{2}$ in. centres. Pear-shaped handle-grips, 28in. bent back hollow, adjustable bars. Cross frame of  $1\frac{3}{4}$ in. 16 W.G. weldless steel tube. Hollow straight seat pillar with slot and bolt adjustment. Spring-fronted scroll spring. Long distance suts pension saddle. Saw step. Pull-up lever hinged plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 42lbs.

Price .. .. . £15.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black.

*Extras.* Hollow rims, 15/- . Ball head, 20/-.

*Remarks.* A good sound machine, with a well stayed frame. (See advertisement.)

## VICTORIA.—R.D.

J. COX &amp; SONS, Railway Road, King's Lynn.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 44 No 12 direct spokes  $2\frac{3}{8}$ in. G.M. hubs. Detachable cranks,  $6\frac{3}{8}$ in. throw. Rubber ball pedals, 12in. tread. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, sliding bracket adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi hollow front and back forks. American hinged head,  $4\frac{1}{2}$ in. centres. Pear-shaped handle-grips, 26in. bent back hollow, detachable, adjustable bars. Cross frame of  $1\frac{1}{2}$ in. 15 W.G. weldless steel tube. Hollow straight seat pillar with split lug adjustment. Salter's No. 15 double scroll spring. Lever tension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Lamp, bell, valise, spanner and oilcan. Weight 47lbs.

Price .. .. . £15 10s.

Sent out with plated handle-bar, seat pillar, cranks and pedals; rest enamelled black.

*Remarks.*—A thorough roadster, and a good machine of its class.

**VICTORIA ARKLOW.—R.D.**

N. DAVIS, 21, Sherborne Place, Cheltenham.

*Description.*  $\frac{7}{8}$ in. moulded red tyres. Crescent rims. 36 No. 11 direct spokes. G.M. hubs. Fixed cranks,  $6\frac{1}{2}$ in. throw. Rubber plain pedals. 30in. driving wheel geared to 56in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork-end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow curved front and back forks. American hinged head, 5in. centres. Elliptical handle-grips, 26in. bent back detachable, adjustable bars. Cross frame of 15 W.G. steel tube.  $\Gamma$  seat pillar with side bolt adjustment. Arab cradle spring. Long-distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 50lbs.

Price .. .. . £14 14s.

Sent out with plated handle-bar, brake fittings, hubs and cranks; rest enamelled black.

*Extras.* Ball pedals, 10/-. Lamp, 5/-.

*Remarks.* Plain but sound.

**WHIPPET.—R.D.**

LINLEY &amp; BIGGS, Mount Row, East Road, City Road, London.

*Description.*  $\frac{3}{4}$ in. and  $\frac{7}{8}$ in. moulded grey tyres. Crescent rims. 32 and 52 No. 12 direct spokes.  $2\frac{1}{2}$ in. G.M. hubs. Detachable cranks, 6in. to 7in. throw. Rubber coned pedals,  $10\frac{1}{2}$ in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted fork-end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Hollow front and back forks. Adjustable socket



THE WHIPPET.

head. Pear-shaped handle-grips, 28in. bent back hollow, detachable, adjustable bars. Whippet spring frame of 16 W.G. weldless steel tube. Hollow seat pillar with clamp and split lug adjustment. Arab cradle spring. Brooks's semi-racing saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Weight 44lbs.

*Specialties.* Whippet spring frame (page 161).

Price .. .. . £20.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks and pedals; rest enamelled black.

*Extras.* Hollow rims, 20/-. Ball pedals, 10/-.

*Remarks.* One of the most comfortable and fastest machines over a rough road it is possible to possess, as seat, handles and pedals are all suspended on springs, by which the vibration is intercepted. It is a well-built mount, with many special points in its construction.

**WHITEHALL.—R.D.**

J. P. DALBY, Whitehall Tricycle Works, Leeds.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 40 No. 12 direct spokes. G.M. hubs. Fixed cranks,  $6\frac{1}{2}$ in. throw. Rubber plain pedals. 30in. driving

wheel geared to 60in. 30in. steerer. Rear wheel drives with chain gear. Abingdon-Humber chain, slotted fork-end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and back forks. American hinged head, 5in. centres. Elliptical handle-grips, 28in. bent back hollow, detachable, adjustable bars. Cross frame of weldless steel tube.  $\Gamma$  seat pillar with side bolt adjustment. Spring-fronted scroll spring. Long distance suspension saddle. Saw step. Double lever spoon brake on front wheel. Mud-guards over both wheels. Spanner and oilcan. Weight 48lbs.

Price .. .. . £15 10s.

Sent out with plated handle-bar, hubs, and cranks; rest painted black.

*Extras.* Ball pedals, 15/-. Hollow rims, 15/-. Cradle spring, 5/-.

*Remarks.* A fairly built mount of the popular type.

#### WILL-O'-THE-WISP.—F.D.

FRANK HUCKLEBRIDGE, 4, Lower Sloane street, Chelsea, London.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 40 and 20 No. 12 direct spokes. Steel hubs. Detachable cranks, 6in. throw. Rubber ball pedals, 14in. tread. 36in. driving wheel geared to 54in. 18in. back wheel. Front wheel drives with chain gear. Kelsey's bearings to crank wheels. Abingdon-Humber chains, slide adjustment. Ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings. 3in. rake. Hollow front and semi-hollow back forks. Stanley head, 5in. centres.  $\Gamma$  horn handles, 28in. dropped bars. 1 $\frac{1}{16}$ in. 18 W.G. weldless steel backbone. Arab cradle spring. Long-distance suspension saddle. Valise, spanner and oilcan. Weight 42lbs.

Price .. .. . £17.

Sent out with plated handle-bar, head, hubs and cranks; rest enamelled black.

*Remarks.* A well-built machine of its kind.

#### WILL-O'-THE-WISP.—R.D.

F. HUCKLEBRIDGE, 4, Lower Sloane Street, Chelsea.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 24 and 36 No. 12 direct spokes. Steel hubs. Detachable cranks, 6in. throw. Rubber ball pedals, 11 $\frac{1}{2}$ in. tread. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain, slotted fork-end with set screw adjustment. Ball bearings to both wheels and cranks. Direct automatic steering, sloping steering post. Semi-hollow front and back forks. Socket head. Elliptical handle-grips, 28in. bent back detachable, adjustable bars. Cross frame of 1 $\frac{3}{16}$ in. 18 W.G. weldless steel tube.  $\Gamma$  seat pillar with side bolt adjustment. Townsend's combination spring and saddle. Pull-up lever plunger spoon brake on front wheel. Mud-guards over both wheels. Valise, spanner and oilcan. Weight 40lbs.

*Specialties.* Automatic steering. Chain adjustment.

Price .. .. . £18.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, spring, cranks and pedals; rest enamelled black.

*Remarks.* A machine of sound construction, and well designed for road work in all weathers, there being plenty of wheel clearance in the frame and mud-guards.

#### WULFRUNA.—R.D.

JOHN BARRATT, St. John's Square, Wolverhampton.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 36 No. 12 direct spokes. G.M. hubs. Detachable cranks, 6in. to 7in. throw. Rubber coned pedals. 30in. driving wheel geared to 52in. 30in. steerer. Rear wheel drives with chain gear. Abingdon chain. slotted fork-end adjustment. Æolus ball bearings to both wheels and cranks. Direct steering, sloping steering post. Semi-hollow front and back forks. American hinged head, 5in. centres. Elliptical handle-grips,

28in bent back hollow, detachable, adjustable bars. Cross frame of 1 $\frac{1}{4}$ in. 15 W.G. weldless steel tube, well stayed. Hollow seat pillar with side bolt adjustment. Double scroll spring. Lever tension saddle. Spanner and oilcan. Weight 44lbs.

Price .. .. . £15.

Sent out with plated handle-bar, seat pillar, spring, cranks and pedals; rest enamelled black.

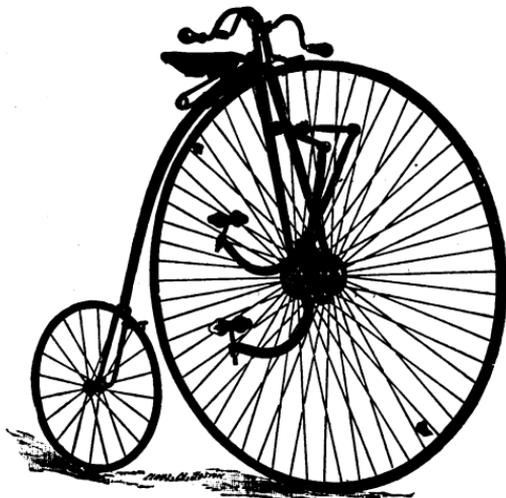
*Extras.* Ball pedals, 20/- Hollow rims and tangent wheels, 20/- Ball bearing head, 20/-

*Remarks.* A sound machine of the popular type. (See advertisement).

### 'XTRAORDINARY.—F.D.

SINGER & Co., Challenge Works, Alma Street, Coventry.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. Otto's corrugated wired tyres. Crescent rims. 60 and 20 No. 12 butt-ended direct spokes. 4in. steel hubs. Detachable cranks. 'Xtraordinary adjustable rubber coned pedals, 10 $\frac{1}{2}$ in. tread. 46in. to 54in. driving wheel, ungeared. 22in. back wheel. Front wheel drives with lever gear. 'Xtraordinary levers. Double ball bearings to driving wheel, balls to



THE 'XTRA.

back. 'Xtraordinary steering. 9in. rake. Hollow fluted front and back forks. 'Xtraordinary Stanley head, 5in. centres. Pear-shaped horn handles, 28in. cowhorn bars. 1 $\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Arab cradle spring. Eclipse saddle. Circular step. D.L.S. brake. Leg-guard. Spanner and oilcan. Weight 48lbs.

*Specialties.* Otto's wired tyres (page 132.) 'Xtraordinary adjustable pedals (page 19.) 'Xtraordinary steering. 'Xtraordinary levers (page 23.)

Price (50in.) .. .. . £20

Sent out with plated handle-bar, head, brake, hubs, links, cranks and spokes rest enamelled in two colours.

*Extras.* All plated except rims, £4. Plated levers, 20/- Plated pedal fittings, 5/- Mud-guard to back wheel, 5/-

*Remarks.* The earliest successful safety bicycle, and now forms a happy medium between the dwarf safety and the ordinary, having most of the best features of either, and giving the high position of the rider with the ease of mounting and of the smaller machine. (See advertisement.)

## SECTION III.

### THE TRADE IN AMERICA.

**O**F all the countries of the world America is the only one to compete at all with England in the manufacture of the bicycle, for, although several Continental houses have recently embarked in the manufacture, the United States is the only other country in which the manufacturing trade is in any way firmly established. Even here, however, its proportions are small compared with England, mainly on account of the large use of English machines, and the restrictions imposed on manufacture by the holders of the principal patents in connection therewith. In addition to the machines actually manufactured in America and described below, nearly every important English make is imported by one or other of the numerous importing dealers located in different parts of the States, several of our home manufacturers building special patterns for the American markets of a somewhat heavier and stronger construction than their usual patterns as supplied for use in this country. The oldest firm in the American trade is the Pope Manufacturing Company, who commenced business some ten years since, and for a long time retained a monopoly by the purchase of every American patent touching on velocipede construction which could by any course of argument be construed to cover any vital portion of the modern machine. From time to time opponents sprang up, and although for a long time, by the expenditure of thousands of dollars, they were either crushed, bought off, or beaten out of the field, the company have at last found it advisable, either on the score of expediency or as a paying transaction, to grant licenses in certain quarters, and put up with the competition produced. The greatest rival of the Pope Company was for a long time the Overman Wheel Company, which first commenced business in tricycles, but have latterly produced very large numbers of bicycles. This firm is one of the most go-ahead in the States, and after a long and expensive litigation with the original firm, has arranged an armistice on mutual terms by which both firms use each other's patents. Neither of these houses, however, nor the firm of W. Read & Son—who have only this year started in the manufacture—make their own machines, they being actually manufactured by the Weed Sewing Machine Company and the Ames Sword Company, of course under proper supervision, and to special designs. The only firms of any note in the States who actually manufacture the machines they sell are the H. B. Smith Machine Company and the Gormully & Jeffery Manu-

facturing Company. The former firm are a large engineering house of Smithville, N.J., and have been in the cycle trade now some seven or eight years, their machine being so constructed as to differ so entirely from the ordinary bicycle that they avoid all the Pope Company's patents, and thus they have been able, whilst holding distinctive patents on their own designs, to ignore the claims of the monopolists and to establish an individuality for their manufactures which it would be hard to dispossess them of. The latter firm, located at Chicago, have grown wonderfully, and from being in 1883 but a small house, making chiefly children's machines, are now one of the largest concerns in the States, with an ever-increasing connection. Besides the firms whose patterns are described below there are the Springfield Bicycle Manufacturing Co. and the King Wheel Co., both new firms with specialties in their driving methods, and another firm who make the "Sterling," a machine with wooden wheels and iron tyres, but of the several patterns of which I have not been able to obtain any definite details of construction. As a rule, the machines made in America are of a fairly high class, and the "cheap" trade is almost entirely untouched; the machines are for the most part machine built throughout on the interchangeable system so largely adopted in American machinery of all kinds. The following machines, of which I am able to give particulars, are described in alphabetical order, and being so few, I have not considered it necessary to separate the safeties from the ordinaries:—

### AMERICAN CHALLENGE.

GORMULLY AND JEFFERY MANUFACTURING Co., 222 to 228, North Franklin Street, Chicago.

*Description.* 1in. and  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 54 and 18 No. 12 doubly butt-ended direct spokes. 16in. back wheel.  $4\frac{1}{2}$ in. G.M. hubs, 9in. axle. Jeffery's detachable cranks,  $4\frac{3}{4}$ in. to  $5\frac{1}{2}$ in. throw. Rubber plain pedals, 13 $\frac{1}{2}$ in. tread. Parallel universal jointed bearings to front, cones to back wheel. Solid front and semi-hollow back forks. Stanley head,  $4\frac{1}{2}$ in. centres. Pear-shaped vulcanite handles, 30in. x 4in. detachable cowhorn bars. 1 $\frac{1}{2}$ in. 16 W.G. weldless steel backbone. Bolted sliding spring. Long-distance suspension saddle. Jeffery's rubber-clothed adjustable step. D L S. brake. Leg-guard. Valise, spanners and oilcan. Weight 45lbs.

*Specialties.* Jeffery's detachable cranks (*Addenda*). Universal jointed parallel bearings. Jeffery's detachable handle-bars (*Addenda*). Jeffery's rubber-clothed step (*page 88*).

#### PRICES.

|       |    |    |    |         |  |       |    |    |    |         |
|-------|----|----|----|---------|--|-------|----|----|----|---------|
| 48in. | .. | .. | .. | \$70.00 |  | 52in. | .. | .. | .. | \$74.00 |
| 50in. | .. | .. | .. | \$72.00 |  | 54in. | .. | .. | .. | \$76.00 |

Sent out with plated handle-bar, head, cranks, and spring; rest enamelled black.

*Extras.* All plated except wheels, \$5.00. Full-plating, \$10.00. Plated spokes, \$2.00. Balls to front wheel, \$7.00. Balls to back, \$4.00. Ball pedals, \$5.00.

*Remarks.* A low-priced—for America—strong mount. (*See advertisement.*)



AMERICAN CHALLENGE.

**AMERICAN CHAMPION.**

GORMULLY & JEFFERY MANUFACTURING COMPANY, 222 to 228, North Franklin Street, Chicago, U.S.A.

*Description.* 11in. and 7in. moulded red tyres. Deep crescent rims. 54 and 20 No. 12 doubly butt-ended direct spokes. 16in. back wheel. 4½in. G.M. hubs. 8½in. axle. Jeffery's detachable cranks. Rubber ball pedals, 13in. tread. Jeffery's ball bearings to front, balls to back wheel. Hollow front and semi-hollow back forks. Jeffery's head, 5in. centres. Elliptical vulcanite handles 30in. x 4in, detachable hollow cowhorn bars. 1½in. 15 W.G. weldless steel backbone. Wire spring. Suspension saddle. Adjustable Ideal saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 44lbs.

*Specialties.* Jeffery's detachable cranks (*Addenda*). Jeffery's ball bearings (*Addenda*). Jeffery's head (*page 52*). Jeffery's detachable handle-bar (*Addenda*). Ideal step (*page 177*). Spring, saddle, &c.

| PRICES. |    |    |             |       |    |    |             |
|---------|----|----|-------------|-------|----|----|-------------|
| 48in.   | .. | .. | .. \$100.00 | 52in. | .. | .. | .. \$105.00 |
| 50in.   | .. | .. | .. \$102.50 | 54in. | .. | .. | .. \$107.50 |

Sent out with plated handle-bar, head, spring, cranks and step; rest enamelled black.

*Extras.* All plated except wheels, \$5.00. Plated all over, \$10.00. Plated spokes, \$2.50. Spade handles, \$1.50.

*Remarks.* A very fine machine for road work of all kinds. Fast and strong, 300 miles having been ridden in 24 hours upon one, as well as 100 miles in 6h. 1½m., 20 miles within the hour, and 1,405 miles in six days. Altogether one of the best machines in the States. (See advertisement.)



AMERICAN CHAMPION.

**AMERICAN IDEAL.**

GORMULLY AND JEFFERY MANUFACTURING Co., 222 to 228, North Franklin Street, Chicago, U.S. America.

*Description.* 7/8 in. and 3/4 in. tyres. Crescent rims. 54 and 18 No. 12 doubly butt-ended direct spokes. 16 in. back wheel. 4 1/2 in. G.M. hubs. 8 1/2 in. axle. Jeffery's detachable cranks, 4 1/2 in. to 5 1/2 in. throw. Rubber plain pedals, 13 in. tread. Parallel universal jointed (interchangeable for ball) bearings to front, cones to back wheel. Hollow front and semi-hollow back forks. Stanley head, 4 1/2 in. centres. Pear-shaped vulcanite handles. Jeffery's detachable 26 in. cowhorn bars. 1 1/2 in. iron backbone. Bolted sliding spring. Long-distance suspension saddle. Jeffery's rubber-clothed adjustable step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight, 43 1/2 lbs.

*Specialties.* Jeffery's detachable cranks (*Addenda*). Jeffery's detachable handles (*Addenda*). Jeffery's rubber-clothed step (*page 88*). Universal jointed interchangeable bearings.

PRICES.

|       |    |    |    |         |  |       |    |    |    |         |
|-------|----|----|----|---------|--|-------|----|----|----|---------|
| 30in. | .. | .. | .. | \$25 00 |  | 44in. | .. | .. | .. | \$45.00 |
| 38in. | .. | .. | .. | \$35.00 |  | 50in. | .. | .. | .. | \$60.00 |



IDEAL.

Sent out with plated handle-bar, head, cranks, and spring; rest painted and lined in gold.

*Extras.* All plated save wheels, \$4.00. Full-plating, \$8.00. Plated spokes, \$2.00. Balls to front wheel, \$7.00. Balls to back wheel, \$4.00. Ball pedals, \$5.00.

*Remarks.* Specially designed for boys and youths, and made in all intermediate sizes between 30in. and 50in., proportionately constructed. Worth its price, and good for its purpose. (See advertisement.)

### AMERICAN LIGHT CHAMPION.

GORMULLY & JEFFERY MANUFACTURING Co., 222 to 228, North Franklin Street, Chicago, U.S.A.

*Description.*  $\frac{3}{4}$ in. and  $\frac{3}{8}$ in. moulded red tyres. Deep crescent rims. 72 and 20 No. 14 butt-ended tangent spokes. 16in. back wheel. Corrugated steel hubs. Detachable cranks. Smith's patent angular rubber ball pedals, 12 $\frac{1}{2}$ in. tread. Jeffery's patent ball bearings to front, balls to back wheel. Hollow front and semi-hollow back forks. Jeffery's patent ball head, 5in. centres. Spade vulcanite handles, 30in. x 4in. hollow ram's-horn bars. 1 $\frac{1}{2}$ in. 17 W.G. weldless steel backbone. Double wire spring. Jeffery's Cobblestone saddle. Adjustable Ideal saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 39 $\frac{1}{2}$ lbs.

*Specialties.* Corrugated hubs (*Addenda*). Smith's patent angular rubber pedal (*Addenda*). Jeffery's patent ball bearing (*Addenda*). American Champion patent ball head (*page 163*). Ram's-horn handle-bars. Jeffery's Cobblestone spring and saddle. Ideal saw step (*page 177*).



AMERICAN LIGHT CHAMPION.

PRICES.

|             |          |             |          |
|-------------|----------|-------------|----------|
| 48in. .. .. | \$115.00 | 52in. .. .. | \$120.00 |
| 50in. .. .. | \$117.50 | 54in. .. .. | \$122.50 |

Sent out with plated handle-bar, head, hubs, cranks and nuts; rest enamelled black.

*Extras.* All plated except wheels, \$5.00. Plated all over, \$13.00.

*Remarks.* One of the finest machines built in America, and specially designed with a view to rigidity and ease of running. (See advertisement.)

**AMERICAN LIGHT SAFETY.—F.D.**

GORMULLY & JEFFERY MANUFACTURING Co., 222 to 228, North Franklin Street, Chicago.

*Description.* 7/8 in. and 3/4 in. moulded red tyres. Crescent rims. No. 12 doubly butt-ended direct spokes. Steel hubs. Detachable cranks, 4in. throw. Rubber plain pedals. 44in. driving wheel, geared level. 20in. back wheel. Front wheel drives with lever gear. American hollow levers. Ball bearings to both wheels and cranks. Steering like ordinary bicycle. Forks pass through bearings. Hollow front and back forks. Jeffery's head, 5in. centres. Pear-shaped vulcanite handles, 30in. hollow, bent back cowhorn bars. 1 1/4 in. 16 W.G. weldless steel backbone. Lillibridge combined spring and saddle. Ideal saw step. D.L.S. brake. Leg-guard. Mud-guard over back wheel. Valise, spanners, and oilcan. Weight 38lbs.

*Specialties.* American levers (page 23.) Jeffery's head (page 52). Lillibridge saddle (page 84). Ideal step (page 177).

PRICE.

|             |          |
|-------------|----------|
| 44in. .. .. | \$120.00 |
|-------------|----------|

Sent out with plated head, spring, pedals, cranks and step; rest enamelled black.

*Extras.* All plated except wheels, \$5.00. Full-plated, \$10.00. Plated spokes, \$2.00. Spade handles, \$1.50.



AMERICAN LIGHT SAFETY.

*Remarks.* A machine of a higher grade and lighter build than the ordinary American safety. Suitable for lighter work generally in the hands of good riders. (See advertisement.)

### AMERICAN SAFETY.—F.D.

GORMULLY & JEFFERY MANUFACTURING Co., 222 to 228, North Franklin Street, Chicago.

*Description.* 1in. and  $\frac{7}{8}$ in. moulded red tyres. Crescent rims. No. 12 double butt-ended direct spokes. Steel hubs. Detachable cranks, 4in. throw. Rubber plain pedals. 44in. driving wheel, driven level. 20in. back wheel. Front wheel drives with lever gear. American levers. Parallel bearings to driving wheel (interchangeable for balls). Cones to back. Steering like ordinary bicycle. Forks pass through bearings. Solid front and semi-hollow back forks. Jeffery's head, 5in. centres. Pear-shaped vulcanite handles, 30in. detachable bars.  $1\frac{1}{4}$ in. 15 W.G. weldless steel backbone. Bolted sliding spring. Long-distance suspension saddle. Jeffery's rubber-clothed step. D.L.S. brake. Leg-guard. Mud-guard over back wheel. Valve, spanners, and oilcan. Weight 45lbs

*Specialties.* American driving levers (page 23). Interchangeable bearings. Jeffery's head (page 52). Jeffery's rubber-clothed step (page 88).

#### PRICE.

44in. . . . . \$74.00

Sent out with plated head, spring, pedals, cranks and step; rest enamelled black.

*Extras.* All plated except wheels, \$5.00. Full plated, \$10.00. Balls to front wheel, \$7.00. Balls to back, \$4.00. Balls to crank pins, \$8.00. Plated spokes, \$2.00. Cowhorn bars, \$1.00.

*Remarks.* A strong, lever-driven machine. Built for work on the rough road; o America. Made in sizes from 40in. to 48in. (See advertisement.)



AMERICAN SAFETY.

**AMERICAN STAR.—R.D.**

H. B. SMITH MACHINE CO., Smithville, Burlington Co., New Jersey.

*Description.*  $\frac{3}{4}$ in. and  $\frac{7}{8}$ in flat-seated Star tyres. Flat-seated Star rims. 60 and 24 doubly butt-ended direct spokes.  $4\frac{1}{4}$ in. steel hubs. Rubber pedals, 9 $\frac{1}{2}$ in. tread. 51in. driving wheel, 22in. steerer. Rear wheel drives with Star lever gear. American Star levers and silent clutches. Plain bearings to both wheels. Direct-steering, long sloping steering post. Semi-hollow front forks. Socket American Star steering. Pear-shaped vulcanite handle-grips, 27in. cowhorn bent back hollow bars. Special form of frame. Long, flat steel spring. Star Cricket saddle. Saw step near hub of driving wheel. Double lever spoon brake on front wheel. Valise, spanner and oilcan. Weight 55lbs.

*Specialties.* Star tyres (page 6). Star rims (page 7). Star levers and silent clutches (*Addenda*). Star steering (page 61). Star frame. Cricket saddle (page 83). General design and build.

PRICES.

|       |    |    |    |    |    |    |    |         |
|-------|----|----|----|----|----|----|----|---------|
| 48in. | .. | .. | .. | .. | .. | .. | .. | \$75.00 |
| 51in. | .. | .. | .. | .. | .. | .. | .. | \$80.00 |
| 54in. | .. | .. | .. | .. | .. | .. | .. | \$85.00 |

Sent out painted and lined.

*Extras.* Enamelled with plated fittings, \$10.00 Enamelled wheels and plated frame, \$15.00. All plated, \$20.00. Hollow levers, \$5.00. Cones to front wheel, \$5.00. Changeable power gear, \$5.00. Packing, \$1.00.

*Remarks.* One of the earliest and most successful safeties, and an entirely American invention. It is the machine ridden by Kaufman, McAnney, and other trick-riders in their polo game. It may be driven with one or both feet alter-

Y

nately or simultaneously. The weight is entirely over the driving wheel, and it is a very powerful machine, and easy enough to ride, though the mounting requires practice. It is safe over the roughest ground, and may be ridden over all sorts of obstacles.

### COLUMBIA LIGHT ROADSTER.

POPE MANUFACTURING CO., 79, Franklin Street, Boston, Mass.

*Description.*  $\frac{3}{4}$ in. and  $\frac{3}{8}$ in. moulded red tyres. Hollow rims ('Club' type.) 56 and 20 No. 13 laced spokes. 16in. back wheel.  $4\frac{1}{2}$ in. steel hubs,  $8\frac{3}{4}$ in. axle. Detachable cranks, 5in. to 6in. throw. Columbia double grip rubber ball pedals, 13in. tread. Columbia ball bearings to both wheels. Hollow front and back forks. Columbia head, 4in. centres. Double grip vulcanite handles, 27in. hollow detachable cowhorn bars.  $1\frac{3}{8}$ in. 15 W.G. weldless steel backbone. Kirkpatrick combined spring and saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 36lbs.

*Specialties.* Columbia double grip pedals (*Addenda*). Columbia ball bearings. Columbia head (*Addenda*). Columbia double grip handles (*page 167*).

#### PRICES.

|               |          |               |          |
|---------------|----------|---------------|----------|
| 49in. .. .. . | \$127.50 | 53in. .. .. . | \$132.50 |
| 51in. .. .. . | \$130.00 | 55in. .. .. . | \$135.00 |

Sent out with plated handle-bar, head, brake, hubs, cranks, pedals and fittings; rest enamelled in two colours.

*Extras.* All plated except rims, \$10.00.

*Remarks.* Built as a light roadster, and apparently fully strong for its weight. Another peculiarity is the build of the standard patterns in the "odd" sizes.

### COLUMBIA RACER.

POPE MANUFACTURING CO., 79, Franklin Street, Boston, Mass.

*Description.*  $\frac{3}{4}$ in. moulded red tyres. Hollow rims to front, crescent to back wheel. 72 and 20 No. 15 tangent spokes. 18in. back wheel.  $3\frac{1}{2}$ in. steel hubs, 8in. axle. Cranks  $4\frac{3}{4}$ in. to  $5\frac{1}{2}$ in. throw. Rat-trap ball pedals, 13in. tread. Columbia ball bearings to both wheels. Hollow front and semi-hollow back forks. Columbia head, 4in. centres. Vulcanite spade handles. 28in. hollow cowhorn bars level with wheel.  $1\frac{3}{8}$ in. 18 W.G. weldless steel backbone. Racing saddle. Spanners and oilcan. Weight 24 $\frac{1}{2}$ lbs.

*Specialties.* Columbia ball bearings. Columbia head (*Addenda*).

Price .. .. . \$140.00.

Sent out enamelled black.

*Remarks.* Really a very fine machine. It was upon one of these machines W. A. Rowe made his marvellous records.

### COLUMBIA SAFETY.—F.D.

POPE MANUFACTURING CO., 79, Franklin Street, Boston, Mass.

*Description.* 1in. and  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 40 and 20 No. 11 $\frac{1}{2}$  doubly butt-ended direct spokes. 23in. steel hubs. Detachable cranks,  $4\frac{1}{2}$ in. to  $5\frac{1}{2}$ in. throw. Columbia double grip rubber ball pedals. 38in. driving wheel geared to 48in. 20in. back wheel. Front wheel drives with chain gear. Ball bearings to crank wheels. Ewart's (Goodby's principle) chains. Clamp and slide adjustment. Columbia ball bearings to both wheels. Steering like ordinary bicycle. Forks pass through bearings.  $1\frac{1}{2}$ in. rake. Hollow front and semi-hollow back forks. Stanley head, 5in. centres. Pear-shaped vulcanite handles, 26in. hollow detachable cowhorn bars.  $1\frac{3}{8}$ in. weldless steel backbone. Kirkpatrick combined spring and saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners, and oilcan. Weight 48lbs.

*Specialties.* Columbia double grip pedals (*Addenda*). Ewart's chains. Columbia ball bearings. Kirkpatrick saddle.

Price .. .. . \$140.00.

Sent out with plated handle-bar, head, hubs, cranks, and fittings; rest enamelled in two colours.

*Remarks.* The only "geared-up dwarf" built in the States. A machine very much resembling the "Rudge" safety.

**COLUMBIA SEMI-ROADSTER.**

POPE MANUFACTURING COMPANY, 79, Franklin Street, Boston, Mass.

*Description.*  $\frac{3}{4}$ in. and  $\frac{5}{8}$ in. moulded red tyres. Crescent rims. 46 and 18 No. 11 $\frac{1}{2}$  doubly butt-ended direct spokes. 16in. back wheel. 3in. steel hubs, 8 $\frac{3}{4}$ in. axle. Detachable cranks, 4in. to 5in. throw. Rubber plain pedals, 13in. tread. Columbia ball bearings to front, cones to back wheel. Hollow front and solid back forks. Stanley head, 4 $\frac{3}{4}$ in. centres. Pear-shaped vulcanite handles, 24in. cowhorn bars. 1 $\frac{1}{2}$ in. 15 W.G. weldless steel backbone. Kirkpatrick combined spring and saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 34lbs.

*Specialties.* Columbia ball bearings.

## PRICES.

|               |         |               |         |
|---------------|---------|---------------|---------|
| 44in. .. .. . | \$82.50 | 48in. .. .. . | \$87.50 |
| 46in. .. .. . | \$85.00 | 50in. .. .. . | \$90.00 |

Sent out with plated handle-bar, head, hubs, cranks and fittings; rest enamelled black.

*Extras.* Ball pedals, \$5.00.

*Remarks.* Practically a youth's machine, as it is only built in sizes under 50in.

**EXPERT COLUMBIA.**

POPE MANUFACTURING CO., 79, Franklin Street, Boston, Mass.

*Description.* 1in. and  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 56 and 18 No. 11 $\frac{1}{2}$  doubly butt-ended direct spokes. 18in. back wheel. 4 $\frac{1}{2}$ in. steel hubs. 8 $\frac{3}{4}$ in. axle. Detachable cranks, 5in. to 6in. throw. Columbia double grip rubber ball pedals, 13in. tread. Adjustable ball bearings to both wheels. Hollow front and back forks. Columbia head, 4in. centres. Columbia double grip vulcanite handles, 27in. hollow, detachable, cowhorn bars. 1 $\frac{1}{2}$ in. 14 W.G. weldless steel backbone. Kirkpatrick combined spring and saddle. Saw step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 45lbs.

*Specialties.* Columbia double grip pedals (*Addenda*). Columbia ball bearings. Columbia head (*Addenda*). Columbia double-grip handles (*page 167*).

## PRICES.

|               |          |               |          |
|---------------|----------|---------------|----------|
| 48in. .. .. . | \$122.50 | 52in. .. .. . | \$127.50 |
| 50in. .. .. . | \$125.00 | 54in. .. .. . | \$130.00 |

Sent out with plated handle-bar, head, hubs, cranks, and spokes; rest enamelled in two colours.

*Extras.* Full-plated, \$10.00.

*Remarks.* It was upon one of these machines that Thomas Stevens performed his celebrated ride round the world. It is a strong roadster, and up to any amount of rough work. It is the leading pattern of the firm, and, like the rest of their machines, is built to their special orders by the Weed Sewing Machine Co. It is machine-built throughout, and interchangeable.

**NEW MAIL LIGHT ROADSTER.**

W. READ &amp; SON, 107, Washington Street, Boston, Mass.

*Description.*  $\frac{3}{4}$ in. and  $\frac{3}{4}$ in. moulded red tyres. Warwick's hollow rims. 72 and 24 No. 15 tangent spokes. 18in. back wheel. 4 $\frac{1}{2}$ in. steel hubs, 8in. axle. Detachable cranks, 6in. throw. Square rubber ball pedals, 12 $\frac{1}{2}$ in. tread. Æolus ball bearings to both wheels. Warwick's Perfection hollow front and semi-hollow back forks. Trigwell's ball head. Spade vulcanite handles, 29in. x 1 $\frac{3}{4}$ in. hollow, detachable cowhorn bars. 1 $\frac{1}{2}$ in. x 1 $\frac{1}{2}$ in. elliptical 14in. x 19in. W.G. Warwick's Perfection backbone. Kirkpatrick combined spring and saddle. Harwood's safety step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 39lbs.

*Specialties.* Trigwell's ball head (*page 165*). Warwick's Perfection backbone and forks (*pages 152 and 153*). Detachable handle-bar.

## PRICES.

|               |          |               |          |
|---------------|----------|---------------|----------|
| 48in. .. .. . | \$130.00 | 52in. .. .. . | \$135.00 |
| 50in. .. .. . | \$132.50 | 54in. .. .. . | \$137.50 |

Sent out with bright handle-bar, head, brake, hubs, cranks, pedals, step, and half spokes; rest enamelled black.

*Extras.* Plated bright parts, \$10.00. All plated, \$15.00.

*Remarks.* This machine is built in America to special designs of the vendors by the Ames Sword Co. It is machine made, and all parts interchangeable. It is placed on the market as a machine of the highest possible grade, and, so far as I am able to judge, it is so. Messrs. Read & Son were, until 1887, importers of the "Royal Mail."

### PONY STAR.—R.D.

H. B. SMITH MACHINE Co., Smithville, Burlington Co., New Jersey.

*Description.* 5in. and 4in. Star flat-seated tyres. Star flat-seated rims. 52 and 24 doubly butt-ended direct spokes. 4in. steel hubs. Rubber pedals. 42in. driving wheel, 22in. steerer. Rear wheel drives with lever gear. American Star lever gear and silent clutches with springs for recovery. Plain bearings to driving wheel, cones to steerer. Direct-steering, long sloping steering-post. Semi-hollow front forks. Star socket steering. Pear-shaped vulcanite handle-grips, 26in. cowhorn bent back bars. Star frame. Star swing spring. Star Cricket saddle. Saw step. Double lever Star spoon brake on front wheel. Valise, spanner and oilcan. Weight 44lbs.

*Specialties.* Star tyre (page 6). Star rims (page 7). Star driving levers and silent clutches (*Addenda*). Star steering (page 61). Star frame. Star swing spring. Star Cricket saddle (page 83).

#### PRICE.

42in. and 45in. . . . . \$75.00.

Sent out painted and lined.

*Extras.* Enamelled, with plated fittings, \$10.00. Half-plated, \$15.00. Full-plated, \$20.00. Roller bearings to driver, \$10.00. Balls to front wheel, \$8.00. Changeable power gear, \$5.00. Hollow framing, \$10.00. Hollow rims, \$5.00. Hollow handle-bar, \$2.50. Packing, \$1.00.

*Remarks.* This machine is built throughout in the same manner as the other patterns of the Star, but with a smaller wheel, and with the levers bent down to allow its being ridden with a straight leg. Very handy for those who find a difficulty in mounting the higher wheel. The mile has been done upon one in 2m. 38s.

### RACING STAR.—R.D.

H. B. SMITH MACHINE Co., Smithville, Burlington Co., New Jersey.

*Description.* 5in. and 4in. Star flat-seated tyres. Star flat-seated hollow rims. Tangent spokes. Steel hubs. Serrated pedals. 54in. driving wheel. 22in. steerer. Rear wheel drives with lever gear. Hollow Star levers and silent clutches. Plain bearings to driving wheel, balls to steerer. Direct-steering, long sloping steering-post. Semi-hollow front forks. Star socket head. Pear-shaped vulcanite handle-grips, 28in. hollow bars. Hollow Star frame. Star Cricket saddle. Saw step. Spoon brake on front wheel. Spanner and oilcan. Weight, 42lbs.

*Specialties.* Star tyres (page 6). Star rims (page 7). Star lever gear and silent ratchets (*Addenda*). Star frame. Star steering (page 61). Star Cricket saddle (page 83).

Price . . . . . \$150.00

Sent out enamelled black, with plated fittings.

*Extras.* Roller bearings, \$10.00.

*Remarks.* Specially built for the path, and a wonderfully fast machine; absolutely the fastest machine for its weight in the world.

### SPECIAL STAR.—R.D.

H. B. SMITH MACHINE Co., Smithville, Burlington Co., New Jersey.

*Description.* 5in. and 4in. Star flat-seated tyres. Star flat-seated rims. 60 and 24 doubly butt-ended direct spokes. 4in. steel hubs. Rubber pedals. 51in. driving wheel, 22in. steerer. Rear wheel drives with lever gear. Hollow American Star levers and silent clutches, with spring to recover the lever at each stroke. Plain bearings to driving wheel, cones to steerer. Direct-steering, long



SPECIAL STAR

sloping steering post. Semi-hollow front forks. Star socket steering. Pear-shaped vulcanite handle-grips, 27in. cowhorn bent back bars. Star frame. Star swing spring. Star Cricket saddle. Saw step. Double lever Star spoon brake on front wheel. Valise, spanner and oilcan. Weight 52lbs.

*Specialties.* Star tyre (page 6). Star rims (page 7). Star levers and driving gear (Addenda). Star steering (page 61). Star frame. Star swing spring. Star Cricket saddle (page 83).

PRICES.

|       |    |    |    |    |    |    |    |          |
|-------|----|----|----|----|----|----|----|----------|
| 48in. | .. | .. | .. | .. | .. | .. | .. | \$107 00 |
| 51in. | .. | .. | .. | .. | .. | .. | .. | \$112 00 |
| 54in. | .. | .. | .. | .. | .. | .. | .. | \$117.00 |

Sent out with plated handle-bar, fittings, spring and nuts; rest enamelled black.

*Extras.* Half-plated, \$5.00. Full-plated, \$10.00. Roller bearings to driver, \$10.00. Balls to front wheel, \$8 00. Changeable power gear, \$5 00. Hollow framing, \$10.00 Hollow rims, \$5 00 Hollow handle-bar, \$2.50. Packing, \$1.00.

*Remarks.* A machine of the highest grade The leading pattern of the firm. First-class in every way, and possessing all the advantages obtainable in the Star.

SEMI-RACING STAR.—R.D.

H. B SMITH MACHINE Co., Smithville, Burlington Co., New Jersey.

*Description.* 5in. and 3in. Star flat-seated tyres. Star flat-seated rims. 60 and 24 doubly butt-ended direct spokes. 4in. steel hubs. Rubber pedals, 9in. tread. 5in. driving wheel, 22in. steerer. Rear wheel drives with Star lever

gear. Hollow American Star levers and silent clutches. Plain bearings to driving wheel, cones to steerer. Direct-steering, long sloping steering post. Semi-hollow front forks. Socket steering. Pear-shaped vulcanite handle-grips, 27in. cowhorn bent back bars. Star frame. Long flat spring. Star Cricket saddle. Saw step. Double lever spoon brake on front wheel. Valise, spanner and oilcan. Weight 50lbs.

*Specialties.* Star tyre (page 6). Star rims (page 7). Star levers and silent clutches. (*Addenda.*) Star frame. Star steering (page 61). Star Cricket saddle (page 83). General design.

## PRICES.

|       |    |    |    |    |    |    |          |
|-------|----|----|----|----|----|----|----------|
| 48in. | .. | .. | .. | .. | .. | .. | \$102 00 |
| 51in. | .. | .. | .. | .. | .. | .. | \$107 00 |
| 54in. | .. | .. | .. | .. | .. | .. | \$112.00 |

Sent out with plated handle-bar, brake fittings, nuts and fittings; rest enamelled black.

*Extras.*—Half-plating, \$5.00. Full-plating, \$10.00. Roller bearings to driver, \$10.00. Ball bearings to front wheel, \$8.00. Changeable power gear, \$5.00. Hollow frame, \$10.00. Hollow rims, \$5.00. Hollow handle-bars, \$2.50. Packing, \$1.00.

*Remarks.* This machine won the Star races at the Springfield Tournament of 1884, and reduced the then mile record to 2m. 41s., so it is fast. It has all the features of the full roadster, but is built for use on good roads and paths.

## STANDARD COLUMBIA.

POPE MANUFACTURING Co., 79, Franklin Steet, Boston, Mass.

*Description.* 1in. and  $\frac{3}{4}$ in. moulded red tyres. Crescent rims. 50 and 18 No. 11 $\frac{1}{2}$  butt-ended direct spokes. 18in. back wheel. 4 $\frac{1}{2}$ in. steel hubs, 9in. axle. Detachable cranks, 5in. to 6in. throw. Rubber plain pedals, 15in. tread. Ball bearings to front, cones to back wheel. Solid forks. Open centre head, 5 $\frac{1}{2}$ in. centres. Pear-shaped vulcanite handles, 26in. bars. 1 $\frac{1}{2}$ in. 14 W.G. weldless steel backbone. Bolted sliding spring. Suspension saddle. Circular step. D.L.S. brake. Leg-guard. Valise, spanners and oilcan. Weight 46lbs.

## PRICES.

|       |    |    |         |       |    |    |         |
|-------|----|----|---------|-------|----|----|---------|
| 48in. | .. | .. | \$80.00 | 52in. | .. | .. | \$90.00 |
| 50in. | .. | .. | \$87.50 | 54in. | .. | .. | \$92.50 |

Sent out with bright handle-bar, head, brake, hubs, cranks, pedals, spring, spokes; rest painted in two colours.

*Extras.* Frame and wheels enamelled and rest plated, \$10.00. All plated save rims, \$15.00. Double grip ball pedals, \$4.00. Dropped handles, \$2.50.

*Remarks.* This was the first modern machine made in America, and is a plain machine with no style, but strong and heavy.

## VICTOR SAFETY.—R.D.

OVERMAN WHEEL Co., 182-188, Columbus Avenue, Boston, Mass.

*Description.*  $\frac{3}{4}$ in. and  $\frac{1}{2}$ in. Victor compressed tyres. Warwick's hollow rims. 40 true tangent spokes. Steel hubs. Detachable cranks, 5 $\frac{1}{2}$ in. to 6 $\frac{1}{2}$ in. throw. Victor square rubber ball pedals. 30in. driving wheel geared to 54in. 30in. steerer. Rear wheel drives with chain gear. S.L. chain, slotted hinged bracket adjustment. Ball bearings to both wheels and cranks. Direct-steering, sloping steering post. Victor spring forks to front wheel. Hollow back forks. Victor ball head. Vulcanite spade handle-grips, 30in. bent back hollow, detachable, adjustable bars. Cross frame of weldless steel tube. Hollow  $\Gamma$  seat pillar with side bolt adjustment. Victor swing spring, and detachable saddle. Detachable saw step. Brake on back wheel. Mud-guard over back wheel. Valise, spanner and oilcan. Weight 50lbs.

*Specialties.* Victor compressed tyres (page 4). Overman square rubber pedals (page 17). Victor spring forks (*Addenda.*) Victor ball head. Victor swing spring and detachable saddle (*Addenda.*)

Price .. .. . \$135.00



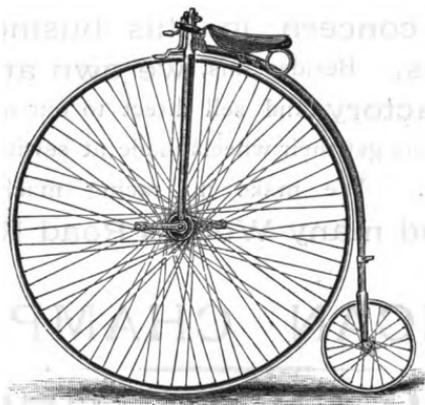
VICTOR SAFETY.

Sent out with plated handle-bar, brake fittings, seat pillar, hubs, cranks and pedals; rest enamelled black in Harrington's enamel.

*Remarks.* The only safety of this type built in America; it has several special features of its own, notably the spring forks, fitting it well for use on the rough roads of the States.

### VICTOR LIGHT ROADSTER.

OVERMAN WHEEL CO., 182-188, Columbus Avenue, Boston, Mass.



VICTOR LIGHT ROADSTER.

*Description.*  $\frac{7}{8}$ in. and  $\frac{3}{4}$ in. Victor compressed tyres. Warwick's hollow rims 72 and 24 true tangent spokes. 18in. back wheel.  $3\frac{1}{2}$ in. steel hubs,  $8\frac{1}{2}$ in. axle. Detachable cranks, 5in. to  $5\frac{3}{4}$ in. throw. Victor square rubber ball pedals,  $12\frac{1}{4}$ in. tread. Æolus ball bearings to both wheels. Hollow front and semi-hollow

back forks. Andrews's head, 5in. centres. Vulcanite spade handles, 29in. hollow cowhorn bars. 1½in. 16 W.G. weldless steel backbone. Victor combined spring and saddle. Adjustable saw step. D.L.S. brake. Ball-ended leg-guard. Valise, spanners and oilcan. Weight 38lbs.

*Specialties.* Victor compressed tyres (*page 4*). Victor square rubber pedals (*page 17*). Æolus ball bearings (*page 36*). Victor spring and saddle (*addenda*). Harrington's enamel.

## PRICES.

|             |          |             |          |
|-------------|----------|-------------|----------|
| 48in. .. .. | \$122.50 | 52in. .. .. | \$127.50 |
| 50in. .. .. | \$125.00 | 54in. .. .. | \$130.00 |

Sent out with plated handle-bar, head, hubs, cranks, and fittings; rest enamelled in Harrington's enamel.

*Remarks.* Built for the company by the Ames Sword Co. It is a really fine mount, of good design and build, and well suited for road work. Is strong and safely built. Constructed also as a racer, it has proved itself very fast. One of the best machines on the American markets.

## "HINGE CRADLE" SPRING.

Tilts backward and forward, and coils give relief to leather. Can be regulated in height, length, pitch, tension and shape.

## "SWING BALANCE" SPRING.

Swings forward, rolls to accommodate pedalling, tensions easily, parts interchangeable, sits immensely, guaranteed to be what you need, or money refunded.

\*\*\*\*\*

**L. S. COPPER & Co.,**  
485, PEARL STREET,  
**CLEVELAND, OHIO, U.S.A.**

### TAKE A NOTE OF THIS.

In 1883 we were about the smallest concern, but are now the largest concern in this business in the United States. Besides this, we own and manage our entire factory and sell direct to our agents, whereas our chief competitors get their wheels made at sewing machine and firearms factories. We make no racing machines, but all American and many World's Road Records have been made on our

**AMERICAN CHAMPIONS.**

**GORMULLY & JEFFERY,**  
**Manufacturing Company,**  
**222 to 228, FRANKLIN STREET, CHICAGO.**

# DIRECTORY OF AMERICAN MANUFACTURERS AND IMPORTERS.

| NAME.                                         | ADDRESS.                                                 | MACHINE HANDLED.               |
|-----------------------------------------------|----------------------------------------------------------|--------------------------------|
| *CLARKE, S. T. & Co. . . . .                  | Baltimore, Maryland . . . . .                            | <i>New Rapid and Quadrant.</i> |
| *COVENTRY MACHINISTS' Co., Ltd. . . . .       | 239, Columbus Avenue, Boston, Mass. . . . .              | <i>Club and Swift.</i>         |
| *EVERETT, W. B. & Co. . . . .                 | 6 and 8, Berkeley Street, Boston, Mass. . . . .          | <i>Apollo and Challenge.</i>   |
| GORMULLY & JEFFERY MANUFACTURING Co. . . . .  | 222 to 228, North Franklin Street, Chicago, Ill. . . . . | <i>American Champion.</i>      |
| KING WHEEL Co. . . . .                        | 51, Barclay Street, New York . . . . .                   | <i>King.</i>                   |
| OVERMAN WHEEL Co. . . . .                     | 182 to 188, Columbus Avenue, Boston, Mass. . . . .       | <i>Victor.</i>                 |
| POPE MANUFACTURING Co. . . . .                | 79, Franklin Street, Boston, Mass. . . . .               | <i>Columbia.</i>               |
| READ, WILLIAM & SONS . . . . .                | 107, Washington Street, Boston, Mass. . . . .            | <i>New Mail.</i>               |
| SMITH, H. B., MACHINE Co. . . . .             | Smithville, Burlington Co., N. J. . . . .                | <i>American Star.</i>          |
| SPALDING, A. G. & BROTHERS . . . . .          | 241, Broadway, New York City . . . . .                   | <i>Spalding.</i>               |
| SPRINGFIELD BICYCLE MANUFACTURING Co. . . . . | 19, Pearl Street, Boston, Mass. . . . .                  | <i>Springfield.</i>            |
| *SQUIRES, H. C. . . . .                       | 178, Broadway, New York . . . . .                        | <i>Royal Mail.</i>             |
| St. NICHOLAS Toy Co. . . . .                  | 784 to 794, Madison Street, Chicago . . . . .            | <i>Children's bicycles.</i>    |
| *STODDARD, LOVERING & Co. . . . .             | 154 to 158, Congress Street, Boston, Mass . . . . .      | <i>Rudge.</i>                  |
| WESTERN Toy Co. . . . .                       | Chicago, Ill. . . . .                                    | <i>Children's bicycles.</i>    |
| *JULIUS WILCOX . . . . .                      | 33, Murray Street, New York . . . . .                    | <i>Facile.</i>                 |

\* Those marked thus are importing houses.

## COMPARATIVE VIEW OF PRICES.

| MACHINE.                        | TYPE. | SIZE. | PRICES. |          | PAGE ON WHICH DESCRIBED |
|---------------------------------|-------|-------|---------|----------|-------------------------|
|                                 |       |       | Inches. | Dollars. |                         |
| Racing Star .. .. .             | S     | 52    | 150.00  | 356      |                         |
| Columbia Racer .. .. .          | O     | 52    | 140.00  | 354      |                         |
| Columbia Safety .. .. .         | S     | 52    | 140.00  | 354      |                         |
| New Mail Light Roadster .. .. . | O     | 52    | 135.00  | 355      |                         |
| Victor Safety .. .. .           | S     | 30    | 135.00  | 358      |                         |
| Columbia Light Roadster .. .. . | O     | 51    | 130.00  | 354      |                         |
| Expert Columbia .. .. .         | O     | 52    | 127.50  | 355      |                         |
| Victor Light Roadster .. .. .   | O     | 52    | 127.50  | 359      |                         |
| American Light Champion .. .. . | O     | 52    | 120.00  | 350      |                         |
| American Light Safety .. .. .   | S     | 44    | 120.00  | 351      |                         |
| Special Star .. .. .            | S     | 51    | 112.00  | 356      |                         |
| Semi-Racing Star .. .. .        | S     | 51    | 107.00  | 358      |                         |
| American Champion .. .. .       | O     | 52    | 105.00  | 348      |                         |
| Columbia Semi-Roadster .. .. .  | O     | 50    | 90.00   | 355      |                         |
| Standard Columbia .. .. .       | O     | 52    | 90.00   | 358      |                         |
| American Star .. .. .           | S     | 51    | 80.00   | 353      |                         |
| Pony Star .. .. .               | S     | 45    | 75.00   | 356      |                         |
| American Challenge .. .. .      | O     | 52    | 74.00   | 347      |                         |
| American Safety .. .. .         | S     | 44    | 74.00   | 352      |                         |
| American Ideal .. .. .          | O     | 50    | 60.00   | 349      |                         |

**THE LARGEST**  
AND  
**MOST COMPLETE FACTORY IN AMERICA**  
FOR THE PRODUCTION OF BICYCLES  
IS THAT IN WHICH THE  
**“AMERICAN CHAMPION”**  
**BICYCLES**  
ARE MADE BY THE  
**GORMULLY & JEFFERY**  
MANUFACTURING Co.,  
222 to 228, NORTH FRANKLIN STREET, CHICAGO.

## SECTION IV.

## COMPARATIVE TABLE OF PRICES AND WEIGHTS OF ORDINARY BICYCLES.

THE following table, compiled for the assistance of the intending purchaser who has to consider the depth of his pocket when making his choice, gives the prices of 52in. machines, fitted and finished as described on the pages named. As machines differ in the quality and completeness of their fittings, a careful reference to the full descriptions will be necessary before deciding which is really the cheaper or more suitable machine of any selected from the table. The graduation of prices may, however, be reckoned a pretty fair criterion as to the comparative finish, fitting, and general excellence of material used in their construction. The weights are for the most part as given me by the manufacturers themselves, and may, in connection with the general description and price, be taken as a tolerably safe guide to the cut and style of the machine. They are about an average, but very few makers build their machines to the weights given by them, mostly running them a pound or two heavier.

| NAME OF MACHINE.                 | Price. |    |    | Weight. | Where Described. |
|----------------------------------|--------|----|----|---------|------------------|
|                                  | £      | s. | d. |         |                  |
| Humber Racer ... ..              | 20     | 0  | 0  | 21      | Page. 227        |
| Royal Mail Racer ... ..          | 20     | 0  | 0  | 23      | 254              |
| Club Racer ... ..                | 19     | 10 | 0  | 22      | 210              |
| Humber Roadster (M. & C.) ... .. | 19     | 0  | 0  | 40      | 228              |
| Invincible Semi-Roadster ... ..  | 19     | 0  | 0  | 28      | 229              |
| Invincible Racer ... ..          | 19     | 0  | 0  | 22      | 230              |
| Queen of the West Tourist ... .. | 18     | 18 | 0  | 38      | 248              |
| Spider Racer ... ..              | 18     | 18 | 0  | 20      | 267              |
| Apollo ... ..                    | 18     | 10 | 0  | 38      | 202              |
| Cambrian Racer ... ..            | 18     | 10 | 0  | 20      | 207              |
| Coventry Imperial No. 0 ... ..   | 18     | 10 | 0  | 38      | 216              |
| Invincible Roadster ... ..       | 18     | 10 | 0  | 34      | 229              |
| King of Clubs ... ..             | 18     | 10 | 0  | 38      | 231              |
| New Rapid Racer ... ..           | 18     | 10 | 0  | 23      | 238              |
| Pilot Light Roadster... ..       | 18     | 10 | 0  | 33      | 244              |
| Pilot Roadster ... ..            | 18     | 10 | 0  | 38      | 245              |
| Regent Roadster ... ..           | 18     | 10 | 0  | 36      | 250              |
| Rudge Racer ... ..               | 18     | 10 | 0  | 22      | 255              |
| Rudge Roadster No. 1 ... ..      | 18     | 10 | 0  | 34      | 256              |
| Singer's Racing Challenge ... .. | 18     | 10 | 0  | 23      | 261              |
| Special Timberlake Semi-Racer .. | 18     | 10 | 0  | 28      | 266              |
| Club Semi-Racer ... ..           | 18     | 0  | 0  | 35      | 210              |
| Dart Racer ... ..                | 18     | 0  | 0  | 20      | 217              |
| Derby Racer ... ..               | 18     | 0  | 0  | 17      | 219              |
| Don Racer No. 1 ... ..           | 18     | 0  | 0  | 22      | 220              |

| NAME OF MACHINE.                    | Price. |    |    | Weight. | Where Described. |
|-------------------------------------|--------|----|----|---------|------------------|
|                                     | £      | s. | d. |         |                  |
| Easthope Light Roadster ...         | 18     | 0  | 0  | 32      | 221              |
| Humber Racer ...                    | 18     | 0  | 0  | 21      | 227              |
| Laced Spoke Special Cambrian ...    | 18     | 0  | 0  | 35      | 233              |
| New Rapid Light Roadster ...        | 18     | 0  | 0  | 34      | 238              |
| Northern No. 1 ...                  | 18     | 0  | 0  | 38      | 240              |
| Pilot Racer ...                     | 18     | 0  | 0  | 22      | 244              |
| Pioneer Racer ...                   | 18     | 0  | 0  | 20      | 245              |
| Pioneer Semi-Racer ...              | 18     | 0  | 0  | 28½     | 245              |
| Premier Racer ...                   | 18     | 0  | 0  | 23      | 247              |
| Regent Racer ...                    | 18     | 0  | 0  | 20½     | 249              |
| R. & P. ...                         | 18     | 0  | 0  | 35      | 250              |
| Royal Premier ...                   | 18     | 0  | 0  | 31      | 253              |
| Sanspareil Racer ...                | 18     | 0  | 0  | 20      | 260              |
| Special Timberlake Racer ...        | 18     | 0  | 0  | 20      | 266              |
| Spider Roadster ...                 | 18     | 0  | 0  | 37      | 267              |
| Victor Excelsior Racer ...          | 18     | 0  | 0  | 21      | 276              |
| Victor Excelsior Light Roadster ... | 18     | 0  | 0  | 30      | 276              |
| Will-o'-the-Wisp Light Roadster ... | 18     | 0  | 0  | 30      | 277              |
| Sanspareil Light Roadster ...       | 17     | 15 | 0  | 34      | 258              |
| Colonial ...                        | 17     | 10 | 0  | 43      | 214              |
| Humber ...                          | 17     | 10 | 0  | 28      | 227              |
| Ivel Light Roadster ...             | 17     | 10 | 0  | 34      | 230              |
| Ivel Racer ...                      | 17     | 10 | 0  | 21      | 231              |
| Moorgate No. 6 ...                  | 17     | 10 | 0  | 36      | 236              |
| New Rapid Roadster ...              | 17     | 10 | 0  | 39      | 239              |
| Sparkbrook Tangent ...              | 17     | 10 | 0  | 33      | 262              |
| Special Cambrian ...                | 17     | 10 | 0  | 37      | 263              |
| Tourist No. 1 ...                   | 17     | 10 | 0  | 35      | 270              |
| Travers No. 1 ...                   | 17     | 10 | 0  | 35      | 270              |
| Travers Racer ...                   | 17     | 10 | 0  | 15¾     | 271              |
| D.E.H.F. ...                        | 17     | 0  | 0  | 44      | 218              |
| D.H.F. ...                          | 17     | 0  | 0  | 42      | 219              |
| Pioneer Roadster ...                | 17     | 0  | 0  | 41      | 246              |
| Dart ...                            | 16     | 16 | 0  | 38      | 217              |
| Fly Racer ...                       | 16     | 16 | 0  | 19      | 226              |
| Queen of the West Roadster ...      | 16     | 16 | 0  | 33      | 248              |
| Special Champion ...                | 16     | 16 | 0  | 32      | 263              |
| Extra Special Timberlake ...        | 16     | 10 | 0  | 36      | 224              |
| Sparkbrook Direct Spoke ...         | 16     | 10 | 0  | 39      | 263              |
| Stanley Excelsior ...               | 16     | 10 | 0  | 36      | 268              |
| Victor Excelsior ...                | 16     | 10 | 0  | 36      | 274              |
| Parr ...                            | 16     | 5  | 0  | 40      | 242              |
| British Challenge ...               | 16     | 0  | 0  | 40      | 205              |
| Centaur D.E.H.F. ...                | 16     | 0  | 0  | 38      | 207              |
| Cunard ...                          | 16     | 0  | 0  | 39      | 217              |
| Northampton Racer ...               | 16     | 0  | 0  | 20      | 239              |
| Rival ...                           | 16     | 0  | 0  | 38½     | 253              |
| Sanspareil Roadster ...             | 16     | 0  | 0  | 40      | 260              |

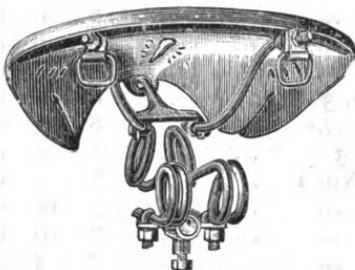
| NAME OF MACHINE.                      | Price. |    |    | Weight.          | Where Described. |
|---------------------------------------|--------|----|----|------------------|------------------|
|                                       | £      | s. | d. |                  |                  |
| Fly Roadster ... ..                   | 15     | 15 | 0  | 40               | 226              |
| Sterling ... ..                       | 15     | 15 | 0  | 36               | 268              |
| Will-o'-the-Wisp ... ..               | 15     | 15 | 0  | 38               | 277              |
| Fox ... ..                            | 15     | 10 | 0  | 32               | 226              |
| New Howe Roadster... ..               | 15     | 10 | 0  | 39               | 238              |
| Raleigh Racer ... ..                  | 15     | 10 | 0  | 20 $\frac{1}{4}$ | 249              |
| King of the Road Tangent ... ..       | 15     | 5  | 0  | 36               | 233              |
| Royal Mail Roadster... ..             | 15     | 5  | 0  | 38               | 255              |
| Barwell ... ..                        | 15     | 0  | 0  | 36               | 204              |
| Barwell Special Light Roadster ... .. | 15     | 0  | 0  | 32               | 204              |
| Birkbeck ... ..                       | 15     | 0  | 0  | 38               | 205              |
| Cogent Racer ... ..                   | 15     | 0  | 0  | 22               | 214              |
| Falcon No. 1 ... ..                   | 15     | 0  | 0  | 43               | 225              |
| Jubilee Tension ... ..                | 15     | 0  | 0  | 39               | 231              |
| Special Timberlake ... ..             | 14     | 14 | 0  | 40               | 265              |
| AI Eclipse ... ..                     | 14     | 10 | 0  | 39               | 201              |
| Moorgate No. 7 ... ..                 | 14     | 10 | 0  | 38               | 237              |
| Carver ... ..                         | 14     | 5  | 0  | 38               | 207              |
| Falcon No. 2 ... ..                   | 14     | 0  | 0  | 41               | 225              |
| Raleigh Light Roadster ... ..         | 14     | 0  | 0  | 27               | 249              |
| Tourist No. 2... ..                   | 14     | 0  | 0  | 40               | 270              |
| Wulfruna No. 1 ... ..                 | 14     | 0  | 0  | 34               | 278              |
| Cambrian No. 3 ... ..                 | 13     | 13 | 0  | 40               | 207              |
| Bedford ... ..                        | 13     | 10 | 0  | 40               | 204              |
| Challenge ... ..                      | 13     | 10 | 0  | 42               | 208              |
| Coventry Triumph No. 1 ... ..         | 13     | 10 | 0  | 42               | 216              |
| Ivel Roadster ... ..                  | 13     | 10 | 0  | 40               | 230              |
| Reliance Racer ... ..                 | 13     | 10 | 0  | 27               | 253              |
| Imperial British Mail ... ..          | 13     | 2  | 0  | 42               | 228              |
| Cogent No. 1 ... ..                   | 13     | 0  | 0  | 35               | 211              |
| Reliance Roadster ... ..              | 13     | 0  | 0  | 36               | 253              |
| Shakespeare T.H.F. ... ..             | 13     | 0  | 0  | 39               | 261              |
| Universal Club No. 1 ... ..           | 13     | 0  | 0  | 45               | 271              |
| Wulfruna Racer ... ..                 | 13     | 0  | 0  | 21               | 278              |
| Extra Special Express ... ..          | 12     | 15 | 0  | 42               | 224              |
| King of the Road ... ..               | 12     | 15 | 0  | 38               | 232              |
| Ashton... ..                          | 12     | 12 | 0  | 38               | 203              |
| Popular Premier ... ..                | 12     | 12 | 0  | 38               | 235              |
| Excelsior No. 1 ... ..                | 12     | 10 | 0  | 40               | 222              |
| Manchester Special Express ... ..     | 12     | 10 | 0  | 38               | 235              |
| Northampton Roadster ... ..           | 12     | 10 | 0  | 30               | 239              |
| Raleigh Roadster ... ..               | 12     | 10 | 0  | 39               | 249              |
| Sandringham No. 1 ... ..              | 12     | 10 | 0  | 38               | 258              |
| Stassen ... ..                        | 12     | 10 | 0  | 42               | 268              |
| Travers No. 2... ..                   | 12     | 10 | 0  | 40               | 270              |
| Derby Roadster ... ..                 | 12     | 0  | 0  | 40               | 219              |
| Don Racer No. 2 ... ..                | 12     | 0  | 0  | 24               | 220              |
| Electric ... ..                       | 12     | 0  | 0  | 40               | 221              |

| NAME OF MACHINE.            | Price. |    |    | Weight.<br>lbs. | Where<br>Described.<br>Page. |
|-----------------------------|--------|----|----|-----------------|------------------------------|
|                             | £      | s. | d. |                 |                              |
| Northern No. 2              | 12     | 0  | 0  | 40              | 240                          |
| Olympic No. 1               | 12     | 0  | 0  | 39              | 240                          |
| Royal Mail No. 2            | 12     | 0  | 0  | 40              | 255                          |
| Rudge No. 2                 | 12     | 0  | 0  | 38              | 257                          |
| Sanspareil No. 2            | 12     | 0  | 0  | 43              | 260                          |
| Universal No. 1             | 12     | 0  | 0  | 38              | 271                          |
| Barwell                     | 11     | 16 | 0  | 36              | 204                          |
| King Semi-Roadster          | 11     | 11 | 0  | 32              | 233                          |
| King of the Road (D. & Co.) | 11     | 11 | 0  | 42              | 232                          |
| Pilot Ar                    | 11     | 11 | 0  | 40              | 244                          |
| Coventry Imperial No. 6     | 11     | 10 | 0  | 40              | 216                          |
| Tempest No. 1               | 11     | 10 | 0  | 38              | 269                          |
| Auto                        | 11     | 4  | 0  | 38              | 203                          |
| Improved Timberlake         | 11     | 2  | 0  | 42              | 229                          |
| Cambrian No. 2              | 11     | 0  | 0  | 42              | 206                          |
| Special Commercial          | 11     | 0  | 0  | 38              | 264                          |
| Whitehall                   | 11     | 0  | 0  | 42              | 277                          |
| Ashton No. 2                | 10     | 10 | 0  | 44              | 203                          |
| Challenge No. 2             | 10     | 10 | 0  | 42              | 208                          |
| Champion                    | 10     | 10 | 0  | 44              | 209                          |
| Dreadnought                 | 10     | 10 | 0  | 39              | 221                          |
| Fox No. 2                   | 10     | 10 | 0  | 32              | 226                          |
| Shakespeare                 | 10     | 10 | 0  | 38              | 261                          |
| Speedwell                   | 10     | 10 | 0  | 38              | 267                          |
| Victoria                    | 10     | 10 | 0  | 48              | 274                          |
| Don                         | 10     | 0  | 0  | 38              | 220                          |
| Essential                   | 10     | 0  | 0  | 37              | 222                          |
| Excelsior No. 2             | 10     | 0  | 0  | 42              | 223                          |
| Express Semi-Racer          | 10     | 0  | 0  | 34              | 223                          |
| Imperial Invicta            | 10     | 0  | 0  | 38              | 228                          |
| Manchester Express No. 1    | 10     | 0  | 0  | 39              | 234                          |
| Original Universal Special  | 10     | 0  | 0  | 40              | 242                          |
| Peeping Tom                 | 10     | 0  | 0  | 40              | 243                          |
| Stanley                     | 10     | 0  | 0  | 40              | 267                          |
| Universal Club No. 2        | 10     | 0  | 0  | 45              | 272                          |
| Universal Premier No. 2     | 10     | 0  | 0  | 44              | 272                          |
| Universal Special           | 10     | 0  | 0  | 40              | 273                          |
| Special Mazeppa             | 9      | 15 | 0  | 39              | 265                          |
| Artisan's                   | 9      | 10 | 0  | 45              | 203                          |
| Emperor                     | 9      | 10 | 0  | 45              | 221                          |
| Cogent No. 2                | 9      | 0  | 0  | 38              | 212                          |
| Moorgate No. 8              | 9      | 0  | 0  | 42              | 237                          |
| Peerless No. 1              | 9      | 0  | 0  | 40              | 243                          |
| Wulfruna No. 2              | 9      | 0  | 0  | 38              | 278                          |
| Universal Timberlake        | 8      | 16 | 0  | 44              | 274                          |
| Emperor No. 2               | 8      | 10 | 0  | 45              | 222                          |
| Hercules                    | 8      | 10 | 0  | 40              | 277                          |
| Pilot No. 0                 | 8      | 8  | 0  | 42              | 244                          |

| NAME OF MACHINE.                  | Price. |    |    | Weight.<br>lbs. | Where<br>Described. |
|-----------------------------------|--------|----|----|-----------------|---------------------|
|                                   | £      | s. | d. |                 |                     |
| Manchester Express No. 2 ...      | 8      | 5  | 0  | 40              | 224                 |
| Special Express ...               | 8      | 5  | 0  | 42              | 264                 |
| Special Whitmore No. 1 ...        | 8      | 5  | 0  | 38              | 266                 |
| Excelsior No. 3 ...               | 8      | 0  | 0  | 42              | 223                 |
| Northern No. 3 ...                | 8      | 0  | 0  | 44              | 240                 |
| Olympic No. 2 ...                 | 8      | 0  | 0  | 40              | 241                 |
| Rudge Roadster No. 3 ...          | 8      | 0  | 0  | 42              | 258                 |
| Special Invicta ...               | 8      | 0  | 0  | 38              | 265                 |
| Universal Club No. 3 ...          | 8      | 0  | 0  | 48              | 272                 |
| Universal Premier No. 1 ...       | 8      | 0  | 0  | 45              | 272                 |
| Sandringham No. 2 ...             | 7      | 10 | 0  | 44              | 258                 |
| Tempest No. 2 ...                 | 7      | 10 | 0  | 40              | 269                 |
| Mazepa Improved ...               | 7      | 5  | 0  | 41              | 235                 |
| Cambrian No. 1 ...                | 7      | 0  | 0  | 43              | 206                 |
| Cogent No. 3 ...                  | 7      | 0  | 0  | 42              | 212                 |
| Coventry Imperial No. 3 ...       | 7      | 0  | 0  | 42              | 216                 |
| Miniature Challenge ...           | 7      | 0  | 0  | 34              | 236                 |
| Olympic No. 3 ...                 | 7      | 0  | 0  | 40              | 241                 |
| Manchester Express No. 3 ...      | 6      | 15 | 0  | 40              | 234                 |
| Whitmore No. 2 ...                | 6      | 15 | 0  | 42              | 277                 |
| Commercial No. 1 ...              | 6      | 10 | 0  | 38              | 214                 |
| Mazepa No. 2 ...                  | 6      | 10 | 0  | 42              | 236                 |
| Peerless No. 2 ...                | 6      | 10 | 0  | 40              | 243                 |
| Special Cogent ...                | 6      | 10 | 0  | 43              | 264                 |
| Special Cogent No. 7... ..        | 6      | 10 | 0  | 44              | 264                 |
| Rego ... ..                       | 6      | 8  | 0  | 40              | 252                 |
| Universal No. 2 ... ..            | 6      | 0  | 0  | 43              | 271                 |
| Boy's Cambrian (4oin.) ... ..     | 5      | 10 | 0  | 34              | 206                 |
| Cogent No. 4 ... ..               | 5      | 10 | 0  | 42              | 212                 |
| Manchester Express No. 4 ... ..   | 5      | 10 | 0  | 40              | 235                 |
| Whitmore No. 3 ... ..             | 5      | 10 | 0  | 40              | 277                 |
| Youth's Timberlake (4oin.) ... .. | 5      | 10 | 0  | 36              | 278                 |
| Tempest No. 3 ... ..              | 5      | 0  | 0  | 44              | 269                 |
| Express No. 2 ... ..              | 4      | 10 | 0  | 45              | 223                 |
| Manchester Express No. 5 ... ..   | 4      | 10 | 0  | 44              | 235                 |
| Olympic No. 4 ... ..              | 4      | 10 | 0  | 45              | 242                 |
| Peerless No. 3 ... ..             | 4      | 10 | 0  | 44              | 243                 |
| Cogent No. 5 ... ..               | 4      | 10 | 0  | 42              | 213                 |
| Commercial No. 2 ... ..           | 4      | 10 | 0  | 45              | 215                 |
| Demo ... ..                       | 4      | 5  | 0  | 44              | 218                 |
| Cogent No. 8 (36in.)... ..        | 3      | 15 | 0  | 34              | 214                 |

Another International Certainty.  
**HARRINGTON v. ALL COMERS.**

**THE  
NEW  
CRADLE**



**SPRING  
SADDLE.**

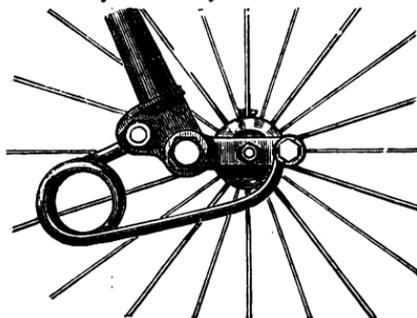
Whips the World.

Look out for it.

**THE VERY BEST**

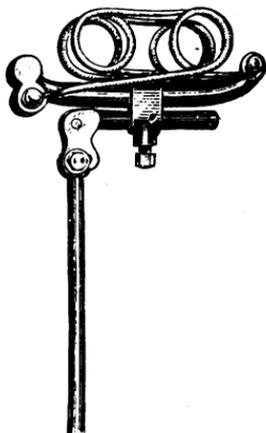
**NON-VIBRATOR**

For Safety and Tricycle Front Wheels is



**HARRINGTON'S  
Patent VIBRATION CHECK**

**SPRING in the MARKET**  
— is still —



**HARRINGTON'S New No. 8**  
For Tricycles and Safeties.

**HARRINGTON & Co.**  
**COVENTRY,**  
And at 398, Fulham Road,  
LONDON, S.W.

**ILLUSTRATED CATALOGUES**  
Free on application.

**THE VERY BEST  
Self-drying Black Enamel**



**IS HARRINGTON'S.**

**IT WILL STAY ON.**

## COMPARATIVE TABLE OF PRICES, SIZES, GEARINGS, PRINCIPLES AND WEIGHTS OF SAFETY BICYCLES.

→ ←

In the following table the second and third columns show the size of wheel and gearing used, in the fourth column the letter L stands for lever gear, C signifying a chain-driven machine, and in the fifth column F and R denote front and driving respectively.

| NAME OF MACHINE.            | PRICE. | SIZE OF DRIVING WHEEL. | GEARED TO | CLASS OF GEARING. | POSITION OF DRIVING WHEEL. | WEIGHT.    | PAGE ON WHICH DESCRIBED |
|-----------------------------|--------|------------------------|-----------|-------------------|----------------------------|------------|-------------------------|
|                             |        |                        |           |                   |                            |            |                         |
| Central Otto ..             | 25     | 4                      | 56        | C                 | D                          | 55-75      | 289                     |
| Crypto 'Extraordinary' ..   | 25     | 0                      | 46-56     | L                 | F                          | 49-46      | 296                     |
| Special Rover ..            | 21     | 10                     | 40        | C                 | R                          | 56         | 333                     |
| Surprise Dart ..            | 21     | 0                      | 30        | C                 | R                          | 56         | 334                     |
| Claviger B ..               | 21     | 0                      | 28        | L                 | R                          | 48         | 290                     |
| Claviger F ..               | 20     | 10                     | 36        | L                 | F                          | 292        |                         |
| Racing Invincible ..        | 20     | 10                     | 50        | L                 | R                          | 48-60 adj. |                         |
| Albemarle No. 2 ..          | 20     | 0                      | 36        | C                 | R                          | 25         | 321                     |
| Courier ..                  | 20     | 0                      | 30        | C                 | R                          | 48         | 280                     |
| Don Racer ..                | 20     | 0                      | 36        | C                 | R                          | 45         | 293                     |
| Falcon No. 3 ..             | 20     | 0                      | 64        | C                 | R                          | 26         | 296                     |
| Humber (H. & Co.) ..        | 20     | 0                      | 30        | C                 | R                          | 49         | 299                     |
| Invicta, Spring Frame ..    | 20     | 0                      | 56        | C                 | R                          | 42         | 303                     |
| Invincible ..               | 20     | 0                      | 30        | C                 | R                          | 50         | 305                     |
| Invincible Semi-roadster .. | 20     | 0                      | 30        | C                 | R                          | 42         | 305                     |
|                             | 20     | 0                      | 56        | C                 | R                          | 36         | 306                     |

| NAME OF MACHINE.        | PRICE. | SIZE OF DRIVING WHEEL. | GEARED TO  | CLASS OF GEARING. | POSITION OF DRIVING WHEEL. | WEIGHT. | PAGE ON WHICH DESCRIBED |
|-------------------------|--------|------------------------|------------|-------------------|----------------------------|---------|-------------------------|
| Kangaroo No. 2          | £ 20 0 | Inches. 36             | Inches. 54 | C                 | F                          | 36      | 309                     |
| Kangaroo Racer          | 20 0   | 40                     | 60         | C                 | F                          | 23      | 311                     |
| Premier Racer ..        | 20 0   | 30                     | 66         | C                 | R                          | 20      | 317                     |
| Premier Semi-racer      | 20 0   | 30                     | 60         | C                 | R                          | 36      | 318                     |
| Quadrant ..             | 20 0   | 32                     | 54         | C                 | R                          | 58      | 320                     |
| Queen of the West       | 20 0   | 32                     | 56         | C                 | R                          | —       | 320                     |
| R. and P. ..            | 20 0   | 30                     | 60         | C                 | R                          | 41      | 320                     |
| Rover ..                | 20 0   | 30                     | 54         | C                 | R                          | 50      | 326                     |
| Swift Racer             | 20 0   | 30                     | 66         | C                 | R                          | 25      | 337                     |
| Whippet..               | 20 0   | 30                     | 54         | C                 | R                          | 44      | 343                     |
| 'Extraordinary ..       | 20 0   | 30                     | ungeared   | L                 | F                          | 48      | 345                     |
| Claviger D No. 3        | 19 10  | 46-54                  | 56         | L                 | R                          | 46      | 291                     |
| Extra Special Facile    | 19 0   | 42                     | 42         | L                 | F                          | 36      | 298                     |
| Gearred Facile ..       | 19 0   | 40                     | 60         | L                 | F                          | 40      | 301                     |
| Humber (M. & C.)        | 19 0   | 28                     | 56         | C                 | R                          | 45      | 304                     |
| New Rapid ..            | 18 18  | 30                     | 57         | C                 | R                          | 46      | 315                     |
| Psycho ..               | 18 10  | 30                     | 54         | C                 | R                          | 41      | 319                     |
| Regent ..               | 18 10  | 30                     | 56         | C                 | R                          | 40      | 323                     |
| Apollo ..               | 18 0   | 30                     | 54         | C                 | R                          | 48      | 281                     |
| Bicyclette ..           | 18 0   | 30                     | 54         | C                 | R                          | 46      | 283                     |
| British Star ..         | 18 0   | 30                     | 56         | C                 | R                          | 48      | 285                     |
| Claviger D No. 2        | 18 0   | 34                     | 56         | L                 | R                          | 48      | 291                     |
| Coventry Imperial No. 9 | 18 0   | 32                     | 52         | C                 | R                          | 47      | 294                     |
| Cunard ..               | 18 0   | 30                     | 56         | C                 | R                          | 48      | 296                     |
| Eureka ..               | 18 0   | 30                     | 54         | C                 | R                          | 40      | 297                     |
| Harvard ..              | 18 0   | 38                     | 54         | C                 | F                          | 43      | 302                     |
| Irish Ivel No. 3        | 18 0   | 30                     | 52         | C                 | R                          | 52½     | 307                     |
| Ivel Semi-racer No. 4.. | 18 0   | 30                     | 60         | C                 | R                          | 35      | 308                     |
| John Keen ..            | 18 0   | 30                     | 55         | C                 | R                          | 37      | 308                     |
| Kangaroo No. 1          | 18 0   | 36                     | 54         | C                 | F                          | 44      | 309                     |

| NAME OF MACHINE.  | PRICE. | SIZE OF DRIVING WHEEL. | GEARED TO  | CLASS OF GEARING. | POSITION OF DRIVING WHEEL. | WEIGHT. | PAGE ON WHICH DESCRIBED |
|-------------------|--------|------------------------|------------|-------------------|----------------------------|---------|-------------------------|
| Moorgate No. 5    | £ 18 0 | Inches. 30             | Inches. 54 | C                 | R                          | lbs. 48 | 314                     |
| Olympia..         | 18 0   | 30                     | 60         | C                 | R                          | 46      | 315                     |
| Premier Roadster  | 18 0   | 30                     | 54         | C                 | R                          | 46      | 318                     |
| Racing Ivel No. 5 | 18 0   | 30                     | 66         | C                 | R                          | 23      | 321                     |
| Raleigh No. 1 ..  | 18 0   | 30                     | 56         | C                 | R                          | 48      | 322                     |
| Raleigh Racer ..  | 18 0   | 30                     | 60         | C                 | R                          | 28      | 323                     |
| Rover No. 2 ..    | 18 0   | 30                     | 54         | C                 | R                          | 50      | 327                     |
| Sanspareil ..     | 18 0   | 30                     | 54         | C                 | R                          | 42      | 329                     |
| Sparkbrook ..     | 18 0   | 30                     | 54         | C                 | R                          | 47      | 331                     |
| Swift No. 1 ..    | 18 0   | 30                     | 57         | C                 | R                          | 49      | 335                     |
| Swift No. 2 ..    | 18 0   | 30                     | 57         | C                 | R                          | 46      | 336                     |
| Turner No. 2 ..   | 18 0   | 30                     | 57         | C                 | R                          | 46      | 341                     |
| Will-o'-the-Wisp  | 18 0   | 30                     | 54         | C                 | R                          | 40      | 344                     |
| Antelope ..       | 17 10  | 36                     | 56         | C                 | R                          | 40      | 281                     |
| Berrymead ..      | 17 10  | 30                     | 54         | C                 | R                          | 35      | 283                     |
| Cambrian R D...   | 17 10  | 30                     | 54         | C                 | R                          | 45      | 287                     |
| Carver ..         | 17 10  | 30                     | 58         | C                 | R                          | 41      | 288                     |
| Ivel No. 2 ..     | 17 10  | 30                     | 56         | C                 | R                          | 46      | 307                     |
| Lady's Ivel ..    | 17 10  | 30                     | 52         | C                 | R                          | 47      | 312                     |
| Pioneer ..        | 17 10  | 30                     | 56         | C                 | R                          | 35      | 317                     |
| Rudge Safety ..   | 17 10  | 38                     | 57         | C                 | F                          | 42      | 328                     |
| Sanspareil Lever  | 17 10  | 40                     | 40         | L                 | F                          | 45      | 329                     |
| Singer ..         | 17 10  | 30                     | 54         | C                 | R                          | 46      | 330                     |
| Timberlake ..     | 17 10  | 30                     | 54         | C                 | R                          | 35      | 338                     |
| Travers No. 1 ..  | 17 10  | 30                     | 60         | C                 | R                          | 38      | 340                     |
| Travers Racer ..  | 17 10  | 30                     | 56         | C                 | R                          | 24      | 340                     |
| Albmarie ..       | 17 0   | 38                     | 52         | C                 | F                          | 44      | 280                     |
| Cambrian Dwarf    | 17 0   | 36                     | 54         | C                 | F                          | 50      | 287                     |
| Will-o'-the-Wisp  | 17 0   | 36                     | 54         | C                 | F                          | 42      | 344                     |
| Albion ..         | 16 16  | 36                     | 54         | C                 | F                          | 41      | 281                     |

| NAME OF MACHINE.                    | PRICE. | SIZE OF DRIVING WHEEL. | GEARED TO | CLASS OF GEARING. | POSITION OF DRIVING WHEEL. | WEIGHT. | PAGE ON WHICH DESCRIBED |
|-------------------------------------|--------|------------------------|-----------|-------------------|----------------------------|---------|-------------------------|
| Charm ..                            | £ 16   | 30                     | 54        | C                 | R                          | 46      | 289                     |
| Fly ..                              | 16     | 30                     | 52        | C                 | R                          | 46      | 300                     |
| Fly Racer ..                        | 16     | 30                     | 60        | C                 | R                          | 25      | 300                     |
| Rival No. 1 ..                      | 16     | 30                     | 54        | C                 | R                          | 45      | 325                     |
| British Mail ..                     | 16     | 30                     | 54        | C                 | R                          | 50      | 285                     |
| Birkbeck ..                         | 16     | 30                     | 56        | C                 | R                          | 46      | 284                     |
| Turner No. 1 ..                     | 16     | 30                     | 57        | C                 | R                          | 45      | 341                     |
| Ashton ..                           | 16     | 30                     | 52        | C                 | R                          | 47      | 282                     |
| Brookes No. 1 ..                    | 16     | 30                     | 54        | C                 | R                          | 36      | 285                     |
| Fox ..                              | 16     | 30                     | 52        | C                 | R                          | 45      | 300                     |
| Ivel No. 1 ..                       | 16     | 30                     | 56        | C                 | R                          | 46      | 306                     |
| Parr ..                             | 16     | 30                     | 53        | C                 | R                          | 44      | 317                     |
| Scarborough ..                      | 16     | 36                     | 54        | C                 | F                          | 49      | 330                     |
| Tempest... ..                       | 16     | 36                     | 54        | C                 | F                          | 48      | 337                     |
| Thaumaturgy ..                      | 16     | 30                     | 54        | C                 | R                          | 46      | 338                     |
| Kelsey ..                           | 15     | 38                     | 52        | C                 | F                          | 42      | 312                     |
| Globe ..                            | 15     | 38                     | 54        | C                 | F                          | 39      | 301                     |
| Victoria (Cox) ..                   | 15     | 30                     | 56        | C                 | R                          | 47      | 342                     |
| Whitehall ..                        | 15     | 30                     | 60        | C                 | R                          | 48      | 343                     |
| Bedford ..                          | 15     | 30                     | 58        | C                 | R                          | 35      | 283                     |
| Cambrian R.D. No. 2 ..              | 15     | 30                     | 54        | C                 | R                          | 50      | 288                     |
| Kangaroo No. 3 ..                   | 15     | 36                     | 54        | C                 | F                          | 48      | 311                     |
| Moorgate Dwarf No. 5 ..             | 15     | 38                     | 54        | C                 | F                          | 44      | 314                     |
| New Northern ..                     | 15     | 30                     | 56        | C                 | R                          | 44      | 314                     |
| Reynard... ..                       | 15     | 30                     | 54        | C                 | R                          | 47      | 324                     |
| Special Facile ..                   | 15     | 42                     | 42        | L                 | F                          | 42      | 332                     |
| Tourist ..                          | 15     | 30                     | 52        | C                 | R                          | 48      | 340                     |
| Universal ..                        | 15     | 32                     | 52        | C                 | R                          | 50      | 342                     |
| Victoria (Midland Cycle Company) .. | 15     | 30                     | 60        | C                 | R                          | 42      | 342                     |
| Wulfruna ..                         | 15     | 30                     | 52        | C                 | R                          | 44      | 344                     |

| NAME OF MACHINE.         | PRICE.  | SIZE OF DRIVING WHEEL. | GEARED TO  | CLASS OF GEARING. | POSITION OF DRIVING WHEEL. | WEIGHT. | PAGE ON WHICH DESCRIBED |
|--------------------------|---------|------------------------|------------|-------------------|----------------------------|---------|-------------------------|
| Victoria Arklow          | £ 14 14 | Inches. 30             | Inches. 56 | C                 | R                          | lbs. 50 | 343                     |
| Raleigh No. 2            | 14 0    | 30                     | 54         | C                 | R                          | 48      | 322                     |
| Cambrian Dwarf No. 2     | 14 0    | 36                     | 54         | C                 | F                          | 53      | 287                     |
| Jubilee                  | 14 0    | 30                     | 56         | C                 | R                          | 45      | 308                     |
| Kear                     | 14 0    | 30                     | 52         | C                 | R                          | 40      | 311                     |
| Mazeppa No. 1.           | 14 0    | 36                     | 56         | C                 | F                          | 40      | 313                     |
| Stassen                  | 14 0    | 30                     | 56         | C                 | R                          | 45      | 334                     |
| Torpedo                  | 13 15   | 30                     | 56         | C                 | R                          | 43      | 339                     |
| Brookes No. 2            | 13 10   | 30                     | 54         | C                 | R                          | 40      | 286                     |
| Coventry Imperial No. 11 | 13 10   | 30                     | 52         | C                 | R                          | 48      | 295                     |
| Dreadnought              | 13 10   | 30                     | 60         | C                 | R                          | 47      | 296                     |
| Invicta No. 2            | 13 10   | 30                     | 56         | C                 | R                          | 47      | 304                     |
| Sandringham              | 13 10   | 36                     | 54         | C                 | F                          | 43      | 329                     |
| Reliance                 | 13 0    | 30                     | 52         | C                 | R                          | 60      | 324                     |
| Cogent No. 18            | 12 10   | 30                     | 56         | C                 | R                          | 42      | 293                     |
| Express                  | 12 10   | 36                     | 52         | C                 | F                          | 42      | 298                     |
| Invicta No. 1            | 12 10   | 38                     | 56         | C                 | F                          | 43      | 304                     |
| Olympic No. 1            | 12 10   | 30                     | 53½        | C                 | R                          | 43      | 315                     |
| Travers No. 2            | 12 10   | 30                     | 56         | C                 | R                          | 340     | 340                     |
| Commercial               | 12 0    | 40                     | 52         | C                 | F                          | 46      | 293                     |
| New Northern No. 2       | 12 0    | 30                     | 56         | C                 | R                          | 45      | 314                     |
| Albion No. 2             | 11 0    | 36                     | 54         | C                 | F                          | 44      | 281                     |
| Rival No. 2              | 11 0    | 30                     | 54         | C                 | R                          | 50      | 326                     |
| Facile                   | 10 10   | 42                     | 42         | L                 | F                          | 45      | 299                     |
| Shakespeare              | 10 10   | 32                     | 52         | C                 | F                          | 50      | 330                     |
| Coventry Imperial No. 8  | 10 0    | 36                     | 52         | C                 | F                          | 44      | 294                     |
| Mazeppa No. 2.           | 10 0    | 36                     | 54         | C                 | F                          | 44      | 313                     |
| Tempo                    | 10 0    | 30                     | 52         | C                 | F                          | 46      | 337                     |
| Homo                     | 9 12    | 38                     | 52         | C                 | F                          | 42      | 302                     |
| Olympic                  | 9 10    | 30                     | 53½        | C                 | R                          | 45      | 316                     |

## SELECTION AND PURCHASE OF MACHINES.



THE object of the present work is to place the intending purchaser of a bicycle in possession of the particulars of every machine in the market, so that he may have a full choice before him. These particulars will be found in the previous pages, and if, after due consideration of them, he cannot decide, or if he is undecided in his choice between one or two makes, I shall be happy to give him the best assistance in my power, through the columns of *The Cyclist*, if he will send all particulars as to his height, weight, and experience, the use for which he would require the machine, the kind of roads in his neighbourhood, price which would be given, and the machines which have struck his fancy, addressing to the Editor *The Cyclist*, Coventry. I would, however, refer him for many useful notes on the points to be considered in the selection and purchase of a machine—as well as hints on its management, treatment, &c.—to my little work, “The Complete Guide to Bicycling,” and would further generally remark that, as to the choice between an ordinary and a safety, if he be fairly active, likes seeing the scenery, and is not of an excessively nervous disposition, he can make no better choice than a soundly-built ordinary, but if he be “older than he was,” at all nervous, or lacking in agility, or if he require the machine for general business purposes in the streets of a town, he will find a safety most likely to suit his requirements. In purchasing, he *may* get hold of a decent second-hand article, but it is always a doubtful experiment, and the best way, unquestionably, is to go direct to one of the first-class makers or agents, whose announcements will be found in these pages, and buy a new machine of as good a quality as his purse will allow.

DIRECTORY TO MANUFACTURERS.

| NAME.                       | ADDRESS.                                            | MACHINE.                   |
|-----------------------------|-----------------------------------------------------|----------------------------|
| ALBONE, DAN ..              | Ivel Cycle Works, Biggleswade ..                    | <i>Ivel.</i>               |
| ANDREWS, WM. (LIMITED) ..   | 21, Victoria Road, Aston, Birmingham ..             | <i>Sanspareil.</i>         |
| ASHTON BROS. ..             | 12, London Road, Clapham, London ..                 | <i>Ashton.</i>             |
| BAGSHAW & SON ..            | Hill Foot, Sheffield ..                             | <i>Electric.</i>           |
| BARRATT, J. ..              | St. John's Square, Wolverhampton ..                 | <i>Wulfruna.</i>           |
| BARWELL & Co. ..            | 159, Great Hampton Row, St. George's, Birmingham .. | <i>Barwell.</i>            |
| BATES, JOSEPH ..            | Tempest Works, Wolverhampton ..                     | <i>Tempest.</i>            |
| BAYLIS, THOMAS & Co. ..     | Lower Ford Street, Coventry ..                      | <i>Excelsior.</i>          |
| BEACH, JAMES ..             | 145, East Beach, Taunton ..                         | <i>Al Ectipse.</i>         |
| BEDFORD CYCLE Co. ..        | St. Paul's Square, Bedford ..                       | <i>Tourist.</i>            |
| BROOKES, J. & H. ..         | Cape Works, near Birmingham ..                      | <i>Brookes.</i>            |
| BURDESS & TOWNSEND ..       | Holyhead Road, Coventry ..                          | <i>Sterling.</i>           |
| CARTER & Co. ..             | Shakespeare Cycle Works, Stratford-on-Avon ..       | <i>Shakespeare</i>         |
| CARVER, A. ..               | Alfred Street Mills, Nottingham ..                  | <i>Carver.</i>             |
| CENTAUR CYCLE Co. ..        | West Orchard, Coventry ..                           | <i>Centaur.</i>            |
| CLARKE, E. C. ..            | 1, Friar Gate, Derby ..                             | <i>Derby.</i>              |
| CLARKE, T. ..               | Darlington Street, Wolverhampton ..                 | <i>Cogent.</i>             |
| CLAVIGER CYCLE Co. ..       | 180, Stockport Road, Manchester ..                  | <i>Manchester Express.</i> |
| COOPER, KITCHEN & Co. ..    | New Bridge Street, Strangeways, Manchester ..       | <i>Claviger.</i>           |
| COVENTRY MACHINISTS' Co. .. | Tower Chambers, Moorgate Street, London ..          | <i>Moorgate.</i>           |
| COX & SONS ..               | Cheylesmore, Coventry ..                            | <i>Club.</i>               |
| CLEAVER & Co. ..            | Railway Road, King's Lynn ..                        | <i>Sandringham.</i>        |
| CUNARD CYCLE Co. ..         | Kent Works, William Street, Sittingbourne ..        | <i>Invicta.</i>            |
| DALBY, J. P. ..             | Wolverhampton ..                                    | <i>Cunard.</i>             |
| DAVIES, NATHANIEL ..        | Whitehall Tricycle Works, Leeds ..                  | <i>Whitehall.</i>          |
| DENNE & Co. ..              | 21, Sherbourne Place, Cheltenham ..                 | <i>Victoria.</i>           |
| DIX, THOS. ..               | East Kent Cycle Works, Sittingbourne ..             | <i>King of the Road.</i>   |
| ELLIS & Co. ..              | Churchfield Road, Acton, London, W. ..              | <i>Berrymead.</i>          |
| FLY CYCLE Co. ..            | 47, Farringdon Road, London ..                      | <i>Facile.</i>             |
|                             | St. Stephen's Place, Norwich ..                     | <i>Fly.</i>                |

| NAME.                        | ADDRESS.                                            | MACHINE.              |
|------------------------------|-----------------------------------------------------|-----------------------|
| FOX, T.                      | Kent Street Works, Leicester                        | Fox.                  |
| GADSBY, E.                   | 24, Bearward Street, Northampton                    | Northampton.          |
| GOODBY & SON                 | Bolt Works, Merridale Street, Wolverhampton         | Peerless.             |
| GOSPEL OAK CO.               | 677, Commercial Road E., London                     | Falcon.               |
| GRIFFITHS & SON              | Clyde Works, Heath Town, Wolverhampton              | Universal.            |
| GROUT, W. H.                 | 7, Watson Street, Stoke Newington Green, London, N. | Jubilee Tension.      |
| GUEST & BARROW               | 279, Broad Street, Birmingham                       | Speedwell.            |
| WINNETT & CO.                | 5, St. John's Square, Wolverhampton                 | Essential.            |
| HILLMAN, HERBERT & COOPER    | Premier Works, Coventry                             | Premier.              |
| HICKLING & CO.               | Maidenhead                                          | Pilot.                |
| HOLLOWAY                     | 157, Westminster Bridge Road, London, S.E.          | Dart.                 |
| HOWE MACHINE CO.             | Bridgeton, Glasgow                                  | Albemarle.            |
| HUCKLEBRIDGE                 | 4, Lower Sloane Street, Chelsea                     | Will-o'-the-Wisp.     |
| HUGHES, GEO.                 | Temple Works, Temple Street, Wolverhampton          | Auto.                 |
| HUMBER & CO.                 | Beeston, Notts.                                     | Humber.               |
| HUMBER & CO.                 | Imperial Works, White Friars Lane, Coventry         | Coventry Imperial.    |
| HUMBER & CO.                 | The Ashes, Great Brickkiln Street, Wolverhampton    | Express.              |
| HUMBER & CO.                 | Stanley Bicycle Works, Sheffield                    | Stanley.              |
| HYDES & WIGFULL              | 5, Holborn Viaduct, London                          | John Keen.            |
| JEWEL CYCLE COMPANY          | Redcross Street, Bristol                            | Kear.                 |
| KEAR, H. E.                  | Handsworth, Birmingham                              | Kelsey.               |
| KELSEY & KELSEY              | Church Lane, Wolverhampton                          | Peeping Tom.          |
| LLOYD, SAM'L.                | Mount Row, East Road, City Road, London             | Whippet.              |
| LINLEY & BIGGS               | 345, Edgware Road, London                           | Champion.             |
| MARKHAM                      | 65A, Holborn Viaduct, London                        | Humber.               |
| MARRIOTT & COOPER            | 127, Leadenhall Street, London                      | Courier.              |
| MAYNARD, HARRIS & CO.        | 75, Bishopsgate Street Without, London              | Mazeppa.              |
| METROPOLITAN MACHINISTS' CO. | Bell Street, Wolverhampton                          | Don.                  |
| MIDLAND CYCLE CO.            | Crockherbtown, Cardiff                              | Cambrian.             |
| MORRIS BROS.                 | 402, Kennington Park Corner                         | Spring Frame Invoice. |
| MOORE & CO.                  | High Bridge, Newcastle-on-Tyne                      | Northern.             |
| NORTH OF ENGLAND CYCLE CO.   | 48, Hatton Gardens, London                          | Otto.                 |
| OTTO, E. C. F.               |                                                     |                       |

| NAME.                           | ADDRESS.                                               | MACHINE.                  |
|---------------------------------|--------------------------------------------------------|---------------------------|
| PARKYN, F.                      | Green Lane, Wolverhampton                              | <i>Olympic.</i>           |
| PARR, J.                        | 61, Friars Gate, Leicester                             | <i>Parr.</i>              |
| PAUSEY & Co.                    | Pioneer Works, Clapham, S.W.                           | <i>Pioneer.</i>           |
| QUADRANT TRICYCLE Co.           | Sheepcote Street, Birmingham                           | <i>Quadrant.</i>          |
| QUEEN OF THE WEST CYCLE Co.     | Newark Street, Bath                                    | <i>Queen of the West.</i> |
| ROBINSON, A.                    | Hospital Street, Wolverhampton                         | <i>Commercial.</i>        |
| ROBINSON & PRICE                | Pembroke Place, Liverpool                              | <i>R. &amp; P.</i>        |
| RODGERS, F.                     | Southwark Cycle Works, Bermondsey Street, London       | <i>Dreadnought</i>        |
| ROYAL MACHINE MANUFACTURING Co. | Herbert Road, Small Heath, Birmingham                  | <i>Royal Mail.</i>        |
| RUDGE & Co.                     | Spon Street, Coventry                                  | <i>Rudge.</i>             |
| SINGER & Co.                    | Alma Street, Coventry                                  | <i>Challenge.</i>         |
| SMITH & SON                     | Satley Mills, Adderley Road, Birmingham                | <i>British Mail.</i>      |
| SNOW, C.                        | Birkbeck Cycle Works, Birkbeck Road, Kingsland, London | <i>Birkbeck.</i>          |
| SPARKBROOK MANUFACTURING Co.    | Much Park Street, Coventry                             | <i>Sparkbrook.</i>        |
| STARLEY BROS.                   | St. John's Works, Queen's Road, Coventry               | <i>Psycho.</i>            |
| STARLEY & SUTTON                | Meteor Works, West Orchard, Coventry                   | <i>Rover.</i>             |
| ST. GEORGE'S ENGINEERING Co.    | Pope Street, Birmingham                                | <i>New Rapid.</i>         |
| STASSEN & SON                   | 251, Euston Road, London                               | <i>Stassen.</i>           |
| SURREY MACHINISTS' Co.          | 128, Great Suffolk Street, Borough, London             | <i>Invincible.</i>        |
| TIMBERLAKE & Co.                | 39, King Street, Maidenhead                            | <i>Timberlake.</i>        |
| TOMES & BEARD                   | Heath Town, Wolverhampton                              | <i>Original Universal</i> |
| TRAVERS & SON                   | York Terrace, Clapham Street, London                   | <i>Travers.</i>           |
| TRIGWELL, WATSON & Co.          | 146, Brixton Hill, London                              | <i>Regent.</i>            |
| TURNER BROS.                    | St. Alban's, Herts.                                    | <i>Turner.</i>            |
| WALKER, T.                      | Reliance Works, St. Luke's Street, Derby               | <i>Reliance.</i>          |
| WARMAN & Co.                    | West Orchard, Coventry                                 | <i>Rival.</i>             |
| WOODHEAD, ANGOIS & ELLIS        | Russell Street, Nottingham                             | <i>Raleigh.</i>           |
| WOOTON, G.                      | Gwyn Street, Bedford                                   | <i>Bedford.</i>           |

## ADDENDA.

---

**I**N compiling a work of this nature it is almost impossible not to omit some item or other; whilst, as one never knows when anything new may be introduced, it is likewise inevitable that some of the newest contrivances will not be brought under the notice of the compiler until that portion of the work in which they should rightly figure is completed. These causes combined have proved the means of preventing the inclusion of the following in their proper places in the earlier sections of the work, and it is, therefore, with no apology I thus present them to my readers.

**Timberlake's Wire-coupled Tyres** differ somewhat from the original wired tyres, in which the hole for the wire was central and unprotected. The tyre is made with a deep groove at the bottom, which takes the wire. This is canvas-lined, so the wire does not cut through, and the continuity of the section of the tyre completed by a thin overlay of black rubber, the wire thus lying snugly below the rubber of the tyre and along the bottom of the rim.

**Holloway's Moving Hub Wheel** introduces an entirely new system into the construction of the driving wheel. The spokes are comparatively few in number, and are screwed direct into the hub flanges, which, however, in place of being firmly keyed to the axle in the usual manner, are loose upon it. The centre of the axle between the flanges carries a series of projecting arms, with cross pieces at their tops, from which spokes or wires are carried to the rim. The principle involved is that whereas the side spokes keep the wheel true and support the weight of the rider, they are entirely relieved from the strain of propulsion, this being taken wholly by the central set.

**The Champion Detachable Cranks** are split through at the base, and the two sides tightened on the axle with a cross screw, as shown in the illustration on page 381.

**The Columbia Double-grip Pedals**, like the Victor square pedals, have the rubbers fitted on round pins. The bars are formed with four high tooth-like ridges projecting from a circular cone, the section being that of a four-pointed star. Their object and action are the same as that of the square rubbers, the foot bedding into rubbers which shift to suit the angle of the foot.

**The American Star Driving Gear.**—This is a combination of the lever and ratchet principles. The levers are bent, and are hinged to projections on the frame to the rear of the rider, the pedals being brought forward of the wheel centre and placed on the other ends of the levers. At the bend of the lever a pin is fixed, to

which a stout strap is attached, this strap passing round a drum on the driving axle. The pressure on the lever draws the strap down and rotates the drum, which drives the wheel with a clutch arrangement, a spring within the drum taking it back, winding up the strap and raising the lever when the pressure on the pedal is removed. The construction of the clutch is best described, with the help of the accompanying illustrations, in the words of the manufacturers, which are as follow :—

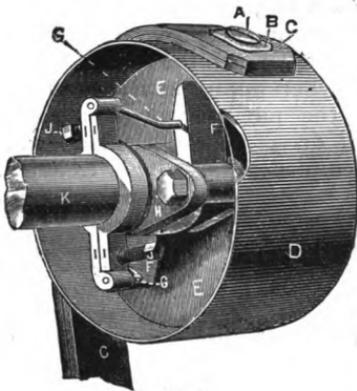


Fig. 1.

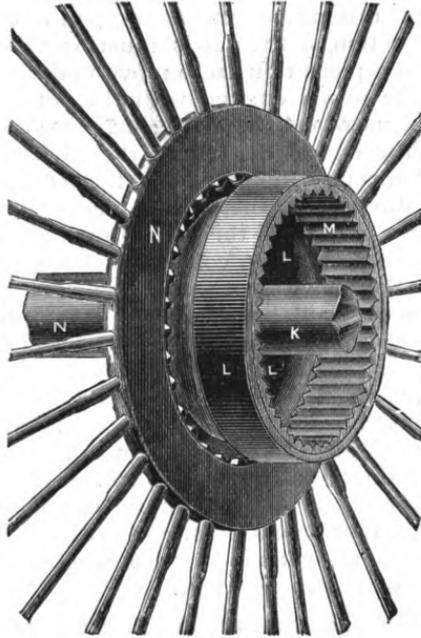


Fig. 2.

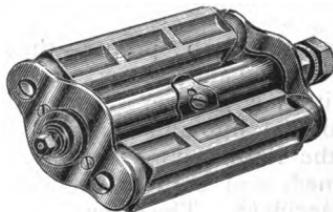
## THE AMERICAN STAR DRIVING GEAR.

Fig. 1 represents the hub proper—through the flanges of which the spokes pass and screw into case-hardened nuts which are seated within a groove. The bell piece L is screwed on to an extension of the hub and contains the notch ring—both are made of steel—the latter being accurately notched by cutting, and carefully hardened, and both are removable and likewise replaceable in case of accident. The extension K represents a portion of the spindle, the same being shown in fig. 2. This latter figure represents the driving box, showing the strap C, covering D, manner of fastening the strap A and B, and pawls F F, and also containing the retracting spring beyond the wall E E. The friction piece I I is separate from the driving mechanism, and also from the hub, except through small crank wires G. This friction piece is divided and held together by screws and springs J, so as to produce a slight

friction upon the still shaft K. Now, when the driving box is in place, the pawls will be directly under the notches, and the friction piece between the hub and box separated from the latter by a collar, but connected as before stated by the wires. The action of the clutch will be understood when it is remembered that the friction piece controls the outer ends of the pawls and cannot move around the shaft except as drawn by the pawls, which are hinged so as to move freely on their bearings. The friction piece being parallel with the pawls, the wires are necessarily at about right angles, hence as the driving box moves forward under a pressure from the foot, the first action of the pawls must be to spread into the notches as the friction piece refuses to move under so slight a pressure, but as soon as the pawls engage with the notches the forward movement must drive the wheel, the whole, including the friction piece, moving together till the end of the stroke, the wheel continuing to move, but as the foot reverses to come back, the retracting spring in the case reverses the direction of the driving mechanism, when again the friction piece comes into play, this time to withdraw the pawls from the notches to a stop and then coming back with the driver, but, of course, holding the pawls out until the foot again depresses the treadles. Hence it will be seen that the clutch must be very positive, and noiseless except when the foot is depressed slower than the wheel is coasting; and also it will be seen that the wheel can be run backwards in handling, which is a convenience, and as no friction is taken from the running wheel it must run perfectly free in coasting. The friction required to control the pawls is imperceptible, being only the fraction of an ounce.

The pawls being diametrically opposed to one another, balance the strain that would otherwise fall upon the spindle, and therefore there is no binding as in the case where the pawls operate only on one side of the ratchet box.

**The Champion Pedal** is another American variety, and is best explained by reference to the accompanying sketch. The rubbers

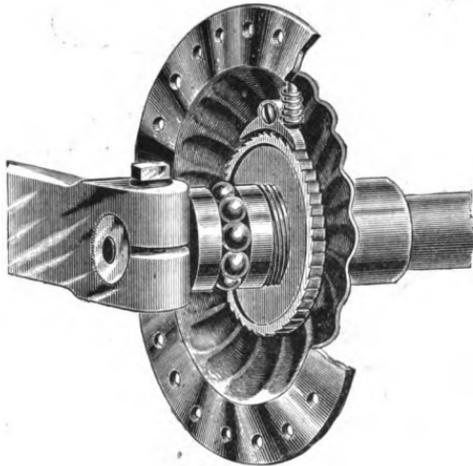


THE CHAMPION PEDAL.

are mounted on angular pins, and are square in section, but lightened and rendered pliable by moulding the surfaces in the shape shown, which enables the rubber to give to the foot.

**The Champion Ball Bearings**, another "Yankee notion," are of the single variety, the balls running in a groove cut upon a

collar fitted on the axle, and contained in a case held in a globe-shaped cavity or universal joint at the end of the forks, which arrangement enables the bearings to automatically find a true and even bearing, and so avoid any twist or side strain. The adjustment is from the *inside*, and is made by means of a ratcheted ring with spring pawl to hold it in position when properly adjusted. This arrangement is shown in the annexed illustration, which also shows



THE CHAMPION BALL BEARINGS.

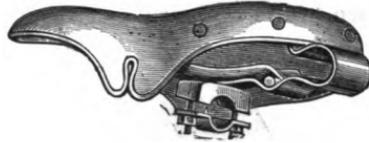
the Champion detachable crank described on page 378 and the corrugated hub flange used on this machine for the combination of lightness with strength.

**The Columbia Head** is of the Stanley variety, but the top centre, in place of being a point or cone, is hemispherical, and there are two adjusting screws, one fitting down around the tapered spindle and taking adjustment for lateral strain, the other inside the first bearing direct down on the top of the spindle head, both screws having their own lock-nuts.

**The Triple Hollow Fork** is an amplification of the principle involved in the D.H.F. Three small round tubes arranged side by side form each fork leg, which is naturally excessively stiff and firm.

**The Quadrant Frame** differs from the rest mainly in the arrangement by which the front wheel is carried, the usual forks being done away with, and their place taken by a horizontal—or nearly so—portion of the frame, shaped somewhat like the prongs of a hay-fork. The ends of this carry the guides of the steering wheel, and the handle-post starts from the rear or crown of the fork, being very nearly vertical, this arrangement very considerably minimising the vibration felt on the arms, whilst retaining the advantage of a rigid frame.

**The Spring Heel Saddle** is the latest introduction in this line, and is illustrated herewith. It consists of the usual solid leather seat-piece supported on a frame which is simplicity itself. This frame comprises two parts—a front or rigid portion to which the fore part of the saddle and the attaching bolts are secured, and the



THE SPRING HEEL SADDLE.

spring heel, a spring of flat spring steel bolted to the back plate of the saddle and curving round in three-parts of a circle, its lower end being pinned to the front part of the frame, just forward of the attachment screws, and separated from it at the back by a rubber roll or buffer. This gives a good amount of spring in the saddle itself.

**The Spring Gripper Lamp Bracket** is attached either to the top of the head of an ordinary bicycle or to the upper portion of the steering post of a safety, and may be turned in any position. Two strips of spring steel are attached to a holder, and are coiled once round and bent sharply up to hold the lamp. The spring in



THE SPRING GRIPPER LAMP BRACKET.

the steels enables it to adjust itself to the socket of any lamp, which is a great advantage, and a great deal of the vibration is absorbed by the coils.

**The Yankee Grip Lock** is an ingenious contrivance. As will be gathered from the annexed illustration, its purpose is to unite



THE YANKEE GRIP LOCK.

the two ends of a chain with which the wheels of a machine are locked to the frame or to each other. There is a short shaft with a

hook or loop on each side, one of which is slightly open on the top for the attachment of the free end of the chain. The central shaft or pillar is cut for a screw, and into this screws a short screw with a smooth circular loose head, which, when screwed home, comes down on the top of the open loop and prevents the removal of the link. To screw it down, however, is a difficult matter, as it revolves loosely on the head of the screw, but by the use of a small cramp the screw and its loose head are bound together, and both screwed home at the same time, the cramp being then taken off and put in the pocket, and unless one is up to the dodge of jaming the head and screw together with the fingers the machine is safe, for upon turning the head it merely revolves upon the screw top without removing it from the pillar.



ADVERTISEMENTS.

# **“Invincible”**

BICYCLES AND TRICYCLES.

The lightest and most rigid in the market.



## **THE “INVINCIBLE” NEW DIRECT-STEERING TRICYCLE.**

The greatest success of the season. Twenty-five Miles Amateur Championship of England, 1887, and other victories and records too numerous to mention. Made in three classes—Full Roadster, Semi-racer, and Racer.



THE

## **“INVINCIBLE” NEW REAR-DRIVING SAFETY BICYCLE.**

Also one of the most popular and successful machines of the season. Made in three classes—Full Roadster, Semi-racer, and Racer.

Also makers of the famed “Invincible” ordinary bicycle, and many other patterns. All machines made with the Company’s patent double section hollow rims and Tangent spokes.

*Illustrated price list post free on application. Photos 4d. each.*

**The SURREY MACHINISTS’ Co., Ltd.,**  
128 & 129, Great Suffolk St., Borough, London, S.E.  
Telegraphic address—Edenwood, London.

ADVERTISEMENTS.

THOSE WHO INTEND BICYCLING OR TRICYCLING

SHOULD FIRST

**SEND A PENNY STAMP**

FOR A SPECIMEN COPY OF

# BICYCLING NEWS

(THE CYCLISTS' ILLUSTRATED PAPER),

EVERY SATURDAY ONE PENNY.

**Bicycling News** is the Oldest Cycling Paper in the World, and has kept pace with the times.

**Bicycling News** is full of interesting accounts of tours of cycling in Great Britain and in every country in the world.

**Bicycling News** supplies free information about machines, roads, and other matters to novices and riders generally.

**Bicycling News** is the only Cyclists' Illustrated Paper.

## TERMS

(INCLUDING POSTAGE).

|                                       |         |
|---------------------------------------|---------|
| One Month (for one trial only) ... .. | 5d.     |
| Three Months ... ..                   | 1s. 7d. |
| Six Months ... ..                     | 2s. 9d. |
| A Whole Year ... ..                   | 5s. 5d. |

WE PREFER HALFPENNY STAMPS OR A POSTAL ORDER.

**Address:**

Manager "Bicycling News," 98, Fleet Street, E.C.

Bristol Apr. 27<sup>th</sup> 1887

Dear Sir

I have much pleasure in stating that the Biography by Mr. Brownlee, my personal friend, has my entire approval. That the cricket doings have been revised and checked by myself, and that the personal incidents are entirely new to the public. I wish you and him hearty success in the work.

Yours truly  
W. G. Grace

Wm. Luffe & Son.

**W. G. GRACE: A BIOGRAPHY.** By W. METHVEN BROWNLEE.  
WITH A TREATISE ON CRICKET BY W. G. GRACE.  
PRICE ONE SHILLING. At all Bookstalls and Newsagents, or ILIFFE & SON,  
98, Fleet Street, London, E.C., and Smithford Street, Coventry.

**-ILIFFE & SON-**

Undertake Publishing and Printing of all kinds  
of Books and Periodicals.

ESTIMATES AND PARTICULARS UPON  
APPLICATION.

98, Fleet Street, London, E.C.

Works: Vicar Lane, Smithford St., Coventry.

The ORDINARY BICYCLE RECORD has been COMPLETELY SMASHED by the  
**BROOKES' REAR DRIVING SAFETY**

Which is now acknowledged to be Faster than a Bicycle.

At Coventry, July 19th, 1887, A. P. ENGLEHEART, Esq., mounted on a BROOKES' SAFETY, covered FIVE MILES in the marvellous time of 13m. 35½s., being nearly 20½s. less than Howell's Champion Record on an ordinary bicycle.



Cheapest. Fastest. Best. Send for Price List.

Makers:—

**J. & H. BROOKES, Cape Cycle Works, Near BIRMINGHAM.**

London Agents—E.C. District: W. Fisher & Co., 17, Devonshire St., Liverpool St.

W.C. District: W. Cooté Reynolds, "Olympia," 175, High Holborn. oogle

# THE COVENTRY MACHINISTS' Co. LIMITED.

MAKERS  
BY  
APPOINTMENT



TO H.R.H.  
THE  
PRINCE OF WALES.

## ✦ BICYCLES ✦

**The King of Clubs.**

**The Special Club.**

**The Universal Clubs 1, 2 & 3.**

**The Swift Safety Nos. 1 & 2.**

**The Club Racer.**

## ✦ TRICYCLES ✦

**The Marlboro' Club Nos. 1 & 2.**

**The Ranelagh Club.**

**The Cheylesmore Club.**

**The Marlboro' Tandem.**

**The Club Tandem.**

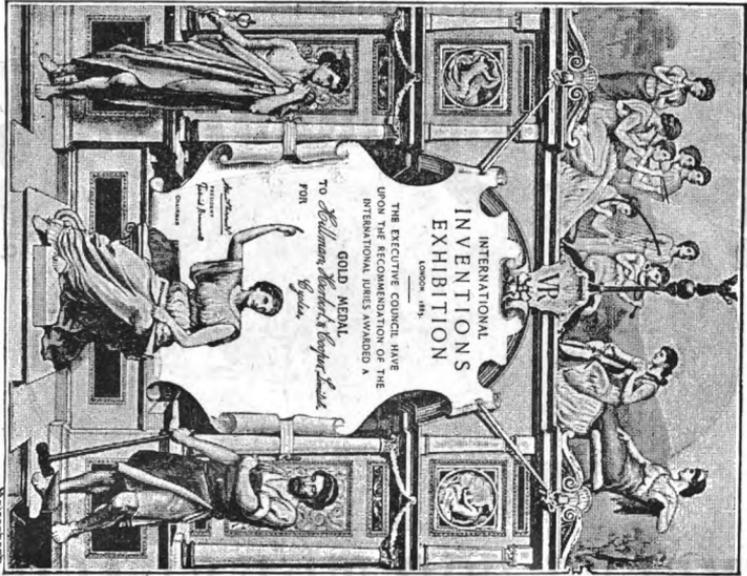
(Three Machines in One.)

**The Junior's Club.**

**Head Offices and Works: COVENTRY.**

LONDON—15 and 16, Holborn Viaduct. MANCHESTER—9, Victoria Buildings. BIRMINGHAM—Swan Buildings. LIVERPOOL—65, Bold Street. EDINBURGH—W. Hirst, O.P. College Buildings. GLASGOW—JENNINGS & Co., 93, Mitchell Street. LEEDS—36, New Brig-gate. BRIGHTON—H. MOORE, Jun., Preston Street. ABERDEEN—WILLOX & WATT, 4 & 6, School Hill. DUBLIN—21, Bachelors' Walk. MELBOURNE—62 & 64, Elizabeth Street. U.S. AMERICA—239, Columbus Avenue, Boston. VIENNA—A. H. CURJEL, 5, Elizabethstrasse. FRANKFURT—H. KLEYER, 9, Gutleutstrasse. ST. PETERSBURG and MOSCOW—J. BLOCK. BERLIN—ADOLPHO SCHLEGEL, Jun. BRUSSELS—F. MIGNOT, 101 & 103, Rue Neuve. DEN-MARK and SOUTH SWEDEN—A. BRANTH, Copenhagen. SWEDEN—Professor CEDERBLOM, Stockholm. HOLLAND—F. A. L. DE GRUYTER, 27, Leidschestraat, Amsterdam. NORTH FRANCE—G. DUPONT, Lille. SHEFFIELD—83 and 85, Sheffield Moor.

HIGHEST AWARD, INVENTIONS EXHIBITION, 1885.



HIGHEST AWARD NUREMBERG EXHIBITION 1885.

# Hillman, Herbert & Cooper, Ltd., Coventry

ORDINARY BICYCLES ... .. from £8  
 KANGAROO SAFETY ... .. from £15

**PREMIER SAFETY,**

**£18.**



**PREMIER SAFETY,**

**£18.**

*(The Safest and Fastest Cycle Manufactured.)*

**TRICYCLES (from £18), TANDEMMS, &c.**

\*\*\*\*\*  
**TESTIMONIAL\***  
 \*\*\*\*\*

Dear Sirs.—The Machine ("Premier" Direct-steerer No. H) has arrived safely and gives me the highest satisfaction. It is, I consider, a beautifully-finished machine, light, speedy and graceful. I enclose cheque in payment.  
 Yours very faithfully,  
 (Rev.) H. DREW.

14, HOLBORN VIADUCT, EG., }  
 5, LISLE STREET, LEICESTER SQUARE, W., } **LONDON.**

ADVERTISEMENTS.

ESTABLISHED 1874.

# BAYLISS, THOMAS & CO



## CYCLES FOR THE SEASON



The Excelsior No. 1. The Eureka Safety.

The Eureka Tricycle. The Eureka Tandem.

**THE EASIEST, FASTEST, LIGHTEST, NEATEST, SAFEST & STRONGEST MOUNTS.**

Folkestone Hill was ridden up by Mr. E. J. Walkiley on a  
"EUREKA" SAFETY BICYCLE, June 18th, 1887.

# Excelsior Works, COVENTRY, ENGLAND.

Descriptive Price Lists, with Woodcuts, Free on Application.

**LONDON DEPOT—227, BLACKFRIARS' ROAD, S.E.**









NOV 10 1951

