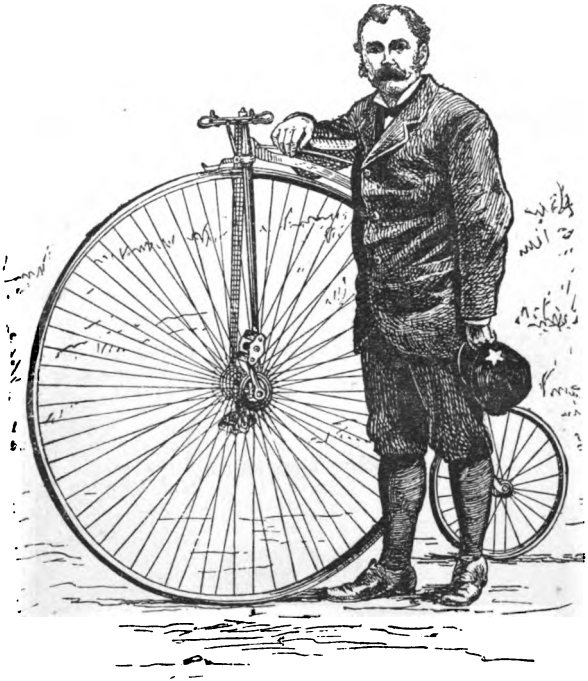
The American Bicycler

Charles Eadward Pratt



Here is the steed, we the caparison.

SHAKSPEARE.

THE

AMERICAN BICYCLER:

A MANUAL

FOR THE OBSERVER, THE LEARNER, AND THE EXPERT.

By CHARLES E. PRATT, A.M.,
B. BI. C.

"There is no disputing against HOBBY-HORSES; and for my part I seldom do. . . . I keep a couple of pads myself, upon which, in their turns, I frequently ride out."—STERNE.

With Illustrations.

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CONTENTS.

ILLUSTRATIONS.

THE AMERICAN BICYCLER.

I.

GREETING.

To the public, divided, as he sees it, into two great classes, bicyclers and non-bicyclers, the author would very deferentially raise his cap. This little book has occupied in its preparation a number of hours snatched from the demands of an exacting profession or from needed rest, and is put forth in the hope that it may both meet a want already felt, and also promote the interest in and the benefits and pleasures of the birotate chariot of which it treats. A large part of the course proposed has been pursued without guide or precedent; but whatever aids were accessible to me I have drawn upon, — not only those mentioned in the chapter on Literature, but also a considerable personal correspondence. My intention and effort have been to make answer accurately, with sufficient detail, and in a convenient form, to most of the questions suggested to any one by the sight or mention of a bicycle, without, however, attempting to tell all I know or believe on the subject; and, where I have erred or failed, I trust it will be easier for me, or for some

one else who is better qualified, to do something better in the future. To those

> Quos curriculo pulverem Olympicum
> Collegisse juvat, metaque fervidis
> Evitata rotis palmaque nobilis
> Terrarum dominos evehit ad deos;

to that larger number who seek quieter ways and broader landscapes on the swift and noiseless wheel; and to the great public who look with indulgence on until the increasing temptations sweep them along with us, — I extend a cordial greeting and this unpretentious endeavor.

C. E. PRATT.

BOSTON, March, 1879.

NOTE. — Club secretaries, riders who keep a log of their runs, manufacturers, and others interested to have in hand each year a complete manual of this kind, are invited to send such corrections or new intelligence or suggestions as they can contribute to the author (40 Water Street, Boston), in time for either a revised edition of the present book or a supplementary one, intended to be issued by him about March 1, 1880.

II.

HISTORICAL SKETCH. — VELOCIPEDES.

"They have sought out many inventions." — *The Preacher.*

MAN is the animal which rides. He has come down through the ages mostly on horseback. The horse was found ready to hand, furnishing in himself, with a little training, both carriage and motive power. In course of time man learned to add a carriage to the horse, and use both: the horse was thus relieved of the service of carriage, and the rude machinery of wagons largely increased the effective result. The remaining step was to add power to the wagon, and let the horse go. A Western professor has lately protested against our allegiance to the horse, as being the heavy drag upon our civilization, the blindly cherished obstacle. He says that our cities are made by taking this quadruped out, and building around him. Take him away, and, with other motive powers and a thousand adaptations accordingly, we should live more economically, more beautifully, and more conveniently. This writer may be the first to make this interesting charge in bold propositions, and challenge to it the attention of the age; but the restless effort of inventive genius has been directed towards an escape from this bondage to the horse for a century; and the accomplished facts of steam, as well as the

beckoning prophecies of electricity, are holding out their promises of deliverance.

As the power of locomotion distinguishes animals from the rest of things, a power generally proportionate with the degree of intelligence, so the ability to increase, by means of mechanical contrivances and the forces of nature, his power of locomotion, distinguishes man from all other animals, — an ability also in some measure proportioned with his intellectual development. Hence the endeavor to increase pedal as well as manual power may be assumed to be an old one.

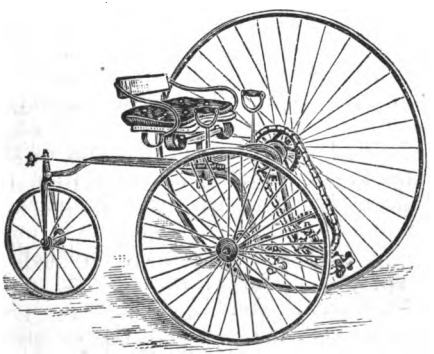
Ever deeper and more commanding, as civilization advances, is the problem, how to move over the greatest distance, in the least time, with the least expenditure of energy, and with the least inconvenience, uncertainty, and expensiveness of means employed. In attempts to solve this problem innumerable devices have been tried, from the staff to the pedespeed, from the skate to the flying-machine.

The centaurs of Thessaly were fabled to have their locomotory limbs like those of the fleet-footed horse. Hermes, swift messenger of the gods, by a later improvement had winged ankles, *pedibus addidit alas*. So the mediæval angel had wings in place of other limbs. But the modern angel glides noiselessly upon the earth, in possession of every human limb, elate on a swift-running wheel.

It is not in place here to trace the origin or the development of the various remoter methods of increasing the travelling power of man; nor is it necessary, as will better appear later on, to note the rise and progress of the velocipede in all its varied forms and adaptations; for this latter is but an elder and less comely sister of the bicycle, of which I shall chiefly treat.

It is now a century since Blanchard and Magurier constructed their cumbersome contrivance[1] to be propelled by the rider, and drew to their exhibition of it in the square later known as the Place de la Concorde many members of the French Academy and other less distinguished spectators. In the time that has elapsed, the velocipede, under various names, has been modified for improvement in almost every direction.

The velocipede is well defined, in a general way, as a species of carriage impelled by the rider; and



EXCELSIOR TRICYCLE.

though it has gone through all the forms of four, five, three, and two, and even one, wheels, of various sizes and constructions, and has been contrived to be propelled by hand, by foot, by both hands and feet, assisted by springs, pedals, cranks, levers, cords and pulleys, ratchet-wheels, and other devices, the true type of velocipede is, and has always been, a three-wheeled vehicle propelled and directed by both hands and feet; and, as in every thing

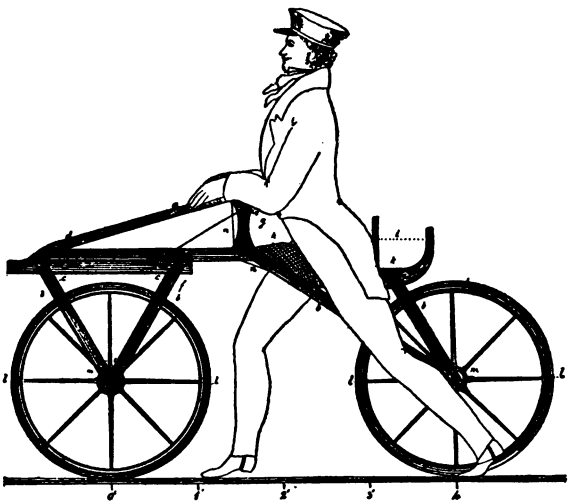
[1] Described in Le Journal de Paris, of 27th July, 1779.

else, the true progress has been toward simplicity. Mechanical carriage, perambulator, accelerator, children's carriage, passepartout, mechanical horse, cantering propeller, velocipede, under whatever name, it is a distinct species of the great genus vehicle. The best modern representative of this species is the tricycle as now constructed by several English manufacturers, with suspension wheels, rubber tires, and pedals so arranged as to utilize as much as possible the weight of the rider in driving. These are made very light, and, though not possessing all the advantages of the bicycle, are much used by ladies and elderly gentlemen who desire a vehicle which keeps its own equilibrium. The term "tricycle" first occurs in the French patent to Duchaussais, 28th June, 1828. The term "vélocipéde" is much older.

The bicycle is also a distinct species of the same genus, and is just as different and distinct from the velocipede as is the tip-cart or the landau, both in structure and in principles of operation; and, as we shall see, it is a much later and more delicate and perfect species. The velocipede has a hundred years of history. The bicycle in its complete form is about ten years old, although the rudiments are, several of them, much older. The first occurrence of the name which I have found is in the English patent records, in the provisional specification of J. I. Stassen, filed 8th April, 1869,—"My invention relates particularly to the construction of velocipedes known as the bicycle." The meaning of this technical term will be given on a later page.

The rudimentary bicycle, or the first step in its divergence from the parent stock, was discovered by the Baron von Drais, of Manheim on the Rhine. As used by him, it consisted of two wheels, one before the other, connected by a bar or perch over

them, the forward wheel axled in a fork swivelled to the fore-end of the perch, and bearing a cross-bar or handles above the latter to guide it by. The rider sat astride the perch, propelled the contrivance on level or up grade by thrusting his feet on the ground, and directed it by means of the handles, by turning the direction of the fore-wheel; while on a descend-



THE DRAISINE.

ing grade he lifted his feet from the ground, and let it run.

This Baron von Drais, whose father was a lawyer, was a landscape-gardener of distinction, master of the forests of the Grand Duke of Baden, and is said to have been a man of considerable scientific attainments. He used his device as an aid to walking while about his official duties. This "célérifère" (or makespeed) was exhibited in the garden of Tivoli, then a favorite Parisian resort, in 1816.

A French patent was obtained for the baron by Louis-Joseph Dineur of Paris, for this invention, in which the latter is described as "une machine appelée *vélocipéde*, formée d'un siége porté sur deux roues, qui obeissent facilement aux mouvements des pieds d'une personne assise sur le siége, *et qui transportent cette personne avec une grande vitesse.*" The preceding cut is taken from this patent.

JOHNSON'S PEDESTRIAN CURRICLE.

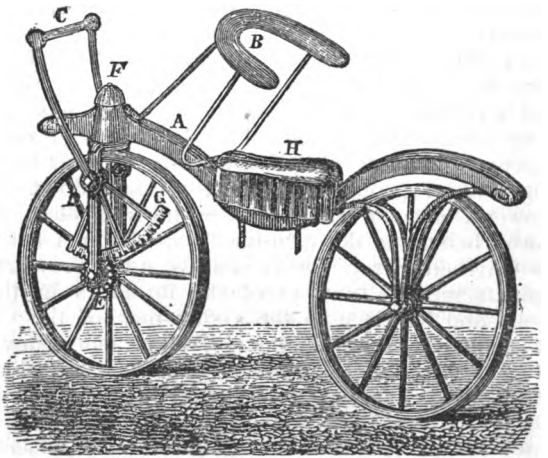
This machine was introduced into England, and patented there with some improvements to Denis Johnson, in 1818, as a "pedestrian curricle." It had already, under the names of Drasina, Drasienne, célérifère, and vélocipéde, excited much attention, and gone into considerable use in France and Germany. This first English bicycle was improved over the original Draisine, and had an adjustable saddle, a cushioned rest for the fore-arms, and a different arrangement of the handles. It is shown in the above cut, taken from Johnson's patent.

This "pedestrian curricle" roused at once the British enthusiasm to a high pitch, and great expectations were entertained of its usefulness and celerity. There it soon acquired the names of "dandy-horse" and "hobby-horse." Was it in prophecy of this, or from familiarity with some precursor, that Laurence Sterne, in 1759, gave his humorous paraphrase of the maxim, "*De gustibus non est disputandum*, that is, There is no disputing against hobby-horses," &c., in his "Tristram Shandy"?

In 1819 this improved Draisine was introduced into New York, and, creating a great *furore* there, the excitement spread rapidly to other cities, — Troy, Saratoga, Philadelphia, Boston, and other places. A riding exhibition was opened near Bowling Green: people rode them up and down the Bowery, and on the parks, a favorite place for speed being the down grade from Chatham Street to City-hall Park. Davis and Rogers, a Troy firm, manufactured a number of the machines in that year, and let them to the young men of the city at a quarter-dollar an hour. With them many a study-worn Harvard student took his moonlight stroll across the long bridge over the Charles into Boston, where there were many of them. And I know several gray and titled gentlemen of this city to-day, who then bestrode the undeveloped steed, which was as different from the one that delights their grandsons as a donkey is from a 2.14 trotter.

It was about this time, 26 June, 1819, that William K. Clarkson was granted a United-States patent for "an improvement in the velocipede;" but on account of the destruction of the Patent Office by fire in 1836, and the fact that this patent was never restored on the files at Washington, I am at present unable to give a description of that improvement.

In England, too, the use of the novel machine continued to find favor; and it was considerably improved by Louis Gompertz in 1821. His machine differed from Johnson's make in having the handle in front of the driver connected with a segment rack, gearing in a pinion on the front wheel, so that it could be driven by the hands, or by the feet on the ground as before. This machine of Gompertz is



GOMPERTZ' HOBBY-HORSE.

shown in the cut above, taken from "The Repertory of Arts," vol. xxxix. 1821.

Amongst the noted men who rode the improved Draisine in that day, was the distinguished naturalist Michael Faraday; and among those to become distinguished was the Right Honorable Robert Lowe, M.P., now President of the West Kent Bicycle Club, who thus became, as he said in his address in

1878, after the races under the auspices of that club, "an ante-bicyclist."

But this fever of favor did not abide with the bicycle in its then crude and clumsy form; and it was not found out how to improve it materially. The inventive genius of three great peoples frittered itself away upon impossible constructions of other mechanical carriages, or was absorbed in other and more necessary discoveries and inventions which changed the whole face of modern civilization. The decline of the dandy-horse is interestingly revealed by William Howitt in his "Visits to Remarkable Places," published in 1841.

The learned Baron von Drais had only to put cranks on his front wheel, and lift his feet to them; or the scientific Faraday might have thrown off the clumsy rack and pinion of Gomperz, and set the equivalent cranks in its place, — and the next important step would have been taken. But they did not think of it; and the world had to wait more than forty years for a French mechanic to show it how to make the first essential improvement.

In the mean time the construction of carriages generally, and of velocipedes, *voitures de malades*, and children's carriages in particular, was carried to a good degree of perfection. On some of them the double-cranked axle was used, with treadles for foot-propulsion; the form began to narrow down to the three-wheeled construction; the single front guiding-wheel was also made a driving-wheel, sometimes with a single crank worked by the hands through a pitman or connecting-rod, and some of them were made for the driver to sit over and astride the wheel, propel it with his feet on the cranks, and guide it with a cross-bar or handles fixed to the fork in which the wheel had its bearings, and to which the perch or saddle-bar was pivoted. Among these, perhaps

the nearest approach to the bicycle was made by M. Mareschal and MM. Woirin and Leconde. The first obtained a patent in France in March, 1865; and he describes and shows in his specification a velocipede consisting of a frame connecting five wheels, each having an independent axle, the ends of which are provided with foot-cranks bearing loose pedals; each wheel to be mounted and driven by its own rider, whose seat is over the wheel; and the front wheel is also a guide-wheel, so that the carriage can be ridden and directed by one rider, or may carry four more, each helping to propel in the same way, who are mounted two abreast behind the one who guides. It was therefore a sort of "double-runner" velocipede, and might be extended indefinitely; but the method of riding over and guiding and propelling by the front wheel was about the same as in the bicycle.

MM. Woirin and Leconde took their French patent in September, 1865. Their velocipede had three wheels, — two smaller rear ones on the same axle, and one larger front wheel having an axle with oppositely projecting cranks at the outer ends, on which were loose pedals for the feet of the rider. The frame connecting these wheels was in the form of a wooden horse, whose rear-legs were pivoted on the rear axle between the two wheels, and whose fore-legs, between which the front wheel revolved, were pivoted on shorter crank-pins than those for the rider's feet on the forward axle; the back of the horse formed the perch on which the rider sat nearly over the forward wheel, and this wheel was both the driving and the guiding wheel.

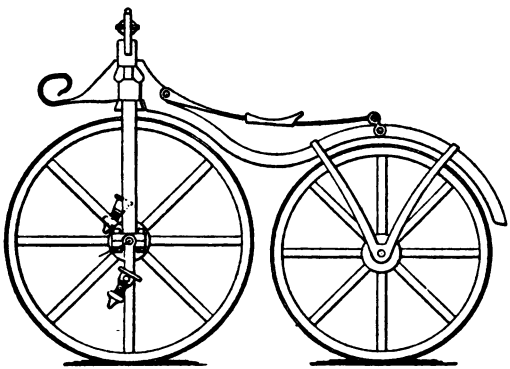
These Frenchmen, therefore, had made the advance improvement of putting foot-cranks with pedals on the guiding-wheel, and making it the driving-wheel also, and had brought the rider over

the wheel so as to gain the assistance of his weight; but they still had a velocipede, and not a bicycle. All these important steps being taken, the construction and qualities of the suspension-wheel being also familiar, and the method of operating a two-wheeled velocipede without cranks having long been well understood, the remaining easier but not less important steps would seem to have been obvious enough. Like many small things, however, they seem easier after being shown than they did before.

Pierre Lallement was a French mechanic, well skilled in making perambulators and children's carriages. He saw that the foot-cranks would work as well on the célérifère as on the three-wheeled velocipede or the five-wheeled pleasure-carriage. He saw that he could take off one of the rear-wheels of the boy's velocipede, set the other wheel up to the middle of the axle, and ride it as the ordinary Draisienne. And so, as far as appears, he first acted on this idea, and the "bone-shaker" was made.

He, or the mechanics in the shop where he worked, made a two-wheeled velocipede in this way; and he succeeded in riding it. This was exhibited by his employer, M. Michaux, at the Paris Exhibition, 1865. He thought but little of the achievement, however, and made no effort to patent or to introduce the improvement. Soon afterwards, in 1866, he came to the United States. Being a young man and out of funds, he worked his passage over here as a stoker. Whilst looking about in Connecticut for employment, he made one of these two-wheeled velocipedes, and excited some attention by riding with it on the level streets of New Haven. At once an observant Yankee saw the opportunity, and induced the young Frenchman to join with him in obtaining a patent for it. A patent was obtained in their joint names, 20th November, 1866; and from that patent the following cut is taken.

This patent of Lallement and Carrol is the first one in the United States showing the two-wheeled velocipede with foot-cranks, or the immediate forerunner of the bicycle here; and is the first complete patent actually obtained anywhere for such a machine. The vehicle described therein consisted of two wooden wheels, with iron tires, of nearly equal size, one before the other, surmounted by a wooden perch, from which projected downwards near its rear end two arms on either side the rear



LALLEMENT'S VELOCIPEDE.

wheel, each pair of arms meeting at the end of the hub, and forming a bearing for the end of the axle; one similar wooden bar projected from the fore end of the perch on either side the forward wheel, furnishing bearings for its axle, and arranged with a pivot in the perch near the upper end so that, by means of a hand-bar above, the fore wheel could be turned in either direction. The perch was curved downward in the middle part; and from a joint near the front arms (or fork), backward to a joint over

the rear wheel, extended a straight steel spring, bearing a saddle for the rider about midway and over the space between the two wheels. From this position he could place his feet upon the balanced pedals on the cranks connected with the front axle, the latter being a fixed one in the wheel; and thus seated, he started the machine in motion with his feet on the ground as always in the Draisienne, and then put them on the pedals, and propelled it. The vehicle was kept in an upright position by means of the handles, turning the wheel to the right if it inclined to fall to the right, and to the left if it inclined to fall to the left; and "the greater the velocity, the more easily the upright position is maintained." It was certainly a better contrivance than the baron's with all previous improvements, but was still a clumsy and awkward affair, and lacked important features yet to make it either a practical road-vehicle or a bicycle.

Soon after this, Lallement returned to France, and sold his remaining interest in the United-States patent. This did not seem of much account then, and nothing was practically done with it or to improve it here until nearly three years later.

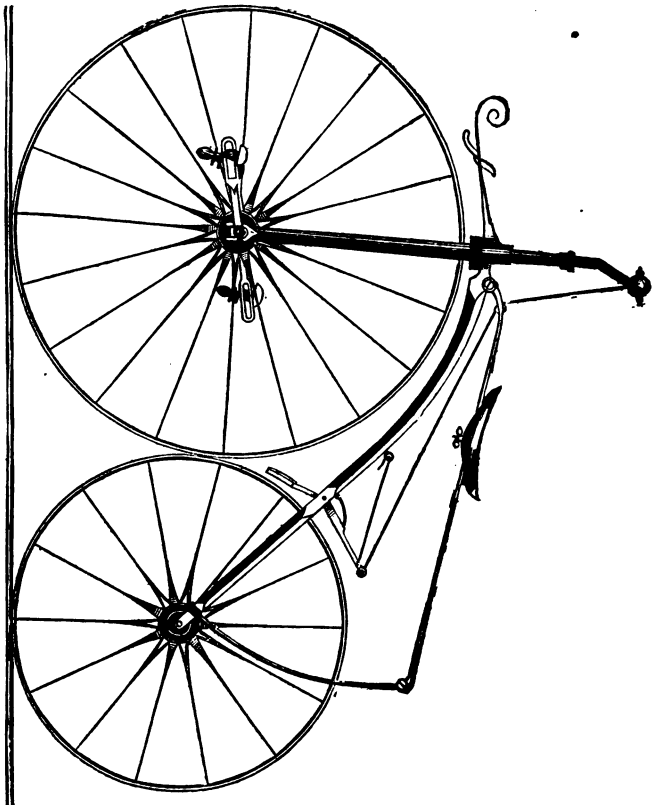
It was not patented in France, but was used considerably there; and improvements on it were soon afterwards made and patented by Michaux et Cie. of Paris and others. Lallement himself became a manufacturer, and in 1868 there were several makers. Parts of the machine were made of iron and bronze instead of wood, and many accessories were added. It was taken to the Champs Elysées and the Tuileries, and again the impressible Parisians were interested and excited. It ought to have been called the "Lallementienne."

But the title of Pierre Lallement to be regarded as the first to take the step above described is dis-

puted. An Englishman, Edward Gilman, was the first to place on public record a description of this two-wheeled crank-action velocipede, in his provisional specification filed in the British Patent Office, 1st August, 1866. He describes in the first place a perch carried by two leading wheels, which are also guiding-wheels, in front, and one driving-wheel behind. The treadles pass between the two leading wheels, and outside the driving-wheel, connecting with cranks on the axle of the latter, and "are to be worked by the alternate motion of the feet of the operator, either in a standing or sitting posture astride the perch [on a saddle], as near to or over the axis of the driving-wheel as convenient." And then he describes a modification of the first, consisting of only "one leading or guide wheel with the single driving-wheel, in which case the operator can, while in a sitting posture, start the machine by the feet acting against the ground outside the treadles, as in the old velocipede or 'dandy-horse.' Having started and balanced the machine, he then brings his feet on to the treadles, and can drive by means of them whilst still in a sitting posture; or, if he stands on the treadles, he can add the force of his weight to the muscular force of the legs, and thus gain a great advantage."

It is to be observed that Gilman approached nearer to the bicycle in respect to placing the rider nearly over the axle of the driving-wheel, and also in respect to driving by weight of rider rather than by unaided muscular effort; while Lallement made a nearer approach in making the front wheel at the same time the guiding and the driving one. But neither of them reached it; and, as we shall see, other steps had to be taken, and other improvements and modifications had to be made, before the completely practical and permanently successful

"wheel" was given to the waiting need of mankind.



FRENCH VELOCIPEDE OF 1869.

This new form of the "hobby-horse" caused even greater enthusiasm than the previous ones;

for it was presented to a new generation, and the former disappointment was forgotten. The use and the exhibition of it, as well as the demand for it, rapidly increased in France and England; and after it became improved, and common enough there, it was revived, and spread like a fever, in the United States.

The new impulse was more immediate in France, where, as we have seen, the manufacturers soon made a lighter and more elegant and serviceable machine of it. The writer has before him price-lists, catalogues, and other publications of Michaux et Cie., Lallement, W. Shand, and others, issued in 1868 and early in 1869, which indicate that it was with them, in connection with tricycles also, already a brisk industry.

The development was more healthy and successful in England; and in the years 1867–8–9, a great many provisional specifications of improvements were filed, and some patents were taken out, showing steady rather than rapid progress in perfecting the construction of the machine.

"Louis Foy Amour Poniatowsky Rivière, of Mark Lane in the County of Middlesex," — a name of decidedly French accent, — on the 31st March, 1868, placed on record a description of his machine, in which the forward wheel was "somewhat larger than the back one," thus pointing the way in a direction which led the English first of all toward the bicycle. In November, 1868, C. K. Bradford of the United States gave them the suggestion of the rubber tire, — the first American contribution to the make-up of our favorite "steed," and an important one. And in December, 1868, Edward A. Cowper, an Englishman, put in the suspension-wheel (and anti-friction bearings), and so supplied the last remaining necessary element in the construction of the bicycle.

So fruitful was the year 1868 in this matter, that three out of the six important features of this peculiar vehicle were brought out during its course.

From 1868 until the present time the patented improvements have been numerous, and the mechanical details of construction have been thoroughly worked out, until the machine has become a marvel of ingenuity and of workmanship; and the modern bicycle has been there developed to its present state of perfection in strength, lightness, ease of propulsion, certainty of control, and gracefulness of design and operation. For ten years England has led the world in bicycles, and the English have led all peoples in their use of it and in their accomplishments with it.

Mr. Charles Spencer, in a little book written by him, claims that he introduced the bicycle and its use into England in 1868, and that what first drew public attention to it there was a ride by himself and John Mayall, with a Mr. Turner of Paris, from London to Brighton, upon it; a ride which was described at length in "The Times" of 19th February, 1869. But the machines which they rode were not much different from the "bone-shaker" of Lallement, although they were better made; and, while their largely witnessed and published achievement probably did much to hasten the progress of events, they were neither the first nor the only ones to ride the two-wheeled velocipede in public there; and it is nearer correct to say that the bicycle in England was the result of many efforts of many persons, of whom Mr. Spencer was among the first, and had the good fortune to be mentioned in "The Times." The first bicycle proper was introduced to the English public in 1869.

America has not even kept pace with France. The later history of this subject here is remarkable,

and does not bear out the reputed American character for inventiveness, for mechanical excellence, or for progress and enterprise.

After the Lallement patent, the first one in the United States describing in any way a two-wheeled velocipede was that of the Hanlon brothers, taken in July, 1868, nearly two years later; and there it is described rather incidentally.

But the use of the machine, having become so general abroad, was soon taken up here again, and this time with a feverish rapidity and infection, as has been intimated. Rinks, halls, and riding-schools were opened in rapid and multiplied succession in all the principal and many of the smaller cities, and the "velocipede" interest became a craze. Manufacturers in a score of towns had all they could do to supply the demand for them. Merchants, professional men, mechanics, college-students, and even the ladies, hurried to its adoption as a pastime and a means of exercise, and also as a hoped-for instrument of practical locomotion. In 1869 the *furore* was at its height. A book[1] was written about it, and a journal[2] was issued devoted exclusively to the new interest; and one of the writers on the subject in that year had confidence like this: "The machines now in use are so radically different from those of fifty years ago, so perfect in propelling power, so easy to ride, so swift of motion, so useful as a means of conveyance, that it seems impossible for history to repeat itself with regard to the present mania."

That was in 1869; and standing beside a "Tension" or a "Columbia" to-day, we can pity the man with the poor thing which it was said about.

[1] The Velocipede, &c. J. T. Goddard. New York: Hurd & Houghton, 1860.

[2] The Velocipedist, edited by W. Chester King, 1869.

Nevertheless, in two years from that date not a "velocipede" was to be found in the United States, except as junk or in the hands of a boy. The "mania" had subsided. The "bone-shaker," with all its promise in America, was laid forever by, to be brought out again only as a relic, or to show off the superiority of the modern bicycle.

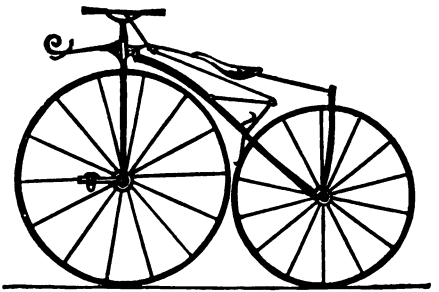
For nearly ten years Yankee gumption and American enterprise had substantially nothing to do with remedying its defects, or devising a substitute.

The assignable causes of this subsidence in the use of the machine are two; namely, re-action after a fever; and the fact which on the opening of spring roads no enthusiasm could long stifle, that the "velocipede" was really a rather dangerous and very laborious toy, suitable for some sport in a hall, but impracticable as a road-machine. It is quite amusing now to hear a *veteran* recount the bruises and tumbles of his learning, and his achievement in riding up some gentle hill on a wager; or a three-months' man relate with what disgust he flung the hundred-weight of wood and iron aside, in the puffing and perspiration of his first ride on the road.

The best machine as made here was a heavy wooden-and-iron affair, with rigid wheels nearly of a size, with flat iron or steel tires, never larger than forty inches in diameter, and thought not to be practicable larger than thirty-six inches; and with the rider poised about midway between them in an unnatural position, thrusting out his feet before him for propulsion, and only able to keep his equilibrium by constant and laborious effort. Cuts of the "best" American and French machines of that date are given, the former on p. 22, and the latter on p. 17.

I have gone rapidly over this later period of history in this sketch, omitting many things, because it is within the memory of us all. Briefer still must

be my mention in this place of the more recent history of the last two years. While Americans visiting in Europe were seeing the bicycle in ever-improved forms in constant use in England by physicians, messengers, clerks, and others as a daily vehicle, and frequent races and multitudinous clubs of gentlemen existing for the favorite sport, and the streets and boulevards of Paris brightened at evening with the headlights of bicycles plenty as the fire-flies of a summer meadow, they could not but be impressed with the example, and seek for themselves a like benefit and delight.



AMERICAN VELOCIPEDE OF 1869.

Nor had the brilliant exhibitions of riding by David Stanton, the English champion, in the early part of 1876, nor the meagre exhibit of foreign bicycles at the Centennial Exhibition at Philadelphia, been wholly lost upon them. And Mr. Wright, perhaps, with his elegant French machine, which he had learned to ride abroad, and with which under the *nom de plume* of "D. Butler" he had beaten Mr. Stanton, set an example of its use which was not to be overlooked.

In the year 1877 an eminent young lawyer of

Boston began to seek his lost health on one of the steel and rubber steeds, and became the pioneer rider of the modern bicycle in Massachusetts. In the same year a prominent architect from the same city did likewise, and induced others to join him in the diversion. Other machines were at once wanted. In November, 1877, the new firm of Cunningham, Heath, & Co., since changed to Cunningham & Co., commenced to import and sell the best English makes of bicycles, which found a ready market, and caused orders to come in faster than they could be filled. This firm thus became the pioneer importing firm,[1] and they soon opened a commodious riding-school in connection with their business at 22 Pearl Street, Boston; and by this means, and by liberal advertising and generous enterprise, they gave an immediate and prosperous impetus to the new cause.

On the 22d December, 1877, there appeared a sprightly bi-weekly periodical of sixteen quarto pages, "The American Bicycling Journal," published in Boston, and edited by Frank W. Weston, afterwards the genial secretary of the Boston Bicycle Club. This was the pioneer paper devoted to the new interest, and is still the only one.

The club referred to was organized in January, 1878, and is the pioneer club in this country, though it was not long left to be the only one.

But the gentlemen composing the firm to which I have alluded, though the first actually in the field, were not alone in forecasting and preparing for the new industry here; nor would the incipient demand for the bicycle have utterly failed of a supply, had they not stepped forward at that time. For, early in the summer of 1877, a visiting English manu-

[1] I do not forget Timms & Co.'s agency at Baltimore, who did not succeed in an attempt to sell some inferior "Ariels" which had been exhibited in Philadelphia.

facturer had a bicycle made as well as he could here, rode it some, and interested in the possibilities of it for this country one of Boston's most enterprising merchants, Col. Albert A. Pope (M. Bi. C.). This gentleman at once took steps towards importing and introducing the new machine. He paid a visit to the leading establishments in London and Coventry, and made himself thoroughly acquainted with the practical construction of the bicycle, and the methods, machinery, and tools used by the best makers. In January, 1878, the Pope Manufacturing Company, of which he is president, opened warerooms for the sale of imported bicycles, and a commodious riding-school in connection with them, at 87 Summer Street, Boston, and made this the leading department of their business. So promising was the outlook for the new industry, that they soon entered upon the manufacture of the machines, and from their manufactory in Connecticut turned out the "Columbia," an excellent and practical roadster, which has already achieved a reputation both on the road and the racing-track. This first good American bicycle entitles its maker to the name of pioneer manufacturer of the modern bicycle in America.

These pioneers all deserve the special mention I have given them; because, by their liberal and patient early sowing, they have enabled so many to reap an earlier harvest of opportunities, and have taught them the value and the possibilities of this new acquisition. Every lover of the sport will be grateful to them, and be glad if their early sacrifices are more than repaid by long-continued success.

A few others here and there have attempted the making of machines singly, or in a small way, but without much success thus far; because the modern machine is so delicate and complicated a piece of machinery, and requires such nicety of construction,

that only by specially skilled labor, and with a large and expensive amount of special machinery, can it be made so as to compare at all with the English manufacture.

Some private persons, singly or in clubs of several, have imported machines directly from the foreign makers; but experience has taught them I believe, as it will all, that the best and cheapest way to obtain "the wheel" from abroad is to consult with and order through a reliable importing house.

Other details as to the progress made here, in respect of this subject, will be more appropriately given in subsequent chapters of this little work.

It is to be said that this latest development of the use of the bipedaliferous wheel in the United States is no "mania," and is without any symptoms of a fever. It has been taken up in a quiet and considerate way, mostly by those who needed it for healthful exercise or a practical vehicle. The spread of it in a year and a half to the hands of about five hundred riders, has been attended with steadily increasing satisfaction to those who own them, and with a very favorable though cautious reception of it by the general public, as one of the permanent acquisitions of the age.

III.

"THE BICYCLE."

"Turn, turn, my wheel! Turn round and round,
Without a pause, without a sound:
So spins the flying world away!" — *Longfellow.*

WHILE, then, the velocipede is an ancient and much-varied contrivance, and the bicycle in its general sense is also old, "*the* bicycle" in a specific and technical sense is a very modern instrument. The name, like many other words which have crept into our language, is a mongrel, and, as classical scholars would say, should have been written *dicycle*[1] or *birote*.[2] The usage is fixed, however; and we have only to take the word with its definition, and make the best of it. The term "bicyclist," as applied to a rider of the bicycle, though considerably in vogue in England, and copied to some extent here, is neither correctly formed, nor euphonious, nor fixed; and not until we can speak of a walkist, a sailist, or a swimist, should the use of it be encouraged by printing it so.

The bicycle, as shown in the cut, is a skeleton vehicle, consisting primarily of two wheels and a perch, but as an organic machine containing the following essential parts and features: viz., one large suspension wheel, having a rubber tire, and an axle of considerable length fixed to rotate with it,

[1] From the Greek δίκυκλος (δίς and κύκλος), a chariot.
[2] From the Latin *birotus* (*bis* and *rota*), two-wheeled.

and set in such a frame, and mounted in such a way, as to constitute it at once the driving, guiding, and substantially supporting wheel of the vehicle; the frame or remainder being a small suspension-wheel following immediately behind the other, having its bearings in the lower forked end of a perch, which extends upwards and in a curved line over the large wheel, and takes a swivelled or socket joint immediately above the periphery of the large wheel in the head or upper part of a fork, and bears on it a step to mount by, and a saddle and spring for the rider; the fork extending downward on either side the fore-wheel has bearings for the axle of the latter, and extending upward in a head has a cross-bar or handles parallel with the axle below, and of a little greater length, — the fore axle being provided with cranks, oppositely projecting from its outermost ends at right angles with it, and which bear on their pins loose pedals for the rider's feet: the whole so constructed and proportioned as to be propelled, guided, and preserved in equilibrium, by the hands and feet of the rider; that the rider has his position a little behind a perpendicular line passing through the axis of the fore wheel and so almost

MODERN BICYCLE.

directly over the latter; that the radius of the fore wheel is of about the length of its rider's leg, measured inside to the ball of the foot, less the length of crank, and thickness of perch and saddle; and so light as to be easily portable, so strong as to be safe and firm, and so elastic as to prevent the dangerous shake and jar incident to a rigid machine. It is mainly one wheel, with the necessary adjuncts to make it operative. Hence the familiar name "the wheel."

It differs from the two-wheeled velocipede, not only in general appearance, but also in several organic features. Its fore wheel is twice as large, and its hind wheel half as large, as in the latter. The wheel is made on the suspension principle, and is of steel instead of wood: the tire is of round rubber instead of flat iron or steel. The shape, while far more graceful and convenient, is such that the rider propels it mostly by a part or the whole of his weight, instead of entirely by muscular thrust; takes upon it the natural position of walking, and so strains no part of his body; maintains his equilibrium in a different and easier manner, and obtains greater speed, or rises a steeper grade, with less effort. It has practically a base on the ground of twenty-four inches, instead of one or two; and it has, when mounted, the centre of gravity below the centre of magnitude, instead of far above it, and so is of much more stable equilibrium. It is half as heavy.

These, as well as many minor points of construction and operation, will be more fully explained in the succeeding chapters.

We have seen, that, of the six necessary component features of the bicycle, the Germans have given us one; Frenchmen, two; an American suggested one; and the English contributed the other two, and then finished up the job, and gave us the complete and perfect machine.

Of these components, three were introduced or suggested in 1868; and it was not until a year or two, at least, after that, that any considerable service was seen by the new recruit, even abroad where it was produced; nor, as we have seen, did it reach here until it was shown at the Centennial Exhibition, and was not able to take a practical hold here until 1877. These suggestions are important to be borne in mind in connection with the subject generally, and especially in reference to the still existing prejudice created by the "velocipede."

It will be seen that the bicycle, though at first appearance a small and simple vehicle, is really, as now made, rather an intricate and complex instrument, and that its use is not too simple to be interesting. Indeed, though very easy to be learned up to the point of ready use, it admits of almost unlimited exhibition of skill in its operation, and leads the performer on with a strong fascination.

The weight of roadsters varies between thirty-five and sixty pounds, and of racers between twenty and thirty-five pounds. The diameter of front wheel ranges from forty to sixty inches, — forty-eight, fifty, fifty-two, and fifty-four inches being the most common sizes; and the wheel is chosen to *fit* the rider as pantaloons are, — according to length of leg, &c. The whole is made in form and finish, lines and proportions, with a view to comely appearance as well as utility, and, when mounted by an accomplished rider, is remarkably handsome.

Running as it does but little in absolutely direct lines, but of necessity always in graceful curves, keeping its rider in gentle but ever-varying motion, and free, erect poise, with unlimited capacity of possible feats and fancy ridings, it is always, wherever it makes its appearance, to the beholder a thing of wonderful attraction and æsthetic interest. To

the rider it is a grateful and a beneficial exercise and a tireless charm.

It runs, it leaps, it rears and writhes, and shies and kicks; it is in infinite restless motion, like a bundle of sensitive nerves; it is beneath its rider like a thing of life, without the uncertainty and resistance of an uncontrolled will.

As a means of exercise, it calls every muscle and nerve and faculty into alert and healthful activity, without fatigue, in the open air, the sunshine, and the natural beauties of a rapidly-changing landscape.

As compared with horseback-riding, it is safer, gentler, readier, and less monotonous; while its less expense and care places it within the reach of many who could not afford the other. Than gymnastic exercises it is more natural, evenly distributed, and stimulating, and is out of doors. There is no danger, except from carelessness; and, however carelessly pursued, it is not as dangerous as any other means of locomotion, as base-ball playing, swimming, skating, shooting, or any of the manly sports pursued with equal want of care. There were some objections to the velocipede on account of liability to rupture and other injuries; but to this no such objections lie. Physicians whose attention has been called to it unanimously pronounce in its favor, and it finds a large number of votaries among them. The testimony of many a professional man of sedentary habits and impaired health, to which I may add my own, is that of gratitude for its benefit and rejuvenation.

As a means of practical travel it is economical, rapid, and capable of long continuance without exhaustion. It is an always-bridled horse; it costs nearly as much in the first place, perhaps, as either a horse or a carriage, but it saves one of them; its feed is a pint of oil a year, and its grooming a hand-

ful of cotton-waste and ten minutes' attention now and then. It never runs away, requires no harness, and breaks no carriages. It has but two disadvantages, or perhaps three: the first is, that it is a selfish affair, — you cannot take on a friend, though it promotes good-fellowship and generosity otherwise; the second is, that it is not adapted to inclement weather, deep mud, or snow; and the third, that it does require at first a little special learning of the art. It takes a man along three times as fast as he can walk, and with much less expenditure of power, as will be seen in proof in another chapter. One rides eight or nine miles an hour on it, over ordinary roads, for several hours in succession, and dismounts as fresh as when he began; and there are no special discomforts, such as follow walking or horseback-riding for the same length of time. One hundred miles in a day is a fair day's ride on the road for an average rider; fifty miles a day is a pastime; a run of ten or twenty miles of an evening, or to a morning breakfast call on a friend, is a pleasant and wholesome diversion. It is driven with ease, after a little practice, up any hill where a horse in light buggy can trot, and over any road that is decent for travel. A sandy road, or deep mud, or very stony way, is difficult; so is a cobble-stone pavement; but the bicycle is a practical road machine for all ordinary highways, up hill and down hill as they occur, and is far more enjoyable out of doors than on a floor.

As a sport, bicycling is manly, innocent, humane, and rational. The companionable "run," the club "meet," the amateur "race," are all full of refreshing enjoyment and healthful excitement. The friendly emulation and the voluntary struggle compel regular and temperate habits, and know no whip or spur; while the professional contests, like those

of cricket and yachting, are as yet without any of those ungentlemanly associations, and even excesses and cruelties, which are so often objectionably attendant upon boxing, billiards, trotting, pedestrian races, and other public exhibitions of physical training or endurance.

The training of eye and ear, the alertness and suppleness of limb and joint and muscle, the quick observation, the prompt decision in emergency, the strength and courage and self-reliance, necessarily developed in this sport, are such as cause it to lead in these respects every other one, and to combine the good results of many. It is pre-eminently a gentlemanly recreation, a refined sport. It is pursued by noblemen and right honorables abroad, and by nature's nobility in our own untitled land. Senior wranglers at the universities, and first-prize Hebrew scholars, are not slow to win championship cups and medals; and, though the royal Guelphs may not be distinguished riders, yet the Prince and Princess of Wales graciously accepted the honor of being escorted into Coventry by bicyclers in November, 1874. Indeed, the ability to ride the bicycle easily and gracefully on occasion is already an accomplishment which no gentleman can afford to be without, even if he be not an habitual devotee.

IV.

MANUFACTURE. — PARTS. — POINTS OF "THE WHEEL."

Men, my brothers, men, the workers, ever reaping something new:
That which they have done but earnest of the things that they shall do.
Tennyson.

THERE are more than two hundred distinct makes of bicycles in England, by nearly as many different manufacturers. These different makes or styles are designated by names more or less euphonious or captivating, such as "Acme," "Britannia," "Centaur," "Challenge," "Defiance," "Excelsior," "Hawk," "Ixion," "Premier," "Pegasus," "Queen Mab," "Stanley," "Swiftsure," "Tension," "Will-o'-the-Wisp," &c.; and each has its specialties and differing points of advantage and disadvantage.

The amount of capital invested in plant and machinery, for manufacturing bicycles in England, is about one million pounds sterling; and the value of the bicycles already in that country is between six hundred thousand and eight hundred thousand pounds. In London there are upwards of thirty thousand bicycles, and in the country outside there are a hundred thousand.

The same reliable English authority from which the above figures are derived estimates the amount of wages paid in the various shops to machinists

making bicycles alone at from twelve hundred to two thousand pounds per week.

There are also many makes in France, the fashions there preserving somewhat more resemblance to the old velocipede, in having the fore wheel smaller, the saddle farther back from a perpendicular through the fore axle, and greater distance between the saddle and the wheel, and the back wheel not so small. There are good machines made there, however; and some of them have been used with good results in racing, both in England and in this country; and some of the longest tours ever ridden have been made with them. Amongst the best manufacturers there may be mentioned Michaux et Cie., Meyer, and Truffant of Tours.

But the English machines are the most perfect; and among the best makers are John Keen of Chapham Junction, near London, maker of the famous racing "Eclipse;" W. H. J. Grout, Watson Street, Stoke Newington Green, London, N., maker of the "Tension;" R. A. Hill & Co., Silvester Gardens, Arundel Street, London, makers of the "Hallamshire;" Hydes & Wigfull, Stanley Street, London, makers of the "Stanley;" Singer & Co., Alma Street, Coventry, makers of the "Challenge" and "Special Challenge;" Bayliss, Thomas, & Co., 80 Lower Ford Street, Coventry, makers of the "Excelsior" and "Duplex Excelsior;" Hilman & Herbert, Premier Works, Coventry, makers of the "Premier." These are all reliable manufacturers of first-class machines, which, with many others, are imported by Cunningham & Co., 22 Pearl Street, Boston, except those of Singer & Co.: the latter are imported by the Pope Manufacturing Company, 87 Summer Street, Boston. All of these I have examined and observed in use, and can recommend.

The prices of these English bicycles range from ten pounds to twenty pounds, and are varied considerably by the number of fittings furnished, bright finish, and other special circumstances; and nickel or silver plating, of course, increases the price. These are made more expensive here, as not only the freight, but also duties of thirty-five per cent *ad valorem*, and royalties under United-States patents, are to be added. The cost of them here, therefore, varies from seventy-five dollars to a hundred and forty dollars, according to size and style.

There is happily now no necessity, however, of sending abroad for a bicycle. The Pope Manufacturing Company, to whom the reader is already introduced, have some time since established facilities and machinery for making it "better than most, and equal to the best," English makes; and their "Columbia," already in the use of many riders, has proved itself an excellent and reliable roadster. It is supplied free of extra charges, at prices which offer the advantage of a saving of twenty per cent on the cost, and the risks and delays of importation. They have avoided the danger, so often met with in this country, of trying to make something exclusively American at first; and having settled upon the popular and reliable roadster, the "Duplex Excelsior," as a model, started with that fully abreast of the English makers, and introduce only such variations as are taught by experience and expert mechanical ingenuity to be desirable. They manufacture under the protection of the existing United-States patents (and these are many), and are therefore able to give their customers a machine free from "let or hinderance" from any one; while the parts, being made mostly by accurate machinery, can be immediately supplied or replaced at any time in case of breakage. This company is also sole importer

of the celebrated "Special Challenge," made by Singer & Co. of England.

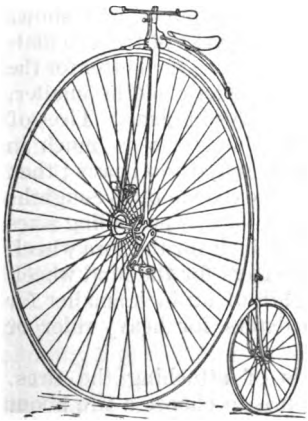
On the opposite page is a heliotype representing the "Columbia" as now made.

The head of the centre-steering class, described on a subsequent page, is of one solid forging (the largest forging of the kind ever made); the spring is bolted to the neck of the perch, and hinged to a sliding clip; the perch, or backbone, is of hollow steel, large in diameter, light, strong, and rigid; the wheels have V-rims, nipples and lock nuts for the spokes, forged steel hubs, adjustable coned bearings well hardened and with coned fastenings; pedals also have adjustable coned bearings, and are protected from the dust; and it is supplied with the necessary accessories. For fuller description the reader is referred to their catalogue.

The "Harvard" bicycle is an eclectic, combining the best qualities of several English makes, and is manufactured expressly for Cunningham & Co., in Coventry, England. This firm imports and keeps in stock a whole line of foreign-made bicycles, including racers, of the best manufactures, and of several of the best is the sole agent and importer; and is also under the protection of the American patents, and thus in a position to sell to its customers machines upon which no claims can be made by other parties. Cunningham & Co. do not attempt to manufacture, but find the field for their business in the demand for light and elegant machines, with the various specialties of hollow forks and handle-bars, ball, roller, and parallel bearings, "Stanley" heads, direct spokes, and other modifications too numerous to recite here; the best of which they have adopted in their "Harvard." For a full description of this, and the latitude for choice by the purchaser, I must refer the reader to their

catalogue. It is in three forms, roadster, light roadster, and racer; and either of them may be had with "Stanley," socket, or "Ariel" head, with ball or parallel bearings, V or crescent rims, &c. It is lighter and more elegant than the "Columbia," and is also more expensive. A cut of the "Harvard Roadster" is given below.

Although the machine is familiarly termed by bicyclers "the wheel," and is essentially only a wheel with the necessary adjuncts or accessories to make it operative, it is in reality a complex structure, and embodies some of the finest results of modern mechanics, and, as ordinarily constructed, consists of nearly three hundred pieces. Having given heretofore a general description, I propose now to specify the different parts and some of their most important variations.



HARVARD ROADSTER.

Every one of these parts has been wrought into its present character on the anvil of experience; and each of them requires the utmost of mechanical skill and the best modern tools and material in its construction. In their make and putting together, every superfluous thing is rejected, every unnecessary ounce of weight or particle of extension removed, as far as possible; the qualities desired being lightness, strength, simplicity, grace, comfort, and safety, so combined as to make an instrument capable of the

greatest speed with the least requisition of power in propelling and controlling it.

The tires are universally made of rubber, round in shape, and of various qualities and densities. A rather soft and pure rubber is the best for wear, and best fulfils its purpose, namely, to lessen the jar and jolt incident to a steel or iron tire; and of the colors — red, black, and gray being in use — there is not much preference, though the red has the advantage in looks, and the gray is the purer, and shows muddiness and dust less. Thickness of tire is a matter of some importance: the thicker, the better for the machine, and the less jar for the rider; but the smaller, the lighter, and the better it stays in place. Tires of one and one-half inches in diameter were much in use at one time, but they were found too heavy; then the fashion went to the other extreme of five-eighths of an inch for roadsters even; but the prevailing sizes now are seven-eighths to one inch for the fore wheel, and five-eighths or three-quarters for the hind wheel, with a variation of one-eighth of an inch smaller for racers, and larger on roadsters for heavy rider or rough roading.

There are four methods of attaching the tires. Of these the most common is to choose a tire about four inches smaller than the periphery of the wheel, and stretch it on, fastening it with a rubber cement made for the purpose. Another way is to make the tire very slightly smaller than the wheel, with an endless rope in its centre: this is "unstretchable," and when once in is said to stay there until it wears out. A third method is to choose the tire somewhat larger than the wheel, with a hollow core in which is a wire, right and left threaded at its ends, and connected by a small nut where they meet. This tire is compressed on; and of course, if cut, the injury does not spread as it does in the first kind: but, if the

wire breaks, it flies off, and is not easily replaced, while in the first method, if the tire loosens, it tends to stay in place, and may be easily confined with a string until it can be permanently repaired. A fourth way is that devised by Grout for his "Tension," and consists in moulding the tire into the rim of the wheel, and vulcanizing it in under steam pressure of thirty or forty pounds to the inch. It is thus made very firm, seldom cuts, never comes off, and is therefore as named, "indestructible."

The rims or felloes of the wheels are either solid or hollow: when solid they are either U or V shape in section, or a sort of UV that is like a V inside of a U, or are crescent-shaped. The V-rim is the oldest, and is strong and heavy, and is usually made of iron. The U-rim is of rolled steel, is very light, and used chiefly in racers, and looks very neat. The UV is Grout's pattern, and combines the advantages of the other two. The crescent rim is of rolled steel, and is like the U, except that it is thicker in the middle, and comes to a thin edge at the sides, and is stronger therefore, and does not nip the tire between the edge and any stone or obstruction.

The hollow rim, as made by the Coventry Machinists' Company, consists of a tube passed through the rolling-mill, and so made somewhat U-shaped: as made for the "Invincible" it is drawn steel, drawn hollow as Druce draws his backbones. The hollow rim is more rigid, and is lighter.

The spokes are composed of either charcoal-iron wire or steel wire, cut to the proper length, and of varying diameter; the tendency being to smaller sizes, but this depends very much upon the number in the wheel. The number was formerly thirty-six, but of late has been greater; and the more common varieties have from forty-eight to sixty, though some have as many as two or even three hundred. The

"Columbia" has forty spokes, and the "Harvard" sixty-eight. The greater number, being of thinner wire, give the wheel a light and airy appearance, and also hold the rim much more evenly; but they are more to clean, and make it difficult to reach inside for cleaning the hubs and axle. They are headed by hammering at one end, and are commonly passed through holes in the rim to the head, and are fastened to the hub by the other end as will be described. In Grout's wheel, and others where the tire is vulcanized into the rim, the latter has hollow, externally-threaded *studs* extending inward, and the spokes are held by the head in slender nuts which screw on to the studs. This form is easily adjusted, and tightened at the outer ends where there is plenty of room.

The inner ends of the spokes are fastened in several ways to the hub. The oldest way is by means of *Nipples*, which are pieces of steel about an inch in length, having a thread cut on one end and a hexagonal or octagonal nut on the other, and a hole drilled through the longitudinal centre: the inner end of the spoke is passed through this hole, and headed, and is then secured and tightened by screwing the nipple into the hub. Some of these nipples have *lock nuts*, which are small nuts working on the thread of the nipple above the hub; and when the spoke is tightened, by screwing the nipple into the hub, these lock-nuts are screwed down on the nipple against the hub, and hold it securely there against the tendency to loosen.

Direct-action spokes are threaded at the hub end, and used without nipples by simply screwing the spoke itself into the hub. These are very neat in appearance, and by not taking so much room on the hub allow more spokes in the wheel. The theory of the suspension wheel is that the rim should be a per-

fect circle, and true in its plane without reference to the spokes; then these latter suspend the weight at the hub from the rim, and the pull of the spokes all around preserves the circular shape of the wheel. If an obstruction is met, or there is a drop in the path, the tendency is to compress the rim at the lower side, and the spokes must either break, bend, or yield lengthwise. With nipples, the spoke has play in them for such emergency; while in direct-action spokes there is no play except at the rim, where it tends to start the tire by constant pressure on it.

Hollow spokes are made of steel ribbon formed longitudinally into a tube, and have about two inches of solid wire brazed into either end for the head and the threaded end, or worm. These are lighter and are more rigid; but the brazing at the ends makes them liable to weak points, and there is a slit throughout the length where the edges of the ribbon meet, which allows moisture and air inside, causing rust. Sometimes the rims are made *button-hole* for the spokes, instead of having a simple round hole, so that that end of the spoke can be removed and replaced without disturbing the rubber; and some are screwed into the rim by means of a worm on the outer end to fit a threaded hole in the rim.

The hub is the middle part of the wheel, from which the spokes radiate, and which carries the bearings. It consists of three parts, which may be called the axle, the flanges (the latter being one near either end, and alike), and the projecting axle or spindle and crank-seat at either end outside the flange; all being solid or fixed, and revolving together.

The axle is a stout bar of steel or iron (sometimes made hollow, and so lighter), varying from half an inch to an inch in diameter, and ten inches or more in length. A good length is desirable, as it

makes control of the wheel easier, as will appear in chap. v.

The flanges are circular disks of metal, from three to four inches in diameter in the fore wheel, and somewhat smaller in the back wheel, from three-sixteenths to a half inch thick at the circumference, and from three-quarters to two inches thick in the middle. These are sometimes made in solid piece with the axle, but are generally made separate, and brazed to it. For nutted or nippled spokes the flanges are of steel or iron; but for direct-action spokes they are frequently of gun-metal or brass, thin at the edges, and gradually spreading out inwards to give a large surface against the axle. They are never less than six inches apart, on large wheels, as that amount of "dish" is required to make the wheel strong, and keep it from buckling: if too far apart, however, they make the wheel look clumsy. The hubs of the back wheels are made with a hole through their longitudinal centre for the wheel-pin, and should have a steel core to prevent wearing out too soon. There are a few variations, as, for instance, in the "block-tension" and "registered-clamp" wheels, where the flange is in two parts, one being screwed to the other after the spokes are in, like a clamp; and additions and modifications are made, as in the "Tangent Wheel," "Garrood's Rigid," "Lawson's Rigid," "Stella," "Superb Rigid," "Perfect Rigid," "Mayher's Lever-Arm Tension," "Ariel," and others, where studs, arms, levers, ratchets, or other contrivances are made use of to secure rigidity of wheel, but which are either too complicated or too little used to be described here. The theory of them all is, that as the power of propulsion is applied to the centre of the wheel, and is transmitted through the spokes to the rim, the spider-wheel springs so as to cause a loss of power,

and that this can be obviated by one or other contrivance to brace the wheel against this tendency. The twist or spring of any ordinary well-built spider-wheel is, however, very slight, and the disadvantage caused by it is inappreciable; while the contrivances referred to add to the weight and complication, and injure the appearance, of the wheel. In fact, the yield or elasticity of the suspension-wheel under the pedals, as well as under the forks, is one of its chief advantages; and a perfectly rigid wheel in a bicycle is so much retrogression toward the "bone-shaker."

The spindle, or part of the axle within the bearings, is, of course, always a cylinder, with either a plain or coned or grooved contour longitudinally adapted to the bearing used for it to revolve in.

The bearings are constructed in a great variety of ways, but always of steel made as hard as possible; the points to be secured in a good bearing being firmness, durability, freedom from dust, and least friction. They are either plain, parallel, coned, rollered, or balled, and will be described in their order and with their more usual modifications. The strain and wear come, of course, on the upper part of the spindle and the upper half of the bearing; and as there is always some wear, no matter how constructed or lubricated, an important desideratum is adjustability for wear so as to keep the bearing always snug and noiseless.

Plain bearing consists of two semicircular surfaces of hardened steel about one inch in length, one fitting on top of the spindle, and the other below it; and these are generally attached to the fork in one of two ways. In one way the upper part is forged solid with the fork, and has a projection on each side; and the lower part is similar in shape, and is secured to the other by means of a screw and nut in

the projections on each side. In the other way the lower end of the fork is shaped like an inverted U, or like a tuning-fork; and the bearings proper are separate, and contained between the prongs of the fork, one on the spindle, and the other underneath it, secured and tightened by a wedge-bolt, or cotter and nut. In this form, either part of the bearing can be easily replaced.

Plain bearings are simple, and run with less friction than some others, but cannot be adjusted for wear. Modifications are, a deep groove around the centre of the bearing, to hold oil; and another, a groove around the bearing, into which a collar turned on the spindle fits, to keep out dirt, and prevent the side-shake arising from wear.

Coned bearings are constructed either by turning the spindle out in the centre so as to appear as if a hollow truncated cone had been slipped on at each end, and bevelling the bearings at their edges to fit them; or the cones are turned on the spindle, with their bases touching each other, and the bearings concaved to fit. The latter method is the better, as it makes a stronger spindle, and the bearing retains oil better. These bearings are adjustable to compensate for wear, and this is an advantage; but there is some increase of friction, and they do not run as easily as ball, parallel, or roller bearings. They are adjusted and secured by nut and cotter as in case of plain bearings; or by an eccentric, consisting of a small steel rod secured to the ends of the bearing-keeps by screws fixed out of its centre, this turned by means of a pin set at right angles to it, raising the lower bearing until sufficiently tight, when the whole is secured by tightening the nuts at the end, or by uniting the ends of the bearing-keeps by a small bar, through the centre of which a screw passes, which, 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.

In the "hinged bearing-box," the bearing-keeps are made to form a cylinder, about one-third of which is separate and hinged to the main part, and secured to projections at one side. The bearing-blocks are alike, and fit both keep and spindle; so that, when the upper block gets worn, its position can be changed with the lower one.

Parallel bearings are constructed with a plain spindle, fitted with a plain hardened steel cylinder or tube, both being hard and smooth as possible; and the cylinder is an inch and a half or more in length, the ends running in recesses in the crank boss and hub flange so as to keep out dust and grit. The spindle revolves in the cylinder, and the cylinder in the bearing-keep; the latter being made sometimes solid with the fork, and sometimes with bolt and nuts. This bearing lubricates well, does not take dust, gives little friction, and wears a long time. It is not adjustable for wear, but can be renewed, if made detachable, at little expense.

Roller bearings consist of a plain cylindrical box of steel larger in diameter than the spindle about which it is placed, and separated from the spindle by small hardened steel rollers which exactly fill the space between, so that, when the spindle revolves, it touches and turns every roller. Theoretically there is more friction with this bearing; but practically they run easily, especially for heavy riders. Perfectly made ones of good material are expensive, and cheap ones are bad; and any kind should be looked after, as, if the rollers get worn, they twist, and then the wear becomes rapid, and the friction greater.

There are several "improvements" introduced into roller-bearings, designed to keep out dust, to

prevent twisting, to make them somewhat adjustable, or to keep the rollers from wearing against each other, which are more or less complicated, and will not be described here in detail, — except the "Cycle" bearing, which has considerable and very favorable use, and is a specialty with Singer & Co., on their "Challenge."

In this "Cycle" bearing the rollers are less in number, and are kept apart by two brass rings or collars which exactly fit the bearing-box, are thin and flat, and have their inner diameter a trifle larger than that of the spindle: the inner edges are perforated for the rollers, and are cut so that, when the rollers are in them, the rollers protrude a little inwards, and fit closely to the spindle. The spindle turns the rollers, which revolve slowly (and without touching each other or the box) on their narrow bearings in the collars, and the latter revolve more slowly in their grooves in the box. They make little friction, they bring each roller in succession to the top, and each part of the collar to the top in the same way, and there can be no twist of the rollers: they are therefore a preferable bearing.

Ball bearings are either single or double; and, though there are several variations, they may be understood by a description of these two typical forms. The double-ball bearing, or "Humber's bearing," has acquired a good reputation on the best bicycles, especially in racers and light roadsters. The bearing-box is in two halves; the upper one being either solid with the fork or detachable, and the lower one is secured to the other by screws and nuts, in side lugs or projections: so that the bearing-box is perfectly cylindrical, but not plain, as it contains two parallel and nearly semicircular grooves running round it, about an eighth of an

inch apart, and about the same distance from either end, and is larger than the spindle; the latter has grooves in it corresponding to those in the bearing-box, but shallower; between the spindle and the bearing-box, smaller than the latter and larger than the former, is placed a thin steel cylindrical collar or sleeve, perforated with alternate holes, whose centres pass over the centres of the grooves; into each of these holes is inserted a small steel ball as perfect as can be made, and all of the same size, just large enough to fill the distance in the grooves between spindle and box.

The spindle turns on the balls: the latter turn on the box and the edges of the collars, and slowly travel around the box in the grooves. In the "New Excelsior" and in the "Harvard" bicycles, there are ten balls to each groove, or twenty to each bearing; and they need little lubricating, and work very easily.

The single ball bearings have only one groove in the spindle, and a corresponding one in the box for each bearing: the balls are larger, and run against each other as common rollers do. They are not so firm or durable or easy as the others.

Ball bearings are not adjustable for wear, except by removing paper washers sometimes, and then tightening up a little, or by putting in new balls slightly larger than the first.

Back wheel bearings take less weight; but, as the wheel revolves nearly three times as fast, the wear of the bearings is more: this latter is increased by the greater amount of dust and grit to which the bearings nearer the ground are accessible. As the spindle does not need to be fixed so as to revolve with the wheel here, it (the hub) has a hollow centre, and revolves on a separate spindle or wheel-pin passing through it. A simple, old,

and easily running bearing consists of a straight steel pin passing through the hub, and fitting it accurately, and secured by lock-nuts to the back fork. As there is no adjustment for wear, it is good only for racers. The "Centaur" back wheel hubs are made with recesses into which bosses on the fork-ends fit, and between these a loose steel collar is placed to prevent side-shake.

Cone bearings are most frequent for these hind wheels, and are either double, single, or sliding. The first are constructed as follows: On the right end of the steel wheel-pin is turned solid with the pin, a truncated cone, about one inch in length; and on the left end is a similar cone, but loose, internally threaded and working on the pin; by screwing up this cone all side-shake can be taken up, and the whole is secured with lock-nuts outside the fork-ends. There is more friction with these, and a liability to fasten the wheel by the too tight working-up of the loose cone. The single or fixed cones are where the cone is fixed at either end, and provided with a square head which fits into a corresponding recess in the fork end. The wheel-pin passes through both cones, and is fastened on the outside the fork-ends with lock-nuts; and the cones are drawn together by tightening the pin. They cannot fasten or twist. In the sliding cone bearing, one cone is fixed and the other adjustable; but the latter slides on the pin instead of screwing on a worm, the end of the pin being flattened on two sides. A loose-nut and a lock-nut put it in position, and keep it there. Roller and ball bearings are sometimes used on the rear wheels of racers, and other modifications are sometimes made. The bearing which seems most approved for the hind-wheel is the fixed cone bearing dust-protected.

The cranks are attached to the crank-seats or

ends of the spindle outside the bearings, so as to project in opposite directions, and at right angles with the axis of the wheel. They are flat iron or steel bars, from five inches to seven inches long, and graduated in thickness from about three-quarters of an inch at the seat, to half an inch at the end; in width they are all about three-quarters or seven-eighths inches at the seat, and for three and one-half inches or more, when they are widened to one inch or more. In the middle of this wider part, a slot about half an inch wide and two inches long is cut to receive the pin or spindle which carries the pedal, and allows adjustment to that extent, in the length of crank actually used. The average length of crank bar on roadsters is six inches, and on racers five inches. Respecting the method of attachment to the crank seat or axle, they are either fixed or detachable. The usual way of attaching fixed cranks is to shrink them on to the seats, and then drive splines or keys between the crank and seat into grooves or slots cut for the purpose. With these it is very difficult to remove the cranks when you need to; and the splines work out sometimes when it is very inconvenient. Detachable cranks are constructed in a variety of ways. One way is to make the boss or seat end of the crank about one inch thick, and divide it edgewise, and remove a portion about a quarter of an inch broad, and extending toward the shaft of the crank. The side of the seat is then flattened, the crank put on, and a cotter driven into the slot and against the flat side of the seat, and this when tight is secured by a nut. Sometimes, as in the "Centaur," the crank is screwed on to its seat, and then a pin is driven through both crank and seat. Sometimes the end of the crank-boss is split, and secured with bolt and lock nut; or the crank is driven on to a smooth

coned seat, and held with a nut; or it is put on plain, and held by screwing in a pin till it catches in the crank seat. These all have the advantages of being easily tightened at any time and of being easily removable.

The pedals are the parts upon which the feet operate directly, are at right angles to the crank, and consist of pin, and a revolving or loose piece on it for each; the pin or spindle having a shoulder against the outside of the crank, and threaded at the end which passes through the slot in the crank, where it is firmly held in any position by a nut on the inside of the crank. The kind most in use is the rubber bar pedal, and consists of a metal tube about four inches in length, at each end of which, and at right angles with it, is set an oblong piece of steel plate, wider in the middle, to prevent the foot from slipping off. The ends are connected by steel rods running parallel with the central tube, and which hold and pass through the centres of round bars of rubber, an inch in diameter or less, and frequently corrugated. The whole revolves on a steel spindle, passing through the central tube, which is often constructed with movable cone bearings, as described for the back wheel, to be adjustable for wear, and to prevent rattle. The plain pin runs easier, however, but soon wears loose.

The "rat-trap" pedal is in general construction like the bar pedal, but has flat pieces of steel with serrated edges, like the teeth of a rat-trap, in place of the rubber bars. These are lighter, give a firm hold, but wear out the boots, and do not help, as the others do, to absorb the jar of the wheel, and so are not so easy for the feet. They do well on racers. There are several varieties and combinations of these two forms, which need not be here described; nor need the varieties of "block"

pedals, no longer in use except on cheap or very old machines.

The "All England" adjustable crank is a modification of which not many have been used here yet; and I cannot speak of it from other knowledge than a hasty examination. In it the crank shaft has a transverse recess cut across its outer face near the end, near the middle, and near the boss; and these are connected by diagonal recesses, of similar width and depth, between either two. The pedal spindle, instead of going through the crank, is fitted with a collar, which goes around it snugly; and the inner foot-plate is fitted with a spring, which acts upon a catch working in the recesses. By pressing the foot sidewise against the spring, the catch is turned, and the pedal shifts position to the next transverse recess. If this is done when the foot is descending, the crank leverage is lengthened; if when ascending, it is shortened. The convenience is, without dismounting, to lengthen the pedal for an up grade, and shorten it for a down grade, or for speed on a level.

The fork connects the bearings of the front wheel with the head of the machine and the backbone or perch, for which, and all the weight thereon, it furnishes support; and by it, through the head and handles, the front wheel is guided, and held against obstructions tending to change its plane of revolution. It also takes the vertical lift and thrust of the rider, when, as in ascending a hill, he adds his strength to his weight, for propulsion. It therefore needs to combine rigidity against forward, backward, and lateral strain, and against the twist of turning the handles, or holding the wheel in its place by them; and strength to resist the downward pressure of weight, and upward pull of rider, with lightness and grace. The simplest ones consist

of two plain flat iron or steel bars, a little longer than the radius of the wheel, meeting at the top ends above the wheel in the head; and this was the oldest form. But they have been greatly improved in strength, rigidity, lightness, and appearance, in several ways.

Bayonet forks are constructed on the theory (confirmed by experience) that most strength is required at the top above the wheel, and less near the bearings, and in the centre rather than at the edges; they are therefore thicker and wider at the upper part, tapering toward the lower ends, and with thin edges, so resembling a bayonet in shape. The average width is about one inch, and the average thickness about three-eighths of an inch; and they are among the best in use.

Hollow forks are constructed of steel tubes, tapered and flattened. These are lighter and more rigid, but cannot be repaired in case of bending or breaking.

Fluted forks are a steel tube tapered and sawn in two lengthwise: the largest part of the tube forms part of the head, and the two halves are bent outward above the wheel and then downward to the bearings. They are the lightest in use.

The "Premier Rigid" is an ordinary bayonet solid fork, stayed with a combination of rods and nuts in front. They are very helpful to the machine on a bad road and in ascending hills; but are of some added weight, don't look very well, and are sure to get broken.

Double hollow forks, made of two tapering steel tubes together on each side, have come into use within the past year, and appear to be very light and rigid. They may be had on the "Premier" and the "Special Challenge."

The fork has a *rake* (that is, it is not exactly per-

pendicular over the bearings, but leans backward) of about two inches at its juncture with the head; in some it is more nearly upright, and in some less so; but the object is to bring the centre of gravity of the parts of the machine above the bearings, a little in rear of a perpendicular, for stability.

The *back forks*, or bifurcated end of the perch, are similar to the others, and vary like them in construction; but they are smaller, as they have less strain, and are curved and set at an angle of thirty degrees to forty-five degrees, according to taste in design. In mounting and dismounting they are subject to some twist and strain; but otherwise their work is very light, and they merely serve to connect the perch and hind wheel.

The head is that part above the fork which affords bearings and connections for the perch and the handles. It is made in a variety of ways and forms, all of two classes, however. The oldest, and until recently the commonest class, is the *socket*-head, in which a thick rounded pin rises from the centre of the fork, tapering toward the top, where it is made square to receive the handle-bar, and terminates with a thread and nut. Fitted to and around this pin is a deep cylindrical collar, or socket, to which the perch is attached; and the handle-bar is fixed on the square part, and thus commands the fork and wheel.

There are some disadvantages to this contrivance; and it has mostly gone out of use, with its several varieties. It is, however, stronger than any other, and allows the wheel to turn more: in an improved form, with cone adjustment for wear, it is still preferred by some. The other leading type is the centre-steering head, constructed in various forms.

The centre-steering head, in the ordinary form, is constructed so that the two uprights of the fork, in-

stead of being united immediately above the wheel, are connected by a bridge there, and are continued upward to the handles, where there is another bridge; sometimes the handle-bar itself forms the bridge, and sometimes there is a flat bridge with lugs for the handle-bar. On the middle of the lower bridge is either a concave cone or a raised centre; and in the centre of the upper bridge a worm is cut, through which works a set screw, carrying at its end either a concave or an inverted cone; between these the perch works, the "neck" of which consists of a straight pin having a raised or depressed centre at either end to fit the bearings in the lower bridge and on the set screw. This is oftenest called the Ariel head, because early used on the "Ariel" machine. The "Acme Fork Top," a solid forging, the "Special," and the "Duplex," are modifications of this head. The latter, which has been adopted in the "Columbia" bicycle, has the forks brought together a little toward and at the top bridge; the upper part of the perch spindle proper has a thread cut on it, and on this a hollow top screws, having a circular nut at its base, and bearing the top centre on its upper part; beneath this, on the lower part of the thread, is placed a circular lock-nut. Both top and lock-nut are pierced with circular holes into which a spanner fits; and the adjustment is effected by first screwing up the top portion, and then tightening the lock-nut. This double spindle and double nut forms a duplex arrangement which gave the machine and head the name. This plan makes the head neat and compact; the oil does not get on the trousers; and the nut on the top above the handles is avoided, which latter used to be thought likely to prove unpleasant, or even dangerous, in case of a "header." This makes a very strong and neat head.

The *Stanley* head, in its simple form, is con-

structed as follows: The fork is continued from immediately above the wheel, in the form of a solid cylinder or barrel, for some six inches, tapering from about one inch and a half diameter at the bottom to about one inch and an eighth at the top, where the handle-bar is fixed parallel with the axle. In front it has the general appearance of a socket-head. In the back side of this barrel a slot is cut, and the interior hollowed out, with a concave cone bearing at the bottom, and a hole is drilled through the centre of the upper part. The neck of the perch is flattened out vertically to about one-fourth inch thickness, and from two to three inches deep; and at the extreme end of this is the pivot or spindle of the perch, which has a convex cone centre at the bottom, and a concave cone centre at the top, into which latter the cone centre of a set screw fits, and the whole is adjusted by a nut at the top of the head. This head is rather more liable to breakage, but allows as much deflection of the wheel as the centre-steering does; is very easy to use, and looks very neat. In various slightly-modified forms this has become the favorite and most common head. Some of the variations are the "ball Stanley," which has a one inch and a half ball top, through which the handle-bar passes; the "Humber," which has an oblong top projecting in front, giving the handles a position a little forward of the centre; the "open Stanley," which has the slot extend through the front; the "superb" nutless Stanley, in which the ball at the top is two inches in diameter, and hollow, and has no nut on top, the centres being adjusted very much as in the "Duplex;" the "Keen steering," in which the head is the same outside for about four inches upward, there is a small tube for about two inches, terminating in a ball through which the bar passes, and the perch spindle has its lower bear-

ing on a bridge as in the "centre-steering;" and the "Premier" head, which is a solid forging, and is really a centre-steering head, but resembles the open Stanley somewhat.

The handle-bar is a rod of iron or steel about eighteen inches in length, sometimes made in a solid forging with the head, but more often is separate and inserted either in the top of the head or in lugs projecting from it, parallel with the axle below. It is sometimes made hollow as in the "New Excelsior" and the "Harvard," and this makes it light and rigid; but, if bent or damaged, it is not easily repaired. When separate, it is either fixed or revolving: the latter are made so for operating brakes, and are inclined to wear loose, and do not operate quite so well. In the "Tension," there is a very good arrangement of split nuts on the handle-bar, externally threaded and working between it and the projection from the head in which it revolves, which may be adjusted so that the handle-bar is always quite firm. There is an "adjustable" handle, and an "electric" vibrating handle, and several other modifications; but simplicity is a good quality here as elsewhere.

The handles are secured upon the ends of the handle-bar in several ways, and are made usually either of ebony or of horn; though rosewood, ivory, and other materials are sometimes used. Buffalo-horn is very soft and smooth, and is said not to tend to blister the hands as much as ebony or other woods. In shape they are round, bulbous at the outer ends, and about three and a half to four inches long. They should be quite large in diameter at the ends, say from one and a quarter to two inches in diameter through the bulb; and spherical handles are very comfortable. The reason of large ones being better is, that they afford a better grip, distribute

the jar over more surface in the hand, and allow of more variety of position of the hands on them.

The perch, or backbone, serves to connect the other parts of the machine, and is subject to much strain; and upon its shape depends much of the gracefulness. It is now always constructed of hollow steel or iron, as this secures much greater strength and lightness. The best are of steel, and lie very near the wheel from the head backward, tapering from about one and a quarter or one and a half inches in diameter under the saddle to about three-quarters or seven-eighths inches where the bifurcation begins for the back wheel, and it follows at an even distance from the large wheel for about one-fifth of its circumference, when it proceeds nearly perpendicular to the back fork. The perch is usually round, but is by one or two makers made elliptical in section for greater strength without adding to the weight. It is united to the neck or spindle and the back fork by welding, or brazing, or brazing and riveting.

The spring is of several varieties of attachment before and behind, but is generally a thin curved plate of tempered steel nearly flat where it receives the saddle; it is sometimes made with an added leaf on top of the other and much shorter, held in position by a bolt and nut working in slots near the ends. In a properly made and tempered spring the added leaf is unnecessary. The requisites of a good spring are, that it lie as near the perch as consistent with effectiveness, that it be strong, light, pliant in proportion to the weight of rider, simple, neat, and free from rattle or side-shake.

The bow-front spring has its forward end secured to a projection from the perch in front of the head, from which point it curves forward and upward through a small semicircle, and extends backward above and along the perch to a movable bearing

thereon at the rear, usually in roller form, as described below. In this construction the spring is divided by a large slot for the socket or spindle of the perch, and must therefore be made wider about the head; and this enlargement, as well as the projection in front, makes it less trim and neat in appearance. The bow-front is also inconsistent with a front wheel brake, and is in the way of a head-lantern; it is in use on the heavier and older makes of machines, and, as it has a considerable reach of spring before the saddle as well as behind, it is a very easy spring, and very satisfactory for rough roads.

The *bolted* spring is more used of late, and in one form or other is almost the only kind used with the Stanley head. It does not extend forward beyond the spindle or socket of the perch, but stops just behind it, curves slightly downward, and clasps a hinge-bolt, which, passing horizontally through it and the neck of the perch, holds it firmly in place. This is the most usual form; and as the front end is divided, and part taken out to allow the end to fall down on either side the neck, it is close-cut and neat, and has considerable play and flexibility at the fore end. This is the most usual form; but Keen and a few others place the fore end of the spring immediately on the neck of the perch (the latter being flattened on top), and bolt it rigidly there. This brings the rider nearer the wheel, and therefore allows him to ride a larger one; but it is, of course, not so easy, and is unsuited to rough roads.

As to the methods of attachment for the rear end of the spring, there are four common ones; and this part of the spring is quite important to be looked to, as the *play* or sweep of the spring in action depends largely on its back bearing. A small grooved *roller*, fitted at the end of the spring to move up and down

the perch on a thin steel plate attached expressly for it, and kept thereon by means of a narrow ring or band surrounding the perch underneath, was long the most common contrivance, especially with large bow-front springs. It works easily, but is apt to rattle, and has been superseded in looks and security of adjustment by the *sliding* attachment in one of three or four forms, either of which is very good. The simplest, and a very neat and easy way, is that used on the "Stanley," where the end of the spring is plain and parallel with the perch for a short distance, where it is fitted with a small clamp or loop of metal fixed to the perch, through which it moves freely endwise. In another form, as in the "Tension," the spring is slotted, and rests on a leather washer, through which into the perch a headed screw or bolt is screwed, which holds the spring firmly vertically and laterally, but allows the endwise play as before to the limit of the slot. The *hinged clip* is a very satisfactory form of rear attachment, and is used on the "Columbia" as well as on several of the best foreign makes. The spring is hinged to the centre of a thin steel clip, or circular piece, folded about two-thirds around the perch, fitting closely and sliding upon it. This gives a little easier seat on account of the extra point of play afforded by the hinge. Another form similar to the above is the *dovetailed slide*, in which the end of the spring is hinged to the centre of a small block of steel, the under side of which is fitted to a way on the back of the perch. Either the upper block or "slide" is dovetailed into the way, or the way is raised and dovetailed into the slide. Both are alike in action, and make a very neat, easy, and noiseless attachment.

The easiest spring in use is the *premier universal*. This is secured to the neck of the perch in front,

extends backward in a plain steel bar about a oot, makes one circular coil, and doubles back upon itself at an angle of about twenty-five degrees, reaching forward nearly to the head. To this free upper part the saddle is attached; and owing to the two facts of double vertical play, and impossibility of striking the perch, it is very easy. It takes more space, however, between the wheel and the saddle, and there is a little more bounce around than is pleasant sometimes.

Other varieties are the *backed* spring, which curves upward near the middle to about three inches higher, and then bends back to the perch, thus keeping the saddle from working back, and keeping the rider forward, and making it easier to get up a spurt in racing, but offering difficulty in mounting and dismounting; the *shackled* spring, the *doubled*, the *front-action* spring, the "*invisible*" (Dedicoat's, used on the "Pegasus"), and others, only one of which will need be described here, viz., the *buffer* spring, used on the "Club" and other machines made by the Coventry Machinists' Company, and which is fastened rigidly to the perch at the rear end, is free at the front end, and has a rubber buffer or pad placed between it and the perch, either near its fore end, or about midway and immediately under the saddle-clamp.

The saddle is a small but very important part of the machine, so far as comfort is in view, and is made in a number of forms and varieties. The simplest is an iron plate nearly pear-shaped, and running to a stem in front, spreading out to some six inches in width in the middle to form a seat for the rider, and usually turning up a little behind. This is covered with leather, — usually pig-skin, — and is often padded with hair or other soft material, but very sparingly. It is supported on a long curved

block of wood about two inches wide, half an inch thick in front, and one and a half or two inches thick behind, so as to raise the top of the saddle to nearly a level seat; and this block rests on the spring, and the whole is fastened by means of two short bolts fixed at the upper end in the saddle-plate, one either side the block about midway; and a short bar or clamp, with a hole in each end for these bolts, is put on under the spring, and tightened by thumb-screws or plain nuts working on threads cut in the lower ends of the bolts. Varieties, with advantages and disadvantages, are the *web-seated*, the *Weymouth* (thick-padded), the *air saddle*, or inflated rubber in several forms, the *cane-seat*, and the *ventilated* or *suspension*, as used on the "New Excelsior," "Harvard," and with the "Columbia." This is an excellent one.

For general use a plain, simple, firm, medium-sized, nearly level saddle is the best. It should be well curved out in front, so as not to press the thighs, and should be (at its centre) about six or seven inches back from the head. It is set a trifle closer for racing, and remoter for touring on hilly roads.

The Centaur *movable* saddle is fixed upon two hinged arms one and a half inches long, fixed to an oblong frame with pins and nuts for fastening to the spring as before. These arms are kept forwards flat on the saddle-spring by a smart concealed spring inside, and, when back, are held by a fly-catch of wire for mounting. The rider, when on, can remove this catch, and then, by raising his body a little, let the saddle forward; or, by leaning forward slightly, and pressing back with his thighs, he can throw the saddle back, thus gaining an adjustment of three inches, which I have seen worked very perfectly, and which must be very useful for ascending and descending hills to any great extent.

The step is a metallic bracket for the toe, on the left side of the perch just above the back wheel, to be used in mounting and dismounting. It is sometimes circular in form, and flat, and sometimes annular or ring-formed, sometimes oval or spoon-shaped, and sometimes with a thin, straight edge upwards, serrated or jagged-edged; and, in whichever form, should have a small surface only for the ball of the toe, and such a one that the shoe will not slip on it at all. Here, as elsewhere, sharp points and corners are avoided. A projection of one and a half to two inches from the perch is the average, and the average height from the ground is about twenty-two inches. Some are screwed to the perch; some set into a hole in the latter; some have a curved neck connecting them with the perch, which is welded or brazed or bolted on. Frequently a second step like the first is placed, often on the same, but usually on the right, side of the perch, four or five inches higher up, to be reached more easily in dismounting. This second step is of little use, however. The step should be as high as can be comfortably covered with the ball of the left toe when standing on the ball of the right foot on the ground beside the back wheel, with hands on the handles; though requiring an extra leap or two, perhaps, on account of being so high, it is much easier sliding from it to the saddle, and much easier reaching and taking it with the toe from the saddle.

There are some hinged, cone, and adjustable steps, and Dedicoat's spring-step (as in the "Pegasus"), which it is unnecessary here to describe.

The trouser-guard is a piece of stout wire about fourteen or fifteen inches in length, bent sharply twice near the middle, so that the two sides are parallel and about two inches apart, the two ends of which are fastened to the fork immediately above

the wheel in such way that it lies along and over the wheel from the fork backward under the perch six or seven inches, and acts whenever the wheel is turned to keep the trouser-leg of the rider from contact with the soiled and moving tire.

The foot-rests are not used or needed on racers, and are not always used on other machines; but they are a great convenience when on the road, and for touring are almost a necessity, as they give a securer position with feet off pedals, and conserve the rider's strength by allowing change and rest. They consist, in one form, of two small circular pieces of metal with roughened surface hinged to small brackets which are screwed one on either side the fork just above the sweep of the crank; these are held "up" by bands of rubber when not in use, and are put "down" by the toes when needed. In another and even simpler form, they consist of little toe-pieces fixed to the fork just out of the way of the cranks, projecting half an inch or more, with a serrated or rat-trap edge to hold the soles. This form is always ready; the other affords a little easier rest; and both are good, because they keep the weight back of the fork in going down hill. In using them, care is of course to be taken not to allow the heels to catch in the spokes of the wheel, and cause a fall.

There are several forms of folding, projecting, "safety," and other foot-rests, which, when in use, project in front of the fork more or less, are of complex construction, and are liable to be rattlesome, and tend to carry the weight of the feet and legs beyond the fork when in use, so as to endanger equilibrium too much. The fixed and the folding ones on the fork above described are the best and safest in use, so far as my examination serves me.

The brake is the only remaining part of the

machine proper of which description is to be given, and it is one of the most important. On racers, and generally on a floor or level road, it is not essential; nor do some good riders use it at all, as with skill and care the wheel can be controlled without it: but skill and care are not always present or on the alert; and he is a foolish rider, however skilful, who rides off for ten miles on country roads without a reliable brake.

The object of the brake is to enable the rider to hold control of the speed of the wheel on a down grade, or to "slow up" quicker than he could otherwise; but it is *not* to stop the wheel at once, or to "slow up" the wheel so quickly that the body does not retard with it; for the result, in either such case, must be a "header."

The brakes in use, of which there are many, are either back-wheel, front-wheel, or ground brakes, and the former is the older class: of those in this older class the method of operating is by means of a cord passing along or through the perch, and connecting with the handle-bar, by turning which the cord is tightened, and the brake applied; and the brake itself is of various forms of construction, as the spoon, the roller, the "grip," the "safety," &c., always, however, dependent for its efficiency upon the strength of the cord, and the amount of drag in the rear wheel when held still, for these are the limits of its power. When the rear wheel was large, and the rider's weight was more considerably upon it, this was a good enough class of brakes, with proper attention to the cord. But the machine has developed in the direction of the front wheel, and the rear one is merely an accessory now; and for "the wheel," as we use it, a back-wheel brake is comparatively good for nothing.

The *front-wheel brakes* are of several varieties,

either of which is sufficiently powerful, and needs to be applied with caution and graduated force, while at the same time the rider leans or sits well backward in the saddle.

The *thumb* brake consists of a perpendicular bar pivoted to the head just above the wheel. This is bent at right angles to extend out over the wheel some two or three inches, where it terminates in a spoon or roller working on the tire, and is bent at right angles again to run along in front of the handle-bar until it reaches the handle, where it ends in a thumb-piece. It is operated by pressing the thumb against the thumb-piece, which through the bent lever-bar depresses the spoon or roller upon the tire, and thus retards the wheel. It is in this form rather tiresome to the thumb if used long. This form is improved upon in the *double-thumb* brake, where a bar is put across the perpendicular one at right angles along the handle-bar in both directions, and has a thumb-piece at each handle. This allows the use of both thumbs, and is a very good form.

The *pull* or *finger* brake is like those just described, except that the bar along the handle-bar is pivoted to the latter and to the vertical one; and power is applied by pulling with the fingers, instead of pushing with the thumb. This is somewhat easier of action than the single-thumb brake, and is more effective. A modification of it, called the *reverse action* brake, is the same thing carried out with both handles, so as to be the reverse of a double-thumb brake; but the arm bearing the roller is made shorter, and, instead of the metallic thumb or finger piece, a small horn handle is usually added at each end.

Stassen's *eccentric*, Timberlake's *ratchet*, and Grout's *vertical-lever* brake are three similarly good

brakes, each of them operating, in the way suggested by its name, upon a vertical rod in front of the head bearing at its lower end a roller brake, and is operated by turning the handle-bar. The latter is the best, and has, besides, a better movement in the parallel arms, and a double roller. These rollers, as indeed any should which operate on the front wheel, have a guard or fender over the roller to stop the fling of mud and dust.

There are several other forms of this class, which, as well as the *ground brakes*, depend upon cords, which once snapped are gone for — luck or a smash-up; in short, are a poor dependence, though pretty safe and effective if you were sure of the cord. I must, however, leave the reader desirous of fuller information to other sources, and briefly describe some of the *accessories* of the bicycle, which are of greater or less necessity or convenience in riding and touring.

The wrench, or *spanner*, is made in many forms, and is usually furnished with each machine adapted to its needs. As it is a mere incident to the machine, I shall not describe it at any length. They are generally unadjustable, and, if well fitted to every nut, are just as well. If the form accompanying any machine is not satisfactory, it is easy enough to obtain a suitable one at any tool-store. For carrying in the saddle-bag, a very light and strong screw or "monkey" wrench that will take a one-inch nut, and is about four and a half or five inches long, is very serviceable. A good one of these is Billings's adjustable pocket wrench.

The oil-can generally used is of tin or brass, circular, about one half-inch thick, and about the size of a large watch; it has spring sides, and is provided with a nose which screws into one edge of the can at one end, tight fitted with a leather washer, and is

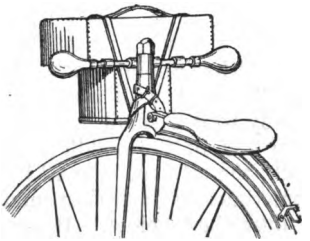
removable for filling the can; the other end of this nose, which is an inch or more long, is small, threaded on the outside, and covered with a neat brass cap which prevents the oil from flowing out when carried either in the pocket or the saddle-bag. It holds enough oil for a hundred miles travel. A larger one of any convenient form is kept at the "stable" for home use and for general oiling, &c.

The *saddle-bag*, or *pouch*, for the needs of the machine only, is of leather (though some are of rubber-cloth), and either cylindrical of about two inches diameter, or oblong; the latter is four and a half or five inches long, about three inches wide, and one inch thick; it is closed by a flap or lap-over, fastened by a spring catch or button like a portemonnaie, and has a loop near each end, through which two small straps with buckles pass for suspending it closely to two small staples in the under side of the rear end of the saddle. It should contain the wrench, the oil-can, a small bunch of cotton waste, and sometimes, if desired, a small padlock and chain, to be described below. It should therefore be light, closed from dust, neat and snug, as well as durable, and is with its contents very desirable, nay, almost indispensable, for road use.

The *Harvard Handle-Bag*, invented by F. W. Weston, B. Bi. C., and made and sold by Cunningham & Co., is the most out of the way of any thing convenient which I have seen or heard of. It is especially well adapted for the "Harvard" or the "Columbia" bicycle; and consists of a cubical lower part, about five inches in dimensions, surmounted with an oblong part about 13 x 5 x 2½ inches, which is strapped to the head and handle-bar in front. It does not interfere with the use of any kind of brake, is sufficiently capacious, waterproof, absolutely out of the way, and is convenient of ac-

cess; and is only intended for carrying a few articles for an over-night excursion.

The *multum in parvo* is a larger saddle-bag, designed for carrying brushes, a change of linen, &c., for the rider's use on a long run. It is of waterproof canvas, about 12 x 6 x 4 inches in dimensions, and is fastened to the saddle as the other, to the spring by a peculiar wooden clamp, and to the perch by a strap at the lower end. It may be obtained of any dealer in bicycles or bicycle-fittings, and will hold more than would seem, is convenient, secure, and, though slightly in the way in mounting, one is soon



HARVARD HANDLE-BAG.

accustomed to clearing it. It has a small pouch similar to the other on the lower end, for the contents mentioned for the saddle-bag. Of course it adds to the load somewhat, and this is an evil: the rider will usually prefer to send a valise ahead by express or otherwise, if on a long run, and take as little with the machine as possible.

Other carrying-devices are Stassen's circular wheel valise, which surrounds the axle within the front wheel; this is out of the way, and easily carried, but is not of satisfactory accessibility. Again, there is the knapsack, which is of course carried by the rider, and is better than the other, but is uncomfortable in

warm weather. A circular handle-bag is also made, to be strapped to the handles in front; but this is in the way of the legs, and of the brake, lantern, &c., as usually made, and adds weight on the wrong side of the head. There are also certain apparatus, or framework luggage-carriers, to be attached over the rear wheel, or over the head of the machine, all more or less objectionable; of these Goy's is the best, consisting of an oblong skeleton-plate fitting on the head of the machine above the handles, secured by a clamp held beneath the set screw of the steering-gear; on the top of this, luggage is strapped.

A small padlock and chain, one foot long, is a very useful device for securing the machine from mischievous or impertinent use in the absence of the owner. The machine is set nearly upright against a wall, or suspended partly by cords reaching to the handles, and the chain is passed round the rims and tires of both wheels, and locked. This is generally security enough against experimental use by others, and is the bicycle *halter*.

The bicycle stand is a triangular cast-iron base, slotted to receive the fore wheel, and with two cords reaching upwards, and looping one over either handle, and tightened by wooden clasps of peculiar simplicity. It is an ingenious and convenient rest for the wheel, keeping it upright without any other support.

Bells are not yet in use in the United States, I believe, but have been abroad; and several varieties specially adapted to the bicycle may be mentioned. These are (1) the spherical, or common sleigh-bell; (2) the American chimes; (3) the "Immaculate" alarum; all continuously sounding bells. Those to be rung at will of the rider are (4) Dedicoat's stop bell, (5) the "*Faire Fuir*," by the same inventor; (6) Stormont's alarum; (7)

Leonardt's alarum, — all more or less complicated and noisy; and (8) gongs of several varieties and modes of attachment. Bells of any kind are a nuisance, and more a source of danger than a preventive; and it is to be hoped they will never be used or required in this country. If they should be, there will be ingenuity enough to adapt and attach them.

Whistles are better, may be of any good kind, and are, of course, carried by and blown at the will of the rider. They are supplied at any hardware store, or by dealers in bicycles or fittings. The one used mostly by the members of the Boston Bicycle Club, is like the New York police whistle, having two tubes about one-half inch in diameter, of German silver, one shorter than the other, connected with a single mouthpiece, and constructed so as to produce a discordant note, of power and singularity enough to attract attention for some distance.

A *horn* or *bugle* is used on club runs and at meets, to give signals for concerted action; the lightest and simplest construction being preferred.

Lamps are desirable for night-riding when it is not moonlight, and outside the domain of street-lamps. When either moon or gas is making the way apparent enough for ordinary pleasure walking or riding, and when the road is familiar to the bicycler, the machine may be cautiously and pleasurably ridden without a lamp. With one, caution is required, and high speed should not be indulged.

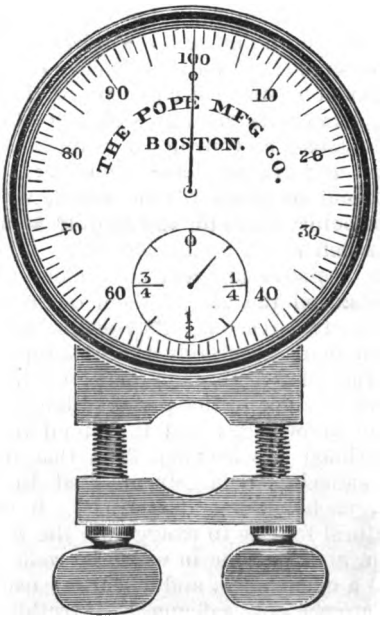
The most usual form of lamp is the Salsbury, which consists of a small, neat oil lantern, with a reflector and a circular plate-glass front, at the back of which is a leather handle, in the form of a quadrangle, having each of its sides enclosed in a casing of thin sheet-metal, and to the back of which is attached a bent metal clamp, which holds it in position

on the head of the bicycle, where it is secured by the set screw or lock-nut on top of the head. The Albion lamp is somewhat similar. Hub lamps are also used, the lamps being similar, but hung by clamps loosely fitting the axle within the front wheel. The head lamp is better, however. The requisites of a good lamp for this use are that they throw a good light directly in front for a considerable distance, be not blown out by the wind or a sudden jar or jerk, be smokeless, out of the way of any necessary movement of the rider or part of the machine, and easily removable; and they should of course be light as possible, and strong and durable, and so constructed and trimmed as to give light for some considerable time without replenishing. The perfectly satisfactory lamp for the bicycle is not yet, I believe, invented.

Distance registers are very convenient and useful attachments, and the use of them ought to be encouraged for two reasons: they enable the rider to learn much more accurately the geographical relations of the places through or between which he passes, and conduce to the preservation and spread of accurate knowledge; and they tend to preserve the brotherhood of wheelmen from that imputation of pale mendacity so largely credited to boatmen, horsemen, yachtsmen, and marines. It is so easy and so natural for one to exaggerate the distance he has ridden, and the time in which he rode it, that a watch and a cyclometer, and a fearless use of them together, are the only safeguards of truthfulness and correct knowledge in the bicycling community.

The best *cyclometer* for road use is that made by the Pope Manufacturing Company, a cut of which is given. It is a dust-proof and water-proof can, with a glass face, to be attached firmly to the axle inside the front wheel by a metallic clamp and nuts, and

revolves with the wheel, while a free weight inside remains downward, and by its resistance moves a train of wheels, indicating miles and fractions on the dial. Of course it requires a special adaptation for each size of wheel. Registering miles, it saves much computation over mere revolution registers.



CYCLOMETER OF POPE MANUFACTURING COMPANY.

"Thompson's Cyclometer" is a similar one, of English make, and registers either miles or revolutions, as chosen for. It costs more here, and is not as good as the other. The same may be said of several other varieties or kinds, such as "Stassen's

Mile Gauge," "Rückert's Mile Recorder," "Johnson's Road Measure," "Stanton's Bicycle Log," the "Telemeter," and others, with the added remark that some of them are too complicated, and some require special adaptations or changes in the machine to operate them. All of these objections are obviated by selecting the very satisfactory and accurate one first named. The weight is trifling, and, being added to the axle, is really inappreciable. It needs only a pencil and memorandum card or leaf, to take off the reading of the dial at starting, and again at stopping; the difference of course being the distance travelled. If each rider would use one, and note at the same time the time, and the quality and direction of the roads, we should soon have accurate and full information of the country roads, which would be invaluable.

V.

MECHANICS OF "THE MACHINE."

"Every finite hath its limitations." — *Axiom.*

I. — Equilibrium.

THERE is the charm of mastery and of motion for the rider, and there is the charm of mystery and surprise for the looker-on.

How does the man ever get to his position on the lofty, slender, and fickle machine? How can he dismount without an awkward tumble? How can he preserve his calm and graceful dominion, perched so high upon a tiny seat, astride a thin network of steel and rubber which rests only upon the narrow support of an inch-wide wheel-rim? These are questions constantly prompted by a curiosity which no explanation but that of experience will satisfy, and to which the expert will oftenest reply that it is all in the knack of it, or is easy as rolling off a log. Such replies are, of course, no answer to the questions; and I have never seen any rational explanation, mechanically speaking, of the points raised.

I shall therefore essay one, which, if it prove not exhaustive or perfectly satisfactory, is at least original and rational as far as it goes. The reader who follows me through this and the remaining part of the present chapter will, I think, be repaid with a better comprehension of the bicycle, and will under-

stand the organic and radical differences between it and the "velocipede" as an instrument of aid to locomotion.

These two propositions may seem paradoxical, but will bear candid consideration: —

1. The average fifty-four-inch bicycle, upright alone, has a base about an inch wide, and thirty-eight inches long; and

2. The same bicycle mounted with its rider, while apparently having the same base, has practically a primary base about twenty-four inches wide, and a secondary base of indefinite width beyond, — the length of base remaining the same.

The truth of these, as of the three following, will appear as I proceed.

3. The base of support of the rider on the bicycle is, or can at any moment, at his will, be made to be, below the centre of gravity of the bicycle; and

4. Since the rider would preserve his own equilibrium if the pedals were fixed, his weight may be taken to be in the point or points where it is applied; and the centre of gravity of the whole (man and machine) is therefore lower than the centre of magnitude; and

5. The line of direction of the centre of gravity of the rider may be placed at any moment on the opposite side of the line of support, from the line of direction of the bicycle, thus making a constant opportunity of compensation; enabling the rider to keep the resultant line of direction coincident, or nearly so, with the line of support. And these five propositions, excepting the first, are not true in respect to the "velocipede," but point to distinctive differences in the machines.

The length of base is, obviously enough, the distance between the points of contact of the two wheels with the ground. The fork has a "rake"

(that is, it inclines from a perpendicular line through the centre of the axle) of about two inches toward the rear wheel, and the position of the rider is from four to seven inches back of this when mounted. In mounting, the weight of the rider is first on the handles and step, both within the perpendiculars through the two points named; and so, under ordinary circumstances, it is obviously easy to keep the line of direction within the length of the base. If a sudden obstruction occurs to the machine when it is in motion, of course the momentum tends to carry the line of direction beyond the base, and a fall is the consequence; so, on a down grade steep enough, there is a tendency to bring that line forward of the front wheel.

The processes of mounting and dismounting by different methods will be explained in a subsequent chapter: they, as well as other feats on the wheel, depend for their success, speaking as to equilibrium, upon keeping the resultant line of direction of the machine and rider (while on it) within the base above referred to.

Where the point or surface of support of a body is below the centre of gravity, the degree of stability of equilibrium depends upon the proportion between the height of the centre of gravity above the base, and the distance from the line of direction to the outer line of the base. When this height is equal to or less than this distance, the body is comparatively stable; when it is greater, the body is comparatively unstable. In such a body, if the base be a moving one, the centre of gravity must also be moving to preserve the equilibrium, and *vice versa*. So a loaded cane may be kept poised on the finger-tip at the bottom with the load upward, the only trick being to move the point of support correspondingly with the movements of the centre of gravity. Thus it will be

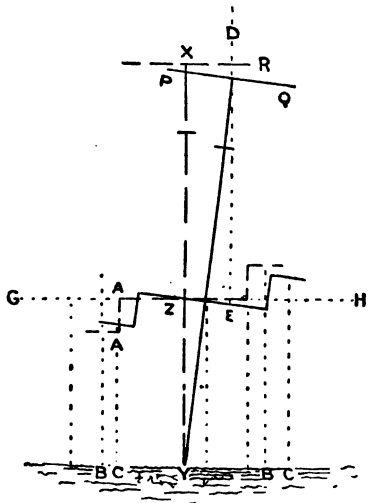
seen that the equilibrium of an unstable body may be maintained when the centre of gravity is in motion one way by moving the point of support the same way, or by moving the centre of gravity the opposite way, or by both, so as to keep the line of direction within the base. This is illustrated in skating; and there the muscles trained by long experience to unconscious action keep the man perpendicular on the narrow base of his skate-runners and the space between them by constantly moving his centre of gravity (by however gentle motions) compensatingly over that base, or that base under it, or both together. And this is exactly the same on the bicycle; the base of the rider being the pedals, the saddle, the handles, the step, the foot-rests, some or all of them at once, and the space between them, — assuming the machine to be without appreciable weight and in a fixed position.

But when the moving of the machine, under the influence of gravity and of propulsion, is taken into the account, the matter becomes more complicated. The rider has then to maintain his own equilibrium on a moving base of support, and to keep that base of support, as another body, in equilibrium also; or, in other words, instead of keeping a simple line of direction of the centre of gravity of his own body within his own base, he has to keep a resultant line of direction of the centre of gravity of himself and of the machine within another secondary and moving base below his own primary one. His movements are to be all with reference both to a centre of gravity and to a base of support below those he is accustomed to. This is of course the necessity of learning the machine; and when experience has accustomed his muscles to this new and more complex order of things, riding becomes as easy and as nearly unconscious as walking, so far as the equilibrium is concerned.

Now, the bicycle upright alone rests upon the width of the flattened tires, or about an inch, for instance. The rider on it may throw the whole or any part of his weight upon either pedal or upon either handle, and thus change the centre of gravity of the two bodies taken together at will; and, assuming the bicycle to be moving in a straight line forward, the line of direction may be kept within the inch-wide base of support by moving this centre of gravity towards a perpendicular through this base whenever there is a tendency to move otherwise. Also, by compensation or resultant, the equilibrium is equally preserved if this line of direction fall alternately on either side this perpendicular, moving one way and the other some little distance evenly across the line like an inverted pendulum.

Take for illustration a fifty-four-inch bicycle, in which the distance between perpendiculars passing through the centre of each pedal is about sixteen inches, and the length of handle-bar is about the same. Now suppose the bicycle and rider to incline to the right from a perpendicular through the tire on the ground, as in the diagram, say until the top of the wheel sways four inches. There is a tendency to fall to the right. The centre of the wheel is one-half as far, or two inches, from the perpendicular, and the centre of the left pedal is now only six inches, instead of eight inches as before, from the same perpendicular. The line of direction of the centre of gravity of machine and rider falls to the right, something less than the four inches, because it is lower than the top of the wheel, but for simplicity assume it to be four inches, and in the line D E; then it falls on the axis line G H, at E. The weight of the rider (or so much as is necessary) is applied to the left pedal at A; the crank, axle, and spokes make a bent lever with a fulcrum at Y or

(what is the same thing) at Z, the weight being at E and the power at A; the long arm of the lever A Z is six inches, and the short arm less than four inches, and it is obvious that the power will cause the lever to tip on its fulcrum, and bring the weight back to or beyond the line X Y. The machine mounted may thus be righted and kept in equilibrium by the feet on the pedals obviously so long as



A Z is greater than Z E. But the change induced by applying the power at A moves the centre of gravity toward the left also, and brings the line of direction D E nearer to the perpendicular X Y, and at the same time lessens the weight at E very considerably (for the weight of rider is about four-fifths of the aggregate weight); and, in fact, so long as the point A remains on the left of X Y any distance

greater than one inch, the power at A will raise the weight at E, and restore the machine to equilibrium. The perpendiculars let fall from A in all its positions within these limits of movement will cover the width of practical base on one side of X Y; and this, taking one-half the possible vibration for the practical and unquestionable width, is four inches each way, or eight inches under each pedal. This measurement leaves a space of four inches on each side X Y uncounted, or eight inches between the other two spaces taken, which should be included. So that by a reasonable calculation from the pedal movement alone, it is shown that the machine mounted has an arc of oscillation consistent with equilibrium, or what is practically a width of base of support, at least equal to 8 inches $\times$ 3 = 24 inches or two feet.

It is now obvious, also, that, by applying a sufficient part of the weight of the rider on the left handle at P, the same result is affected as by pressure at A; and also that it is an equivalent for the former to lift on the right handle at Q, for then the fulcrum is at X, and the weight at R, lessening and moving toward perpendicular and fulcrum at the same time that power is applying, as before; and the arc of oscillation or practical width of base is a little greater than before.

It is by these two systems of leverage, availed of consciously or unconsciously, together or separately, maintaining a compensatory oscillation of the centre of gravity over the points of support, that the equilibrium of the machine and rider is maintained, having regard only to forward motion in a straight line. But the bicycle is usually propelled in curves, and is rarely kept in an absolutely straight line of progression. That requires a very skilful rider. Because, first, when the wheel inclines at all, it of

course tends to travel on an arc of a circle, whose radius is smaller, the greater the incline; and, secondly, there is a tendency to preserve the equilibrium (as much at least as by the other methods) by consciously or unconsciously deflecting the course of the fore-wheel.

BICYCLE AND RIDER.

Suppose, for instance, the machine to incline a little to the rider's left in the cut above, the centre of gravity moves from the perpendicular, and the line of direction is outside to the left of the point of support. Now let the rider pull a little on the left handle, or push a little on the right handle, and the plane of revolution evidently changes accordingly,

and the wheel runs a little to the left, bringing the point of support under the centre of gravity again. This is the case of balancing the cane on the finger-tip. The moving point of support, by moving just as the centre of gravity does, as in turning a corner, or by compensatingly oscillating under it, keeps the line of direction always within the base described by it on the ground, and so aids to preserve the equilibrium of the structure.

The impulse caused by the tipping of the structure to one side or the other is thus merely added to the momentum of the machine, and slightly increases its velocity; while the persistence of the machine in its right plane of motion forward operates when the wheel is deflected as described to "right up" the load, or, in other words, tends to move the centre of gravity over the point of support at the same time that the latter is moving under it; and this doubled effect has to be allowed for carefully, when the rate of speed is high.

The path the wheel describes is thus a curved one; and the rider progressing in graceful curves is really riding more easily, for the double reason that he is changing the tension of muscles from one set to another successively, and is making the machine keep its own equilibrium. The infinite demand on the rider, therefore, in the ever-varying position of the bicycle, and of himself on it, is met and relieved by the infinite variety afforded by these three methods of maintaining equilibrium, and their natural modifications and combinations.

It will be observed that I have thus far made nothing of the "gyroscope" explanation, which is the one oftenest offered as solving the puzzle of "how is it done;" and which was not long since gravely put forth as the scientific explanation of bicyclic equilibrium, by a contributor to "The Scientific American."

The wheel of the gyroscope, when set in rapid motion, persists in its plane of rotation, just as any wheel of considerable mass, and revolving rapidly, does. So to a *very limited extent* does the wheel of the bicycle. If the fore wheel revolved at a speed, say, of three thousand or five thousand turns a minute, its resistance to any deflection of its plane of revolution would perhaps be enough to keep it in equilibrium. This, however, would involve a rate of travel, of about eight to fourteen miles a minute, — a velocity which would take the breath away from even a philosopher.

In fact, the rate of speed of a fifty-four-inch bicycle wheel, in actual use on a level, ranges between one and a hundred and thirty revolutions a minute, and in going down long steep grades with feet up, the speed may sometimes reach two hundred and sixty turns a minute. So that the persistence in its plane of revolution is, in such a spider-web slenderness of wheel, at such a low speed on its axis of rotation, very slight in theory; and practice proves the correctness of theory in this respect, because a very gentle pressure on pedal or handle is enough to cause deflection of the wheel.

II. — Power.

I turn now to a consideration of the amount of power required for propelling the bicycle, and of some of the limits of the use of the machine in this direction.

Is there any practical economy in force expenditure attending the use of this instrument? What advantage has bicycling over walking, for instance, in this respect?

The incredulous and unreflecting often urge that as the rider is obliged to carry along in addition to

his own weight, the forty pounds, more or less, of steel and rubber, and to overcome the friction of the machine, there can be no economy; and that, although greater speed may be attained for a time, it it must be at the expense of a correspondingly greater amount of muscular exhaustion. Some have undertaken off-hand explanations of the matter, but generally with inaccuracy or absurdity.

To the bicycler experience answers these questions so satisfactorily that he does not often worry himself about the *why* or the *how;* and non-bicyclers must accept the testimony of hundreds of the experienced, that there *is* in bicycling great economy of force over that expended in walking or any other known means of progression by human muscular action alone, and that there *is less* exhaustion at the higher speed, as the best practical answers.

Nevertheless I will attempt some suggestions as to the *how* and the *why* and also the *how much;* and, while I cannot in a small space here give an exhaustive analysis, it may be such an approximation as will incite to something better.

Assume, then, the following facts for the purposes of this calculation: viz., —

Height of rider, 5 feet 11 inches.	Diameter of wheel, 54 inches.
Weight of rider, 160 pounds.	Weight of bicycle, 40 pounds.
Length of step (army regulation), 28 inches.	Length of crank, 6 inches.
Height of step (or vertical rise of body), 2 inches.	Surface of bicycle and rider offered to resistance of air = 1½ the surface offered by man walking.
Resistance of air in walking = load of 4 pounds.	
Distance (for each), 1 mile.	Track, smooth level road.
Time, walking, 15 minutes.	Time, bicycling, 5 minutes.

Then take from any good work on mechanics: —

Horse-power = 33,000 foot-pounds a minute.

Resistance of air to moving body increases as square of velocity.

Friction of carriage, or resistance to be overcome moving

a load on modern carriage on good level road = $\frac{1}{30}$ of weight of load and all.

Formula for wheel and crank, W : w :: R : r, or W = $\frac{w R}{r}$.

One mile = 63,360 inches.

Diameter : Circumference :: 1 : 3.141592.

With these data, which are sufficient to indicate the line of inquiry and to enable us to arrive at approximate results, let us proceed to calculate.

The walker takes 63,360 ÷ 28 = 2,262$\frac{2}{7}$ steps, lifting (160 + 4) pounds up two inches 2,262$\frac{2}{7}$ times, = raising one pound 742,217$\frac{1}{7}$ times one inch in fifteen minutes, an expenditure of power = 61,-851$\frac{3}{7}$ foot-pounds, or 1.87+ horse-power in the mile or in the fifteen minutes, which is at a rate of 4123.43 foot-pounds or .125 horse-power a minute.

I have reckoned here simply the lift and air resistance of walking, taking no account of the friction of carriage, effort of keeping balance, or the thrust of the toe in advancing, which is a matter of considerable friction. So in the next calculation I shall omit the power used in mounting and dismounting or in maintaining equilibrium; nor, on the other hand, do I allow any thing for the reduction in friction on the delicately finished and advantageously constructed bicycle with its wheel and a half as compared with an ordinary four-wheeled carriage with plain bearings, &c.

54 inches × 3.141,592 = 169.645,968 inches = circumference of wheel; 63,360 inches ÷ 169.645,-968 = the number of revolutions of the wheel in the mile, which × 2 = the number of foot-propulsions or steps, or 746.9; the force required to pedal for each foot-propulsion is $W = \frac{1}{30} \times 27 \times \frac{160+40+(3^2 \times 6)}{6}$ = 38.1 pounds, through, say, nearly four inches, or

about = 11.86 foot-pounds; hence 11.86 foot-pounds × 746.9 = 8,858.23 foot-pounds = .27 + horse-power in the mile or in the five minutes, or .054 horse-power a minute.

By comparison of results it appears that there is a saving (in bicycling, over walking) of two-thirds of the time in going the same distance, accompanied by a saving of about 85% in force expenditure, while at the same time there is required .071 less horse-power in each of the five minutes than in either of the fifteen. *In other words, as compared with walking, you can bicycle a given distance in one-third of the time and with less than one-sixth of the exertion.*

In order to make a comparison in another way, let us assume even rapidity of foot-movement and even time, instead of even distance and relative time. The rate of walking was taken at four miles an hour, a good rate, and the rate of bicycling at twelve miles an hour, also a good rate, but not so near a racing speed as the other. In the walking there were, as we saw, 2,262½ steps in fifteen minutes; distance one mile; 27⅓ foot-pounds power to the step; whole power expended, 1.87+ horse-power.

Let the bicycler take 2,262½ foot-propulsions in fifteen minutes; each foot-propulsion carries him a semi-circumference, or 84.8229 inches; whole distance, 3.013 miles; 11.86 foot-pounds to the foot-propulsion; whole power expended, .813 horse-power.

Here it is shown that the saving of power is 15.47 foot-pounds on every step, or 1.05 horse-power in the whole time, with a gain of 2.013 miles in distance. *In other words, as compared with walking, you can bicycle three times the distance in the same time and with the same rapidity of movement, with less than half the exertion.*

It will be observed that these computations are for a smooth level road. If there be obstructions, such as small stones, of course they reduce the gain of the bicycle, for it must pass over or around them; while the walker steps over them, and is retarded less thereby.

III.—Wind and Grade.

In going up hill the force required is perhaps greater in proportion with the bicycle, because of the added weight to lift at each step, and the lessened ease of balancing. The walker has then to lift his weight through the perpendicular rise in the road in the distance covered by each step; and the bicycler, according to the law of other carriages, would lift such part of the load as bears the same ratio to the whole load as the perpendicular height of the hill bears to its length, but really does more (except perhaps expert riders) because his progression is caused more by single intermittent impulses and less by continuous momentum than that of other carriages. But on an average road this disadvantage, whatever it be, and also the disadvantage from the fact that a grade too steep to allow of proper position on the wheel for riding must be walked, are more than offset by the fact that on the compensating down grade no exertion is required, and the rider rests and exhilarates while the walker still exerts himself.

We have seen that the power to pedal on level road is about thirty-eight pounds. The rider evidently can direct substantially the whole force of his weight to the pedal, or one hundred and sixty pounds; and, as one can easily lift as much as his weight, by lifting or pulling on the handles, he may double this: so the limit of his power of propulsion is about three hundred and twenty pounds, or say,

on an average, and allowing for inaccuracies, three hundred pounds. While the resistance demands less than this, he can ride, and when the demand is in excess he must stop. This rule is applicable in the cases of riding up hill, and against the wind.

In the former, suppose the grade to be one foot in ten; then 10 : 1 :: 200 : the *lift* additional, which = 20 pounds. 300 — 38 = 262 pounds = the reserve power for up grade, and 20 : 262 :: 1 : limit of grade = 13.1 feet in 10; but the man at about 5 feet in 10 (angle of 45 degrees) loses the power of his weight, and has only his strength, 262 — 160 = 102 pounds; and the approximate proportion is, 20 : 102 :: 1 : limit of grade = 5.1. Five feet in ten, or forty-five degrees, is therefore the practical limit in grade; and this cannot be ridden up long without exhaustion. But few hills are so steep.

As to riding against the wind, — the speed of a mile in five minutes in calm evidently creates an air resistance equal to a wind at rate of $\frac{1}{5}$ mile a minute, or twelve miles an hour. Taking, then, the same data as used on a preceding page, we have the proportion, 54 : 300 :: 12^2 : the square of the limit of velocity of wind, which gives 28.2+ miles an hour; and, as this could not be ridden against long without exhaustion, the practical limit is less. However, as time of a mile in two minutes thirty-six seconds has been made, a rate equivalent to wind at twenty-three miles an hour, the above figure is not far from correct. Speed at twelve miles an hour against wind at sixteen is equivalent to the limit of wind at twenty-eight; and so allowance can easily be made on rates against wind if the latter be known. A favoring wind, or riding with the wind, of course counts the other way; and in practical riding this is a fine item to consider as regards direction.

One other point in the mechanics of the modern bicycle may be noticed here. It is sometimes objected, that the rubber tire by its compressibility forms a constant trig in front of the wheel, and thus makes it run harder than a steel one. On the contrary, it makes the wheel run easier. The rubber being very resilient tends to return, when compressed, with a force equal to its resistance to the pressure, and this would make the after bounce equal to the forward trig; but, as the wheel is moving away from its position at any moment, of course this after bounce is partly lost. There is more than compensation for this slight loss, however, and a positive advantage besides, in the fact that the rubber tire (as well as the elastic suspension-wheel, and the spring under the saddle, in like manner), not only eases the rider's seat, but also eases the draught by taking the jar and jolt arising from the small obstructions of the road, and thus lessening the *lift* or the *height* of the obstructions, so to speak. For example: when the wheel meets a stick or a stone an inch in diameter, if the tire and wheel and saddle were rigid, the whole load, machine and man, must be lifted one inch; whereas, as they are constructed, the tire or other parts or all yield to the obstruction, and the rider is scarcely moved at all, only a part of the weight of the machine being lifted, and not the whole load. Taking together the countless small irregularities, pebbles, &c., in the ordinary road or on the Belgian pavement or the turnpike, this saving is not only considerable, but immense.

And it should be added, in respect to the comparisons between bicycling and walking, that, the power being less in the former, it admits of a more rapid movement of the feet with the same degree of exertion, and hence a much more rapid comparative rate

of speed may be sustained by the same person without exhaustion.

That the movement of the feet through a circle whose radius is six inches may be made more rapidly than through a horizontal distance of twenty-eight inches, and, therefore, that the bicycler can under some circumstances go more than three times as fast as the walker, has been doubted by some; but it is to be answered, that the cranks are usually shortened in racing to four and a half or five inches, making the circle smaller, as matter of fact; but whether this be done, or not, a comparison of the quickest times made in either way, with a calculation of the number of foot-movements necessarily made in each to accomplish the result, will show that the foot-movements *have* been and *are* made faster in bicycling than in walking.

In conclusion, I may say, that these results in favor of the bicycle, though resting in part upon data difficult of exact ascertainment, are not to be regarded as widely overdrawn or strange. The baggageman tips a trunk which he can hardly lift on to a truck, and runs it off with great ease. The bicycler, instead of constantly lifting and carrying himself, tilts himself once on to a truck most perfectly constructed of any vehicular machine made, and rolls it easily along.

Another fact to be borne in mind is, that he drives not so much by muscular effort as by simply changing a part of his weight from one pedal to the other. Less than one-third of his weight on the pedal will propel him on a level road; and he substantially lifts his legs, and lets them fall again alternately, instead of his whole body. Again, it is well understood that continuous exertion of one set of muscles in one way is much more exhausting than severer effort constantly varied; and so it is, that the bicycle,

while it calls into action every muscle and joint by varied turns, —but none of them continuously, — making the rider's hands change workе with his feet, and his shoulders with his loins, and so on throughout, seldom exhausts or tires; but is dismounted after many hours, even, of riding, with a freshness and elasticity which is left by no other exercise yet devised.

VI.

SUGGESTIONS FOR LEARNERS.

If at first you don't succeed,
Try, try again. — *Old Rhyme.*

BEFORE attempting the use or mastery of a new animal, machine, or instrument, it is well to know something of its character, construction, principles, and methods of operation, and behavior under the conditions of use. The reader who has consulted and understood the preceding chapters will have acquired a measure of such knowledge, and will also, I trust, if he be not already a bicycler, have been stimulated in his desire to ride one of these marvellous steeds. Indeed, this is an accomplishment, as before suggested, which no gentleman can afford to be without, even if he do not habitually ride it, either for health, pastime, or convenience. It may be useful and proper, then, especially as many readers may not have access to a riding-school or training-teacher, to add some observations on how to select a bicycle, how to learn and use it, how to take care of it, and what may be done with it.

THE SELECTION

of a bicycle as to its style, and of whose manufacture, must be left to individual taste and judgment or opportunity. There is a wide range of choice.

But, in general, it may be said, that it is always better economy to buy a machine than to hire one; to procure the most perfect, even at a greater present outlay, and to obtain it of or through responsible parties. One can hardly go astray in dealing with any of the houses mentioned in this book, or on any of the machines described. It is in general better to buy a new machine, but that of course depends; and a machine which has the test of use, if not worn too much, and is sound, has a good recommendation in itself; and a second-hand machine, if well set up, true and sound, is just as good for learning on. Never, however, try to learn on a poor machine. It is more difficult, and very discouraging. It takes a good workman to succeed with poor tools: an apprentice should have the best. The recommendation often given, and sometimes printed, to begin with an old-style velocipede or "bone-shaker," is erroneous and foolish. To follow it would be to learn two things instead of one, and to take the more difficult first. It is like telling one to learn to skate by taking lessons in rowing.

The way to learn bicycling is to learn it, and not something else which is quite different; nor is the art so difficult that it requires any circuitous or long preparatory course. It is as easy to learn as dancing, or skating, or swimming, and only requires confidence, determination, and patience, to begin with. An hour's practice a day for three days with a teacher, or for a week or so without a teacher, if he has a general knowledge of how to learn, will be sufficient to enable one to ride in a hall; but more time will be required to learn the common tricks, or to gain complete control and ease in handling the machine. There will be good exercise in it, and the charm of advancement all the while.

But to return to selection. The weight, experience, and kind of use intended by the rider, as well as the qualities of road or track on which it is to be used, will guide the choice somewhat as to weight and size.

A very light, close-saddled machine, as large as can comfortably be ridden, will be preferred for very smooth, level roads, and for racing in hall or on cinder path; but for ordinary everywhere and every-day use, a medium-weight machine, that is, from thirty-five to forty-five pounds, will be the best choice, and for size a little under rather than over the ordinary measurements given.

In adopting size, the best way is, if possible, to find it by trial. The rule will then be, to take one on which the rider can sit erect in the saddle with the ball of each foot on a pedal, so that when the pedal is down at its lowest position the leg will be comfortably straight, and the sole of the foot about level. There should be no straining or inclining, nor much pointing of the toes downward to keep the pedal through its revolution with firmness and ease.

Of course, the diameter of fore wheel will depend somewhat upon the closeness of backbone, spring, and saddle, and the length of crank; the requirement being, that the distance from the top of the saddle-seat to the top of the pedal extended shall be equal to the length of leg inside to the ball of the foot. This distance, less the length of crank and distance of saddle-top from circumference of wheel, will be the semi-diameter of wheel required.

The following table will be found substantially correct, for the machines as most commonly constructed, for those who must procure a machine by rule; the length of leg being taken as before stated.

Length of Leg.	Diameter of Front Wheel.	Length of Leg.	Diameter of Front Wheel.
30 inches.	42 inches.	35 inches.	52 inches.
31 "	44 "	36 "	54 "
32 "	46 "	37 "	56 "
33 "	48 "	38 "	58 "
34 "	50 "	39 "	60 "

Men differ considerably in length of leg in proportion to their height; but for the average man, the following table is in accordance with the same rule as to size of machine required for different men, taken according to their height. I give it rather as a matter of interest than of use, for the other measurement is safer.

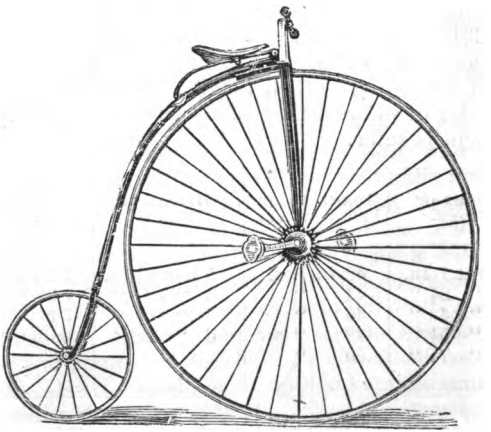
Height of Rider.	Diameter of Front Wheel.	Height of Rider.	Diameter of Front Wheel.
5 feet 1 in.	42 inches.	5 feet 8½ in.	52 inches.
5 " 2½ "	44 "	5 " 10 "	54 "
5 " 4 "	46 "	5 " 11½ "	56 "
5 " 5½ "	48 "	6 " 1 "	60 "
5 " 7 "	50 "		

These are, as nearly as can be laid down, comfortable and practical sizes for ordinary use. It is better to take a size under than a size over for intermediate lengths. For riding in a hall or on very smooth track, it might be taken a size larger; but for ordinary use, it is never advisable to ride a wheel larger than fifty-six inches, whatever the length of leg, as the disproportion between the crank and the radius becomes too great, and the gain in speed does not compensate for the loss in power.

Having judiciously selected a machine, the next thing is

LEARNING

to ride. The first lesson is to watch other riders, if possible, and notice particularly the motions of all the parts of the machine and the movements of the rider, until they become somewhat familiar and understandable by observation. The candidate should then take his machine, and handle it.



DUPLEX BICYCLE.

To lift and carry it, stand on the left side of it with the right hand on the saddle, grasp the fork with the left hand just above the hub of the wheel, place the palm of the right hand on the inside of the perch or backbone near its division for the small wheel, and take hold, and so take it up. In this way it is carried very easily, and there is no trouble with tipping it or pinching the fingers.

To roll it, stand on the left side of it, take the handle with the left hand, and place the right hand on the spring below the saddle or on the perch near the spring, and push with the right hand; then let go the handle, and both propel and guide it with the right hand as before, keeping the wheel upright for a direct line, and inclining it slightly to or from the body as it is desired to change the direction to left or right respectively. Familiarize the arms and hands with its motion. Put one hand on either handle, and walk around with it, first on one side and then on the other.

Now, if with a teacher or a friend who rides, and will assist, let the other hold the machine firmly with the left hand on the head of the machine; then let the learner place his left toe upon the step, and his hands on the handles, raise himself by the left leg, and slide (not spring) into the saddle, and put the feet at the ball (not the instep) on the pedals; the other in the mean time holds with his right hand the spring or perch just back of the saddle, and the end of the handle with his left hand, and will not allow the machine to fall. Having well got the bearings of the seat and pedals, not holding hard on the handles at all, let the other push the machine along, holding it as before as he walks beside it and guides it. In this way the learner will become accustomed to the motions of the machine, and to follow the pedals with his feet, and to guide by the handles, and will continue this until, when on it, he can propel and guide the machine, and preserve his equilibrium. He will soon observe, that, when he feels a tendency to fall to one side, he will not, as in walking, move the foot on the same side, but will press downward with the other, or lift on the handle on the same side, or press down on the other, or gently turn the wheel in the direction

in which he is tending to fall. In this connection, to save repetition, let the reader refer to the chapter on mechanics. If the learner does fall, he will quickly learn to come down on the foot lifted from the pedal on the side to which he falls, and will still hold the handles of his machine up, so as to prevent injury to the machine. All this will be done either on a good large floor, or on a smooth, hard, level piece of road.

The learner has thus learned to ride before he can mount, and the latter will be the more easily learned for it. As the learning to mount and dismount is the same, whether with or without a teacher, I will now resume the supposition of a learner by himself. He will need to exercise all his patience and ingenuity. He would better afford considerable time and expense to attend a riding-school. But others have learned alone, and he can.

His next lesson may be to stand astride the hind wheel, place the toe of his left foot on the step, and, holding the handles in his hands, and leaning forward, propel the machine and himself by stepping or hopping with his right toe on the ground, raising himself up a little on the other toe, and practise this until he can give the wheel some momentum, and let it run, standing on the step, and guiding it with the hands, at the same time keeping the equilibrium by the handles, aided by moving his right leg to right or left, and so remain on it until it stops. If he has a smooth piece of gentle down grade accessible, it will then be well to continue this there. When he has given the wheel a considerable momentum, and can control it with his hands while standing on the step, he should then gently raise himself forward, lifting the right leg, and *slide* (not spring) into the saddle, and place his feet lightly on the pedals. For this purpose it is well to have

the saddle set pretty well back to avoid taking a "header" over the handles. He may have to try this several times before succeeding; but if he falls, and when he stops, he will let the wheel tip to one side, and come down on his foot, as before described. The pedal action is quickly learned, and he will now become a rider before he is aware.

The exercise should at no time be continued to exhaustion or weariness. It is better to leave, and return to it, than to be in the least tired. The rider should sit erect on the saddle, and not move his body from side to side. He should look before him, and not at the wheel. He should not hold the handles too hard, but learn to depend upon his feet; and these he should keep level and straight, and not catch his heels in the spokes, nor let them slide forward till the hollow of the foot is on the pedal.

When riding in a hall, it will be found better at first to ride around to the left, as for physiological reasons turning to the left is easier.

To the experienced or the utterly inexperienced, the foregoing may seem very elementary and even trivial; but it includes the most difficult and the most important part of riding. There are, however, many other things to learn, and some suggestions thereon may be valuable as hints.

Some of these things are obvious, and will be found out by the learner for himself, such as riding with either foot alone, and without either; with either foot on the foot-rest on the side of the fork, and then with both there; with either hand off the handle, and then with both off, and propelling and guiding by the feet alone; with either leg over the handle, and then with both over; standing with either foot on the step, and propelling with the other foot on the pedal; losing and catching the pedals when in rapid motion; treading back on the pedals

to check speed; mounting and dismounting in various ways, some of which will be described; and all of them are worth practising as giving confidence and mastery, and are sometimes of value in emergency. The ability to ride without hands, allowing them to hang down, folding them behind and before, and finally to do any thing else with them, is a very important accomplishment on the road. And so is treading back a necessary resource; for one cannot be dependent on a brake, the immediate use of it often being dangerous or impossible.

Mounting by the step, in the manner already described, is the most usual and practical way; but there are several other methods, of which are the following: still-mounting by the step without hopping, the machine being held still, and the pedals taken very quickly; walking-mount, in which the handles are taken as usual, the rider walks on the left of it till it is started, and then with a little hop takes the step with his left toe, and completes in the usual way; spring-mount, where the rider walks rapidly beside the machine a moment or two, with his hands in position, and then springs to the saddle from the ground; and, what is perhaps the most graceful and the most convenient method, next to the first, is the mount by pedal, when the left pedal is made horizontal, the crank is little below the horizontal, and the rider puts his left foot on the pedal, and springs gently from it and the ground, throwing his right foot over the saddle, and quickly takes his position, and moves off. An easier way to do this is to walk with the machine till it has a little momentum, and then take the pedal as it comes up, and proceed as before. In all these methods, quickness in operating the pedals is the special point, as the equilibrium is lost if the wheel stands still more than a moment without the feet acting on the pedals.

In dismounting, the best method, and the first to be learned, is by the step, and is nearly the reverse of mounting by the step. In learning, the rider should slide back on the saddle as far as convenient; then the left foot should be lifted from the pedal, and the extended toe carried back to the backbone, and then down by the latter till it rests on the step, care being taken not to entangle the toe with the spokes of the wheel: when the toe is on the step, lift the right foot, rest gently on the handles, and spring lightly to the ground on the left side of the machine, still holding the handles. Some machines have a second step on the right side of the perch: the above movements may then be taken for the right side in like manner. The next quicker, and to some an easier method, is by the backbone. Here the rider carries either foot back, and, instead of placing the ball of the toe on the step, rests the top of the toe on the perch, and then, when the opposite pedal is ascending, springs from it and the perch lightly to the ground on the same side as the used pedal. This is a useful method on the road, as it is so quickly done, and may be done when the machine has scarcely any or no momentum; but care is to be taken not to spring when the crank is forward. Another good method is by the pedal: the rider rests his weight on the descending pedal, throws the other foot over the perch, and springs to the ground just as the pedal is at its lowest. This is a graceful and easy method, and may be done on either side very quickly, but must not be tried on an ascending pedal, nor when the rate of speed is very high.

The vault is by taking the neck of the saddle near to the head of the machine, and then quickly vaulting to the ground. A showy but rather foolish method is over the handles. The rider raises the

left leg, for instance, lets go the left handle, and, passing the leg above, replaces his hand, moves the leg over, lets go the right handle, brings the leg to the right side, replaces his hand, and drops to the ground — or sits on the wreck of his machine, according to his skill.

There are some other tricks, such as riding with one foot in the saddle, and the other high in the air, removing the coat and trousers while riding, and riding side-saddle-wise, and other things, which do well enough for exhibitors, who will learn them without a book, and no one else wants to. Riding side-saddle is, however, very graceful and interesting as a trick, and is not very difficult to one expert with the bicycle. It is too hazardous to the wheel for a beginner to try.

The learner having acquired the art of riding his new steed, his affection for and pride in it will prompt him

TO TAKE CARE OF IT.

It is said that a good horseman is known by the care he takes of his horse; and this is in some sense true of a bicycler: a good rider will not use a machine in bad condition.

The first requisite is that the bearings be properly oiled. Every bearing where there is any motion should be kept lubricated, — not much oil at a time, but often. This should be looked to always on commencing, and generally every two hours or so while riding. As to the best oil to use, there are some differences of opinion; but the requisites are, that it should have some body, i.e., be of sufficient consistency to lubricate well; and that it should not be gummy, i.e., liable to thicken, and clog the bearings. Almost any good oil in use for sewing-machines or light machinery may be used; a White's mineral

machine-oil being good, or, as some think, sperm or clear neat's-foot. A mixture of nine parts sperm to one of paraffine is good. No dust or grit should be allowed in the bearings; and hence, with machines used on the road especially, it will be well to take the machine apart occasionally, and clean the bearings with paraffine or benzine, care being taken afterwards to replace all the parts accurately.

The machine should be kept true and well set up. To this end it should be frequently tried by shaking and other inspection; and where wear has occurred, or screws or nuts loosened, the parts should be tightened up. This is especially true of the bearings of the rear wheel, and of the perch in the head as well as the pedals and spokes. The wheel should be kept true by observing the centre of the tire when riding slowly, whether the centre always passes the middle point in the arch of the fork. Any deviation may be corrected by tightening and loosening the spokes accordingly, though this should be done with care.

The tires of a few makes — Grout's "tension," for instance — are vulcanized on to the rims; but most are cemented on, and should be looked after. If the tire starts while on a run, it can be at once confined with a string wound around it and the felloe. If allowed to remain loosened for even a small part, a throw will be the result. If the rider is not near a regular repairer of bicycles, he should keep the cement for the tires on hand, and may use it as follows: First clean the rim and the rubber where it is to be used; then melt the cement in a ladle over a fire or gas-flame, and pour evenly into the rim, put the rubber in place on it, and then heat the rim under it over a gas-flame or with a lamp; press the tire firmly down, secure it with a string, and let it set an hour or two: then the string may be removed, and the paint rubbed with a moist rag.

The brake, if worked by a cord, should be watched, and the cord replaced with a new one at the first sign of wear or breakage. The hub-brakes with spoon-bearing, or roller-brakes worked by the handles upon the front wheel, are best; the former should be held back with rubber rings or bands, and the latter should be kept in a condition not too easily to be applied, as the sudden or unexpected working of a brake may cause a "header."

Cleaning the machine is an important matter, both for looks and for prevention of rust, &c. Painted parts may be kept clean by means of a brush for the mud when dried sufficiently to sweep well, and a cloth or sponge sometimes moistened a little. In addition to the brush and sponge or cloth for this purpose, the bicycler should have a chamois-skin or two, a few pieces of cotton-waste or soft cloth, two or three sheets of emery-cloth of differing fineness, a bottle of oil, and, of course, a wrench or wrenches to fit all nuts.

The bright parts must not be allowed to rust, as, besides the injury to the machine, this entails more labor in cleaning, and makes the parts look bad. The machine should be rubbed down every time it is brought in from a run, or at least very frequently; and, as the use of the above-named articles will be apparent, it only needs, if any thing, the further suggestion that the rubbing should end with a slight going over the bright parts, at least, with oily waste or rag. Several "rust-preventives" are in use, of which "Paravaselin" may be mentioned, as easily applied with a cloth in a thin coat, and one that is very transparent, and will last some time, as it hardens on. It is put up by the Gun-Implement Manufactory, 204 East Twenty-third Street, New York, and sold by gun-dealers, and by the Pope Manufacturing Company, 87 Summer Street, Bos-

ton. There are several English "rust-preventives," considerably used there, and which may be procured through bicycle-dealers; and also certain "bluing" preparations, "bronzing," &c. And machines may be silver or nickel plated, which is more expensive of course, but is better; especially nickel-plating, which is easily kept bright, and makes a machine look attractive. For the smooth parts, such as perch, hubs, handles, head, fork, and cranks, it is without any drawback. On the spokes, or where there are many joints, it is apt to crack, let the rust under, and peel.

Stabling, or the place in which the bicycle is kept when not in use, will vary according to the facilities of the owner; but it should be in a dry, cool, and clean place, and safe from accidents. The machine should be kept in an upright position, to avoid straining, working-out of the oil, &c. It may rest against a wall, slightly inclining; or, better, may be suspended by the handles so as just to rest on the floor, and be firmly upright, by attaching cords to hooks or beams overhead, and letting them hang to the right length, looped for the handles, or terminating with a rubber ring, which will be easily moved on or off, and will not be quite so rigid. A bicycle-stand is a good thing to use where this cannot be done. This is described in a preceding chapter.

As to any substantial repairs, they had better be confided to a competent machinist, and should be attended to as soon as their need is discovered; and the bicycler should remember the old tale, "For want of a nail, the shoe was lost," &c., till the horse was lost, and the rider was lost too.

MEM. — Never borrow or lend a bicycle.

VII.

RIDING AND RACING.

Love the art, whatever it may be, which thou hast chosen.
— *Antoninus.*

THE beginner who has learned on a floor will find the road to feel quite differently under him. While in the hall, it required less than the weight of a leg on the pedal to drive him: now, on a level it will require a pressure to pedal, as we have seen, of about thirty-eight pounds; and, whilst he there sat lazily on his saddle, he will here stand with greater or less part of his weight at the cranks. The inequalities of surface and obstacles thereon will tend to deflect his fore wheel, and will also make him conscious of a tremor and sometimes jarring of the machine, and more movement in the spring. Moreover he has had no experience of going up or down grade, either of which will give him a new sensation; and the former especially, until experience and adaptation have taught him the indescribable *how*, will try his muscle if not his temper. The mud, the rut, the wind, the passer-by, the small boy, the hollow, the pavement, and the car-track, — a thousand things will persuade him that a man is not a rider of the restless rubber-hoofed steed until he has circled with it up and down the common highways. When he can do this, an ennobling sense of assurance,

of independence, conquest, enjoyment, will be his ample reward.

This art, as, indeed, any complex art, cannot be written fully in a book. It is to be found out by each for himself. It is not very difficult, for it is step by step; and he who is courageous enough and patient enough to acquire the mounting of a bicycle will find every thing easy after that.

In riding against the wind, the difficulty to be overcome, and hence the force required, will increase as the square of the velocity of the wind; and in riding up hill the increase of the same will be as the grade, i.e., as the perpendicular height in proportion to its length. And in meeting this difficulty or added load, in either case, the rider will sit forward on the saddle, and lean his body forward; and, if the demand be great enough, he will no longer drive by his weight alone, but will lift or pull on the handles at the same time that he presses or pushes with his feet.

He will also learn to operate the crank through a greater arc by a graduated push-press-pull action of the foot, resembling the action of the hand on a hand-crank. As to the limits of wind and grade, see the chapter on "Mechanics," where it is shown that a grade of five feet in ten, or a wind of twenty-eight miles an hour, cannot be ridden against long at any speed. They should not be attempted, or any thing approaching them, by the tyro on the road.

Nor should more than two or three miles at a time be ridden at the very first. Every thing by degrees. Although, after a half-dozen rides on the road, a spin of ten miles would be moderate, and after a little more practice twenty, thirty, or fifty miles would be a morning or evening pastime, it is better not to get either exhausted or discouraged at first.

Frequent dismounts should be made, as a few minutes' change and rest and a remount enable the rider to continue with greater ease and pleasure. Great speed should be equally avoided. Any new exercise is laborious at first; and, before any considerable effort is made in it, there needs the bracing-up of lung and muscle by gradually increased practice.

The tyro should select the smoothest and levelest road available for his early attempts, and should avoid crowded thoroughfares until he is master of his own conveyance, and has learned to calculate the actions of others from his moving standpoint. He will find good natural roads (hard loam or gravel), asphalt, or concrete, macadamized, ungraded country, gravelly, turnpike, Belgian (or granite) paved, cobble-stone, and sandy roads and streets, to be good, indifferent, and bad, in about the order named. Almost any ordinary hill can be taken after a while; and for longer rides a moderately hilly road is not harder, because of the relief and variety of down grade interspersed. Care must be taken in descending hills not to acquire too great momentum. Unless the hill can be seen to the bottom to be smooth and unobstructed, the bicycle should always be held under perfect control either by brake or back-pedalling or both; for most of the accidents that occur, and the greatest danger possible, are from neglect of this precaution.

Treading back, or back-pedalling, can only be learned to any extent on the road, and should there be at once and thoroughly acquired. It consists in reversing the action of the feet as taken in propelling; that is, instead of lifting the foot on the ascending pedal, the rider presses on it, and resists with either one or both feet alternately the upward throw of the crank with a part or all of his weight.

He should sit well back in the saddle to avoid being raised and thrown over the handles; and with a little practice he will be able so to graduate and control the speed of his machine by this means, that he will have very infrequent use for his brake.

The efficacy of this art, as well as of the use of the brake, depend upon gradual and prompt use in the beginning, and should not be neglected until a great velocity is attained, in any expectation that they can be suddenly used to stop the machine safely; for the rider will not then usually stop with it.

It is a good rule, never to "show off" on the road, and not to attempt a race with every horse that comes along.

The laws and courtesies of the road should be carefully observed. Some of these are pointed out in a subsequent chapter. Gentlemanly dignity and consideration for others never stand in better stead than in bicycling.

The rider will find it most convenient and necessary to carry a small saddle-bag on his machine, in riding on the road; in which he will need to carry a small oiler (always filled before starting), a wrench, a small lock and chain, and a little cotton-waste to keep the others from rattling, and to clean his fingers, or any oil that exudes from the bearings where it will be likely to soil his dress.

He will often be paid for always carrying also two or three rubber rings, to replace those on foot-rests or brake, if need be, and also some string — a yard or two of stout twine is good — to wind his tire in case it should get started, or for any other use.

A cyclometer (see p. 71) is also almost as necessary as a watch, and especially on untried roads, or random or long rides, is a very useful index to the rider, and a means (in connection with pencil and paper or cards) of much useful information and

suggestion to others. When exploring, a small county-map which may be folded small, and which shows the roads, is very useful, and often saves inquiries and unnecessary detours.

This is all that is necessary for an outfit, except in touring; and then it is better to send additional supplies, changes of apparel, &c., ahead by express or by rail.

The costume will soon become a matter of concern in riding, aside from any club demands in that direction; and a few suggestions thereon may not be out of place here. The requisite qualities of costume are simplicity and unobtrusiveness, lightness, freedom for muscular action, and that it shall be *out of the way* of the bicycle, and not show dust, or other soiling quickly. Grays, drabs, and browns are therefore best for colors. A cap is better than a hat, though in midsummer a brim or a visor is a comfortable protection of the eyes from the sun; for general riding a round or oblong cap, or a hook-down visor cap, or a Glengarry, or a "Technology" cap are either of them good. The coat should be short enough not to sit down on it, or for the tails to reach the wheel; a jacket, or blouse, or sack-coat, or short frock walking-coat will do, the former being best. The ordinary form of pantaloons get soiled at the bottom with dust, or oil from the bearings, and are apt to catch the foot-rests or crank-bosses, besides looking badly for their flapping: if worn, they should be tied or buttoned over. I have found a small button on the bottom in front, and a neat buttonhole stitched on around nearly to the back part of the bottom inside, which may be brought together on mounting, and unbuttoned on leaving the wheel, a good contrivance where one doesn't wish to change. But short breeches or knickerbockers, and long stockings, are the neatest and most comforta-

ble leg-apparel, with little choice between them. Knickerbockers are a little looser about the knee, and less likely to pull up off from the stockings, while the elastic in them holds the latter up like garters. Either low shoes or congress gaiters, with moderately thick sole, are best for the feet. These should be sewed bottoms. Gloves should also be worn to protect the hands. Corduroy for spring and fall, and flannel for summer, are very satisfactory and economical for riding-suits, and may be procured or dyed of any color. The color, as well as the cut and other points of choice in apparel, will be taken most frequently according to club belongings; and, outside of that, experience and observation will be good teachers.

It should be borne in mind that the smile of the supercilious is not a thing to be afraid of. If a man chooses to wear a cap and knickerbockers through the streets, that he may be "dressed according to his work," he will not mind the gaze of the very proper and provincial nobodies who make remarks either in the papers or elsewhere. The idea that a man of dignity and decorum can wear no dress in public but a frock-coat and high silk hat is fast fading out of our Americans; and the time will soon come when any sensible or useful and comfortable costume can be worn by a gentleman here with as little notice as it attracts abroad.

One should not ride much on either a full or an empty stomach. If one starts before breakfast, as will often be the case, a little bread and butter, or a roll and a cup of coffee, or a glass of milk, should be taken. Spirits of any kind should not be taken before or during a ride, as a very little alcohol takes the edge off the muscle, and unsteadies the nerve. The best beverage on a run is a glass of milk at a time, with an egg beaten into it, or a spoonful of

rum. Lager-beer, one glass at a stop, is admissible. Little water when one is warm, is a good rule. Tea and toast is a favorite refreshment with many. Light meals of nourishing but easily digestible food are to be taken; and too much care cannot be observed in respect to all the laws of health by the rider, especially when touring or taking long runs. Of course one should not, when in perspiration, sit on stone, or remain in an air-draught, even for the refreshment of cooling off. The bath in tepid water and a good rubbing-down, after a run, is a luxury and a prophylactic which every rider of experience will appreciate.

All these remarks apply with even more pertinency to touring, or long riding day after day. Then care should be taken never to *over*-ride. Plans will be laid for thirty to seventy miles a day perhaps, and the course carefully marked out, with stopping-places appointed if not engaged, beforehand; but one should not, in order to carry out plans, overtax his strength, and turn a pleasure into a toilsome effort. In making these plans, care should be taken not to map out too long stretches for any day's accomplishment. The writer has ridden fifty miles through the hilly country of Massachusetts after two o'clock P.M.; others have ridden from seventy to one hundred and eight miles in single days in the same State; and in England one thousand miles in six days has been done. But distances like these are for good riders, after considerable previous training on the road, and should not be proposed for pleasure-touring.

Companionship is stimulus and doubled enjoyment, especially on a long ride, and should be well chosen.

In summer, morning and evening runs, with rest or other diversion through the middle and heat of the day, and early and undissipated rest at night,

are to be arranged for. In taking long rides, it is well to remember that the average of grade is easier from the interior toward the coast, and down river basins rather than up them; also, to take advantage of prevailing wind.

On a tour, the machine should be well taken care of, — indeed, very much as a horse would under similar circumstances: and the laws and courtesies of the road should be even more punctiliously observed, because the rider is likely to be "a stranger in a strange land," and will fare less tenderly, in case any thing does happen, than if among his neighbors; and this especially in villages and cities, as he does not know all the ordinances, and only his good sense and courtesy may save him from being a law-breaker.

I shall close this chapter, which is not intended for an exhaustive source of instruction, but rather as containing some of the most needed suggestions, with some remarks on racing for amateurs.

Professional racers will have their special sources of information and their special training; but the amateur may be glad of some hints, even from a source like this. The racing bicycle should generally be specially chosen, for a light, close-cut, well-fitted, and unencumbered machine; and enough will be found on this in the previous chapter on "Construction and Parts." The costume should be lighter than for riding or touring, and free from every thing superfluous.

Training is important for any race, and consists essentially in practice on the wheel, and regulation of diet and other habits of living. For the first part, daily riding on the track to be raced upon, or one as like it as is available, is of course the main thing; care being taken not to ride too fast or too long, but always to keep within the limits of strength,

and control of wheel, with a reserve for a "spurt," or for the last part of the course. Speed can be gradually increased by the rider to a surprising extent, without fatigue, by care and repeated practice.

As to the second part, the habits should be regular and temperate to a nicety in every detail. Luxuries must be omitted. Food and drink should be chosen for muscle and good nerve, and not for fat or stimulus; for scant sufficiency, and not to surfeiting. A list of foods and drinks would be useless, for the racer must be guided by his own experience and needs largely; but simple meats, cereals, and vegetables, simply cooked, should be taken, with few condiments; and pork, fatty or sodden dishes, pastry, sausages, wines and beers, and the like, should be avoided. Much sleep and little exhaustive labor of any kind are to be taken, and especially don't get worried or excited.

The amateur generally does better in a road-race; for the non-professional bicycler shuns a hall, and takes to the roads as a bird to the tree-tops, and there he has his practice.

So different are the two kinds of use of the machine, racing and riding, that a good rider on the road is seldom a good racer; and he who is the pride of his comrades on the club-run or the long-distance tour will disappoint them usually on the cinder-track or the short and level race-course.

Racers are either professional or amateur, as has been intimated; and the inexperienced racer should bear this fact in mind, as well as the distinctions that are made to determine which one is, or he may unawares lose his birthright as an amateur.

Amateur prizes are medals, silver or gold plate, articles of *vertu*, or any thing which simply and only affords the winner a suitable memento of the contest, which he may keep as a trophy. These are

consistent with the real difference in objects of the professional and amateur racer: that of the former being gain and self-aggrandizement; of the latter, love of the sport and a generous emulation in its development.

Fuller discussion of the definition of "professional" and "amateur," and other details in regard to racing, courses, times, &c., are given in another chapter.

A few long rides, not mentioned on other pages, may be noted here.

Sept. 2, 1876, Messrs. E. Coston and F. Smythe, of Lynn, England, rode 204 miles in twenty-two hours, including all stops, on a road 25½ miles in length.

June 24, 1877, G. T. Clough of the Pickwick Bicycle Club rode 200 miles, on the hilly road from Stratford to Norwich and return, in twenty-three hours, including all stops.

In June, 1877, R. Newman made a tour of 858 miles, from London to Edinburgh and back, in eleven days.

In 1875 M. Laumaillé of Paris rode from Paris to Vienna in twelve days.

In 1878 Mr. Britten of London rode from Hyde Park Corner to Bath, and return, in a day, — twenty-three hours, fifty-five minutes.

In the same year Frank White rode over English roads 152 miles without dismounting.

The longer tours of Messrs. Pollock and Roe, 1,528 miles, and of MM. the Baron de Graffenried and Laumaillé, 2,500 miles, performed last year, are given in Foreign Summary.

No such feats have been performed in America as yet; but, as indicating the beginnings already made, the following may be given.

In November, 1877, Mr. A. D. Chandler (now of the B. Bi. C. and S. Bi. C.) rode from Leominster to Boston, forty miles, in four hours. He has frequently ridden from fifty to seventy-five miles in a day for pleasure.

In May, 1878, Messrs. R. Sharp and J. Storer (S. Bi. C.) rode from Boston to Newport, R.I., seventy-two miles, in thirteen hours, including stops; running time, ten and a half hours.

In the same month Messrs. Pratt and Hodges (B. Bi. C.) took a run through the country from West Boylston to Roxbury, Mass., fifty miles, in an afternoon; running time, six and a half hours.

In October, 1878, Messrs. E. W. Pope and F. S. Jaquith (M. Bi. C.) made a spin of seventy-seven miles through the towns near Boston in eleven hours, including stops.

In November, 1878, Mr. W. H. Pearce (W. Bi. C.) of Worcester rode from that city to Boston in four hours and thirty minutes, a distance of forty-six miles.

And during last year several other long rides were made over various routes, in time varying from seven to twelve miles an hour, according to conditions of road and wind, and experience in riding.

It is a mistake, however, excepting when, for special reasons, the making of quick time is the sole object of the rider, to ride as if a high rate of speed were necessary, or a low rate discreditable. Riding is, or should be, either for practical conveyance or for intelligent recreation; and in either case it is error to make of it hard work or discomfort. The bicycler who rides to any degree of exhaustion, except in a race, is unsuccessful and foolish. An average of eight miles an hour on fair roads, and for any time above two hours, is a good pace for excursions, for club-runs, or for touring; and in

laying out plans for the latter it is wiser to calculate accomplishments at seven miles an hour on unknown roads, and count the rest as optional, either for more distance, or better observation, or greater enjoyment.

VIII.

LAWS AND COURTESIES OF THE ROAD.

Pas de droit sans devoir,
Pas de devoir sans droit. — *Lieber.*

Every person has an equal right to travel on the highways, either on foot or with his own conveyance, team, or vehicle. This right is older than our constitutions and statutes; and for the exercise of it the highways exist like an arterial system, often added to, sometimes changed, but one system since our collective existence began, and furnishing the channels of a vital circulation.

The right to *travel* to market, to mill, to church, to public meetings, to visit relatives, — that is, to pass over the public roads for purposes of necessity or charity, — is undisputed. The highest courts have also held it to be lawful in like manner to use the streets for reasonable exercise; and indirectly the decisions of the courts sustain the law of common consent and usage in permitting the use of the highways for any social or public convenience, pleasure, or recreation, so long as these are confined to *travelling*, with a reasonable latitude in the use of the term.

But no one has a right to appropriate the road or any part of it peculiarly to his use; no one has, for instance, any right to erect a building in the highway,

or to stack or store his property in it, or to change the surface of it to suit his purpose to the detriment of others, or to leave his vehicle in the road longer than by reasonable effort he can move it off; and so generally one must use the public road only to pass over it, and leave it for others to pass over, making it a means of getting from one place to another, and transacting all other business than travelling (in its broad sense) somewhère else.

In getting from place to place, however, one may use a donkey, an ox-team, or a stallion, a tandem, or an eight-in-hand; and any kind of carriage for himself or his goods, from the wheelbarrow or the tip-cart to the barrel-rack, the barge, or the landau. Every kind of team is there equally entitled to respect, whether it be fast or slow, large or small, graceful or awkward, silent or noisy, new or old; and each may be used according to its necessary qualities, purposes, and limitations. The drivers of horses have no peculiar or exclusive rights in the roads as against travellers by any other mode.

New modes of conveyance may be taken upon the highways, and used with equal right and privilege with old ones, provided they be not so inconsistent with other and more usual modes as practically to exclude the latter or to put them in unreasonable peril. It has been held that steam-railroads were not lawfully on a public thoroughfare; not because steam might not be used there to propel, or cars could not be run there as carriages, but because the laying of rails therein was an unlawful appropriation to private use of an easement belonging to the public, — the steam-cars did not simply pass along the highway, and leave it as before to the use of others.

The supreme rule of the road is, Thou shalt use it so as to interfere as little as possible with the equal

right of every other person to use it at the same time; and thou shalt be reasonably careful that no one suffer injury thereon by act or neglect of thine.

It is, in one way or another, to aid the expression and the enforcement of this broad rule, that most of the statutes and ordinances regulating travel on the streets and roads are passed and upheld.

It is statute regulation, for instance, everywhere in the United States, that, when two persons approach and pass each other from opposite directions, each shall turn out to his right; and, with respect to teams or carriages, each shall be driven to the right of the middle line of the travelled part of the road. This is the general rule, and good for all ordinary occasions, but it is not absolute. If a man on horseback meet a carriage with considerable load travelling on his right of the middle line, and it be smoother on that side, he should turn to his left, and respect the greater burden; and so often of carriages where one is more heavily loaded or less easily diverted from its line of advance. So a walker must turn out entirely for a carriage, and a hand-cart for an ox-team; but the latter must leave the former room enough on one side to go by. And so, if one driver see another coming, in a narrow road or where there is a ditch or rough margin, making it difficult to turn out, and he can by stopping beforehand make a good turnout for both, he must wait accordingly. These are illustrations of the fact that the above statute, as well as other laws of the road, are all to be interpreted and acted upon as a prudent and intelligent man would act under any arising circumstances, and as subservient to the supreme rule of the road before stated.

I write thus in general under this head, because the bicycle has not yet been brought specifically before our courts; and, in its use, we must be

guided by general principles. It has been decided to be "a vehicle" or "carriage" by the department of justice at Washington, as, indeed, it would be decided anywhere;[1] and, being a vehicle, it brings its rider and itself under the laws and ordinances regulating the use of vehicles upon the highways, and prohibiting its use in other places. Towns and cities generally have the right by their charters or by statute to *regulate* travel on the streets and roads within their boundaries. The right to regulate, of course, carries no right to prohibit, but implies the contrary; and no town or city, nor any board of its officials, can lawfully prevent the use of the bicycle on the public highways with like freedom as other carriages are used. Indeed, nothing short of a State statute can drive the rider or his wheel from the street, except by discontinuing the street; and even such statute would be unconstitutional and void if it should discriminate unequally against any part of the public.

But regulations of travel, so long as they are within legal limits, and under the supreme rule above stated, are to be scrupulously obeyed. Of course they cannot all, or for everywhere, be stated in this small book; but the bicycler must take pains to ascertain them, and always ride everywhere as if all the regulations he ever heard of were in force, unless he knows the contrary. As examples of the class of regulations spoken of, the substance of some of the ordinances of the city of Boston may be cited, as follows: "The passage of carriages or vehicles over or on the Public Garden, the Common, or any of the parks and squares of the city, is prohibited, except by special license." The same ordinances

[1] Since this chapter was written, the English courts have, in one or two decisions in bicycle cases, held substantially as I have stated the law above. As this chapter is for popular, and not for professional use, I have omitted all specific citations.

prohibit the passage of any wagon, &c., or "other carriage of burden or pleasure," except children's hand-carriages containing children only, on any foot-path or sidewalk in the city; they also prohibit the riding or driving of any vehicle in the streets of the city so near to others in the same line that the distance between any two vehicles shall be less than ten feet; and they ordain that no person shall drive, or allow to be driven or propelled, "any vehicle around, against, or foul of any person." These are all wholesome regulations, and offenders against them are subject to express penalties of twenty dollars or so for each offence.

As to riding on foot-paths and sidewalks, it may be said that bicyclers, like travellers generally, have not only a right to travel in the highway, but they have a right to a passage along the highway, notwithstanding obstructions; and, if the middle of the road be impassable for their carriage, the side may be taken; and if the whole roadway, including foot-paths, be impassable, they even have a right to turn out upon the abutting close, and pass over private land around the obstruction, provided they can do so without committing irreparable or very incommensurate damage. So that if, in suburban streets or country roads, the carriage-track is in so bad a condition as to be difficult or impossible of passage by a bicycle, and the foot-path can be taken without imminent risk to foot-passers at the time, it is justifiable for the bicycler to take it.[1]

When one passes by another going the same way, he is required to turn out to his left, and pass by on the left of the one passed; and the latter is bound to offer a fair chance to go by, unless he be travel-

[1] I am informed that the town of Brookline allows by ordinance the riding of bicycles on the sidewalk, so it be done without inconvenience to foot-passers. This courteous recognition of bicyclers' interests ought to be acknowledged.

ling as fast as the law allows; and even then, on request, if possible, he must let the other pass, for he may be going for a physician or on a public errand, or for other reason have a right to travel faster.

The rate of speed is another thing usually limited by ordinance; and in Boston, for instance, within certain central city limits, no one may ride or drive faster than seven miles an hour, and within certain wider urban limits one may ride or drive at a rate of twelve miles an hour. There are also restraints imposed, as to the rapidity with which a corner may be turned, or a street-crossing be passed over.

It is the duty of the bicycler, therefore, to ascertain the laws of the roads on which he rides, and, remembering that he is on a carriage, to observe them accordingly. It is his duty also, to remember and to apply, according to his best and ever-alert judgment, the highest rule of the road; viz., to use it so as to interfere as little as possible with the equal right of every other person to use it at the same time, and with reasonable care that no one suffer injury by his act or neglect.

Damages resulting from negligent or wrongful acts on the highway are to be recovered by and against the bicycler, of course, in like manner as by and against other travellers; the remedies and the rules of law and of evidence being applicable, substantially, alike to all. No such cases have yet been carried through the courts, and it is to be hoped that none will be. When they arise they will be submitted to counsel, and this book has nothing to do with them.

One other legal aspect may be mentioned here, however; and that is, that others are bound to observe the laws toward bicyclers, and bicyclers have a right to insist that they shall. This looks too simple; but it would seem that a little public education

is needed on this part of the subject. The bicycler having, as we have seen, a good right to travel on the highway, any person who negligently causes him injury is liable civilly to respond in damages; and any one who wantonly or maliciously or mischievously injures him, or his machine, is a trespasser, and liable both criminally and civilly.

Numerous cases of this kind have arisen in England; and those who have assaulted or dangerously interfered with bicyclers have been summarily punished by fine or imprisonment. Here, however, scarcely a serious case of the kind has happened: when it does it will be well to bring the offender speedily to justice, and have an example made.

As to this point of riding without molestation, much of course depends upon the tact of the rider. When the machine first made its appearance about, there was a tendency among the *gamins* and young roughs, as well as with children and dogs, to cut certain pranks, such as standing in the way, running and trying to catch, throwing sticks and stones; and a friend of mine who rode a veteran of fifty-six inches used to carry a long cowhide under his coat, with which he dealt summary punishment upon the boys and dogs who came within reach. But, as the novelty wears off, most mischief of that kind subsides; and a little vigorous English is all that I have found necessary in order to teach the wayside jokers respect.

Upon all hands the bicycler must take care; and he will need to supplement the observance of legal rights and duties with the gentler obligations of courtesy. It seldom costs much to be courteous, and sometimes it saves a fortune. Not only "a soft answer turneth away wrath," but a considerate word or act very often prevents wrath.

Especially in the infancy of our favorite sport,

when we are on trial for general public favor, should every bicycler be punctiliously courteous to every one.

It is a courtesy of the road to turn out more than the law requires, to dismount rather than force out a loaded team, to avoid riding at and through a herd of live animals driven on the road; also to speak or sound a whistle when approaching a street-crossing, or passing by walkers from behind, and sometimes when approaching a carriage to give the driver seasonable notice of approach. It is polite to use more care when meeting or passing ladies; and if several be riding bicycles together, and meet a lady on horseback, if the horse or the lady appears at all disturbed, it is courteous for one to dismount, and lead the horse by. Indeed, a thousand courtesies of the road will suggest themselves to the careful rider, and will be obeyed.

The greatest demand on one's courtesy, however, comes from skittish or untrained horses and skittish or stupid drivers. With these drivers one must get along as best he can, remembering that it is easier and better to keep out of a fuss than to get out of one, and that a gentleman will be courteous, even to the idiotic and the profane.

But horses have rights and feelings which the good bicycler will always respect. There is no need of frightening or having any trouble with them, unless their drivers make it. They are intelligent, and soon comprehend the new vehicle: once they have smelled it, and looked it over, they will never shy at it again; and it often repays a rider to take some pains and a trifle of time to educate a young or spirited and timid horse occasionally in this way.

A bicycler should not ride by a horse (unless known, or in a city, or attached to a heavy load) from behind without speaking, and should give him

as wide berth as convenient, and should not close in immediately in front of him. The voice is the great

THE VEHICLE OF TO-DAY.

calmer: where a bell or a whistle might startle or alarm, a word or two will quiet and re-assure. So, in approaching a horse and carriage from an oppo-

site direction, a word from the bicycler will usually save all misunderstanding.

The horse is a very expressive animal; and by observing him as one approaches, particularly his ears and nose and the poise of his head, one can tell at once whether it is necessary to speak, or to ride slowly to one side, or to dismount.

Of course it is pure courtesy to dismount, unless one fears a turn-about which will throw him; but it is better when needful to do so. The rule is, never frighten a horse at all. There is no need of it, — "well, hardly ever." The writer's experience is that city and suburban horses seldom take any special notice of a bicycle, perhaps one in a hundred being a little nervous the first time or two of seeing it; while of country horses, not so much accustomed to variety in vehicles, one or two in a hundred will need dismounting for. I have passed thousands of horses during a year's experience on the road, alone, in company, and with clubs, and have never seen a runaway caused by a bicycle, or an accident to any other carriage. There is no doubt that nine-tenths of all the nervousness of horses and the accidents once in a while heard of, charged to bicyclers, is due to the negligence and stupidity of their drivers. A very good suggestion has been made, that the raised arm and hand should be understood by bicyclers as a signal from drivers to use caution, and, when repeated, to dismount. Any such signal mutually understood will, no doubt, be cordially obeyed by all.

Another instance of times when courtesy stands one in good stead is when, on dropping from the pig-skin in a strange village, the crowd gathers about you with its many curious questions and remarks, and where you or your delicate steed might fare ill "on the ground you have no friends." The courteous will find he has friends everywhere; and a well-

disposed crowd is the best protection for man and machine.

It pays to be courteous to the policeman, and eke to the intoxicated traveller on the same road, but not too familiar with either. This part of the subject has been pursued far enough, however, to be suggestive; and, when all summed up, it only amounts to this, that a bicycler should be, on the road as everywhere else, a gentleman.

As of interest in connection with this chapter, I give here the road rules adapted and put forth by the Bicycle Union (see Foreign Summary), last summer as

RECOMMENDATIONS IN REGARD TO ROAD-RIDING.

1. It is desirable that a rider should at all times keep to the left-hand [1] side of the road, even if no vehicle be in sight; and riding on the footway should never be resorted to. The rules of the road should be strictly adhered to: i.e., in meeting any vehicle or rider, always keep to the left; in overtaking any thing which is going in the same direction as the rider, pass on the right; but, on meeting or passing a led horse, take that side of the road on which the man is who is leading the animal.

2. Under no circumstances should a rider pass on the wrong side of a vehicle; as, in the event of an accident, he thereby renders himself liable for damages.

3. Before overtaking any passenger on the road, a signal should be given, and whilst at a sufficient distance to allow such passenger time to look round before the rider passes.

4. On no account pass between two riders when overtaking them: riders, upon hearing a signal from any man wishing to pass, should take close order to the left, and, if the road be narrow, take order in single file.

5. On forming single from double file, the right-hand man should fall to the rear of his companion.

6. In turning a corner the rider should moderate his pace, and should give a signal, unless he can see a sufficient

[1] The law in the United States requires, as before stated, a traveller on meeting another to turn out to the right, and on passing another to turn to the left, so that the terms in this rule (1.) should be taken as reversed for this country.

distance ahead to be assured that no vehicle is near, and that no foot-passenger is crossing or about to cross.

7. In turning a corner to the right [see note], care should be taken to leave sufficient room for any vehicle to pass on its own side, as some drivers are particularly fond of swinging round a corner at a fast pace.

8. Foot-passengers on the road should not be needlessly shouted at, but should be courteously warned, and be given a wide berth, especially at crossings.

9. Care should be taken by the bicyclist not to startle any horse by passing at a high rate of speed; and, upon meeting one which shows signs of restiveness, a dismount should invariably be made, if requested by the driver, and in as quiet a manner as possible: it is, however, frequently desirable to ride slowly by, speaking to the horse, as a sudden dismount might frighten the animal.

10. The ground in front of a horse should not be taken until the bicyclist is at least ten yards ahead.

11. In company riding, (*a*) The leader, on passing any one, should announce that others are following. (*b*) The leader should, at all times, give sufficient notice to allow those in the rear to slacken speed, before easing up himself. (*c*) When descending a hill, the machine should be kept thoroughly under control, and riders should not rush past those preceding them, with feet off the pedals.

12. For night riding, a lamp should be used to signify to other passengers the whereabouts of the bicyclist; and in frequented thoroughfares warning should be given by bell, or in some noticeable manner, of his otherwise noiseless approach.

The first and second of the above rules should be taken with the qualifications indicated in a previous portion of this chapter; otherwise these rules are important enough to be learned and heeded by every rider.

IX.

ROADS

Willst du immer weiter schweifen?
Sieh', das Gute liegt so nah!
Lerne nur das Glück ergreifen,
Denn das Glück ist immer da.—*Goethe.*

Do not smile at the caption, indulgent reader; for I intend neither a treatise on road-making, nor a catalogue of the roads of America, though of the latter one might wish we had a beginning. In the older countries there are itineraries giving direction, distance, surface, and other interesting facts about the principal highways; and in England especially, where bicycling is also of some years, the roads from London to Edinburgh, to Liverpool, to Land's End, and a thousand shorter roads all over and through that country, are fully described and mapped and indexed for the use of bicyclers.

It goes without saying that we have nothing of the kind here, and we have scarcely any materials yet for a road-book. A little pains on the part of bicyclers, however, to take off cyclometer readings more frequently, and to note down the roads over which they ride, — to keep a log-book, in short, and to send some extracts from it to "The American Bicycling Journal," or to the author of this book, — would soon result in a valuable road-book. The use of maps in connection with this exercise, and

the closer observation induced by noting the turns, stopping-places, views, distances, quality and kind of road-surface, and other items of interest, would conduce very much to the value of the diversion and to the enjoyment of others, as well as afford means of reviewing particular rides at any time afterwards.

In noting roads it is better to mention the make and composition of the road, than to say it is "good" or "rather poor," &c.; for it is permanent characteristics one wants to know, and not those merely temporary states induced by rain, drought, repairing, &c. These states can usually be calculated for by the almanac and general observation; though it is true that no almanac warns of the New-England habit of "mending," or "working on," the country roads some time between the first of May and the middle of June; a process which consists of ploughing up the sides of the road, scraping the sods, gravel, loam, and all into the middle or travelled part, and leaving them to be trodden down by passing teams. Sometimes this process is applied, with little interruption, for several miles; and then it becomes a serious matter for the touring bicycler, who will do well to bear this annual fact in mind. The winter always, in our northern country, takes out two months or so of the year by its snow and mud; but, whenever one would take carriage-driving or horseback-riding for pleasure, the bicycle is available.

Of my personal observation I can say that most of the roads in the New-England States, and especially about the principal cities and villages, and also the streets about Philadelphia, Wilmington, Washington, St. Louis, Cleveland, Buffalo, Albany, New York, Brooklyn, Newark, and their suburbs, are well suited for bicycling travel; and I am informed that Denver, Detroit, Chicago, Toronto, Sacramen-

to, San Francisco, and many other cities, with their surrounding towns, offer good running for the birotate chariot. Indeed, although there are degrees of choice in roads everywhere, there is no place where the one-horse buggy is driven at ten miles an hour that the bicycle cannot be ridden with pleasure and success; and it promises not to be very long before nearly every highway and byway where our modern civilization reaches will be frequented by the rubber hoof.

As a beginning of a road-book such as is suggested above, I subjoin a list of routes, with such data as I have at hand concerning them. All of these have been ridden with the bicycle; some of them by myself, and others by those who have reported them for the papers from which I have condensed and revised them. Of the latter several were contributed to the press by the accomplished president of the Suffolk Bicycle Club. Although I have requested several riders of long distances to give me some contributions for a chapter like this, the only one who has responded is Mr. George R. Agassiz, of Cambridge, the genial member of the Boston Bicycle Club, whose name appears with so much credit in the chapter on races. Corrections, and especially additions, to this list are asked for, to appear in a subsequent edition of this work or a separate hand-book of routes, as the demand may require.

As before suggested, this is but a part of even the reported roads at hand, selected for interest or as better described, or as best routes for beginners (who are in majority now); and it is to be regretted that necessity compels here the almost utter lack of routes outside Massachusetts, — a necessity which will not long exist.

A good way to enjoy longer routes is to take

the cars to some desirable point, and then mount. Some of the routes here given, extending mainly in one direction, are well so taken.

ROUTE I. — BOSTON TO MILTON AND QUINCY.

From the Common, by Boylston and Dartmouth Streets, mostly macadam, and Columbus Avenue, asphalt (1.25 m.), Chester Park (to the left), macadam (.6 m.), Albany Street, &c. (cobble-stone for short distance), Swett Street, macadam (1.2 m.), then Dorchester Street (to right and on to Washington Street), macadam and gravel (2.75 m.), Washington Street (to left), down Codman Hill with care, good gravel roads (2 m.), to Milton Lower Mills; thence across the Neponset and up Milton Hill (pretty stiff, and ridable only by the experienced) and along Milton Avenue, good gravel roads (2.75 m.), to East Milton, and thence by main road, smooth gravel (2.25 m.), to Quincy ("Robertson House"); making in all a run of 11.8 miles, over varied and very good roads, and through fine scenery. The views from Mount Bowdoin and Milton Hills are charming.

ROUTE II. — BOSTON TO MATTAPAN AND RETURN.

Common to Chester Park as in Route I. (1.25 m.); to left through Chester Park, macadam (.5 m.), to right, Harrison Avenue, macadam (.6 m.), Warren Street (moderate hill), Walnut Avenue, macadam, Townsend (to the left), Quincy and (to the right) Columbia Streets, gravel and hard loam (2.8 m.), Washington Street (to left), gravel (2.6 m.), into Milton Lower Mills; thence (to right) along River Street, smooth gravel and loam, but one considerable hill (1.4 m.), to Mattapan;

thence (to right) by Blue Hill Avenue, turnpike, rather rough (.6 m.), Walk Hill Street (to left), gravel and loam (2 m.), to Forest Hills station (Boston & Providence Railroad); thence by South, Eliot (to left), Pond (to right, and along Jamaica Pond), and Centre Streets (3.3 m.) to Eliot Square, Roxbury; thence by Roxbury, Linden Park, Cabot, macadam, Tremont, small granite pavement, and Northampton Streets (.8 m.), Columbus Avenue, West Chester Park, Commonwealth Avenue, Arlington and Boylston Streets (2 m.), to beginning.

This is a very pleasurable round spin of about 17.85 miles, all within the city limits of Boston, and includes good variety of road and scenery, and may be indefinitely varied by taking a different street at almost any corner without risk of much bad riding.

ROUTE III. — BOSTON TO SQUANTUM POINT.

Boston to Milton Lower Mills by Route either I. or II. (7.80 or 7.75 m.); thence to the left along Adams Street, Codman (to the right) and Minot Streets, hard gravel roadways (1.75 m.), then to the right over the Neponset (wooden bridge), to the left along Atlantic Street, gravel (.13 m.), Squantum Street, old road (1.87 m.), to "Old Squantum House." A hill near the end, and some rough and rutty roads except in dry weather, repaid by fine harbor view. Whole distance, about 12 miles.

ROUTE IV. — BOSTON TO DEDHAM AND HYDE PARK, AND RETURN.

Common to Warren Street (2.35 m.) as in Route II.; thence by Warren Street (left) and Walnut Avenue (right), Forest Hills (left) and Morton

Streets (right), macadam and gravel, winding, varied grade and fine running (3 m.), to Forest Hills station (Boston & Providence Railroad), cross the railway, and up a pretty stiff but short hill, to the left by the Bussey Farm on Spring Street, keeping to left, under railroad, very short distance on turnpike (to right), and then to right across railway again over moderate hill, and keep Spring Street till it runs into Centre Street, through West Roxbury nearly direct to Dedham village; nearly all hard smooth gravel and fine running (7 m.). Thence by direct street to east under railroad, gravel road, varied easy grade (2.75 m.), into Hyde Park village, where take (after crossing bridge) Hyde Park Avenue (to left), gravel, mostly level or down grade (5 m.), to Morton Street, and choice of routes to Boston, say as in Route II. (at end), (6.1 m.), or by shorter ways obvious enough. A very enjoyable spin at any time, and roads remarkably good. Distance, about 26.2 miles at longest.

ROUTE V. — BOSTON TO CANTON AND RETURN.

Boylston, Dartmouth, Huntington Avenue, Chester Park (to left), Harrison Avenue, Warren Street, Walnut Avenue, Forest Hills, and Morton Streets (5.35 m.), about as in Route IV.; but turn to left of Forest Hills station along Washington Street, turnpike, a short distance, and then bear to left along Hyde Park Avenue, gravel (5 m.), to Hyde Park village; thence by gravel (hard and smooth) roads (per guide-boards), (2 m.) to Readville; thence to left across bridge by good main road, then to right, up long but moderate grade to Brush Hill turnpike on side of Milton Hills (1.9 m.); soon leave turnpike to right along a winding gravel road partly through woods (look out for one considerable

descent with loose gravel at bottom, sure spill at high speed), pretty direct (3.9 m.) to "Bartlett's" large and hospitable place, and then by like road, but keeping next left and afterwards to right (2.7 m.), to Canton Village (depot); thence by main road (fairly level) *viâ* West Dedham (11 m.) to Dedham village, and thence as in first half of Route IV., reversed (12.35 m.); *or*, thence by Spring and Centre Streets, fine gravel road (3.5 m.), to West Roxbury village; thence to left by Lagrange and Hammond Streets, fair gravel, undulating (3.75 m.), to Boylston Street (near Holyrood Cemetery); thence to right along Boylston Street (past old Brookline Reservoir), turnpike (2.5 m.), Western Avenue, fair gravel (1.7 m.), to forks of road, thence by Beacon Street (Milldam), rather rough semi-turnpike and bumpy macadam (.75 m.), to Arlington Street. Whole distance, 40.55 miles; and by taking cars either to or from Canton is divided into two good afternoon spins of about 20 miles each.

ROUTE VI. — BOSTON TO CHESTNUT-HILL RESERVOIR AND RETURN.

From City Hall by Beacon Street, macadam (hill by Common requires a little care), to Charles Street (.5 m.), continue on Beacon Street, over milldam, little wooden pavement, rest macadam and turnpike (rough, hard road, especially after rain), directly to entrance arch of reservoir (4.63 m.), round reservoirs (2.25 m.), to corner of Brighton and Beacon Streets, thence by Beacon Street (5 m.) to City Hall. The road-bed around the reservoirs is of the best accessible; and, in spite of the hard riding part of the way to reach it, this is a favorite run, and affords good starting-point for various routes. Whole distance, 12.38 miles.

ROUTE VII. — BOSTON TO CHESTNUT HILL AND BROOKLINE, AND RETURN.

From Common by Commonwealth Avenue, Exeter (to right), and Beacon Streets (to left), macadam, turnpike, and gravel (4.9 m.), to entrance arch of reservoir, around lower basin of reservoir, and up Beacon to Hammond Street, fine road-bed (1.38 m.), southerly by Hammond, across Boylston and Heath Streets), gravel (1.9 m.), Newton Street (to left) in Brookline, gravel (1.5 m.), then by Clyde, Warren, and Heath Streets (1.37 m.), Boylston Street (.85 m.), Cypress (to left), School, and Harvard Streets (1 m.), Beacon Street (2.75 m.), to Common. Total, 15.65 miles.

ROUTE VIII. — BOSTON ROUND NEWTON AND RETURN.

From Charles Street to forks of road by Beacon Street (1.25 m.), Brighton Avenue (to right), turnpike road, and Cambridge Street (3.25 m.), to Brighton, thence to Newton, either over or round the hill (1.75 m.), thence through Newtonville (2.5 m.) to West Newton, thence by Washington Street (1.5 m.) to Beacon Street, where "great signboards" are, thence to left through Newton Centre, by Beacon Street (9.5 m.), direct to Common. Roads and streets in the Newtons very good. Total, 19.75 miles.

ROUTE IX. — BOSTON TO NEWTON HIGHLANDS AND RETURN.

From Common to "great signboards," as in Route VIII. (10.25 m.), thence by Beacon and Woodward Streets to Newton Highlands, and direct to Brookline by Boylston Street ("Worcester

Turnpike") (7.5 m.), a "fine run: skilled riders may take every hill; the great hill at Thompsonville is mounted by making the circuit of Jackson Street;" thence by Brookline Avenue and Beacon Street (3 m.) to Common. Round distance, 20.75 miles.

ROUTE X. — BOSTON TO NEWTON HIGHLANDS AND RETURN.

From Common to "great signboards," as in Route VIII. (10.25 m.); thence by Beacon and Woodward Streets to Newton Highlands, thence by Winchester Street to old cemetery on right, then to left by Dedham Street, fine run (4 m.), to Oak Hill; thence by Brookline and Newton Streets, fine run (2.5 m.), to Clyde Street in Brookline; thence by Clyde, Warren, Heath, and Boylston Streets, through Brookline, and to Common by choice of roads (6 m.). Total, 22.75 miles.

ROUTE XI. — BOSTON TO CAMBRIDGE, ARLINGTON, BELMONT, AND RETURN.

From Common to forks of road by Beacon Street (1.25 m.), by Brighton Avenue (to right), heavy turnpike (.75 m.), to Cottage Farm Bridge, to Harvard Street, over Mile Ground (1 m.), by Harvard, Franklin, North Harvard, and Brighton Streets direct (1.87 m.), to Harvard Square, Cambridge; thence by North Avenue to North Cambridge, Porter's Station (1 m.), and by North Avenue on to Arlington (2.75 m.); thence by Pleasant Street (1.75 m.) to Belmont; thence by Forest Street (1 m.) to North Street, Waverly; thence by Lexington Street to Main Street, and so on (1.75 m.) to Watertown; thence (.75 m.) to Newton station; thence either over or round the hill (1.75 m.) to

Brighton; thence by Mile Ground and Beacon Street (4.5 m.), to Common. Total, 20.87 miles.

ROUTE XII. — BOSTON TO LEXINGTON AND WALTHAM, AND RETURN.

From Common to Arlington (9.25 m.), as in Route XI.; thence by main road (4.75 m.) to Lexington Monument; thence by Waltham Street, fine run (5 m.), to Waltham; thence by Moody and River Streets (2 m.) to West Newton; thence through Newtonville (2.5 m.) to Newton; thence through Brighton (6.25 m.) to Common. Whole distance, 29.75 miles.

ROUTE XIII. — BOSTON TO LYNN AND SWAMPSCOTT, AND MARBLEHEAD.

From Scollay Square through Court and Hanover Streets, small granite pavement (1 m.), to Chelsea Ferry; by ferry-boat (1.5 m.) to Chelsea; by Winnisimmet and Broadway Streets, small granite (about .75 m.), and on by turnpike road to a road branching to left at angle of 135° and about 2.5 m. from the ferry (thus far the road is rather rough and bumpy, but nearly level, and is merely ridable: from this point to end of route it is very fine running, and most of it charming for views); thence by the gravel road to left by East Malden, through East Saugus, and by Lynn Common (9.82 m.) to Lynn (Eastern Railroad) station; passing on, leaving front of station on left, up broad street, bear to left along car-tracks to brow of slight hill leading down to right, and follow main travelled road through Swampscott (fine sea views), direct to Marblehead (7.75 m.), taking right-hand street, short distance beyond railroad-crossing, for Marble-

head Neck ("Samoset House"), or keeping on into old town. (This route may be improved and lengthened by taking course through Cambridge and Malden to Lynn, instead of through Chelsea and East Saugus. See Route XIV.) Whole distance as given above, 23.32 miles.

ROUTE XIV. — CAMBRIDGE TO MALDEN, LYNN, AND NAHANT.

From Harvard Square, down Kirkland and Washington Streets, through Somerville (road poor in Somerville), to Charlestown; over Malden Bridge to Malden, taking the turn to left at the crossing; thence by Salem Street through East Malden (road level and very good), to Sweetser's Corner; just before entering East Saugus, take a sharp turn to right, arriving at Lynn turnpike, cross the bridge, and take the first turn to right, into Lynn. The road thence to Nahant is unmistakable and very good. Whole distance, about 17.5 miles.

ROUTE XV. — CAMBRIDGE TO SALEM AND BEVERLY FARMS.

To Lynn as in Route XIV., thence by Essex Street and the southern roads (avoid taking direct turnpike, as it is hilly and rather sandy), to Salem; thence over Beverly Bridge to Beverly, and thence by direct road to Beverly Farms. Whole distance, about 25 miles.

ROUTE XVI. — CAMBRIDGE TO STONEHAM, AND RETURN *viâ* MEDFORD.

To Malden as in Route XIV., to left after crossing car-track, and up the road to flagstaff, and then

to right (scenery very fine), direct to Spot Pond; thence to Stoneham. Return by Main Street to Medford, straight on to trotting-track; here turn to right, and on till you reach and follow horse-car track, down a few streets; then to left, and descend North Avenue to Harvard Square. Distance, about 20 miles.

ROUTE XVII. — CAMBRIDGE TO MELROSE AND WAKEFIELD, AND RETURN *viâ* READING.

To Malden as in Route XIV. (or *viâ* Medford), and thence by direct road through Melrose and Greenwood (the road from Greenwood to Stoneham is also good), to Wakefield; thence, keeping South Reading Pond on the left, by Haverhill and Salem Streets to Reading; thence by Main Street through Stoneham, as in Route XVI. Distance, about 30 miles.

ROUTE XVIII. — CAMBRIDGE TO READING, *via* WEST MEDFORD, WINCHESTER, AND WOBURN.

Up North Avenue, take first turn to right, follow horse-car track to railroad-crossing, and straight on, turning to left at top of the hill; just before reaching Arlington, take right-hand fork of the road, and go by Medford Street to West Medford; thence by the direct road to Winchester, and on to Woburn; thence by Middle, West, Willow, and Lowell Streets, to Reading; thence return as in Routes XVII. and XVI., *viâ* Stoneham. Distance, about 35 miles.

ROUTE XIX. — CAMBRIDGE TO CANTON, *viâ* MATTAPAN.

From Harvard Square by North Harvard and South Harvard Streets to Beacon Street, up Beacon

Street, take first turn to left, and at end of street turn again to left, at the church turn down to right, and go direct to Jamaica Pond; thence, keeping pond on the left, to Jamaica Plain, and by South and Walk Hill Streets, and Blue Hill Avenue, to Mattapan; thence by Brush Hill turnpike (some hills) and Washington Street to Canton. Distance, about 19 miles.

ROUTE XX. — CAMBRIDGE TO MATTAPAN AND MILTON, AND RETURN.

Harvard Square to Mattapan, as in Route XIX., thence by Blue Hill Avenue to Washington Street, and on to East Milton; thence to Milton Lower Mills, and by Forest Hill, Madison, Morton, and Ellicutt Streets, to Walnut Street; thence to right through Walnut Avenue, Warren down to Dudley Street, and to left; then to right and left around church, Roxbury Street, Shawmut Avenue, Vernon Street, Tremont Street (to left), Station Street, and to right to Longwood Avenue, by the latter to South Harvard, and so on to Harvard Square. Distance, about 24 miles.

ROUTE XXI. — CONCORD TO BOSTON, *viâ* WALTHAM.

From Concord station by direct road (1.5 m.), to Walden Pond; thence by poor road, keeping to right at fork .75 m. from pond (1 m.), to Fitchburg Railroad bridge; thence by better road, keeping to left, passing the Grange, a fine old country-seat (2 m.), to Fitchburg Railroad crossing; thence over good road (5 m.), to Waltham Village; thence by Watertown, Market Street, Mile Ground, and Beacon Street (9 m.), to Common. Total, 18.5 miles.

ROUTE XXII. — SOUTH FRAMINGHAM TO BOSTON, *viâ* NATICK, WELLESLEY, GRANTVILLE, AND NEWTON.

From station (Boston & Albany Railroad) at South Framingham, by direct road, nearly level (3.5 m.), to Natick; thence by same road (3 m.) to Wellesley; thence by same road (1.5 m.) to Grantville; thence by direct road (about half-mile from Grantville, take right-hand road for fine view) to Newton Lower Falls, which is entered by a long descent to be taken with caution, and on to West Newton (3.5 m.); thence Newtonville and Newton to Brighton (4 m.); and thence by Mile Ground and Beacon Street (4.5 m.), to Common. From West Newton the route may be varied, as in Routes VIII., IX., and X. With little exception the road is good, and the country interesting, throughout this route. Distance as above, 20 miles.

ROUTE XXIII. — MILTON, BRAINTREE, BROCKTON, CAMPELLO, TO TAUNTON.

At East Milton (good hotel at "Pratt's"), just across railroad-crossing turn to right, toward West Quincy station; near stone-quarry turn into Cemetery Street (road for 2 m. firm clayey loam, very smooth); leaving West Quincy, instead of keeping direct over hill to Braintree, pass schoolhouse on right, and bear to left through shaded road, then straight on by narrow good road, crossing Old Colony Railroad tracks at Quincy Adams station; take first turn to right, and after half-mile straight on come to foot of Paine's Hill (a steep grade), at top of which turn sharp to right, and (after riding half-mile look back for fine view of Quincy) turn to left into Cedar Street (good road), to Braintree, by a short steep descent, and sharp turn at foot (look out); here turn to right, across railroad into Wash-

ington Street, to South Braintree; arriving at square, keep straight on, encountering one hill, to Holbrook (about 7 miles); then over fine road by Huntington Heights, through Brockton, on to Campello; and then straight on to West Bridgewater (about 10 miles); thence on to Bridgewater and a short detour by State Normal School; course thus far mainly south, but now tends nearly west on turnpike, by Scotland and Raynham, through Taunton, to the "Green" (City Hotel, good stopping-place). Whole distance from Boston, about 40 miles.

ROUTE XXIV. — CHESTNUT HILL, MASS., TO PROVIDENCE, R.I.

From reservoir through Newton, West Roxbury, Dedham, Norwood, Walpole, Foxborough, Mansfield, Attleborough, Seekonk, and Pawtucket, by main roads, to Providence. A good run. Distance, about 44 miles.

ROUTE XXV. — SPRINGFIELD, MASS., TO WORCESTER.

By direct main road from Springfield eastward (5.87 m.), *viâ* Indian Orchard and (3.87 m.) Wilbraham, to (5.37 m.) Palmer, sandy and poor roads all the way; thence (5.37 m.) to West Brimfield, (3.7 m.) to West Warren, (2.5 m.) to West Brookfield, fair road and picturesque scenery, grade easier ridden the other way; thence (3.25 m.) to Brookfield, (3.5 m.) to East Brookfield, (3.25 m.) to Spencer Centre (5.25 m.) to Leicester Centre, (6.63 m.) to Worcester, passable roads, some good, others hilly. Distance, 48.55 miles.

ROUTE XXVI. — WORCESTER TO WEST BOYLSTON, STERLING, CLINTON, AND LANCASTER.

From City Hall through Main Street, directly

north, by the cemetery, by fairly level gravel main road (8.5 m.), to West Boylston (hotel); thence by good gravel road (2 m.), through Oakdale, and straight on (1.75 m.); then to right, undulating gravel road (2.75 m.) to Sterling Centre (hotel); thence, bearing to right, by burying-ground, same road (4.5 m.), to Clinton village; thence to left, by good gravel road (1.5 m.), through South Lancaster, fine roads (1.25 m.), to Lancaster Centre. Delightful country. Total, 20.5 miles.

ROUTE XXVII. — WORCESTER TO SOUTH FRAMINGHAM AND BOSTON.

From Union Depot, south-east by main road to New-England Village (5.75 m.), and on to left by pond (3 m.) to Grafton; *or*, turning to left about half-way to New-England Village, cross railroad, and keep by pond on left and railroad on right, turning near Grafton to right and across railroad again; from Grafton on by main road, on (rather hilly) through Westborough (5 m.), and through Woodville, to Hopkinton Centre (6 m.); thence by main road pretty direct (4 m.) to Ashland Centre; thence direct (2 m.) to South Framingham. About 26 miles, by roads taken, from Worcester, and scarcely average riding. From here to Boston Common (20 m.), as in Route XXII. Whole distance, about 46 miles.

ROUTE XXVIII. — FITCHBURG TO BOSTON *viâ* STOW.

From Fitchburg station, by main road direct, fine run, road descends (4.5 m.) to Leominster village; thence, over Ballard Hill (walk up, and ride cautiously down), fine road (6 m.), to North Lancaster; thence by direct road (one hill to walk, then fine run) (4 m.) to Bolton; thence by direct road (6 m.)

to Stow (hotel here; better order dinner by letter day before); thence by main road, signboards directing (leave Maynard village quarter of mile on left), through North Sudbury, roads mostly fair at good seasons (8 m.), to Sudbury-river Bridge; thence by main road through part of Lincoln and Weston, crossing Fitchburg Railroad, whence fine run (8 m.) to Waltham Village; thence by Watertown, Market Street (passing south of the Arsenal), Mile-Ground, and Beacon Street (9 m.) to Common. Whole distance, 45.5 miles.

ROUTE XXIX. — FITCHBURG TO MARLBOROUGH, SOUTH FRAMINGHAM, AND BOSTON.

From Fitchburg station to North Lancaster (hotel), as in Route XXVIII. (10.29 m.); thence to Bolton (post-office) (4.44 m.); thence to Hudson (Mansion House) (4.21 m.); thence to Marlborough (hay-scales) (3.6 m.); thence to Southborough (St. Mark's Church) (3.06 m.); thence to Framingham (hotel) (5.48 m.), thence to South Framingham station (1.58 m.). Total to South Framingham, 32.66 miles. Main roads taken, and fair riding. From here to Boston, as in Route XXII., 20 miles. Whole distance, 52.66 miles.

ROUTE XXX. — SALEM TO GLOUCESTER.

Salem (2.5 m.) to Beverly, then (3 m.) by Beverly Farms (2,5 m.) to Manchester village; thence (7 m.) to Gloucester. Gravel roads. Distance, about 15 miles.

ROUTE XXXI. — BEVERLY TO IPSWICH AND NEWBURYPORT.

Beverly station (2 m.) to North Beverly; thence

(2.5 m.) by Wenham Centre and (2 m.) Hamilton, on (5.5 m.) to Ipswich; thence (4 m.) to Rowley, and on (7.5 m.) *viâ* Newbury to Newburyport. Gravel roads. Distance, about 23.5 miles.

ROUTE XXXII. — LOWELL TO CAMBRIDGE.

From Lowell (6.25 m.) by Billerica village, and (5 m.) Burlington Centre, and (2.5 m.) Woburn, and (2.25 m.) Winchester, to Harvard Square (7.5 m.), Cambridge. Roads for first half unreliable and rather poor. Distance, about 23.5 miles.

ROUTE XXXIII. — QUINCY TO HINGHAM AND COHASSET.

Quincy Centre, south-east (3 m.) to North Weymouth, and (5 m.) Hingham Centre; thence (2.5 m.) to North Cohasset, whence either by Jerusalem Road or by direct road (about 3.5 m.) to Cohasset. Hard, reliable roads. Distance, about 14 miles.

ROUTE XXXIV. — TEMPLETON TO FITCHBURG.

From Templeton village (5 m.) to South Gardner, thence (3.75 m.) to Westminster Centre, thence (7.5 m.) to Fitchburg. Direct roads, good. Distance, about 16.25 miles.

ROUTE XXXV. — GREENFIELD, MASS., TO BRATTLEBOROUGH, VT.

From Greenfield station nearly north, by direct roads and of good quality, to Brattleborough; about 20 miles.

ROUTE XXXVI. — WELLESLEY TO MILFORD.

From Wellesley (station) to South Natick (2.25 m.), thence (3.25 m.) to Sherborn, and (4.5 m.) to

Holliston, whence (6 m.) to Milford. Gravel and mixed roads, and pleasant run. Distance, about 16 miles.

ROUTE XXXVII. — WORCESTER TO UXBRIDGE.

From Worcester city nearly south (6 m.) to Millbury Centre; thence (2.25 m.) by Wilkinsonville, and (2.5 m.) Farnhamsville, on (2.25 m.) to Rockdale, and thence (7 m.) to Uxbridge village. Gravel roads. Pretty run; (from Uxbridge on to Blackstone, however, said to be sandy). Distance, about 20 miles.

ROUTE XXXVIII. — FITCHBURG TO WORCESTER *viâ* CLINTON.

From station to North Lancaster as in Route XXVIII. (10.3 m.), and thence through Lancaster direct to South Lancaster (2.25 m.), then across railroad, and, keeping railroad on right (1.5 m.), to Clinton village (station); thence by main road, good running (6 m.), to West Boylston, across the Nashua River, and up quite a hill; then turn to left, and by main road (gravel, as mostly on this route) (8.5 m.) into Worcester, to City Hall. Total, 29 miles.

ROUTE XXXIX. — WORCESTER TO BOSTON *viâ* WEST BOYLSTON, NORTHBOROUGH, MARLBOROUGH, AND FRAMINGHAM.

From Union Depot to right by Common to Main Street, to right by Main Street to West Boylston, as by Route XXVI. (8.7 m.); thence by main road, one bad hill (3 m.), to Boylston Centre; thence, keeping to left over hill by direct road, rather hilly and rough for two or three miles, then descending

and good gravel road (7.9 m.) to Northborough (good hotel); thence by fair direct road to Marlborough (hotel), fine descent into village (5.9 m.), and fine views of Wachusett, Monadnock, ponds, and country, on the way; thence to right, after passing through village, by nearly direct road through part of Southborough (to avoid hills on more direct road) to Fayville, and turn to left there, taking direct road to Framingham (9.42 m.), road rather poor, and one or two hills, into Framingham; thence direct, fine run (1.58 m.), to South Framingham; thence to Boston (20 m.), as in Route XXII. An interesting route. Whole distance, 56 miles.

X.

RACES, COURSES, TIME, ETC.

The natural is ever best; yet many men, by learning of prowess, essay to achieve fame. — *Pindar.*

ALTHOUGH road-riding must ever be the fullest test of both bicycle and bicycler, afford scope to more varied accomplishments, and give greater satisfaction and benefit to the larger number, yet races are an important department of almost every sport, develop its capabilities, and interest the general public more intensely.

Bicycling races in England have been much encouraged for years, with great success, not only under the auspices of bicycle clubs, but widely otherwise. The Inter 'Varsity races, annual since 1874, are fast rivalling, in interest and enthusiasm, the famous rowing contests between the students of Cambridge and Oxford. The great professional and amateur contests at Agricultural Hall and Lillie Bridge attract vast throngs of spectators. At one race alone, out of several, at the Molineux Grounds last year, fifteen thousand people were present.

So far has the emulation and ambition for speed and distance been carried, that remarkable and even wonderful results have been accomplished; and "champions" have, from the numerous races and different auspices, become almost as numerous in

Great Britain as "colonels" are in the United States. Few of these, and fewer of their feats, can be mentioned here; and as their glories are constantly being eclipsed, by themselves or by newer aspirants in the whirl of change and development, any summary will need constant revision.

M. Charles Terront is, so far as I am aware, the champion professional bicycler of France, for both long and short distances (except for touring), and leads the world on the two, five, and six mile courses, having accomplished the first in 5 min. 44 sec., the second in 14 min. 20 sec., and the third in 17 min. 28 sec., on the St. Germain Road, in 1878. He has, however, been beaten on other tracks by several English champions. At an international five-mile championship race at Wolverhampton, 10 July, 1876, the three Frenchmen won; viz., Jocquet, Terront, and Geris.

Blood and Hassard are well-known Irish champions; and M'Gregor and Purdie are familiar Scottish names, the latter having won the ten-mile championship-cup at Linlithgow Road last year.

Among English professionals, the names of John Keen and David Stanton are most familiar, the former as short-distance, and the latter as long-distance champion: yet both have been beaten by amateurs, and other professionals have snatched their honors for the shortest and the longest distances.

The quickest mile has been made by R. Edlin, in 2 min. 46½ sec.; the quickest fifty miles (abroad), by John Keen, in 3 h. 6 min. 45 sec.; the quickest hundred miles, by D. Stanton, in 6 h. 46 min. 20 sec.; and the quickest two hundred miles, against all three, by W. Cann, in 15 h. 38 min. 45 sec.

Cann won over Keen, Stanton, Terront, Phillips, Edlin, Markham, and six other professionals, in a

six-days' contest (as noted in Foreign Summary), at Agricultural Hall, London, making the longest distance ever ridden in six consecutive days, 1,060-.66 miles; but whether he made better time on the even thousand miles than Stanton had done at the same place before, is in question, as his actual time in saddle has not been reported. Stanton did it in 73 h. 40 min. 35 sec. in saddle.

Keen is forty years old, and is the most winning man in Europe. He and Fred. Cooper have alternately won the one-mile professional championship of England many times, the latter taking it last year.

Stanton came to the United States in 1876, and exhibited some of his skill in racing. He not only beat one Harding, and again one McClellan, in a fifty-mile race, 17 April, 1876, and was beaten himself by W. M. Wright ("D. Butler"), but also scored fifty miles in 3 h. 3 min. 55 sec., in New York, the 22d April, — the fastest recorded time for that distance ever covered with bicycle anywhere, I believe. After his return, he rode one hundred and one-half miles at Lillie Bridge, 14 October, 1876, in 6.45.0.

Races with horses have been had by some professionals, and of these two or three may be mentioned. M. Terront, on the St. Germain Road, nearly straight and smooth, ran against a noted racing stallion, six miles and fifteen hundred yards, winning by two seconds; the times being, for bicycler, 20.26, and for horse, 20.28. Mr. J. Keen, in January, 1878, ran a twenty-mile race against two trotting horses relieving each other, and won by one hundred and sixty yards, in 1 h. 13 min. 30 sec. And Stanton had beaten four trotters, 21 February, 1876, at Agricultural Hall, London.

Amongst English amateur bicyclers, the Hon.

Ion Grant Neville Keith-Falconer, of the Cambridge University Bicycle Club, a very young and promising man, is *facile princeps* on the racing path. He has made the fastest time ever recorded, one quarter-mile in thirty-nine seconds, being a rate of a mile in 2.36, or of twenty-three miles an hour; and that was at the end of a five-mile race, under auspices of the Bicycle Union, against Keen, over whom he won, in 15 min. 13⅖ sec., the quickest five miles with bicycle ever recorded, except that of Terront, above noted. He has also accomplished the fastest ten miles with bicycle ever recorded, in 32.25, and is credited with several other remarkable performances. The quickest mile ever ridden without a flying start was scored by East, last year, in 2.54¼. The fastest long-distance amateur is Mr. Frank Appleyard, of the London Bicycle Club, who, on the road between Bath and London, in a contest with Thorn, Coleman, Butler, Dalton, and twenty other amateurs, made one hundred miles in 7 h. 18 min. 55 sec.; and of this seventy miles were run without stopping, in 4 h. 50 min. Messrs. A. P. Trotter, W. d'A. Crofton, A. A. Weir, S. C. Rhodes, H. Osborne, J. C. Thorpe, R. R. Mackinnon, Wadham Wyndham, F. V. Honeywell, H. P. Whiting, and Derkinderen, are other amateur champions of distinguished accomplishments. A. A. Weir holds the Bicycle Union Championship for twenty-five miles.

I give below a carefully prepared table of the fastest times yet recorded, for distances ranging from one quarter-mile to one thousand miles, with the names of racers abroad, both professional and amateur. It is to be observed that these are the *fastest* times, made with racing machines, and by eminent performers of long training and often-tried skill: they are not always approached even in the

most creditable English races. In many of the latter, the amateur times may be compared with those already made in America, without disparagement of the latter, when the circumstances of track, weather, and machine are taken into account.

TABLE OF ENGLISH TIMES AND DISTANCES.

Miles.	Professional Rider.	Time.	Amateur Rider.	Time.
		H. M. S.		H. M. S.
¼	. . . . .	. . .	I. Keith-Falconer .	.39
1	R. Edlin . . .	2.46½	" . .	2.52⅔
2	C. Terront . .	5.44	F. T. East	6.00⅘
3	J. Keen . . .	8.55	"	9.04½
4	" . . .	12.01	"	12.17⅘
5	C. Terront . .	14.20	I. Keith-Falconer .	15.13⅘
6	" . .	17.28	W. d'A. Crofton . .	19.24
7	J. Keen . . .	23.24	" . .	22.40
8	" . . .	26.20	" . .	25.57
9	" . . .	29.40	" . .	29.16
10	" . . .	32.39	I. Keith-Falconer .	32.25
11	" . . .	36.03	A. A. Weir	36.33
12	" . . .	39.31	"	40.06
13	" . . .	42.50	"	43.35
14	" . . .	46.02½	"	47.02
15	" . . .	48.12	"	50.27
16	" . . .	52.33	"	53.52
17	" . . .	55.48	"	57.15
18	" . . .	59.05	"	1.00.46
19	" . . .	1.02.19	"	1.04.13
20	" . . .	1.05.34	"	1.07.44
21	" . . .	1.08.50	"	1.11.07
22	" . . .	1.12.06	"	1.14.31
23	" . . .	1.15.46	"	1.18.00
24	" . . .	1.20.29	"	1.21.24
25	" . . .	1.20.37	"	1.24.36
26	" . . .	1.33.02	A. E. Derkinderen .	1.34.11
27	" . . .	1.36.46½	" .	1.37.53
28	D. Stanton . .	1.40.17	" .	1.41.23
29	" . .	1.44.00	" .	1.45.00
30	J. Keen . . .	1.45.00	" .	1.48.38
31	D. Stanton . .	1.51.25	" .	1.52.19
32	J. Keen . . .	1.55.07	" .	1.56.18
33	" . . .	1.58.36	H. Osborne . . .	2.01.17
34	D. Stanton . .	2.02.46	H. L. Cortis . . .	2.05.08
35	" . .	2.06.38	"	2.09.00
36	" . .	2.10.36	"	2.12.47
37	" . .	2.14.41	"	2.16.46
38	" . .	2.18.53	H. Osborne . . .	2.18.00
39	" . .	2.23.01	H. L. Cortis . . .	2.24.25

TABLE OF ENGLISH TIMES AND DISTANCES, — *Continued.*

MILES.	PROFESSIONAL RIDER.	TIME.	AMATEUR RIDER.	TIME.
		H. M. S.		H. M. S.
40	D. Stanton . .	2.27.13	H. L. Cortis. . . .	2.29.10
41	" . .	2.31.22	" . . . / W. McWilliam . .	2.34.31
42	" . .	2.35.42	H. L. Cortis. . . .	2.37.36
43	" . .	2.40.06	W. McWilliam . .	2.41.49
44	J. Keen . . .	2.43.39	" . .	2.46.04
45	" . . .	2.47.24	H. L. Cortis . . .	2.54.14
46	" . . .	2.51.06	" . . .	2.54.21
47	" . . .	2.54.47	" . . .	2.58.20
48	" . . .	2.58.41	" . . .	3.02.18
49	" . . .	3.02.45	A. E. Derkinderen .	3.06.10
50	D. Stanton . .	3.03.55	" . .	3.09.56
70	. . . . .	. . .	F. E. Appleyard . .	4.50.00
100	D. Stanton . .	6.46.20	" . .	7.18.55
100½	" . .	6.45.00	. . . . .	. . .
200	W. Cann . .	15.38.45	. . . . .	. . .
204	. . . . .	. . .	E. Coston . . . . / F. Smythe	22.00.00
212	. . . . .	. . .	W. S. Britten . . .	23.54.00
226.53	W. Cann . .	18.00.00		
1000	" . .	95.42.09, including short stops.		
1000	D. Stanton . .	104.24.24, including short stops.		
1000	" . .	73.40.35, time actually in saddle.		
1060.66	W. Cann . .	6 days of 18 hours each, including short stops.		

The courses upon which successful bicycle-races have been run abroad are of four varieties of surface principally; namely, common road, grass, hall-floor, and cinder-path. In the United States a few races, notably those of the Boston Bicycle Club, have been run on the road; none have been run on grass; some have taken place in halls under the disadvantage of narrow space and short laps (as no large hall has been used for the purpose); and the rest on trotting-courses, which are of course soft and heavy for the wheel, and worse for this use than either of the four kinds of track above named.

A cinder-path well laid and rolled hard is the best, and in fact the only really suitable track for bicycle-racing; and it should be large enough for not more

than four laps to the mile, better two, and in the form either of an oval with one straight side, or of an ellipse wide enough for four to ride abreast. Such a track is agitated and likely to be laid in Boston; and, with the increasing interest in the sport, it is probable the like will be laid in many places, especially in connection with race-courses where it can be laid inside the trotting-track pretty satisfactorily. Next to this a good rolled grassy sod or a smooth gravel road is desirable.

But under the disadvantages of unsuitable tracks, short training (or even no training, properly speaking), and heavy machines, some very creditable performances have been done here within a year, as will be referred to more fully in "Review of 1878." Racing naturally develops after riding has become skilful and common; and professional riders are developed only after the sport has taken a hold on the popular favor, and riders have become expert. So it happens that all the races in the United States thus far have been announced and entered for as "amateur" races. In these contests professional and amateurs both (strictly speaking) have often contended together, and until latterly without protest on the part of the latter. As the rules of the sport and the relations of riders are better understood, however, it is probable that this will not occur hereafter; but the two classes of racers will be kept distinct, and their true relations preserved. The confusion heretofore has partly been due, no doubt, to the fact that the bicycle-clubs have neglected to define the terms "professional" and "amateur" in their rules. This matter has for some time been under consideration by the B. Bi. C., and an effort is making in conference with the other clubs to have a uniform rule established here; and it is probable that similar rules to those fixed by the Bicycle Union

(and given on a subsequent page) will be adopted by the time this book falls into the hands of readers.

For the reasons above suggested, the professional champions in America are few. Mr. W. M. Wright of New York, who was the first and the only amateur to win over D. Stanton, the English professional, has been decided to be a professional by the New York Athletic Club, and won in the only race in which he has entered during the past year. His best time was two miles in 9.54 on a heavy track and with easy competition. He is an accomplished rider, and worthy feats may be expected of him whenever he may enter the course in future.

The same may be said of Mr. Will R. Pitman of Boston, who has perhaps done as much to aid and develop the sport here as any one person. He has ridden in quite a number of races, given exhibitions in some of the principal cities, and taught some of his pupils to do better than himself has yet done. His best time is one mile with flying start in 3.45, against time, in the Mechanics Fair Building, Boston, in January, 1879. He has only been beaten in the same race by Mr. Wright. Mr. Wright and Mr. Pitman both claim to be amateurs, and the status of the latter has never been determined. Among those who know his career he is deemed now a professional; but he is entitled to the benefit of the doubt until he has been adjudged so.

Mr. Charles A. Booth of Boston, like the preceding, was a champion velocipede-rider. He won considerable distinction on the old machine in England and France as well as here; and he is a very expert rider in the hall, having given some fine exhibitions of trick-riding. He has not claimed to be an amateur, and though he has challenged others has not competed on the bicycle with any one so far as I know; though, having challenged all others without

acceptance, he claims to be the professional "champion." That title is yet to be raced for here, however.

Mr. A. DeWitt Lyon and Mr. Thomas Harrison, now of Boston, Mr. DeNoielle, of New York, Messrs. Harding, McClellan, and others, are well-known professional riders.

It is noteworthy that strictly amateur riders have scored the quickest times yet made in America. Of these Mr. George R. Agassiz (B. Bi. C., S. Bi. C.) of Cambridge, Mass., leads all others, whether professional or amateur. He has won a gold medal and the championship in two races under the auspices of the Boston Bicycle Club; a one-mile race, at Chestnut Hill Reservoir, in 3.21½ and 3.25, best two in three heats, Mr. T. N. Hastings (B. Bi. C.) being second; and a twenty-mile race, on country road in Boston and Newton, in 1h. 46m. 45s.; and a strong wind to contend with in both instances. Mr. J. A. Lafon (E. Bi. C.), of Newark, N.J., who, by the ruling-out of Wright in the New-York Athletic Club contest, won the first prize there in a two-mile race in 11.26, is an accomplished amateur bicycler, as well as a distinguished athletic in several other sports.

Mr. W. D. Swan, winner of first prizes in the Harvard Athletic Association races, has made his mile in 3.49, starting still from scratch. H. E. Parkhurst (M. Bi. C.), winner at Taunton, crossed the mile line in 3.50½. Messrs. H. W. Knight (E. Bi. C), J. C. Sharp (S. Bi. C.), and H. M. Pope are also winners in creditable contests; the latter, though only sixteen years of age, is a promising rider, and won a mile race at Framingham against Agassiz last year.

Two interesting "scrub" or informal races have resulted in very fast time. The first took place at

Chestnut Hill, where Mr. Russell Codman, of the Suffolk Bicycle Club, covered a circuit accurately surveyed as 1.17 miles in distance, in 3m. 30s., the best time yet known to have been made here for any thing over a mile.

In the second, Mr. Charles Krauskoph, of Washington, is said to have run a hundred miles on certain streets in that city, with Mr. Frank Wood, in the remarkable time of seven hours. If the distance was accurately measured, and the time correctly taken, this rider has excelled all other amateurs for that distance whose time has been recorded.

There are in the clubs other quite as accomplished and capable riders as any of those above named, who have not yet competed in any public race, and whose names are therefore not invidiously mentioned here. With the greater number of good fellows and good bicyclers, "to be happy is the chiefest prize; to be glorious the next lot," as old Pindar hath it.

I give here, for reference, a table of the fastest recorded times made here in races, professional and amateur, with the distances, and the names of riders.

TABLE OF FASTEST TIMES. (AMERICAN.)

MILES.	RIDER. PROFESSIONAL.	TIME.	RIDER. AMATEUR.	TIME.
		H. M. S.		H. M. S.
1	W. R. Pitman .	3.45	George R. Agassiz .	3.21½
1.17	. . . . .	. . .	Russell Codman . .	3.30
2	W. M. Wright .	9.54	J. C. Sharpe . . .	8.05
3	W. R. Pitman .	11.54	. . . . .	. . .
5	" . .	21.07	. . . . .	. . .
20	. . . . .	. . .	George R. Agassiz .	1.46.45
100	. . . . .	. . .	C. Krauskoph . .	7.0.0

Other times are given for the same purpose in the following fuller

TABLE OF RACES IN 1878-79.

DATE.	PLACE.	TRACK.	DISTANCE.	COMPETITORS.	TIME.
1878.					
July 4.	Brockton . .	Trotting course . .	1 mile; 3 heats . .	W. R. Pitman . . .	3.59; 3.47; 3.50.
				T. Harrison	–
July 4.	Lynn . . .	Road around the common	Called "about a mile." 3 heats .	W. R. Pitman . . .	3.31; 3.11.
				C. C. Fletcher . . .	3.32; 3.15.
Sept. 16.	Portland . .	Trotting park. . .	3 miles	W. R. Pitman . . .	11.54.
				T. Harrison	–
" 17.	Framingham.	Half-mile trotting course.	5 miles; best 2 in 3 heats	W. R. Pitman . . .	21.07; 21.38.
				A. De W. Lyon. . .	22.42. –
" 17.	Framingham.	Half-mile trotting course.	2 miles; best 3 in 5 heats	H. E. Parkhurst . .	8.48; 8.32; 8.40.
				William H. Pearce .	9. – –
" 17.	Framingham.	Half-mile trotting course.	1 mile; best 3 in 5 heats	H. M. Pope	4.08; 4.03; 4.06.
				G. R. Agassiz . . .	5.55. – –
" 20.	Bridgewater.	Trotting track . .	1 mile; best 2 in 3 heats	A. De W. Lyon. . .	–
				A. Stedman	–
" 25.	Taunton . .	—	1 mile	H. E. Parkhurst . .	3.50½.
" 25.	Concord . .	—	1 mile; best 3 in 5 heats	W. R. Pitman . . .	4.11; 4.14; 3.51¾.
Oct. 3.	Attleborough,	Trotting park (bad),	2 miles; best 2 in 3 heats	A. De W. Lyon. . .	10.46; 10.10.
" 19.	Boston . . .	Road, Chestnut-hill Reservoir . . .	1 mile; best 2 in 3 heats	G. R. Agassiz . . .	3.21½; 3.25.

1878.					
Oct. .	N. H. . . .	—	1 mile	W. R. Pitman . . .	4.57; 5.02.
Nov. 2 .	Cambridge .	Jarvis' Field (soft ground)	1 mile (handicap) best 2 in 3 heats .	W. D. Swan (scratch)	3.49; 4.07.
" 30 .	Boston and Newton .	Country road . . .	20 miles	G. R. Agassiz . . .	1.46.45.
1879.					
Jan. 3 .	New York .	Gilmore's Garden .	2 miles; 3 heats . .	W. M. Wright[1] . . .	– 10.05¼; 9.54.
				J. A. Lafon	– 11.26. –
				W. R. Pitman . . .	10.58. – –
Jan. . .	Boston . . .	Mechanics' Fair building; 8 laps to mile	2 miles	J. C. Sharpe	8.05.
				W. H. Pearce . . .	8.07.
Jan. . .	Boston . . .	Mechanics' Fair building; 8 laps to mile	1 mile, flying start .	W. R. Pitman (against time)	3.45.

[1] Adjudged a professional after the race, and counted out, leaving Lafon first and Pitman second.

The prizes won in the above races were either silver plate, bicycles, medals, or other amateur prizes (with one exception, I am informed); in all except that of Pitman against time (who had a flying start), the start was from scratch; and in most there were a larger number of competitors where I have only given names of first and second. Handicapping, though only too frequent in England, has not obtained much here, only one of the above races having been handicapped. This was the one at Jarvis Field, Cambridge, where W. D. Swan was assigned to scratch, C. P. Parker was allowed fifteen yards, R. C. Sturgis (S. Bi. C.) fifty yards, and A. C. Stubbs two hundred yards. It is to be hoped that handicappers will not be indulged here until riders have made sufficient record to enable such discrimination to be fair and interesting. No correct comparison of men can be made until they have shown their skill and prowess under the same conditions of distance, track, wind, competition, and training. And another point is worth bearing in mind, that no fair comparison of the speed of bicyclers, pedestrians, and trotting-horses can be made until conditions are given to each that are equally and respectively favorable; that is to say, it is no fair test to put a bicycler on the harrowed trotting-course, or on the short-lapped, narrow sawdust track of the pedestrian.

The New York Athletic Club definition of "an amateur," which has been sometimes referred to as authority, is as follows: —

"An amateur athlete is one who does not enter in an open competition, or for a stake, public money, or admission-money or entrance-fee, or compete with or against a professional for any prize; or has never taught, pursued, or assisted in the pursuit of exercises as a means of livelihood."

The definition of "professional" and "amateur"

adopted by the (English) Bicycle Union, with its explanation, is as follows: —

1. A professional bicyclist is one who has ridden a bicycle in public for money, or who has engaged, taught, or assisted in the art of riding the bicycle, or in any other athletic exercise, for money.
2. A bicyclist who shall have competed with a professional bicyclist in public or for a prize, knowingly and without protest (except at a meeting specially sanctioned by the Bicycle Union), shall also be considered a professional bicyclist.
3. Any person not included in the above definitions shall be considered an amateur bicyclist.

A bicyclist forfeits his right to compete as an amateur, and thereby becomes a professional bicyclist, by —

1. Pursuing the art of riding the bicycle, or any other athletic exercise, as a means of gaining a livelihood.
2. Riding a bicycle or engaging in any athletic exercise for a money prize, or for gate-money.
3. Accepting remuneration for riding the bicycle, or for engaging in any athletic exercise.
4. Accepting payment for training or coaching others for bicycle-racing or for any athletic exercise.
5. Receiving payment for services personally rendered in teaching bicycle-riding.
6. Competing with a professional bicyclist in public or for a prize, according to paragraph 2 of the definition.
7. Personally teaching bicycle-riding (by a manufacturer or agent) as a means to effect the sale of the machine.

The following rules for competition, adopted by the Bicycle Union for races under its auspices, may be of interest in connection with this chapter, and may serve as a useful guide to those arranging for races here, or for suggestions to clubs; viz., —

1. Any competitor making a false entry will be disqualified.
2. If a machine becomes disabled, the rider will be allowed to use another.
3. University or club costume may be worn.
4. Every competitor will receive in the dressing-room a ticket bearing a number corresponding with his number on the programme, which must be worn during the race.

5. A bell will be rung before each heat, when the competitors are to answer to their names opposite the judges' table ; after the names have been called over, a start will be effected.

6. The start will be effected by report of pistol.

7. Any competitor starting before the signal, to be put back at the discretion of the starter ; on a repetition of the offence, to be disqualified.

8. One attendant only will be allowed to each competitor in any race.

9. Riders must pass on the outside (unless the man passed be dismounted), and must be a clear length of the bicycle in front before taking the inside ; the inside man must allow room for his competitor to pass. This rule will be strictly enforced.

10. Any competitor guilty of foul riding will be disqualified.

11. The committee reserve the power of postponing the races in case of necessity. On no account will entrance-fees be returned, or expenses allowed, to any competitor in case of postponement.

12. Any protest against a competitor, respecting his qualification as an amateur, must be lodged with the committee before the start is effected, and any protest respecting foul riding to be made to the judge immediately after the heat is finished.

13. The committee reserve the right of adjudicating any questionable entry, or any other point not provided for, and of making any alteration in the programme that may be deemed necessary.

14. The judges' decision to be final.

15. The races will be strictly confined to amateurs as defined by the Bicycle Union (except at special meeting during the year).

16. The committee reserve the right of refusing or cancelling any entry, if necessary, before the start, without giving its reason for so doing.

17. Competitors may dismount during a race at their pleasure, and may *run* with their bicycles if they wish to do so ; but they must keep to the *extreme outside* of the path whenever dismounted.

XI.

CLUBS. — RULES. — MEETS AND RUNS.

Behold how good and how pleasant it is for brethren to dwell together in unity. — *The Psalmist.*

THERE are two hundred and thirty bicycle-clubs, with not only names and habitations, but also officers, costumes, and various other distinctive attributes, registered in the British directories. Of these the Pickwick Bicycle Club is oldest, formed 22 June, 1870; and the Cambridge University Bicycle Club is largest, with its 271 members, while the London Bicycle Club comes in next with its 250 members; and the others range in membership from ten upwards toward those just mentioned. This indicates that the bipedaliferous wheel rouses enough warmth of feeling in its devotees to cause a fusion of interests and of fellowship into clubs resting on the force of its attractions alone. There are, of course, thousands of "the unattached;" and at the Hampton Court meet in 1878, 650 of these attended, and were marshalled into line with the 1,050 representatives of 76 clubs.

The direct advantages of club-membership are many, and are obvious to those who have enjoyed them, as well as to those who are accustomed to the advantages of clubs devoted to other interests. Amongst these advantages are good-fellowship, com-

panionship for spins, and social standing in the bicycling community, special stimulus to interest, and incentives to excellence in riding. They afford opportunities for comparison of experience and of opinions, for obtaining information, and for associated or disciplined riding on interesting occasions. Most clubs offer the benefits of headquarters for reading-rooms; for putting up or keeping and caring for machines, and for changing of costume, &c. They give occasions for forming new acquaintances and valuable friendships; and the relations and associations cherished by them are constantly resulting in pleasure, whether by the casual meeting on the road, by the contrived excursion, at the annual dinner, or in a hundred different ways. The general advantages, which, of course, every member shares, arise from the general principle that in union there are strength and wisdom. The impression made on the public, and the consequent respect and favor accorded to bicycling, are greatly enhanced by the formation and healthful existence of clubs; and the united influence of many in these organizations is greater for acquisition of privileges, as well as for protection from hardships, official, judicial, legislative, or mobocratic. As the number of riders increases, and the use of bicycles is more frequent and extended, the needs of such unions will be felt more and more. They promote, in short, like all other societies and associations, both individual and collective enjoyment, while they mould public sentiment and unite forces for defence and advancement.

There are few clubs already formed in America, a list of which is given at the end of this chapter. The number of clubs will, no doubt, be largely increased in the future, and the formation of them will perhaps be a theme of interest to many readers of these pages. Some suggestions may therefore be in place.

Wherever there are six or more gentlemen who ride the bicycle, and are enthusiastic in its use (but not professionals), living near enough together, and either already companions or likely to be companionable to each other, it is desirable that they should form a club. The requisite preliminaries need not be here written out; but, when the nucleus of a club assemble for a meeting, there will be four important subjects to claim their attention, — namely, officers, headquarters, costume, and rules. The disposition of these matters will depend largely upon the circumstances of each case. In general, however, it may be remarked, that, in the selection of officers, discretion should be used to select the men who, having the other necessary qualifications, are sufficiently interested to give their special attention and considerable time enthusiastically to the interests of the club. The president should not only be able to preside with dignity and understanding, but also, if obtainable, a man of such attainments or social standing or other eminence as to give prestige and influence to the club in the community; and, if he have intelligent interest in the cause, he need not necessarily be a good rider, though if he be also that, it is better. The secretary should be one who can and will devote considerable time to the duties of the office and the interests of the club; he should be a good and enthusiastic bicycler, and of pleasing manners and much acquaintance. He may also well be treasurer. His is the most important and useful office, and much of the success of the organization will depend upon his efforts. The captaincy is another important office. It was formerly, and is yet to some extent, the custom for members to race for this position, the winner holding it for a term, at the end of which another competition determined the successor. But this practice has not prevailed here,

and is fading out abroad: the fact being, that while the captain ought to be the best rider, or one of the best, in the club, the winner in a race is not always that man; and, if he were, he would not necessarily have those other qualifications of good judgment, quick perception, courteous bearing and yet respect-exacting authority, which are looked for in a commander or a leader.

The club (or executive) committee should consist of these three officers *ex-officiis*, and of three or more other members, in proportion to the whole number, not holding any other office, who can and will attend committee-meetings, and should have general management and arrangement of those matters not passed upon by the full club, and the carrying-out of these when not otherwise provided for.

Headquarters are most frequently, by small clubs, made at the secretary's office or some other convenient and accessible one, which may be had free; and sometimes, though not advisably, at a public house where a room will be given up, on occasion, for the purpose of meetings.

The desirable thing, however, and the thing which makes a good impression, attracts new members, and affords solid satisfaction and advantage, is to have rooms exclusively for the club use. These should be within the means of the club (or voluntary subscriptions), for expensiveness; and should, if possible, include at least a room for "stabling" or keeping and taking care of machines, a washing and bathing room, a dressing-room with suitable arrangements for leaving suits and changes, and a reading, chatting, meeting, and committee room: where it is possible to have more rooms, these uses and others, may be assigned to different rooms. These should be located as conveniently and accessibly as possible for all, and should, when in cities, be

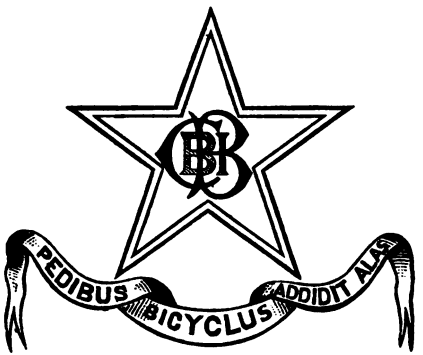
near good mounting, and outside the crowded thoroughfares, but easily reached either on foot or by street-cars.

In adopting uniform costume, color and cap are most essential to fix upon; leaving material and cut to individual taste or convenience, will be found in many cases necessary. But a nearly uniform costume is desirable in many ways: it is sociable to have it, it lends a better appearance to the club when riding together, and it affords a distinctive mark of membership, and also of club-belonging, where there are several. In general or grand meets it is thrice comely and desirable. It is also pleasanter to wear, as being a small fashion. Blues, grays, browns, drab, green, and even black are worn. Corduroy, flannel, tweed, and other inexpensive and durable materials are worn. Leggings or "gaiters" should be discarded. Short breeches, either buttoned or buckled just below the knee, or knickerbockers with elastic band, are the things for the legs; with long stockings, and either low shoes or elastic-side congress boots. A short coat or jacket, with woollen shirt, and either castor, dogskin, or thread gloves, linen collar, or turnover woollen on the shirt, with tie to choice, complete the suit. It should be made as quiet and neat in appearance as possible, with nothing *outré* or gaudy about it.

The most favorite head-gear is the polo or plug cap, though the helmet is much worn; and many clubs prefer a cap with visor, of some close and simple shape. The club monogram or emblem is usually worn on the front or side of the cap, and sometimes a ribbon or badge is also worn. It is desirable that a club costume should be different in color or cap, or some readily distinguishable feature, from those worn by other clubs. The initials B. C. have become so familiarly associated with base-ball, that

B. B. C. would to a stranger suggest perhaps Bangor Base-ball Club. The style, first used in "The American Bicycling Journal," I believe, of writing "Bi." for "Bicycle," — e.g., B. Bi. C. for Buffalo Bicycle Club, — has been adopted in this book; and, as it is distinctive and convenient, should be encouraged as a part of bicycling nomenclature.

Rules should be simple as consistent with completeness, and when adopted should be observed. They should be printed in convenient form, usually with names of members and officers, and be in the



hands of each member for ready reference and familiarity.

The first thing a committee on rules will wish for is a copy of those of some other club for suggestions. I therefore give place here to the rules of one club entire, as heretofore published; they were drawn after a comparison of those of some of the best English clubs, and have, with some modifications, been in operation for more than a year.[1] They

[1] These rules have been substantially adopted by two or three other clubs already.

are rather long, intended for a large club, and would admit of variations for improvement; and may be taken rather for suggestiveness than as a model. They are as follows: —

PREAMBLE.

The organization of this club having been effected for the purpose of thereby obtaining increased facilities for, and enjoyments in, the pursuits of bicycling, as a manly and healthful pastime; and being aware that in order to obtain the best results from such organization, and to secure for it the largest amount of influence, order must be intelligently observed in its proceedings, the members of this club do hereby bind themselves to observe and be governed by the following: —

BY-LAWS, RULES, AND REGULATIONS.

ARTICLE I. — *Name.*

The name of this organization shall be "The Bicycle Club."

ARTICLE II. — *Objects.*

The objects of this club shall be: —

(1) The mutual enjoyment of its members in the pursuit of bicycling as a pastime; to which end, club-meets, tours, excursions, races, &c., shall be arranged and carried out.

(2) The promotion (by force of example) of the use of the bicycle as a practicable and enjoyable aid to locomotion, by the general public.

ARTICLE III. — *Officers.*

The officers of the club shall be and rank as follows: president, captain, senior sub-captain, junior sub-captain, secretary (who shall also be treasurer), three guides, three buglers, and a club committee to consist of the president, captain, and secretary (*ex-officio*), and four other members, who shall not hold any other office in the club.

ARTICLE IV. — *Duties of Officers.*

It shall be the duty of the president to preside at all the business meetings of the club and of its committee, and to enforce all the rules and regulations which may herein ap-

pear, or which may ultimately be adopted. He may call a special business meeting of the club at his pleasure, and shall do so at the written request of any three active members thereof.

The captain shall assist the president in the discharge of his duties, and in his absence shall officiate in his stead. He shall command the club in its meets and excursions, and shall decide upon the route, rate of speed, and all other matters therewith connected.

The sub-captains shall each assist the captain in the discharge of his duties, and, in order of seniority, shall officiate in his stead, when the absence of the captain may render it necessary. In club excursions, they shall see that the orders of the captain are obeyed; and, when the captain deems it desirable to divide the club, they shall hold themselves in readiness to assume the command of the subdivisions appointed to them.

The secretary and treasurer shall keep a correct account of all the business meetings of the club, and report same at each meeting. He shall send all notifications to members, and keep a correct roll of the membership. He shall take care of and become responsible for the funds, collect all dues, pay all bills, and generally manage all the financial affairs of the club. He shall keep a correct account of all receipts and expenditures, and report same at each business meeting.

The three guides shall ride next to the captain and sub-captains (one to each) on all club excursions. They shall hold themselves in readiness to speed forward, either to explore condition of the roads, to engage hotel accommodations, or to render any other aid or acquire any information which the captain or his sub-captains may order.

The three buglers shall ride near to the captain and sub-captains (one to each), and shall transmit to the club such orders as they may be directed. Orders to be transmitted by one bugle only, except when otherwise ordered. No bugle to be sounded except by order.

The club committee shall transact the whole of the general business of the club, shall hold special meetings therefor, and shall report their action at each business meeting of the club. They shall examine into the standing and position of applicants for membership, and shall refuse or accept such as in their judgment the best interests of the club may demand.

Action of the committee can only be revoked by the unanimous votes of the full active membership of the club, which may be in general or special business meeting assembled.

ARTICLE V. — *Club Business Meetings.*

The regular business meeting of the club shall be held on the first Monday in each month, throughout the year.

The annual meeting for the election of officers shall take place on the first Monday in each February, and shall be by written or printed ballot. Each officer shall be elected by a separate ballot, and shall hold office until the adjournment of the first annual meeting of the following year.

Vacancies may be filled at any business meeting. A majority-vote of members present shall elect.

Five members shall constitute a quorum at all business meetings.

ARTICLE VI. —*Order of Business.*

At all meetings — a quorum being present — the order of business shall be as follows: —

First, Reading of the minutes of the last meeting, which shall stand approved unless corrected.

Second, Report of the treasurer, which shall be put to the meeting for acceptance or correction.

Third, Report of the club committee, which shall embrace all elections to membership, and all rejections of applications for membership together with the reasons therefor, and also all other action in which the committee may have engaged since date of their last report. The action of the committee shall in all cases be sustained, except same is unanimously objected to by all non-committee members present.

Fourth, Reports of special committees.

Fifth, Report of the captain, which shall include the reports of his sub-captains, if any, and shall cover all bicyclic proceedings in which the club have engaged since date of last report.

Sixth, Report of the secretary, which shall include all items of interest to the club, not covered by the foregoing.

Seventh, Resignation and miscellaneous business.

Eighth, Adjournment.

ARTICLE VII. — *Rules of Order.*

Members wishing to speak at any club business meeting will rise, and address the chair.

If two or more members claim the floor at the same time, the chair shall decide who is entitled to it.

No member shall speak more than twice on the same subject; and no member shall leave the room prior to adjournment, without the permission of the chair.

ARTICLE VIII. — *Chairman.*

At all business meetings the chair shall be filled by the officer of highest rank present. In absence of all officers, a chairman to be chosen by the meeting.

ARTICLE IX. — *Visitors.*

Members will be allowed to introduce visitors at club headquarters at all times, except during business meetings, at which no one but club members will be allowed to be present.

ARTICLE X. — *Membership — Active and Honorary.*

Any gentleman who is not a professional bicycler shall be eligible to active membership.

A professional bicycler is one who

Candidates for admission to the active ranks of the club must be proposed and seconded by members; and the name and address of such candidate, together with the names of the members proposing and seconding him, must be sent to the secretary, and by him handed to the club committee.

Each application for admission must be accompanied by the amount of the entrance-fee, which will be returned should the candidate not be elected.

The club committee shall take action upon each application for membership with as little delay as possible; and such action shall always result either in (1) admission, or (2) rejection, or (3) indefinite postponement. In either case the secretary is to immediately notify the applicant of the result. If the former (1) the entrance-fee will be retained; but, if either of the latter (2) or (3), the entrance-fee to be returned in full.

Any gentleman who has distinguished himself in the encouragement of bicycling, or who has rendered the club important services or benefits, or whom, for any other reasons, the club may see fit thus to honor, may (provided he is not an active member of the club) be elected to honorary membership, the like proceedings being observed as are provided for active membership. Honorary members are permitted to be present at all club meetings, but are not eligible to office, or permitted to take part in debate. All honorary members are exempt from all club taxes or assessments.

ARTICLE XI. — *Dues.*

The entrance-fee shall be the sum of five dollars, which is to be paid as provided in Article X. Each subsequent

payment shall be the sum of one dollar, which shall become due and payable immediately upon election, and upon the first Mondays in May, August, November, and February thereafter.

The names of members in arrears shall be reported by the secretary, at each monthly business meeting; and the names of any members who may thus be twice reported shall be stricken from the club roll, unless allowed to remain by a majority-vote of those present.

No member shall be allowed to compete in the club races, or be accorded honorable discharge from the club, unless his dues are paid.

The secretary shall be exempt from all dues and assessments.

ARTICLE XII. — *Bicycling Meetings, and Club Riding upon the Roads.*

At least once each year, there shall be an excursion or tour at a time to be appointed by the captain, in which all members of the club shall be expected to participate: the duration and distance of the tour to be decided upon and published not less than one month prior to the meet therefor; the absence from headquarters not to exceed two weeks; and each member participating, to remain with the club during the whole run, unless excused by the captain, or deterred by illness or accident.

The club may meet for runs in company at such times and places as shall be appointed; and, upon arriving at the outward terminal point of each run, those members who so desire shall be permitted by the captain to extend the run as far as they may wish. The captain, in such cases, if he does not accompany, to appoint some member to officiate in his stead. Upon all runs, tours, or excursions, the club will implicitly observe and obey the orders of the captain or his representative.

The position of the captain, while the club is in motion, is at the front; and, while the captain is in that position, no member shall be allowed to pass him without permission.

This rule, however, shall not operate to prevent the captain occupying any position along the line to which circumstances may call him.

When on a run, tour, or excursion, as a club, each member is requested to wear the club uniform.

On all club runs, tours, or excursions, it shall be governed by the following

Road Rules.

Section 1. The object of club excursions is not to ride against time, still less to encourage any competition between individual members attending them. Their intention is, —

(1) To provide an opportunity for members to get ordinary bicycle exercise in company, and

(2) To make them acquainted with the various roads suitable for bicycling, together with the objects of interest, &c., in the neighborhood.

Sect. 2. In the absence of any officer or member of committee, the senior member of the club (according to the date of his election) present should act as leader, and his directions should be implicitly obeyed. He should set a *moderate* pace, and bear well in mind the needs of the less experienced, not only as regards pace, but as to occasional halts, dismounting for hills, &c. These matters and many others must be left to his discretion, as the company and the occasion may suggest; but as a general rule it is not well to aim at more than ten miles to the hour, nor to keep the company in the saddle for more than an hour at a stretch.

Sect. 3. For the better regulation of the pace, and to prevent straggling, one of the sub-captains should ride in the rear for the purpose of signalling whenever the tail of the company is getting out-distanced; and the leader should then slacken until he receives a second signal indicating that they have closed up. In case of accidents, &c., some special signal should be given, on hearing which the leader should dismount.

Sect. 4. In ordinary riding, on country roads, signals from the rear to the front of a company can be easily passed on by word of mouth. Whilst the wishes of the leader can as readily be ascertained by watching his movements (as regards a dismount or alteration of pace), a set of signals shall be used for the most obvious purposes: —

(1) For *extended* order (see Sect. 8), the *right* hand held *out*.

(2) For *closing* up again (see Sect. 8), the *left* hand held *out*.

(3) For slackening pace, whilst maintaining the same distance between each rider or pair, the *right* hand held *up*.

(4) For sudden halt, in case of danger, the *left* hand with a handkerchief in it to be held up.

Mere acceleration of pace gives its own signal; and for the formation of *single* and *double* file the leader has only

to give the order to his own companion, and the rest of the company will naturally follow suit.

SECT. 5. But for cases of emergency, or where (as in towns) there is too much noise and interruption of view to admit of mere *verbal* or *manual* signalling, or whenever the captain may so elect, the orders shall be given by whistle or bugle.

The orders when given by bugle shall be as follows:—

REVEILLE (No. 3, Cavalry Tactics, United States Army), to be sounded first thing in the morning when the club is on a tour.

STABLE CALL (No. 14, Cavalry Tactics, United States Army), to be sounded twenty minutes after the "Reveille" to call club together to oil up, and put machines in order for the day's run; or may be sounded as an order to clean machines after the day's run.

MESS (No. 7, Cavalry Tactics, United States Army), to be sounded to summon to any meal.

ASSEMBLY (No. 2, Cavalry Tactics, United States Army), to be sounded to order to call club together, to fall in preparatory to mounting.

BOOTS AND SADDLES (No. 16, Cavalry Tactics, United States Army), at sound of which the club shall mount, always left in front.

GALLOP (No. 43, Cavalry Tactics, United States Army), to increase the pace.

WALK (No. 41, Cavalry Tactics, United States Army), at sound of which the club shall proceed more slowly.

HALT (No. 40, Cavalry Tactics, United States Army), at sound of which the club shall dismount and halt.

DISMOUNT (No. 38, Cavalry Tactics, United States Army), at sound of which each man (commencing always from the rear) shall dismount, and walk by the left-hand side of his machine.

FORM TWOS (No. 42, Cavalry Tactics, United States Army), at sound of which the club will form twos; the even numbers always quickening, and taking their position as right-hand men.

QUICKSTEP (No. 33, Cavalry Tactics, United States Army) conveys no order to the club, but may be sounded by order of the captain, when passing through villages, or at the captain's discretion.

RIDE AT EASE (No. 15, Cavalry Tactics, United States Army), at sound of which each rider may choose his own companion.

RE-FORM, SINGLE FILE (No. 23, Cavalry Tactics, United States Army), at sound of which each rider shall resume his proper position in the column.

RETREAT (No. 4, Cavalry Tactics, United States Army) may be sounded if the captain so orders, to announce that the day's run is completed.

TATTOO (No. 5, Cavalry Tactics, United States Army) may be sounded if the captain so orders, as a suggestion to the club that it would be advisable to go to bed, and get ready for the exertions of the morrow.

In the absence of the bugler, and when the captain may elect to give the order by whistle, the following code shall be used: —

One long whistle — fall in.
One short whistle — mount.
Two short whistles — form twos.
Two long whistles — slacken speed.
Six short whistles — increase speed.
One short and one long whistle, repeated three times — dismount and walk.
Three short, well-separated whistles — dismount and halt.
One long, two short, and one long again, repeated three times — ride at ease.

No orders shall be given, or whistles or bugles sounded, except by the captain or his order.

SECT. 6. Where more than twenty riders attend a club meet, run, or excursion, the captain shall divide them into companies not to exceed — if it can be avoided — sixteen members to each company; each division to be under order of a sub-captain, or officer specially appointed, and each division to preserve a distance of not less than two hundred yards between them.

SECT. 7. As a general rule, the company should ride *two* abreast; but in towns and villages, in passing and meeting vehicles, in riding up and down hills, and where the road is soft, rough, or stony, and requires picking, *single* file should invariably be adopted, the *left*-hand man always *quickening*, and the right-hand man dropping in behind him.

SECT. 8. When in *single* file, an interval of at least *ten* yards should be kept between each rider, and in *double* file *twenty* yards between each pair. These intervals should be doubled in hilly country. In approaching a hill, whether up or down, the leading files should quicken, and the rear files slacken, so as to allow of the company extending out to double distance; and on reaching the level they should slacken and quicken again respectively, till the original interval is attained.

SECT. 9. When riding in company down hill, the bicyclist, if the hill be a long one, should be careful to keep his machine well in hand, and not remove his feet from the

treadles. It is very undesirable for a *company* to ride down a long hill if there is a curve obstructing the view to the bottom. It should not be forgotten that horses which will take one bicycle quietly may often turn restive when passed by several in succession; and, should any consequent complications arise toward the bottom of a long hill, it is very difficult to avoid disaster. In the case of a winding hill, it is better that the leader should advance alone till he sees that all is clear, and then whistle the company on. Much must be left to the discretion of the leader, whose own movements as regards dismounting, riding with the feet off, &c., must be taken as the rule for the rest.

SECT. 10. The ordinary rules of the road as regards passing vehicles, &c., should *be rigidly adhered to.*

a. A horse should *never* be passed *on both sides at once.*

b. A *led* horse should always be passed on the same side as the man who is leading it.

c. Before overtaking a vehicle or rider, it is well to give some sort of warning; not a shout, the intention of which may be misinterpreted and give offence. In company-riding, a word to your own companion will suffice to attract the necessary attention. The mere sound of the human voice previously is often all that is wanted to prevent a horse from starting at the sudden passing of the noiseless machine.

d. The ground in front of a horse should never be taken till the bicyclist is at least ten yards ahead of him.

e. If a horse, on meeting a bicycle, show signs of restiveness, it is not always wise to dismount at once. To dismount *suddenly* is more likely to frighten a horse than to continue riding *slowly* by, *speaking to the horse* as you do so. But the leader should order a dismount at his discretion (even if he himself has passed the horse), and should *invariably* do so on any signal or request from the driver or horseman.

f. Foot-passengers on the roads should not be needlessly shouted at, but should always be given a *good wide berth,* especially at crossings.

g. In company-riding, the leader, on passing any one (whether riding, driving, or walking), should announce that *others* are following close after; and the rear man should in the same way signify that *all* have passed.

h. Inattention to these and other rules and courtesies of the road will cause annoyance to the public, and create prejudices against bicycling.

SECT. 11. Bicycling after dark is on all accounts most undesirable, but may be occasionally necessary. In company-riding, the leader and the rear man only should be pro-

vided with lights. A multiplication of lights is confusing to the bicyclist (owing to the attendant shadows, &c.) and very alarming to horses. Single file must be invariably adopted, and the leader and the rear man should always make the proper announcement (section 10 *g*) in passing.

If the night be not over-dark, bells which can be rung or stopped at will may be substituted for lights. Bells should be always carried *in passing through towns and villages* after dark.

SECT. 12. A bicyclist, *when riding in company*, should never take a dog with him, however well he may have trained him to follow him when alone.

SECT. 13. The time named for a club-excursion is the exact time of *the start*, which will in all cases be punctually observed. Members are therefore requested to be at the spot named *at least ten minutes before*, that they may arrange themselves in order for the start, and receive the instructions of the leader as regards signals and any other directions that may be necessary.

SECT. 14. The leader may always alter the *direction* of the excursion at his discretion, to avoid a contrary wind or a bad road, &c.; but the *starting-place* named must be always adhered to.

SECT. 15. At all club-meets, the bugle will sound the "assembly" five minutes before the time appointed for the start. At this signal the club will form in line, left in front, the smaller wheels to the left. The company will then tell off by twos, and the *odd numbers will be the left-hand men.*

This order shall be preserved during the whole run, except the captain order the bugler to sound the "Ride at ease," when each rider shall be at liberty to choose his own companion. In no case shall a member ride ahead of the captain; and, immediately the "Re-form single file" is sounded, he shall resume his proper place in the column.

Upon the bugle sounding "Boots and saddles," each man shall turn his machine to the left, and place his left foot upon the step, then each man shall mount; but he shall first be sure that the man immediately in front of him has mounted safely, and proceeded at least two revolutions, before doing so. As soon as the whole company has mounted, the distance of ten yards between each machine is to be kept.

Upon approaching a stopping-place, or the end of the run, the club will be brought into single file. The bugle will then sound the "Halt," when the dismounting will commence FROM THE REAR, each man passing the word forward as he gets off his machine.

ARTICLE XIII. — *Annual Race for Championship of the Club.*

There shall be once in each year (preferably in the month of October), a race for the championship of the club. Each man shall ride a modern bicycle, without multiplying gear, and shall not employ any other means than pedal motion for covering the distance. The size of the wheel shall be at discretion of rider.

The day and the course shall be left to the discretion of the committee, but the length of the championship race shall be not less than fifty miles.

The winner shall be the rider who covers the distance in the shortest time; and the prize shall be a silver trophy, which shall have the champion's name and the date of the race inscribed thereon, and shall be kept in the club headquarters until it is won by a competitor each year for three consecutive years, when it shall become his own private and personal property.

In addition to the above, each of the riders (up to ten) who covers the distance within five hours shall receive a silver medal suitably inscribed and commemorative of the event. This race shall be open to club-members only.

ARTICLE XIV. — *Club Racing.*

All club races shall be run subject to the following rules and conditions, together with such others as the judges may dictate.

Rule 1. None but members of the club, or invited members of other bicycle-clubs, shall be allowed to compete.

Rule 2. All competitors shall wear the club colors, and a distinguishing number on the breast, during each race.

RULE 3. No attendants will be allowed to accompany a competitor.

RULE 4. Riders must pass each other on the outside, and be a clear length of the bicycle in front, before taking an inside position.

RULE 5. Competitors may stop or dismount during a race, but must not in any way obstruct the course.

RULE 6. The committee shall appoint the judges, who shall attend to all necessary duties, and whose decision shall be final.

RULE 7. No two machines shall touch each other while in motion, during a race.

RULE 8. Any violation of these rules must be reported to the judges immediately the race is concluded.

RULE 9. These rules shall operate equally in races on the road, cinder-paths, or other track.

ARTICLE XV. — *Club Colors, when to be worn, &c.*

The club colors shall be red, white, and blue, combined in stripes of silk ribbon, each stripe to be a quarter of an inch in width. A sample of the club colors, as above described, to be displayed at the club headquarters.

The club colors may be worn by members at any time, and shall be worn by all members competing in club or inter-club races.

ARTICLE XVI. — *Expulsion.*

Any member found guilty of violating the rules or regulations of the club, of disobedience to orders, or of conduct unbecoming a gentleman, may, after a fair trial, of which he shall have at least seven days' notice, and at which he may be heard in his own defence, be admonished, suspended, or expelled from the club, by a vote of two-thirds of the members present.

ARTICLE XVII. — *Amendments.*

These by-laws, rules, and regulations may be amended or altered, at any regular or special business meeting of the club, by a two-thirds vote of the members present; but no amendment shall be valid unless ratified at a subsequent meeting by a similar vote. Neither in a proposed amendment, nor in any other business meeting of the club, shall voting by proxy be permitted.

UNIFORM.

The uniform shall be dark seal-brown in color, and shall consist of jacket, shirt, breeches and stockings, and cap; the latter to have the club monogram in silver on the front or left-hand side. (The cap will be furnished to each member, without charge, on admission into the club; the silver monogram remaining the club property, and to be returned to the secretary whenever any member resigns.)

The jacket to be of the short reefer pattern, made to button close round the neck at will.

The shirt to be of brown flannel, with turn-down collar, and two or more breast-pockets, to be worn with a black-silk necktie.

The breeches to be of same material as the jacket, and to button round the leg just below the knee.

The stockings to be of brown wool. Yellow gaiters may be worn on cold or wet journeys.

Fine cotton corduroy as the material for the uniform,

and moderately thick boots with elastic spring-sides, are recommended.

By the by-laws of the Montreal Bicycle Club, for instance, the election of new members is by two-thirds ballot of the active members; and intending members are to ride with the club previous to election. The distinctive badges of the club are, (1) a silver beaver, to be worn on the left breast; and (2) the letters M. B. C. to be embroidered in white silk on the front of the cap; the uniform is a dark-blue knickerbocker suit, with fore-and-after cap of same color. No member to join any other bicycle-club in island of Montreal; and the signals to be given when riding together are after this simple code: —

"From the leader: *one prolonged whistle*, fall in and mount; *one distinct whistle*, single file; *two distinct whistles*, two abreast; *three distinct whistles*, dismount. From the rear: *one prolonged whistle*, decrease speed; *three prolonged whistles*, halt.

Club runs and meets will be a pleasant and important part of club action; and they should be carefully arranged for and appointed on such days and at such times as most of the members can attend. The rules above quoted, Article XII., sections 1 to 15, are very appropriate to be considered in this connection, and are substantially the same as those of the Cambridge University Bicycle Club. The directions and suggestions given elsewhere in this volume are, of course, also applicable here, and many others will be learned by experience.[1]

The runs should generally be circular, afford as

[1] Since this chapter was written, the Suffolk Bicycle Club has adopted the following rule: —

"8. An amateur is one who has never competed for public money, or with a professional for a prize, public money, or admission money, and who has never taught or assisted in the pursuit of athletic exercises as a means of livelihood."

much variety as possible, and, when practicable, associated with some collateral interest. Meets of different clubs should be carefully arranged for, and competently managed, and ought to be held in such places as to inconvenience the general public travel as little as possible.

Honorary memberships are well accorded only to those who have specially benefited, or whose influence and position qualify them for ornamenting and encouraging the interests of, the cause of bicycling.

Every member and all officers should take thought and pains to promote a healthful *esprit du corps* and brotherly co-operation and good feeling.

Below is an alphabetical list of the clubs in America, at this writing, given with such accuracy and fulness of details as the secretaries or other sources have enabled me. I can but regret that letters to the secretaries have failed to elicit seasonable response in two or three instances.

LIST OF CLUBS, OFFICERS, ETC.

BANGOR BICYCLE CLUB. — Bangor, Me. Organized August, 1878. A. E. Meigs, secretary (?). About 20 members.

BOSTON BICYCLE CLUB. — Boston, Mass. Organized 5 January, 1878. Uniform, seal-brown; colors, red, white, and blue ribbon; monogram, B. Bi. C., raised on silver star, worn on cap; motto, *pedibus bicyclus addidit alas.* 35 members. Officers: president, Charles E. Pratt; secretary and treasurer, Frank W. Weston (178 Devonshire Street); captain, Arthur Stedman; senior sub-captain, H. S. Mann; junior sub-captain, T. N. Hastings; club committee, president, secretary, captain, *ex officiis*, and Edward Preble, W. Farrington, J. G. Dalton, J. S. Dean.

BUFFALO BICYCLE CLUB. — Buffalo, N.Y. Organized 22 February, 1879. Number of members, 10 (only two of whom are less than six feet high). Color, blue. Officers: president and captain, G. F. Chavel; vice-president, Dr. H. T. Appleby; secretary and treasurer, John T. Gard (276 Main Street).

CAPITAL BICYCLE CLUB. — Washington, D.C. Organized 31 January, 1879. Uniform, navy-blue coat and cap, 8 members. Officers: president, ————; vice-president. Max Hausmann; secretary and treasurer, E. P. Einolf; captain, H. S. Owen (428 M Street, N.W.).

ESSEX BICYCLE CLUB. — Newark, N.J. Organized 8 March, 1879. Number of members, . Officers: president, Joseph Lafon; secretary and treasurer, Herbert W. Knight (766 Broad Street, Newark); captain, Llewellyn H. Johnson; senior sub-captain, Charles A. Knight; junior sub-captain, Sandford B. Pomeroy; guide, Wilson Farrand; bugler, William P. Field; club counsel, Walter J. Knight.

FITCHBURG BICYCLE CLUB. — Fitchburg, Mass. Organized 21 February, 1879. 6 members. Officers: president, W. W. Clark; treasurer, E. L. Caldwell; secretary, George A. Wilson.

MASSACHUSETTS BICYCLE CLUB. — Boston, Mass. Organized February, 1879. Uniform, brown suit and cap. 17 members. Officers: president, Albert A. Pope (87 Summer Street); vice-president, H. W. Warren; secretary and treasurer, Howard E. Parkhurst; captain, E. W. Pope; senior sub-captain, Joseph P. Livermore; junior sub-captain, C. H. Carkin; club committee, president, secretary, captain, *ex officiis*, and F. W. Freeborn, W. S. Slocum, W. H. Ames.

MONTREAL BICYCLE CLUB. — Montreal, Canada. Organized 2 December, 1878. Number of members, 10 (?). Badges, &c., see p. 183. Secretary, Horace S. Tibbs (Box 1733.)

SALEM BICYCLE CLUB. — Salem, Mass. Organized 14 March, 1879. Number of members, 12. Costume, gray cap, shirt, blouse, and breeches, trimmed with blue, and blue stockings. Badge, narrow alternate gray and blue ribbon (4) held by round silver pin with monogram. Officers: president, A. L. Huntington; vice-president, J. H. Southwick; secretary, Dr. C. A. Buxton; treasurer, A. J. Philbrick; captain, F. M. Paine.

SAN FRANCISCO BICYCLE CLUB. — San Francisco, Cal. Organized 1878. Colors, blue and white. About 12 members. Officers: president, R. de Clairmont; secretary and treasurer, Charles L. Barrett; captain, G. L. Cunningham (206 Sansome Street); sub-captain, G. H. Strong.

SUFFOLK BICYCLE CLUB. — Boston, Mass. Organized 8 April, 1878. Uniform, gray suit, polo cap with monogram stitched on front; for summer, light straw hat, with band of alternate red and black stripes. 42 members. Present officers (elected semi-annually): president, Alfred D. Chan-

dler; secretary and treasurer, F. Elliot Cabot (42 Thayer, Harvard University, Cambridge, Mass.); captain, John C. Sharp, jun.; sub-captain, G. Tappan Francis; directors, George E. Cabot, Russell S. Codman, Charles P. Curtis, jun., Albert W. Iasigi, Arthur R. Sharp.

WORCESTER BICYCLE CLUB. — Worcester, Mass. Organized 9 April, 1879. About 12 members. Officers: president and captain, Fred S. Pratt; sub-captain, William H. Pearce; secretary and treasurer, George M. Doe.

NOTE. — The number of members is given above as returned by the secretaries, or found otherwise, prior to the middle of March, 1879; since that time their membership has largely increased, until, as I am informed, one club contains about seventy members, and others much larger numbers than the above figures indicate. As the season will have fairly opened when this book comes to hand, the reader may safely double the membership number for most of the clubs.

XII.

REVIEW OF 1878.

Despise not the day of small things. — *Adage.*

THE past year, like the preceding, has been one of beginnings. It opened, as we have seen, with one importing firm, one riding-school, one club, one experimental journal, and a dozen riders devoted to the interests of bicycling, but with promises of development which have been more than realized. These realizations have, in part, been already referred to in previous chapters; but it may be of some interest to glance at a brief summary of the year's progress. This review will extend to the 1st of March, 1879, because that is when the season proper for bicycling on the road commences in our northern sections; and because, if the reception of this epitome of bicycling information be encouraging, it may be issued in whole or in part, with revision and additions, as an annual at about that time.

The first notable impulse to the cause in hand last year was given by the Boston Bicycle Club runs, which began on the 9th March, 1878, were continued weekly until late in July, and were resumed in the fall. They commenced from the square in front of Trinity Church, in Boston, and extended in various directions through many towns, and were witnessed

by large numbers of people. As many as two thousand persons assembled at one time at the place of starting alone; and it was usually the case that sufficient space for a mount could only be reserved by the efficient aid of the police. These were supplemented by runs of the Suffolk Bicycle Club after its formation, and in the fall one or two successful meets of the two clubs were effected at the same place.

The daily and weekly press has favored the newcomer, not only with full reports of these runs and other achievements with respect to it, but by giving generous space to contributed and editorial articles, and by furnishing to the public, from time to time, much valuable descriptive and statistical information. Some of the weekly papers now give a regular column to bicycling news as they do for the turf, the diamond-field, or the oar.

The tentative "American Bicycling Journal" did not evanesce like "The Velocipedist" of earlier date, but has found a permanent place as the organ and authority of its chosen sphere; and its issues, suspended only for the brief quiet season in the summer, disseminate the infectious enthusiasm and reliable facts and diverting fancies of bicyclers to thousands of readers.

Riding-schools have been opened, not only to the number of four or five in Boston, but in many of the principal cities and towns of the country, where the use of the machine is rapidly and efficiently taught; and agents have exhibited the capabilities of the silent steed from Bangor to San Francisco.

The enterprise of the Pope Manufacturing Company has been shown, not only in wide dissemination of bicycling literature in various forms, sending out of agents, liberal aid and encouragement of races, and the supply of excellent machines; but also in

establishing a liberal and adequate plant of expensive machinery for the home manufacture of the vehicle which their efforts have helped to make a necessity of modern life. One of the chief events of the year is the turning out and placing upon the market of their "Columbia" roadster, a heliograph of which is given opposite p. 36.

It has been proved a good, strong, and reliable machine, by practical use from Maine to Colorado, and from Ohio to Georgia; and its appearance is an event which not only does credit to American skill and enterprise, but also makes it possible for the bicycler or the would-be bicycler to provide himself with a satisfactory roadster at twenty per cent less expense and without delay.

Cunningham & Co. have also, during the year, added to their facilities for supplying imported machines, and have also carefully observed the needs and the preferences of expert riders. In endeavoring to meet these, and to place a more perfect bicycle before the public, they have introduced the "Harvard:" this is described and shown on pp. 36, 37. Experienced riders and racers will thank the firm for these advances.

Amongst minor improvements introduced during the year, may be mentioned the new cyclometer of the Pope Manufacturing Company, a description and cut of which are given on p. 72, and which is better and cheaper than any thing yet. Also the "Harvard Handle-bag," a boon for tourists, or those whose rides involve the staying over night, and which is especially adapted for the "Harvard" and the "Columbia" bicycles: it is capacious, compact, out of the way of every thing, and is described on p. 68.

The formation of clubs has been another feature of progress, and has kept pace proportionately with

the increase of riders, especially during the last part of the year. These augur well for permanency: for sporadic riders may be drawn off by other attractions; but the clubs form safe bridges over the summer dispersion to the water and the mountains, and over the winter snow. These have appeared as far north as Montreal and west to San Francisco, and a summary of them is given in another place.

The institution of club-races by the Boston Bicycle Club is an auspicious precedent, and has developed the fastest riding of the year; Mr. Agassiz' mile from scratch in 3.21½ comparing creditably with the best amateur performances abroad, and being at the rapid rate of 17.87 miles an hour on a road. His twenty miles in 1.46.45, however, although the fastest long-distance time recorded here, does not compare so well with foreign accomplishments, being at the rate of 11.25 miles an hour; but this was on a country road, without competition, and against a considerable wind.

Mr. Pitman's mile in 3.45, with flying start, is the fastest professional time made here during the year, and is at the rate of sixteen miles an hour. He has yet ridden no longer race than five miles; this was in 21.27, a rate of 13.9 miles an hour.

The most notable thing about the races, however, is that they have been promptly instituted under various auspices, and accorded a favorable recognition by the public. Besides the club referred to, the Harvard Athletic Association, the New York Athletic Club, the Middlesex South Agricultural Society, the Maine State Fair, the Plymouth Agricultural Society, the Middlesex Agricultural Society, the Farmers' Association (at Attleborough, Mass.), various city authorities, the Hebrew Fair in Boston, the Scottish-American Athletic Club (of New York), and other patrons of public entertainments and

diversions, have given the sport the prestige of their patronage, with satisfactory results.

A most notable long ride, and really remarkable if the distance was accurately measured, and the time correctly taken, occurred in Washington, D.C., in February, 1879, where C. Krauskoph and Frank Wood entered into a scrub-race on the streets, from Fourteenth and K, up K to the Circle, down Vermont Avenue to Fourteenth Street, and up Fourteenth to K Street, Krauskoph winning, 100 miles in 7 hours. That is faster than any amateur time before made anywhere, and beats the best twenty-four London Bicycle Club men, as will be seen on a subsequent page.

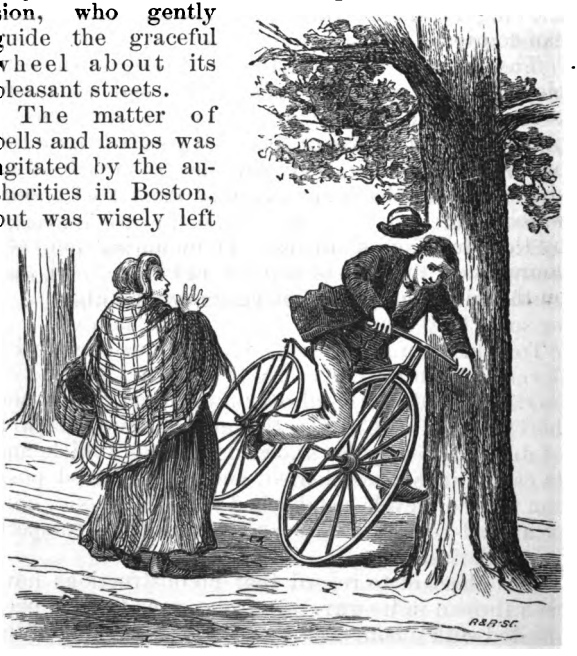
Excursions and short tours taken during the year presage well also for something more extended and mentionable during the coming season, and the plans for some long tours have already been matured.

To sum up in a sentence: the year has closed with eleven clubs formed, over five hundred registered riders distributed nearly all over the United States and the Dominion of Canada, the manufacture here well established, a popular knowledge of the vehicle and its capabilities disseminated, and a recognized position for the bicycle established with the public, both as a road-vehicle and as an instrument of competitive athletics.

It is pleasant to record that no obstructions have been thrown in its way. Detroit seems to have been infested with "bone-shakers;" and the coming of the wise men from the east on bicycles appears to have revived the use of those ill-starred velocipedes there, even to the extent of thousands (one bicycler reported three thousand to be in use there). These infested the sidewalks to such an extent, that the mayor and city council were greatly agitated over the subject, and were disposed to exterminate them

and every thing resembling them. The popular sentiment restrained them, however. The bicycle has begun to supersede them; and Detroit leads the country in having (as reported) an aristocratic lady-bicycler, with a coterie of companions in the diversion, who gently guide the graceful wheel about its pleasant streets.

The matter of bells and lamps was agitated by the authorities in Boston, but was wisely left



END OF THE VELOCIPEDE.

to the self-preservative interests of the bicyclers themselves, and the popular reasonableness and indulgence.

Very few accidents have occurred, which may be summed up fairly and fully, I believe, as follows:

one person run against; one runaway of horses and smash-up of carriage; one assault on a bicycler by a mistaken policeman; and two serious accidents to riders. For a year and a quarter of riding by hundreds of riders, this is certainly not a dangerous showing for the machine, and does credit to American courtesy.

The popular apprehension in advance, that the bicycle would frighten horses, has been practically overcome and proved groundless. The intelligent public has recognized the fact that drivers and riders of horses have, neither by law nor reason, any exclusive rights in the highways, and that this danger, which is of very small proportions, is to be averted by the education of horses, and by mutual care and courtesy on the part of drivers and riders of horses on the one hand, and of bicyclers on the other.

XIII.

FOREIGN SUMMARY.

He would tell the noble deeds of England. — *Geoffrey.*

THE doings of our transatlantic brethren can only be looked at here in bird's-eye view.

The chief event of 1878 was the formation of the Bicycle Union, in Great Britain, of which the first meeting was held on the 16th February.

At this meeting the objects of the Union were expressed in the following unanimous resolutions: —

"That the 'Bicycle Union' shall be a means by which bicyclists can co-operate together (by representation) for the following and other purposes: —

"1. To secure a fair and equitable administration of justice as regards the rights of bicyclists on the public roads. 2. To watch the course of any legislative proposals in Parliament or elsewhere, affecting the interests of the bicycling public, and to make such representations on the subject as the occasion may demand. 3. To consider the existing relations between bicyclists and the railway companies, with the view of securing, if possible, some modification of the present tariff for carriage of bicycles, and greater security in their conveyance. 4. To examine the question of bicycle-racing in general, and to frame definitions and recommend rules on the subject. To arrange for annual race meetings, at which the amateur championship shall be decided."

It is composed of representative active members of a large number of clubs, accredited delegates from which form the acting body of the Union, under

the title of "The Council of the Bicycle Union." The definitions and recommended rules adopted have been given on other pages. It has had occasion to do active work in carrying out the other objects referred to, during the year, and has met with success in all. It also instituted a competition between professionals and amateurs, the first and only one of the kind that has occurred; and in it Hon. I. Keith-Falconer bore off the honor from J. Keen. The race was for five miles; and the former won in 15 m. 13⅖ s., the fastest time on record, the last quarter-mile being at the rate of twenty-three miles an hour. The winner is a young man about twenty-two years of age, still a student at Cambridge University, in the department of theology, and is a distinguished Hebrew and Greek scholar; he is not only the most accomplished and honored of amateur bicyclers, but has won several first prizes in scholarly competitions. He won the two-mile championship of the Bicycle Union; but A. A. Weir won its twenty-five-mile championship against Falconer and others.

Wonderful times and distances have been made on road and path, requiring almost a complete change in the previous lists of fastest times. One of these is F. E. Appleyard's 100 miles in 7 h. 18 m. 55 s., the actual riding time being 6 h. 48 m., on the Bath road. H. Osborne's Surrey-road race of thirty-eight miles in 2 h. 18 m. is another. Derkinderen has also performed some astonishing feats, as shown in the list on p.154. So is Frank White's 152 miles, without dismounting, in very rapid time. G. P. Coleman did 100 miles at Alexandra Palace, in 7 h. 25 m. 20 s., making the last quarter-mile in 39⅘ seconds, almost equal to Falconer's rate.

Among the professionals there have been lively times also. J. Keen, at Lillie Bridge, taking

scratch, and giving other competitors from three to seven minutes' start, won a twenty-five-mile race in 1 h. 23 m. 43 s.; and again beat Stanton and Phillips on the same distance, in 1 h. 20 m. 37 s., the fastest time for that distance yet. He also competed at Agricultural Hall, against two trotting horses relieving each other, in a twenty-mile race, and won. He was beaten by Cooper, however, in a race for the one-mile championship; winner's time, 3 m. $\frac{3}{5}$ s. Keen also ran eighteen miles three hundred yards in one hour, against time, on the C. U. Bi. C. grounds; and competed, on eighteen and a half miles, against Perkins the pedestrian (walking) on eight miles, and won; their time being 1 h. 36s. and 1h. 3 m. $1\frac{3}{4}$ s. respectively.

D. Stanton rode ten miles against three trotters, and won in 36 h. 2 m., by seven hundred yards; and one thousand miles in Agricultural Hall, London, in six days time, 104 h. 24 m. 24 s. actually in saddle. This last effort was eclipsed, however, in the six days' competition which took place on the same track, in November, where W. Cann won over Keen, Stanton, Edlin, Terront, Phillips, Lees, and six other professional riders. The riding time was limited to six days, eighteen hours each day, between 6 A.M. and 12 P.M.; the prizes were a gold medal and £100 to the rider who should cover the greatest distance; a silver medal and £25, to the second; £15 to the third; £10 to the fourth; and £10 was offered to each who should cover nine hundred miles, and £5 to each who should cover six hundred miles, without winning a prize.

The riding began at six A.M. on the 18th November; and the miles covered by each of the first eight on each day of riding are as follows: —

NAME.	1ST DAY.	2D DAY.	3D DAY.	4TH DAY.	5TH DAY.	6TH DAY.	TOTALS.
W. Cann. . . .	226.23	196	191	184	149	114.43	1,060.66
R. Edlin	201	194	191	181	149	109	1,025
G. Lees	186	164	160	180	140	122	952
T. Andrews . .	202	167	151	152	138	118	928
C. Terront . . .	124	179	166	139	131	161	900
J. Higham . . .	167	143	117	113	90	87	707
A. Evans . . .	182	111	67	120	120	104	704
D. Stanton . . .	214	138	48	–	–	–	–

The hall afforded a course of seven and a half laps to the mile (too short for high speed), and space for a large assemblage of spectators. It was watched with intense interest. Cann's accomplishment was the greatest on record in the aggregate; the distance of 1,000 miles was ridden in 95 h. 42 m. 9 s., including short stops; 226.53 in 18 hours; and 200 miles in 15 h. 38 m. 45 s.; whilst he rode within three of 800 miles in four 18-hour days; five remarkable feats. Stanton scored 100 miles on his first day in 6.46.20, without a dismount, also a "fastest on record." Mr. Cann is twenty-five years of age, five feet eight and a half inches tall, and weighed one hundred and forty pounds. He lost seven pounds in weight during the contest, but completed it in good condition, as did the others.

Indeed from this, as from all bicycling races, the absence of painful and brutal conditions and merciless forcing to work, attendant upon long pedestrian contests, were wholly and conspicuously absent.

The machines used were as follows: by Cann, a 52-inch "Stanley" roadster, weight 40½ lbs.; by Edlin, 52-inch "Emperor," weight 25 lbs. 10 oz.; by Terront, a 50-inch of Truffant of Tours; by Stanton, a 56-inch "Humber;" by Keen, a 56-inch "Eclipse."

On June 10, the London Bi. C. instituted a race on the road between Bath and London, in which twenty-four members competed, and ran the whole distance. The prizes were medals. The distance was 100 miles. The times of the first six men (including stops) were as follows: —

	H. M. S.
Appleyard	7.18.55
Thorn	7.24.57
Coleman	7.25.20
Butler	7.30.28
Dalton	7.35.59
Walmesley	7.36.23

and the time of the last man of the twenty-four was 9.5.35.

The race for the amateur championship of Scotland (first held by McGregor) took place on the Linlithgow road, July 11; the course was ten miles, and ten competitors craved the prize, a cup valued at fifteen guineas. J. S. Purdie won in 32 m. 52s., within 27 seconds of the fastest time on record. And Terront's five miles in 14.20, the quickest ever recorded, should not be overlooked.

In touring, the accomplishments abroad have been even more interesting. Nearly all over England, Wales, and Scotland; from Cambridge to Nice and return; from London to Paris and return; from Leipzig to Dresden; from Le Val de Joux to Geneva, — and many other tours of interest and magnitude have been taken.

The Baron de Graffenried and M. A. Laumaillé, both of Paris, left that city on the 16th March, and returned on the 21st April, making in forty days a tour through the west, centre, south, and south-east districts of France, and through Northern Italy and Switzerland, about 900 leagues. Thirteen days were spent in visiting and seeing principal cities, and twenty-seven days in riding, at an

average rate of 33⅓ leagues, or about 92 miles a day. The baron is about sixteen years old; and M. Laumaillé is an accomplished traveller, having in the last ten years ridden in all about 27,000 leagues on the bicycle.

The annual meet of the bicycle-clubs of England occurred on the 18th May last: it was attended by 76 clubs, represented by 1,050 members, and by 650 "unattached" riders, who were marshalled into line, and formed the imposing army of 1,700 bicyclers mounted and spinning in one body. This is an institution of great public interest, and, though under disadvantages of rain and mud and wind, was attended with the usual excitement and by a greater concourse of spectators than that of the year before.

Although eclipsed in its general results by the six days' competition in November, the contest of last May (commencing with the 18th) was one of the most interesting of the year. It, too, was for six days of eighteen hours each; and the competing of horsemen with relays was a peculiar feature. Leon the Mexican rider, with nineteen horses relieving each other, won; and the distances of the first four were: —

J. Leon (with 19 horses)	969 miles.
W. Cann (with bicycle)	910 "
F. White (with bicycle, 150 miles without dismounting)	864 "
Phillips	850 "

XIV.

LITERATURE.

Nec mora, nec requies. — *Vergilius.*

THE printed sources of information and the special literature on the subjects of which this little book treats, and which have been consulted in its preparation or previously by the author, are mostly included in the following list. They are given a place here for the double purpose of completing the general plan of the present work as a reference-book, and of encouraging its readers to find for themselves many facts and details necessarily omitted here, as well as the current future record as it is made. For of this sport, or interest, as of others, the better informed one is, and the more and fresher intelligence he has about its development, the intenser is his enjoyment.

The French, English, and American patent specifications from 1790 to 1879.

The price-lists and catalogues of manufacturers and dealers, American and foreign.

THE AMERICAN BICYCLING JOURNAL. 178 Devonshire Street, Boston. Semi-monthly heretofore, and intended to be weekly. Price, 10 cents a single copy; $2.50 a year of 52 copies. Edited by Frank W. Weston, B. Bi. C.

THE BICYCLING TIMES AND TOURING GAZETTE. East Temple Chambers, Whitefriars Street, London, E.C., Eng. 4to, 10 pp. (with advertisements, 20 pp.), weekly. Price, 3*d.*

a copy. Particularly good for club doings, and portraits of bicycling celebrities, with sketches.

THE BICYCLING NEWS. 13 York Street, Covent Garden, London. Weekly. 4to, 12 pp. Price, 2*d.* a copy. Most valuable part is its correspondence.

THE BICYCLE JOURNAL. 14 St. Bride Street, Ludgate Circus, London, E.C. Weekly. Small 4to, 12 pp. Price, 1*d.* a copy. Specialty is racing news.

THE BICYCLE GAZETTE. Monthly. London and Coventry.

CYCLING. A monthly magazine of bicycling and tricycling. W. D. Welford, manager, 66 Gray Street, Newcastle-on-Tyne, Eng. Small 4to, 16 pp. Illustrated. Price, 3*d.* a copy.

THE BICYCLE ANNUAL for 1877. "Bicycling Times" office, as above given. Edited by C. W. Nairn and C. J. Fox, jun. 8vo, about 100 pp. and advertisements. Miscellaneous contents. Price, 1*s.*; by post 1*s.* 2*d.*

THE BICYCLE ANNUAL for 1878. In same series with above, but different miscellaneous contents, and portrait of J. Keen. Price, description, and address as above.

THE BICYCLE ANNUAL for 1879. Description, address, and price as above; same series. Contents: Portrait of Fred. Cooper; Review of the year 1878 (brief); Diary for 1879; Map of England, Scotland, and Wales, with bicycle routes; one hundred and eleven bicycling routes, with distances; Racing of 1878; Club Directory, &c. A small edition of this is bound with their catalogue, and issued by Pope Manufacturing Co., 87 Summer Street, Boston.

THE BICYCLE for 1874 (also the same for 1876, 1877, and 1878, with different contents for each year, the earlier ones being the more valuable; the latter ones having less pages). Address "Bicycle Journal" office as above. 8vo, 250 pp. Price, 1*s.*; by post 1*s.* 2*d.* Price of the later ones, 6*d.*, by post 7½*d.*

THE BICYCLIST'S POCKET-BOOK AND DIARY for 1878. London. "The Country" office, 170 Strand, W.C. 2¾ x 4¼ inches, fine paper. 167 pp., neatly bound in morocco, with pencil and pockets. Contents very well chosen and valuable. Price,

The same for 1879.

The *daily newspapers* of Boston during 1878; and among weeklies, "The (Boston) Sunday Herald," "The Scientific American," "Forest and Stream," and "The Spirit of the Times."

THE "INDISPENSABLE" BICYCLIST'S HANDBOOK. By

Henry Sturmley, W. B. C. (of Weymouth, Eng.). Weymouth: H. Wheeler, County Library, St. Mary Street. July, 1878. Narrow 4to. 233 pp.

THE VELOCIPEDE. By J. T. Goddard. New York: Hurd & Houghton, 1869. Illustrated. 12mo. Racily written, and good for the date; but only valuable in a historical view now.

THE MODERN BICYCLE. By Charles Spencer, London. F. Warne & Co. 1870. Illustrated. This has passed through two or three editions, but is meagre, and relates to the "bone-shaker."

A POCKET MANUAL ON THE BICYCLE. Hamilton Adams & Co., 1878. English. 3½ x 5 inches; pp. 32.

BICYCLES OF THE YEAR 1877. By Harry H. Griffin. "Bazaar" office, 170 Strand. 5 x 7½ inches; pp. 32.

THE GUARDIANS. By "Ixion." "Bicycling News" office. A burlesque with parodies, &c. Price, 6*d*.

KNIGHT'S MECHANICAL DICTIONARY, *sub voc.* "Velocipede."

ENCYCLOPÆDIA BRITANNICA, *sub voc.* "Bicycle."

Law reports, statutes, ordinances; treatises and text-books on mechanics, mechanism, and training; maps; and other sources of information on related subjects generally.

A useful little book, not only for the bicycler as such, but for every one who wishes to be "in good condition," is —

EXERCISE AND TRAINING. By C. H. Ralfe, M.D. New York: D. Appleton & Co., 1879.

Into music the bicycle has already been adopted, in several original compositions; and the muse of song has often been invoked in its behalf. The rhythm of its motion, the charm of the new world which it opens, and the glowing spirit of youthfulness which it brings to its *favoris*, inspire many a mute Milton or unsuspected Holmes to essay poetic praises in metric strain. As on pigskin and pedal he teases the light breezes of heaven, flirts with the sloping hills, and spins through the smiling valleys, surprising Nature in her morning and evening charms, every man is a poet. But the written effusions thus

far appearing leave occasion to remark that the bicycle has yet to be invested with the caparisons of pure literature, and to hope that it will soon find such recognition of the gifted as will place it among immortal chariots of poetry and art.

XV.

INDEX.

THE END.

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(*See Cut on page 22.*)

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