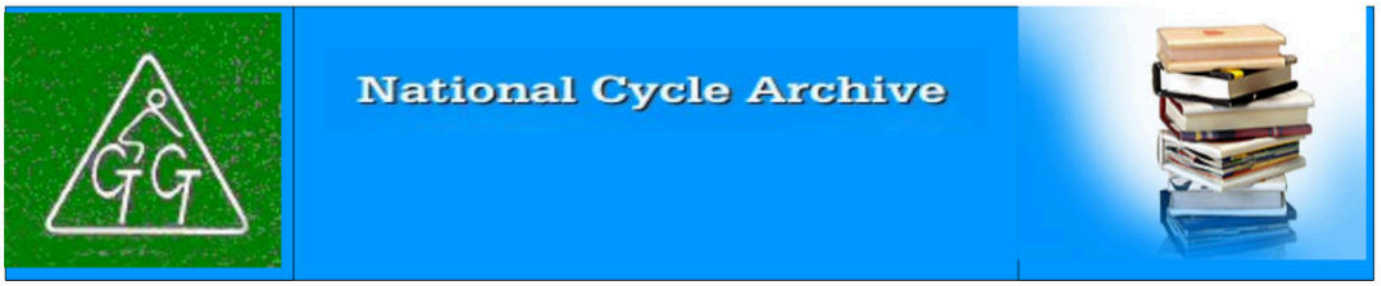
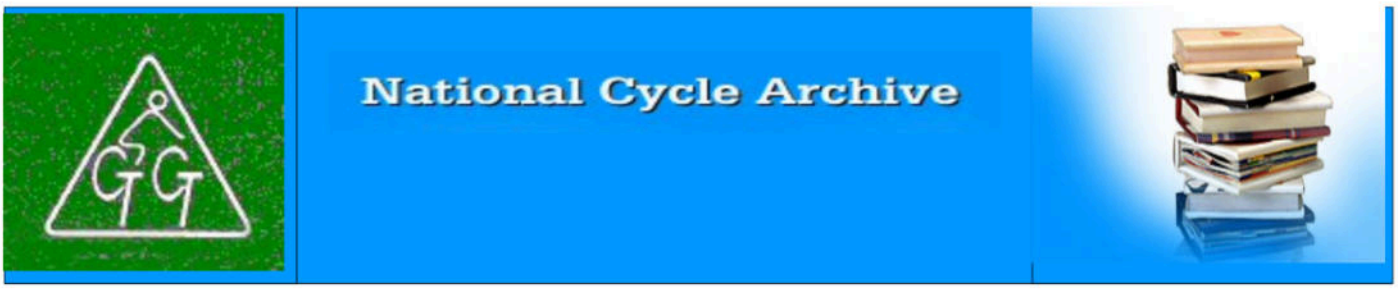




"THE TRADER" REPAIRERS' SUPPLEMENT—2

# Costed Cycle Repairs

**The first published hints on accurate costing of repair work. A valuable guide for all dealers**

VERY little has been published on the subject of the actual cost of cycle service, and there must be many traders who guess at a price to charge the customer rather than endeavour to estimate accurately the actual cost of the time which they and their mechanics expend on the various jobs entrusted to them.

## An Easy Trap

It is probable that this state of affairs exists, because the vast majority of the jobs which the average dealer encounters are extremely simple, and can be carried out in a short space of time by comparatively unskilled labour. The cost to the customer must, therefore, be reckoned in pence rather than in pounds and shillings, so that it is fatally easy to fall into the trap that consists of thinking that a penny or two either way is of little moment.

If an analysis is made of what is probably the most common job of all —the repair of a puncture—it will be found that even the simplest type can only just be done at a profit at the normal ruling price of sixpence. And yet sometimes we hear of dealers doing this job for 3d. How much are they out of pocket if, as sometimes happens, a lifted patch causes a tremendous waste of time before the source of the trouble is traced?

## Alternative Courses

Taking this example as typical of many of the simpler low-priced jobs where "snags" may continually be encountered, it is obvious that the dealer can adopt one of three courses. First of all, he can analyse his costs, add a useful margin for possible snags, and fix his standardised charges accordingly. Alternatively, he can charge for the exact time expended so that his bill varies with the difficulty of the job, whilst the third method is to fix his charges for the simple jobs at a round sum which is just as large as the business will bear.

In the first case—i.e., taking the rough with the smooth and charging an average price for any given job—his price is likely to cause dissatisfaction amongst his customers, and this, too, applies if he charges for the actual time spent when unexpected difficulties crop up. In the third case, he will make a definite loss on those jobs revealing unexpected difficulties.

This loss must be made up or allocated elsewhere, and here again there is a choice of two methods of dealing with the loss. The first is to regard the repair shop as an entirely self-contained unit, which must pay its way and carry its fair share of overheads, and the second is to charge the loss on simple jobs as publicity expenditure, and allocate it accordingly so that the loss is included in another set of accounts. If the workshop is to be regarded as being self-contained, then the more "ambitious" jobs must be "loaded" to carry the losses.

## Overheads

But to find out which jobs are profitable and which are not entails the establishment of a close system of control which many dealers are unable or unwilling to adopt. A certain proportion of the overheads—rent, rates, light, heat, etc.—must be allocated to the repair shop, and the sum total of this allocation, plus an allowance for depreciation and loss of tools, assessed in pounds sterling, divided by the total takings of the repair shop, gives the fraction which must be added for overheads to the actual cost of each job.

It is obviously impossible to quote an exact figure for this fraction. In many cases 100 per cent. is taken as a fair approximation. Similarly, with regard to wages, these vary between very wide limits represented by the unskilled boy in a country repair shop, and the really skilled mechanic in a London district. To arrive at a useful approximation we have invited several of our readers in widely separated parts of the country to give us their views as to the figure which should be charged to the customer. The average thus arrived at is 2s. 6d., per hour, which includes mechanics' wages and overheads.

But it should be remembered that it is only an average figure and that each dealer should endeavour to find the exact figure which suits his conditions. Thus if he allocates £100 per annum to his repair shop for rent, rates, light, heat, depreciation, and loss of tools, and the mechanic's time spent on various jobs throughout the year amounts to £120, 80 per cent. must be added to the time spent on any one job.

## A Standard Figure

Assuming that a job takes one hour's time of a mechanic who is paid 1s. 3d. per hour, then the labour cost charged to the customer would be:

$$\frac{15 \times 180}{100} \text{ pence} = 2/3.$$

Nevertheless, for the purpose of giving approximate costs, we will take 2s. 6d. as a standard figure. This done, we are faced with yet another variation—that of individual skill and speed. In an endeavour to reach an "average" figure, as in the case of the cost per hour, "The Trader" has employed a mechanic who is quick and skilful, turning out at all times a good job. From this one would expect the times given in this forthcoming series of articles on "Costed Repairs" to be rather on the low side. That would indeed be the case but for the fact that he is normally employed on motor car service and is consequently comparatively experienced in cycle repair work. The actual times returned can thus be said to represent a fair average.

## Against the Watch

On the following pages are given the first of a series of "Costed Repair Jobs." In each case the job has actually been carried out against the watch and the time taken noted down. In most cases the method to be adopted, the tools required, and the material cost is also noted, whilst where necessary the points to be watched and any special tools which facilitate the work are also described.

*COSTED CYCLE REPAIRS—continued*

# Wheel and Tyre Repairs

Coming as it does into intimate contact with a road surface which is not always smooth, it is not surprising that the wheel and its tyre are more frequently the subjects of the repairer's attention than are any other parts of the bicycle. Bearings, spokes, rims, covers, and tubes all require periodic attention and are all too often neglected by the rider.

For this reason the opening part of our "Costed Cycle Repairs" series is devoted to the attention which is from time to time required by these hard-worked components.

## PUNCTURE REPAIRS

TO inform our readers as to the proper methods to be employed in repairing a puncture is ridiculous, and yet the time taken may prove a surprise. The job was done on a wheel with a 28in. × 1½in. tyre and a Westwood rim on which worked a stirrup-type brake. The wheel was not removed in the first case since the puncture was easily traced:

| | |
|---|---|
| *Time taken, 7 minutes* | 3½*d.* |
| *Patch, say* ..... | 1*d.* |
| *TOTAL* ..... | 4½*d.* |

Another case representing a more difficult job was taken. Here the brake was disconnected, the wheel removed, and the tube completely detached from the rim. It was then re-inflated, tested in water, an old patch removed and replaced by a new one. The old patch was removed by petrol soaking. The time given below includes removing and replacing the wheel as well as the testing, patching, and retesting of the tube.

| | |
|---|---|
| *Time taken, 19 minutes* | 9½*d.* |
| *Patch, say* ..... | 1*d.* |
| *TOTAL* ..... | 10½*d.* |

## REFITTING SPOKES

Next to punctures, spoke breakages are obviously the most common small job. Here again two cases were taken.

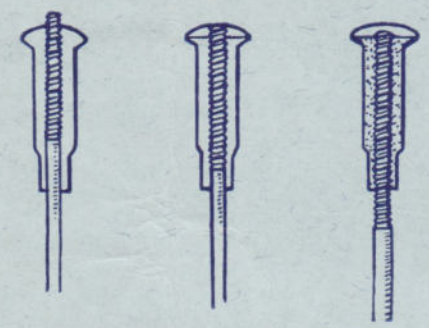
In the first case the nipple appeared to be in good condition and the two parts of the broken spoke easily removed. A new spoke was measured against the broken one, adjusted for length by cutting ⅛in. from the end, and treaded into place. The tyre was deflated but not removed.

| | |
|---|---|
| *Time taken, 4 minutes* | 2*d.* |
| *New spoke* ..... | ½*d.* |
| *TOTAL* ..... | 2½*d.* |

In the second case both spoke and nipple were replaced and a spoke of excessive length adapted by measuring the required length, cutting off and running a spoke die down the thread to give the required thread length. One side of the cover was removed and the rim tape lifted.

| | |
|---|---|
| *Time taken, 11 minutes* | 5½*d.* |
| *Spoke and nipple* ..... | ½*d.* |
| *TOTAL* ..... | 6*d.* |
| *Each additional spoke* | 2*d.* |

*Points to watch* when fitting new spokes is to see that the neck length suits the hub flange width and that



**The centre sketch shows how the spoke should fit the nipple.**

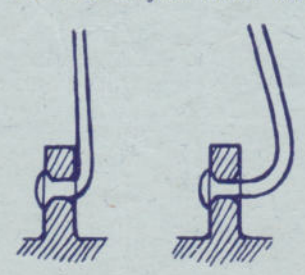
the total length of the spoke is correct, whilst the thread length is also important.

If the neck is too long the radius will not allow the spoke to lie snugly against the hub flange, so that a certain amount of "spring" will be permitted and the consequent flexing will soon lead to fracture. The neck, together with its radius, should be firmly supported by the hole and countersink in the hub flange. One of our illustrations shows the right and the wrong way for the spoke to lie in the hub flange.

Similarly at the nipple end. The nipple thread is cleared away at the mouth to the diameter of the spoke. The length of spoke should be such that the end is just flush with the nipple head, whilst the thread length should be such that a small portion of the full diameter of the spoke should coincide with the cleared portion of the nipple. These instructions, of course, apply when the spoke is fully tensioned.

An illustration shows a correctly fitted spoke and two other examples showing the faults mentioned above.

*Tools Required.*—Cutters (4s. 6d. to 5s.) or fine-toothed hacksaw, spoke dies (1s. 7d. each), spoke key (6d. to 1s. 9d.).



**Correct (left) and incorrectly (right) fitted spokes**

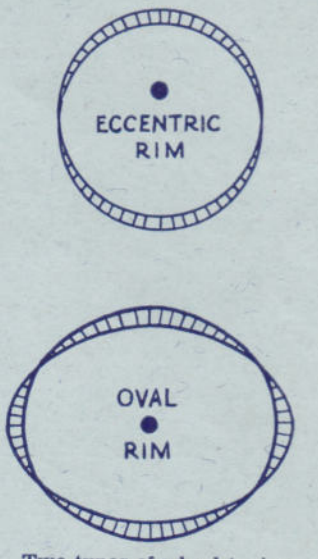
## TRUING RIMS

It is quite useless to try to correct a badly distorted rim by straining on the spokes. Even if some semblance of circularity and truth is obtained, spoke tensions will vary so much that breakages will occur and the wheel will soon lose its truth.

Minor deviations can, of course, be readily cured by altering spoke tensions, and the following example will show the time taken to remove a lateral "wobble" of ⅛in. in a 28in. wheel.

| | |
|---|---|
| *Time taken, 20 minutes* | 10*d.* |
| *TOTAL* ..... | 10*d.* |

Here are some pointers when truing




**Two types of wheel truing**

a wheel with an apparently sound rim:—

OVAL WHEEL.—Release tension of spokes on both sides of wheel at the extremities of the smallest diameter. These spokes should be slackened most. Reduce tension of spokes on each side by gradually decreasing amounts until a point on the rim 45 degrees each side of the smallest diameter, then continue increasing tension, reaching a maximum on the original greatest diameter.

ECCENTRIC WHEEL.—Release tension of spokes on both sides of the

## COSTED CYCLE REPAIRS—continued

rim where the radius is smallest; graduate the amount of tension released down to zero at 45 degrees on each side of this point; tighten two spokes at point diametrically opposite to original smallest radius until wheel is nearly true. Finally tension any slack spokes and recheck.

LATERAL "WOBBLE."—Release spokes on high side of rim and slacken those on the low side until wobble disappears.

*Tools Required.*—Wheel truing stand (see following page); spoke key.

## STRAIGHTENING RIMS

A dented rim is a comparatively common occurrence, and yet it can be one of the most unpleasant happenings from the point of view of the rider, since where a stirrup or caliper brake is used the resultant roughness of the braking may be highly dangerous.

It is difficult to give useful information on this subject, since no two dents are the same, but a safe rule when dealing with rims is to throw the hammer away and use screw-applied pressure rather than heavy blows. The brake track is, of course, the part of the rim where truth is most required.

### A "Flat"

The job undertaken was the rectification of a "flat" on a Westwood rim. The flat was $\frac{1}{8}$in. out of the true circular form at its maximum point and about 3in. in length. The method adopted was to cut a baulk of hardwood in a concave arc of a radius slightly less than the outside diameter of the rim. Another and smaller piece of hardwood was shaped to fit the inner surface of the rim. (In the time given below the period spent making these is not included.

The wheel was removed and also the tyre and tube, two spokes were removed by the "flat" and the rim placed between the two pieces of hardwood, both of which were cramped tightly in the vice, thus moulding the rim to the shape of the concave arc in the hardwood. This removed the flat but "spread" the rim slightly, and this was rectified by pressure between soft jaws in the vice.

The wheel was then retrued and all parts replaced.

*Time taken, 48 minutes* 2s.

*TOTAL* ..... 2s.

Similar jobs on Endrick rims are not so frequently called for, since they are invariably used with caliper brakes, where a "flat" is not so serious. We hope, however, to deal with straightening Endrick rims in a later issue.

## ADJUSTING WHEEL BEARINGS

Plain adjustment is, of course, a matter of moments, and the cost to the customer is negligible. Thirty seconds is probably a fair time for the job.

Dismantling a front or single-speed hub is also simple and takes little time. As a test a front hub was dismantled, thoroughly cleaned, examined and adjusted.

*Time, 12 minutes* 6d.

*Points to Note.*—Pitting or cracks in cups, cones or balls. If cones and cups appear good but the balls are in a bad state, fit complete set of balls—*not* one or two only.

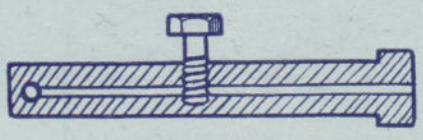
## FITTING NEW CUPS

Probably the most common method of removing pressed-in cups is by using a hammer and a drift. Although with care this can be done without damage, there is always the possibility that, by reason of the drift being of necessity slightly out of true, the hub shell may swell or distort, making replacement of new cups difficult without rectifying the hub.

A tool which obviates this difficulty is here illustrated, and can very easily be made. Obtain a 4in. length of mild steel of a diameter which will just pass through the bore of the cup. Reduce its diameter by $\frac{1}{8}$in. for the whole of its length except for $\frac{1}{2}$in. at one end. Drill a $\frac{1}{8}$in. diameter hole $\frac{1}{2}$in. from the reduced end at right angles to the axis and slit from the other end down the centre of the bar until it runs into the $\frac{1}{8}$in. hole.

Next drill and tap a $\frac{1}{4}$in. B.S.F. hole at right angles to the slit and $2\frac{1}{2}$in. from the reduced end. Do not drill right through. A set screw can now be inserted in order to spread the slit.

To use the tool, pass it through the hub until the face of the larger diameter rests against the back of the cup



**An easily-made tool to facilitate the removal of pressed-in cups**

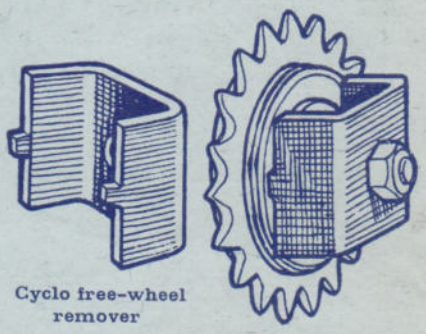
to be removed, and with its end projecting through that cup. Insert the set-screw and expand the jaws, after which cup and tool can be drifted or pressed out together.

Using such a tool a front hub was completely dismantled, cleaned and reassembled with new cups, cones and balls, the cost working out as follows:

| | |
|---|---|
| *Time, 16 minutes* ..... | 8d. |
| *2 cones* ..... | 8d. |
| *Set of balls* ..... | 4d. |
| *2 cups* ..... | 5d. |
| *TOTAL* ..... | 2s. 1d. |

## REMOVING FREE WHEELS

Being as it is firmly locked upon its seating by the pull caused by the drive of the rider the free wheel is naturally rather difficult to remove. Not only is it firmly fixed to its seating by the



**Cyclo free-wheel remover**

driving effort, but the teeth—the only really easy parts upon which to get a grip—are naturally intended to rotate freely in the wrong direction. To remove a free wheel is, in fact, only possible if brute force—by means of a hammer and drift—is used on the free wheel centre, or if a proper spanner is used.

In the case in question a free wheel remover marketed by Brown Bros., Ltd., was used. This tool, the dogs of which accurately fit into the shallow slots in the average free wheel housing, is made by the Cyclo Co., and other suitable tools are made by Lake and Elliott, Ltd., and by the Constrictor Company. Both these tools fit into the slots in the free wheel body and are firmly held in place by the spindle nut, so that slipping is definitely prevented. To use the tool the dogs fit into the slots in the free wheel, the spindle nut is tightened, and the tool held in the vice while the rim is twisted in an anti-clockwise direction.

Using the tool in question, the job of removing a rear wheel was accomplished quickly, and the free wheel replaced in a very short space of time. Actually, in default of a new free wheel, the old one was replaced, but, naturally, the time would remain the same.

| | |
|---|---|
| *Time, 21 minutes* ... | 10½d. |
| *Free wheel* ..... | 2s 6d. |
| *TOTAL* ..... | 3s. 4½d. |

*Tools required:*
*Free-wheel remover* ..... 1s. 6d.-15s. 4d.

*COSTED CYCLE REPAIRS—continued*

# Useful Tools and Parts

## PUNCTURE REPAIRS

NATURALLY, the repairer, when buying repair outfits, is not concerned with the comparatively small affair which fits into the normal cyclist's toolbag. He buys wholesale, and naturally in wholesale quantities, so that the larger outfits are the most economical. Here are some examples:

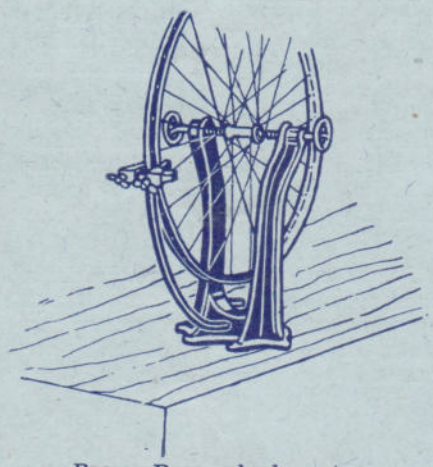
| | |
|---|---|
| *Patches (Dunlop, Chemico, John Bull, etc.)* .. | *2s.-3s. gross* |
| *Solution (John Bull, Dunlop)* .. | *2s.-3s. lb.* |
| *Rim tape (John Bull, Dunlop, Brown Bros.)* .. | *2s. 6d.-5s. doz.* |

## TRUING WHEELS

The dealer who wishes to enter the wheel-truing market must, of course, have a wheel-truing jig of some sort or another. If he is equipping his shop afresh, and has plenty of money to spend, he would do well to purchase one of the many excellent wheel-truing jigs available. These can be obtained from most factors, and prices range from as low as 7s. to 25s.

It must be remembered that a wheel-truing jig gives comparative and not direct measurements, so that the utmost accuracy in its construction is not really essential. It is, for example, sufficient to know that a wheel is out of truth at one point rather than to know that the lateral offset is 0.312in. and the ovality 0.189in.

Consequently, if there is any likelihood of spare time in the workshop,



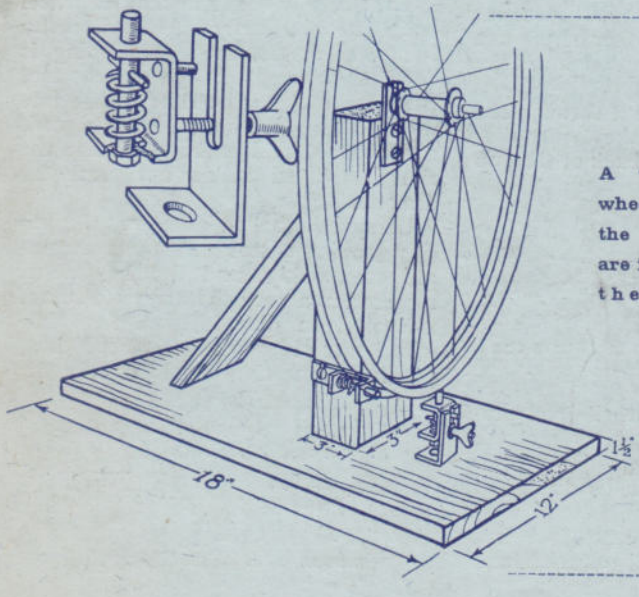
**Brown Bros. wheel erector.**

the mechanic might as well be employed in making a wheel-truing jig as on anything else. Consequently we have no regrets in outlining a suitable jig which is illustrated on this page.

The base and pillar are both of wood, as is the supporting strut for the centre pillar. The actual dimensions do not really matter as long as the base is stable and the centre pillar free from whip.

Vertical and horizontal spring-loaded plungers are provided to check ovality or eccentricity on the one hand, and lateral play on the other. It will be noted that the principal adjustments are simply made by using wingnuts, whereas the adjustment for differing rim sizes are made by means of a screwdriver.

It will be noted that any variation in the dishing of the wheel is not provided for in the jig without changing over the wheel. If it is desired to make the wheel truly central between cones—the most usual practice unless certain forms of derailleur gear are fitted—the spring-loaded plunger should be set so as to give equal clearance at any one rim point when the wheel is reversed.




**A "Home-made" wheel-truing stand, the details of which are fully explained in the accompanying text**

## REMOVING FREE WHEELS

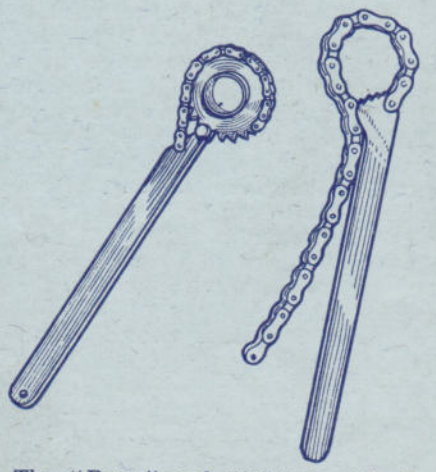
The tool shown in our illustration on the previous page was chosen because it illustrates the possibility of making a similar tool easily and quickly. A piece of 2in. × $\frac{3}{16}$in. thick steel strip bent to channel section and with dogs cut on the extremities plus essential hole to take the spindle is all that is required.

At 2s. the Constrictor "Congee" remover can be obtained, and this is fitted with wide and narrow interchangeable dogs to suit various types of free wheels.

At 1s. 6d. a similar type of tool can be obtained from T. D. Cross, whilst Lake and Elliott provide a rather elaborate but highly efficient tool at 11s. 6d. The type illustrated is, by the way, a product of the Cyclo Company, and is known as the Rosa, whilst it is obtainable at 1s. 2d.

## REMOVING COGS

A "Cee" spanner or a tool similar to the Cyclo "Rosa" free wheel remover is used to take off fixed cog lock rings. Never forget that these have left-hand threads, or much time will be wasted. To remove the cog itself—on a right-hand thread—there is nothing like a chain wrench. Two types are illustrated—the Cyclo at 1s.



**The "Rosa," and (right) the "Cecil Thomson" cog removers**

and the Cecil Thomson at 1s. 6d. Cheap and really efficient is the Perry grip wrench of this type, which costs only 9d.

"THE TRADER" REPAIRERS' SUPPLEMENT—4

# Costed Cycle Repairs

## WHEEL BUILDING

**A description of one of the most important jobs which the average dealer is called upon to undertake**

BY far the most common "big" job which the average retailer is called upon to execute is that of wheel building. If an enthusiast requires a different type of braking system or speed gear it will be found that in nearly every case a new wheel is required.

Where accidents have caused damage to a wheel it is often cheaper and certainly quicker to obtain a complete new wheel than to fit a new rim and set of spokes to a hub which may be badly worn. But if a dealer is catering for a really enthusiastic clientele it is practically impossible to carry a complete stock of ready-made wheels since the number of combinations is so vast. As an example, a hub brake and four rims—26in. × 1½in. Westwood, 28in. × 1½in. Westwood, 26in. × 1¼in. Endrick, and 26in. × 1⅜in. Endrick—should meet most front wheel requirements, whereas if wheels are stocked ready to fit the original outlay calls for four hub brakes.

Consequently the outlay on wheel building equipment—a wheel truing stand, nipple keys, spoke dies, and the like—is well worth while.

### SPOKE LENGTHS

When ordering any particular component such as a hub, hub brake or variable gear, ask the manufacturer of the product in question to give details of the exact spoke lengths required for various sized wheels. Enter these details in a workshop notebook, and if you so desire, on a tally attached to the part in question. To get halfway through the building of a wheel only to find that the spokes are too long or too short is one of the tragedies of a repairer's life. In addition to this question of length, there is also the length of head in relation to the thickness of the hub flange to be considered, although to-day there is naturally more standardisation in this respect.

The importance of the correct length and length of head in a spoke was fully emphasised in the paragraph on "Refitting Spokes" in our Supplement No. 2.

### STORING SPOKES

In conjunction with a reference book of spoke lengths, a storage system by which spokes of different lengths and gauges can readily be identified should be instituted. The method adopted by a "Trader" reader is described at the conclusion of this article, and is both cheap and effective.

### RECTIFYING SPOKES

Even with the best will in the world it may happen that a job comes in which requires different spoke lengths from those actually in stock. Since most factors carry supplies of every conceivable length, it is usually easy to obtain supplies of the length required at short notice. Where, however, the job is very "special," it is often necessary to take a spoke which is slightly longer than is required and to cut it and thread it to suit.

When extending the thread of a spoke it is possible for the die to run off centre and weaken the spoke unless some means of holding the spoke central to the die is used. There are many types of spoke-threading machines on the market to-day, and these can be obtained at reasonable prices. A typical example is shown, and it can be seen that the spoke and die must be held in perfect alignment.

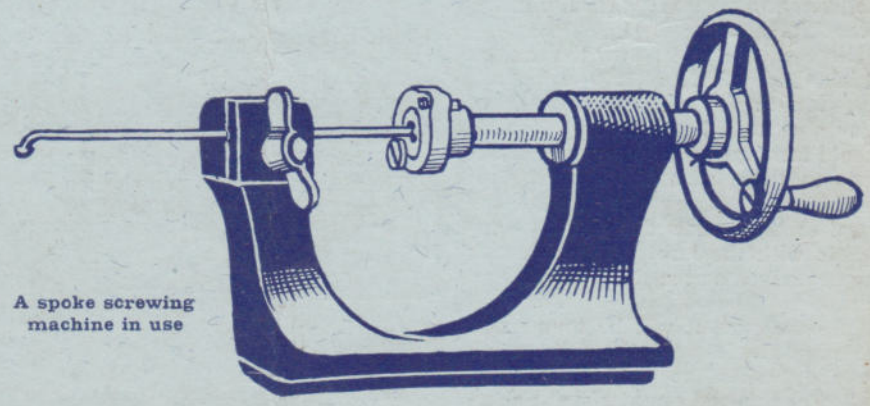
### SPOKE ARRANGEMENTS

Apart from the front wheels of some Raleigh models and a few other machines, the tangential method of spoke lacing is universal. This system, as its name implies, produces a wheel in which all the spokes leave the hub flange at a tangent.

In the radial system, on the other hand, the spokes radiate from the hub flange to the rim by the shortest possible route. This arrangement cannot resist braking or driving stresses as readily as is the case with the tangential system, as is obvious from an examination of the two types. This will show how braking or driving produces a direct pull on the spokes which are disposed so as to resist torsion as well as axle loading.

There are three different spoke quantities used in wheel building—32, 36 and 40. Of these the latter two are most common. The number of spokes is, of course, immaterial, but the method of starting the lacing differs as shown in the various diagrams.

Enough has now been said by way of explanation, and thus we can



**A spoke screwing machine in use**

## COSTED CYCLE REPAIRS—*continued*

describe the actual work of building the wheel. The first step is to draw from the stores the appropriate number of spokes, nipples, and washers, together with the hub and rim. The bench vice and a piece of sheet metal 2ft. × 2ft. with a hole in the middle through which the hub spindle can pass is next required. This metal sheet is helpful in locating rim, spokes, and hub before assembly.

First of all examine the hub carefully. It will be found that the holes are not in line with each other owing to the fact that it is obviously impossible to carry two spokes to one rim hole. In actual fact a spoke pushed through one rim flange and held parallel to the hub spindle would touch the opposite flange midway between two holes. Mark with a spot of paint one of the holes in one flange and make a similar mark on the other flange round the hole most nearly opposite to the hole first marked. There is a choice of two holes, but either may be used. These marks serve as a useful guide when the actual business of lacing is commenced.

Place all the spokes in position in the hub flanges, being careful to reverse the direction of threading with each alternate spoke. Thus taking one flange only the first spoke should be threaded from the outside, so that when it is in place the head faces outwards. Then if that spoke hole is called No. 1, and the remaining holes numbered round the flange in their order, No. 2 hole should have the spoke head on the inside, No. 3 outside, and so on. Repeat with the other side until the flanges are filled with spokes.

## HOLDING THE PARTS

Now lay the square of sheet metal on the vice, pass the spindle through the hole, and clamp it vertically in the vice. Soft jaws, please!

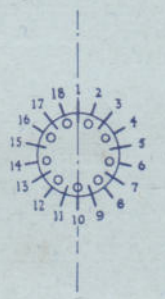
Dispose the spokes at the angles which they will eventually take up, i.e., tangential to the hub flange. Spokes with the heads facing outwards should form tangents in opposite directions to those with heads facing inwards. Then lay the rim on the metal sheet so that it is roughly concentric with the hub. A guide mark can be scribed on the sheet to facilitate this.

In some rims it will be found that the nipple holes and the countersink for the washers or nipple heads are drilled or bumped out at a slight angle to allow for the fact that tangent spokes do not enter the rim truly radially. If this is the case care must be taken to see that the first spoke is entered in a rim hole which is pierced at the correct angle. Once this has been done the other spokes will automatically come right.

## LACING A 36-SPOKE WHEEL

In a 36-spoke wheel, since the number of spokes in each flange is not divisible by four, it is obviously impossible roughly to centre the wheel by tightening two pairs of spokes which pull in opposite directions. Consequently the preliminary centring is done by tightening up three pairs of spokes at angles of 120 degrees to each other.

Commencing with the uppermost hub flange and taking the spoke in the marked hole as No. 1, lead it to any hole which emerges from the rim at the correct angle. Thread the nipple through the washer and start it on the spoke threads.




**This diagram shows how the spokes are numbered and the centring operation on a 36-spoke wheel**

Now lead the spoke which enters the hub flange at a point diametrically opposite to No. 1 in a direction roughly parallel to No. 1 spoke. This spoke (No. 10) should enter the rim two holes away from No. 1.

Counting in a clockwise direction from No. 1, next line up No. 4 spoke which should enter the rim—still counting in a clockwise direction—22 holes from where No. 1 enters the rim. Follow up with spoke No. 13 which lies almost parallel with spoke No. 4, and enters the rim two holes away from it.

Next lead No. 16 spoke to the 10th hole from the point of entry of No. 1 and No. 7 spoke to the 12th hole.

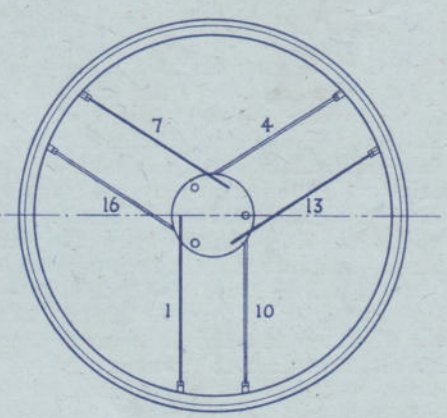
These six spokes can then be tightened up, but not quite fully. A useful tool for this purpose is shown in one of the illustrations. This is a ratchet screwdriver with steps cut in the blade. The centre projection enters the nipple and prevents slip, whilst if the depth of the step is about $\frac{1}{16}$in. the tool will slip from the slot when the spoke is almost screwed home.

**A special screwdriver blade for roughly tightening spokes**

The remaining twelve spokes can now be entered and tightened up in rotation. Counting the rim holes in a clockwise direction from where No. 1 spoke enters the procedure is as follows:—

| Spoke No. | Rim Hole. | Spoke No. | Rim Hole |
|---|---|---|---|
| 2 | 18 | 3 | 4 |
| 4 | 22 | 5 | 8 |
| 6 | 26 | 7 | 12 |
| 8 | 30 | 9 | 16 |
| 10 | 34 | 11 | 20 |
| 12 | 2 | 13 | 24 |
| 14 | 6 | 15 | 28 |
| 16 | 10 | 17 | 32 |
| 18 | 14 | | |

Each spoke crosses three others in its path to the rim. If the head of No. 1 spoke faces inwards, as shown in the diagram, all odd-numbered spokes run in the same direction and




pass above the even-numbered spokes as shown. These even-numbered spokes, of course, run the opposite way and should be laced last.

Next, release the spindle from the vice and turn the partially completed wheel over. Keep the plate in place to avoid the wheel taking on the appearance of an umbrella that has blown inside out. Clamp the spindle and commence lacing the other side.

The rim being centred, this is extremely easy. It will be remembered that the two sets of holes in the hub flanges are staggered. Sight along the No. 1 spoke hole, and note the point on the other flange which is in line with it. On each side of this point are two adjoining spoke holes, one of which has its spoke threaded through with the head facing inwards.

If this hole is situated round the hub in an anti-clockwise direction from the point in line with the No. 1 spoke head, lead the spoke to the hole between No. 1 and No. 10 spoke. If it is in a clockwise direction, lead it to the hole between No. 1 and No. 12.

Follow on with the other spokes of

## COSTED CYCLE REPAIRS—*continued*

which the heads face inwards in rotation round the rim, missing one vacant hole each time. Then commence inserting and tightening the remaining spokes, lacing them underneath all the spokes which they cross until the wheel is completely ready for truing.

## THE 40-SPOKE WHEEL

Thread the hub flanges with their full complement of spokes as described above, and place the spindle through the hole in the metal plate and vertically in the vice jaws. *Mark the flange midway between two adjoining holes and make another mark diametrically opposite.*

**These are the first four spokes to be entered in a 40-spoke wheel.**

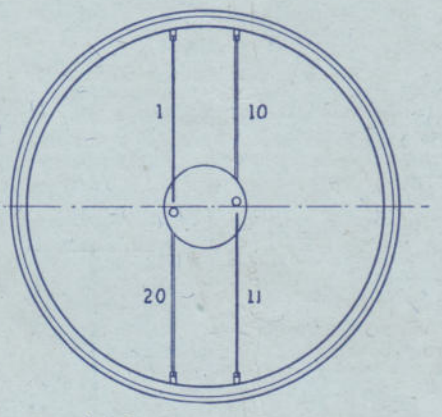
Regard the spoke in the hole adjacent to one of the marks and in a clockwise direction from it, as No. 1. Then the other mark will be between spokes No. 10 and No. 11, whilst No. 20 adjoins No. 1.

Roughly centre the rim and lead spoke No. 1 to a rim hole which falls at the proper angle. Start the nipple on its thread and lead spoke No. 10 to the second hole in the rim (in a clockwise direction) from where No. 1 enters. Spoke No. 11 is then led to a hole diametrically opposite to hole No. 1, and No. 20 to the hole which is diametrically opposite to that in which spoke No. 10 has been entered.

If these four spokes are tightened equally, the hub will be approximately centred, and the other spokes can be, in turn, threaded into their places as shown below. The rim hole spaces are counted in a clockwise direction from where No. 1 enters.

| Spoke Hole. | Rim Hole. | Spoke No. | Rim Hole |
|---|---|---|---|
| 3 | 4 | 2 | 26 |
| 5 | 8 | 4 | 30 |
| 7 | 12 | 6 | 34 |
| 9 | 16 | 8 | 38 |
| 13 | 24 | 12 | 6 |
| 15 | 28 | 14 | 10 |
| 17 | 32 | 16 | 14 |
| 19 | 136 | 18 | 18 |

Turn the wheel over and commence on the other side with the spoke which lies at a point on the hub in line with the mark between spokes No. 1 and No. 20. That spoke will be run to the hole between spokes Nos. 1 and 8. Going round in a clockwise direction, enter all the spokes of which the heads face inwards, leaving alternate vacant holes blank. Follow up with the remaining spokes, lacing them beneath those already in place and starting with that spoke immediately adjacent to the spoke first inserted on this side, again working in a clockwise direction. This is led to the hole between those occupied by spokes Nos. 11 and 20.

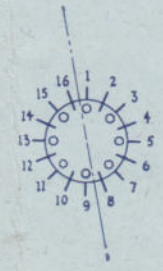



Still working in a clockwise direction fill up the vacant holes in rotation, and the wheel is complete and ready for truing.

## THE 32-SPOKE WHEEL

Although less frequently encountered, the 32-spoke wheel is quite simple to build. The same method as is used in centring the 40-spoke wheel is employed, the opening stages being as follows:—

**In the 32-spoke wheel start as for a 40-spoke wheel and then insert 4 spokes at right angles.**



No. 1 spoke to rim; No. 8 spoke to rim two holes away.

No. 16 spoke to hole diametrically opposite to No. 8 spoke hole.

No. 9 spoke to hole diametrically opposite to No. 1 hole.

Starting from No. 1 spoke hole and again working in a clockwise direction here are the placings:—

| Spoke No. | Rim Hole. | Spoke No | Rim Hole. |
|---|---|---|---|
| 3 | 4 | 2 | 22 |
| 5 | 8 | 4 | 26 |
| 7 | 12 | 6 | 30 |
| 11 | 20 | 10 | 6 |
| 13 | 24 | 12 | 10 |
| 15 | 28 | 14 | 14 |

## TRUING THE WHEEL

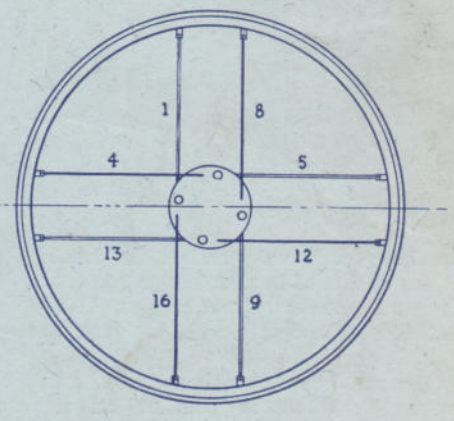
This process was fully described in "Service Supplement No. 2," to which the reader should refer for detailed information. The wheel is mounted in the wheel-truing fixture and all slackness in the spokes taken up, the wheel meanwhile being spun to test for truth.

Remember that where the wheel is eccentric, but does not "wobble," the spokes leading from *both* flanges must be slackened where the rim most closely approaches the hubs, and those diametrically opposite tightened a like amount.

Where there is a lateral "wobble," the spokes leading to the flange which is nearest the hub centre must be slackened, and the *adjacent* spokes leading to the other flange tightened.

## DISHED WHEELS

When building certain types of *derailleur* gear into a wheel it will be found that, if the chain stays are set to give the correct chain line on middle gear and the correct distance over the cones, the wheel rim, if built up dead central between the flanges, does not line up with the front wheel and, indeed, may actually foul the chain stay on the side opposite to the drive.




The remedy for this state of affairs is to dish the wheel, i.e., to set the rim out of centre with the hub flanges. To do this entails shortening or tightening the spokes on one flange so as to draw the rim over towards that flange and to lengthen those on the other flange to permit of the rim being pulled over.

## COSTED CYCLE REPAIRS—*continued*

If the wheel has been properly trued and is central with the flanges, all the spokes on the side away from the direction in which the rim must be drawn over are slackened by an equal amount.

The table below may be useful, since it shows the approximate amounts by which the spokes must be slackened or tightened for given offsets.

| Amount Off Centre. | Tighten spokes by | Slacken other side by |
|---|---|---|
| ¼" | .030"=1⅛ turns | .025"=1 turns |
| ½" | .055"=3 turns | .070"=4 turns |
| ¾" | .075"=4¼ turns | .115"=6½ turns |

The number of turns of the nipple is calculated for spokes having 56 threads per inch.

It should be particularly noted that these dimensions are only approximate, since the hub width between flanges, the pitch diameter of the spoke holes in the flange, and the rim diameter, all affect the result. They will, however, save much tedious trial and error work.

## CHECKING OVER

There are three tests which should be applied to the finished wheel—two by eye and one by ear. First of all, it is tested in the truing fixture for ovality, eccentricity and lateral truth. Then it should be checked to see that it is central between cones, or, if offset is required, that the amount of "dishing" is correct.

A further check on this can be made with the wheel in position on the machine when a straight-edge can be used to check its alignment with the other wheel.

The aural test is made by "twanging" the spokes like the strings of a harp. Each spoke should give off a note of approximately the same pitch as its fellows, and this note should be fairly high, thus indicating a proper degree of tension. A wheel which is true when it leaves the bench will soon lose its truth on the road if the spoke tensions are not equal or slack.

## TIME TAKEN

The job carried through in connection with our description of wheel-building methods consisted of building a rear wheel from a single-speed 36-spoke hub and a 26in. by 1½in. Westwood rim. There was no dishing required, but half the spokes selected were purposely 1in. too long. These were cut to length and threaded down before the actual building was commenced.

The time analysis worked out as follows:—

*Cutting and threading 18 spokes* ..... = 16 *minutes*
*Assembling spokes in hub and setting up* ..... = 5 *minutes*
*Lacing spokes* ..... = 51 *minutes*
*Checking and truing* ..... = 38 *minutes*
*Fitting to machine and testing* ..... = 8 *minutes*
*Fitting cover and tube* .... = 3 *minutes*

*TOTAL* 2 *hrs.* 1 *min.* = 5*s.* 0½*d.*

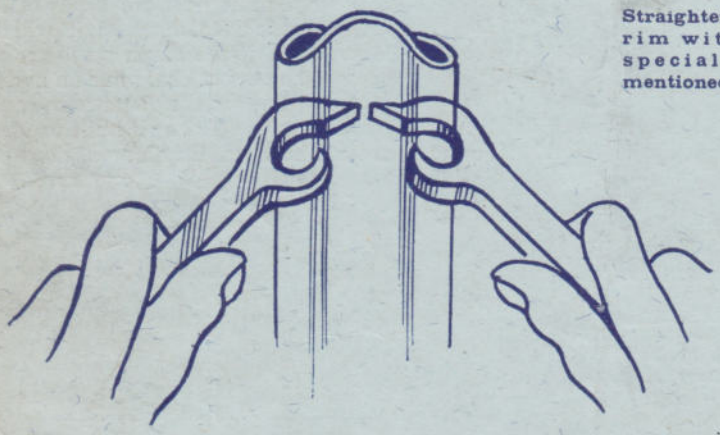
*MATERIAL COST: 1 rim* 3*s.* 1*d.*, 36 *spokes* 1*s.* 1*d.*, 36 *nipples* 5*d.*, 36 *washers* 1*d.*, *hubs* 2*s.* 3*d.* *Total* 6*s.* 11*d.*

*TOTAL COST* = 12*s.*

## ACCURACY

Readers may be interested in the accuracy achieved in the particular job.

| | |
|---|---|
| Max. eccentricity ..... | .018" |
| Max. ovality ..... | .014" |
| Lateral wobble (max.) ..... | .016" |
| Centrality (between flanges) .... | .040" |



**Straightening a rim with the special tools mentioned here.**

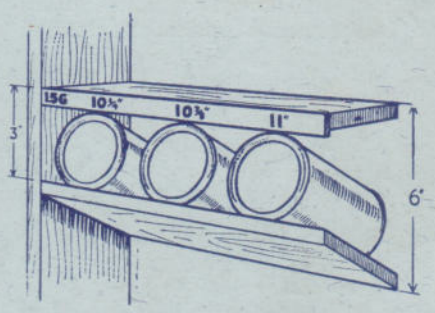
## STRAIGHTENING RIMS

For removing minor dents in rims there is an interesting pair of tools marketed by Brown Bros., Ltd. These tools are in the form of spanners, which grip the rim firmly and allow it to be levered easily into the correct shape. A clever design of the contour of the jaws enables the setting operation to be carried out without undue distortion in other directions. The price is 3s. per pair.

## SPOKE STORAGE

*"H. D.," a well-known Cambridge retailer, writes us, giving the following interesting and useful hint on storing spokes:—*

For a long time only 5 or 6 sizes of spokes have been required for general repair work. But now, the multiplicity of combinations of rims and hubs of varying dimensions has produced a demand for a large variety of spoke sizes, and the question of storage has assumed some importance.




**Part of a reader's useful spoke storage bin set.**

We tried one or two methods of storage, but they were not strikingly successful. One day, however, during a periodical clear-up, a number of empty 1 lb. carbide tins seemed to ask to be used in preference to being thrown out, and we were seized with an idea which when carried out proved very satisfactory.

Along the back of the work-bench is a shelf and under this we made another shelf, pitched so that whilst the front edge is 3 inches below, the back edge is 6 inches below the top shelf. The empty tins—with lids removed—were then arranged side by side along the lower shelf with the open ends outwards.

To complete the job a strip of wood, 1 inch wide and ¼ inch thick, was enamelled black and screwed to the front edge of the top shelf, then with a small brush and some white enamel the firm's artist wrote above each tin the size of spoke to be stored therein.

We use only 14 and 15 G. spokes, and the lengths vary from 10⅛in. to 12¼in. All 15 G. sizes are arranged to the left of the centre, and the 14 G. to the right. Altogether we used 20 tins, 16 for present use, and the extras will serve for any fresh sizes we may have to add in the future.

Another small shelf has now been added underneath, and on this are kept the nipples and washers in small tins, also enamelled black, and with particulars of the contents plainly marked in white on sides and top.

Made up from odd pieces of packing cases and empty tins, this arrangement cost nothing but a little time to produce.

"THE TRADER" REPAIRERS' SUPPLEMENT—8

# Brake Adjustment and Repair Costs

**Some common jobs required on roller lever, caliper and hub brakes and controls**

THE brakes of a bicycle are by far the most important component, since upon them more than upon any other part depends the safety of the rider. Consequently no dealer who takes in a brake repairing or adjusting job should allow a machine to leave his shop unless the job has been done perfectly, for nothing less than perfection will do.

A badly adjusted bracket or hub bearing, a rusty and badly adjusted chain, a wobbly wheel or bent crank are common faults in a badly cared-for bicycle. They mean discomfort and extra work for the rider, and nothing more, but ineffective brakes may mean serious injury.

Roller lever brakes—particularly on the rear wheel—may be so worn and badly set that the angles of the bell cranks prevent half the possible leverage from being applied; the shoes may only be bearing on the rim over a small fraction of their surface, and rust may be causing friction and actual binding.

Calipers and hub brakes which are cable operated are even more prone to give trouble if neglected, since the inner cable is out of sight and all too often out of mind! Hub brakes are often found which are only 50 per cent. effective, due to the rider's undue enthusiasm with the oil-can.

It is faults such as these which the dealer will be called upon to rectify, and it is here that he must resolutely put on one side any temptation to turn out anything that savours of a "cheap" job.

## ROLLER LEVER BRAKES

### WHEEL TRUTH

It is absolutely useless to attempt any work by way of adjustment or repair of roller-lever-operated rim brakes unless the wheel rim is reasonably in truth. In the case of rear wheels it is also necessary to check the alignment of the wheel in relation to the chain stays.

First of all the rims should be carefully examined for dents and other surface irregularities, which should be removed by using wringing irons of the type illustrated on page iv of "The Trader" Repairers' Supplement No. 4.

Next, the spoke tension should be checked and rectified where necessary, so that all spokes are tight and the rim true. The wheel need not be removed for this operation unless it is in a very bad state, since the forks or chain stays can be used as sight lines for checking truth.

Naturally, it is quite impossible to give anything more than an approximate time for such a job, since the work required varies so enormously. A wheel truing job was dealt with in Supplement No. 2, and the following times obtained:—

*Truing ⅛in. lateral wobble, 20 minutes* = 10*d.*

*Removing wheel and tyre, taking out dent in rim, retruing, 48 minutes* = 2*s.*

### FITTING BLOCKS

By placing a stout screwdriver between block and shoe the former can easily be prised out. The surface of the shoe upon which the block rests should then be thoroughly cleaned with petrol to remove scale and old rubber.

This done, the new block is well wetted and is slid into place. The job can be done with the shoes in place, but it is really simpler to remove them, particularly in view of the fact that readjustment is always necessary.

*Time (per shoe), 6 minutes* = 3*d.*
*Block* = 1*d.*
*Total* 4*d.*

### ADJUSTING FRONT BRAKE

Assuming the rim to have been trued correctly and that the rim has been made as straight as possible, there are only two further points which require checking on a front roller brake. The first is to see that the blocks bear upon the proper part of the rim, and the second that a full bearing surface is obtained.

On most machines the design of the brake is such that it is almost impossible for the shoe to become displaced laterally unless the frame clip which holds the guide in place has been damaged. If this is so the remedy is, of course, to set it so that the brake block positions itself as near to the rim well as possible without actually bearing on it.

To cut out "toeing" or "heeling" on most designs the nut which secures the shoe to the stirrup is slackened and the brake fully applied, after which the nut is again tightened.

With the brake shoes properly positioned and the rim trued it now remains to slacken the adjusting nut and lift the stirrup so that the shoes are just clear of the rim when the brake is "off."

On the machine which was the subject of our timed test, one shoe was moved slightly inwards, the shoes slightly set to cut out "toeing" with the new blocks, and the whole readjusted.

*Time, 26 minutes* = 1*s.* 1*d.*

### REAR BRAKES

So far as truing and lining up the blocks are concerned the procedure is similar to that outlined for front brakes. The linkage of the operating rods—which with their bell cranks and swivel joints are so much more complicated than the comparatively simple front brake layout—means, however, that there are several other points to watch. Furthermore, where there is an adjustment below the bracket in that most impossibly exposed position, it often happens that adjustment is found to be practically non-existent owing to rust. This causes one of the "snags" which upset even the most carefully worked-out time schedule.

Before commencing any work whatever it is advisable thoroughly to clean the bell crank, adjuster (if any) and the stirrup guides. Petrol or paraffin and a stiff brush work wonders.

Next it is advisable to check carefully the angles of the bell cranks, particularly if their pivots are clip-

## BRAKE ADJUSTMENT AND REPAIR COSTS—*continued*

mounted on the frame tubes. The clips may be badly positioned or the cranks themselves may have become distorted in an emergency stop, the result in each case being that proper leverage cannot be applied.

With the brake just about to come "on" each bell-crank arm should be exactly at right angles to the rod to which it is attached. If this is not the case then either the clip needs moving along the frame tube or the bell cranks need setting.

The sequence of the examination which is necessary here is to slacken off the adjustment until the brake lever can be pulled half on. The swivel tube should then be at right angles to the bell-crank arm. If it is not, make the necessary adjustment and then, still holding the lever, check the relationship between the other end of the bell crank and its rod. If it is not at right angles the crank should be removed and set to the correct position.

The same remarks apply to the other bell crank.

# CALIPER BRAKES

The increasing popularity of the modern lightweight bicycle with its light tyres and Endrick rims has led to the caliper type of rim brake becoming extremely common to-day. Properly fitted it is a most excellent brake, but its design is such that it lacks the simplicity of the roller lever-operated stirrup type, and is thus apt to be neglected.

## CABLES

The ordinary Bowden cable mechanism which is essential to the proper functioning of most caliper brake mechanisms, and which is consequently almost universal, has been developed to such a pitch of efficiency that properly installed and properly cared for it gives excellent trouble-free service over long periods. Unfortunately, however, it is not always installed correctly, and—even more often—it is neglected so that trouble occurs and the dealer gets a job. Dry and rusted inner cables are frequently found, and broken cables are by no means uncommon.

## ADJUSTMENTS

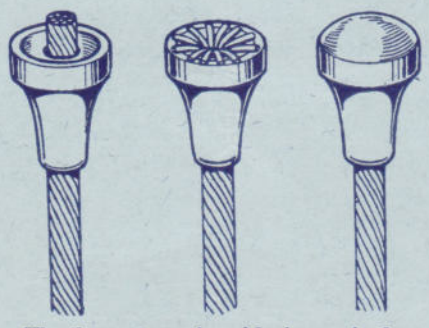
On many caliper brakes the only adjustment provided is on the cable itself, the stop against which the outer cable bears being adjustable, being made with a threaded body and a hexagon head. Slack in the cable can be taken up by rotating this hexagon head, which has the effect of lengthening the outer cable.

## FITTING NEW CABLES

The usual cable assembly consists of an inner wire with a nipple at each end, one of which is anchored in the control lever and the other in the brake operating arm—or in one brake operating arm if the mechanism is of the scissors type. This inner wire passes through an outer casing which is anchored at one end in the control lever body, and at the other on the brake framework. In scissors-type brakes the outer cable is anchored at one end in the operating arm.

Thus, when assembling a cable a suitable length of outer casing is cut off and fitted with ferrules at each end. The adjusting stop is screwed right home, and the outer cable laid in place against the control at one end and the stop at the other.

Next a suitable length of inner cable—the modern fray-proof type such as that made by the Amal company is much the easiest to work with—is obtained, and a nipple securely soldered to one end.



**The three stages in soldering a nipple securely.**

Now thread the inner wire through the control-lever housing and through the outer cable until the nipple is in place in its socket in the lever. Compress the operating spring of the brake until the brake blocks are almost touching the rim, thread a nipple over the free end of the wire until it can be fitted into its socket in the brake-operating arm. Mark its position on the cable and then unhook the nipple. Cut the cable and solder the nipple in place. Again hook the nipple into position and adjust.

The above remarks are only of general application. Particular cases will be dealt with later.

*Important.*—Well grease the cable to within a distance of about two inches from where the second nipple is to be soldered before finally inserting it and soldering up. Keep the cable clear of grease where it is to be soldered or the usual difficulty will be encountered.

## SOLDERING

The correct procedure for sweating nipples on to inner cables has been so often described that it seems ridiculous to repeat such directions here. Nevertheless, they must be included.

First of all the most scrupulous cleanliness is essential. Steel is always the most difficult metal on which to make solder take, and if this difficulty is enhanced by the presence of grease it is ten to one that the joint, although appearing to be perfectly sound, will be lacking in strength. If there is a suspicion of grease on the wire at the points where it is to be soldered, it must be thoroughly cleaned in petrol or some similar degreasing fluid.

Next it is essential to use a non-corrosive flux. There are several good ones on the market to-day—notably Baker's Soldering Fluid—so that it is quite unnecessary to use anything of an acid nature, and thus run the risk of future corrosion and trouble.

Thirdly, it is advisable to make a mechanical grip as well as the solder contact. This can be done as shown in the illustration. First of all, the wire is fluxed and pushed through the nipple, in which the hole should be countersunk, until it projects about $\frac{1}{32}$in. The strands of the cable are then splayed out so that they spread fanwise round the edge of the countersink. Solder is then run through, leaving a head which entirely fills the countersink and covers the splayed ends of the wire.

The added strength given by this method is easily seen when it is remembered that, if the wire were splayed out and a blob of solder applied to the splayed end, in all probability it would be strong enough to hold even without any soldered contact with the nipple.

The control cable of an ordinary side pull caliper brake was removed and fitted with a new inner wire adjusted for length and soldered in the manner outlined above.

| | s. | d. |
|---|---|---|
| *Time taken, 31 minutes* .. | 1 | 3 |
| *2 nipples and 18in. inner cable* .. .. | 0 | 3 |
| *Total* .. .. | 1 | 6 |

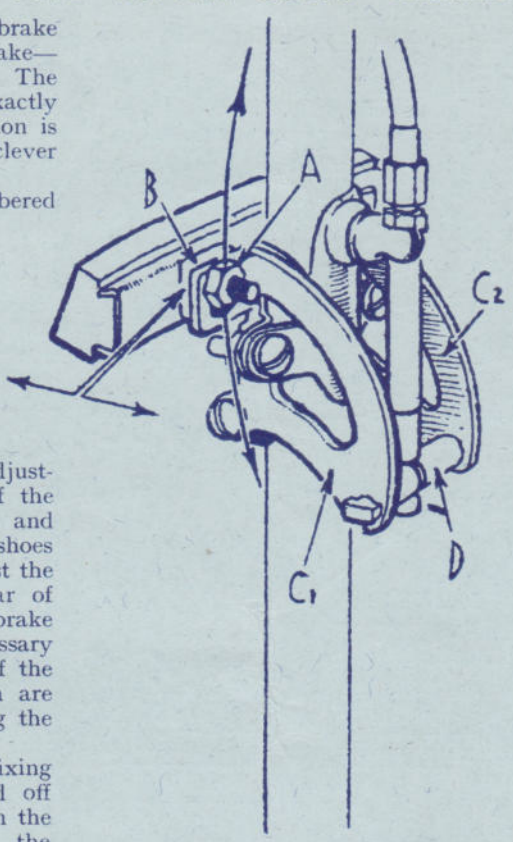
## RESILION ADJUSTMENTS

One of the most popular makes of caliper brake is the Resilion cantilever, which in design and adjustment differs from the majority, so that a few words on this particular make should be of interest.

## BRAKE ADJUSTMENT AND REPAIR COSTS—*continued*

The illustration shows the rear brake—or rather one side of the rear brake—of the de luxe cantilever design. The cheaper Cantilette embodies exactly the same principle, but production is simplified by the use of some clever examples of press work.

First of all it must be remembered that on Resilion rear brakes adjustment is not made by means of the cables. On all rear Cantilevers and Cantilettes the backs of the shoes when the brake is off bear against the fixing bracket. If through wear of the blocks or other causes the brake cannot be fully applied the necessary adjustment is made by means of the square nuts and locknuts which are threaded on to the studs holding the shoes to the cantilevers.




**This view of a Resilion Cantilever shows the various adjustments. A is the shoe lock nut and B the adjusting nut**

To adjust these brakes the fixing bracket set-screws are slackened off and the brackets slid up or down the seat stays until the centre of the block is dead in line with the centre of the side of the rim. The bracket is then clamped up and the cable adjusters slackened off until the back of the shoe is touching the bracket.

The two hexagon locknuts are then slackened off and the squared adjusting nuts screwed out until there is about $\frac{1}{16}$in. clearance between the block and the rim. Before tightening up the locknuts the shoe is swivelled in its locating slots until it is exactly parallel with the rim.

To adjust the cables after these operations have been carried out to both sides in turn, both of the secondary adjusters (those on the brackets) are screwed right home and the main adjuster on the cable shoe is unscrewed until there is only a fractional amount of play at the lever. This done, the slacker of the two secondary adjusters is unscrewed until the shoe is just about to be pulled away from the bracket.

### BRAKE BLOCK THICKNESS

Resilion brake blocks are made in differing thicknesses. To secure the longest possible life blocks should be selected of such a thickness that they only just clear the rim with cable and brake shoe adjustments slacked back as far as possible.

Obtaining the proper thickness of block is most important on front brakes where there is no adjustment on the shoe.

### DISMANTLING

Remove the brake control, remove the wheel from the frame, remove the spindle nut and also the large nut which holds the back plate against the face of the cone. The back plate together with the two shoes then comes away.

Unscrew the fulcrum pin nut and slide the shoes off. Unhook the return springs and separate the shoes. On some brakes, notably the Sturmey-Archer, this is quite unnecessary and is, in fact, to be avoided since the fulcrum sleeve upon which the shoes pivot is riveted over.

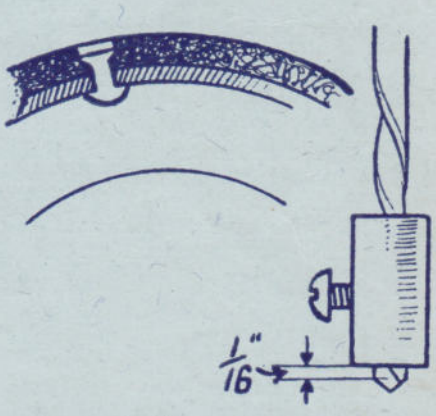
### RELINING

All brakes of this type have fabric linings riveted to steel or aluminium shoes, and it is this lining which requires replacement when a large amount of wear has taken place. Fitting a new lining requires a very considerable degree of skill, and if possible a set of special tools should be made up or obtained for use here.

To remove the old linings it is customary to chisel them off if the shoes are of steel, but with a soft aluminium shoe this is risky, and it is best to drill out the rivets one by one.

### RIVETING

One of the illustrations shows what is required if a shoe is to be relined properly. Note how the lining is held tightly against the shoe, how the rivet head comes almost halfway through the lining, and how there is a nice amount of metal clenched over.




**A properly fitted and set brake lining rivet and, right, an adjustable countersinking drill.**

### SPECIAL CLAMPS

To obtain the first and most important of these requirements a clamp must be made by which the lining can be held firmly to the shoe, whilst the holes are being drilled. Such a clamp

## HUB BRAKES

The absolutely weatherproof qualities of the internal expanding brake, coupled with the fact that the rims are not used as braking surfaces and thus maintain their showroom finish, is causing much more interest in this type. Its disadvantages—rather greater weight, liability to suffer from excessive oil, and expensive service costs—together with greater production costs militate against its becoming universal, but to-day it is quite sufficiently popular to deserve a place here.

### ADJUSTMENT

All hub brakes are fitted with either rod or cable operation, and in each case the adjustment is simplicity itself. Rod-controlled brakes have a simple thumb nut, whilst adjustable cable stops are used on the cable types. The time required to carry out either form of adjustment can best be counted in seconds rather than minutes.

## BRAKE ADJUSTMENT AND REPAIR COSTS—*continued*

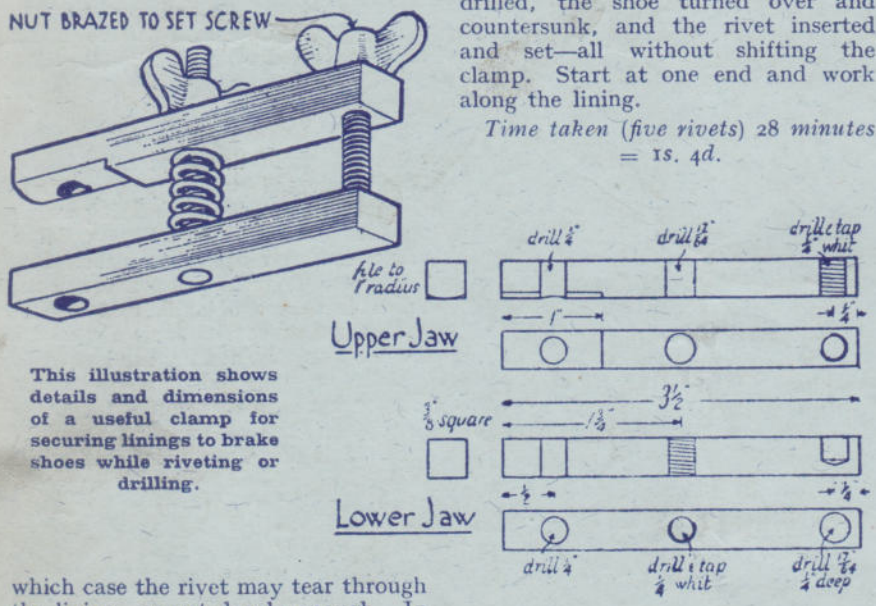
is shown in one of our illustrations, and by using this particular type with drilled jaws pressure can be applied to the lining all the way round the rivet hole.

Full details and dimensions are shown in the drawing.

## SPECIAL DRILLS

For drilling linings several firms supply small countersinking tools with stops which prevent the holes being countersunk too deeply—in which case the rivet may tear through the lining—or not deeply enough. In the latter case, of course, the rivet head and not the lining would carry the braking pressure with a corresponding loss of efficiency.

Linings can, however, be countersunk quite satisfactorily by using an ordinary twist drill, and if a suitable collar is made as shown in the sketch, the same drill can be used for linings of different thicknesses. A 5/32in. dia. drill is about right for countersinking most cycle brake lining rivets.




**This illustration shows details and dimensions of a useful clamp for securing linings to brake shoes while riveting or drilling.**

## RELINING

After removing the old linings all that is required if ready drilled replacement linings are used is to insert a rivet at each end to position the lining on the shoe, slip the clamp over it with the ¼in. diameter holes concentric with one of the rivets, adjust the jaws so that they are parallel and tighten up.

The lining is now firmly held and the rivet can be set. To do this, insert a 5/32in. silver steel anvil in the vice with its head pointing vertically upward. Place the shoe (lining downwards) on the anvil so that the latter passes through the hole in the clamp and bears against the rivet head. A pin punch with a 5/32in. dia. head can now be inserted and used to clench the rivet. The illustration shows how the shoe and punch can be held.

Start with the rivets at one end and work along the lining, clamping up before setting each rivet.

*Time taken (five rivets)* 10 *minutes* = 5*d.*

## DRILLING

Where undrilled linings are used, the lining is carefully clamped in position at one end. The rivet hole is drilled, the shoe turned over and countersunk, and the rivet inserted and set—all without shifting the clamp. Start at one end and work along the lining.

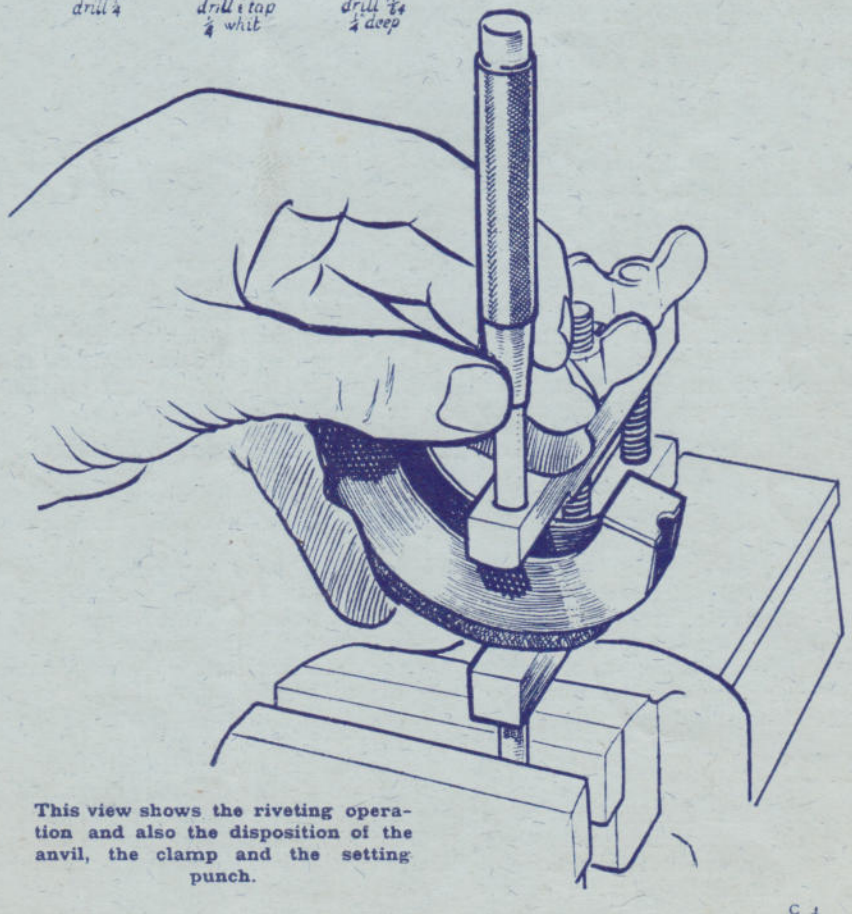
*Time taken (five rivets)* 28 *minutes* = 1*s.* 4*d.*

Points to note in connection with drilling and countersinking are that the distance from the lower end of the collar to the shoulder of the countersink drill should be equal to half the thickness of the lining. Where the countersinking is carried out through the clamp the 1/16in. dimension shown in the drawing—the normal distance for a typical lining of a thickness of 9/64in.—must be increased by ⅜in., which is the thickness of the clamp jaw. The shoulder then bears on the clamp jaw when the countersink has been made sufficiently deep.

## BEDDING-IN

All internal expanding brakes benefit by being bedded-in, so that the linings bear evenly on the drum throughout the whole of their length. Before replacing the back plate and shoes chalk lines on the linings about ¼in. apart, and parallel to the spindle. Replace the back plate and rotate the wheel against brake pressure for a few revolutions.

Remove the shoes for examination and file down the high spots, which are revealed at the points where the chalk has been rubbed away. This, of course, takes time and can only be done when the customer is prepared to pay for a really good and therefore expensive job.



**This view shows the riveting operation and also the disposition of the anvil, the clamp and the setting punch.**

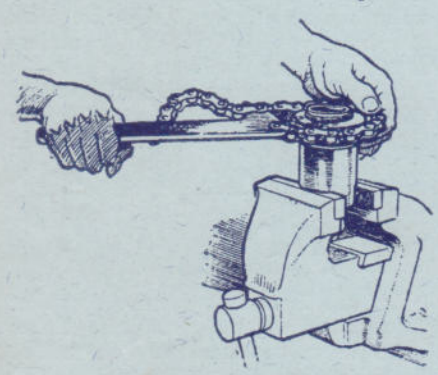
## COSTED STURMEY-ARCHER REPAIRS—*continued*

### Reassembling

To reassemble, drop the driving dog in position and assemble the balls in the large race, the number required on old-type hubs being twenty. It is possible to insert twenty-one balls, but there is a tendency for these to jamb if this number is used. The current design has 3/16in. diameter balls held in place by a retainer over them. When this retainer is pressed on the balls should be free to turn, but should not fall out. The number of balls is now 24.

When replacing the caged balls in the driving dog remember that the solid side of the cage faces the cone. The same remarks apply to the indicator side ball race.

The next step is to screw up the right-hand cone, thus positioning the gear ring, ball cup and driving dog. This cone should be screwed up with



**Removing a cog from the driver using the special fixture available**

the fingers as tightly as possible, and then slackened back just sufficiently to allow the parts to revolve freely on the axle, the adjustment then being correct. Next place the star washer in position in the slots of the cone, and secure it in place by means of a sharp blow with a small chisel on the face of the washer near the flats on the spindle. This swages the metal of the star washer up against the spindle flats and holds the washer securely.

The mechanism can now be inserted in the hub shell and the right-hand ball cup with its two-start thread screwed home. The hub shell and the ball ring should have been marked before dismantling, and these marks should coincide when the ball ring has been drifted tight. If they do not do so the ball ring must be unscrewed and started on the other thread.

Until its insertion in the hub the whole of the mechanism has been built up with the flats on the indicator end of the spindle gripped in the vice. The control end flats should now be held in the vice, after which the end plate should be fitted over the end of the planet wheel cage, and the coil spring threaded over the spindle. Follow this up with the left-hand ball cup, which should be screwed into the hub shell; thereafter nothing remains but to screw home the cone.

The hub is now completely built up and the sprocket can be fitted, care being taken not to omit the dust cover which lies behind it.

The time taken to remove a wheel, renew all bearings, fit cog to new driving dog, reassemble, refit wheel and adjust was 66 minutes, so that the charge for a complete bearing overhaul would be as follows.

| | s. | d. |
|---|---|---|
| *Time, 66 minutes* .. .. | 2 | 9 |
| *Material: Indicator side parts, as listed previously, 5s. 7d.; ball ring, 3s. 6d.; cone, 1s. 4d.; balls, 4d.; drive dog, 3s. 6d.; drive dog balls, 4d...* .. .. | 14 | 7 |
| *Total* .. .. | 17 | 4 |

## CHANGING COG

Remove wheel and place in vice with indicator end of spindle held vertically. Remove star washer and unscrew cone. Lift off cog and driver. Hold the latter in the special fixture described above, and unscrew the cog with a chain wrench. Fit new cog.

On older-type hubs with uncaged bearings it is necessary to invert the wheel over a suitable receptacle to collect the loose balls, which in the large race are twenty in number. When reassembling this type of hub and new balls are used, *remember not to insert twenty-one balls.*

When this is done place the smaller ball race in position. If the balls are uncaged, smear the race with grease to hold them in place. In the latest types see that the solid side of the cage faces the cone. This is also the case with the ball race on the indicator side.

Now reassemble the drive side cone and adjust as described when dealing with bearing replacement. It is not necessary to interfere in any way with the indicator side of the hub. The hub on which the cog was changed was fitted with caged bearings.

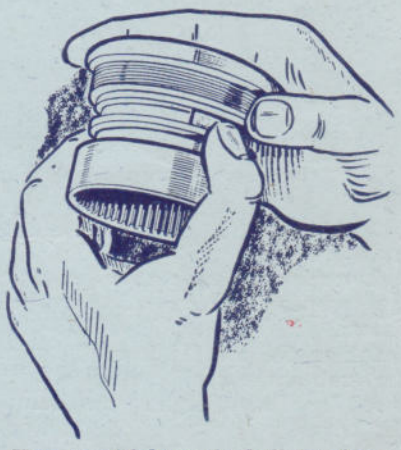
| | s. | d. |
|---|---|---|
| *Time, 22 minutes* .. .. | | 11 |
| *Cog* .. .. .. .. | 1 | 6 |
| *Total* .. .. | 2 | 5 |

## FITTING NEW GEAR RING PAWLS

Proceed as described for a bearing overhaul, until it is possible to lift off the driver, drive side ball cup and gear ring, holding them together as described. Now lift the ball cup off the gear ring.

Lifting the ball cup exposes the two pawls on the gear ring. The pawl pins can be pushed out and the pawls removed, care being taken not to lose the small "R" springs.

*On older types the pawl springs are cylindrical and may fly out, so that the pawls should be held with the fingers until the ball ring has been removed.* On these types, too, the pawl pins are held by small split pins which must be removed before the pawl pins can be taken out.



**How to withdraw the ball cup from the gear ring without losing the pawl springs**

Then replace the pawls and springs in the gear ring and insert the pawl pins. *On older hubs see that the ends of the pawl springs are in the recesses in the pawls and on the milled platforms on the gear ring.* Fit the pawl pins and split pins, if fitted. Compress the pawls with the thumb and first finger, and drop the ball cup over them.

## REMOVING GEAR PARTS

With the gear ring lifted off, the sliding clutch and planet wheels can be removed. With the spindle still held in the vice by the indicator end, the right-hand threaded nut which holds the sliding clutch to the control sleeve is removed. The sliding clutch can now be removed. Follow up by removing the planet wheel pins, which are merely a sliding fit in the planet wheel cage. (*Time 2 minutes.*)

## CONTROL SLEEVE PARTS

If the planet wheel cage and the control sleeve are to be removed, further work is necessary. The first step is to take off the indicator and the control rod. To do this the indicator rod can be gripped by a pair of pliers (this rod now has a screwdriver slot in the end) and the control chain unscrewed. The control rod and indi-

## COSTED STURMEY-ARCHER REPAIRS—*continued*

cator can now be withdrawn from opposite ends of the spindle.

Note that the indicator should be firmly gripped until the control rod and chain have been withdrawn. If not, the sudden release of the internal spring may shoot it out of sight. (*Time* 2 *minutes.*)

Next, insert a narrow-bladed $\frac{11}{64}$in. wide) screwdriver into the control end of the spindle and remove the grub screw which holds the mainspring. The screwdriver in question can be obtained from the factory, price 6d., and is doubly useful since it is marked to serve as a gauge for the proper location of the grub screws.


**An "exploded" view of the spindle and control parts**

Taking the spindle from the vice, the grub screw can be removed, followed by the mainspring and its collar, which is a very small part and should not be lost. The control sleeve cross pin can then be pushed out and the control sleeve and planet wheel cage taken away from the spindle.

When reassembling, starting with the bare spindle, the planet pinion cage is slid on and followed up by the sliding sleeve. The sleeve pin is then inserted and rotated until the cross hole is on the same centre line as the spindle. The mainspring is then inserted in the control end of the spindle.

Before inserting the mainspring and its collar the mechanic should carefully check the tightness in the coils of the collar, since it is most important that this should remain in position. If loose, the end coils of the mainspring should be slightly compressed.

The illustration given above should assist here, which shows the arrangement of the parts which fit inside the spindle: it also serves to show the parts in position in a sectioned spindle.

Now, with the mainspring and collar in position, the grub screw can be screwed in to a depth of $\frac{1}{2}$in. (except in the case of a tandem), this dimension being important and is marked on the special screwdriver provided. If the grub screw is not tight on its threads a small wedge can be inserted, and given a sharp tap to spread the sawcut in the end.

The indicator with its spring can now be inserted, also the control rod, when the two can be screwed together internally by holding the indicator and rotating the control rod. This is a delicate operation: only a small pressure is required if fracture of the fine thread on the end of the indicator rod is to be avoided. (*Time* 6 *minutes.*)

## FITTING NEW SLIDING CLUTCH

Put the sliding dog clutch on the sleeve, hold the indicator end of the spindle in the vice and screw the locknut up tightly. If a new sliding clutch is to be fitted it must be examined closely to see whether it binds or not. If any binding is experienced the end of the sliding clutch next the locknut must be ground down slightly.

From now on, the work of reassembling the wheel proceeds as described under "Reassembly" in the section devoted to bearing replacements.

**KEEP A FILE OF SERVICE DATA**

Reprints of these supplements can be supplied at 4d. each or twelve copies of any one issue for 3/9, post free. A sturdy spring-back binder covered in black leather-cloth and designed for hard use in the workshop is available at 3/- post free to 'Trader' subscribers.

## A SLIPPING CONTROL

The top tube control is a simple affair, and the only trouble likely to occur is for the lever to slip out. This can be obviated by slightly undercutting the locating peg.

The control should be readjusted so that the indicator is flush with the spindle end when the control is in normal gear.

## SERVICE TOOLS

The tools used in this series are all obtainable from the factory service department, but some dealers will prefer to make them up themselves, so that some instructions may be useful.

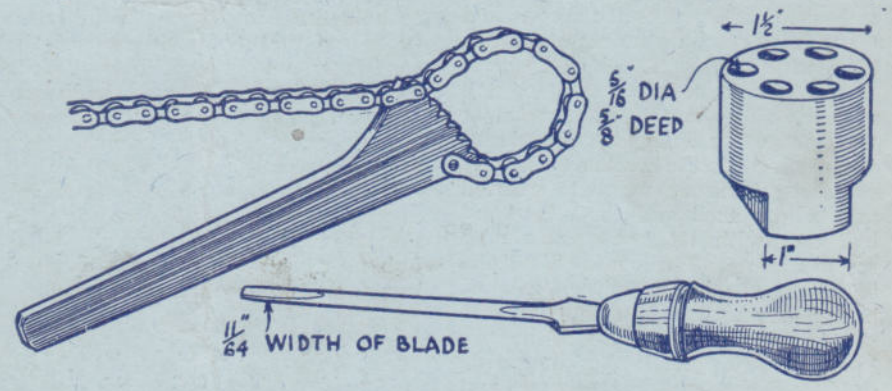
The first tool is the fixture which holds the dogs of the driver whilst a refractory sprocket is being removed. The material required is a $2\frac{1}{2}$in. length of $1\frac{1}{2}$in. diameter steel bar.

Two flats 1in. across and 1in. deep are then milled at one end so that the fixture can be securely held in the vice jaws.

Next mark off on the other end of the bar six holes equi-spaced on a $1\frac{1}{8}$in. diameter circle which has its centre on the axis of the bar. These holes are then drilled to a depth of $\frac{5}{8}$in., using a $\frac{5}{16}$in. dia. drill. These holes must be accurately drilled or the whole purpose of the tool—which is to spread the load over all the dogs—will be lost. Such a tool "ready-made" costs 2s. 9d. from Messrs. Sturmey-Archer Gears, Ltd.

There is yet another tool which can easily be made, and that is the small screwdriver for fixing or removing the mainspring grub screw. This should have a blade $\frac{11}{64}$in. wide, and a further refinement is a scribed mark $\frac{1}{2}$in. from the end of the blade. It costs 6d. from the factory.

The cone spanner and chain wrench required for some jobs are, of course, standard.




**THREE USEFUL TOOLS. Above are shown a chain wrench, the driving dog fixture and the special grub-screw screwdriver**

"THE TRADER" REPAIRERS' SUPPLEMENT—14

# THE AR STURMEY-ARCHER HUB

This week, instead of our "Costed Cycle Repairs," we include a selection of service hints of general interest which have been contributed by manufacturers and retailers

IN our Service Supplements Nos. 10 and 12 we have dealt fairly exhaustively with the old K type Sturmey-Archer hub and with the AW and AM hubs which are the wide and medium ratio hubs in the latest Sturmey-Archer range.

For the enthusiastic clubman, however, there is the AR hub, and this is selling in such numbers that we have been compelled to include some notes regarding its maintenance in this series although as yet unable to include it in our "Costed Cycle Repairs" series.

The information contained in the following article has been specially prepared for us by the Service Department of Sturmey-Archer Gears, Ltd., to whom we are indebted for the information.

## COG AND DRIVER

This hub provides very close ratios which are specially suited for racing and competition purposes.

The splined-fitting driver and sprocket mentioned in a previous "Trader" Supplement with regard to the AM type hub are fitted as standard to all AR hubs. The special right-hand ball ring with ball retainer and single dust cap are only necessary with 14- and 15-tooth sprockets owing to the small diameter of these sprockets. With 16-tooth and larger sprockets always use the standard right-hand ball ring which uses loose $\frac{3}{16}$in. diam. balls and two steel dust caps, as this affords much better protection against the entrance of dirt and water. When the small sprockets are used, it should be stressed to the customer that special attention to lubrication is desirable, and the use of a good quality oil is also very essential in such cases.

## PLANET CAGE ASSEMBLY

The planet cage assembly in these hubs is rather more complicated than in the other types, and where it is found necessary to dismantle this part of the hub two special spanners will be necessary. There are two trains of gears which are inter-coupled. The gear ring meshes with the planets in the planet cage proper, but a second left-hand gear ring is screwed to this planet cage, and this left-hand gear ring carries pawls providing the usual low-gear drive to the left-hand ball cup. The intermediate planet cage, which meshes with the left-hand gear ring, is extended in the form of a sleeve along the axle and on this sleeve is cut the sun pinion for the primary train of gears. The sun pinion of the intermediate train is solid with the axle.

## HOW THE GEARS WORK

The drive on high gear is from the sliding clutch to the planet cage in the usual way. Thus the left-hand gear ring drives the intermediate planet cage, and consequently the sun pinion of the primary train, at a slower rate. It is because this sun pinion is caused to revolve in this way that only a small increase in speed is transmitted by the pinions in the main planet cage to the gear ring, which drives the wheel by means of the gear ring pawls and the right-hand ball ring. Middle gear is direct drive from sliding clutch to gear ring and right-hand ball ring, and low gear reverses the high gear action, as is usual with the Sturmey-Archer design.

## DISMANTLING

This hub is dismantled in similar manner to the AW type (see "Trader" Repairers' Supplement No. 12) until the planet cage assembly has been removed as a unit from the axle. Then pull out the planet spindles and examine for wear the ends which project to form driving dogs for the high gear. The four planet pinions will then drop out.

The special holding block DD.4976 is now required. Fix this in the vice and place the planet cage over the pegs, then unscrew the lock ring which secures the left-hand gear ring. This has a left-hand thread and is provided with two small holes for punching it round, but be careful not to damage the thread beneath in this process. Now use the peg spanner DD.4977 to unscrew the left-hand gear ring from the planet cage. This has a right-hand thread. The pawl spindles in the left-hand gear ring are punched over on the inside to secure them in position, but it is not a difficult matter to knock them out if necessary in order to renew the springs or change the pawls. These pawls are reversible, so that they can be turned round unless the nose at both ends is worn, when new pawls will be required. Both pawls should be reversed at the same time to ensure even pressure when driving.

The intermediate planet cage can next be lifted from the main planet cage and the planet spindles and three planet pinions removed. These pinions are identical with those in the main planet cage, and it is immaterial which of the sets are replaced in this position. A thin steel washer will be found between the two planet cages. This is to keep the two sets of pinion spindles apart, and fits over the sun pinion end of the inner planet cage. Care must be taken not to trap this washer when re-assembling.

This completes dismantling, and the parts can now be cleaned and examined before commencing re-assembly. The two special tools are obtainable from the factory.

## REASSEMBLING

First, fit the main planet cage and the intermediate planet cage together with the steel shim washer between, and fix the main cage down over the pegs of the holding block in the vice. Fit the three pinions to the intermediate planet cage. Fit the pawls in the left-hand gear ring, taking care that they are the right way up and facing the correct direction, and screw this to the main planet cage, using the special peg spanner. Lift the assembly off the holding block and fit the lock ring, replacing on the block to enable the lock ring to be punched tight. Remove from block and turn over to fit the planets in the main cage Make sure the projections on the pinion spindles are in good condition. Then slide the complete assembly over the axle.

The rest of the assembly is exactly the same as described for the AW hub.

# Resilion Brake Hints

ON sports machines the caliper brake working on an Endrick rim is one of the most popular types in use to-day, and where this type is concerned the products of the Resilion Company are outstanding. Three models are on the market—Cantilever for high-grade machines; Cantilette, which is a cheaper grade; and the interesting Anchor model. Some notes regarding the servicing of these brakes have been supplied to us by the company.

With the exception of the cable control on the Cantilever and Cantilette types, there is nothing in either the adjustment or overhauling of all parts of these brakes which is not simplicity itself.

Even the replacement of frayed or broken cables is a simple matter, but since extreme accuracy in cutting the inner wires to length and a special clenching operation on the junction nipple before soldering are required, the makers prefer that dealers make use of the replacement service whereby new cables can be obtained either from the factory at 200, Liverpool Road, London, N.1, or from any Resilion stockists.

Of the three types made, we propose, for the sake of simplicity, to deal with their adjustment and overhaul separately, commencing with the Cantilever type.

## THE CANTILEVER MODEL

### ORDERING

When ordering it is essential to give the following information in order that the brake may be exactly suited to the job which it must perform:—

**Front or rear.**

**Width between stays or fork blades opposite the rim.**

**Section and dimensions of stays or fork blades.**

**Length of cable.**

By giving these details the correct size brake blocks, bracket and clamping shield will be obtained.

One of our illustrations shows one side of the brake completely dismantled, whilst the adjusting nuts and the parts mentioned in the following paragraph are lettered in another.

### FITTING

Remove the cable nipple from the cable bar D in the quadrants (C1 & C2) by compressing the springs and pulling the nipple with a pair of pliers. Next turn the cable bar through 90 deg. and press it downwards out of the slots in the quadrants.

Unscrew the fixing screws and detach the clamping shield—the part to which the cable stop is attached. The brake is now sufficiently dismantled to permit of its being fixed in place.

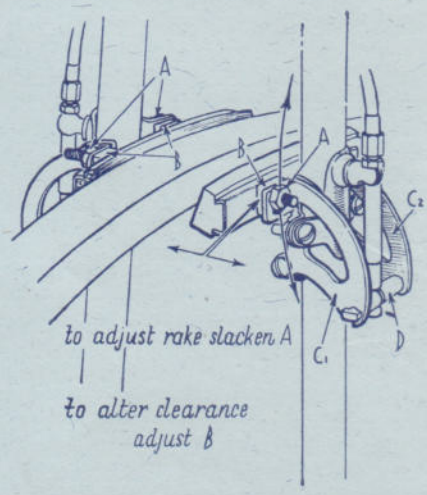
Make sure that the assembly is fitted on the right side, i.e., that the blind end of the brake shoe faces forward. Place one fixing bracket together with the crank members and shoe in position inside the stays, replace the clamping shield, leaving the fixing screws slack. Make sure that the rear wheel is properly aligned and true and slide the fixing bracket up or down the chain stays until a position is obtained where the full surface of the block bears on the rim. The nuts B which hold the shoe should be slackened so that the right rake is obtained.

Tighten up the fixing screws with the shoe pressed firmly against the rim and proceed to repeat these operations on the other side. Incidentally the makers recommend that the rear brake junction shoe should be placed above the top tube with the twin cables passing one each side of the seat pillar.

Next replace the cable bar (right way up, please!) and the cable nipples fit the handlebar lever and all is ready for the final adjustments.

### ADJUSTING REAR BRAKES

Screw the main cable adjuster home until the back of one brake shoe bears against the fixing bracket. Whilst this is being done, both secondary adjusters should be screwed right home. Unscrew the secondary adjuster on this side and screw the main adjuster further home until both shoes bear on the fixing brackets with no slack in the cables.

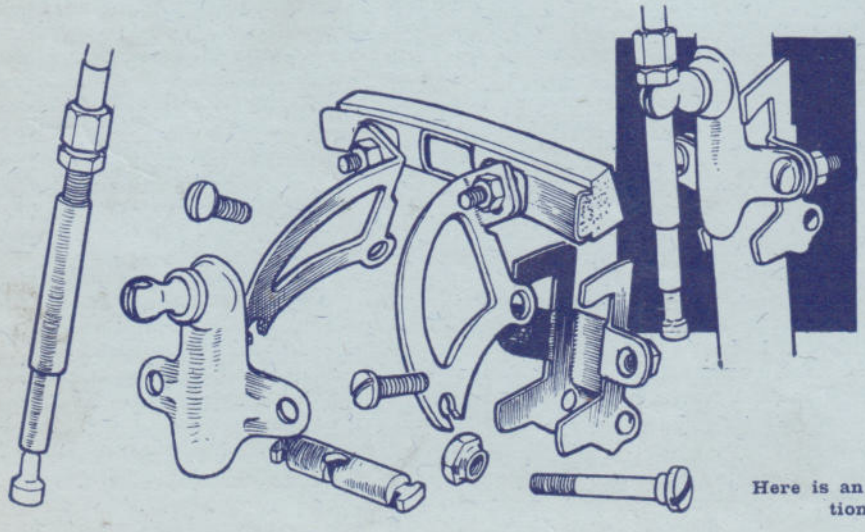



**Resilion Cantilever adjustments**

Now slacken the shoe fixing nuts A and adjust the square nuts B until the shoes are parallel to the rim and have $\frac{1}{16}$in. clearance. Before tightening make sure that the shoes have the proper rake, which is carried out by sliding the shoe fixing bolts in the slots in the quadrant bars. The adjustments are now complete.

### FRONT BRAKE ADJUSTMENT

On front brakes there is no adjustment at the shoes, and if, when the cables are fully slackened off, there is



**Here is an "exploded" view showing the construction of the Resilion Cantilever model**

more than $\frac{1}{8}$in. clearance between block and rim fit thicker blocks. The proper clearance in the off position is $\frac{1}{16}$in., and with the correct block thickness should be obtained with the adjustment fully slackened off when the blocks are new. Minor variations are taken up by the main and secondary cable adjusters. Rake adjustment is carried out in the same way as on the rear brakes.

## WHEN WEAR OCCURS

*REAR BRAKES:* As the blocks wear all adjustments should be made at the shoes as described above. Cable stretch only is taken up by the adjusters.

*FRONT BRAKES:* As wear takes place adjustment is made by means of the adjustable cable stops.

## FITTING NEW BLOCKS

Prise out the old blocks, wet the new blocks and slide them into the open end of the shoe. The size of the new blocks and the adjustments after fitting are carried out in the same way as when fitting a new brake.

## CABLES

Cables should occasionally be removed and soaked for an hour or so in thin oil.

To do this slacken off all adjustments, unhook the nipples from the cable bars, unscrew the secondary adjusters, remove the control lever fulcrum pin and unhitch the main cable.

The exposed cable at the lever end should be frequently greased.

Should a dealer not be within reach of a Resilion stockist and be called upon to repair a broken cable, it is advisable to renew all three inner wires. This simplifies matters, since if a secondary cable breaks—a rare occurrence—the remaining wire can be used as a pattern and both new wires can be cut to the same length. The main cable should be cut to length after the cable has been assembled, and should allow a fractional clearance with all adjusters screwed right home.

# THE CANTILETTE MODEL

## ORDERING

To order a Cantilette type brake the same details as are necessary for a Cantilever model should be supplied.

## FITTING

Fitting is simplicity itself, since the shoe lock nuts can be slackened and the shoes removed. The fixing screws are then removed, the fixing bracket placed in position *outside* the stays or forks with the clamping bars on the inside. The fixing screws and shoes are replaced and the same adjustments for height and rake carried out as have been described for the Cantilever model.

## ADJUSTMENTS

Final adjustments and adjustments for wear are identically as described for the Cantilever type, whilst the cable assembly is the same and demands the same treatment.

# THE ANCHOR MODEL

This type, the latest Resilion product, is of entirely new design, so that a special description of its fitting and adjustment is required.

The general design is illustrated and its absolute simplicity is well depicted.

## FITTING

To fit this brake the nuts and bolts A in the illustration are removed and the fixing clips sprung open slightly to allow their ends to pass over the fork blades. The brake is then positioned so that the full faces of the blocks bear against the rim, the fixing bolts are replaced, and the whole assembly tightened up.

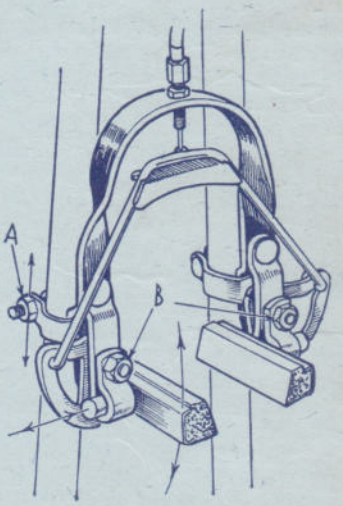
## ADJUSTMENTS

First slack off the cable until the shoes come back away from the rim as far as possible, then slacken nuts B and slide or twist the shoes until the correct rake and clearance ($\frac{1}{16}$in. from block to rim) are obtained.

All future adjustments for block wear are made at B, the cable adjuster being only used to take up any slack in the cable.

## CABLE DETAILS

The repair of the single cable—there is no junction box on this type—is a simple matter, since the nipples at either end can be unhooked without dismantling anything. Removal of the adjuster then allows the cable to come away.




**This illustration clearly shows the simple construction of the Resilion Anchor model. The adjustments provided are lettered and mentioned in the text**

# Readers' Repair Ideas

## STRAIGHTENING TUBES

J. J. Davis, of Western Cycle Depot, Dundee, 1, uses a car jack for tube straightening. He writes as follows:—

"It often happens, when a tradesman's cycle comes in for repair, that the sides of the carrier are badly bent, presenting a difficulty in straightening. To overcome this, procure an old car jack. Place it between the tubing of the carrier, and expand out the sides. You will find this is an effective repair.

"This method can be employed in the same way when the seat tube of a low-gravity cycle is bent forward, as is often the case. This time place the jack between the head of the frame and seat lugs, and expand as before.'

## STRIPPED PEDAL SPINDLES

"I am often asked to braze stripped pedal spindles to crank ends, and I find the following the most efficient method that I have tried for years.

"First of all I soften the end of the pedal spindle and drill a $\frac{5}{32}$in. dia. or $\frac{3}{16}$in. dia. hole about $\frac{3}{4}$in. or $\frac{5}{8}$in.

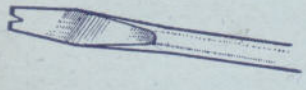
## READERS' REPAIR IDEAS—continued

deep in the spindle end. Saw-cut the end—parallel with the axis—for the depth of the thread and then flux the stripped threads.

"Fit the spindle to the crank, drive a taper pin into the ⅜in. dia. or 5/16in. hole and braze up. I have yet to have a complaint of this coming loose or breaking." L. PATTON.

## ROLLER LEVER SPRINGS

Some difficulty is often experienced in hooking the return springs of roller lever brakes over the stop on the lever. Many cases of damaged knuckles have



**The converted screwdriver blade**

been experienced by repairers who endeavour to do this job by using the blade of a screwdriver to exert pressure on the spring. The screwdriver slips and the damage is done!

Fred Smith, of Regent Street, Hinckley, when doing this job, uses a special tool which is simply made by grinding or filing a Vee slot in the blade of an ordinary screwdriver. The groove prevents the screwdriver blade from slipping and greatly facilitates the job.

## REAR BRAKE REPAIRS

L. P. points out that the lower adjusting bolt which is fitted below the bracket in the layout of the normal type of rod-operated stirrup brake often gets rusted up so that no adjustment is possible.

Renewal is therefore necessary but, should replacement parts not be available, "L. P." offers an alternative suggestion. He, in such cases, obtains an old heavy-gauge mudguard stay and threads it down for its full length, using a 3/16in. dia. 24T.P.I. or 3/16in. dia. B.S.F. die.

He then threads two thin mudguard bolt nuts on to this rod and fits it to the brake stirrup. After the required length has been ascertained the surplus length of rod is removed.

## FOOT OPERATION FOR GRINDER

In many grinding jobs it is helpful, if not exactly necessary, to be able to hold the job with both hands whilst grinding This is quite impossible if a hand grinder is used unless help is at hand, and even then it is a waste of valuable time to employ two men for a job that, with a little ingenuity, can be done without assistance.

The average hand grinder can readily be fitted with a simple pedal attachment, the only materials necessary being a length of strip steel about an inch wide, a plank of 4in. × 2in. timber about 3ft. in length and a strong hinge.

Saw the plank in two and join one of the narrow (4in. × 2in.) edges of each piece by means of the hinge. Next make two angle pieces 1½in. × 1½in. × 1in. wide from the strip and secure them face to face to the upper of the two pieces of wood about 16in. from the hinge. Drill a ⅜in. dia. clearance hole through both of the vertical arms of the angle pieces so that the holes are in line.

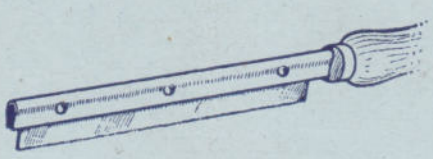
Drill another clearance hole for a ⅜in. bolt ¾in. from one end of the remaining length of strip, place the strip between the angle pieces and pass a ⅜in. dia. bolt through the three holes.

The strip forms the connecting rod so that the next step is to place the wooden treadle and base on the floor immediately below the handle of the grinder. With the latter at bottom dead centre and a distance piece about ¼in. thick between the treadle block and its base, the connecting rod can be measured for length and cut off, leaving sufficient to form a loop which will loosely encircle the handle of the grinder.

Place the connecting rod in position and your hand grinder is converted into a treadle-operated job. Further refinements are the fixing of the treadle base to the floor by means of Rawlplugs and the addition of a spring return to the treadle block. J. M. F.

## A USEFUL SAW

M. Bird, of Lowestoft, has found a useful method of utilising old and broken hacksaw blades for cutting material in positions where it is im-



**The simply made holder for use with broken hacksaw blades**

possible—or next to impossible—to use an ordinary hacksaw.

This tool, which only costs a few pence, is very easy to make. He obtains a 15in. length of ½in. dia. tubing of the type which electricians use for conduit work. This tubing is of steel and has a seam in it which can readily be opened out.

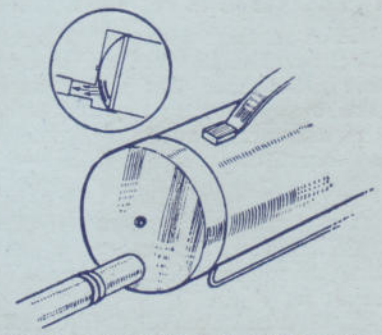
Drill three holes 17/64in. dia. through the tubing at right angles to the seam, drilling the first hole ½in. from one end and the other two at intervals of three inches. The seam is now opened out just enough to accommodate a broken hacksaw blade and three ⅜in. dia. bolts are threaded through the holes. The tube should also be slightly flattened.

Nuts are placed on these bolts, the hacksaw blade—which may be of any length up to 6in.—is inserted in the seam and the nuts tightened up. This contracts the seam and grips the blade securely.

To complete the job obtain a large wooden handle and bore it out to take the other end of the tube, a snug fit being, of course, necessary.

## AIR PRESSURE FOR TORCHES

Many dealers who do a fair amount of brazing use gas torches but are still content to use hearths in which the necessary air pressure is supplied by means of foot-operated bellows.



**How an old vacuum cleaner can be converted to supply air pressure for a gas torch**

Colston Davies, of Etnam Street, Leominster, has rather tired of this method and has evolved an excellent labour-saving substitute at low cost. He writes as follows:—

We have for several years used a gas blowpipe for brazing, supplied with air from a circular foot bellows, but this method is rather tiring when one has a lot of work on hand. Looking round for an effective substitute (with price for the main consideration) we purchased an old Electrolux vacuum cleaner for 10s., fitted a plate and tube over the end slots where the waste air escapes and simply connected a pipe from this to the air supply on the blow pipe.

We have used this for periods up to half an hour without overheating the motor and the result is far superior to the foot method as it ensures a steady pressure all the time. Also we find that when brazing a frame, the part is heated in about two-thirds of the time usually taken by the foot method.

A cleaner with the outside bag attachment is even more easy to convert for this work as merely a flat plate with a piece of metal tube fitted in is all that is required. These old motors (the older the better if in sound condition as they are heavily built) can be used for driving small bench drills, etc.

"THE TRADER" REPAIRERS' SUPPLEMENT—18

# TRIVELOX DERAILLEUR GEARS

**Service and repair hints on the Model A constant-chain-line Derailleur and the more recently introduced Models B and C**

THE introduction of the TriVelox derailleur gear, with its ingenious design permitting perfect alignment of the chain on all gears, has been attended with great success, and many thousands of these gears are now in use.

There are now three types of TriVelox, of which Model A is the original constant-chain-line type. Model B is a more recent and less expensive type in which gears are changed by lateral movement of the chain, whilst Model C is a conversion set in which the triple free wheel can be fitted to an existing hub.

The servicing of all three types is covered in this supplement.

## THE MODEL A

### CONSTRUCTION

The Model A hub has a splined extension outside the flange on the drive side. On these splines slides the centre of a triple-cog free wheel, the movement of which is controlled by a cable and return spring. The jockey cogs are mounted in line with the chain-wheel on a fixed bracket, and changes are made by sliding the free wheel laterally until one or other of its sprockets lines up with the guide cog.

### ORDERING

The following particulars are required by the factory when the gear is ordered:—

1. Solo or Tandem?
2. Cog sizes? (High, 14-18 teeth; Normal, 17-21 teeth; Low, 20-26 teeth.)
3. Conversion plate type—plain or drop out?
4. Control Clip dia.—$\frac{7}{8}$in. dia. or 1in. dia.?
5. Length of cable?
6. Bowden or open cable?
7. Brake hub or plain?

With regard to (2) it should be noted that if a 16-tooth middle gear cog is required this can be supplied at the time of order, but that if it does not prove satisfactory it cannot be changed without considerable trouble and expense, since in this size a special body with integral cog must be used.

Conversion plates, i.e., the bracket which holds the jockey cog assembly, are supplied in two types, as shown in our illustration. Both are located by a nut and bolt passing through the spindle slot, but in one case the plate and jockey arm must be removed before the wheel can drop out.

Open or Bowden control cables are available, the latter being the recommended type.

### WHEEL BUILDING

The rim must be central between cones and not between flanges. To obtain the correct result it is essential that the maker's instructions should be followed as regards lacing, spoke length and spoke diameters. Here are these recommendations:—

| Type of hub ... ... ... | Solo | Solo, with Brake | Tandem | Tandem (Large Flange) | Tandem with Brake |
|---|---|---|---|---|---|
| Chain Line ... ... ... | 1½in. | 1½in. | 1⅝in. | 1⅝in. | 1⅝in. |
| Rim Size ... ... ... | 26in.×1¼in. | 26in.×1¼in. | 26in.×1⅜in. | 26in.×1⅜in. | 26in.×1⅜in. |
| Spoke Dia. (gear side) ... | 13/15G | 13/15G | 13/15G | 12/14G single butted | 12/14G |
| Spoke Dia. (near side) ... | 15/17G | 13/15G | 15G | 14G | 12/14G |
| Spoke Length (gear side) ... | 11¼in. | 9 $\frac{7}{16}$in. | 11¼in. | 9⅜in. | 9⅜in. |
| Spoke Length (near side) ... | 11⅜in. | 10⅛in. | 11¼in. | 11¼in. | 9⅜in. |
| Lace over Spokes (gear side) | 4 | 1 | 4 | 1 | 1 |
| Lace over Spokes (near side) | 4 | 3 | 4 | 4 | 2 |

These spoke lengths are correct if rim washers are used on the gear side only or on both sides if a hub brake is incorporated.

### FORK ENDS

These should be spread equally to a dimension of 4$\frac{7}{8}$in. between faces on solo machines or 5$\frac{3}{8}$in. on tandems.

### CONVERSION PLATE

Fit the hub in the fork ends and secure it by means of the control-side spindle nut. Remove gear-side spindle nut, thread conversion plate over spindle, and refit nut.

The conversion plate should be fitted with the jockey sprocket assembly, and set (this can be done cold) to comply with the following requirements:—

1. The centre of the jockey arm pivot must be 1$\frac{7}{8}$in. from the centre of the chain stay.
2. A straight edge laid along the faces of the two jockey sprockets must be exactly in line with one laid along the chain wheel.

Next the jockey arm pivot can be packed out with washers of varying thicknesses (to allow for variations in fork-end thickness) until the two jockey cogs are dead in line with the chain wheel.

Alternative methods of holding the jockey cog assembly include a chain-stay clip fitting or a brazed-up lug. These should be fitted with their centre lines 3¼in. from the rear spindle centre, whilst the previous remarks about alignment apply.

### CHAIN LENGTH

It is most important that the correct length of chain is used, otherwise chain jumping on high gear or difficult changing may be experienced. Adjust the chain length so that in the high gear (small cog) position the jockey arm lies just behind the vertical, i.e., with its bottom end pointing slightly towards the rear of the machine.

### TENSION SPRING

Next fit the tension spring and clip, shortening the former at the clip end if required to suit varying chain stay lengths.

**Two types of Model A, TriVelox conversion plate**

## TRIVELOX DERAILLEUR GEARS—*continued*

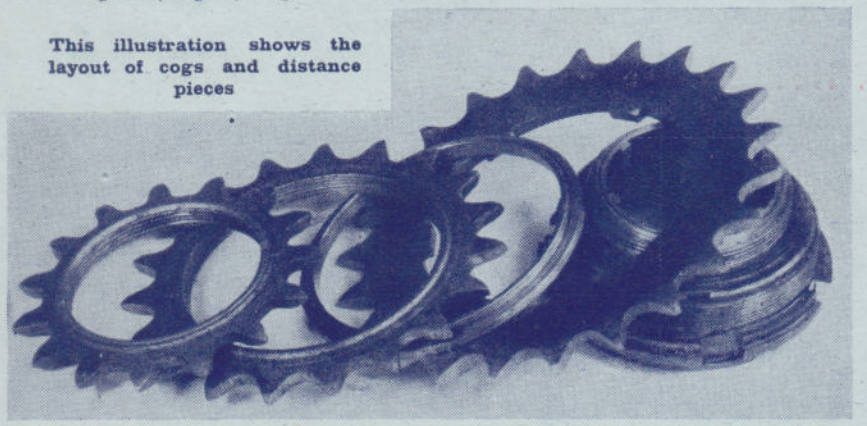
### THE CONTROL

For those who want the utmost in weight reduction an open celluloid-covered cable passing over a pulley near the seat lug can be supplied, but this is not quite so durable as the standard layout which includes a Bowden cable running along the top tube to a buttress clip fitted near the mudguard bridge. If a fitting of this type is required for a lady's machine a 1in. diameter clip can be supplied for fitting to the seat tube about halfway down its length. Standard clip is 1in. diameter with packing washers for $\frac{7}{8}$in. tubes.

Adjust cable so that in middle gear the centre cog is dead in line.

### CHANGING COGS

To change the cogs unhitch the control, remove the wheel, and obtain two chain wrenches. With one hold the low gear (largest) cog, and with the other unscrew the high gear cog, which has a right-hand thread. Treat the middle gear cog in a similar manner (it also has a right-hand thread), lift off the distance piece and the low gear cog.



**This illustration shows the layout of cogs and distance pieces**

It may happen that the top gear adaptor may unscrew itself with the top gear cog. If that happens, remove the cog and adaptor carefully to avoid losing one row of the free-wheel bearings. Put the adaptor in the vice and unscrew the cog. Replace the balls in the race, using a spot of grease, and screw the adaptor hard home.

When reassembling and after sliding the low gear cog in place, see that the shoulder on the distance piece faces away from the low gear cog.

The cogs are reversible, and when removed, turned round and replaced, offer what is in every respect a new bearing surface to match up with a new chain if one is fitted.

### DISMANTLING HUB

Disconnect the control, remove spindle nuts and washers and remove the wheel. Hold the spindle vertically in the vice by the flats on the gear side cone lock nut, prise off the control side dust cover, remove the lock nut and cone. A distance piece, the main spring collar and the main spring can now be lifted off, and also the nine $\frac{1}{4}$in. dia. balls from the control side bearing.

Remove spindle from vice, and, holding wheel and spindle together, place it over a box or other receptacle in order to catch the nine gear-side balls when the spindle is withdrawn.

If it is desired to remove the control rod from inside the spindle it is only necessary to hold the chain and unscrew the indicator by means of the screwdriver slot in its head.

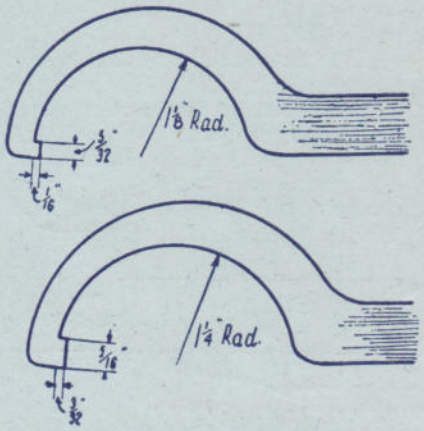
### REMOVING GEAR-SIDE BALL CUP

For this operation a tool made to the dimensions shown in one of our illustrations is desirable, but a piece of mild steel strip $\frac{11}{16}$in. × $\frac{1}{8}$in. × 12in. long, bent to a right-angle $\frac{3}{4}$in. from one end will serve. The cup has a right-hand thread.

Behind the cup lies the control sleeve which is in two parts, one of which screws into the other with a right-hand thread. The outer half should be unscrewed, right-hand thread, using a tool of the type illustrated. Again a length of mild steel strip 1in. × $\frac{1}{8}$in. × 12in. bent over $2\frac{1}{2}$in. from one end will serve.

### REMOVING THE FREE WHEEL

Looking inside the hub two keys sliding in slots in the hub can be seen. Remove these with a pair of round-nosed pliers and the free wheel is then free to slide off, and the inner half of the control sleeve will also slide out from inside the hub.

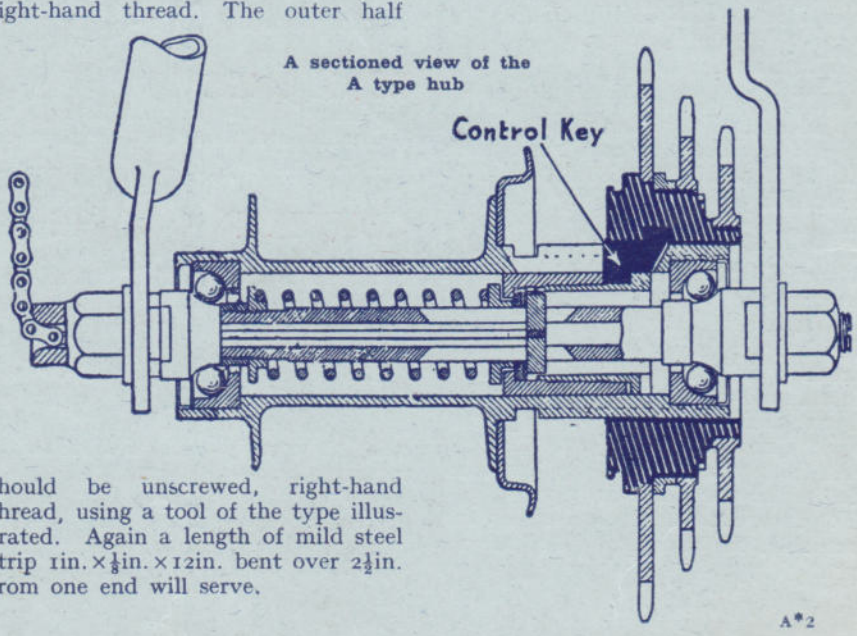



**"Cee" spanners with these dimensions are useful for dismantling the free wheel**

### DISMANTLING THE FREE WHEEL

The free wheel is perfectly straightforward in design with an end plate on the low gear side which can be unscrewed by holding the low gear cog and using a "Cee" spanner on the end plate slots. *The end plate has a left-hand thread.* If the cogs have been removed, another "Cee" spanner can be used on the low gear dogs. Dimensions for these "Cee" spanners are given in one of our illustrations.

End play in the free wheel is taken up by shims behind the end plate.

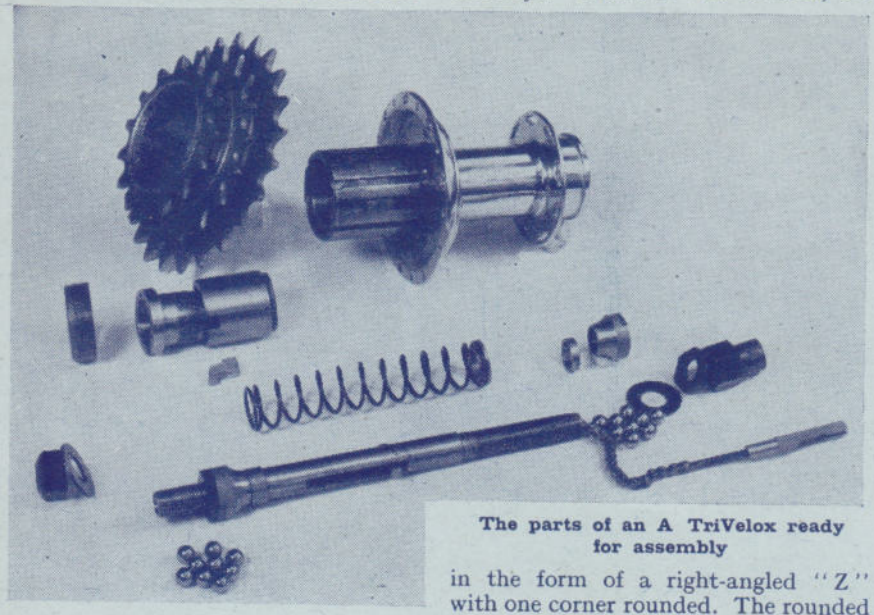



**A sectioned view of the A type hub**

## TRIVELOX DERAILLEUR GEARS—continued

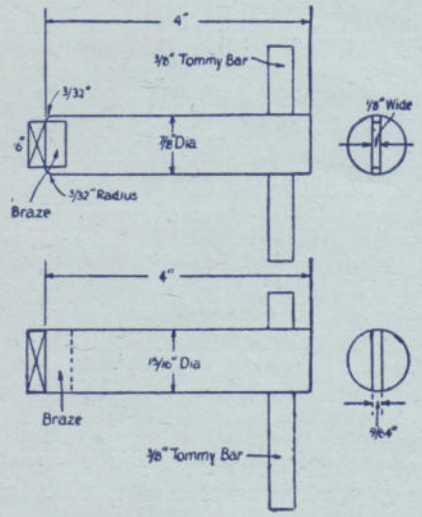
### ASSEMBLY

Start with the inner half of the control sleeve and its two hardened washers, one of which has a shoulder



The parts of an A TriVelox ready for assembly

which bears on the other, and between which the small diameter of the control sleeve fits with a small clearance. When the gear is assembled the main spring bears against the shouldered washer and the control cross-pin against the plain washer. Thus the




**The upper of these tools will extract the Model A gear side cone: the other unscrews the control sleeve. The principal adjustments and the layout of the Model B TriVelox are shown on the right together with the cog layout**

washers are fixed whilst the control sleeve rotates, so that the importance of clearance can be seen.

The sectional drawing shows the arrangements of these parts.

Now slide the free wheel into place—it must be fitted on to the correct splines to allow the key-way in the free-wheel body to register with the slot in the hub body. Next comes the most ticklish job of the lot—the insertion of the keys. These, it will be seen, are in the form of a right-angled "Z" with one corner rounded. The rounded end should face outwards and fit into the cross-slot in the freewheel body through the slot in the hub, whilst the other end fits into the slot in the control sleeve. Patience and a pair of round-nosed pliers are required, but once the knack is mastered it is a fairly easy job. Note that the keys should be inserted so that the end of the free wheel travel is such that in high gear its face comes approximately flush with the end of the splines.

Next screw home the outer half of the control sleeve and follow this up by screwing in the ball-race cup. In both cases use the tools specified for dismantling. Insert the spindle from the gear side, place the nine balls in the cup and turn the wheel over.

Now in turn thread the main spring, its collar, and the small distance piece over the control end of the spindle. Screw the cone almost home, insert the nine balls and adjust the bearings by means of the near-side cone. Screw on the locknut.

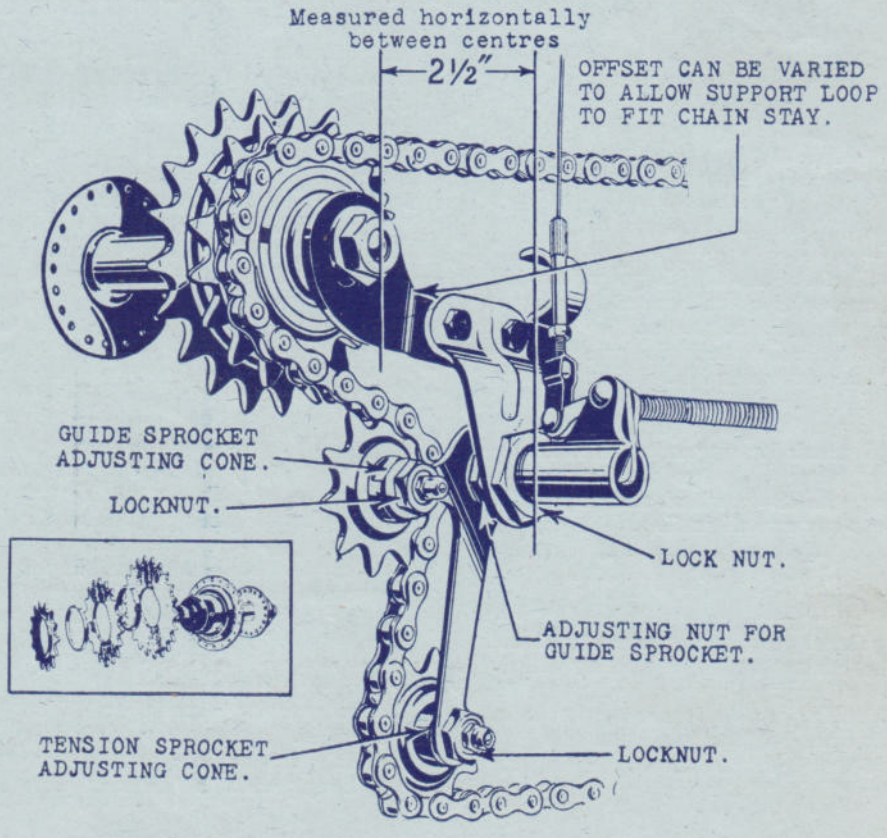
### JOCKEY COG BEARINGS

These are of the single-row type. To adjust, slacken off the spindle nut and take up play by means of the cone.

## THE MODEL B

### CONSTRUCTION

A triple free wheel is built into the hub, and the jockey and guide cog assembly is free to slide laterally in its bracket. Its movement is controlled by the operating cable by means of a bell crank lever, and a return spring is fitted. Lateral movement of the guide cog carries the



## TRIVELOX DERAILLEUR GEARS—continued

chain into line with one or other of the cogs on the triple free wheel.

### FORK ENDS

These should be spread equally to a dimension of $4\frac{7}{8}$in. between inside faces.

### FITTING

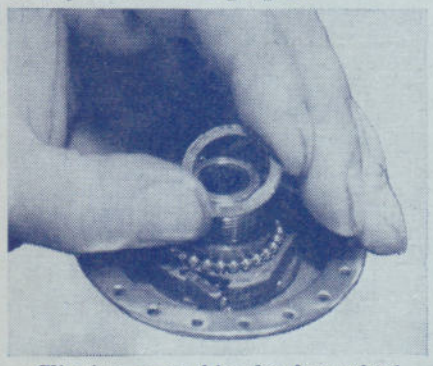
The conversion plate which holds the guide cog assembly fits over the wheel spindle and has a support loop at its other end. It is slightly cranked to give a certain degree of offset.

Fit the wheel to the fork ends and tighten up the near side spindle nut. Remove gear side spindle nut, thread conversion plate over spindle and tighten up. If support loop does not fit against the chain stay, decrease the amount of offset, taking great care that the wheel spindle and that which carries the guide cog assembly remain absolutely parallel when the bracket carrying the latter is bolted in place.

Check the alignment of the chain wheel and middle gear cog.

### CONTROL

Fit control quadrant and pulley to frame tubes and adjust cable so that it is just taut in high gear.



**Slipping on a shim for free wheel adjustment**

### FINAL ADJUSTMENT

Slacken off the large nut which clamps the actuating-rod housing to its bracket, set the bell crank lever so that it is dead in line with the run of the control cable. Place the control in the middle gear notch, and using a thin plate spanner rotate the bell crank bearing nuts, thus moving the latter endways until the guide cog, the chain wheel and the middle gear cog are all in line.

### TENSION SPRING AND CHAIN

The chain should now be fitted with the control in high gear and should be of such a length that when the chain is properly tensioned the jockey cog arm should slope backwards.

Finally, fit the tension spring and the clip which holds it to the chain stay. If it is necessary to shorten this spring to secure adequate tension, shorten it at the forward end.

### GUIDE COG

This and the jockey cog are carried on single-row adjustable ball bearings. Adjust as model A.

### CHANGING COGS

On the B type gear the only screwed cog is the high gear cog which has a right-hand thread.

Distance pieces are fitted between the cogs, and the correct order of assembly is as follows:—Low gear cog, wide distance piece, middle gear cog, narrow distance piece, high gear cog. All cogs are reversible.

### FREE WHEEL BEARINGS

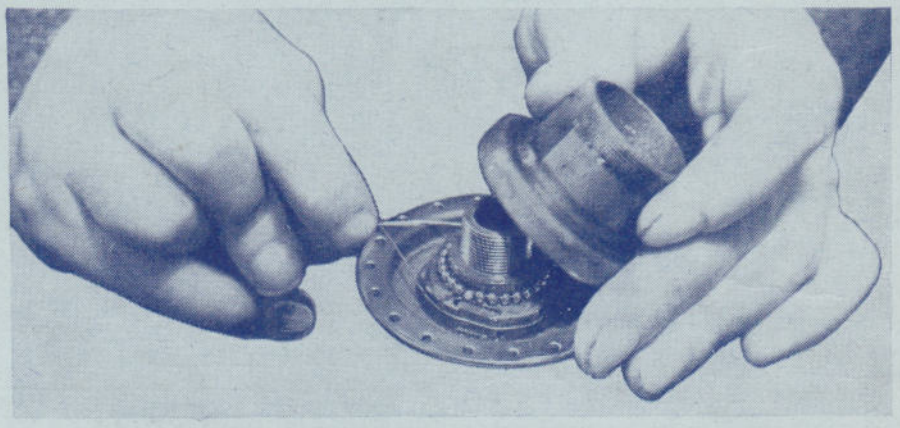
If the free wheel bearings become sloppy, place a strip of $\frac{3}{32}$ thick mild steel strip edge upwards in the vice. Remove the wheel, remove spindle-nut, lock-nut and cone on the near side, taking care not to lose the balls. Withdraw spindle from gear side.

Engage the slots in the ball cup with the edge of the mild steel strip and rotate the rim in an anti-clockwise direction. After slackening off, unscrew the cone and lift off the free wheel body. If the wheel is held with the hub vertical, neither balls nor pawl springs will be lost.

The shims can now be lifted off and their thickness varied.

### FREE WHEEL REASSEMBLY

Holding the hub vertical, place the inner row of balls in position on the free wheel centre, holding them with a little grease.



**Holding the pawls before dropping the free wheel body in place**

Fit the pawls and their springs in position, compress the springs and hold them in place with a loop of very fine wire—5 amp. fuse wire will do nicely. Drop the free wheel body into place and withdraw the wire. Using grease as before, assemble the balls in the free wheel body and screw up the ball cup. Tighten by turning the wheel over and using the mild steel strip in the vice. Check for freedom and lack of side play: if adjustment is incorrect, repeat the dismantling and try a new combination of shims.

Finally, insert the drive side balls and the spindle, add the near side balls and screw up the adjusting cone.

## THE MODEL C

### CONSTRUCTION

This gear is identical in all respects with model B except for the free wheel unit which is designed to screw on to an existing hub. When servicing the operating gear and fitting it, follow the instructions given for model B.

Fork ends must be widened, whilst an extended spindle with distance pieces is also advisable when fitting.

### CHANGING COGS

The low gear cog is carried on splines and is held in place by the middle gear cog which screws on to the free wheel body with a distance-piece between. The shoulder of this distance-piece should face outwards. The top gear cog screws on to an adaptor.

### FREE WHEEL ADJUSTMENT

Remove cogs and, using a spanner on the free wheel body, unscrew it from the hub (right-hand thread, of course). An end plate will be found at the back, and using two C spanners on end plate and free wheel body respectively, the left-hand-threaded end plate can be removed, thus exposing the interior of the free wheel.

Adjustment is by means of shims behind the end plate.

"THE TRADER" REPAIRERS' SUPPLEMENT—19

# MORE ABOUT MOTORISED CYCLES

**A further section on motorised cycles with details of the Cyc-Auto engine and with reference to general maintenance**

IN this, our second servicing supplement on motorised cycles, we deal with the Cyc-Auto unit, and with individual features of Excelsior, James, and Raynal machines. Since the compilation of this article many new makes have made their debut at the show. Obviously it is not possible to include them until road and workshop experiences have been gained.

The extension of these notes on motorised cycles into two supplements must by no means be taken as an indication that servicing is apt to be extensive or in any way difficult. Our enquiries of motorised cycle dealer specialists reveal that with a little running attention given in the early stages, servicing other than of an infrequent and elementary nature scarcely arises.

The cycle parts, too, give little trouble, but for the benefit of mechanics who are mainly motor cycle minded, we give one or two hints on general cycle practice. No attempt is made to divide these to apply to individual makes, as the similarity is sufficient to render this redundant.

Much satisfaction has been expressed with the Villiers lighting and ignition set. We dealt with the Villiers engine in our issue of October 21st.

## THE CYC-AUTO UNIT

This has a vertical cylinder with flywheel magneto at forward end, while rear end of drive shaft is slotted to take a flat steel driving strip of which the other end engages in a slot in a worm shaft. The underslung worm drives a worm wheel which rides free on the bottom bracket axle on a bush. There are two locating pegs, one chisel-point, the other blunt ended, with a stirrup shaped spring clip connecting each. The "power chain" sprocket takes up the drive when the pedal spindle is tapped over with the foot, to bring into engagement mitred dogs on the sprocket with mitred slots on the worm wheel centre. The worm shaft itself terminates in a caged thrust race in a housing covered by a cap screwed into the bracket shell cover. Study of the sectional illustration will make the assembly clear.

### DISMANTLING

Remove petrol pipes and carburettor. Remove sparking plug and release valve. Take off exhaust pipe. Loosen the clamp bolt through the bottom bracket, and remove the bolt through the cylinder head and frame lug. Pull engine forward along tube (if necessary, levering from behind expansion chamber) and out of frame.

### CYLINDER REMOVAL

Remove the expansion chamber by undoing the lock ring on the support tube and the screw plug Prise off. Engine may now be held between soft jaws in a vice. Remove cylinder base nuts, and see that piston is at bottom dead centre. Then be careful when drawing off the cylinder not to allow the cylinder to turn, as otherwise one of the ring ends may foul a port.

For general instructions on decarbonising follow our notes in supplement dated October 21st.

Before fitting new rings to the piston place them dead square just inside the cylinder and see that the gap is between .006in. and .008in. If less, a small section should be carefully filed from the ends of the ring to allow it to close further. Any old ring showing a gap of more than $\frac{1}{32}$in. should be replaced.

When decarbonising, do not forget to clean out the exhaust pipe and the expansion chamber. An old dodge, of course, to remove encrusted carbon from the pipe, if a flue brush fails, is to heat it well and then tap the outside, although this naturally ruins the enamel.

### THE RELEASE VALVE

This must be gas-tight. The essentials are a good clean seating, correct adjustment of control lever and wire, and finally to screw well home on to a sound copper washer. If the valve and seating are bady fitted they should be "ground-in" with a little valve-grinding paste. For the information of the purely cycle-minded, this is done by applying the paste to the seating, then rotating the valve against it by way of a screwdriver in half-turns, until the surfaces are good. Then swill thoroughly with paraffin. If return spring has become softened through heat, fit new. The control wire is threaded under a clamp plate to the required adjustment and the plate is then tightened down with a set screw.

### ENGINE BEARINGS

The following is of course elementary to motor cycle traders. Normally main bearings (to crankshaft) should not require renewal except after very big mileage. To test, after removal of cylinder and piston, hold engine in vice. Grip the shaft and try to force up and down to detect any vertical play. A slight amount of "end" play is essential and must not be confused with this. Similarly the big-end bearing can be so tested by pulling on the connecting rod when the engine is at top of stroke. Do not confuse with side movement, of which a slight amount should be perceptible.

The "little" end bush at the top of the connecting rod is a parallel fit and can be pushed or pressed out from either side after removing the gudgeon pin. If it is obdurate, take one bush slightly smaller in external diameter than the one to be removed, and another with an inside diameter bigger than the existing bush's external diameter. Place these one on either side of the "little end" bush. Run a bolt through the three. Screw on to it a large nut with washer. Screw up the nut and the bush will be forced out by the travel of the small one into the larger on the other side. A similar type of operation, it will be seen, can be used to fit the replacement bush.

As to other work on bearings, this is self-evident to motor cycle mechanics, but such work, and also that of renewing big-end bearings, is best put out by the purely cycle repairer, unless possessed of the necessary versatility and equipment. Its full detailing to the

## MORE ABOUT MOTORISED CYCLES—*continued*

entirely uninitiated is a matter scarcely within the immediate purview of this article. Neither are such operations called for to much extent in actual practice.

## TRANSMISSION

Adjustment most frequently called for is to take up play due to wear. Remove one of the bottom bracket lock rings and take out shim behind it. If play is excessive and removal of shims *both* sides fails to cure, pack behind the inner race with suitable smaller diameter shims. In some earlier models ball cages are not fitted to bottom bracket bearings. Sudden seizure may be due to disintegration of a bearing and the jamming of the balls in the drive. In this case strip down, renew all damaged parts.

## DISMANTLING BOTTOM BRACKET

Remove chain guards, chains, left-hand cotter pin and crank, power chain sprocket, thrust washer, three bottom bracket cover screws and dip-stick (if fitted). Lay model on left side on large sheet of paper. Give a sharp tap with hammer and screwdriver to remove bottom bracket cover. Withdraw worm wheel and worm centre. Ball cages are marked with a star. This side, on reassembly, should face toward the worm wheel. Note that in uncaged models the correct number of balls should be checked up, i.e., 20 on each side.

## REASSEMBLING BOTTOM BRACKET

Stand model up. Clean bearing cups. Pack 20 balls into each cup or cage, using thick vaseline or grease. Fit cover. The adjustment for wear and correct alignment is by means of the adjustable screwed cup on the left-hand side of the bracket. The check-up can only be made by removing the engine entirely and introducing a screwdriver to ascertain the position of the slot in the front end of the worm shaft. After any adjustments to the bottom bracket note that the assembly should rotate freely. Test by turning the worm wheel centre, introducing the power sprocket to do so.

In service occasionally flush out the assembly with spindle oil. There is a drain plug.

## LIGHTING AND IGNITION (GENERAL)

It is hoped to deal fully with various electrical systems in a later series. Method of dismantling and reassembling the Villiers flywheel magneto, together with an outline of its principles, was given in our supplement of October 21st. The illustration on page 3 shows clearly the disposition of its parts. Note the poleshoes, across which a piece of iron, e.g., a spanner, must be placed when dismantling, to avoid demagnetisation. Partial demagnetisation may also occur if the flywheel is dropped.

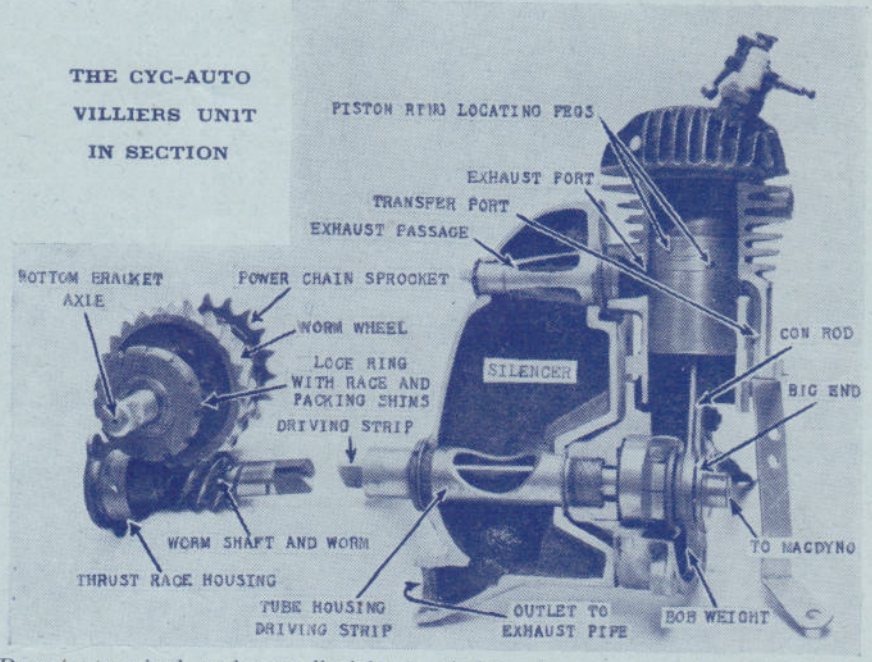
In actual service the component calls for little beyond superficial attention.

A rare, but somewhat puzzling, "shortage of sparks" may be traced to a faulty pick-up spring. At magneto end of high-tension cable there is a terminal located by a spring clip. Remove terminal, and a small pick-up spring will be revealed inside. This spring should be quite straight, and should make proper connection with the small contact point on the coil, immediately beneath it.

The direct lighting system is essentially simple. It consists of one cable taken from the back of the armature plate direct to headlamp and thence to tail lamp (wired in series) and earth. Connection at magneto end is usually by way of a split terminal.

It will be appreciated that the system being in series, failure of one bulb occasions failure of the other. Another source to which this trouble is often traced is the snapping off of the earth clip. Therefore always check for this in remedying such failures.

THE CYC-AUTO VILLIERS UNIT IN SECTION




# CYCLE PARTS

## ENGINE MOUNTINGS

On most makes engine removal is self-evident. First, of course, disconnect petrol pipe, clutch wire, and other obvious connections.

On *Excelsiors* it will be observed that two small steel plates carry the engine at back and front. Each has an upper and a lower bolt. Removal is easiest if the *top front bolt* and the *lower rear bolt* are those selected for removal. The top rear bolt is apt to present a little difficulty by reason of its fouling the crank and chainwheel assembly. Therefore loosen the nut on the opposite end of this bolt and take away the chainguard. This gives access to the lower bolt, which can then be drawn out on the same side.

The *James* mounting embodies two bolts only, securing the engine direct to the bracket. There is no need to disturb the bracket. Draw the two bolts, and lift off engine complete with exhaust pipe.

The *Raynal* engine mounting is also two-point and is obvious after disconnecting usual connections. Remove chainguard for the purpose of easy access.

## JAMES

Bottom bracket has ball-bearing axle with usual cup and cone assembly. Chain adjustment is by way of the usual type of adjuster on the rear fork ends. This adjusts power chain tension, while the jockey sprocket is set to correct the pedal chain.

Note that to facilitate rear wheel removal the back mudguard stay is secured to the guard by a fly-nut. Release this, and slacken nuts at other extremities, when stay can be swung up out of the way. Saddle is adjustable up and down, forward and back. Freewheel is of double row heavy carrier type. Note this for replacement purposes.

## MORE ABOUT MOTORISED CYCLES—*continued*

### RAYNAL

Two individual points are the spring fork and the rear brake actuation. Front shock-absorbers are of simple friction-lined pattern. Adjustment for play after bedding down can be taken up by loosening lock nut on near side of fork (R.H. thread), and then tightening the fork bolt from the off-side, subsequently locking up again. Do not forget that there is grease gun lubrication to the fork bolt. To dismantle, it is simply necessary to withdraw the bolt and the fork can be pulled out forwards and downwards complete with the spring, and away from the steering head base. Thereafter, renewal of shock-absorber linings or replacement of spring are self-evident.

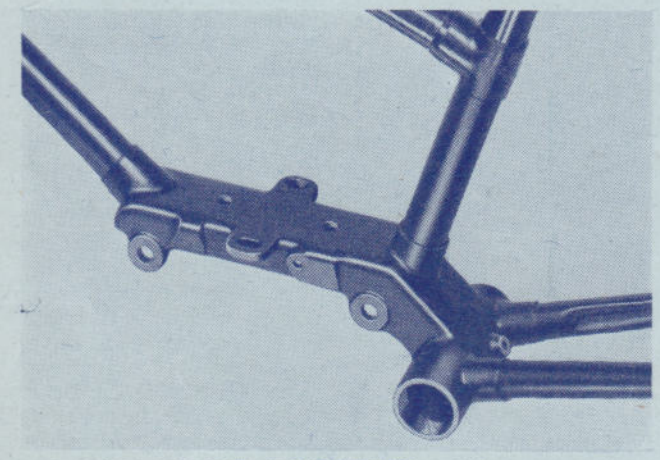
The rear brake is simply actuated by a catch plate on the left-hand crank which engages the brake rod on a back-pedalling motion. To adjust brake it is easiest to place the machine on the stand with clutch withdrawn, rotate rear wheel and take up adjustment at end of rod until shoes just begin to rub. Then slack off adjusting nut two or three full turns for necessary clearance.

Chain adjustment is obvious, by rear fork end adjusters, and a plate-mounted jockey.

### EXCELSIOR

Bottom bracket is plain bearing and has an eccentric to deal with pedal chain adjustment, for which a Cee spanner is provided. Slack off pinch bolt just below and behind bracket, turn eccentric (near side of machine) to required degree. Fork end adjusters are provided to take care of the power chain.

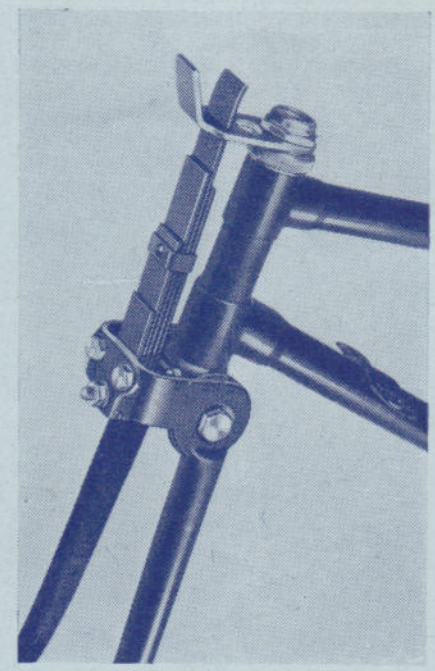
Clutch.—See that about $\frac{1}{16}$in. play is maintained in clutch-operating lever on bar. Do not forget a spot of oil between clutch-operating pin and clutch push-rod end.



**RAYNAL ENGINE MOUNTINGS and base support for tank**

### GENERAL SERVICING

It is as well to detail here some idea of the equipment that may be needed in order to service most makes of motorised cycles, and traders can rest assured that very little beyond the normal run is required. In point of fact, any cycle dealer with a normally well-equipped workshop can confidently undertake what is needful on the motorised cycle.

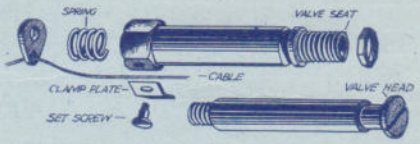


**The Raynal spring fork**

### A USEFUL BENCH

It is as well at the outset to provide oneself with a workbench especially for handling these little jobs. Such a bench can be a very simple affair, constructed from any timber which may be handy or which can be bought cheaply. It should, of course, be long enough to take the machine, and height depends on the operator. A useful point to bear in mind is to make the legs long enough to enable the engine itself to be at a useful working height without entailing the need for stooping over the job. A ready accessibility saves much time, temper, and money, and enables an awkward job to be much simplified.

To each end of the bench secure parallel strips of wood to hold the machine upright by the wheels, and also provide yourself with a block to go beneath the bottom bracket.




**Showing parts of the release valve on a normal two-stroke engine**

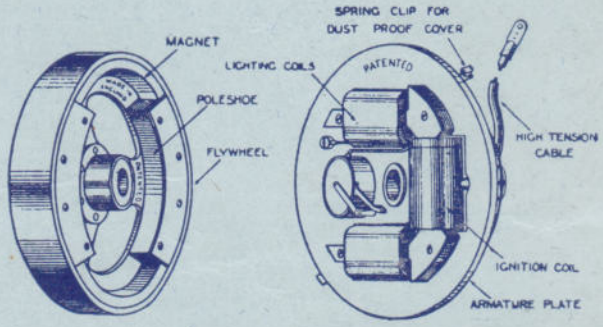
Having thus obtained a useful platform upon which the model can be maintained in an upright position, the next thing to consider is that the presence of an engine calls for the handling of many more small components than are encountered in servicing a pedal cycle.

It is advisable, therefore, to secure to the sides of the bench, one at each end and on each side, four small wooden boxes, or even old disused tins, into which the parts dismantled can be dropped. In this way there is little fear of misplacing or losing an essential component.

Further, if four such boxes are used, the parts, as they are dismantled, are kept in some sort of order, and are very readily reached when the work of building up again is undertaken.

One trader of our acquaintance even elaborates upon this idea so far as to provide a ramp at the end of the bench, up which the machine can be wheeled, but such a fitting is more luxurious than necessary.

Special tools are scarcely called for. A tubular distance piece for assembling Villiers' clutches, and a Villiers "Hammer-tight" spanner, together with a pair of liners to the vice-jaws (for holding pistons, crankcases, and so forth) are about all that are called




**Parts of the Villiers flywheel set. See notes on facing page**

## MORE ABOUT MOTORISED CYCLES—*continued*

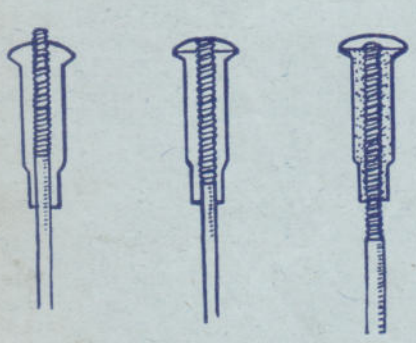
for over and above the usual cycle workshop outfit.

## WHEELS

One of the most common complaints encountered is that of rear wheel spoke breakage. In most cases a new spoke can be fitted without removing the wheel. The thread must be filed down to the same length as the old one. Curl the spoke into a large Cee shape while threading over the others and see that the nipple is kept hard up against the rim, not letting it pull back against spoke tension while tightening up.

Our supplement No. 2 of January 28th gives details for fitting spokes and truing rims.

In spoke replacement the essentials are to see that the thread length is correct, flush at top with head of nipple, and short enough to allow a small portion of the full diameter to lie inside the bottom end of the nipple, where the nipple thread is cleared away to take it.



**The centre illustration depicts the correct setting of a spoke in the nipple. Note the flush fit of the thread, and the full diameter entering the base**

The neck of the spoke should also be a snug fit. If the neck is too long, flexing will frequently give rise to breakage.

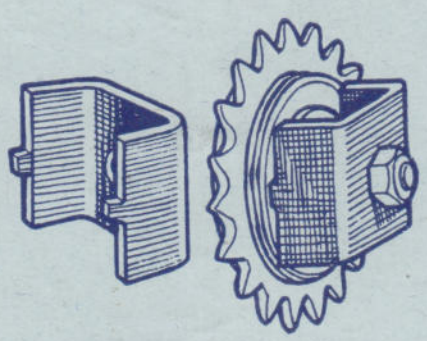
If the rim has become dented do not try to hammer out. Use a form of screw-pressure. Useful equipment consists of two hardwood blocks, one with a concave arc radiused to slightly less than that of the outside of the rim, the other convex to fit the inner surface. Cramping in a vice between two such blocks will usually take out dents, and if the rim spreads a little it can be rectified by gentle side pressure between soft jaws.

In addition to notes in Supplement 2, January 28th, full instructions on wheel building will be found in Supplement 4, February 25th, in the "Costed Cycle Repairs" series.

*Note.*—In all cases of wheel trouble, check the cone adjustments on the machine. Root cause can often be so discovered.

## REMOVING THE FREE-WHEEL

A piece of steel 2in. by $\frac{3}{16}$in. thick should be bent to channel section, and drilled centrally to pass the spindle. On each end cut dogs to fit the slots in the free-wheel housing. Tighten the spindle nut while the tool is held in a vice and the wheel is rotated anti-clockwise. Special tools of this character are marketed by Cyclo, Lake and Elliott, Ltd., Constrictor, Brown Bros. and T. D. Cross.



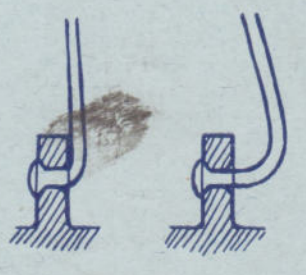
**A useful tool can be easily constructed to remove free-wheels**

## BOTTOM BRACKETS

Space precludes detailing tools and methods employed in work on bottom brackets, cranks, etc. The reader is referred to Supplement 6, March 25th, wherein will be found a comprehensive and informative survey, applicable equally to the motorised cycle.

## BRAKES

The final section of Supplement 8, April 22nd, is an excellent guide to hub brake servicing, and can be taken to read "as for motorised cycles also." Our illustration shows how, when relining, the lining must be a tight



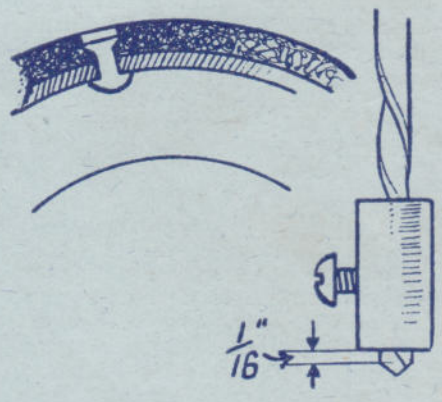
**Showing how it is essential to secure a good fit at the neck end of the spoke to avoid flexing**

snug fit against the shoe, how the rivets penetrate the lining almost halfway and are possessed of a substantial head clenched well over. Several firms supply small countersinking tools for rivets, which ensure correct depth of penetration. A careful perusal of the Supplement will prove of immense benefit to those to whom cycle brake servicing is not entirely familiar, and gives details of many inexpensive and useful pieces of equipment.

## AVOIDING TROUBLE

The first two or three hundred miles is the crucial period in the existence of a motorised bicycle. Try impressing upon customers the need for bringing the machine in to be looked over after, say, the first 250, and the first 500 miles, so many minor sources of complaint can be eradicated. The inauguration of such a scheme costs practically nothing, it ensures customer-satisfaction, and enables the trader to retain the goodwill of the purchaser, and so extend his business by recommendation.

Traders will be doing the movement a particular service by impressing upon new owners the need for careful handling during the running-in period. Most of the complaints which come to our ears are caused initially by injudicious usage in the first stages of the life of the machine.




**How the lining should fit the shoe. Note depth of rivet and turnover. An adjustable counter-sinking drill is on the right**

On such routine service check-ups as we have indicated there is not a lot to be done, but the following points are worth watching.

Check the carburation. It is possibly a little on the rich side, and is better so until the engine has settled down. Smoking at the exhaust and a tendency to "four-stroke" are indications that the mixture could be weakened to give slightly better performance and consumption.

Clean the plug points and check electrical connections, see that the petrol supply system is clear, and swill out the carburettor float chamber. See that the needle seats cleanly. Examine, and if necessary adjust, the chains, check rear-wheel bearings to see that play has not developed. Adjust brakes. Go over all nuts and tighten up. If these, and other obvious little attentions are given at the outset, the trader should find subsequent servicing a slight matter.

"THE TRADER" DATA SHEETS—1

# Cycle Hub Specifications

## The First of a Series of Monthly Charts of Useful Information for the Cycle Dealer

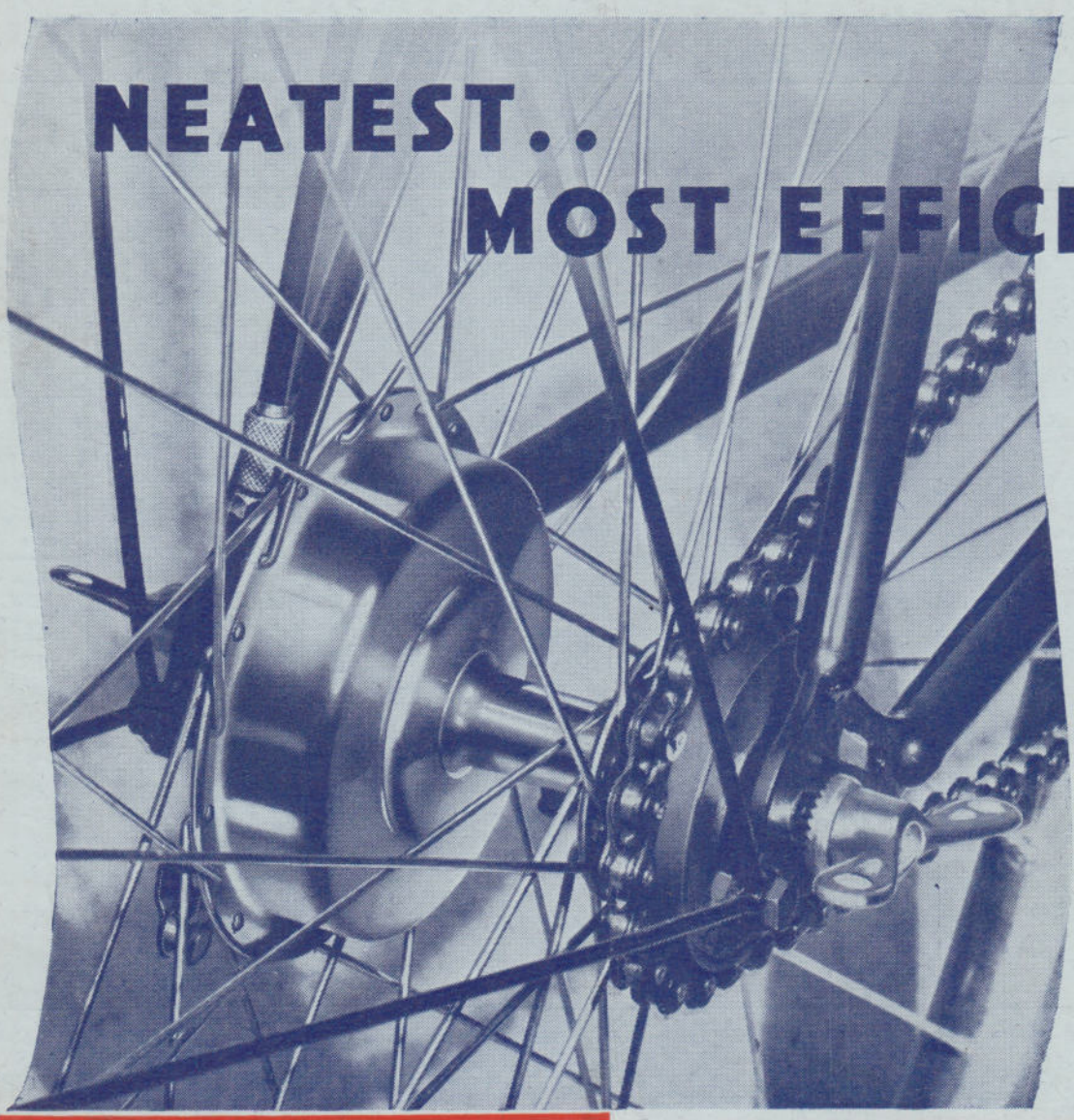
| NAME AND TYPE OF HUB | Spoke lengths for 26in. wheel | Spoke lengths for 28in. wheel | Number of spokes | Flange dia. (outside dia.) | Barrel dia. | Material (malleable casting, steel tubular or light alloy) | Weight in ounces | Single- or double-sided | Finish (chrome, nickel, black, anodised, etc.) | Bearing balls dia. | Spindle dia. | Spindle length | Adjustment (disc or cone) | Width over cones or lock nuts | Chain line | Gear case clearance (yes or no) | Retail Price: Chrome | Retail Price: Nickel or Black |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | in. | in. | | in. | in. | | | | | in. | in. | in. | | in. | in. | | s. d. | |
| **BAYLISS WILEY :** | | | | | | | | | | | | | | | | | | |
| Ideal Front | 11 1/8 | 12 1/8 | 32 or 36 | 1 9/16 | 3/4 | Malleable casting | 6 3/4 | — | Nickel, Chrome or Black | 3/16 | 5/16 | 4 7/8 | Cone | 3 5/16 | — | — | 3 2 | |
| Ideal Rear | 11 1/8 | 12 1/4 | 40 or 36 | 2 | 7/8 | ,, | 12 3/4 | Single | ,, | 1/4 | 3/8 | 5 3/4 | ,, | 4 1/2 A/C. | 1 1/2 | Yes | 4 4 | |
| No. 9 | 11 1/8 | 12 1/4 | 32 or 36 | 1 9/16 | 9/16 | ,, | 6 | — | ,, | 3/16 | 5/16 | 5 | ,, | 3 1/2 A/L. | — | — | 6 0 | |
| No. 10 | 11 1/8 | 12 1/8 | 40 or 36 | 2 | 9/16 | ,, | 10 3/4 | Double | ,, | 1/4 | 3/8 | 5 3/4 | ,, | 4 1/2 A/L. | 1 1/2 | No | 9 0 | |
| North Road Special | 11 1/8 | 12 1/4 | 40 or 36 | 2 | 9/16 | ,, | 12 | ,, | ,, | 1/4 | 3/8 | 5 3/4 | ,, | 4 1/2 A/L. | 1 1/2 | ,, | 6 0 | |
| Continental Derail | 11 1/8 | 12 1/8 | 40 or 36 | 2 | 9/16 | ,, | 11 1/4 | ,, | ,, | 1/4 | 3/8 | 5 3/4 | ,, | 4 1/2 A/L. | 1 1/2 | ,, | 7 6 | |
| No. 6. Fr. | 11 1/2 | 12 1/4 | 32 or 36 | 1 7/16 | 9/16 | ,, | 8 3/4 | — | ,, | 1/4 | 5/16 or 3/8 | 5 | ,, | 3 3/4 A/L. | — | — | 5 0 | |
| Featherweight, Fr. | 11 1/2 | 12 1/8 | 32 or 36 | 1 9/16 | 9/16 | ,, | 5 3/4 | — | ,, | 3/16 | 5/16 | 5 1/16 | ,, | 3 3/4 A/L. | — | — | 7 6 | |
| Featherweight, Rear | 11 1/8 | 12 1/8 | 40 or 36 | 2 | 9/16 | ,, | 9 | Single or Double | ,, | 1/4 | 3/8 | 5 3/4 | ,, | 4 1/4 A/L. | 1 1/2 | No | 11 0 | |
| Tour de France, Fr. | 10 3/8 | 11 7/8 | 32 or 36 | 3 1/4 | 1/2 | ,, | 10 1/2 | | ,, | 1/4 | 3/8 | 5 1/4 | ,, | 4 1/4 A/L. | — | — | 12 0 | |
| Tour de France, Rear | 10 3/8 | 11 7/8 | 40 or 36 | 3 1/4 | 1/2 | ,, | 13 | Double | ,, | 1/4 | 3/8 | 5 5/16 | ,, | 4 1/4 A/L. | 1 1/2 | No | 18 0 | |
| No. 8. Fr. | 10 3/8 | 11 7/8 | 32 or 36 | 1 7/8 | 7/8 | ,, | 10 1/2 | — | ,, | 1/4 | 3/8 | 5 1/4 | ,, | 3 3/4 A/C. | — | — | 4 4 | |
| No. 4, Rear | 10 3/8 | 11 7/8 | 40 or 36 | 2 | 7/8 | ,, | 13 1/2 | Single | ,, | 1/4 | 3/8 | 5 1/4 | ,, | 4 1/4 A/C. | 1 3/4 | Yes | 4 8 | |
| G.P.O. Type 8 | 10 3/8 1 3/4 Rim | 11 7/8 | 32 | 1 7/8 | 7/8 | ,, | 11 | — | ,, | 1/4 | 3/8 | 5 1/4 | ,, | 3 3/8 A/C. | — | — | 4 8 | |
| G.P.O. Type 4 | 10 3/8 1 3/4 Rim | 11 7/8 | 40 | 2 | 7/8 | ,, | 13 3/4 | Single | ,, | 1/4 | 3/8 | 6 5/16 | ,, | 4 1/4 A/C. | 1 3/4 | Yes | 5 0 | |
| Freewheel Hub Unit | 11 1/8 | 12 1/8 | 40 or 36 | 2 1/8 | 5/16 | ,, | 16 1/2 | ,, | ,, | 1/4 | 3/8 | 5 3/8 | ,, | 4 1/4 A/L. | 1 1/2 | ,, | 10 6 | |
| **BRAMPTON** | | | | | | | | | | | | | | | | | s. d. | s. d. |
| No. 100 | 11 1/32 | 12 1/32 | 32/36 | 1 3/8 | 1 1/16 | Steel Tubular | 7 1/2 | Front | Chrome, Nickel or Blk. | 3/16 | 5/16 | 5 | Cone | 3 1/2 | — | — | 1 6 | 1 5 |
| ,, 101 | 11 1/32 | 12 1/32 | 40/36 | 2 | 1 1/16 | ,, | 14 | Rear S.S. Racer | ,, | 1/4 | 3/8 | 5 3/8 | ,, | 4 | 1 1/2 | Yes | 2 2 | 2 1 |
| ,, 102 | 11 1/32 | 12 1/32 | 32/36 | 1 13/16 | 11/16 | ,, | 9 3/4 | Front | ,, | 1/4 | 3/8 Fl. | 5 | ,, | 3 1/2 | — | — | 1 8 | 1 7 |
| ,, 103 | 11 1/32 | 12 1/32 | 40/36 | 2 1/16 | 11/16 | ,, | 14 | Rear S.S. Roadster | ,, | 1/4 | 3/8 | 5 3/8 | ,, | 4 | 1 1/2 | Yes | 2 3 | 2 2 |
| ,, 104 | 11 1/16 | 12 1/16 | 32/36 | 1 9/16 | 5/8 | ,, | 6 | Front | ,, | 3/16 | 5/16 | 5 | ,, | 3 1/2 | — | — | 1 5 | 1 4 |
| ,, 105 | 11 1/32 | 12 1/32 | 40/36 | 2 1/16 | 11/16 | ,, | 14 1/4 | Rear D.S. Racer | ,, | 1/4 | 3/8 Fl. | 5 7/8 | ,, | 4 1/4 | 1 1/2 | No | 2 9 | 2 8 |
| ,, 106 | 11 1/32 | 12 1/32 | 40/36 | 2 1/16 | 11/16 | ,, | 13 1/2 | Rear S.S. Racer | ,, | 1/4 | 3/8 Fl. | 5 3/8 | ,, | 4 | 1 1/2 | ,, | 2 5 | 2 4 |
| ,, 120 | 7 5/16 (18×1 3/8) | 8 5/16 (20×1 3/8) | 20 | 1 13/32 | 5/8 | ,, | 5 1/4 | Front | ,, | 5/32 | 5/16 | 4 1/2 | ,, | 3 | — | — | 1 1 | 1 1 |
| ,, 121 | 7 5/16 | 8 5/16 | 20 | 1 3/4 | 5/8 | ,, | 8 1/4 | Rear S.S. Roadster | ,, | 5/32 | 5/16 | 5 | ,, | 3 1/2 | 1 5/16 | No | 1 6 | 1 6 |
| ,, 150 | 11 1/8 | 12 1/8 | 32/36 | 1 9/16 | 3/4 | Malleable Casting | 6 3/4 | — | ,, | 3/16 | 5/16 | 4 7/8 | ,, | 3 5/16 | — | — | 2 1 | 2 1 |
| ,, 151 | 11 1/8 | 12 1/8 | 40/36 | 2 | 7/8 | ,, | 12 3/4 | Single | ,, | 1/4 | 3/8 | 5 3/8 | ,, | 4 1/8 A/C. | 1 1/2 | Yes | 2 9 | 2 9 |
| ,, 165 | 11 1/8 | 12 1/8 | 32/36 | 1 9/16 | 11/16 | ,, | 6 | — | ,, | 3/16 | 5/16 | 5 | ,, | 3 1/8 A/L. | — | — | 2 8 | 2 8 |
| ,, 166 | 11 1/8 | 12 1/8 | 40/36 | 2 | 11/16 | ,, | 10 3/4 | Double | ,, | 1/4 | 3/8 | 5 3/8 | ,, | 4 1/4 A/L. | 1 1/2 | No | 3 10 | 3 10 |
| ,, 152 Front | 11 1/8 | 12 1/8 | 32/36 | 1 7/8 | 7/8 | ,, | 8 1/4 | — | ,, | 1/4 | 5/16 or 3/8 | 5 | ,, | 3 3/4 A/L. | — | — | 2 5 | 2 5 |
| ,, 170 | 10 3/8 | 11 7/8 | 32/36 | 1 7/8 | 7/8 | ,, | 10 1/2 | — | ,, | 1/4 | 3/8 | 5 1/4 | ,, | 3 5/8 A/C. | — | — | 2 9 | 2 9 |
| ,, 171 | 10 3/8 | 11 7/8 | 40/36 | 2 | 7/8 | ,, | 13 1/2 | Single | ,, | 1/4 | 3/8 | 5 5/8 | ,, | 4 1/4 A/C. | 1 3/4 | Yes | 3 0 | 3 0 |
| ,, 160 | — | — | 32/36 | 2 1/16 | 11/16 | ,, | 6 1/4 | — | — | 3/16 | 5/16 | 5 | ,, | 3 3/4 | — | — | 2 2 | 2 2 |
| ,, 161 | — | — | 36/40 | 2 5/16 | 2 3/32 | ,, | 12 1/2 | Double | ,, | 1/4 | 3/8 | 5 3/4 | ,, | 4 5/16 | 1 1/2 | No | 3 0 | 3 0 |
| **BRITISH HUB :** | | | | | | | | | | | | | | | | | s. d. | |
| Airlite, Fr. | 11 3/8 | 12 3/8 | 32 | 1 5/8 | 7/16 | Steel and Duralumin | Approx. 4 | — | Chrome | 3/16 | 5/16 | 5 | Cone | 3 3/4 | — | — | 8 0 | |
| Airlite, Rear | 11 3/8 | 12 3/8 | 40 | 2 | 1/2 | ,, | 7 | S.S.& D.S. | ,, | 1/4 | 3/8 | 5 11/16 | ,, | 4 1/2 | 1 1/2 | No | 13 0 | |
| Airlite-Continental, Fr. | 11 3/16 | 12 3/16 | 32 | 3 1/4 | 7/16 | ,, | 7 1/4 | — | ,, | 3/16 | 5/16 | 5 | ,, | 3 3/4 | — | — | 11 6 | |
| Airlite-Continental, Rear | 11 3/16 | 12 3/16 | 40 | 3 3/8 | 1/2 | ,, | 11 1/4 | S.S.& D.S. | ,, | 1/4 | 3/8 | 5 11/16 | ,, | 4 1/2 | 1 1/2 | No | 16 6 | |
| Solite, Fr. | 11 3/8 | 12 3/8 | 32 | 1 5/8 | 7/16 | Steel Casting | 5 3/4 | — | ,, | 3/16 | 5/16 | 5 | ,, | 3 3/4 | — | — | 5 7 | |
| Solite, Rear | 11 3/8 | 12 3/8 | 40 | 2 | 9/16 | ,, | 9 3/4 | S.S.& D.S. | ,, | 1/4 | 3/8 | 5 11/16 | ,, | 4 1/2 | 1 1/2 | No | 9 5 | |
| Sivada, Fr. | 11 3/8 | 12 3/8 | 32 | 1 5/8 | 7/16 | Cast Malleable | 6 1/2 | — | ,, | 3/16 | 5/16 | 5 | ,, | 3 3/4 | — | — | 2 4 | |
| Sivada, No. 61, Fr. | 11 3/8 | 12 3/8 | 32 | 1 3/4 | 9/16 | ,, | 9 | — | ,, | 1/4 | 3/8 | 5 | ,, | 3 3/4 | — | — | 2 6 | |
| Sivada, Rear | 11 3/8 | 12 3/8 | 40 | 2 | 9/16 | ,, | 12 | S.S.& D.S. | ,, | 1/4 | 3/8 | 5 3/4 | ,, | 4 1/4 | 1 1/2 | Optl. | 3 8 | |
| **B.S.A. :** | | | | | | | | | | | | | | | | | s. d. | |
| Fr. Lightweight | 11 7/16 | — | 32 | 1 1/32 | 1/2 | Steel Forging | 5* | — | Chrome | 3/16 | 5/16 | 4 19/16 | Cone | 3 1/32 | — | — | — | |
| Rear Lightweight | 11 7/16 | — | 40 | 1 31/32 | 3/16 | ,, | 10* | D. | ,, | 1/4 | 3/8 | 5 1/32 | ,, | 4 1/16 | 1 1/2 | No | — | |
| Rear Lightweight | 11 7/16 | — | 40 | 1 31/32 | 7/16 | ,, | 9 1/4* | S. | ,, | 1/4 | 3/8 | 5 1/32 | ,, | 4 1/16 | 1 1/2 | No | — | |
| Rear Lightweight for Cyclo and Fixed Gear | 11 7/16 | — | 40 | 1 31/32 | 7/16 | ,, — | 12* | D.† | ,, | 1/4 | 3/8 | 6 | ,, | 4 1/2 | 1 5/8 | No | — | |
| **CONSTRICTOR :** | | | | | | | | | | | | | | | | | s. d. | |
| Circum Steel. Front Metal Rim | One lgth. for 26 | One lgth. for 27 | 16 double | 2 1/32 | 5/16 | Steel Casting | 8 3/4 | — | Chrome | 3/16 | 5/16 | 5 1/2 | Cone | 3 3/4 | — | — | 8 3 | |
| Front Wood Rim | ,, | ,, | ,, | 2 11/32 | 5/16 | ,, | 8 3/4 | — | ,, | 3/16 | 5/16 | 5 1/2 | ,, | 3 3/4 | — | — | 8 3 | |
| Rear Double Fixed and Osgear. | ,, | ,, | 20 double | 3 5/16 | 1/2 | ,, | 15 | Fixed & Osgear | ,, | 1/4 | 3/8 | 5 3/4 | ,, | 4 5/16 | — | — | 12 3 | |
| Rear Double, both fixed. | ,, | ,, | ,, | 3 5/16 | 1/2 | ,, | 14 1/2 | Both fixed | ,, | 1/4 | 3/8 | 5 3/4 | ,, | 4 5/16 | — | — | 12 3 | |

*Weight without Nuts (Hex. Nuts or Wing Nuts). Wing Nuts, 2 oz. per pair; Hex. Nuts, 1/2 oz. per pair. † 1 end single threaded for Cyclo Gear.

| NAME AND TYPE OF HUB | Spoke lengths for 26in. wheel | Spoke lengths for 28in. wheel N.B. Constrictor 27" | Number of spokes | Flange dia. (outside dia.) | Barrel dia. | Material (malleable casting, steel tubular or light alloy) | Weight in ounces | Single- or double-sided | Finish (chrome, nickel, black, anodised, etc.) | Bearing balls dia. | Spindle dia. | Spindle length | Adjustment (disc or cone) | Width over cones or lock nuts | Chain line | Gear case clearance (yes or no) | Retail Price Chrome | Retail Price Nickel or Black |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | in. | in. | | in. | in. | | | | | in. | in. | in. | | in. | in. | | s. d. | |
| **CONSTRICTOR (cont.):** | | | | | | | | | | | | | | | | | | |
| **Circum Conloy.** | | | | | | | | | | | | | | | | | | |
| Front Metal Rim ... | One lgth. for 26 | One lgth. for 27 | 16 Double Spokes | 2 11/16 | 7/16 | Conloy and Steel | 6¾ | — | Polished Conloy & Chrome | 5/16 | 5/16 | 5 1/8 | Cone | 3 7/8 | — | — | 11 6 | |
| Front Wood Rim ... | ,, | ,, | ,, | 2 11/16 | 7/16 | ,, | 6¾ | — | ,, | 5/16 | 5/16 | 5 1/8 | ,, | 3 7/8 | — | — | 11 6 | |
| Rear Fixed and Osgear | ,, | ,, | 20 Double Spokes | 3 5/16 | ½ | ,, | 11¼ | Osgear one side | ,, | ¼ | ⅜ | 5⅝ | ,, | 4 5/16 | — | — | 17 0 | |
| Rear Double Fixed ... | For 26 Rim | For 27 Rim | ,, | 3 5/16 | ½ | ,, | 10½ | Fixed both sides | ,, | ¼ | ⅜ | 5¾ | ,, | 4¼ | — | — | 17 0 | |
| **Conloy.** | | | | | | | | | | | | | | | | | | |
| Front Metal Rim ... | 11‡ | 12 | 32 | 1½ | ⅝ | Conloy | 4½ | — | Polished Conloy | 5/16 | 5/16 | 5 | Cone | 3⅝ | — | — | 8 6 | |
| Front Wood Rim ... | 11½ | 12‡ | 32 | — | — | — | — | — | — | — | — | — | — | — | — | — | — | |
| Rear Single Gear ... | 11½§ 11‡‖ | 12½§ 12‖ | 40 | 2 | ⅝ | ,, | 7½ | Single | Polished Conloy | ¼ | ⅜ | 5½ | ,, | 4 | 1½ | — | 12 0 | |
| Rear Double Gear Fixed. | 11½§ 11‡‖ | 12½§ 12‖ | 40 | 2⅛ | ¾ | ,, | 7¾ | Double | ,, | ¼ | ⅜ | 5½ | ,, | 4 | 1½ | — | 12 0 | |
| **Continental.** | | | | | | | | | | | | | | | | | | |
| Alloy Front ... ... | 11‡ | 12 | 32 | 1 11/16 | ½ | Polished Alloy | 4¾ | — | Polished Alloy | 5/16 | 5/16 | 5½ | Cone | 3⅞ | — | — | 6 6 | |
| Steel Front ... ... | 11½ | 12½ | 32 | 1 11/16 | ½ | Steel Casting | 6 | — | Chrome | 5/16 | 5/16 | 5½ | ,, | 3⅞ | — | — | 4 6 | |
| Alloy Double Osgear... | 11½ | 12⅛ | 40 | 2 | ½ | Polished Alloy | 8½ | Fixed & Osgear | Polished Alloy | ¼ | ⅜ | 6 | ,, | 4⅜ | — | — | 10 3 | |
| Steel Double Osgear... | 11½ | 12⅛ | 40 | 2 | ½ | Steel Casting | 11¼ | Both Fixed | Chrome | ¼ | ⅜ | 6 | ,, | 4⅜ | — | — | 7 6 | |
| Alloy Single Osgear ... | 11‡* 11‡† | 12½* 12½† | 40 | 2 | ½ | Alloy | 8 | Single | Polished Alloy | ¼ | ⅜ | 6 | ,, | 4⅜ | — | — | 10 3 | |
| Steel Single Osgear ... | 11‡* 11‡† | 12½* 12½† | 40 | 2 | ½ | Steel Casting | 11 | Single | Chrome | ¼ | ⅜ | 6 | ,, | 4⅜ | — | — | 7 6 | |
| **Light Steel.** | | | | | | | | | | | | | | | | | | |
| Front Metal Rim ... | 11‡ | 12 | 32 | 1½ | 17/32 | Steel Casting | 5½ | — | Chrome | 5/16 | 5/16 | 5 | Cone | 3 11/16 | — | — | 6 0 | |
| Front Wood Rim ... | 11½ | 12½ | 32 | 1½ | 17/32 | ,, | 5½ | — | — | — | — | — | — | — | — | — | 6 0 | |
| Single Gear ... ... | 11½§ 11‡‖ | 12½§ 12‖ | 40 | 2 | 17/32 | ,, | 9¾ | Single | Chrome | ¼ | ⅜ | 5½ | Cone | 4 | 1½ | — | 9 0 | |
| Double Gear Fixed ... | 11½§ 11‡‖ | 12½§ 12‖ | 40 | 2 | 17/32 | ,, | 10 | Double Fixed | ,, | ¼ | ⅜ | 5½ | ,, | 4 | 1½ | — | 9 0 | |
| Double Gear one side Osgear | 11½§ 11‡‖ | 12½§ 12‖ | 40 | 2 | 17/32 | ,, | 11 | Osgear one side | ,, | ¼ | ⅜ | 6⅛ | ,, | 4 5/16 | — | — | 9 6 | |
| **Nivex Alloy.** | | | | | | | | | | | | | | | | | | |
| Alloy Metal Rim Fr.... | 11‡ | 12 | 32 | 1 11/16 | ½ | Polished Alloy | 4¾ | — | Polished | 5/16 | 5/16 | 5½ | Cone | 3⅞ | — | — | 6 6 | |
| Front Wood Rim ... | 11½ | 12½ | 32 | 1 11/16 | ½ | ,, | 4¾ | — | ,, | 5/16 | 5/16 | 5½ | ,, | 3⅞ | — | — | 6 6 | |
| Single Osgear Type ... | 11‡* 11‡† | 12½* 12½† | 40 | 2 | ½ | ,, | 7¾ | Single | Polished Alloy | ¼ | ⅜ | 5⅝‡‡ | ,, | 4 5/16 | — | — | 10 0 | |
| **Nivex Steel.** | | | | | | | | | | | | | | | | | | |
| Steel Rim ... ... | 11‡ | 12 | 32 | 1 11/16 | ½ | Steel Casting | 6 | — | Chrome | 5/16 | 5/16 | 5½ | Cone | 3⅞ | — | — | 4 6 | |
| Front Wood Rim ... | 11½ | 12½ | 32 | 1 11/16 | ½ | ,, | 6 | — | ,, | 5/16 | 5/16 | 5½ | ,, | 3⅞ | — | — | 4 6 | |
| Single Osgear Type ... | 11‡* 11‡† | 12½* 12½† | 40 | 2 | ½ | ,, | 9½ | Single | ,, | ¼ | ⅜ | 5⅝‡‡ | ,, | 4 5/16 | — | — | 7 3 | |
| **PERRY:** | | | | | | | | | | | | | | | | | | |
| Perfection, Front ... | 11⅛ | 12⅛ | 32 or 36 | 1 5/16 | ¾ | Malleable casting | 6¾ | — | Nickel, Chrome, Black | 5/16 | 5/16 | 4⅞ | Cone | 3 7/16 | — | — | 3 2 | |
| Perfection, Rear ... | 11⅛ | 12⅛ | 40 or 36 | 2 | ⅞ | ,, | 12¾ | Single | ,, | ¼ | ⅜ | 5¾ | ,, | 4¼ A/C. | 1½ | Yes | 4 4 | |
| No. 9 ... ... ... | 11¼ | 12⅜ | 32 or 36 | 1 5/16 | 5/16 | ,, | 6 | — | ,, | 5/16 | 5/16 | 5 | ,, | 3¾ A/L. | — | — | 6 0 | |
| No. 10 ... ... | 11⅛ | 12⅝ | 40 or 36 | 2 | 5/16 | ,, | 10¾ | Double | ,, | ¼ | ⅜ | 5¾ | ,, | 4¼ A/L. | 1½ | No | 9 0 | |
| No. 6, Front ... ... | 11⅛ | 12⅛ | 32 or 36 | 1⅝ | 5/16 | ,, | 8¾ | — | ,, | ¼ | 5/16 or ⅜ | 5 | ,, | 3¾ A/L. | — | — | 5 0 | |
| No. 8, Front ... ... | 10 7/16 | 11 7/16 | 32 or 36 | 1⅞ | ⅜ | ,, | 10½ | — | ,, | ¼ | ⅜ | 5½ | ,, | 3⅝ A/C. | — | — | 4 4 | |
| No. 4, Rear ... ... | 10 7/16 | 11 7/16 | 40 or 36 | 2 | ⅜ | ,, | 18½ | Single | ,, | ¼ | ⅜ | 5⅝ | ,, | 4¼ A/C. | 1¾ | Yes | 4 8 | |
| **PHILLIPS:** | | | | | | | | | | | | | | | | | s. d. | s. d. |
| Anglo, Front, No. 51... | 11 1/32 | 12 1/32 | 32 | 1⅞ | 11/16 | Steel Tubular | 10 | — | N.P., C.P., or A.B. | ¼ | ⅜** | 4⅞ | Cone | 3½ | — | — | 1 7 | 1 6 |
| Anglo, Rear, No. 52... | 11 1/32 | 12 1/32 | 40 | 2 1/16 | 11/16 | ,, | 14½ | Single | ,, | ¼ | ⅜ | 5⅝ | ,, | 4 | 1½ | Yes | 2 3 | 2 2 |
| Anglo, Rear, No. 53... | 11 1/32 | 12 1/32 | 40 | 2 1/16 | 11/16 | ,, | 13½ | ,, | ,, | ¼ | ⅜** | 5⅝ | ,, | 4 | 1½ | ,, | 2 4 | 2 3 |
| Anglo, Rear, No. 54... | 11 1/32 | 12 1/32 | 40 | 2 1/16 | 11/16 | ,, | 14¼ | Double | ,, | ¼ | ⅜** | 5⅝ | ,, | 4¼ | 1½ | No | 2 7 | 2 6 |
| Celtonia, Front, No. 37 | 11 1/32 | 12 1/32 | 32 | 1⅝ | 1 1/16 | ,, | 9¼ | — | ,, | ¼ | ⅜ | 4⅝ | ,, | 3½ | — | — | 1 6 | 1 5 |
| Celtonia, Rear, No. 39 | 11 1/32 | 12 1/32 | 40 | 2 1/16 | 1 1/16 | ,, | 14 | Single | ,, | ¼ | ⅜ | 5⅝ | ,, | 4 | 1½ | Yes | 2 1 | 2 0 |
| Celtonia, Rear, No. 40 | 11 1/32 | 12 1/32 | 40 | 2 1/16 | 1 1/16 | ,, | 13 | ,, | ,, | ¼ | ⅜** | 5⅝ | ,, | 4 | 1½ | No | 2 3 | 2 2 |
| Celtonia, Rear, No. 42 | 11 1/32 | 12 1/32 | 40 | 2 1/16 | 1 1/16 | ,, | 14½ | ,, | ,, | ¼ | ⅜ | 6⅛ | ,, | 4⅛ | 1½ | Yes | 2 2 | 2 1 |
| Celtonia, Rear, No. 43 | 11 1/32 | 12 1/32 | 40 | 2 1/16 | 1 1/16 | ,, | 14½ | Double | ,, | ¼ | ⅜** | 5⅝ | ,, | 4¼ | 1½ | No | 2 6 | 2 5 |
| Grande Vitesse, Front, No. 35 | 11 1/32 | 12 1/32 | 32 | 1¾ | 1 1/32 | ,, | 8¼ | — | ,, | ¼ | 5/16 | 5¼ | ,, | 3½ | — | — | 1 6 | 1 5 |
| Philco, Front, No. 67 | 11 1/16 | 12 1/16 | 32 | 1 5/16 | 5/8 | ,, | 6½ | — | ,, | 5/16 | 5/16 | 5 | ,, | 3⅛ | — | — | 1 4 | 1 3 |
| Kiddies, Front, No. 22 | — | — | 20 | 1 1/16 | 5/8 | ,, | 5¼ | — | ,, | 5/32 | 5/16 | 4½ | ,, | 2⅞ | — | — | 1 0 | 1 0 |
| Kiddies, Rear, No. 23 | — | — | 20 | 1¾ | 5/8 | ,, | 8½ | Single | ,, | 5/32 | 5/16 | 5 | ,, | 3½ | 1 5/16 | No | 1 5 | 1 5 |
| **RADMALL:** | | | | | | | | | | | | | | | | | | |
| No. 193, Rear Standard | 11⅛ | 12 | 40 & 36 | 2⅛ | 1 | Steel Tubular | 16 | Single sided | Chrome, N.P., Black | ¼ | ⅜ | 5⅝ | Cone | 4 | 1½ | Yes | 2 1 | 2 0 |
| No. 192, Front St'dard | 11⅛ | 12 1/16 | 32 & 36 | 1 5/16 | 1 | ,, | 7 | — | ,, | 5/16 | 5/16 | 4 13/16 | ,, | 3½ | — | — | 1 5 | 1 4 |
| No. 187, Rear Racing | 11⅜ | 12⅜ | 40 & 36 | 2⅛ | 23/32 | ,, | 14 | Double sided | ,, | ¼ | ⅜ | 5⅝ | ,, | 4¼ | 1½ | Yes | 2 6 | 2 5 |
| No. 186, Front Racing | 11⅜ | 12⅜ | 32 & 36 | 1 5/16 | 5/16 | ,, | 6 | — | ,, | 5/16 | 5/16 | 5½ | ,, | 3¾ | — | — | 1 8 | 1 7 |
| **TABUCCHI:** | | | | | | | | | | | | | | | | | s. | d. |
| Ambra Secondus ... | 11⅛ | 12 | Rear 40 Fr. 32†† | R. 2 Fr. 1⅝ | R. ½ Fr. ½ | Solid Steel | F. 6¾ R.9¼ | Double Cog | Chrom. plated | Fr. 3/16 R. ¼ | Fr. 5/16 R. ⅜ | F.4¾ R.5¾ | Cone | Fr. 3¾ R. 4¼ | 1½ | No | 16 | 6 pr. |
| Ambra Superga ... | 11⅛ | 12 | ,, | ,, | ,, | Solid Steel Barrel ‡‡ | F. 4½ R. 7⅛ | D.S. or S.S. | ,, | ,, | ,, | ,, | ,, | ,, | 1½ | ,, | 21 | 0 pr. |

* Plain side. † Gear side. ‡ Only one side. § Wood. ‖ Metal. ** Flatted for use in 5/16in. Fork Ends. †† Or Rear and Front 36. ‡‡ Shrunk on Duralumin Flange

# THE BRAKES THAT MAKE CYCLING *safe*




*You can't do better than advise your customers to fit the best—*

STURMEY ARCHER

Sturmey-Archer Internal Expanding Brakes are accepted the highest achievement of brake design —tremendously powerful yet delightfully smooth, unsurpassed for durability and reliability. Neat, efficient, totally-enclosed, it's to your advantage both from the point of view of goodwill and profits to sell the best—Sturmey-Archer.

## INTERNAL EXPANDING BRAKES

BRC. Rear single-speed hub with internal expanding brake.

BFC. Front Hub (companion to the BRC) with internal expanding brake.

BRT. Tandem Single-speed Rear Hub.

BFT. Tandem Front Hub with internal expanding brake.

THESE BRAKES ARE SUITABLE FOR ALL TYPES OF SOLO AND TANDEM CYCLES

STURMEY-ARCHER GEARS LTD., NOTTINGHAM S.T.5

"THE TRADER" DATA SHEET—2

# Cycle Brake Specifications

## Hub—Internal Expanding and Coaster

| TYPE. | Diameter of Drum | Width of Shoe | Thickness of Lining | No. of Rivets | Length of Rivets | Diameter of Rivets | Reccd. Rivet Material | Weight, Front | Weight, Rear | Spoke Lengths, 26in. Wheel, 1⅜in. Endrick | Spoke Lengths, 28in. Wheel, 1½in. Westwood | Retail Price |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **BAYLISS WILEY :** | in. | in. | in. | | in. | in. | | lb. oz. | lb. oz. | in. | in. | |
| **Solo.** | | | | | | | | | | | | |
| Front Rod, Front Cable | 3½ | ⅝ | 9/64 | 10 | ¼ | 3/32 | Aluminium | 1 13 (less lever and cable) | — | 10⅛, 11¼ | 11⅜, 12⅛ | 13/9 |
| Rear Rod, Rear Cable | 3½ | ⅝ | 9/64 | 10 | ¼ | 3/32 | ,, | — | 2 6 | 10⅛, 11 | 11 5/16, 11⅞ | 15/3 |
| 3-sp. Rod, 3-sp. Cable... | 3½ | ⅝ | 9/64 | 10 | ¼ | 3/32 | ,, | — | 3 5 | 10⅜, 10⅞ | — | 32/6 |
| **Tandem.** | | | | | | | | | | | | |
| Front ... ... ... | 4⅜ | ⅝ | 9/64 | 12 | 11/32 | 3/32 | Brass | 2 10 | — | 9 5/16, 11 1/16 | 11⅜, 12 1/16 | 17/– |
| Rear ... ... ... | 4⅜ | ⅝ | 9/64 | 12 | 11/32 | 3/32 | ,, | — | 2 10 | 9⅝, 11 | 11¼, 12 1/16 | 18/6 |
| 3-speed ... ... ... | 4⅜ | ⅝ | 9/64 | 12 | 11/32 | 3/32 | ,, | — | 4 3 | 9¾, 10 5/16 | 11⅞, 12 | 35/– |
| Coaster* ... ... | — | — | — | — | — | — | — | — | 2 4 | 26×1½, 11 1/16 | 28×1½, 12 1/16 | 13/3 |
| **BRITISH HUB :** | | | | | | | | | | | | |
| Solite, Front ... ... | 3 | 11/16 | 1/8 | 12 | ¼ | 14 Gauge | Brass | 1 6 | — | 11 5/16, 11 5/16 | 12 5/16, 12 5/16 | 14/3 |
| Solite, Rear ... ... | 3 | 11/16 | 1/8 | 12 | ¼ | ,, | ,, | — | 1 11 | 11⅜, 11½ | 12⅜, 12½ | 15/9 |
| Super Solo, Front ... | 3⅝ | 11/16 | 1/8 | 16 | ¼ | ,, | ,, | 2 3 | — | 11¼, 10 5/16 | 12¼, 11 5/16 | 13/6 |
| Super Solo, Rear ... | 3⅝ | 11/16 | 1/8 | 16 | ¼ | ,, | ,, | 2 3 | — | 11¼, 10 5/16 | 12¼, 11 5/16 | 15/– |
| Super Tandem, Front... | 4 | 13/16 | 5/32 | 16 | 9/32 | ,, | ,, | 3 0 | — | 10⅜ | 11⅜ | 17/– |
| Super Tandem, Rear ... | 4 | 13/16 | 5/32 | 16 | 9/32 | ,, | ,, | — | 3 2 | 10⅛ | 11⅜ | 19/– |
| Super Special Tand., Fr. | 4¼ | ⅞ | 5/32 | 16 | 9/32 | ,, | ,, | 3 10 | — | 10 1/16 | 11 1/16 | 18/8 |
| Super Special Tand., R. | 4¼ | ⅞ | 5/32 | 16 | 9/32 | ,, | ,, | — | 3 12 | 10 1/16 | 11 1/16 | 20/8 |
| **B.S.A. :** | | | | | | | | | | | | |
| **Expanding Brake Hubs.** | | | | | | | | | | | | |
| 3½in. Front ... ... | 3½ | ⅝ | .156 | 12 | 5/16 | .097 | — | 1 13 | — | 11 1/16, 11⅜ | — | — |
| 3½in. Rear ... ... | 3½ | ⅝ | .156 | 12 | 5/16 | .097 | — | — | 2 0 | 11¼, 11⅜ | — | — |
| 3¾in. Front ... ... | 3¾ | ⅝ | .156 | 6 | 1 | .125 | — | 2 4 | — | 10 13/16, 11 1/16 | 11⅜, 12 1/16 | — |
| 3¾in. Rear ... ... | 3¾ | ⅝ | .156 | 6 | 1 | .125 | — | — | 2 2½ | 11⅛, 11 3/16 | 11 13/16, 12 1/16 | — |
| Eadie Coaster Hub ... | 2.4 | .531 | .2 | 2 | .265 | .123 | — | — | 2 6 | 11⅛, 11 3/16 | 11 13/16, 12 1/16 | — |
| **CYCLO :** | | | | | | | | | | | | |
| Super Tank (Tandem) | 4⅝ | ¾ | ⅛ | 8 per shoe | 5/16 | 3/32 | Brass | 3 14 | 3 14 | 26×1⅜ 9¾in. gear side 9¼in. drum side laced over 2) | 27 ⅜in. longer, 28 1in. longer | 34/6 |
| Super Unit Tank (Solo) | 3⅝ | 11/16 | ⅛ | 8 per shoe | 5/16 | 3/32 | ,, | 2 12 | 2 14 | 26×1¼ (11⅛in. gear side laced over 3, 10⅜in. drum side laced over 3) | As above | 28/– |
| Super Unit Tank (Tand.) | 4⅝ | ¾ | ⅛ | 8 per shoe | 5/16 | 3/32 | ,, | 3 14 | 3 13 | 26×1⅜ (11in. gear side laced over 3, 9¼in. drum side laced over 2) | As above | 32/– |
| **PHILLIPS :** | | | | | | | | | | | | |
| Crabbe, Front, with Rod Trans. No. 246 | 3½ | 9/16 | ⅛ | 6 | .325 | 3/32 | Aluminium | 2 2† | — | 11, 10 11/16 | 12 1/32, 11 11/16 | 9/9 |
| Crabbe, Rear, with Rod Trans. No. 247 | 3½ | 9/16 | ⅛ | 6 | .325 | 3/32 | ,, | — | 2 4† | 11 3/16, 10⅝ 11 1/32, 10⅝ | 12¼, 11⅝ 12 1/32, 11⅝ | 9/9 |
| Crabbe, Front, No. 248, complete with cable and Lever | 3½ | 9/16 | ⅛ | 6 | .325 | 3/32 | ,, | 2 3† | — | 11¼, 11 3/32 11, 10 11/16 | 12¼, 12 1/16 12 1/32, 11 11/16 | 9/9 |
| Crabbe, Rear, No. 249, complete with Cable and Lever | 3½ | 9/16 | ⅛ | 6 | .325 | 3/32 | ,, | — | 2 4† | 11 3/16, 10⅝ 11 1/32, 10⅝ 11¼, 11 3/32 | 12¼, 11⅝ 12 1/32, 11⅝ 12¼, 12 1/16 | 9/9 |
| **PERRY :** | | | | | | | | | | | | |
| **Solo.** | | | | | | | | | | | | |
| Front Rod, Front Cable | 3½ | ⅝ | 9/64 | 10 | ¼ | 3/32 | Aluminium | 1 13 (less lever and cable) | — | 10⅛, 11¼ | 11⅜, 12⅛ | 13/9 |
| Rear Rod, Rear Cable... | 3½ | ⅝ | 9/64 | 10 | ¼ | 3/32 | ,, | — | 2 6 | 10⅛, 11 | 11 5/16, 11⅞ | 15/3 |
| 3-sp. Rod, 3-sp. Cable... | 3½ | ⅝ | 9/64 | 10 | ¼ | 3/32 | ,, | — | 3 5 | 10⅜, 10⅞ | — | 32/6 |
| **Tandem.** | | | | | | | | | | | | |
| Front ... ... ... | 4⅜ | ⅝ | 9/64 | 12 | 11/32 | 3/32 | Brass | 2 10 | — | 9 5/16, 11 1/16 | 11⅜, 12 1/16 | 17/– |
| Rear ... ... ... | 4⅜ | ⅝ | 9/64 | 12 | 11/32 | 3/32 | ,, | — | 2 10 | 9⅝, 11 | 11¼, 12 1/16 | 18/6 |
| 3-speed ... ... ... | 4⅜ | ⅝ | 9/64 | 12 | 11/32 | 3/32 | ,, | — | 4 3 | 9¾, 10 5/16 | 11⅞, 12 | 35/– |
| Coaster* ... ... | — | — | — | — | — | — | — | — | 2 4 | 26×1½, 11 1/16 | 28×1½, 12 1/16 | 13/3 |
| **STURMEY ARCHER :** | | | | | | | | | | | | |
| BF Solo, Front ... | 3½ | ⅝ | 9/64 | 10 | ¼ | 3/32 | Aluminium | 2 8 (with control) | — | 10⅛, 11¼ | 11⅜, 12 3/32 | 13/9 |
| BR Solo, Rear ... | 3½ | ⅝ | 9/64 | 10 | ¼ | 3/32 | ,, | — | 3 0 (with control) | 10½, 11 | 11 5/16, 11 13/16 | 15/3 |
| BFT Tandem, Front ... | 4⅜ | ⅝ | 9/64 | 12 | 11/32 | 3/32 | Brass | 3 0 | — | 9 5/16, 11 1/16 | — | 17/– |
| BRT Tandem, Rear ... | 4⅜ | ⅝ | 9/64 | 12 | 11/32 | 3/32 | ,, | — | 3 7 | 9⅜, 11 | — | 18/6 |
| AB 3-speed wide ratio, with Brake, Solo | 3½ | ⅝ | 9/64 | 10 | ¼ | 3/32 | Aluminium | — | 4 6 (with Trigger control) | 10½, 10¾ | 11 5/16, 11 5/16 | 32/6 |
| AT Tandem, 3-speed, wide ratio, with Brake | 4⅜ | ⅝ | 9/64 | 12 | 11/32 | 3/32 | Brass | — | 5 3 (with Trigger control) | 9¾, 10¾ | — | 35/– |
| **TORPEDO :** | | | | | | | | | | | | |
| Coaster ... ... ... | — | — | — | — | — | — | — | — | 2 5 | — | — | 13/– |
| Coaster, 2-sp. ... ... | — | — | — | — | — | — | — | — | 3 4½ | — | — | 35/– |
| Coaster, 3-sp. ... ... | — | — | — | — | — | — | — | — | 3 9 | — | — | 44/– |

* Aluminium Bronze Brake Liner on hardened steel shell. † Less levers and transmissions.

# Rim Brakes—Cable and Rod Operated

| TYPE | Operation (Rod or Cable) | Side or Centre Pull | Shoe—Length and Width | Fixing (Bolt or Clip) | Finish (Chrome, Nickel or Black) | Retail Price |
|---|---|---|---|---|---|---|
| | | | in. | | | |
| **ASHBY :** | | | | | | |
| No. 21 Pressed Lever ... | Cable | C. | 1⅜ × ⅜ | Rear, Bolt. Front, Clip | N.P. C.P. | 3/2 3/6 |
| No. 22 Solid Lever ... | ,, | C. | 1¾ × ⅜ | Rear, Bolt Front, Clip | N.P. C.P. | 3/4 3/8 |
| **CONSTRICTOR :** | | | | | | |
| Viper Steel ... ... | Cable | C. | 1½ × ⅜ | Bolt, Clip, or to order | N.P., C.P. or B. | 5/3 Rear, 5/– Front. 6d. extra C.P. |
| Adder Steel ... ... | ,, | S. | 1½ × ⅜ | Bolt | N.P., C.P. | 5/– Front. 6d. extra C.P. |
| Conloy Alloy ... ... | ,, | S. | 1½ × ⅜ | Bolt, Clip, or to order | Alloy | 10/9 Rear, 10/6 Front. |
| Cobra Steel ... ... | ,, | S. | 1½ × ⅜ | | N.P., C.P. or B. | 6/3 Rear, 6/– Front. 6d. extra C.P. |
| **CYCLO :** | | | | | | |
| Rosa Crown, Front ... | Cable | C. | 2 × ⅞ round | Clip | C.P. | 7/6 Front. |
| Rosa Crown, Back ... | ,, | C. | 2 × ⅞ round | ,, | ,, | 7/9 Back. |
| **FONTEYN :** | | | | | | |
| Gloria Tour de France... | Cable | S. | 1⅝ × ½ | Bolt | C.P. Dural. | 7/– 12/6 |
| Bowden ... ... ... | ,, | S. | 1⅝ × ½ | ,, | C.P. Dural. | 7/– 12/6 |
| V and W Sport ... | ,, | S. | 1½ × ½ | ,, | C.P. | 5/6 |
| **HICKING :** | | | | | | |
| Bowden ... ... ... | Cable (in colours) | S. | 1½ × ½ | Bolt | Dural. C.P. N.P. | 10/6 Fr., 11/– R. 6/6 Fr., 7/– R. 5/6 Fr., 6/– R. |
| **MONITOR :** | | | | | | |
| *Roller Lever ... ... | Rod | — | 2⅛ × 7/16 | Clip | C.P. and B. | 9/– per set. |
| *Front only ... ... | ,, | — | 2⅛ × 7/16 | ,, | ,, ,, | 6/6 ,, |
| *Carrier Roller Lever ... | ,, | — | 2¾ × 7/16 | ,, | B. | 11/– ,, |
| *Carrier Front only ... | ,, | — | 2¾ × 7/16 | ,, | ,, | 7/9 ,, |
| *Junior, Roller Lever ... | ,, | — | 1½ × 9/32 | ,, | C.P. and B. | 8/– ,, |
| *Junior, Front only ... | ,, | — | 1½ × 9/32 | ,, | ,, ,, | 5/11 ,, |
| *Power Plus, Roller Lever Super Cam ... | ,, | C. | 1¾ × 7/16 | ,, | ,, ,, | 15/– ,, |
| Super Cam ... ... | Cable | C. | 1¾ × 7/16 | ,, | C.P. | 7/– each. |
| Climax ... ... ... | ,, | S. | 1¾ × 7/16 | Bolt | ,, | 5/– ,, |
| Speedster ... ... | ,, | S. | 1¾ × 7/16 | ,, | ,, | 5/6 ,, |
| | | | | | **N.P.** | **C.P.** **Black** |
| **PHILLIPS :** | | | | | | |
| Philco, Front, 115 ... | Cable | C. | 1⅝ × 7/16 | Clip | Optional | 2/11 3/5 3/3 |
| Philco, Rear, 116 ... | ,, | C. | 1¾ × 7/16 | Plate | ,, | 3/– 3/6 3/4 |
| Sellwell, Front, 300 ... | ,, | C. | 1¾ × 7/16 | Clip | ,, | 3/8 4/2 4/– |
| Sellwell, Rear, 302 ... | ,, | C. | 1¾ × 7/16 | Plate | ,, | 3/10 4/4 4/2 |
| Grande Vitesse, Fr., 330 | ,, | S. | 1 5/16 × 7/16 | Bolt | ,, | 3/10 3/10 3/10 |
| Grande Vitesse, R., 331 | ,, | S. | 1 5/16 × 7/16 | ,, | ,, | 3/11 3/11 3/11 |
| Philite, Front, 334 ... | ,, | S. | 1¾ × 7/16 | Clip | ,, | 3/10 4/4 4/2 |
| Philite, Rear, 335 ... | ,, | S. | 1¾ × 7/16 | ,, | ,, | 3/11 4/5 4/3 |
| Agrippa, Front, 336 ... | ,, | S. | 1¾ × 7/16 | Bolt | ,, | 4/2 4/8 4/6 |
| Agrippa, Rear, 337 ... | ,, | S. | 1¾ × 7/16 | ,, | ,, | 4/4 4/10 4/8 |
| Agrippa, Front, 338 ... | ,, | S. | 1¾ × 7/16 | Clip | ,, | 4/2 4/8 4/6 |
| Agrippa, Rear, 339 ... | ,, | S. | 1¾ × 7/16 | ,, | ,, | 4/4 4/10 4/8 |
| Crabbe, Front, 360 ... | ,, | S. | 1¾ × 7/16 | Optional | ,, | 4/2 4/2 4/2 |
| Crabbe, Rear, 361 ... | ,, | S. | 1¾ × 7/16 | ,, | ,, | 4/4 4/4 4/4 |
| Crabbe, Front, 362 ... | ,, | S. | 1¾ × 7/16 | ,, | ,, | 4/2 4/2 4/2 |
| Crabbe, Rear, 363 ... | ,, | S. | 1¾ × 7/16 | ,, | ,, | 4/4 4/4 4/4 |
| Cosmos, Front, 18 ... | Rod | — | 2 3/16 × 7/16 | Clip | ,, | 2/– 2/4 2/4 |

* With handlebars.

| TYPE | Operation (Rod or Cable) | Side or Centre Pull | Shoe—Length and Width | Fixing (Bolt or Clip) | Finish (Chrome, Nickel or Black) | Retail Price |
|---|---|---|---|---|---|---|
| | | | in. | | | |
| **PHILLIPS—contd.** | | | | | | |
| Cosmos, Rear, 19 ... | Rod | — | 2 3/16 × 7/16 | Clip | Optional | 3/– 3/4 3/4 |
| Quickfit, Front, 2, 4, 5 and 6. | ,, | — | 2 7/16 × 7/16 | ,, | ,, | 1/10 2/2 2/2 |
| Credex, Front, 27 ... | ,, | — | 2 7/16 × 7/16 | ,, | ,, | 1/10 2/2 2/2 |
| Quickfit, Rear, 8 and 9... | ,, | — | 2 7/16 × 7/16 | ,, | ,, | 2/8 3/– 3/– |
| Credex, Rear, 28 ... | ,, | — | 2 7/16 × 7/16 | ,, | ,, | 2/8 3/– 3/– |
| Philco, Front, 351 ... | ,, | C. | 2 7/16 × 7/16 | ,, | ,, | 3/– 3/4 3/4 |
| **RADNALL :** | | | | | | |
| No. 56, Caliper ... ... | Cable | S. | 1⅝ × ½ | Bolt | C.P. | 5/– |
| No. 57, Caliper ... ... | ,, | S. | 1¾ × ½ | ,, | ,, | 5/– |
| | | | | | | Enam. Trans. / Waterproof Trans. |
| No. 25, Caliper ... ... | ,, | S. | 1¾ × ½ | ,, | N.P. | 3/3 3/6 |
| | | | | | C.P. | 3/8 4/– |
| No. 26, Caliper ... ... | ,, | S. | 1¾ × ½ | ,, | N.P. | 3/4 3/7 |
| | | | | | C.P. | 4/– 4/2 |
| No. 50, Caliper ... ... | ,, | C. | 1¾ × ½ | Clip | N.P. | 2/11 3/4 |
| | | | | | C.P. | 3/4 3/9 |
| No. 51, Caliper ... ... | ,, | C. | 1¾ × ½ | ,, | N.P. | 3/1 3/6 |
| | | | | | C.P. | 3/6 3/11 |
| No. 54, Caliper ... ... | ,, | C. | 1¾ × ½ | ,, | N.P. | 2/8 3/2 |
| | | | | | C.P. | 2/10 3/4 |
| No. 55, Caliper ... ... | ,, | C. | 1¾ × ½ | ,, | N.P. | 2/10 3/4 |
| | | | | | C.P. | 3/– 3/6 |
| **RESILION :** | | | | | | |
| Cantilever Brake ... | Cable | — | 3 — | Clip | N.P. or B. | Front 11/6, Rear 10/6, Tandem (Front or Rear) 12/6. |
| | | | | | C.P. | Front 13/6, Rear 12/6, Tandem (Front or Rear) 14/6. |
| Cantilette Brake ... | ,, | — | 2¼ — | ,, | B. | Front or Rear 7/6, with Chrome Lever 8/–. |
| Anchor Brake ... ... | ,, | C. | 1¼ — | ,, | C.P. | Front or Rear 5/6. |
| **SACKVILLE :** | | | | | | |
| Caliper, No. 996 ... | Cable | S. | — | Bolt | C.P. | — |
| Caliper, No. 997 ... | ,, | S. | — | ,, | ,, | — |
| Caliper, No. 998 ... | ,, | S. | — | ,, | ,, | — |
| Caliper, No. 999 ... | ,, | S. | — | ,, | ,, | — |
| Caliper, No. 1000 ... | ,, | C. | — | Clip | ,, | — |
| Caliper, No. 1002 ... | ,, | C. | — | ,, | ,, | — |
| Caliper, No. 1003 ... | ,, | C. | — | ,, | ,, | — |
| Caliper, No. 1005 ... | ,, | C. | — | ,, | ,, | — |
| **TABUCCHI :** | | | | | | |
| Ambra Superga, Caliper | Cable | S. | 1½ × ½ | Single bolt on only | Chrome | 7/6 |
| Ambra Superga, Caliper Dural ... ... ... | ,, | S. | 1½ × ½ | ,, ,, | Dural. | Front 10/6, Rear 11/–. |
| **WEBB :** | | | | | | |
| Model A, Front ... | Cable | S. | 1¾ × ¾ | Bolt | C.P. | 5/– |
| Model B, Rear ... ... | ,, | S. | 1¾ × ¾ | ,, | ,, | 5/6, Ladies' 5/9. |
| Model C, Rear ... ... | ,, | S. | 1¾ × ¾ | ,, | ,, | 5/6, Ladies' 5/9. |
| Model D, Rear ... ... | ,, | S. | 1¾ × ¾ | ,, | ,, | 5/3, Ladies' 5/6. |
| Ten Spot ... ... | ,, | C. | 1⅝ × ⅞ | Clip | ,, | 7/–, Front or Rear. |
| **WHITMILL :** | | | | | | |
| Caliper ... ... ... | Cable | C. | 1 11/16 × 7/16 | Clip | C. and B. | 6/– Front, 6/6 Rear. |

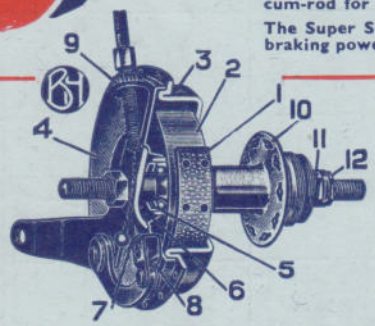
# BH "CYKLBRAKE" Internal Expanding

The pioneer internal expanding fabric-lined Hub Brake, and still the leader, because it is the most reliable braking system ever produced. The solo models have 3¼" dia. brake drums, and operation is by cable, or rod for roller levers. The Tandem models have 4" dia. brake drums, and operation is by cable for front hub and cable-cum-rod for rear hub.

The Super Special Tandem models have 4¾" dia. brake drums and give exceptional braking power. All models can be supplied for fixed gear, free wheel or speed gear.

SUPER SOLO FRONT HUB

**28/6** Pair

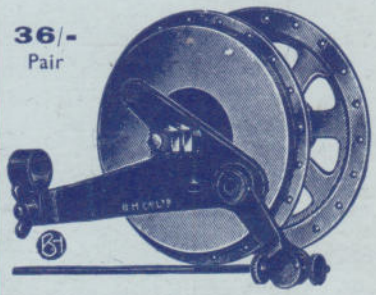



1. Special Ferodo Brake Lining (extra wide)
2. STEEL SHOES
3. Reinforced drum with set back spoke flange
4. Totally enclosed side plate
5. Felt oil retaining washer
6. Oil Trap
7. Covered oil outlet
8. QUICK RELEASE YOKE for ready detachment of cable wire
9. Adjuster stop allows ball nipple to pass through
10. Keyholed spoke fitting flange
11. Carbon chrome steel cone
12. Cone Locking Nut

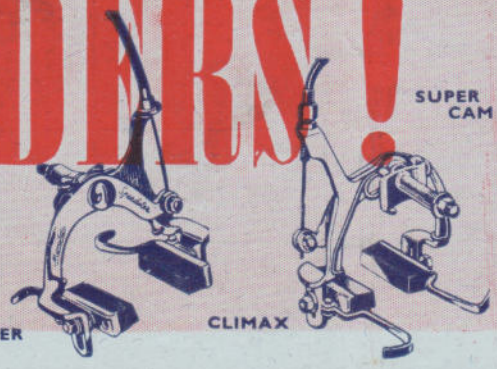
BRITISH HUB CO. LTD., CLYDE WORKS, BIRMINGHAM, 4

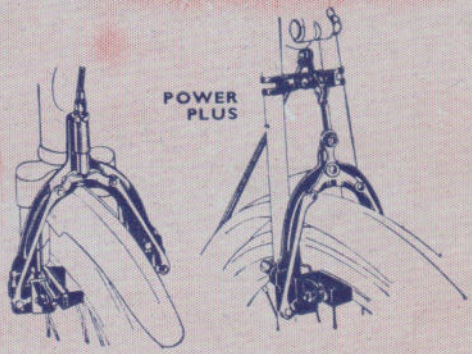
SUPER TANDEM REAR HUB

**36/-** Pair



# LEADERS!




We are specialists in the truest sense—we concentrate all our energies on making perfect Cycle Brakes and nothing else. We have solved the problem of converting easy movement at the lever end into tremendous power at the brake end. We have eliminated cable strain, solved the problem of wet rims, and perfected correct lever action. We have made the cycle the most perfectly-braked method of transport to-day.

**SELL SAFETY...SELL** *Monitor*

**THE NEAREST THING TO BRAKE PERFECTION**

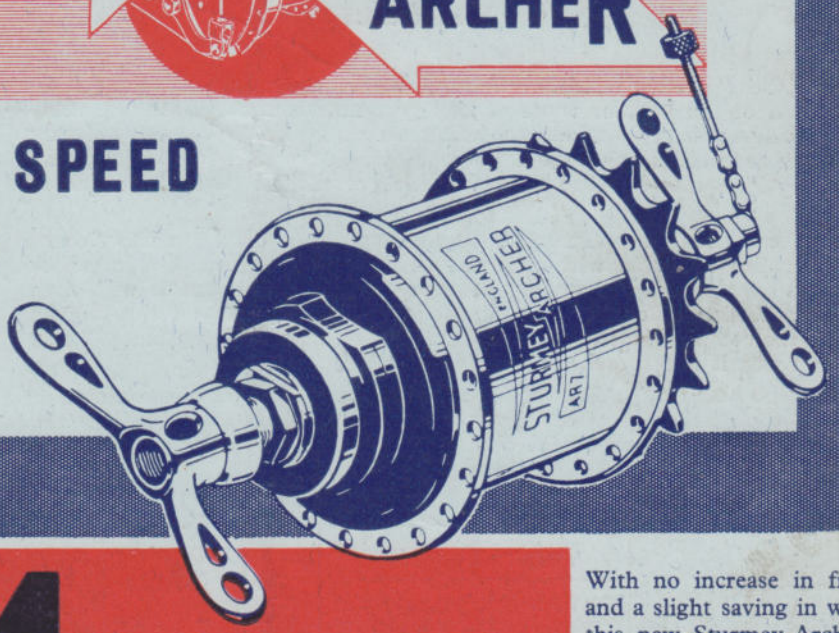
Write for details to THE MONITOR BRAKE CO., BROOKVALE ROAD, BIRMINGHAM 6

w.h.w.

# THE HIGHEST DEVELOPMENT IN GEAR DESIGN

## STURMEY ARCHER

## 3 & 4 SPEED GEARS




## The new 4 SPEED GEAR

**PROOF** "that the British cycle industry can think and create along new lines." DAILY HERALD.

With no increase in friction and a slight saving in weight, this new Sturmey-Archer 4-speed gear does for cycling what 4-speeds did for motoring! Its overall dimensions are the same as the famous Sturmey-3-speed hubs, it is totally-enclosed, continuously oil-bathed and trigger control is provided. There will be an enormous demand for this new gear!

## The Famous 3 SPEED GEAR

Already fitted by more than 3 million cyclists!

Over 3,000,000 Sturmey-Archer 3-speed gears are already in use. Neat, light and frictionless, there is no better gear to sell and recommend. And remember this: census figures prove that *it's easier to sell a cycle when it's fitted with a Sturmey-Archer gear!*

**IT PAYS YOU BETTER TO ADVISE YOUR CUSTOMERS TO FIT THE BEST!**

STURMEY-ARCHER GEARS LIMITED, NOTTINGHAM ST.9

"THE TRADER" DATA SHEET—3

# Hub Gear Specifications

## Details of Interest to the Cycle Builder and Repairer

PREVIOUS "Trader" Repairers' Supplements have dealt with servicing certain of the popular types of hub gear now marketed. In the table on this page is given additional information regarding cycle hub gears on the British market, which should prove useful both to cycle builders, and also to repairers who have to fit a variable geared hub to a single geared machine.

This information is supplemented, on the opposite page, by a selection of the gear ratios available with the various hubs. Considerations of space prevent us from printing every gear combination which is available with each hub, by variation of chain wheel sizes. We have, therefore, limited the tables to the combinations obtainable for 26in. and 28in. wheels with 46T and 48T chain wheels and sprocket sizes of from 14T to 20T.

All the hub gear makers issue tables showing the full ranges of gears obtainable with their hubs, but those given on the opposite page will enable the dealer to advise customers on the choice of a suitable gear for any particular purpose.

**REPAIRERS' SUPPLEMENTS ALREADY ISSUED**

| | 1938 |
|---|---|
| Servicing the 1938 Ariel Range | Jan. 14 |
| Costed Cycle Repairs (Wheel and Tyre) | Jan. 28 |
| Servicing Modern B.S.A. "Singles" | Feb. 11 |
| Costed Cycle Repairs (Wheel Building) | Feb. 25 |
| Servicing Royal Enfield "Single" Models | Mar. 11 |
| Pedal and Bracket Repairs Costed | Mar. 25 |
| Servicing the Modern Norton | April 8 |
| Brake Adjustment and Repair Costs | April 22 |
| Motor Cycle Service Hints | May 13 |
| Rudge Service Notes | May 20 |
| Costed Sturmey-Archer Repairs (K-Type) | June 3 |
| Servicing 1938 A.J.S. Models | June 17 |
| Costed Sturmey-Archer Repairs (A-Type) | July 1 |
| Servicing the Triumph Range | July 15 |
| The A.R. Sturmey-Archer Hub | July 29 |
| Servicing New Imperials | Aug. 12 |
| The Cyclo Derailleur | Aug. 26 |
| Servicing Motorised Cycles | Oct. 21 |
| Tri-Velox Derailleur Gears | Nov. 4 |
| More About Motorised Cycles | Nov. 18 |
| Simplex and Osgear Derailleurs | Dec. 9 |
| Servicing Matchless Models | Dec. 23 |
| | 1939 |
| Lucas Electrical Equipment | Jan. 20 |
| Francis-Barnett Service | Feb. 17 |
| Servicing Burman Gear Boxes | Mar. 17 |
| Servicing Amal Carburetters | April 14 |

**CYCLE DATA SHEETS**

| | 1939 |
|---|---|
| Cycle Hub Specifications | Jan. 27 |
| Cycle Brake Specifications | Feb. 24 |

Copies of the above may be obtained from "The Trader" offices, price 4d. each, or 3/9 per dozen, post free.

A sturdy spring-back binder for them is available for 3/-.

| Make and Type | Spoke Lengths: 28×1½in. Westwood | Spoke Lengths: 26×1⅜in. Endrick | Spoke Lengths: 26×1¼in. Endrick | Flange Diameter | Weight | Overall Width | Chain Line | Controls | Price, Loose |
|---|---|---|---|---|---|---|---|---|---|
| **STURMEY-ARCHER** | in. | in. | in. | in. | lb. oz. | in. | in. | | £ s. d. |
| AW Standard Wide Ratio, 3-speed. | 11 9/16 | 11⅛ | 10⅞ | 2 5/64 | 2 6 | 4 1/16—4 5/16 | 1½—1¾ | HB or TT | 1 3 9 |
| AM Medium Ratio, 3-speed | 11 9/16 | 11⅛ | 10⅞ | 2 5/64 | 2 7 | 4 1/16—4 5/16 | 1½—1¾ | HB or TT | 1 6 0 |
| AR Ultra Close Ratio, 3-sp. | 11 9/16 | 11⅛ | 10⅞ | 2 5/64 | 2 10 | 4 1/16—4 5/16 | 1½—1¾ | Trigger | 1 9 0 |
| AB and ABC Wide Ratio, 3-speed. | 11 5/16 B.† 11 15/16 C.† | 11⅛ B.† and C.† | 10 19/32 B.† 10⅞ C.† | — | 3 8 | 4 1/16—4 5/16 | 1½—1¾ | HB or TT | 1 12 6 |
| AT and ATC Wide Ratio, 3-speed. | — | — | — | | 4 0 | 4 13/16—5 5/16 | 1½—1¾ | HB or TT | 1 15 0 |
| T and TF, 2-speed ... | 11 27/32 L.† 11 9/16 C.† | 11 5/16 L.† 11⅛ C.† | 10⅞ C.† 11 5/32 L.† | — | T 1 14 TF 1 9 | 4 1/16—4 5/16 | 1½—1¾ | HB or TT | 0 19 6 |
| TC Close Ratio, 2-speed ... | — | — | — | — | 2 5 | 4 5/16 | 1½—1¾ fixed 1½—1⅝ free | — | 0 19 6 |
| AF, 4-speed... ... ... | 11 9/16 | 11⅛ | 10⅞ | 2 5/64 | 2 8½ | 4 1/16—4 5/16 | 1½—1¾ | Trigger | 1 19 0 |
| **PERRY** | | | | | | | | | |
| PA.BC, 3-speed ... ... | 11 5/16 B.† 12 C.† | — | 10⅝ B.† 11¼ C.† | 4 5/16 B.† 2 27/32 C.† | 3 10 | 4¼ | 1½—1¾ | HB or TT | 1 12 6 |
| **B.S.A.** | | | | | | | | | |
| 3-speed ... ... ... | 11 15/16 | 11 1/16 | 11¼ | 2.844 | 2 7 | — | 1½ (1⅝ GCC) | HB or TT | ‡ |
| 3-speed Expanding Hub ... | 11¼ B. 11 9/16 C. | 10 7/16 B. 10 11/16 C. | 10⅝ B. 10 3/16 C. | 4½ B. 3 5/32 C. | 3 11 | — | 1½ | HB or TT | ‡ |
| 2-speed D.P. (Fixed or free) | — | — | 11 13/16 | 3.06L† 3.31C† | 2 5 | — | 1½ | — | ‡ |
| **TORMO** | | | | | | | | | |
| "Torpedo" 3-speed Coaster | — | — | — | 3 1/16 | 2 15 | 4¼ | 1½ | HB or TT | §2 4 0 ‖2 5 0 |
| "Torpedo" 2-speed Coaster | — | — | — | 2⅞ | 2 10 | 4¼ | 1½ | HB or TT | §1 15 0 ‖1 16 0 |

B. and L.† Brake or left side. C.† Chain side. ‡ These gears are only fitted to new B.S.A. machines. § Nickel. ‖ Chrome.

# Gear Ratio Tables

| Make and Type | Hub Sprocket | 28in. Wheel L | N | H | Hub Sprocket | 26in. Wheel L | N | H |
|---|---|---|---|---|---|---|---|---|
| **STURMEY-ARCHER** | | | | **48 T Chain Wheel** | | | | |
| AW Standard Wide Ratio. AB, ABC, AT and ATC Wide Ratio. | 16 | 63.0 | 84.0 | 112.0 | 16 | 58.5 | 78.0 | 104.0 |
| | 17 | 59.3 | 79.1 | 105.5 | 17 | 55.1 | 73.5 | 98.0 |
| | 18 | 56.0 | 74.7 | 99.6 | 18 | 52.0 | 69.3 | 92.4 |
| | 19 | 53.0 | 70.7 | 94.3 | 19 | 49.3 | 65.7 | 87.6 |
| | 20 | 50.4 | 67.2 | 89.6 | 20 | 46.8 | 62.4 | 83.2 |
| | | | | **46 T Chain Wheel** | | | | |
| | 16 | 60.4 | 80.5 | 107.3 | 16 | 56.0 | 74.7 | 99.6 |
| | 17 | 56.9 | 75.8 | 101.1 | 17 | 52.7 | 70.3 | 93.7 |
| | 18 | 53.6 | 71.5 | 95.3 | 18 | 49.8 | 66.4 | 88.5 |
| | 19 | 50.9 | 67.8 | 90.4 | 19 | 47.2 | 62.9 | 83.9 |
| | 20 | 48.3 | 64.4 | 85.9 | 20 | 44.9 | 59.8 | 79.7 |
| | | | | **48 T Chain Wheel** | | | | |
| AM Medium Ratio ...* | 14 | 80.3 | 92.5 | 107.0 | 14 | 77.4 | 89.1 | 103.0 |
| | 15 | 75.0 | 86.4 | 100.0 | 15 | 72.1 | 83.2 | 96.0 |
| | 16 | 70.2 | 81.0 | 93.5 | 16 | 67.7 | 78.0 | 90.0 |
| | 17 | 66.1 | 76.2 | 88.0 | 17 | 63.7 | 73.5 | 85.0 |
| | 18 | 62.5 | 72.0 | 83.2 | 18 | 60.0 | 69.3 | 80.2 |
| | | | | **46 T Chain Wheel** | | | | |
| * | 14 | 77.0 | 88.7 | 102.5 | 14 | 74.0 | 85.4 | 98.6 |
| | 15 | 71.8 | 82.2 | 95.6 | 15 | 69.1 | 79.7 | 92.0 |
| | 16 | 67.3 | 77.6 | 89.5 | 16 | 64.8 | 74.7 | 86.2 |
| | 17 | 63.3 | 73.0 | 84.2 | 17 | 61.2 | 70.3 | 81.3 |
| | 18 | 59.8 | 69.0 | 79.6 | 18 | 57.6 | 66.4 | 76.8 |
| | | | | **48 T Chain Wheel** | | | | |
| AR Ultra Close Ratio ...* | 14 | 86.3 | 92.5 | 99.2 | 14 | 83.1 | 89.1 | 95.6 |
| | 15 | 80.6 | 86.4 | 92.7 | 15 | 77.6 | 83.2 | 89.2 |
| | 16 | 75.5 | 81.0 | 86.9 | 16 | 72.7 | 78.0 | 83.7 |
| | 17 | 71.7 | 76.2 | 81.7 | 17 | 68.5 | 73.5 | 78.8 |
| | 18 | 67.1 | 72.0 | 77.2 | 18 | 64.6 | 69.3 | 74.3 |
| | | | | **46 T Chain Wheel** | | | | |
| * | 14 | 82.7 | 88.7 | 95.2 | 14 | 79.6 | 85.4 | 91.6 |
| | 15 | 77.2 | 82.8 | 88.8 | 15 | 74.3 | 79.7 | 85.5 |
| | 16 | 72.3 | 77.6 | 83.2 | 16 | 69.6 | 74.7 | 80.1 |
| | 17 | 68.1 | 73.0 | 78.3 | 17 | 65.5 | 70.3 | 75.4 |
| | 18 | 64.3 | 69.0 | 74.0 | 18 | 61.9 | 66.4 | 71.2 |
| | | * 27in. wheels | | | | | | |
| | | | | **48 T Chain Wheel** | | | | |
| T and TF 2-speed ... | 14 | 72.0 | — | 96.0 | 14 | 66.9 | — | 89.1 |
| | 15 | 67.2 | — | 89.6 | 15 | 62.4 | — | 83.2 |
| | 16 | 63.0 | — | 84.0 | 16 | 58.5 | — | 78.0 |
| | 17 | 59.4 | — | 79.1 | 17 | 55.2 | — | 73.5 |
| | 18 | 56.1 | — | 74.7 | 18 | 52.0 | — | 69.3 |
| | 19 | 53.1 | — | 70.7 | 19 | 49.3 | — | 65.7 |
| | 20 | 50.4 | — | 67.2 | 20 | 46.8 | — | 62.4 |
| | | | | **46 T Chain Wheel** | | | | |
| | 14 | 69.0 | — | 92.0 | 14 | 64.1 | — | 85.4 |
| | 15 | 64.5 | — | 85.9 | 15 | 59.8 | — | 79.7 |
| | 16 | 60.4 | — | 80.5 | 16 | 56.1 | — | 74.7 |
| | 17 | 56.9 | — | 75.8 | 17 | 52.8 | — | 70.3 |
| | 18 | 53.7 | — | 71.5 | 18 | 49.8 | — | 66.4 |
| | 19 | 50.9 | — | 67.8 | 19 | 47.2 | — | 62.9 |
| | 20 | 48.3 | — | 64.4 | 20 | 44.9 | — | 59.8 |
| | | | | **48 T Chain Wheel** | | | | |
| TC Close Ratio, 2-speed | 14 | 83.1 | — | 96.0 | 14 | 77.1 | — | 89.1 |
| | 15 | 77.5 | — | 89.6 | 15 | 72.0 | — | 83.2 |
| | 16 | 72.7 | — | 84.0 | 16 | 67.5 | — | 78.0 |
| | 17 | 68.4 | — | 79.1 | 17 | 63.6 | — | 73.5 |
| | 18 | 64.6 | — | 74.7 | 18 | 59.9 | — | 69.3 |
| | 19 | 61.2 | — | 70.7 | 19 | 56.8 | — | 65.7 |
| | 20 | 58.1 | — | 67.2 | 20 | 54.0 | — | 62.4 |
| | | | | **46 T Chain Wheel** | | | | |
| | 14 | 79.6 | — | 92.0 | 14 | 73.9 | — | 85.4 |
| | 15 | 74.3 | — | 85.9 | 15 | 69.0 | — | 79.7 |
| | 16 | 69.7 | — | 80.5 | 16 | 64.6 | — | 74.7 |
| | 17 | 65.6 | — | 75.8 | 17 | 60.8 | — | 70.3 |
| | 18 | 61.9 | — | 71.5 | 18 | 57.5 | — | 66.4 |
| | 19 | 58.7 | — | 67.8 | 19 | 54.4 | — | 62.9 |
| | 20 | 55.7 | — | 64.4 | 20 | 51.7 | — | 59.8 |

| Make and Type | Hub Sprocket | 28in. Wheel L | N | H | Hub Sprocket | 26in. Wheel L | N | H |
|---|---|---|---|---|---|---|---|---|
| **B.S.A.** | | | | **48 T Chain Wheel** | | | | |
| 3-speed ... ... ... | 16 | 59.4 | 78.0 | 102.4 | 16 | 64.0 | 84.0 | 110.2 |
| | 18 | 52.8 | 69.3 | 90.9 | 18 | 56.8 | 74.6 | 97.9 |
| | 20 | 47.5 | 62.4 | 81.9 | 20 | 51.2 | 67.2 | 88.2 |
| | 22 | 43.2 | 56.7 | 74.4 | 22 | 46.4 | 61.0 | 80.1 |
| | | | | **46 T Chain Wheel** | | | | |
| | 16 | 61.3 | 80.5 | 105.6 | 16 | 56.9 | 74.7 | 98.0 |
| | 18 | 54.5 | 71.5 | 93.8 | 18 | 50.6 | 66.4 | 87.1 |
| | 20 | 49.1 | 64.4 | 84.5 | 20 | 45.6 | 59.8 | 78.5 |
| | 22 | 44.6 | 58.5 | 76.8 | 22 | 41.3 | 54.3 | 71.3 |
| **PERRY** | | | | **48 T Chain Wheel** | | | | |
| PABC and PAB, 3-speed | 16 | 63.0 | 84.0 | 112.0 | 16 | 58.5 | 78.0 | 104.0 |
| | 17 | 59.3 | 79.1 | 105.5 | 17 | 58.1 | 73.5 | 98.0 |
| | 18 | 56.0 | 74.7 | 99.6 | 18 | 52.0 | 69.3 | 92.4 |
| | 19 | 53.0 | 70.7 | 94.3 | 19 | 49.3 | 65.7 | 87.6 |
| | 20 | 50.4 | 67.2 | 89.6 | 20 | 56.8 | 62.4 | 83.2 |
| | | | | **46 T Chain Wheel** | | | | |
| | 16 | 60.4 | 80.5 | 107.3 | 16 | 56.0 | 74.7 | 99.6 |
| | 17 | 56.9 | 75.8 | 101.1 | 17 | 52.7 | 70.3 | 93.7 |
| | 18 | 53.6 | 71.8 | 95.3 | 18 | 49.8 | 66.4 | 88.5 |
| | 19 | 50.9 | 67.8 | 90.4 | 19 | 47.2 | 62.9 | 83.9 |
| | 20 | 48.3 | 64.4 | 85.9 | 20 | 44.9 | 59.8 | 79.7 |
| **TORMO** | | | | **48 T Chain Wheel** | | | | |
| "Torpedo," 3-speed coaster | 16 | 56.0 | 67.0 | 84.0 | 15 | 55.0 | 66.0 | 83.0 |
| | 17 | 53.0 | 63.0 | 79.0 | 16 | 52.0 | 62.0 | 78.0 |
| | 18 | 50.0 | 60.0 | 75.0 | 17 | 49.0 | 59.0 | 73.0 |
| | 19 | 47.0 | 57.0 | 71.0 | 18 | 46.0 | 55.0 | 69.0 |
| | 20 | 45.0 | 54.0 | 67.0 | 19 | 44.0 | 53.0 | 66.0 |
| | 21 | 43.0 | 51.0 | 64.0 | 20 | 42.0 | 50.0 | 62.0 |
| | 22 | 41.0 | 49.0 | 61.0 | 21 | 40.0 | 48.0 | 60.0 |
| | 23 | 39.0 | 47.0 | 58.0 | 22 | 38.0 | 45.0 | 57.0 |
| | 24 | 37.0 | 45.0 | 56.0 | 23 | 36.0 | 43.0 | 53.0 |
| | | | | **46 T Chain Wheel** | | | | |
| | 15 | 57.0 | 69.0 | 86.0 | 14 | 57.0 | 68.0 | 85.0 |
| | 16 | 54.0 | 64.0 | 81.0 | 15 | 53.0 | 64.0 | 80.0 |
| | 17 | 50.0 | 61.0 | 76.0 | 16 | 50.0 | 60.0 | 75.0 |
| | 18 | 48.0 | 57.0 | 72.0 | 17 | 47.0 | 56.0 | 70.0 |
| | 19 | 45.0 | 54.0 | 68.0 | 18 | 44.0 | 53.0 | 66.0 |
| | 20 | 43.0 | 52.0 | 64.0 | 19 | 42.0 | 50.0 | 63.0 |
| | 21 | 41.0 | 49.0 | 61.0 | 20 | 40.0 | 48.0 | 60.0 |
| | 22 | 39.0 | 47.0 | 59.0 | 21 | 38.0 | 46.0 | 57.0 |
| | 23 | 37.0 | 45.0 | 56.0 | 22 | 36.0 | 44.0 | 54.0 |
| | | | | **48 T Chain Wheel** | | | | |
| "Torpedo," 2-speed coaster | 16 | 64.0 | — | 84.0 | 16 | 59.0 | — | 78.0 |
| | 18 | 57.0 | — | 75.0 | 18 | 53.0 | — | 70.0 |
| | 20 | 51.0 | — | 67.0 | 20 | 47.0 | — | 62.0 |
| | 22 | 46.0 | — | 61.0 | 22 | 43.0 | — | 57.0 |
| | | | | **46 T Chain Wheel** | | | | |
| | 16 | 62.0 | — | 81.0 | 16 | 56.0 | — | 75.0 |
| | 18 | 55.0 | — | 72.0 | 18 | 50.0 | — | 67.0 |
| | 20 | 49.0 | — | 64.0 | 20 | 44.0 | — | 59.0 |
| | 22 | 45.0 | — | 59.0 | 22 | 41.0 | — | 55.0 |

| Make and Type | Hub Sprocket | 28in. Wheel Low 1 | 2 | 3 | High 4 | Hub Sprocket | 26in. Wheel Low 1 | 2 | 3 | High 4 |
|---|---|---|---|---|---|---|---|---|---|---|
| **STURMEY-ARCHER** | | | | | **48 T Chain Wheel** | | | | | |
| AF, 4-speed ... ... | 14 | 72.0 | 86.4 | 96.0 | 104.7 | 14 | 66.8 | 80.1 | 89.1 | 97.2 |
| | 15 | 67.2 | 80.6 | 89.6 | 97.8 | 15 | 62.4 | 74.9 | 83.2 | 90.8 |
| | 16 | 63.0 | 75.6 | 84.0 | 91.6 | 16 | 58.5 | 70.2 | 78.0 | 85.1 |
| | 17 | 59.3 | 71.2 | 79.1 | 86.3 | 17 | 55.1 | 66.1 | 73.5 | 80.2 |
| | 18 | 56.0 | 67.2 | 74.7 | 81.5 | 18 | 52.0 | 62.4 | 69.3 | 75.6 |
| | 19 | 53.0 | 63.6 | 70.7 | 77.2 | 19 | 49.3 | 59.1 | 65.7 | 71.7 |
| | 20 | 50.4 | 60.5 | 67.2 | 73.3 | 20 | 46.8 | 56.2 | 62.4 | 68.1 |
| | | | | | **46 T Chain Wheel** | | | | | |
| | 14 | 69.0 | 82.8 | 92.0 | 100.5 | 14 | 64.0 | 76.9 | 85.4 | 93.2 |
| | 15 | 64.4 | 77.3 | 85.9 | 93.7 | 15 | 59.8 | 71.7 | 79.7 | 87.0 |
| | 16 | 60.4 | 72.4 | 80.5 | 87.8 | 16 | 56.0 | 67.2 | 74.7 | 81.5 |
| | 17 | 56.9 | 68.2 | 75.8 | 82.7 | 17 | 52.7 | 63.3 | 70.3 | 76.8 |
| | 18 | 53.6 | 64.3 | 71.5 | 78.0 | 18 | 49.8 | 59.8 | 66.4 | 72.4 |
| | 19 | 50.9 | 61.0 | 67.8 | 74.0 | 19 | 47.2 | 56.6 | 62.9 | 68.6 |
| | 20 | 48.3 | 57.9 | 64.4 | 70.3 | 20 | 44.9 | 53.0 | 59.8 | 65.3 |

# Sales and Service Agreement Forms

IT is impossible for a trader to carry on business for any lengthy period without experiencing the need for some kind of form or document to facilitate the easy working of his business. Repair work, garaging, hiring, battery charging, sales on hire purchase or by " easy payments " all necessitate the use of one form or another. For 40 years the Trader Publishing Co. Ltd have supplied a variety of forms which, by long experience, have proved to be the simplest, safest and most convenient in use. Brief details of these forms, together with the current prices at which they are supplied, are given below :—

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***FORM No. 2A.**—Hire Purchase of Motor Car or Commercial Vehicle (not exceeding £50). Price 6d. each. 6/6, 25; 10/-, 50; 17/6, 100.

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**FORM No. 2/S.**—Hire Purchase of Motor Car. Designed to comply with provisions of Scottish Law for transactions which exceed £20 in value. Price 4d. each. 5/-, 25; 7/6, 50; 10/6, 100.

**FORM No. 2A/S.**—Hire Purchase of Motor Van or Lorry. Designed to comply with the provisions of Scottish Law for transactions which exceed £20 in value. Price 4d. each. 5/-, 25; 7/6, 50; 10/6, 100.

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M.T.C.T.1.

"THE TRADER" DATA SHEET—4

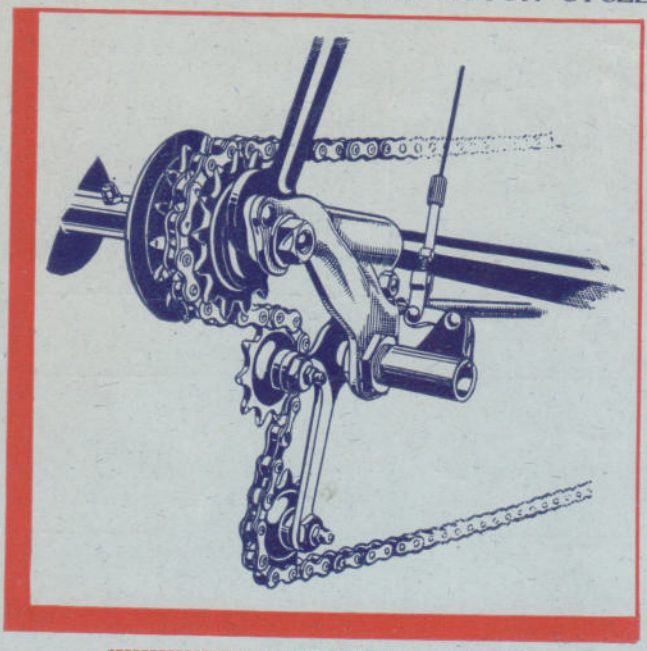
# DERAILLEUR GEAR SPECIFICATIONS

**Useful Information Designed to Facilitate Fitting and Servicing**

| Maker and Type | Spoke Lengths | | | | Fork End Width | Average Weight Complete | Chain Line | Sprocket Sizes | | | Chain Tensioning Employed | Method of Gear Selection | Method of Control (Single or Double Wire or Rod) | Price (unfitted) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 28×1½ | 26×1⅜ | 26×1¼ | 27×1¼ | | | | Low | Med'm | High | | | | | |
| | in. | in. | in. | in. | in. | lb. oz. | in. | Teeth | Teeth | Teeth | | | | | |
| **The Constrictor Tyre Co., Ltd.** | | | | | | | | | | | | | | | |
| Osgear Single Roller, 3-sp., steel. | — | — | 11½ | 12 | 4–4¼ | 1 6½ | Centre cog 1½, ¼ diff. high and low gear. | 18/22 | 16/17 | 13/15 | Jockey arm, chain wheel, sprocket or roller. | Fork throw-over. | Single wire | 19/6* | Also obtainable in 4-sp. at 3/– extra. |
| Do. do. Conloy finish. | — | — | 11½ | 12 | 4–4¼ | 1 6 | „ „ | 18/22 | 16/17 | 13/15 | „ „ „ | „ „ | Single wire | 20/6* | „ „ „ |
| Do. do. Professional | — | — | 11½ | 12 | 4–4¼ | 1 8 | „ „ | 18/22 | 16/17 | 13/15 | „ „ „ | „ „ | Single wire† | 30/–* | „ „ „ † An extra cable and wire to take tension of jockey arm. |
| Osgear Grand Sport, Double Roller. | — | — | 11½ | 12 | 4–4¼ | 1 6½ | „ „ | 18/22 | 16/17 | 13/15 | Jockey arm, fork end. | Sliding spr'kt or roller. | Single wire | 22/6* | * Prices given include plain pattern triple freewheel. |
| Osgear du Monde ... | — | — | 11½ | 12 | 4–4¼ | 1 4 | „ „ | 18/22 | 16/17 | 13/15 | „ „ „ | „ „ | Single wire | 25/–* | |
| Osgear Empire ... | — | — | 11½ | 12 | 4–4¼ | 1 4½ | „ „ | 18/22 | 16/17 | 13/15 | „ „ „ | „ „ | Single wire | 25/–* | |
| **Cyclo Gear Co., Ltd.** | | | | | | † | | | | | | | | | |
| Cyclo 2-sp. ... ... | — | — | — | — | 4½ | 1 5 | 1½ | 17/24 | — | 16/19 | Tension sprocket | Sprocket | Double wire | 20/– | † All weights less f'wheel |
| Witmy 2-sp. ... ... | — | — | — | — | 4½ | 1 0 | 1½ | 17/24 | — | 16/19 | Tension sprocket | Sprocket | Single wire | 15/– | Av. weight of triple free-wheel is 11 ozs. |
| Cyclo Star 3-sp. Cycle | — | — | — | — | 4½–4⅞ | 1 0 | 1½ | 18/22 | 17/18 | 13/17 | Tension sprocket | Sprocket | Single wire | 22/– | |
| Cyclo Star 3-sp. Cycle | — | — | — | — | 4½–4⅞ | — | 1½ | 18/22 | 16/18 | 13/16 | Tension sprocket | Sprocket | Single wire | 22/– | Boss type freewheel. |
| Cyclo 3-sp. Cycle ... | — | — | — | — | 4½–4⅞ | 1 8 | 1½ | 18/28 | 17/20 | 13/17 | Tension sprocket | Sprocket | Double wire | 25/– | |
| Cyclo 3-sp. Tandem... | — | — | — | — | 5 | — | 1¾ | 18/28 | 17/20 | 13/17 | Tension sprocket | Sprocket | Double wire | 28/– | |
| Cyclo 4-sp. Cycle ... | — | — | — | — | 4⅞–5 | 1 6½ | 1½ | 25/28 | 17/19 | 13/16* | Pulley | Sprocket | Double wire | 32/– | * 4-sp. third gear, 20-23T. |
| Cyclo 4-sp. Tandem... | — | — | — | — | 5 | — | 1¾ | 25/28 | 17/19 | 13/16 | Pulley | Sprocket | Double wire | 35/– | |
| Oppy 4-sp. Cycle ... | — | — | — | — | 4½–4⅞ | — | 1½ | 20/23 | 16/19 | 12/15* | Pulley | Sprocket | Double wire | 40/– | With hub unit. * 4-sp. third gear, 17-19T. |
| Oppy 3-sp. Cycle ... | — | — | — | — | 4½–4⅞ | 0 15 | 1½ | 18/23 | 17/18 | 13/17 | Sprocket | Sprocket | Double wire | 30/– | |
| Ace Close Ratio Gear | — | — | — | — | 4½–4⅞ | 0 15 | 1½ | 17/21 | 17/18 | 14/16 | Sprocket | Striking fork | Double wire | 17/6 | |
| Ace Close Ratio Gear | — | — | — | — | 4½–4⅞ | 0 15 | 1½ | 18/22 | 16/18 | 14/16 | Sprocket | Striking fork | Double wire | 17/6 | Boss type freewheel. |
| Hub Unit Sprockets . | — | — | — | — | — | — | — | 12 | 28 | — | — | — | — | 1/3 ea. | Up to 22 T. |
| | | | | | | | | | | | | | | 1/9 ea. | 23T. up to 28T. |
| | | | | | | | | | | | | | | | N.B.—All Solo gears supplied with hub unit, 5/– extra. All sprockets interchangeable. |
| **Dean Willis & Co** | | | | | | | | | | | | | | | |
| Super Inax ... ... | — | 11¼ | 11⅜ | 12 | 4½ | 0 8 | 1½ | 17/21 | 16/18 | 13/16 | Sprung arm and pulley | Spring loaded chain guide. | Single wire | 22/6 | |
| **The Enfield Cycle Co., Ltd.** | | | | | | | | | | | | | | | |
| Enfield 3-sp. Easy-change. | 12⅛ | 11¼ | 11⅜ | 12 | 4⅞ | 2 0 | 1⅝ | 20/22 | 17/18 | 14/15 | Jockey sprocket | Sliding spr'kt. | Double wire | — | Not supplied "unfitted." |

C 2

| Maker and Type | Spoke Lengths | | | | Fork End Width | Average Weight Complete | Chain Line | Sprocket Sizes | | | Chain Tensioning Employed | Method of Gear Selection | Method of Control (Single or Double Wire or Rod) | Price (unfitted) | Remarks |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 28×1½ | 26×1⅜ | 26×1¼ | 27×1¼ | | | | Low | Med'm | High | | | | | |
| | in. | in. | in. | in. | in. | lb. oz. | in. | Teeth | Teeth | Teeth | | | | | |
| **Fonteyn & Co., Ltd.** | | | | | | | | | | | | | | | |
| Professional Simplex . | — | — | — | — | 4¼ | 0 15 | 1½ | 17/22 | 16/19 | 14/17 | Jockey roller | Sliding cage | Single wire | 30/– | 3- or 4-sp., ⅛ or 3/32 chain. |
| Selection Standard Simplex. | — | — | — | — | 4¼ | 0 16 | 1½ | 17/23 | 16/20 | 14/17 | Jockey roller on tension arm. | Striking fork | Single wire | 19/6 | 3-sp. ⅛, 4-sp. 3/32 chain. |
| Light Tourist Simplex | — | — | — | — | 4¼ | 0 17½ | 1½ | 30 | 16/26 | 14/19 | Jockey roller on tension arm. | Sliding tension arm and jockey. | Single wire | 22/6 | 3- or 4-sp. ⅛ chain. |
| **Morgan Helical Derailleur Gear Co., Ltd.** | | | | | | | | | | | | | | | |
| Helical slotted Derailleur. | — | — | — | — | — | 0 13½* | 1½ | 19/24 | 16/20 | 12/16 | Jockey sprocket and pulley. | Floating | Dual cable rod. | 22/6 | £1 1s. fitted as equipment of new machine. * Mechanism without triple freewheel. |
| **The Taybrook Mfg. Co., Ltd.** | | | | | | | | | | | | | | | |
| Victo gear ... ... | — | — | — | — | 4½–5 | — | 1½ | 17/21 | 13/16 | 12/15 | Jockey sprocket | Sliding spr'kt. | Rod or single wire. | 21/– | |
| **Trivelox Gears, Ltd.** | | | | | | | | | | | | | | | |
| TriVelox, Model A1 (Solo less brake). | *12<br>†12⅛ | *11⅛<br>†11¼ | *11¼<br>†11⅜ | *11¾<br>†11⅞ | 4⅞ for 1⅜ cl.<br>5⅜ for 1¾ cl. | 2 14§ | 1½ or 1¾ | 19/26 | 17/21 | 14/18 | Jockey sprocket | Sliding triple freewheel. | Single wire | 32/6 | Chain in line on all gears. Reversible sprockets. |
| TriVelox, Model A2 (Solo with hub brake). | *19 3/16<br>‡19⅛ | *9 5/16<br>‡10¾ | *9 7/16<br>‡10⅝ | *9 15/16<br>‡10⅞ | 4⅞ for 1½ cl. | 4 7§ | 1½ or 1¾ | 19/26 | 17/21 | 14/18 | Jockey sprocket | Sliding triple freewheel. | Single wire | 43/– | Chain in line on all gears. 3¾in. dia. hub brake, cable control, reversible sprockets. |
| TriVelox, Model A4 (Tandem with brake) | —<br>— | *9⅜<br>‡9⅜ | *9½<br>‡9½ | *10<br>‡10 | 5⅜ | 5 8§ | 1¾ | 19/26 | 17/21 | 14/18 | Jockey sprocket | Sliding triple freewheel. | Single wire | 45/6 | Chain in line on all gears. 5in. dia. hub brake, cable-cum-rod control, reversible sprockets. |
| TriVelox, Model B1 (less brake). | *12<br>†12⅛ | *11⅛<br>†11¼ | *11¼<br>†11⅜ | *11¾<br>†11⅞ | 4½ | 2 8§ | 1½ or to order. | 14/28 | 13/27 | 12/16 | Jockey sprocket | Sliding jockey | Single wire | 27/6 | Freewheel built in hub, quickly detachable and reversible sprockets. |
| TriVelox, Model B2 (with hub brake). | *12<br>‡11⅜ | *11⅛<br>‡10½ | *11¼<br>‡10⅝ | *11¾<br>‡11⅛ | 4½ | 3 8‖ | 1½ | 14/28 | 13/27 | 12/16 | Jockey sprocket | Sliding jockey | Single wire | 38/– | Freewheel built in hub, quickly detachable and reversible sprockets. 3¾in. dia. hub brake, cable control. |
| TriVelox, Model C1 (Solo). | — | — | — | — | — | 1 11 | — | 19/26 | 17/21 | 14/18 | Jockey sprocket | Sliding jockey | Single wire | 25/– | Jockey system as "B" model, freewheel screwed to fit standard rear hub. Sold as an attachment for fitting to existing hub. Spoke lengths: *Gear side. †Plain side. ‡Brake side. §With hub. ‖Hub with brake. |
| TriVelox, Model C2 (Tandem). | — | — | — | — | — | 1 12 | — | 19/26 | 17/21 | 14/18 | Jockey sprocket | Sliding jockey | Single wire | 26/– | |
| | | | | | | | | COUNTERSHAFT GEAR | | | | | | | |
| **The Villiers Engineering Co., Ltd.** | | | | | | | | | | | | | | | |
| 2-sp. Countershaft gear | — | — | — | — | 4 13/16 | 2 0 | Normal | 20/18 | or | 20/19 | Normal | Countershaft | Wire control | 15/– | Tandem and carrier, 2s. extra. Gear screws on normal hub in place of freewheel. |



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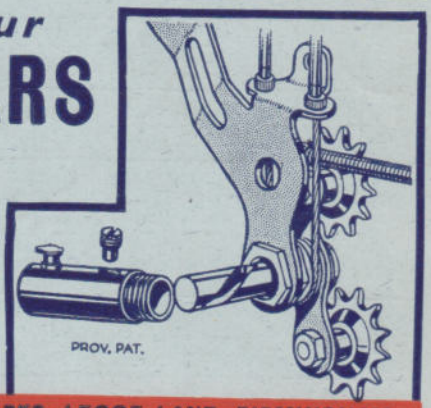


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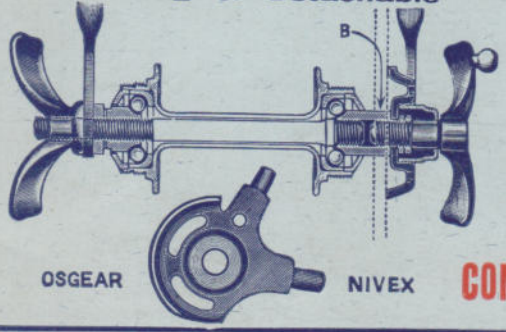
# OSGEAR DERAILLEURS

**NIVEX QUICK RELEASE**
**Brazing or Detachable**

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| Single Roller type - - - | **19/6** |
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| Du Monde, as illustrated - | **25/-** |

*(Last two sold in this country under Cyclo Patents.)*

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***10% reduction if 6 or more taken at the time.***

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