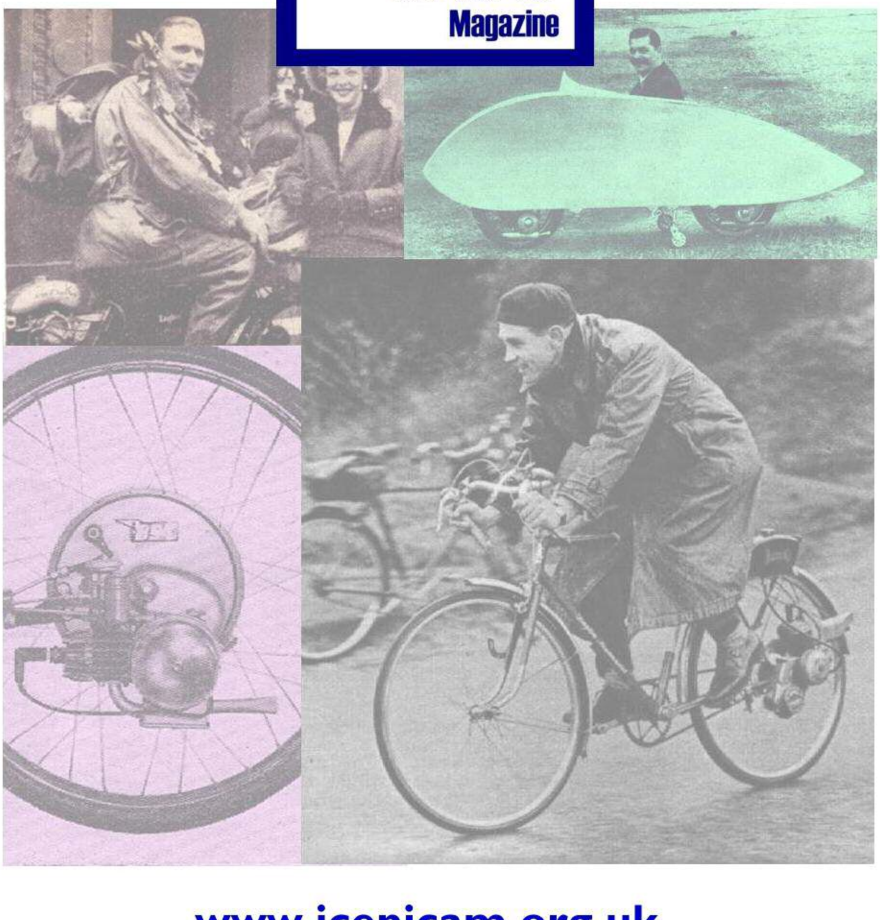
IceniCAM
Information Service

The Iceni CAM (Cyclemotor Autocycle & Moped) Magazine



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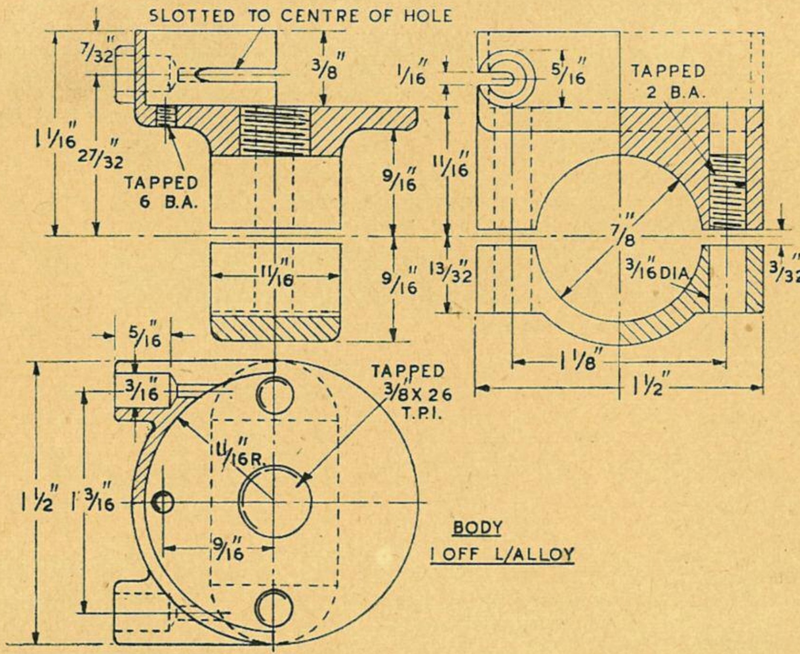
Although the action of this control lever does not differ in general principles from the usual type, there are some details in its design and construction which are unusual and call for brief explanation. The body of the control is intended to be made as a casting, though it could be machined from the solid without difficulty, and is integral with the upper component of the split clamp, by means of which it is secured to the handle-bar of the cycle. To simplify construction, it is proposed to machine the lower half of the clamp also in one piece with the body, and separate it afterwards. Note that the screws or bolts of the clamp are located as close as possible to the seating so that the maximum grip is assured, and any spring or distortion of the clamp which may take place does not impair the grip.



In common with most similar devices, the lever operates on a central stud, and friction is applied by a thrust plate and spring washer so that the control "stays put" when manipulated. But a special feature is that the stud is arranged so that it cannot loosen, neither can the adjustment of the friction washers alter, by any fair means, and the degree of friction can readily be controlled.

The lever operates the cables by what one might aptly describe as "gabhooks," as their action is reminiscent of some of the early types of steam engine valve-gears. Nipples attached to the inner cables by soldering in the normal way, are arranged to be capable of moving in a limited arc, in slots formed in keep-plates above and below the actuating lever. In the position illustrated in the plan view, the lever is in "neutral"; that is to say, both the throttle and the decompressor valve are closed. If the lever is now moved in a clockwise direction, the upper horn of the "gabhook" will pick up the corresponding nipple and pull it round, the cable lying in the circular groove of the lever and having a straight-line motion, with no tendency to bend at the nipple. The lower nipple will be disengaged by its hook, but will be held by the limit slots in the keep-plates so that the cable is neither loosened nor tightened. Movement of the lever in an anti-clockwise direction, however, allows the upper nipple to revert to the position shown, where it is prevented moving further by the limit slots, and further movement of the lever then actuates the lower nipple. It will be noted that the amount of "lost motion" in the hooks of the lever, and also the limits in the slots, varies in the two cases, as the decompressor requires only a small amount of movement to open it fully, whereas the throttle requires a larger range of controlled movement.

Where this lever arrangement differs from (and is claimed to be an improvement upon) existing types is in the means employed to confine the cable movements to their proper orbits, and avoid the risk that if the cables should stick, the nipples may escape from the hooks and render the control inoperative. The keep-plates also serve the purpose of locked friction pads and prevent any tendency of the cover plate or centre stud to turn with the lever—a prevalent fault of many control levers. It will be seen (from the detail drawings) that the keep-plates have half their circumference rebated so that they are restrained from turning, when assembled, by the semi-circular wall on the left side of the body; and the plates, in their turn, are provided with hexagonal centre holes which fit over the centre part of the stud and prevent it unscrewing from the body.

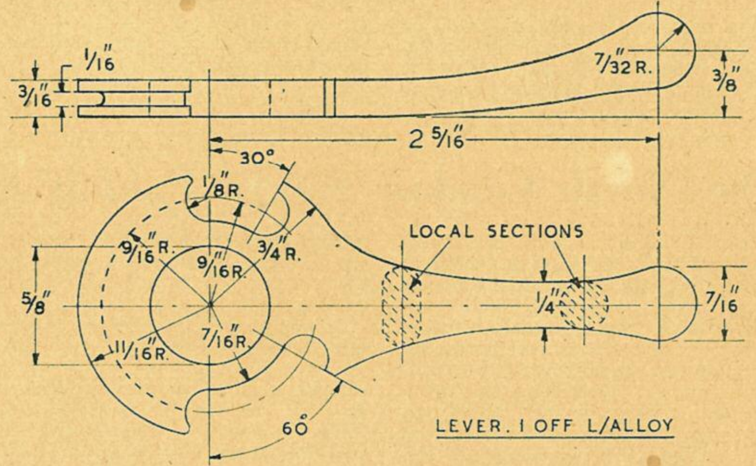
Frictional pressure on the large area of the keep-plates is applied, through a plain thrust washer, by means of a large spring washer, which is pressed down by a cover plate internally screwed to fit the top end of the centre stud. To prevent risk of the cover plate unscrewing, it is provided with a notched edge, to engage a check spring attached to the body of the control. This locking device is equally effective, whether the cover plate is screwed down hard to make contact with the edge of the body, or partially slackened off; thus the friction can be adjusted to a nicety, and the effect of any possible wear compensated.

I do not claim that this is the "control to end all controls"; from the aspect of the manufacturer, it would probably be considered too expensive to produce, and there may be criticisms of its weight and bulk, in comparison to the popular modern "streamlined" production. But I hope that my critics (and they are legion!) will at least give me credit for the very careful thought put into the design, and agree that the "refinements" are desirable and effective.

Body

If a casting is used, it should be in good quality alloy, and free from flaws or porosity, which would seriously impair its strength. As an alternative to aluminium alloy, gunmetal would be a highly suitable material, but unless it is to be plated afterwards, its colour might be an objection. As previously mentioned, the clamp may with advantage be cast in one piece with the body, but in any case, the recommended procedure for machining is to hold it first by the lower end in the four-jaw chuck for machining the recessed face of the seating, the inside and top face of the semi-circular wall, and drilling and tapping the centre hole. These are all quite straightforward operations, and do not call for specially close limits of accuracy.

For boring the clamp seating, the simplest method of holding the work is on an angle-plate, using a single stud with the end screwed to fit the centre stud hole and a parallel distance-bush or thick spacer to bear on the flat seating face and deep enough to clear the semi-circular edge. The stud should not project through the centre hole to interfere with the boring operation. Set the bore of the clamp to run truly and bore it out to the size of the handle-bar, as closely as can be measured by the means available, but erring, if anything, on the easy side.



LEVER. 1 OFF L/ALLOY

Before splitting the clamp, it is advisable to drill and tap the holes for the clamping screws. Note that the drawing shows these holes passing right through into the body to facilitate tapping, though not necessarily tapped their full length. An alternative to the use of screws, which may be preferred on the ground of reliability, is to fit studs or bolts; the holes may be counterbored to $\frac{1}{4}$ in. dia. at the top, and long screws, with the heads reduced to $\frac{1}{4}$ in., put in from this end.

The clamp may now be separated with a hand or machine saw, and the faces machined or filed up so that when fitted to the handle-bar there is a definite gap between the halves, with due allowance for any subsequent closing up by distortion of the clamp. Holes are drilled and counterbored in the horizontal bosses to form the sockets which locate the ends of the cable casing, and these are slotted out as shown to facilitate cable assembly. This operation can be carried out by mounting the work on the vertical side of an angle-plate on the lathe cross-slide, using the centre stud and distance-piece as before, and running a circular slotting saw of appropriate thickness on an arbor in the chuck or between centres. Another method would be to set the work eccentrically on the faceplate and use a narrow parting tool, to deal with each of the bosses in turn.

Lever

This can also be dealt with to best advantage if made as a casting; if made from solid, it will entail a good deal of cutting away, unless there is more or less drastic departure from the shape shown. It will, however, be found that the bulbous end is most convenient for finger operation, and the slight bend carries the lever well clear of the handle-bar. In the old days, levers were often fitted with neat turned wooden or vulcanite handles at the ends, and this idea might be adopted, the end of the lever being made in the form of a screwed stud, with a cap nut fitted to the end. In this case it could be made from $\frac{3}{16}$ in. thick flat brass or dural, but beware of weakening the section where it is shouldered down to take the handle.

If a casting is used, the flat portion should be machined and truly bored through the centre, with care to get the sides parallel with each other. The " hooks " may be filed to shape, but machining of the circular edge and groove is desirable, and this can be done by mounting the lever on a stud fixed to the side of an angle-plate on the lathe cross-slide. Either the stud, or a bush fitted thereto, should be a working fit in the bore of the lever, and a nut and friction washer fitted to enable the lever to rotate somewhat stiffly. A side milling cutter may then be used to machine the edge, and a small circular saw to form the groove. The drawings show the bottom of the groove rounded, but this is not important, as a square-cut groove will fulfil the purpose of guiding the cable equally well.

(To be continued)

The North London S.M.E. Exhibition

THE North London Society of Model Engineers held their exhibition in a different place this year. St. John's Hall, Friern Barnet Lane, Whetstone, N.20, may be a smaller one than last year but what it lacks in space it makes up for in novelty For instance, the locomotive track starts, station like, under cover but extends " out into the country," and from the track, passengers obtain a view of the model car race track. At night both were illuminated with electric lights. The great advantage of this system is that the steam enthusiasts with their internal-combustion-engine colleagues can both let themselves go without filling the main hall with smoke and fumes to the detriment of viewing the other models.

The kidney-shaped model car race track was very busy, never a dull moment. It is known as the " Silverwood Circuit " ; it is completely transportable and consists of four road tracks mounted on hardboard sections. Arranged effectively in the garden at the back of the hall with the smallest loop embracing the base of a large oak tree. This was 3 ft. higher than the opposite side. Cars started off slightly downhill, swept into the first left-hand bend and commenced to climb on leaving the second bend. The club has nearly completed an accurate lap and timing apparatus to cover the four tracks.

Returning to the hall, the locomotives claimed immediate attention. A very nice " Hielan' Lassie " by Mr. A. E. Walker was in steam and running on a stand, an interesting $3\frac{1}{2}$-in. gauge 2-6.0 + 0.6-4 articulated tender locomotive by Mr. H. E. White, which he appropriately calls *Arthropod*, won't be long before it is completed. On the track and kept very much at work was Mr. G. R. Wuidart's new free-lance steam locomotive which one might describe as a modernised G.N.R. Atlantic with outside valve gear. Built to 5-in. gauge and pressed to 80 lb. per sq. in., she has a drawbar pull of 40 lb. She simply played with trainloads of grown-ups, making steam so effectively that her driver had to leave the firehole door open to keep her quiet.

A one-man, electrically driven three-rail race car track was the work of Mr. A. E. Dowell ; each car was controlled by a simple push-button switch, so that three people could each race a car. The whole track was made up on hardboard sections and could be fully assembled in about ten minutes. It would just about fill an ordinary living room. It was complete with pits and starting grid.

In one of the rooms off the main hall was the Boat Section. Most of the exhibits had been shown before but new work was in evidence showing this to be a keen section of the club. A very nice radio-controlled cabin cruiser *Sirius Star* with a water-cooled engine, and a coal-fired steam tug *Evelyn May* by Mr. F. W. Thomas, a club member. In the other room off the main hall were housed models of stationary engines working either by compressed air supplied by a horizontal engine adapted for the purpose or by independent coal-fired vertical boilers. In one corner was a lathe set up with a horizontal milling rig. In the main hall again a preview was obtained of the lap and time recording gear mentioned earlier. Also shown was the very accurate r.t.p. boat-timing apparatus. These two exhibits were among those in the Science and Research Section. The Aero Section was poorly represented and is but a shadow of its former self ; this is a pity, as not more than two years ago it was a very flourishing concern.

The " OO " gauge layout seems to get better and better each year. Several new locomotives were spotted and the control was notably smooth working. New scenic effects were noted including a model street, buses, cars, and an overbridge.

One thing your correspondent would like to congratulate the club on is the sensible provision of a centrally placed information desk where a club member was always in attendance and ready to answer all questions. For instance, if you wanted to know just where old "Bill Bloggs" model was or whether " Joe Soaks " was coming tonight, " Information " supplied the answer. New members were enrolled at the same place.

As usual, the mainstay of any M.E. society, the unsung heroines, the wives of members did a splendid job of supplying tea, ices, and refreshments at very modest prices. The notice over the canteen door met with amusement and approval, it read : " Strictly Canteen Staff Only. *Members* please note."

To sum up, if this year's N.L.S.M.E. exhibition was a little cramped for space it certainly was not for ideas and enthusiasm.—C.B.M.

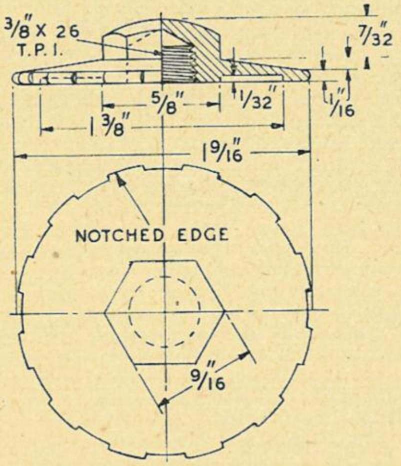
A Control Lever for the "Busy Bee"

by Edgar T. Westbury

THE cover plate may be made from an aluminium alloy casting, provided that the material is sound, but it will be better still if made from a hard alloy such as duralumin. An alternative form of construction would be to make this in the form of a light alloy washer, with a hexagonal hub of harder material, shouldered down and pressed tightly into its centre.

In either case, it is important that the tapped hole in the centre should be concentric, and square with the underside face, also that the thread should be well cut, to ensure the minimum risk of becoming stripped in use. Although not shown on the drawing, the end of the tapped hole may well be recessed or undercut, to relieve the tap when cutting the thread, and ensure that the cover will screw on the stud to the limit of the depth of the hole.

For the rest, it is only necessary to clean up the top face and mill or file the hexagon to a convenient spanner size. The notches in the edge of the disc may also be milled or filed,



COVER PLATE

1 OFF DURAL

but a still more convenient method, for workers with limited equipment, is to use a shaping process, using a parting tool on its side, in conjunction with indexing of the lathe mandrel. Twelve notches are shown on the drawing, but the exact number is immaterial; an alternative would be a coarse knurl on the edge, with a modified form of check spring to engage the serrations; but the locking action will not be quite so positive if this method is adopted.

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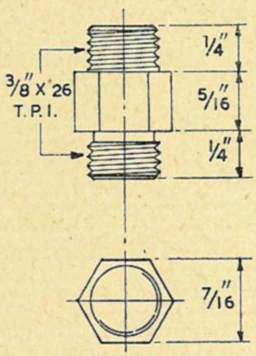
Centre Stud

It will be seen that this is specified as hexagonal over the major diameter; the object is not only to facilitate screwing it in, but also to ensure that it is locked against unscrewing by the keep plates. Obviously, a square or any other regular or irregular polygon would serve this purpose just as well, if the holes in the keep plates are made to suit. In specifying the sizes of hexagonal



CENTRE STUD

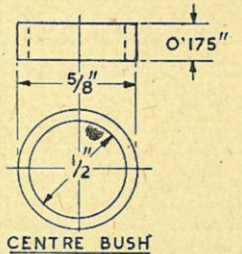
1 OFF M.S.

material, I generally state the nearest fractional size, and I am often reminded by readers that this does not correspond exactly to British Standards Specifications for hexagon bolts and nuts. My experience in buying hexagonal bars, however, is that they are more often than not odd sizes (none of the samples in my possession at present will fit standard spanners!) and one is generally very glad to be able to obtain any such material at all, without being so fastidious as to go around "miking up" any piece that is offered.

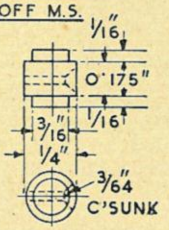
In the present case, it is clear that the exact size of the hexagon is of very little importance, but as the centre bush of the lever fits over the corners of the hexagon, this must be bored to the diagonal dimension of the latter. It is advisable, while the stud is set up for turning the lower threaded end, to check the concentricity of the hexagon by taking a light skim over the corners, just sufficient to show that the tool is touching them all. This will not impair the locking power of the hexagon, but will ensure that the bush is located concentric with the screwed stud.

The lower end of the stud has an undercut at the shoulder, to ensure that it will screw fully home in the body. While the stud is still set up for screwing, the body should be tried on, to make certain that the position of the hexagon is correct to engage the keep washers when fully tightened. Any necessary correction can be made by skimming back the shoulder slightly ; when the desired result is achieved, it may possibly be necessary to take a skim off the end of the stud to ensure that it does not project beyond the surface of the clamp seating of the body.

The concentricity of the screwed top end of the stud is not of vital importance, but should be reasonably true. My usual practice in making double-ended studs of this type is to neck down the reverse end to its specified size while still initially set up, before parting off. It is then



CENTRE BUSH
1 OFF M.S.



NIPPLE
2 OFF BRASS

reversed for screwing, and so long as it does not run badly out of truth, the die will follow it and produce a true thread.

Centre Bush

This can be turned and bored at one setting, the outside being a working fit in the bore of the lever, and the inside a push fit over the corners of the hexagonal stud. One could, of course, be "meticulous" and machine or file a hexagonal hole to fit the stud, but there is really no necessity for this at all in practice, and few constructors, I imagine, wish to spend time on operations which do not in any way improve the functional efficiency of the job. The length of the bush should be slightly less than the thickness of the lever at this point ; a decimal figure is given for this dimension to indicate that there is a definite difference ; but there is no need to work to fine limits, and the bush may simply be parted off with a keen tool to "minus $\frac{3}{16}$ in.", requiring little or no further machining.

Keep Plates

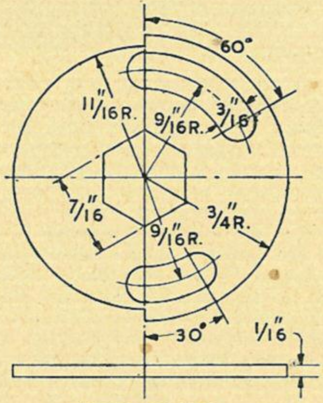
Apart from drilling, these require no machining, as it will be just as satisfactory to file them up from $\frac{1}{16}$ in. (or 16-gauge) sheet steel as to attempt to use any kind of machining process, except possibly turning the larger diameter portion of the edge, and boring the centre hole to the "across flats" dimension of the hexagon. After drilling a small hole in the centre, the two plates may be bolted together and dealt with as one piece for drilling and filing out the limit slots, and shaping the outer edge. Then, before removing the centre bolt, two smaller bolts through the limit slots may be used to preserve location while filing out the hexagonal centre, to fit the stud. It is rather unlikely that provision for more than one position of the stud will be necessary, but if desired, the hole could be made twelve-pointed (like the popular "star-angled-spanner") to ensure maximum adaptability. All burrs should be removed and the surfaces of the plates finished as truly flat as possible.

It will be noted that these two plates act like the discs of a multi-plate clutch, to produce a controlled amount of friction on the sides of the lever, under the pressure of the spring. They need not necessarily be of metal, and sometimes vulcanised fibre or other non-metallic plates are preferred. These certainly give a smoother frictional effect, but in my experience are liable to be influenced by climatic conditions, and may swell considerably in wet weather so as to produce a stiff or sticky action. Steel or bronze plates, with a little graphite grease or similar lubricant on them, have been found more consistently reliable in this respect.

Thrust Washer and Spring Washer

A thin plain washer, which may be made of steel or brass shim stock about 0.015 in. thick, is fitted on top of the upper keep plate. This is only necessary because the limit slots in the keep plate prevent the latter being used as a surface to take the thrust of the spring washer.

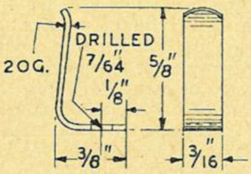
Any form of standard spring washer of con-



KEEP PLATE
2 OFF M.S.

venient size may be used in this control, but in some cases it may be necessary to modify the means of location in the cover plate, or provide a little more room between the latter and the thrust washer. The most convenient type of spring washer is one of the "saucer" type, which is very resilient, and takes up little end space. If a single washer of this type does not produce sufficient friction, two of them, both convex side up, may be used together.

In the event of no suitable washer being readily available, it is possible to make one from spring steel of about 20-gauge, such as an old joiner's scraper or handsaw blade, which should first be annealed, by heating to dull red and allowing to cool as slowly as possible, then filed or machined to shape, and then bent to a curve (in one plane) about $\frac{1}{8}$ in. high in the centre. It is then re-hardened by heating to redness and quenching out in water with a film of thin oil on the surface, and tempered to a dark blue by heating uniformly all over on a steel plate over a gas ring, or in a sand bath, and re-quenching. To assist in the latter operation, the washer should be scoured bright first, but as it will be very brittle after the first quenching it will need careful handling. Some samples of spring steel are supplied in a semi-hard condition, so that they can be worked without annealing and have sufficient elasticity to avoid the need for tempering ; but I regret that I cannot inform readers where to obtain this or any other suitable raw material, under present conditions of restricted supply.



CHECK SPRING
1 OFF SPRING STEEL

Check Spring

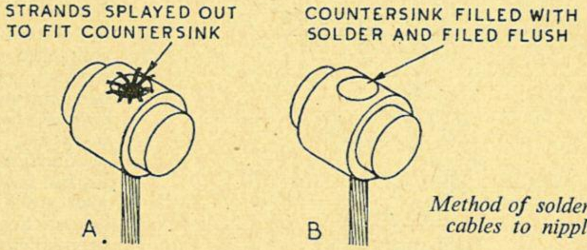
This may be made of the same material, and dealt with in the same way, as the spring washer. An ordinary hacksaw blade (not the flexible type) is wide enough to provide the material in this case ; it will, of course, have to be annealed and re-tempered as described above. It is attached to the underside of the body by a single 6-B.A. screw, and care should be taken to see that the latter does not project inside the body to foul the lower keep plate, unless a hole is drilled in the latter to clear it. The spring should snap into the notches of the cover plate, and hold it positively in any position of adjustment, requiring to be lifted by the finger nail if any readjustment of the cover is desired.

Nipples

Hard brass " screw rod " is suitable for these and they may be turned at one operation from $\frac{1}{4}$ in. diameter material, as the outside need not be touched. Note that the length of this portion again must be slightly less than the thickness of the lever. The cross hole should not be larger than is necessary to pass the Bowden cable freely through it, as the security of the soldered joint is much impaired if the solder is required to fill up a wide gap. Most of the commercially-made nipples I have encountered leave much to be desired in this respect. The hole should be deeply countersunk on one side and de-burred on the other.

Fitting Cables

In dealing with the description of the " Busy Bee " engine, I assumed that readers would be familiar with the method of fitting Bowden cables ; but it appears that this assumption was not entirely correct, as I have received many requests for advice on this matter. Incidentally, I have found that some motor-cycle repair fitters do not seem to know too much about it either, to judge by some of the jobs I have encountered, so I will describe the methods which I employ, and which may not be " accepted practice," but produce satisfactory results.



Method of soldering cables to nipples

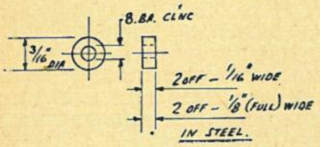
First of all, I thoroughly tin the holes in the nipples, by applying flux to them and heating up over a bunsen burner or spirit lamp. The use of combined flux and solder, in the form of " solder paint," such as Fryolux, very much simplifies this operation.

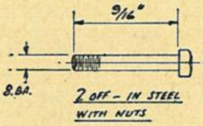
The cable is also well tinned before fitting, but this is best done with a soldering-bit, owing to the risk of overheating, and thereby drawing the temper, of some of the strands of the cable, if a flame is used. It is best to allow a little spare length of cable so that one does not have to work at the extreme end, as this is liable to fray out and interfere with compactness of the strands, but these should in any case be coalesced by soldering to assist in getting them through the nipple, and it may then be found necessary to file surplus solder away before the cable will pass through the hole.

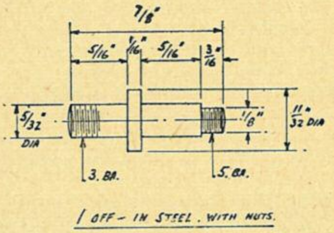
After threading the cable through the nipple as far as required—see that the cable is tinned at this point—it is gripped with a light pair of pliers or tongs (do not use your best pliers, as they may become softened by heating) so that the nipple rests on the jaws and is thereby located. The nipple is then heated, preferably by a blowpipe, to the fusion point of the solder, avoiding exposure of the cable to the flame, and if necessary adding just a little solder to fix it, but avoiding excess. Allow to cool, and cut off the cable about $\frac{1}{16}$ in. outside the nipple ; then with a small screwdriver or chisel, splay out the strands of cable to fill the countersink, as shown at *A* in the illustration. Using either a soldering-bit or a blowpipe, apply more solder to embed the strands firmly and fill any interstices, and after cooling off, file away projecting strands, flush with the surface of the nipple, as

(*Continued on page* 417)

required to extend said spring " X " inches, at normal atmospheric temperature and pressure, and so on. That department is three floors up, and I'm busy down here at the moment ; but if you really want to make a spring, all you need is some fairly fine spring wire, a stouter piece of wire or the shank of a small twist-drill on which to wind it, and a keen ear for music ; the latter accomplishment is useful the first time the spring gets away, and you want to hear where it lands. A lost spring has also been responsible, more than once, for a really thorough clear up in the workshop ; but that, of course, is the purely human angle and I will not pursue it further.







Come in, " Minor "

" Minor " has been in the news so much during this instalment, that we must not fail him now. When he comes to make the lever part, he may prefer to start off with a plain blade of $\frac{1}{8}$ in. material, and stick all the other parts on.

If he can guarantee to silver-solder *well*, he may be permitted to fit the handle portion on in this manner ; but nothing looks sillier than a handle that falls off at the first important locomotive meeting, so rather than face such a degrading debacle, he may have second thoughts and finish off the blade with a small portion of male thread to which he may screw the handle securely.

The other portions simply call out for building up with silver-soldered additions, with the bottom eye built up with turned bushes, " let in " to a larger hole, and the soldering metal run round the lot ; this is similar to the methods I have described before, for use on cranks with wide bosses.

Setting Up the Lever

The position for the lever is given, relative to the rear buffer beam, and its vertical position is shown on the drawing as level with the frame line at that point. It is necessary to make up a reach-rod—not shown on the drawing ; this is simply a strip of metal, $\frac{1}{8}$ in. thick if in ordinary mild-steel, and 3/32 in. thick if in stainless. The rod can taper from about $\frac{7}{16}$ in. wide at the lever end, to about $\frac{5}{16}$ in. at the crank end, and it will have to be set to pass the side of the firebox. This is not as difficult as it may seem ; all you have to do is to avoid the opening provided for the firebox (the space between the last two stretchers, in case you do not know by now) at *all positions of the lever.*

When making the sets in the reach-rod, keep these long, gentle and sweeping, within the limits and conditions as set forth above ; a rod treated in this way, looks better and is much stronger and stiffer than one having short sharp bends.

(*To be continued*)

A Control Lever for the " Busy Bee "

(*Continued from page* 408)

at *B*. These operations are quite easy with new cable, but on a repair job, it may not be found at all easy to get the solder to adhere properly to greasy or dirty cable ; however, this is most essential if the soldered joint is to be really secure.

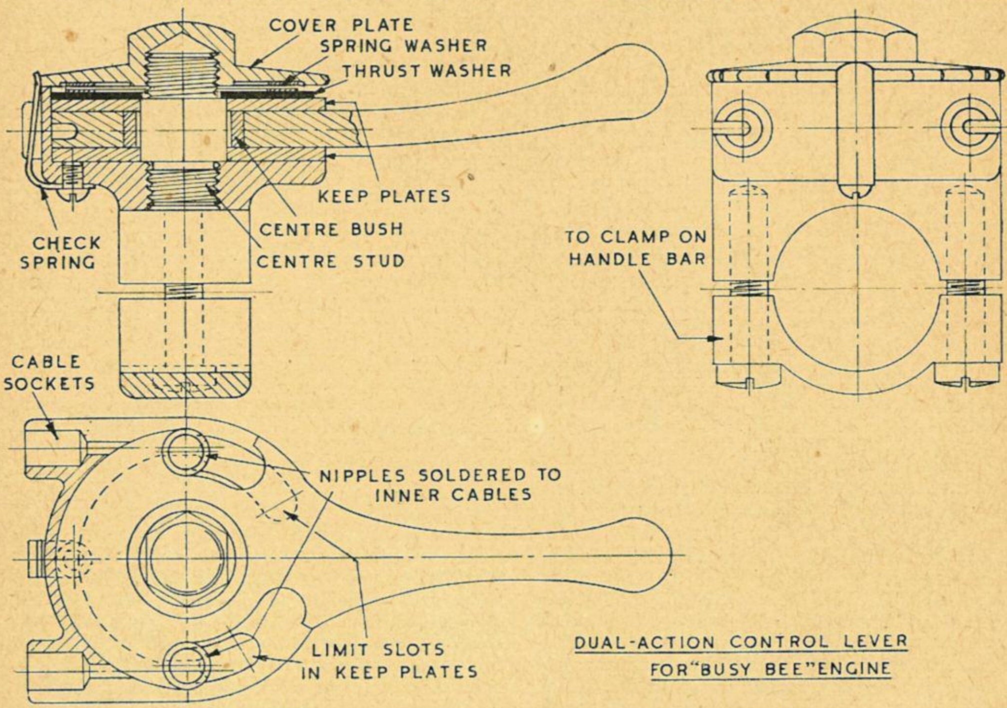
The cables should be attached at the engine end, that is, to the carburettor and decompressor, before attaching the nipples in the control lever. In the case of the carburettor nipple, this is necessarily very small, and in the form of a ferrule or bead. Sometimes this is made by winding a few turns of fine copper wire round the cable and soldering it into a solid knob, and this is quite satisfactory if properly done, but I prefer to make a solid nipple from brass rod and secure it as described.

After securing one end of each cable, the outer casings are threaded over them, with thimbles on the ends to protect them where fitted to the sockets. The amount of spare inner cable required at the control end, with the throttle and decompressor both closed, is measured, allowing for the thimbles to be seated in the sockets *at both ends*, and the control-end nipples can then be sweated on. The cable adjusters should, of course, be screwed right in, so that any subsequent stretch can be adjusted to the maximum extent. By removing the cover plate, spring washer, thrust washer and upper keep plate of the control, the nipples may be fitted in place and the parts reasssembled. The casings are then sprung into the sockets, and all that remains to be done is to adjust the cover plate to provide sufficient friction for comfortable and positive action of both controls.

A Control Lever for the "Busy Bee"

by Edgar T. Westbury

NEARLY all the modern engines applied to pedal cycles are controlled by a single handle-bar lever which actuates the Bowden cables of both the carburettor throttle and the decompressor valve, in alternate directions of movement. This arrangement is very convenient, and avoids complication of controls, an important asset from the aspect of the rider who is making his first venture with power drive, but the practical working-out of the idea often leaves something to be desired. In the attempt to lighten and cheapen the controls, they are often made over-flimsy, and liable to loosen on the handle-bar or lose their adjustment.



One realises, of course, that the makers of these devices must necessarily split hairs in their production methods, in order to keep within the price limits which must necessarily be the main justification for the very existence of cycle motors; but one feels that it would not be unreasonable to ask for at least a little more metal to be put into them. I have had the disconcerting experience of a narrowly-averted crash through failure of a control lever, which completely disintegrated with the engine going flat out, and approaching traffic. That was one time when I was profoundly thankful that the engine was a small one, and the cycle brakes had been kept in good condition! From discussions with other users of cycle motors, I understand that such emergencies are not as uncommon as they should be.

In the control lever illustrated here, I have, therefore, been at great pains to rectify what I believe to be the most serious deficiency in the commercially-produced control levers which I have encountered. Careful (some may possibly say over-elaborate) precautions have been taken to ensure mechanical reliability, both in the fixing of the lever, and the maintenance of its essential adjustments. But I believe that in the circumstances, these matters are of greater importance than they are on a motor-cycle, not only because one must rely upon a single engine control, but also because the vibration encountered with a powered pedal cycle is much worse than with a machine specially designed for power propulsion, by the provision of such refinements as large tyres and spring forks. Even on normal road surfaces, pedal cycles driven much in excess of 12 or 15 m.p.h. get a good shaking up, but when roads are bad, or one drives over cobbles or Continental "pavé," the effect on all mechanical fittings on the cycle must be experienced to be believed. I have seen lamp brackets, brake anchorages, and number plates fractured many times on "motor-assisted" cycles.