Continued from 28 April 1960, pager 509 to 51 I

Turn counter and tumbler reverse

THE pronged centre for use in the chuck may be found a great help when mounting coils. The design can be used for larger sizes than the one I have drawn, and a selection of these should be made to suit all requirements for different formers and coils.

Headless draw-bolts should also be made with one end shouldered

By—
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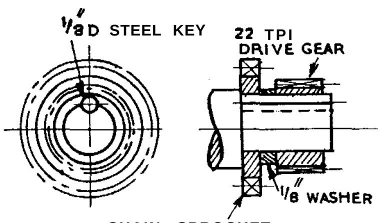
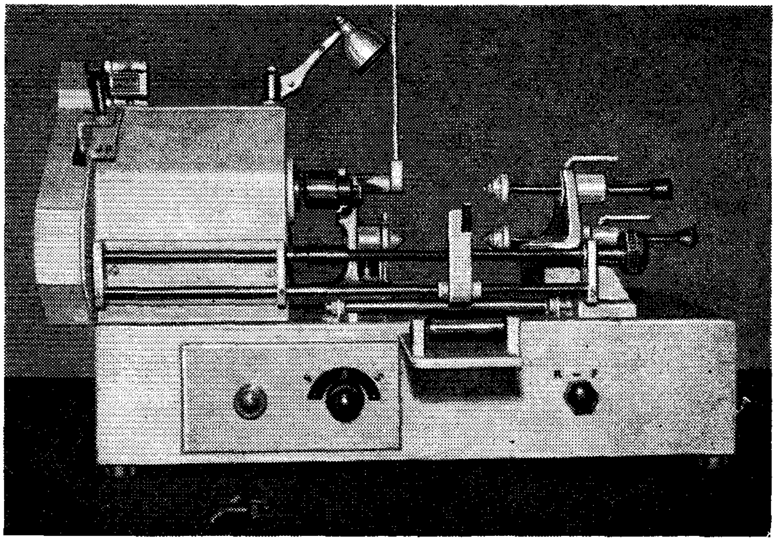
down to fit the'chuck, and the other end centred for the revolving tailstock centre. These will be useful for clamping formers of the type where the coils have to be taped up-field coils, for example.

The turn-counter on the machine is a Veeder type and should be mounted in such a position that it is in view when winding. The position shown need not be strictly adhered to. It depends on the type of counter used. The counter I used was in circuit with a piece of TV equipment. Its end cover was taken off, a few drops of light machine oil inserted. If the oil is overdone it will leak out or blur the figure glass. On no account must oil of a heavier grade be used, or the glass and *figures* will take on *a* brown film.

The need for oil was apparent, as the counter figure drums were made of aluminium, and in their present situation on the coilwinder, would now be revolving faster than they were intended to. I had the misfortune to run the counter at high speed and it duly seized up bone-dry. I stripped it down to examine it. The



KEYING GEAR & SPROCKET TO MANDREL.



trouble was, of course, the binding of one aluminium to the other.

It is of advantage to make the tumbler reverse at this stage to enable the gear plate and the reduction gears to be lined up with the tumbler-reverse lever, etc. The latter is a fabricated Job for which a piece of flat mild steel $1\frac{1}{2}$ in. x $\frac{1}{4}$ in. thick is required. Tt can then be held in the vice between protective soft metal and scribed to the dimensions indicated. The accurate position of the $\frac{3}{8}$ in. reamed hole in which the lever will eventually pivot, and the relative positions of the tumbler gears is most important.

Locating gear positions

The best way of getting this is as follows. The outline of the lever is first marked out, and the $\frac{3}{8}$ in. hole position, centre popped. The metal is then mounted on the faceplate with the lathe back-centre brought up as an aid to centre the $\frac{3}{8}$ in. hole position. Turn the tailstock handwheel just enough to grip the job, and lock the tailstock barrel. It will then be an easy job to clamp the work to the faceplate with clamps or bolts. Of course, a wobble centre is the accurate method for centring work of this nature. But in this case, if the position has been centre popped deeply, it will be accurate enough for the first hole to be dealt with.

When satisfied that the work is clamped tightly to the faceplate without distortion, mount the tailstock chuck and centre the work with a Slocombe drill, using a moderate speed. Open up with a pilot drill and follow with larger drills, up to a drill 23/64 in. Use new drills if possible, or drills that have been accurately ground. The hole can then be bored to finish or finished with a D-bit of $\frac{3}{8}$ in. Use a very slow speed, with oil. If bored, leave the slightest amount of metal to be finished with a $\frac{3}{8}$ in. reamer. A piece of #in. silver steel can be used as a guide when boring.

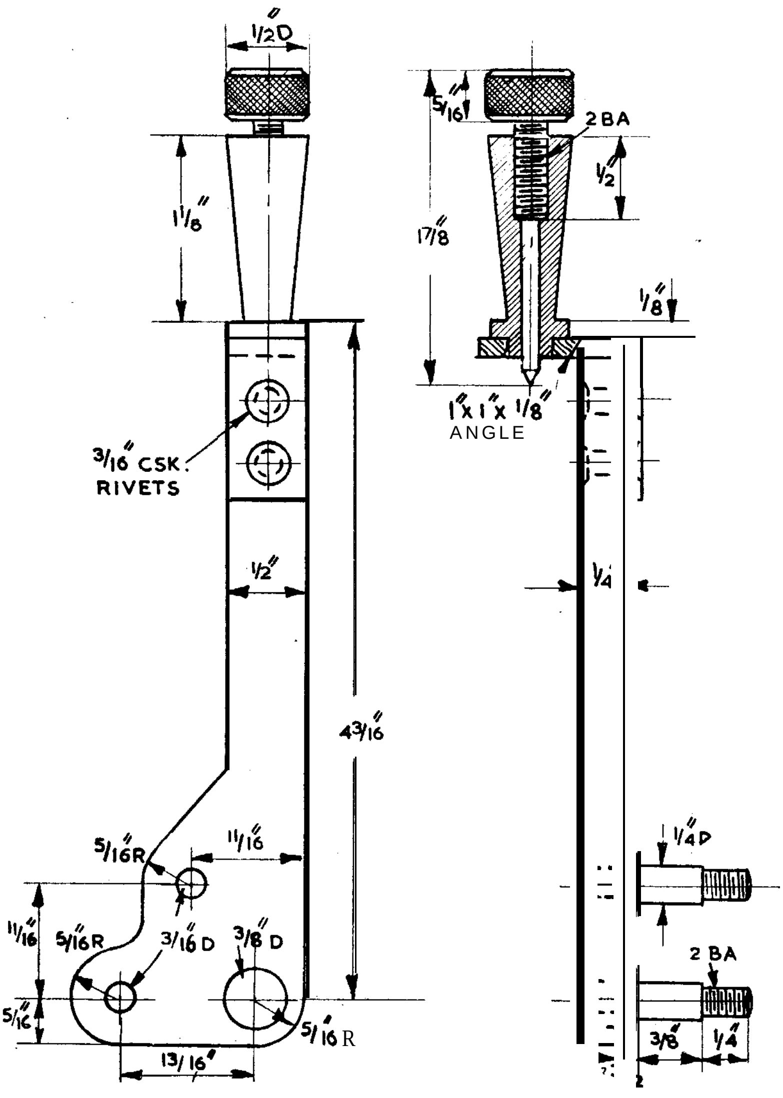
The work is now dismantled, and the three-jaw put to the lathe. A piece of $\frac{3}{8}$ in. silver steel is chucked accurate with a fin. projecting out of the chuck jaws, or a piece of round stock is turned down to $\frac{3}{8}$ in., and the end faced. The Slocombe drill is now used to lightly centre the stock. Now use an extremely sharp punch and tap a small indent &ad in the centre. This is to enable the dividers to be used.

The lever is now fitted to the chucked piece (be careful it is the right way round) and the dividers set to the gear centres. Using the cluster gears shown they will be set .to scribe a pitch circle of $\frac{13}{16}$ in. The first circle to be scribed will be the uppermost gear position from the lever pivot centre. The lever is removed from the lathe (leaving the chucked piece in position for the moment) and put on a flat surface for centre-punching the position of the uppermost gear. This is done by scribing a line from left to right of the lever at a height 1 in. from the bottom of the lever. This should now be an accurate base line to work from, as also should be the right-angle side of the lever line. When this is found by the intersection of the lines, it should be centre punched accurately and the dividers as previously set, used to scribe a circle from this position to the lower gear position. When this semi-circle has been scribed, the dividers are opened up an extra $\frac{1}{8}$ in. from the last measurement, making a **tota** of $\frac{15}{16}$ in. pitch circle.

The lever is once more placed on the mandrel in the chuck, and one leg of the dividers again pivoted in the lever pivot centre or mandrel, and a circle scribed for the lower gear position. Remove the lever for punching this centre, as before. With the increase of the $\frac{1}{8}$ in. set to the original measurement of gear centres, the lower gear will be out-of-mesh with the lever pivot gear, but still in mesh with the uppermost gear. The three gears will revolve freely, and in mesh with each other when mounted, at these positions.

If larger gears are used,. the tumbler lever will have to be increased in length to obtain leverage for changing gear. The bulkiness would become intolerable at these scales. The gear spigots should be now made for the tumbler cluster. First, if the gears were ma& in the workshop, their bores will be correct to the measurements shown. If ready-made gears were used, their bores will need be opened up. To get over this, a piece of round stock of larger diameter should be chucked centrally in the four-jaw or the three-jaw, if it will take it. This should be bored out to take the gear or gears, a slight push-fit.

While the gear to be opened up is tried in position within this bore, it will be found easier to withdraw it if a headed screw is put in the bore first. When a push-fit is obtained, the gear can be locked in position with a suitable BA screw, and the hole tapped in the side of the bore. Drill and tap this while the material is in the chuck, taking the gear out, of course. If it is &sired to take the stock out of the lathe for drilling and tapping, its position in the chuck will have to be marked, and the No 1 jaw position " popped " on the stock also. Remember the jaw that was tightened in the first place, and use this to re-tighten on replacement. Insert the gear and drive home the locking-screw. The gear should then revolve truly in the lathe.

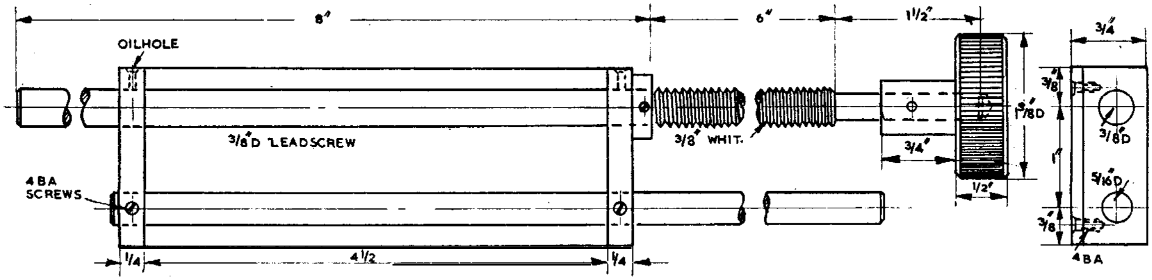


TUMBLER REVERSE LEVER HANDLE & LOCK

Testing gear mesh

With the gears and spigots ready, try for engagement first before fixing permanently. There should be some slackness between gears, but it should not be a sloppy fit. It should be possible to pass a piece of newspaper through the revolving gears without it being chewed-up. If the gears are found to be out of mesh or too tightly meshed, they can be corrected as follows. It will first be necessary to elongate the spigot holes of the two gears in the lever and *not* the $\frac{3}{8}$ in. hole. They can be elongated away from the trouble side with a small rat-tail file while the lever is in the vice, but don't overdo it. The two fin. spigots will have to be chucked in turn in the three-jaw, and their ends turned down to $\frac{3}{16}$ in. at the rear, and threaded 2 BA for a nut and washer. It will then be an easy job to align the gears.

If the nut method has been used for the clamping of the spigots, the lever spigot will have to be extended out and away a similar amount from the gear-plate to clear the swing of the nuts, etc., so take this into account when making the $\frac{3}{8}$ in. lever spigot. The latter is a slide fit in its position on the gear-plate, and the rear end of it is riveted behind the plate which is countersunk as well, so that it can be seated flush on the end of the head-



LEADSCREW & BRACKET

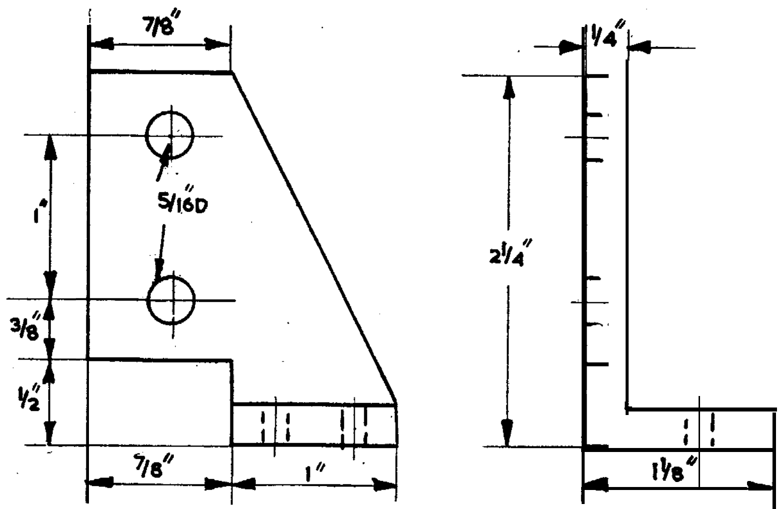
stock. To enable the gear plate and its associated tumbler-reverse to be meshed with the mandrel 22 tooth gear, the gear plate has elongated **fixing** holes on two holes only. The remainder of the fixing holes are spotted through to the headstock after alignment of the gear plate, and correct meshing of the gears.

The gear plate should next be made, and the tumbler reverse lever and its spigot fixed. The marking out of the intermediate gears can be left for the moment, and the plate as assembled temporarily **fixed** to the headstock with two screws. Use the elongated holes and mesh the gears by putting the lever to first, forward, and then reverse positions. The lever, when at the centre position of the **gear-**plate quadrant, should be in a neutral position, of course. Do not yet spot the holes for the lever in the quadrant. Before doing this, it is advisable first to settle the total gear positions. T'he way to do this is to make the **lead-**screw and its brackets, and the **guide-**bar or rod. The tumbler lever handle. and the selection locking-screw are shown in the sketches which are **self-**explanatory.

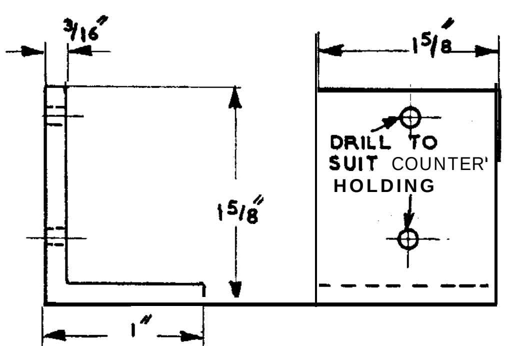
The material for the leadscrew is a length of #in. mild steel, which is chucked in the three-jaw to run truly. It is screwed #in. Whitworth for a length of 7½ in. from one end. The last 5/16 in. dia. is turned down on completing the thread. With the gear ratio specified, a reduction of the order of 3 : 1 is present at the **lead-**screw. This advances the carriage about 20 thou for each revolution of the mandrel. On trial on the completed machine, this advancement of the carriage' enables a number of the different gauges of wire — between 23 and 28 gauge to be used. It was considered a good enough ratio for the normal s.w.g. wire used within this range, and no provision was made for the interchanging of extra **step-**up, or step-down gears, between the leadscrew and mandrel.

It is quite possible to make and fit a gear-quadrant that can be swung into and out of position, as in the average 3½ in. lathes for the changing of the intermediate gearing, and so increase or decrease the advancement of the carriage. Below 23 s.w.g., the wire would probably be wound or guided on by hand, and the machine would do the winding under its own power. The effect would be the same with the higher gauges also.

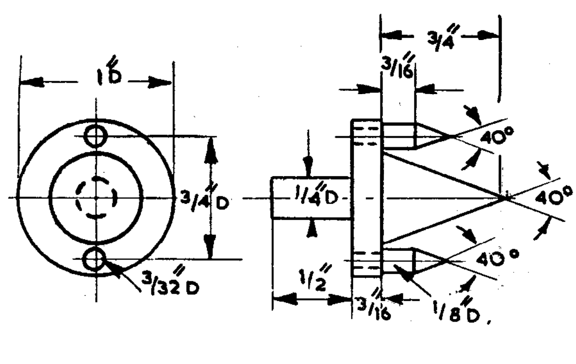
★ *To be concluded on May 26*



LEADSCREW END BRACKET



TURN COUNTER BRKT.



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