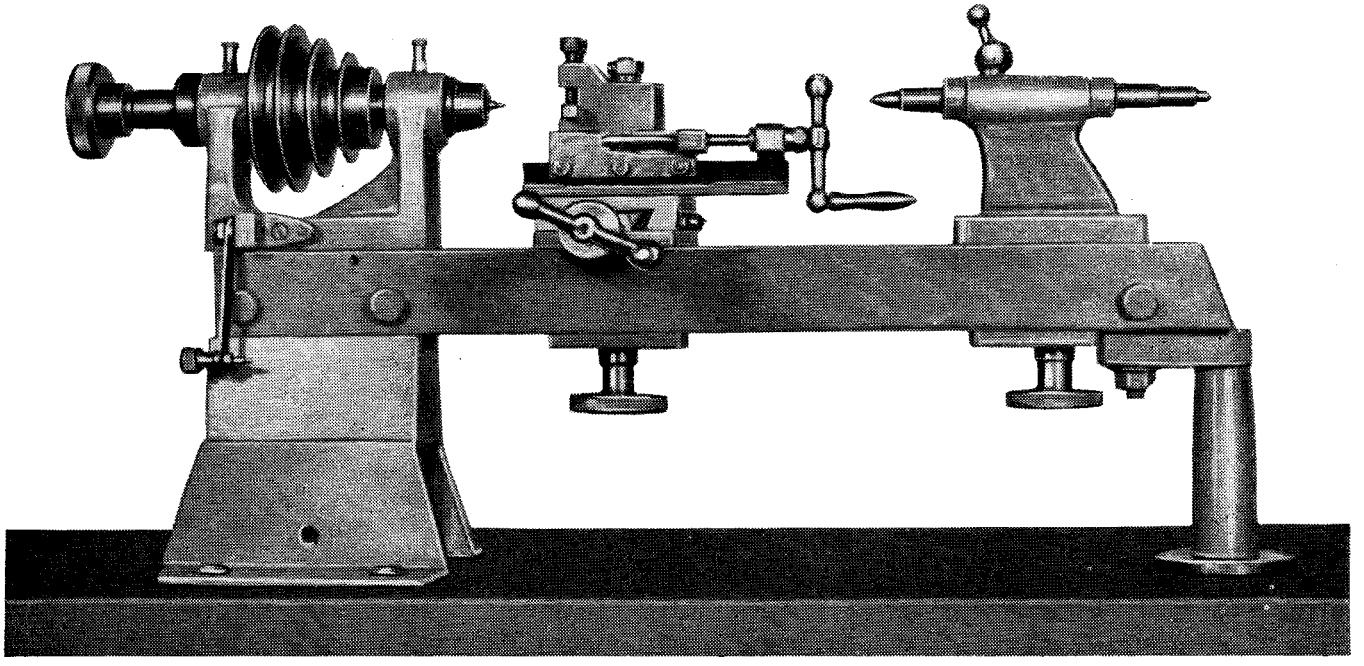


A LATHE YOU CAN BUILD

John K. Mold finds it a useful adjunct to his Myford

THIS small lathe was made to facilitate the making of small components for clocks and other instruments, for which it has seen some years of service. When, however, I turned my attention to model making I found it an excellent adjunct to my Myford and for this reason think it may be of interest to other readers.

The design was governed partly by the requirement that the cost had to be as low as possible and so all sorts of oddments from the scrap box were pressed into use. Castings were, however, obtained for the headstock and tailstock.

The principal dimensions are as follows : —

Overall length	17 in.
Overall height	8-1/4 in.
Centre height	2-1/16 in.
Distance between centres	5-1/2 in.
Maximum collect capacity	1/4 in.
Cross-slide travel	1-3/4 in.
Top-slide travel	1-3/8 in.
Driving belt	Round leather
Spindle bearings	Split parrallel
Spindle nose bored for Crawford collets	Type No, 2807

Before I describe in detail how to construct the lathe it would be well if I mention, first, some of the main features of the design and add a note about the drawings. They are complete in all essentials, except that I have not given details of items like screws, bolts and washers because these are standard items and do not need description. Where a dimension is given in decimals it merely emphasises that a good fit or other desirable feature is to be aimed at and that failure to conform to the sizes given will not be disastrous ! There is no reason either, why an alteration to the design should not be made by the constructor if it pleases him, but I would point out that the drawings represent a machine which has a comfortable "feel" about it and is free from some of the irritating features which have existed in other small lathes that I have made.

The bed consists of two lengths of steel bar separated at each end by a distance piece. The essential guiding surfaces are narrow and it is not difficult to file and scrape them flat and true. The headstock is a simple iron casting with the spindle running direct in it. Adjustment of the bearing is provided for. As is usual in this type of lathe, the spindle nose is designed to take chucks.

The tailstock is also simple and no provision is made for mechanical feed to the barrel (or" runner" as the clockmaker would call it) nor is one necessary. The fourth major assembly is the compound slide rest and while this may appear to be a distinctly tricky piece of work it is simple enough if correct setting procedures are adopted. I will deal with this later in detail.

The bed

The general arrangement is shown in the drawing. The assembly comprises front and rear members (1) and (2) together with distance pieces (3) and (4), the whole being held together with close-fitting bolts (5). Take two pieces of bright mild steel 1-1/4 in. x 3/8 in. and if possible select them for straightness. If they are not perfectly straight, leave them as they are and do not try to improve them by using a hammer- unless you are skilled at this kind of thing.

Square up the ends with a file and remove all sharp edges and burrs, then mark out and drill three 19/64 in. holes on one piece only. The holes must be square with the broad surface of the material; you will court trouble if you hold the metal on any old bit of wood packing that happens to be on the

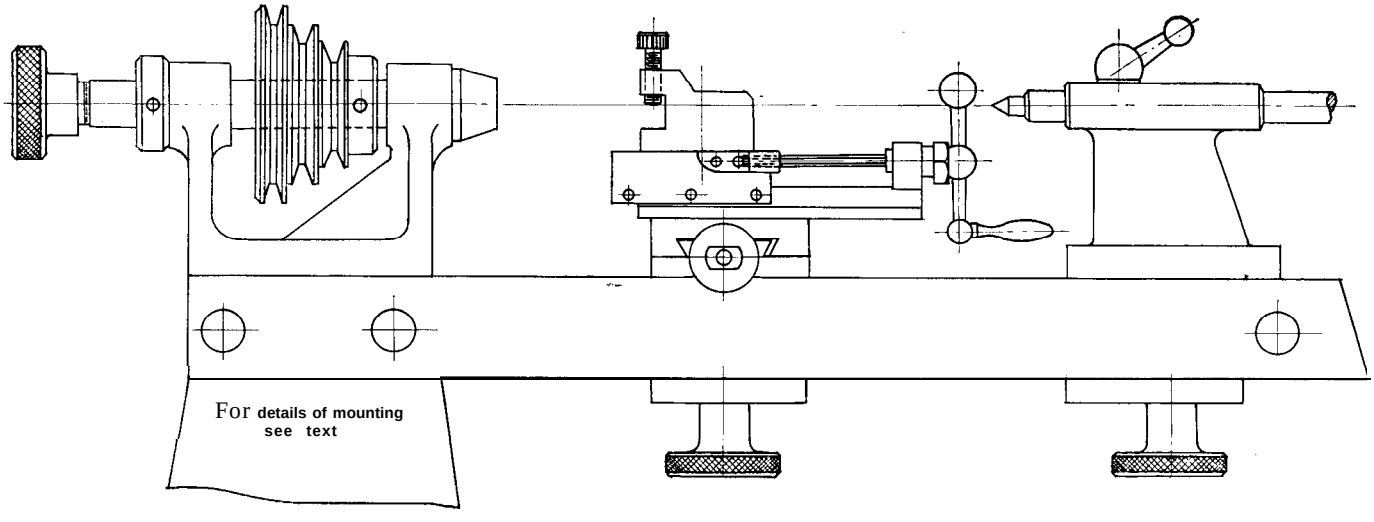
drilling machine table. Clamp the work down to the table and if packing is needed, employ pieces of bright mild steel which are reasonably flat and true.

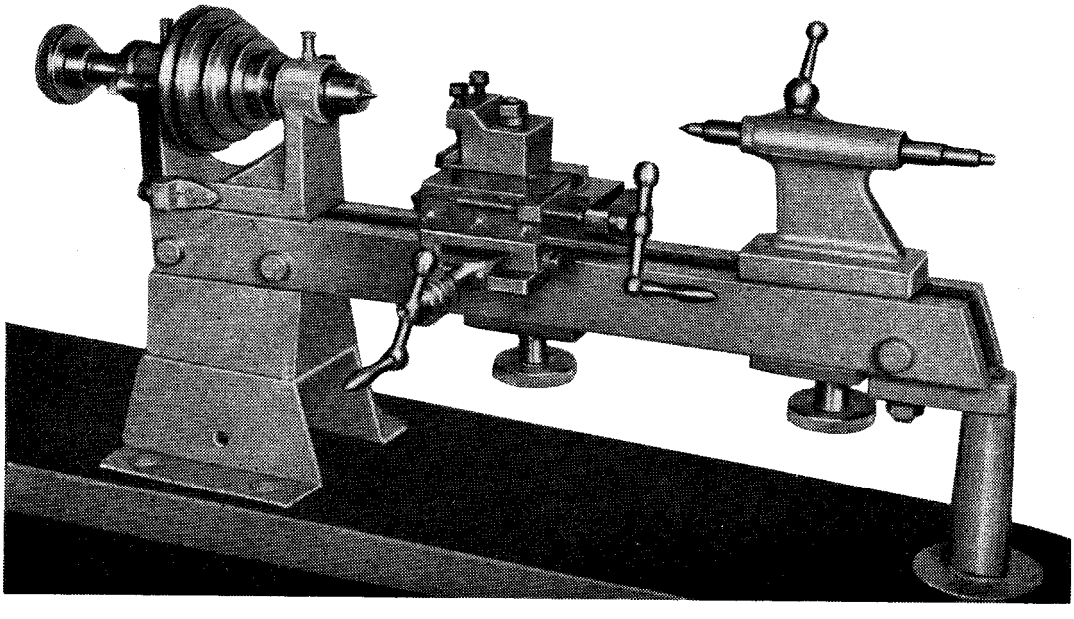
The shaded area in the drawing must now be milled to reduce the metal 5/16 in. in thickness. A vertical milling machine would make light work of this, but I had to use a vertical slide on the Myford, removing the metal with a 1/2 in. end mill. In this way, of course, only a limited area can be covered at one setting but accuracy is only necessary in the region of the right-hand bolt hole where the small distance piece (item 4) is fitted. For this reason set the vertical slide carefully for this operation so that the milled surface will be parallel with the outer or unmachined one. Be careful also to mill the metal away so that a right- and left-hand component is produced.

Next prepare the two steel blocks (3) and (4) but do not at this stage drill any of the holes, although you should dot-punch the position of the 17/64 in. holes in item (3). Assembly now follows. Place the front and rear members on a surface plate (or the bed of a larger lathe would serve very well) so that they stand upright with the distance pieces in between and in their correct positions. Fix all together with toolmakers' cramps and examine the result.

The long narrow surfaces Y should be reasonably parallel at this stage and they may be tested by sliding a 9/16 in. dia. steel bar in between them when any slackness can be measured with a feeler gauge or a piece of paper. If the bar will not go in at all, reduce its diameter in the lathe until it will. A maximum deviation from parallelism of about 1/64 in. is acceptable at this stage. Finally check once again that the top surfaces X bed down reasonably well on the surface plate and again test with a feeler gauge. If the error is more than 0.010 in. improve it by releasing the cramps and filing a little off the distance pieces.

It is worth while to take some care to get the assembly within the limits I have specified at this stage since it will save time later on. When everything is correct make a final check to see that the cramps are tight and then, using the drilled member as a jig, drill one hole only right through the assembly at the headstock end. Ream it 5/16 in. and make a bolt (item 5) a light drive fit in this hole, assemble, and

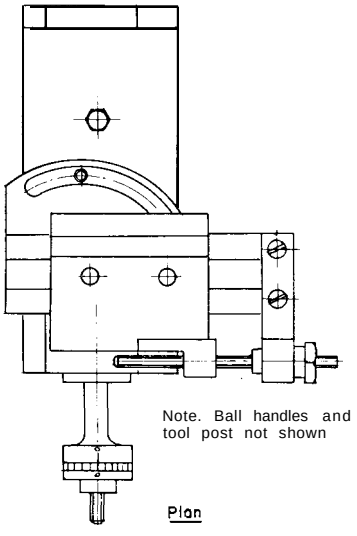




The photographs for this article were taken by Mr R. Latham and Mr R. E. Foster

tighten up. The second hole at the tailstock end can be attended to and finally the remaining hole at the headstock end.

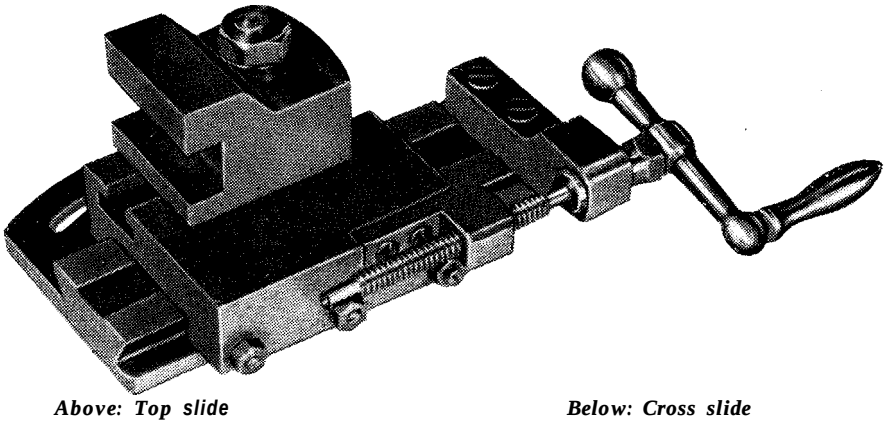
The bed can now be treated as a single component and truing of the upper ways X can be carried out by filing and scraping. To do this a surface plate is desirable but not essential. My plate was not large enough and so I used the bed of the ML7. Thick plate glass is easily obtainable and it makes an excellent surface plate. Whatever is used, smear the surface with engineer's marking blue and stand the bed on it and slide it about. Examination will show that it has been in contact with the true surface in, say, two places only. Often these are diagonally opposite. If the test shows that your bed touches in five or six places



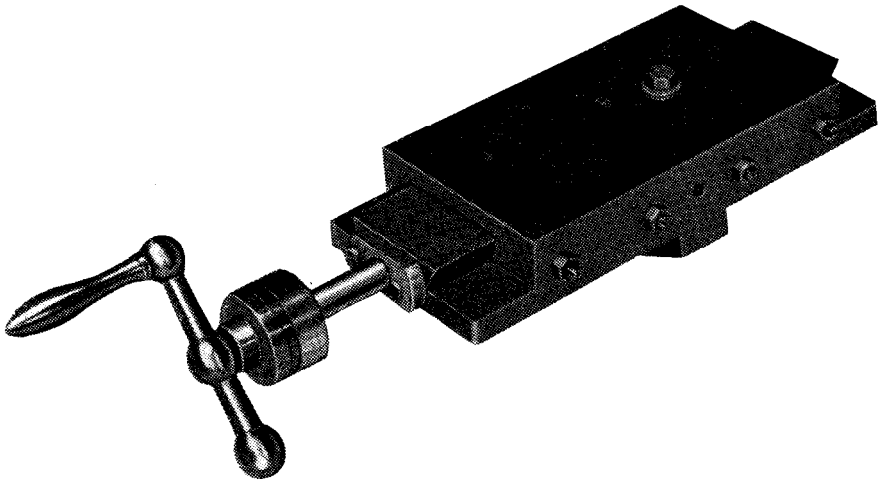
you are doing very well indeed.

Carefully draw-file the offending places and when you have got it as true as possible discard the file and use a scraper. In case you have never scraped a surface before, I venture to offer some advice. In the first place read up the subject. Then experiment on a block of iron or steel about 1-1/2 in. long x3/4 in. wide. If you feel that you are not making much progress, the most probable reason is that the scraper is not sharp. Do not, for example, expect a newly-purchased scraper to be sharp. It must be sharpened on an oilstone not only when first received but frequently during use.

Take care, also, in holding the work in the vice. Grip it where it is rigid and only hold it with as little pressure as possible and where it is convenient. It will be time to stop scraping when you find the blue marking showing



Above: Top slide



Below: Cross slide

up as more or less evenly distributed patches all over the surface. Examine your work at this stage. If you smear the surface plate with a single drop of lubricating oil and place the bed on it you may find that there is a marked suction effect between the surfaces. You should be pleased with this for whereas most of the work we do is rarely as accurate as we believe it to be, your flat surface is " flatter" than you thought it was.

The inner surfaces Y must now be taken in hand but of course you cannot rub them on the surface plate. Instead, scrape one of the narrow faces on an 8 in. length of 3/4 in. square steel until it is flat and use this as a long narrow reference surface, smearing it as before with marking blue and sliding it along the rear, inner face Y. Get this straight and flat before attending to the inner front surface. A triangular scraper will reach in the confined space, for the work will not be as accessible as in your previous attempts.. The inner front face must not only be straight and flat but parallel with its neighbour at the rear. A preliminary check with a small block of steel filed to fit closely tween them will soon tell you where to remove metal and from now on correction must be made on the front face only.

The remaining work on the bed consists of drilling and sawing in accordance with the drawing.

With the bed finished we should consider ways of mounting it on the bench but I have not shown drawings of this since my method was to press into service an old welded fitting of obscure origin and other bits and pieces all of which can be seen in the photograph. The appearance of these mountings is poor, and I leave the constructor to attend to this himself.

The truth is that a nicely shaped casting to go under the headstock would involve some pattern making and the casting would be relatively costly for one-off. Readers who are expert in woodworking will no doubt readily think of a suitable mounting.

(To be continued)

This instalment must be read in conjunction with the next one to appear in which the key references will be shown.