HOW TO MAKE AN ECCENTRIC CHUCK.

(Concluded from page 215.)

As the work has already been levelled underneath, be sure that the bottom of the chuck is quite level, and that the casting rests perfectly upon it. Turn it up, and now drill for the pin, and also turn a little recess in the end of the screw, to take a washer and screw (as shown in the drawing, Fig. 3), the pin being squared for $\frac{1}{10}$ in., and also drilled and tapped for a screw, which will hold this part firmly in its place upon the eccentric slide. If the screw upon the nose of the chuck and mandril is $\frac{3}{4}$in. diameter, with the usual coarse thread, the centre pin can be made $\frac{1}{4}$in. diameter, or nearly so, which will give a very firm bearing to the division or click-wheel, and stand the strain of turning up wood upon the chuck without fear of its bending or yielding in any way—a matter essential, but not always attended to.

The main parts of the chuck, being now complete, should be put together, mounted on the mandril, and finally connected wherever necessary. The chasing of the nose should be done, or at all events finished when the slide is in place, though it may be begun at a previous stage. I have presupposed hand-work throughout, and, therefore, hand chasing; but if a traversing mandril is on the lathe, all risk of a drunken thread is, of course, avoided, as it is also if Cooke and Sons' excellent contrivance for originating screws is at hand. We now have to make and fit the leading screw, divide the chuck-wheel, and fit it with either click-stop or tangent-screw. The first may be $\frac{2}{10}$ to $\frac{1}{4}$ diameter in the screwed part, which will lie in a groove or channel in the lower plate. This may be filed out or it may be cast in the plate at first. Here, as in other parts, is room for variety, the screw and slide being differently arranged by different makers. If the casting is like the drawing, there need be no apprehension of weakening the lower plate by cutting a channel, a great part of which will be opposite its thickest part, and it might even penetrate the plate without material harm. The screw is made with a squared end for the winch-handle, beyond which is a round part, and next a shoulder or flange, which lies beneath a little steel plate attached by screws, the brass being recessed to receive it. A nut is screwed firmly into the under side of the sliding-plate, through which the leading screw passes stiffly; and this nut of brass should be sawn across on the lower side to cause it to spring, and thus grasp the screw, that it may work easily yet stiffly, with as little back lash as possible. Observe the slide moves away from the winch-handle, so that it does not come in its way as its eccentricity is increased. By mounting the slide and screw in this way, both can be readily removed for oiling, cleaning, &c., it being only necessary to take off the small steel plate which retains the head of the leading screw. The slide with this attached to it by the nut can then be pulled straight out, and it can be replaced and secured in a few seconds. This mode of connection may be reversed if preferred, the nut being screwed into the bottom plate, and the screw held by a plate attached to the slide. In this case, when the latter is removed the screw will remain in its nut, and the slide will pull out by itself. As the slide carries the screw, the eccentricity of the latter must take place in the direction of the winch-handle. The distance to which the slide can be thrown out depends on the position of the nut, as this, by coming in contact with the end of the recess in which the screw lies, in the lower plate, prevents further movement; and it is generally so arranged that when this nut is stopped by the head of the screw in the other direction, the nose of the chuck shall be concentric, and in one line with that of the mandril, in which position the holes for the steel pins previously mentioned will be opposite those in the foundation plate. The chuck will then have no eccentricity, and can (and generally must) be used to put the final touch of the chisel upon the work to be decorated. In no other way can it be made to run absolutely true when shifted from the mandril screw to that of the chuck, although one is a counterpart of the other. The leading screw should have 10 threads to the inch, and its head should be marked with 10 lines, numbers being engraved at every second line, which should be twice as long as the intermediate ones—$\frac{1}{100}$th of an inch can thus be obtained—a small pointer of steel, or a mere line on the end of the chuck, serving as an index point. The marked head of the screw is of brass, and, having a milled head, suffices instead of the winch for moving the slide through small distances. But when several turns are needed, the little winch-handle will be found far more convenient. In addition to the divisions upon the screw-head, an inch should be marked in tenths, on the slide itself, with an index-line on the face of the steel guide-bar adjacent to it. Unless the reader is well up to his work, with the necessary means, also of reliable quality, at hand, I should recommend him to have his leading screw cut for him and divided, and also the click-wheel. Indeed, he *must* have it done, unless he has a dividing plate, and some kind of wheel-cutting engine, either attached to the lathe or otherwise. In London, and in many provincial towns, there will be no difficulty in this, and the cost will not be great. If, however, he determines to do this for himself, he shoul consult "J. K. P's" excellent directions in the ENGLISH MECHANIC, (Vols XII, p 277, XIII, 113, XI., p. 12,) and I might say *passim*, for "J. K. P." has given full details of this work, and also of racking for a tangent screw, far better than I could do, even if had time, which at present I have not. But when I say that wooden clocks have been made to keep good time, the wheels of which were cut with a saw and narrow chisel, which fact I vouch for, the division of a chuck wheel can scarcely be called an *insurmountable* difficulty, even without slide-rest and revolving cutters, and if the lathe pulley is divided it can *certainly* be done by hand. But far better is the plan recommended, to go to a clock or lathe maker, and get it done well. The tangent screw and wheel is by many preferred to the click wheel, but is not much better in reality, and more difficult to make, and I am writing for such as are compelled to do as well as they can with the simple appliances of an ordinary workshop. The catch is a simple affair, kept down by a spring, and needs no detailed description. The dividing wheel should have 96 teeth at least, which is the usual practice, but if the wheel is racked instead, the face may be also divided into 100, every five such divisions being marked. I decidedly prefer a large-sized wheel, reaching to the edge of the chuck, or nearly so. If the screws on the guiding-slips are countersunk this is easily arranged; if not, the wheel can be fitted to stand a little off the plate below it. The adjusting screws to tighten the guides are inserted in the edge of the lower plate, their heads being generally recessed to enable them to press the guide bars. This recessing is done with a pin-drill or counter-sink, like Fig. 9—a very useful tool, and one easily made. The hole is first drilled, then countersunk to form the recess, and then tapped. The different parts of the chuck in the drawings are lettered as follows:—

Fig. 1.—Chuck complete, showing A, dividing wheel; B, a shoulder or raised part on the sliding plate, seen again at D in Fig. 2, to keep the chuck a little off the slide—it is not essential; C, the screwed nose of the chuck, kept in place by the screw D in the centre; E, F, guide bars of steel, G, sliding plate, shown as thrown out by the action of the screw N, H, pressure screws acting on the guide bars; K, the sliding plate seen edgewise to show the chamfers, M, brass movable head of screw, graduated; N, leading screw; O, small steel plate, to retain screw head in its place; P, catch, kept up by spring Q, which is attached by screw R.

Fig. 2.—Profile of chuck, showing A, the squared end of screw; B, its movable head; C, divided part of the same; D, dividing wheel; F, catch; G, G, pressure screws; H, steel pointer, used when divisions are marked on a second circle.

Fig. 3.—This is given merely to show the countersunk recesses in the lower plate for the heads of the pressure screws, B, one of the steel strips which the heads of these screws overlap, as shown.

Fig 4.—A, leading screw; B, its nut, shown again at C, D, E and F. F, show how the steel plate is recessed to take and retain the head of the leading screw; this plate is recessed or let into the end of lower plate held by small screws at F, F.

Fig 5.—A movable head of screw B; section C, plan of the same.

Fig. 6.—A pin on which dividing plate turns, squared to take B, a thin washer, and also drilled in the centre for the screw C.

Fig. 7 is a cross section; B, being the foundation plate, D, the guide slips; E, the tightening screws; the central pin H is here clearly seen; F is the click wheel, recessed below to fit over the turned boss on the sliding plate, O; C is the head of the leading screw; L is part of the wheel, E, slightly raised upon its surface, K is the screw to hold the wheel and nozzle to the sliding plate.