TOOLS
by drilling and filing

By GEOMETER

AN experienced model engineer, like a good cook, is a practical person who can often produce acceptable results from odds and ends with few tools. Both may work with equipment which is far from ideal.

Until a generation ago, cooks got magnificent results with primitive ovens. Model engineers performed splendid work on elementary lathes. The principle holds today, for it is results that matter in a workshop, as in a kitchen. In some hands_, a fork is as good as an electric whisk, just as in others files and scrapers will do some of the work of machine tools.

Recognition of these age-old principles should encourage newcomers; for there are many small tools whose making requires only stock materials and standard screws and bolts,. and the few tools that a beginner possesses for drilling, sawing and filing. The sketches show some examples of tools that can be made with this limited equipment- although for some operations a lathe would normally be used.

The first example, shown at A, is a substitute for a toolmaker's clamp. This clamp is one of the basic tools of a workshop, and is often made as an exercise in technique. In the standard type, there are holes to tap and threads to cut. The heads of the screws are knurled.

In the substitute, these operations are avoided by the drilling of clearance holes and the use of standard screws and nuts. As shown, you drill two clearance holes for the screws in the bottom piece of square bar, and one clearance hole and a dimple in the top piece. If you wish, the ends of the jaws can be hacksawed and filed at an angle. You tighten the clamp with a spanner on the nuts.

Diagram B shows clamps that can be used for light work of uniform thickness. Work of this sort often calls for several clamps; besides being large and heavy, toolmakers' clamps are usually too few in number. For the clamp at Bl, you bend a piece of rectangular steel at right-angles and drill it with the flat piece for the screw and nut. For the clamp at B2, you turn the material U-shape and drill it. This clamp should be squeezed in the that it has to be opened by pnsmg with a screwdriver to slip on the work. Then there is reduced strain on the screw. The clamp at B3 is made from thick rectangular material, drilled for springiness and slit with a hacksaw. The jaws can be smoothed with a thin file.

The tap wrench shown at C is a favourite with some toolmakers. I know professional turners whose preference in lathe carriers is for the type illustrated. Both these tools can be made from square mild steel bar, even by novices. You should clamp the pieces for drilling to keep the holes in line. File matching Vs in the pieces for the tap wrench to locate and grip the tap by two corners of its square. Use a round file to produce shallow radii for work held in the carrier. You can turn each of the handles of the tap wrench in a lathe by holding one end in a four-jaw chuck with the other end centred and supported by the tailstock centre .

With three pieces of flat steel 1/16 in. or 3/32in. thick, you can make a gauge, as at ***D,*** for checking the angle of lips on a twist drill, to be certain that both are the same. Two pieces are used for the stock and one piece is used for the blade. The stock is spaced by a washer at the opposite end. You can set the blade to a good drill, and then scribe it from the stock, as a guide for resetting on subsequent occasions.

Sketch E shows two other easily-made small tools, a depth gauge and a V-block. You make the stock of the depth gauge from two pieces of flat material held by screws; the rod is gripped between them. The two thick pieces for the V-block are spaced by washers on two bolts.

A scribing block can be made as at F, with the base drilled for countersunk screws, on which the scribing bar is held by nuts. Make this bar from silver steel, hardened and tempered, or from mild steel, by bending it down and drilling, so that a sewing needle can be held by solder.