

# Some types of clamps

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**W**HETHER work is to be performed by hand or by machine, components or material have first to be suitably held, which generally involves some form of clamping. Hand work is well covered by bench vices, G-clamps, toolmaker's clamps, self-locking pliers, etc. Machine work can be mounted in chucks. To facilitate setting up, the majority of faceplates and angleplates have slots and holes right through, and cross-slide tables and vertical slides are T-slotted-in each case so that bolts can be used for simple clamps.

With these basic provisions, the speed and ease of setting up-and often to a great extent the enjoyment and satisfaction to be got from the job depend on an assortment of suitable clamps, packing pieces and washers, together with bolts and nuts-these last preferably of uniform size and free-running for easy manipulation. Subsidiary difficulties will then be at a minimum, and effort can be concentrated on the job in hand.

## Simple clamps

Simple clamps can easily be cut from bright rectangular bar, drilled centrally and used with bolts and packing pieces. The latter may similarly be from flat stock, supplemented where necessary by strips of thinner packing to build up a thickness at which the clamps will lie level. It is easy enough however, to cut bar stock-rectangular or round-and face it in the lathe, to have at hand packing pieces of required thickness. Attention to this point before starting to set up is often advisable and time-saving.

If a simple clamp has a screw at one or both ends, packing may be dispensed with, since within the limits of length of the reaction screw, the clamp can be set level. A case in point is the clamp often used for tools on the slide, though here use of a reaction screw largely at one position may severely indent the surface of the slide; and a piece of packing under the screw (dimpled by a drill), or a cup as at A on the screw, may be advisable.

In general, rather than bolts screwed for a limited distance, setscrews screwed their full length should be used with clamps. One never arrives simultaneously at the clamping position and-at the end of the thread; and over-long setscrews can easily be shortened.

Bolts may be needed for use in T-slots-the type with large Whitworth heads, which can be thinned by facing in the lathe, and filed on the sides to slip in the slots. Alternatively, countersunk screws may be used, as at B1 and 2, each put through a piece of drilled and countersunk plate and soldered or brazed to hold it. Such bolts give more distributed pressure than the ordinary headed type, and so cannot damage the slots.

As at B1, a small light clamp from flat stock may be bent at right angles, and so avoid the use of packing and the difficulties which might occur in setting up on a vertical face. Such material, too, may be bent right round to make a clamp of minimum bulk for thin parts like flanges, as at B3. For normal straight

clamps, a stepped packing block, as at C, is an alternative to various strip packing or a reaction screw. A small selection of such blocks can be turned in the odd hour from rectangular material, off-setting in the four-jaw independent chuck.

Round stock may be held by a simple clamp which will balance on two pieces, as at D, and accuracy in setting can be ensured using a V-base block for location. In large scale production, a special swinging and balancing clamp may hold several pieces, clamping from a single nut, as shown.

A block which is bored, then split and provided with a stud on the principle employed for holding a tailstock barrel, as at E, may be used for setting up and clamping round material. An alternative is a grooved cotter in a cross-hole, to pull on one side of the round material. An adaptation of this can be made, as on some tailstocks, as at F, where the round material is gripped between the shaped head of a bolt and the end of a sleeve.

