Clamping and holding

IN NUMEROUS operations-drilling, filing, assembling, etc.-clamping is advantageous even if not strictly necessary. It can free both hands for the operation, prevent movement where parts have to be kept in alignment, and save broken drills and damaged fingers where otherwise there would be a want of control, as on machine drills.

If components have to be heated, as in soldering, brazing and welding, clamping and careful aligning when cold are usually essential; and where there is a tendency to heating, as in grinding, it can be useful when components are too small to clamp them to something which is larger and easier to manipulate.

Two components which have to be filed (or planed if they are wood) can be held together in the vice to bring them to the same shape or outline; then, when convenient, portions can be left projecting from the vice jaws on which a clamp can be fitted when necessary to remove for examination. This obviates movement and the necessity for time-wasting re-alignment. Similarly, on long flexible parts, clamps and temporary stiffening pieces eliminate vibration.

In assembly work, where weight or awkwardness may have to be contended with, simple clamped stops, which may be no more than blocks or short pieces of angle iron, can act as rests or means of alignment until bolts or screws can be entered. Again, clamps admit of parts being temporarily set for alignment to be checked before vital holes are drilled.

Clamping devices

The common C-clamp or G-clamp, ***A,*** is made in various sizes and designs. Types which are no more than pieces of flat steel bent U-shape and fitted with a screw, may be used for light clamping-since under force they spring and open; and types in which the body is of cast iron can be broken, if they are small, by using too much pressure. Consequently, the best clamps of this type have reinforced bodies of steel or malleable cast iron.

Important factors in efficiency of such a clamp are straightness of screw and body-the screw turning without wobble centrally on to the jaw. A bent screw wobbles the clamp in tightening; and with malaligned screw and jaw the clamp tends to twist off.

For edge-grip clamping within their jaw opening (about 3/4 in.), self-locking or toggle action pliers are equally suitable as C-clamps and they are quicker and easier to use; and if the need is for a firm hold on flat material, without clamping, the most suitable tools are parallel-jaw pliers, ***B.***

For a firm well-regulated hold on metal, thin wood, etc., classic clamps are the toolmaker's pattern, C, these having a clamping screw and a support, or reaction screw, by means of which latter the jaws must be kept parallel in use. Toolmaker's vee-blocks, ***D,*** also have clamps for securing round material for checking, marking-off or drilling.

Work which would be marked by clamps or self-locking pliers can be protected by using smooth strip metal to distribute the pressure, with or without soft material like paper or cardboard.

Conversely, where there is a tendency for clamps or pliers to slip, particularly on metal, a firmer hold obtained using soft material-hardwood, or emery cloth folded abrasive outwards. Short sections broken off small worn-out files also prevent slip.

Edges or faces needing to be flush, alignment can be effected through a flat surface, like the slide of a vice or lathe bed, ***E*** and ***F,*** and should a step be necessary, as when clamping two strips, packing of suitable thickness can be used under one, G.

Gripping **round material**

Difficulties in gripping round material can be overcome using a bar and block for the clamp H; or a small clamp can be made to take a countersunk screw-useful when drilling, I. On the drilling machine table, a length of steel channel often provides easy clamping, J.

In soldering or welding, where heat would be lost in the mountings, methods at ***K*** can be used-material such as ***Pl, P2*** being packed up or, as at X overhung from the mounting plate and clamped Y, ❑