SQUARING and QUARTERING

By GEOMETER

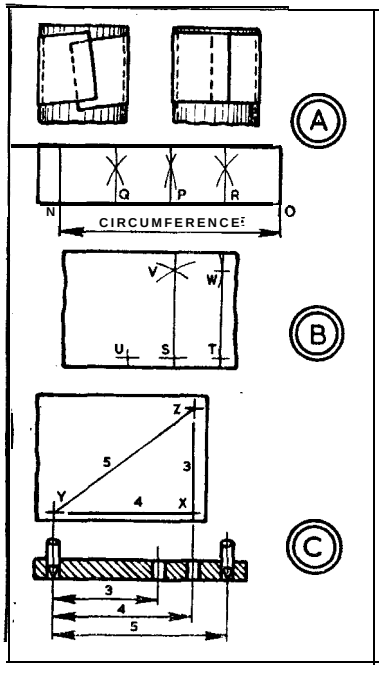
With a major part of the basic alignment of components taken care of by standard equipment and machining, other methods which nevertheless give good results tend to be neglected until circumstances compel their use-such as lack of equipment, an unusual job or process which must be done accurately by hand.

Often, when a hand operation like cutting-off is to be followed by machining, the main consideration is a surplus of material. Whether this is much or little does not affect the result, so there is no real incentive to accuracy. An example of this is squaring material by facing in the lathe. for the end to be true with the length or sides.

If the job is the cutting-off of a piece of large-diameter shafting to turn a flywheel, or tubing to make a boiler barrel, or squaring the ends of tubing by filing rather than facing in the lathe, then preparation and care are required.

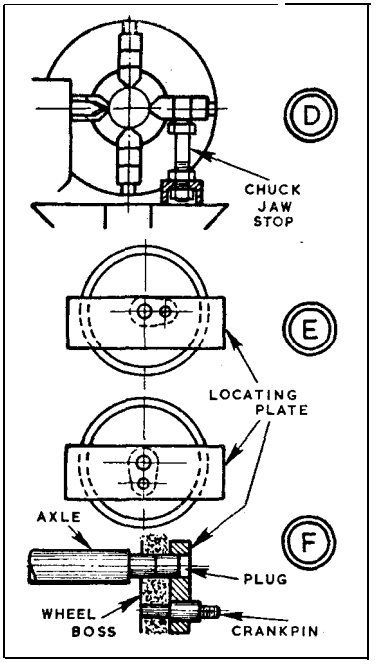
True, if the shafting has a faced end, the line for a square cut by hand-saw can be made by measuring back from the end, and using a centre-punch to leave a series of dots round the circumference. Otherwise, if the end is rough or aslant like the end of unfaced tubing, an accurate line round the material can be obtained as at A, using a pieee of straight-edged paper. This should be fairly wide, wrapped tightly round the material, and the edges then brought level at the overlap-as on the right. To leave both hands free, the paper can be held by a rubber band, and scriber marks made for placing centre punch dots if required.

A piece of straight-edged paper wrapped round circular stock to obtain the circumference, then opened out and marked, similarly provides the solution to the problem of dividing into halves or quarters, for example, when this must be accurate though not necessarily by machine dividing. Pencil compasses are entered at the ends of the circumference, N and 0, to describe arcs giving the position of the halfway line ***P;*** and from these three positions, those for the quarters Q and ***R*** can be obtained.



Squaring-up

For locating lines squarely across material, an ordinary square may be used wtthin the length of its blade. When necessary further length may be obtained by prolonging the line with a straightedge. On very wide material this can lead to inaccuracy and the method at B is preferable. It is performed geometrically with dividers or beam compasses, and straightedge. If the position of the mark is S, a short distance is measured in to locate the point? then arcs are described to ***T*** and U, with measurements in to locate the points. From these, arcs are crossed to locate point ***V.*** A straightedge can then be used between this and S to mark the connecting line.



If the job is not to find a cutting line for material, but to trim the edge square, the principle applies. Point ***V*** is used to describe an arc to W, distant from it as T from S. Then from ***Ta*** straight line can be run to touch W.

Alternatively, squaring can be done, as at C. From X there are four units to Y, and three to Z; and distance Y to Z is five units. To avoid setting of dividers, and possible errors, a tool can be made by drilling bar to take silver steel scribers with points like centre punches. Using a given centre punch indentation, arcs are described to locate other points and complete the right-angle.

Quartering of round stock for marking corners of squares or the positions of teeth on cutters, can be done as at ***D*** with a pointed tool on the slide and a stop on the lathe bed for the jaws of the four-jaw chuck; and quartering of locomotive wheels to locate crankpins can be effected as at ***E*** and ***F.***

One locating plate may serve for drilling the crankpin holes; and the other plate can be produced from it, located by a plug, and clamped with the functional edges set square. In fitting the wheels, a plug is used in the boss of each and its locating plate, and the functional edges of the plates are brought into line-or to a single plane. I.3