COTTER FITTINGS

By GEOMETER

THERE are several methods of fitting arms and levers to shafts and securing spindles and pins in bosses. Shafts can be threaded at the ends, tapered, squared, or provided with half-round keys so that parts which are made to correspond can be held by nuts.

Sometimes alternatives are sought and cotters are chosen because of advantages which they have over other fittings.

The two common cotters are the flat-sided and the grooved, as at Al and 2. To employ a flat-sided cotter, a lever is drilled and the shaft is provided with a flat which locates the lever rotationally and endwise when the cotter is tapped in and secured by its nut. To employ a grooved-type cotter, the lever (or other part) is drilled as before; then the cotter is provided with a groove corresponding to the radius of the shaft.

As this cotter has only a friction grip, there is no location and only moderate resistance to twisting. Another important point with this cotter is that, in dismantling, it can only be tapped free until the parts have been separated. Unlike the flat-sided cotter, it cannot be tapped right out. Consequently, in an assembly, a cotter which is free but will not come out is a grooved one.

The resemblance of various fittings can be seen from diagrams ***A*** and B. Bl illustrates a common method of securing a lever on the square end of a shaft. The flat-sided cotter fitting, ***Al,*** is similar to it, but is simpler to make, as the hole in the lever is round. At B2, a crankpin is held in an overhung crankshaft with the web drilled to take a bolt, and split to grip as the bolt is tightened. For extra security, the bolt passes across a groove in the crankpin. This is a better fitting than one emplo ing a grooved cotter, A2, though a flat-sided cotter, B3, would give good security.

The grooved cotter, A2, is very suitable for securing a threaded part, like an anvil in a gauge, which has to be set and then locked against further movement, as in the example at C. No damage is caused to the thread on the adjustable anvil, as the groove of the cotter is threaded to suit. The alternative to such a fitting would be to split the end of the gauge and fit a clamping screw or bolt.

Most cotter fittings are easily made, even though shaft and cotter holes intersect, so that a proper order of working must be followed. If the hole for the shaft is finished first, it should be fitted with a tight plug of the same material. Then the hole for the cotter can be drilled and the plug pressed out. Conversely, if the cotter hole is drilled first, it should be plugged-or a bolt can be fitted. Then the hole for the shaft can be drilled and reamed.

With a grooved and threaded cotter, as at C, the hole for the cotter should be drilled and a bolt fitted with a washer under its head. Then the hole for the anvil can be drilled and tapped, the threads being cut in the groove of the bolt at the same time. Finally, the head is turned off the bolt, which thus becomes the cotter.

Sometimes it is necessary to fit a lever in precise relationship with other parts of a shaft. On occasion, it can be. done by mounting the partly-finished lever, by its cotter, on the shaft, and then marking-off for finishing. Alternatively, it can be done by careful attention to angles and use of jigs.

Angles are as at ***D.*** Line ***RS*** is the centre line of shaft and lever. The angle of cotter is T, whose flat, and the flat of the shaft, are on line ***UV.*** For filing cotter and shaft, split jigs can be used, as at ***E*** and with similar angles on lines ***WX*** and YZ. The jig is machined on an angle plate when set to the the tangent of the angle by indicator. With 1 in. movement of the cross slide, the indicator shows in thous the angle given as a decimal fraction in trigonometrical tables. ❑