

Cotters and wedges

By Geometer

As SECURITY DEVICES, means of making adjustment or of exerting force. cotters and wedges find innumerable applications in mechanisms and techniques.

Cotters are mainly used for securing arms or cranks to spindles, or pins into bosses, and function on the wedge principle through tightening of a nut. There are two types—the flat-sided or cycle type, **A**, and the grooved type, **B**. For the flat-sided cotter the spindle has a flat with which the cotter engages, providing a firm hold and positive location. For the grooved cotter the spindle or pin is uniformly circular: and although the cotter grips and holds firmly for the purposes for which it is used, its action is less powerful than the other and it does not positively locate.

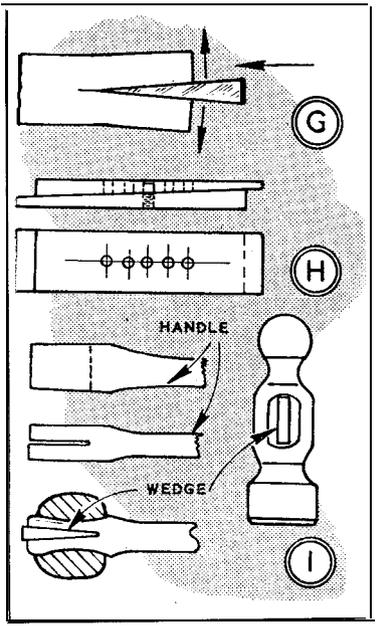
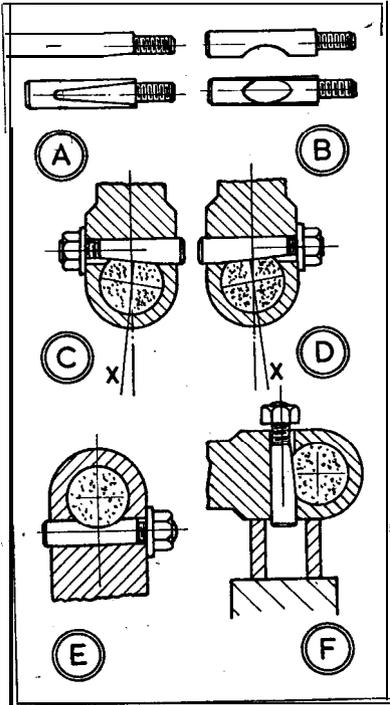
These differences are important, not only technically, but in assembling and, particularly, in dismantling—especially if one is not sure which type of cotter is used, and on occasion it is not certain. The flat-sided cotter is fitted after the spindle is in place and must be knocked right out before the spindle can be removed. The grooved cotter, however, must be fitted before the spindle, and can only be loosened and tapped free (not right out) with the spindle in position. With the spindle out the cotter can, of course, be removed. Old type Austin Sevens and other models of this make employ grooved-type cotters for securing king-pins.

Fitting and removing

Depending on the way a flat-sided cotter is fitted the angular relationship with the spindle varies slightly—**C** and **D**. Here the centre line is vertical, but a line at right-angles to the flat on the spindle is to the left (X) at **C**, and to the right (X) at **D**. In the case

of cycle cranks, cotters are generally fitted opposite to keep them in line. The fitting of a grooved cotter is as **E**.

For fitting a flat-sided cotter the spindle is carefully aligned in the boss, with the flat inclined to the side of entering the cotter. Too much inclination, and the cotter thread will be damaged, while with too little the cotter flat "digs in." As always, the cotter should be tapped in firmly with a hammer, then the nut fitted. Flats of new cotters often require filing to fit. A grooved cotter on the contrary is usually ready to fit, and is only tightened by the nut.



To remove a flat-sided cotter, **F**, the nut is removed and the washer extracted, then the nut run on to the end of the thread; supporting the boss or crank from the opposite side with a piece of heavy tubing and a weight the cotter can be tapped free.

The ordinary wedge, **G**, is a means of increasing force or making adjustment with a long endwise movement for a much smaller increase in the separation of its faces. It can be employed for opening a long "hugging" saw-cut and is used in tree-felling to support the trunk as the cross-cut saw goes through. Tough logs may be split, and machine tools raised to bring the beds level by wedges under the feet for bedding with concrete.

Two wedges together, **H**, of the same taper form "parallels" used in packing blocks as a means of fine adjustment. In the example shown the lower one has a fixed pin and the upper a number of holes, which are placed over the pin to vary the adjustment—as for centre setting a turning tool on a lathe.

As a security means the wedge is used for hammer, axe heads, etc. Initially, the handle should be a good fit in the head, being filed or otherwise shaped to enter, and any excess length cut off. If not provided with a narrow vertical slit, one can be made with a hacksaw for about half the depth of the head. The bore in the head is larger each end than in the middle, and when a hardwood or steel wedge is driven in the outer end of the handle is expanded, **I**, for the head to be firmly secured.