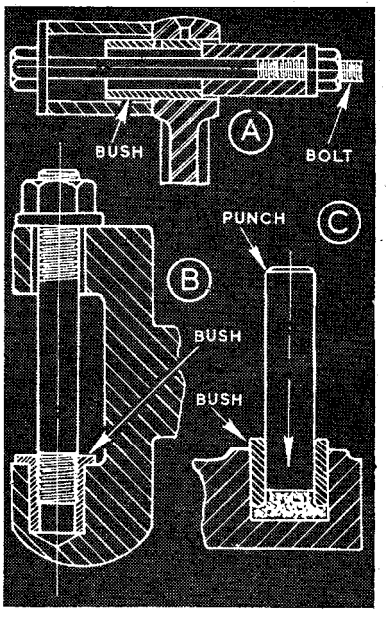
# BUSHES AND BEARINGS

**GEOMETER describes the main uses of these necessary components and explains how they are fitted and removed**



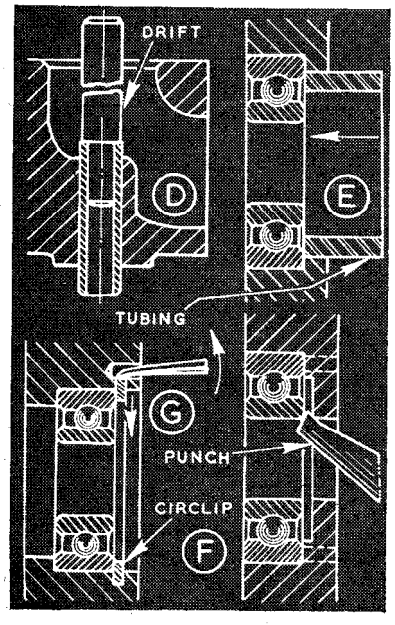

**BUSHES SERVE TWO** main purposes. They enable more suitable metal than their housings to be used with shafts and pins and, when wear occurs, permit inexpensive renewal. Ball races and roller types carry the principle a stage further. Light force fits in regard to shafts and housings, they carry the running loads, and being all-hard, turn very freely and resist wear.

Common materials for bushes are phosphor bronze and gun metal, with which steel shafts and pins should preferably be hard. White metal is also used to some extent, as is cast-iron. When steel bushes are used, they are almost invariably hardened. All except hardened bushes generally require to be reamed after fitting.

At some time, every engineer must renew bushes, commencing with the extraction of the old. If the fitting is open, for the bush to be forced straight out, such as the small end of a connecting rod, the method at ***A*** is employed. A distance piece, or length of tube, to fit over the outside of the bush, another to bear on the end and pass through the housing, suitable washers and a long bolt are all that are necessary. The new bush is fitted similarly, the oil hole carefully aligned, or drilled afterwards and the bore finally reamed.

When an assembly can be brought to the vice and held without strain (engineers' vice, steel, with parallel jaws), a bush can be forced out and another pressed in, using merely the tubes or distance pieces, and checking the new bush starts squarely.

With bushes in blind holes, a problem occurs in the absence of access to the further side. Often, as at ***B,*** a bush which is soft can be tapped to take a stud or bolt, then can be drawn out easily. A free bush being present,. it should be removed first, to provide way for tap and stud.




### Hydraulic method

The method at C is applicable to a blind-hole bush which is hard and cannot be tapped for extraction. A close-fitting rod or punch is obtained, and the bush about half filled with thick oil or grease. The housing is supported opposite the bush on a flat metal surface, the punch entered and struck with a hammer. The oil or grease is thus forced into the gap between the bottom of the bush and the housing, and drives the bush out hydraulically.

When' housings or main components can be properly supported, bushes can, of course, be driven out using a stepped punch or drift as it is generally called. This is the case with valve guides, as at ***D,*** where the length is such that using a bolt would be slow and laborious.

Problems similar to those in removing bushes occur with ball races. With these, however, it is inadvisable to hammer or force on the centre member if the races are to be used again, since blows or thrust must be transmitted through the balls to the outer member-with the danger of damage or failure later..

Whenever possible, a piece of tubing or distance piece should be used direct on the outer member as at ***E.*** The tubing can be tapped all round to keep the bearing square, or a bridge piece laid across for central blows, or the bolt method adopted.

When races are to be renewed and access to the outer member is obstructed, blows or force can be applied to the inner member through a drift, or if this is impossible, using a cranked or lipped punch, as at ***F.***

### Alternative method

Another method is to drill two holes, using normal and flat-ended twist drills, to come on opposite sides against the outer member. A parallel punch can then be used, and the holes finally filled by tapping and fitting screws.

A spring ring or circlip locating a race in a housing can present a removal problem, owing to the stiffness of the ring and absence of access behind it. A hole, however, drilled to come approximately to the bottom of the circlip, as at G, permits an instrument like a stiff blunt scriber to be inserted and one end of the raised-nor need the hole be filled afterwards. ❑