Some uses of BALL BEARINGS

By GEOMETER

BECAUSE of their shape, accuracy and hardness, steel balls have very wide applications in engineering production and components. Their shape, a geometrical element, coupled to great accuracy, enables them to be used in many measuring set-ups. In carriages and bearings, rolling contact can be made with other elements with the minimum of friction; and with hardness obviating distortion and reducing wear, heavy loads can be supported.

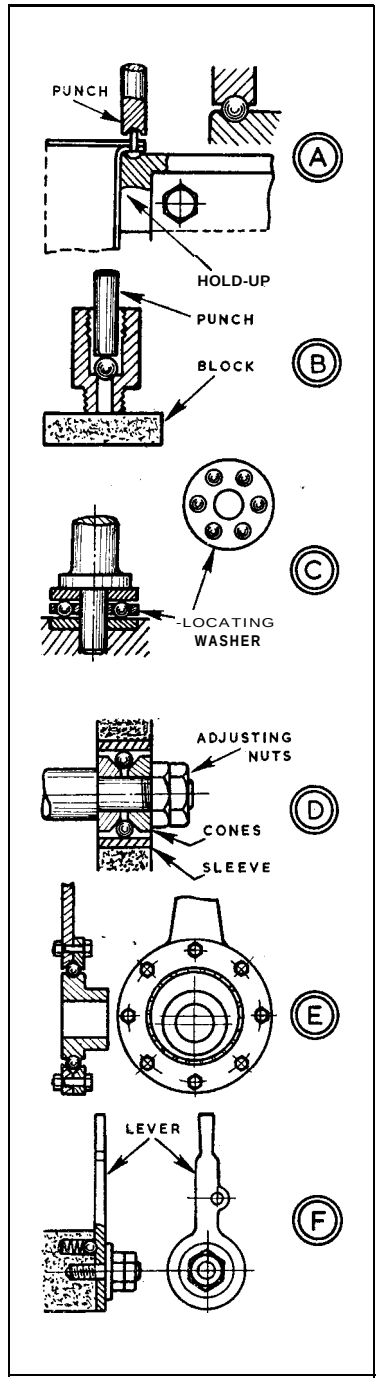
The carriages of measuring machines may employ ball bearings in straight V-ways for easy running and accurate alignment. They are the rolling parts in circular tracks in thrust and journal bearings. The Brine11 hardness test uses a steel ball to make a depression in material from which hardness can be assessed from a formula. Materials may be as widely divergent as hardened steel and lead-and so various sized balls and graded loads are specified, giving suitable combinations.

Aid in riveting

The hollows in hold-ups for supporting snap-head or round-head rivets, and those in punches for displacing the shanks to similar shape, are commonly made using steel balls of suitable size. A neat job can then be made of a riveting operation, as at A. The hold-up can be a piece of flat mild steel bar for gripping in the vice. After the end has been dimpled deeply with a twist drill, it is heated red, placed on a firm support-such as an anvil-and then the ball is dropped into the depression and given a blow with a hammer. The punch can be mild steel as well, made in a similar fashion. Afterwards, the depressions can be brought to size machining or filing the too of the bar and the end of the punch, testing with a rivet for clearance.

Both the hold-up and the punch can be case-hardened: but as the punch has forming work to do, it is advisable for frequent use to make it of cast steel or silver steel, and harden and temper it; while the hold-up, which is merely a support with the rivet head fitting its curvature, can be left soft for one-off jobs.

A steel ball tapped to the pin-drilled seating of a non-return valve with a brass punch, as at ***B***,. will ensure perfect sealing in use with a rustless steel or bronze ball of the same size. It can be done with the valve body on a block of lead to avoid burring the end thread. Such a light forming operation will not harm the ball for further use-but balls used for making punches should be thrown away, as damage which might be inflicted would make them unsuitable for work like this.



Bearings for end loads

Three plain flat washers, as at C, the centre one drilled for locating balls, make a thrust bearing for end loads. If it is to be subjected to light intermittent use, the washers can be mild steel, case-hardened; otherwise, they should be cast steel with the usual treatment. A variation in design is to turn a groove of 90 deg. included angle in one washer, which should then be substantially thicker, and dispense with that used for locating the balls. Their number should then be that which will go in the groove without jamming-and grease will secure them for assembly on a horizontal shaft.

A small ball journal bearing, which will admit of end float on a shaft, and at the same time be adjustable, is as at ***D.*** All parts can be in cast steel or silver steel; and following heat treatment, the sleeve can be lapped true in the bore. Adjustment can be made through locknuts on the shaft, or by allowing the cones initially to butt up, then grinding or lapping the end faces, or using shims between them, so that a single nut, tightened fully, will secure and size the bearing.

Minimising distortion

A locating version of such a bearing, which could be used for an eccentric, is as at ***E.*** Here the members forming the outer V-groove are bolted up-and adjusted by grinding or shimming. Distortion can be minimised in case-hardening by clamping these parts between collars with only the inner inclined faces accessible to the compound.

When spring-loaded and engaging in grooves or dimples, balls provide light location for rods and levers to hold them against movement at predetermined positions-and an example of a fitting-for a lever made from flat plate, is as at F. El