Ways of applying pressure

THERE are several ways of applying pressure. We employ some of them in the workshop without giving much thought to them. The spindle of a drilling machine may be pressed down by a lever, by a pinion and rack, or by a screw. A toggle linkage may be used for the ram of a small press-or a screw again; a large press is usually operated by a crank and connecting rod. A flat wedge is used to free taper-shank drills and sets of sockets. For gripping components in jigs, plungers may be operated by air pressure or hydraulically.

The use of screw threads is the commonest way of applying pressure through bolts, studs, nuts, and so forth. A screw is the means of closing

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the jaws of a vice and of operating many clamps and pullers. Its force can be increased with two threads of different pitch, on a differential principle; sometimes the screw of a puller has a hydraulic plunger by which final maximum pressure is applied.

A bolt can be the means of applying pressure to extract a bush from a connecting rod, as at ***A,*** when the job cannot be done in the vice. The sleeve which is used should be as long as the bush to be extracted, with a bore slightly larger than the outside diameter of the bush. The material can be steel or brass. The collars or washers at each end of the bolt must be stiff enough not to distort under pressure; the one to the bush can be stepped so that its outside diameter clears the bore of the connecting rod.

Many pressing operations, such as the fitting of bushes, can be done in a bench vice with accurate jaws-though it is usually advisable to place smooth-faced packing to the surface of work which must be kept free from dents and burrs, as at O-P. Hollow packing or a washer, 0, allows a bush to be pressed beyond the end of its bore or housing. Care should be taken to start a bush or bearing squarely in its housing. Then it will press home smoothly with minimum force. Oil or other lubricant also helps at times to reduce the pressure needed.

When necessary, the force exerted by a screw can be calculated in reference to diamgram B. Here, a force Q is applied at a radius ***R*** for the full circle S to move the screw one pitch T. Circle S and pitch Trepresent the ratio of leverage. S in inches = ***R*** in inches x 2 x 3.14; and T = 1 in. divided by t.p.i. Thus, if ***R*** is 3 in., S will be 18.8 in.: and if the screw has 20 t.p.i., T will be 0.050 in. By dividing 0.050 into 18.8, the ratio of leverage of 376 to 1 is obtained (or 18.8 can be multiplied by 20, the t.p.i.). If the force Q is 5 lb., the pressure exerted by the screw will be 375 x 5, or 1,880 lb. In practice, this would be reduced by friction; a reasonable average would be 80 per cent of it.

The screw of a puller may be provided with hydraulic plungers, as at Cl, to increase pressure without the need for a fine pitch thread which would be mechanically weak. A large plunger at the end of the main screw is forced out by a smaller plunger operated by the hydraulic screw. The space between the plungers is filled with oil or grease.

Another way of applying pressure to a plunger in a screw is as at C2. Here the screw is shown fitted with a greaser on which a high pressure gun can be used after the screw has been fully tightened. A plain screw can sometimes be altered like this.

A standard hydraulic jack has ample power for many jobs. By providing a frame, it can be used as a press in the workshop. The easiest way of making the frame, as at ***D,*** is to bolt together standard angle and channel sections.

Two channel sections U-V are needed and four angle sections, W-X, with two extra angle sections to bolt crosswise at the bottom. An anvil Y is mounted by a stud and nut to the upper channel section, and a platform Z is fitted by a spigot into the ram of the jack. These may be made, of course, to suit the particular work. •I