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H. C. GOODE

BUSHING REMOVING AND REPLACING TOOL

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Fig. 1.

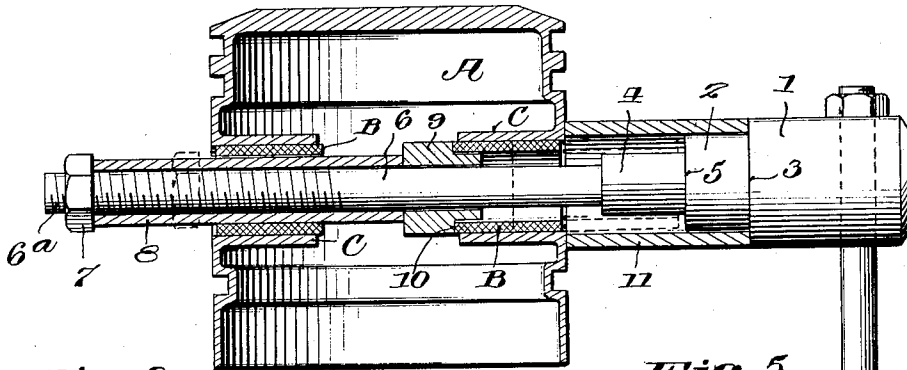


Fig. 3.

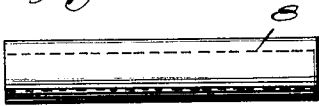


Fig. 5.



Fig. 4.

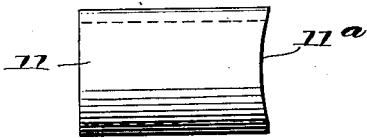


Fig. 6.

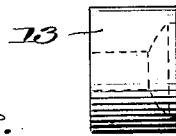
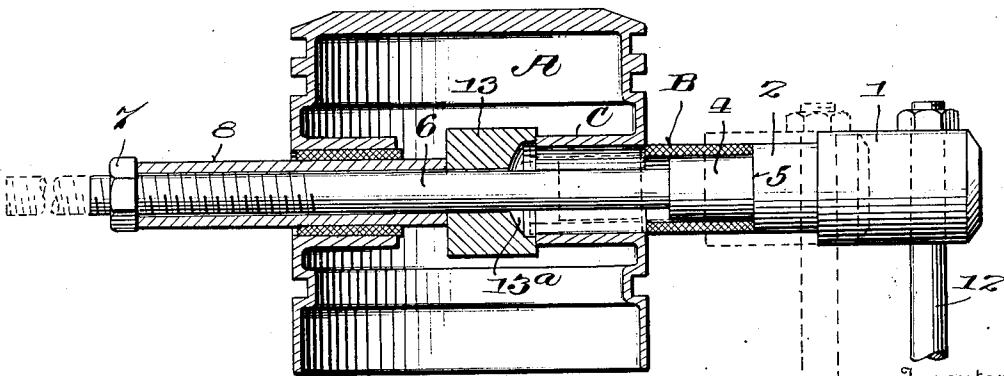


Fig. 2.



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BUSHING REMOVING AND REPLACING TOOL.

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This invention relates to tools or appliances for use in removing and replacing bushings from various machine parts such as wrist pins and hangers, and more particularly to a tool for removing and replacing bushings from hollow bodies such as engine pistons, in which a pair of aligned apertured bushing receiving bosses are provided.

10 The objects of the invention are to provide a device of this character by the use of which bushings can be quickly and easily removed and replaced without marring or mutilating the parts, and in which all portions of the device which have to be manipulated by the operator are on the outside of the piston.

In order that the invention may be readily understood, reference is had to the accompanying drawing, forming part of this specification, and in which:—

Fig. 1 is a sectional view illustrating my improved tool when applied to removing a bushing, parts being shown in elevation;

25 Fig. 2 is a similar view showing the tool used for replacing a bushing;

Figs. 3, 4 and 5 are side elevations of various parts or elements of the tool, as illustrated in Fig. 1; and

30 Fig. 6 is a side elevation of the special thrust block used in Fig. 2 instead of the elements shown in Figs. 4 and 5.

Referring to the drawings in detail, I have illustrated, at A, an ordinary piston such as is commonly used in internal combustion engines. Such pistons are usually made with a pair of aligned apertured, inwardly projecting bosses C, in which bearing bushings B are mounted. When these bushings become worn, it is necessary to remove them and insert new ones, and my improved tool is especially designed to facilitate this operation.

45 The tool comprises a head 1 having formed integral therewith a plurality of portions 2 and 4 of progressively decreasing diameter and arranged in stepped relation with annular shoulders 3 and 5 between the adjacent portions of different diameters. To this stepped head member is secured a shank 6, of such length as to be capable of extending entirely through the piston from one side to the other, and of a diameter considerably smaller than the interior of the bushings.

The end of the shank 6 opposite the step-

ped head member is threaded, as indicated at 6^a, and on this threaded end works a nut 7. Surrounding the threaded end portion of the shank adjacent the nut is a relatively long and small sleeve 8, which is of such size as to snugly fit over the shank and be capable of passing through the bushings.

Loosely fitting on the shank and supported by it inside of the hollow piston is a thrust block 9 having a reduced neck or nipple 9^a of a size adapted to enter the end of the bushing B. The diameter of the block 9 is substantially the same as the outside diameter of the bushing so that this block is capable of passing into and through the bushing receiving apertures in the bosses C. Between the body and neck of the thrust block is formed an annular shoulder 10 which serves to bear against the inner end of the bushing, as clearly shown in Fig. 1.

A second thrust sleeve 11, which is relatively short and of large diameter, surrounds the outer portion of the shank 6 adjacent the head 1 and fits snugly over the reduced portion 2 thereof. The outer end of this sleeve bears against the annular shoulder 3 while the inner end bears against the side of the piston adjacent the bushing. This inner end is preferably slightly curved, as shown at 11^a in Figure 4, so as to conform with the shape of the piston.

The portions 1 and 2 of the stepped head constitute, in effect, fixed collars carried by the shank 6, and serving to engage the thrust sleeve, as shown in Fig. 1, or the bushing, as shown in Fig. 2. Means are provided for imparting relative rotation to the nut and shank, the preferred means being a handle or lever formed by a rod 12 passing loosely through a transverse opening in the head 1 and provided with nuts or the like, at its ends, to prevent it from becoming detached.

From the above description, it is obvious that with the parts in the position shown in Fig. 1, if the shank 6 is rotated by turning the handle 12, the nut 7 will be caused to travel therealong, such nut operating through the sleeve 8 and thrust block 9 to exert a firm pressure against the inner end of the bushing B, and force it outward. The thrust at the other end of the shank is taken up by the sleeve 11, interposed between the shoulder 3 and piston. Owing to the large diameter of this sleeve, ample clearance is provided on the inside thereof

to receive the bushing as it is pushed outwardly by the thrust block 9. The position of the bushing, after it has been removed from the box, is indicated in dotted lines in Fig. 1, and it will be seen that it lies within the sleeve 11 and surrounds the stepped portion 4 of the shank head.

Ordinarily the friction of the parts will prevent the nut 7 from rotating when the shank is turned by means of the handle 12, but if it should have any tendency to turn, it may be readily held against rotation by means of a wrench or pliers.

For replacing a bushing, the arrangement shown in Fig. 2 is employed. As shown in this figure, the sleeve 11 and thrust block 9 are dispensed with. In place of the latter, a special thrust block 13 is employed, and this is so constructed as to bear against the inner edge of the boss C, the central portion of the block adjacent this boss being cut away, as shown at 13^a, to provide a small clearance, in order to permit the bushing to be fully inserted.

To replace a bushing, the bushing is slipped over the reduced portion 4 until its outer end bears against the shoulder 5, as shown in full lines. This acts as a guide to hold the bushing in alignment. The shank is then passed through the piston, the block 13 and sleeve 8 placed in position, and the nut 7 screwed on. Then, when the shank 6 is rotated, by means of the handle 12, the shank travels forwardly, as indicated in dotted lines, thus forcing the bushing into the hollow boss. It will be noted that the bushing is forced from the outside toward the inside of the piston, and that the thrust is taken up by the block 13 bearing against the inner end of the same boss into which the bushing is being forced, thus avoiding all strain on the body of the piston itself.

It will be observed that when using the tool either for removing or replacing bushings the shank extends entirely through the piston with the nut at one end and the stepped head or collar at the other end, wholly outside of the piston and freely accessible to the operator.

By virtue of this arrangement, the operator is relieved from the necessity of attempting to manipulate bolts, screws or other parts in the cramped space on the inside of

the piston, as has been the case with devices heretofore proposed.

What I claim is:—

1. A tool of the character described comprising a shank having a series of annular steps at one end, and threaded at the other, a nut on said threaded end, a block slidable freely on said shank, a sleeve interposed between said nut and block, and means for exerting an axial thrust in opposite directions on two telescoping parts interposed between one of said steps and said block.

2. A tool for removing bushings comprising a shank having a stepped end having a plurality of portions of different diameters, one of said portions being adapted to fit within the bushing, a thrust sleeve adapted to fit over the next larger and adjacent portion, a nut threaded on the other end of said shank, and means between said sleeve and nut for engaging the end of the bushing.

3. A tool for removing bushings from a hollow body, such as a piston, having a pair of aligned apertured bosses in which the bushings are mounted, said tool comprising a shank adapted to extend entirely through both bushings, and threaded at one end, a nut on such threaded end, outside of said piston, a fixed collar at the other end of said shank, also outside of the piston, and means between said collar and nut for exerting an outward thrust against one of said bushings when relative rotation is imparted to said nut and shank.

4. A tool for operating on bushings in a hollow body such as a piston having a pair of aligned apertured bosses in which the bushings are received, said tool comprising a shank adapted to extend entirely through both apertured bosses, and threaded at one end, a nut on such threaded end, outside of the piston, a fixed collar at the other end of said shank, also outside of the piston, a thrust block fitting loosely on said shank and adapted to be supported by it at a point within the hollow piston, between the bosses, and a thrust sleeve on said shank, interposed between said nut and thrust block and of such size as to pass through and lie within one of the bushings.

In testimony whereof I affix my signature.

HORACE C. GOODE.