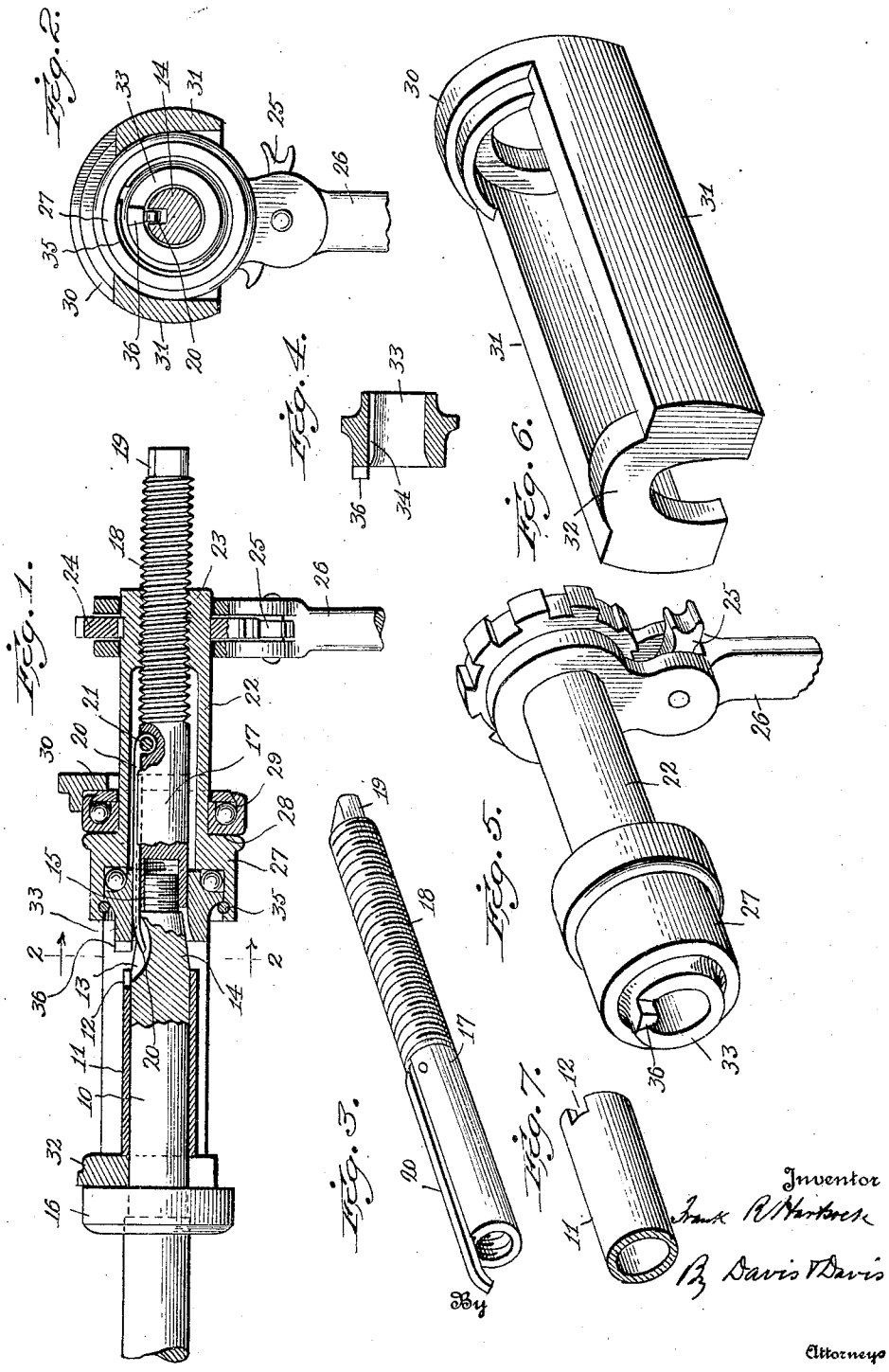
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SLEEVE REMOVER AND REPLACER

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SLEEVE REMOVER AND REPLACER.

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The object of this invention is to provide a simple tool for sliding a sleeve off a shaft and sliding it back on the shaft. A particular use for this device is in removing the bearing-sleeve from the rear end of the propeller-shaft of a motor vehicle and replacing the repaired sleeve or a new sleeve on the shaft. These sleeves are fitted very tightly on the shaft and consequently the matter of sliding them off and sliding them on is a difficult and laborious job. With my implement, the manual labor in removing as well as replacing the sleeve is reduced to a negligible point and, besides, the sleeve is certain to be replaced in precisely the proper position on the shaft, as more fully hereinafter set forth.

In the drawing—

Fig. 1 is a longitudinal sectional view of my device as it appears in use as a puller;

Fig. 2 is a transverse sectional view on the line 2—2 of Fig. 1;

Figs. 3, 4, 5, 6 and 7 are views of details hereinafter described.

Referring to the drawings annexed by reference-characters, 10 designates the rear end of the usual propeller-shaft and 11 the usual bearing-sleeve shrunk or fitted thereon and provided at its outer end with a key-notch 12 which is adapted to register with a key-way 13 formed in the bevel-seat 14 formed on the shaft for the driving pinion of the differential. The extreme end of the shaft is provided with a threaded reduced end 15 for the reception of the usual pinion-clamping nut. The numeral 16 designates the usual thrust ball-bearing on the shaft.

A supporting-rod 17 is provided at its forward end with a threaded socket adapted to screw onto the member 15, the outer, rear portion of this cylindrical supporting-rod being threaded at 18 and its extreme rear end being provided with an angular part 19 for the reception of a wrench for screwing it on and off the nipple 15. The exterior surface of the supporting-rod, near its forward end, is provided with a longitudinal keyway for the reception of a key 20 whose rear end is pivotally attached on the support at 21 and whose forward end projects beyond the support and is slightly curved toward the axial center of the support so that when the support is screwed onto the shaft, this bent-in end of the key will lie in the key-way 13.

Surrounding the supporting-rod is a tubular casing 22 which, at its outer end, is provided with a nut portion 23 which is adapted to be screwed back and forth on the threaded part 18 of the support. Any suitable means may be provided for screwing this casing back and forth on the support. I prefer the means shown, which consists of a double-faced ratchet-wheel 24 affixed to the casing and adapted to be rotated in either direction by means of a double pawl 25 pivotally mounted on a lever 26, the lever itself being pivotally mounted on the tubular casing 22, the lever being bifurcated in order to straddle the ratchet-wheel 24 and thus prevent it from sliding off the tubular casing.

The tubular casing 22 is provided with an annular head 27 at its forward end, which head provides a rearwardly-facing shoulder 28 against which abuts one member of a ball-bearing 29. The other member of this ball-bearing 29 is adapted to abut against one of the arches 30 of a yoke consisting of said arch 30, a pair of side-bars 31 and another arch 32. This yoke is long enough to permit its forward arch 32 to be slipped down behind the inner end of the sleeve 11, the thrust bearing 16 being pushed back away from the sleeve 11 far enough to permit this to be done. With the arch 30 against the rear side of the thrust bearing 29 and the arch 32 behind the inner end of the tube 11, as shown in Fig. 1, it will be seen that by screwing the tubular casing outwardly, a pulling force will be exerted on the sleeve 11 and thus the sleeve 11 will be slid off endwisely from the shaft. The thrust bearing 29 is simply for the purpose of reducing friction. The pulling yoke is desirably detachably mounted and is put in position after the supporting-bar has been screwed onto the shaft and the casing 22 has been advanced far enough to permit the arches 30 and 32 to be properly positioned. The key 20 prevents the supporting-rod 17 (after it is screwed onto the shaft to the desired point and the key has been folded down so as to bring its bent end into the usual keyway 13) from rotating independently of the shaft.

To enable this implement to be used for

the purpose of pushing a sleeve onto the shaft, I provide an additional member, to wit, an annular thimble 33 housed in a recess in the forward end of the head 27, this thimble being provided with a key-way 34 in its interior adapted to receive the key 20, so that this thimble will be held against rotation by this engagement with the key. To relieve thrust friction against this thrust-thimble, I provide an annular ball-bearing between its outer end and the adjacent forwardly-facing shoulder in the head 27. This thrust-thimble is locked in position in the head by a lock-ring 35, and its forward end is provided with a forwardly-extending lug 36 which is adapted to enter the notch 12 in the sleeve 11. In using the implement for pushing-on a sleeve, the yoke may be laid aside, as the yoke as well as the ball-bearing 29 have no function in this use of the device.

In replacing the sleeve 11 onto the shaft 10, the supporting bar 17 is first screwed onto the nipple 15 of the shaft 10 until the inturned end of the key 20 drops into the notch 13 of the shaft 10. The sleeve 11 is then slipped over the supporting bar 17 until it comes in loose contact with the end of the shaft 10. The tubular apparatus shown in Fig. 5 is then slipped onto the supporting bar 17 until it comes in loose contact with the sleeve 11, the enlarged unthreaded interior of the tube 22 permitting it to pass over the threaded part 18 of the supporting bar. Care is taken to see that the keyway 34 engages the key 20 and the lug 36 engages into notch 12 formed in the sleeve 11, to thereby assure the sleeve 11 starting home with its notch 12 in perfect alinement with keyway 13. The threads within the tubular member 22 are then engaged with the threaded part 18 of the supporting rod, whereupon the sleeve 11 may be pushed home, without rotation on the shaft, by merely operating the handle 26 in a direction to force the tubular casting 22 forwardly. It will be observed that a very valuable feature of my construction is that by reason of the interlocking arrangement between the shaft and the supporting-bar 17 and the non-rotatable thrust-thimble 33, with its lug 36 in engagement with notch 12, the sleeve cannot rotate in either direction during its forward sliding movement on the shaft with the consequence that when it is pushed home, this key-notch 12 will register exactly with the keyway 13, thereby insuring a proper assembly of the parts of the driving mechanism of the car.

What I claim as new is:

1. In a tool of the class set forth, a support adapted to be detachably attached to the end of a shaft, and means carried by said support for pushing a sleeve on the shaft, a device being provided for preventing rotation of said support with respect to the shaft.

2. In a tool of the class set forth, a support adapted to be detachably attached to the end of a shaft, and means carried by said support for pushing a sleeve on the shaft, a device being provided for preventing rotation of said support with respect to the shaft, said device consisting of a key hinged to the support and adapted to engage a key-way in the shaft.

3. In a tool of the class set forth, a support adapted to be detachably attached to the end of a shaft, and means carried by said support for manipulating a sleeve while on the shaft, said means embodying a casing surrounding and threaded on the support and a manually-operable device for rotating said sleeve.

4. In a tool of the class set forth, a support adapted to be detachably attached to the end of a shaft, and means carried by said support for manipulating a sleeve while on the shaft, said means embodying a casing surrounding and threaded on the support and a manually-operable device for rotating said sleeve, said manually-operable device embodying a double-faced ratchet-wheel affixed to the casing and a lever pivotally mounted on the casing and provided with a double-faced pawl, whereby the casing may be rotated in either direction.

5. In a tool of the class set forth, a support adapted to be detachably attached to the end of a shaft, and means carried by said support for pushing a sleeve on the shaft, said means embodying a thrust-member adapted to push against the outer end of the sleeve in sliding the same onto the shaft.

6. In a tool of the class set forth, a support adapted to be detachably attached to the end of a shaft, and means carried by said support for pushing a sleeve on the shaft, said means embodying a thrust-member adapted to push against the outer end of the sleeve in sliding the same onto the shaft, said thrust-member consisting of a non-rotatable thimble having a lug for engaging the usual notch in the rear end of the sleeve.

7. A tool for pushing a sleeve onto the end of a shaft embodying a supporting-member adapted to be detachably attached to the end of the shaft, and screw-operated thrust-means mounted on said support, said means embodying a casing adapted to be advanced or returned on the support and a non-rotatable thrust-ring supported in said casing and adapted to engage the outer end of the sleeve.

In testimony whereof I hereunto affix my signature.

FRANK R. HARTSOCK.