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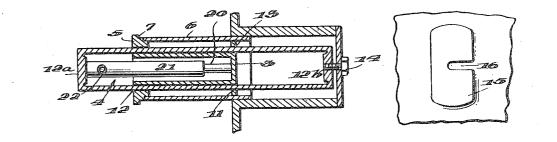
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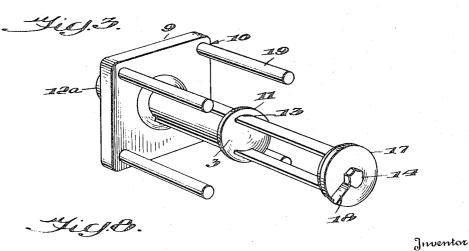
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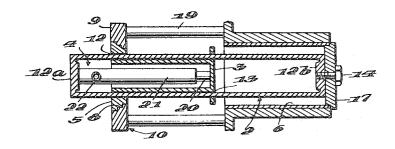
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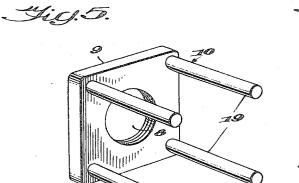
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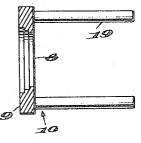
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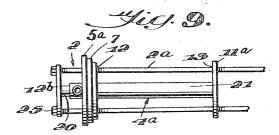
Fig. A.







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SLEEVE PULLER AND INSERTER

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4 Claims. (Cl. 29-252)

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This invention relates to a sleeve puller and inserter; and it comprises a device which can be used for removing and/or inserting sleeves in the cylinders of automobiles, Diesel engines and the like; said device comprising an inner frame, an 5 outer frame slidably mounted about said inner frame and a removable pedestal, a jack mounted between the upper end of said outer frame and the base of said inner frame for causing relative movement of said frames, said inner frame hav- 10 ing a head with an outer stepped-down lip flange adapted to engage the upper end of a sleeve when the latter is to be inserted in a cylinder, and usually having a bottom flange forming part of its base, said two flanges providing a support and 15 bearing surfaces for said outer frame, said lip flange being also adapted to engage said pedestal when a sleeve is to be removed, said outer frame being provided with means for securing thereto either of two exchangeable elements, one element 20 being a block for bearing against the cylinder block beneath a cylinder during the insertion of a sleeve and the other element being a disc for engaging the lower end of a sleeve during removal thereof, said pedestal being adapted to 25 support the device in spaced thrust relationship to a cylinder when used for removing a sleeve therefrom. My invention also includes the described sleeve inserter and sleeve puller as separate devices, the lip flange of the cup-shared 30 inner frame then being usually made integral with the pedestal; all as more fully hereinafter set forth and as claimed.

Modern internal combustion engines, whether of the gasoline or the Diesel type, are constructed 35 with cylinders having liners or sleeves of a material differing from that of which the cylinder blocks are constructed. These sleeves are usually of hard, wear-resistant steels but in spite of this fact they require rather frequent replacement. 40 sleeve puller, showing a sleeve in position ready The sleeves are press-fitted into the cylinders and, of course, a considerable force is required both to remove them and to seat them. Various instruments have been designed for these two purposes, which are operated by hydraulic rams or 45 the like. Most of these devices have consisted of stationary equipment but at least one portable sleeve inserter or press has been described. This device, however, is of rather crude design and is far from compact. For example, it re- 50 puller, quires an cuter stationary frame which is roughly four times the length of a sleeve and a movable frame which is even longer. It appears that no one has heretofore suggested a portable device of any type which can be used both as a sleeve 55 the sleeve puller,

puller and inserter and which is sufficiently compact to be practical.

I have been able to develop a combined sleeve puller and inserter which is extremely compact and portable and hence very convenient to employ. This device has an inner frame which can be made with a length only slightly greater than the length of a sleeve and an outer frame which needs to be only slightly longer than twice the length of a sleeve. This compactness is obtained primarily by the use of an inner cup-shaped element which is adapted to hold a hydraulic ram or jack and the fact that the outer frame, as well as the lower end of the inner frame, is adapted to operate inside the sleeve which is to be inserted or removed. My jack operates inside both inner and outer frames rather than at one end of the inner frame as in prior constructions. The device can, of course, be made in two separate parts, if desired, one designed as a sleeve puller and the other as a sleeve inserter. I have found, however, that these devices can be conveniently combined by the use of a removable pedestal, which is used only when the device is to be used as a sleeve puller, and two detachable

blocks one of which is used during the pulling and the other during the insertion of a sleeve.

My invention can be described in greater detail by reference to the accompanying drawing which shows a preferred modification of my combined sleeve puller and inserter as well as illustrative embodiments of individual sleeve pullers and inserters constructed in accordance with this invention. In this showing,

Fig. 1 is a perspective view of my sleeve inserter, which when used in connection with the pedestal of Figs. 5 and 6 becomes a sleeve puller,

Fig. 2 is a longitudinal section through the to be inserted in a cylinder,

Fig. 3 is a perspective view of my device with the pedestal in position ready to be used as a sleeve puller.

Fig. 4 is a longitudinal section through the sleeve puller showing it in position ready to remove a sleeve,

Fig. 5 is a perspective view of the pedestal which converts the sleeve inserter into a sleeve

Fig. 6 is a sectional view through the pedestal. Fig. 7 is a plan view of an anchor washer used with the sleeve inserter,

Fig. 8 is a similar view of the washer used with

3 Fig. 9 is a partial view in elevation of a modification.

In the various figures like parts are designated by like reference numerals. My sleeve puller and inserter have in common an inner frame and an 5 outer frame, shown generally at I and 2, respectively. The inner frame consists of a cup-shaped member which is adapted to receive a hydraulic or other jack shown at 4, the bottom 3 of this member being closed and the top open. The said 10 from an outside source, through the hydraulic cup-shaped member is provided with a lip flange 5, which is adapted to engage one end of a sleeve 6 to be inserted, as shown in Fig. 2, the flange being stepped down as at 7 in order to receive sleeves of different sizes. This stepped down 15 section of the lip flange is also adapted to engage the correspondingly stepped central bore 8 of the top 9 of pedestal 10 when the device is employed as a sleeve puller, as shown in Fig. 4. The cupshaped member of the inner frame is also usually 20 provided with a lower or base flange []. The flanges 5 and 11 are slotted adjacent the cup member at 12 and 13, respectively, in order to slidably engage the outer frame 2. The periphery of the base flange 11 also serves as a guide 25 special jack with a hydraulic connection at its to the sleeve when the latter is being inserted or removed from the cylinder.

The outer frame 2 consists merely of two or more spaced-parallel rods or legs 2a which are advantageously arcuate in cross section and have 30 an outer diameter smaller than the inner diameter of a sleeve. These frame members are welded or otherwise secured to discs at the top and bottom. The top disc 12a of the outer frame forms a seat to receive the upper end of the jack. 35 The other end of the jack, of course, bears against the closed bottom of the cup-shaped member. The lower disc 12b of the outer frame is threaded at its bottom to receive a bolt 14, the latter being employed, in the sleeve inserting embodiment, 40 to secure a plate 15 to the end of the frame; see Figs. 1, 2 and 7. This plate usually has a central slot 16 to receive the bolt and hence the latter needs to be merely loosened when the plate is to be removed or applied. The plate has a length sufficient to fit over the end of the cylinder during the insertion of a sleeve, as shown best in Fig. 2.

When my device is used as a sleeve puller, as shown in Figs. 3 and 4, a disc 17 is attached by 50 the bolt 14 to the lower end of the outer frame. This disc must have dimensions such that the sleeve is properly engaged during removal while making at least a sliding fit in the cylinder proper. Different size cylinders require different size 55 discs; hence a series of discs of various sizes is usually provided. These discs are provided with a slot 18 to permit easy removal and replacement.

The pedestal 10 which is used when the device is to be used as a sleeve puller is shown equipped 60 with four legs 19 which are adapted to rest on the cylinder block, as shown in Fig. 4. It is obvious, of course, that the shape and number cf the legs employed can be varied.

If it is desired to manufacture my device in 65 two different parts, one for sleeve pulling and the other for sleeve inserting, this can be accomplished readily. Fig. 1, for example, shows an embodiment of a separate sleeve inserter, while Fig. 3 shows an embodiment of a separate sleeve 70 puller. In this case the top of the pedestal can be made integral with the lip flange of the inner frame, or a screw joint can be employed at this point, if desired.

It will be noted that, in the various figures in 75 cylinder.

the drawing, the jack 4 is shown to have a diameter somewhat smaller than the inside diameter of the cylinder. It is usually pc sible to obtain jacks sufficiently smaller than the bore of the cylinder to enable the structure shown to be employed. The jack to be employed can be constructed, for example, in the form of a plunger 20 operating in a cylinder 21 with liquid pressure supplied by means of a hose or pipe connection attachment shown at 22.

A modification is shown in Fig. 9 in which the jack or ram forms part of the inner frame. In this construction the lower end of the ram is provided with a flange 11a which corresponds to the bottom flange of the other modification, while the lip flange 5a is attached close to the top of the jack as shown. In this modification the legs 2a of the outer frame 2 are in the form of rods sliding in the flanges of the inner frame, while the top end 12b of the outer frame is secured to the rods by means of nuts 25. This modification is particularly useful in connection with small cylinders. It is usually necessary to employ a upper end, as shown, when this construction is used. In effect the "cup" of the other construction forms part of the jack or ram in the construction of Fig. 9.

It is to be noted that the jack which operates my sleeve puller and inserter is mounted inside the two frames and that the outer diameters of these frames are smaller than the inner diameter of the sleeve, also that the lower end of the inner frame is adapted to enter the sleeve during inserting and removing operations, whereby the over-all (that is the maximum length of the device during the operations of inserting and removing sleeves) can be made only slightly greater than twice the length of the sleeve. This is important when the head room available for operation of the device is limited.

The operation of my sleeve puller and inserter is believed to be rather obvious from the preceding description. When used as a sleeve inserter the hydraulic ram is placed in the cup of the inner frame. The sleeve is slipped over the lower end of the inner cup-shaped frame with the upper end of the sleeve bearing against the lip flange 5, as shown in Fig. 2. The lower end of the outer frame is then inserted in the cylinder into which the sleeve is to be inserted with its end protruding slightly below the end of the cylinder. The bolt 14 is then loosened and the plate 15 applied against the bottom of the cylinder block. The assembly is then ready for the hydraulic pressure to be applied. This of course causes the plunger of the jack to push the inner frame and hence the sleeve downwardly into the cylinder. When the sleeve is seated it is only necessary to detach the plate 15 from the end of the frame and to remove the device.

When the device is to be used as a sleeve puller the pedestal is applied to the lip flange of the inner frame, as shown in Figs. 3 and 4 and the assembly placed on top of the cylinder block above the sleeve to be removed, with the end of the inner frame protruding just below the cylinder. The bolt 14 is then loosened and the disc 17 applied and engaged with the end of the sleeve, care being taken that the disc is exactly centered. When the jack is then operated the inner frame remains stationary while the outer frame is lifted together with the sleeve which slides out of the

It is to be noted that the inner frame remains stationary when the device is used as a sleeve puller while it is the outer frame which remains stationary when the device is used to insert a sleeve. The functions of the two frames are thus ĸ reversed. It is also believed evident from the preceding description that the operation and use of the device in inserting or removing sleeves is very simple and more or less fool-proof. Any ordinary mechanic can operate the device without 10 difficulty.

While I have described what I consider to be the best operating embodiments of my invention, it is obvious, of course, that various changes can be made in the specific structures which have been 15 described without departing from the purview of this invention. It is evident, for example, that my device can be operated with any of the usual hydraulic or hand jacks. I have found that the so-called Porter Power Jack is sufficiently small to be used with the ordinary sized cylinders and sleeves. I have used the device shown in the figures in removing and inserting sleeves in several different makes of automobile and Diesel engines and believe that the principles used in the 25 is a disc adapted to engage the lower end of said construction thereof can be used in the making of sleeve pullers and inserters suitable for use in connection with cylinders and sleeves of all types. If desired the power jack can be welded into the inner frame or to the top of the outer 30 frame of my device. It is obviously immaterial to which frame the jack is attached. It needs only to be held in some fashion between the upper end of the outer frame and the lower end of the inner frame to cause relative movement between 35 the frames. Other modifications which fall within the scope of the following claims will be immediately evident to those skilled in this art.

What I claim is:

1. A mechanism adapted to operate on sleeves 40 of cylinder blocks of internal combustion engines, which comprises an outer frame with inner and outer ends and with longitudinal members extending therebetween and joining the two ends, an inner frame with a length about half that of 45 said outer frame, having an outer centrally apertured head and an inner base with an annular flange spaced from each other by longitudinal frame members, the head and annular flange being provided with apertures to slidably engage the longitudinal members of said outer frame so that the inner frame is slidable from one end to the

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other inside of said outer frame, an expansible fluid-operated jack mounted inside said frames to engage between the base of said inner frame and the outer end of said outer frame, passing through the central aperture of the head of said inner frame and adapted to produce relative longitudinal movement of said frames; the outer dimensions of said outer frame and of said annular flange being smaller than the inner diameter of a sleeve of an integnal combustion engine so that these elements can enter the sleeve during cperations thereon, means connected to the inner end of said outer frame for engagement within a cylinder block and means on the head of said inner frame for engagement outside of said cylinder block in the operation of manipulating a sleeve with respect to said cylinder block of said internal combustion engine.

2. The mechanism of claim 1 wherein said 20 means on the head of said inner frame comprises a pedestal adapted to mount the mechanism in spaced thrust relationship to a cylinder block from which a sleeve is to be removed and wherein said means at the lower end of said outer frame sleeve during a sleeve pulling operation.

3. The mechanism of claim 1 wherein said means on the head of said inner frame comprises a stepped-down annular flange adapted to engage the top and inside of a sleeve and said means connected to the inner end of said outer frame is a plate adapted to engage the bottom of the cylinder block during a sleeve inserting operation.

4. The mechanism of claim 3 wherein said flange is of a diameter to support the entrance end of a sleeve during an inserting operation. FLOYD J. WYSCAVER.

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