Sept. 4, 1951 J. V. MILLER 2,566,847

CYLINDER SLEEVE REMOVING TOOL

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Fig. 1.

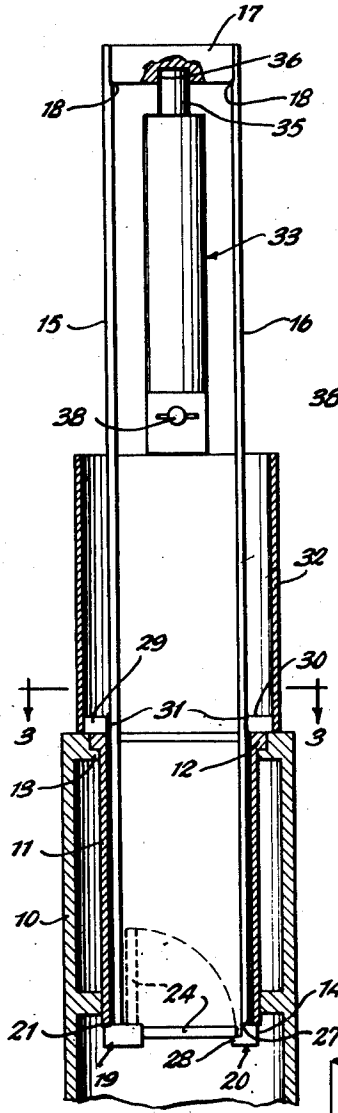


Fig. 2.

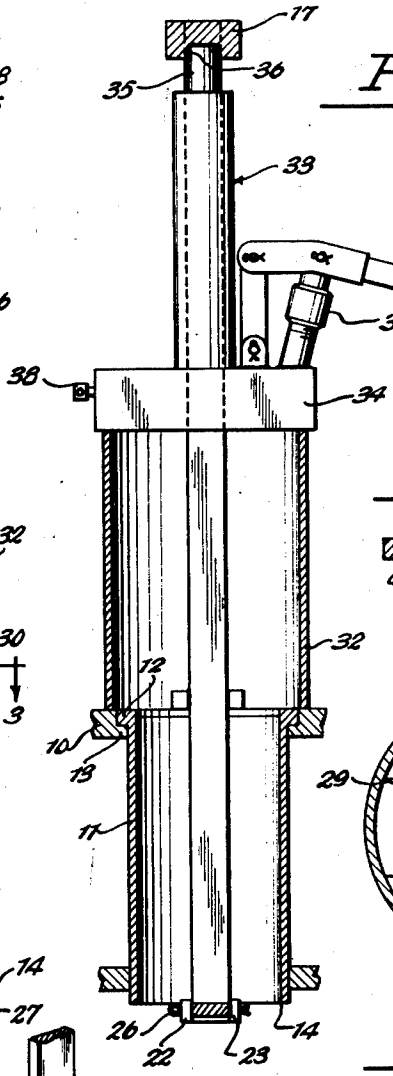
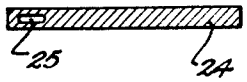


Fig. 5.



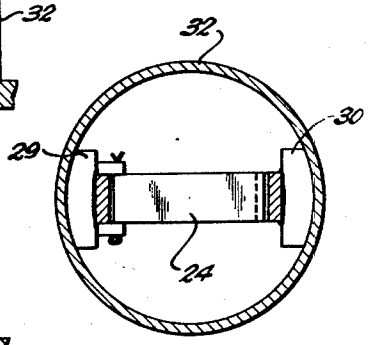


Fig. 3.

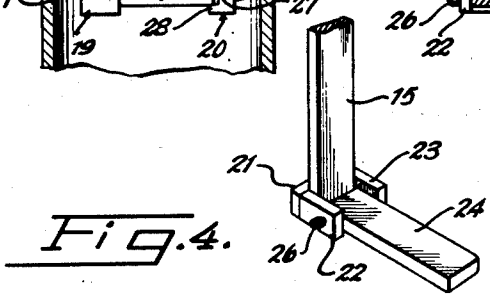


Fig. 4.

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CYLINDER SLEEVE REMOVING TOOL

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2 Claims. (Cl. 29—252)

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The present invention relates to improvements in a cylinder sleeve removing tool and has for an object to provide an improved device of this kind in which the insertion and operation of the tool can be performed from the upper side of the cylinder only. With the use of this improved tool, it is not necessary to apply pulling plates or nuts from the underside of the cylinder.

Another object of the present invention is to provide an improved cylinder sleeve removing tool in which the sleeve pulling bars are held in engagement with the sleeve by a rotatable lock plate. This lock plate can be quickly and easily moved to operative position from the upper side of the cylinder so that time is saved by eliminating the necessity of applying pulling disks or the like.

A further object of the present invention is to provide an improved device of this character in which means are mounted on the pulling bars for automatically arresting the insertion of the pulling bars into the cylinder when the sleeve engaging portions of the pulling bars have engaged the lower edge of the sleeve. This automatic arresting means also serves the purpose of locating the power operating device for the tool concentrically of the cylinder sleeve to be removed.

The present invention aims to provide an improved cylinder sleeve removing tool which comprises relatively few parts so that the cost of manufacture and maintenance is relatively low.

The present invention also aims to provide an improved device of this type which on account of its extreme simplicity can be assembled for removing a cylinder sleeve in a matter of seconds instead of the extended length of time required for assembling prior art devices employed for a similar purpose.

In one of its broad aspects, the present invention contemplates providing an improved cylinder sleeve removing device comprising a pair of pulling bars connected at one end and having their opposite ends free and provided with portions for engaging the inner end of a cylinder sleeve and means for urging the free end portions of the pulling bars apart so that the sleeve engaging portions thereof will engage the lower edge of the cylinder sleeve.

With the foregoing and other objects in view, the invention will be hereinafter more fully described and more particularly pointed out in the appended claims.

In the drawings, in which the same parts are denoted by the same reference numerals throughout the several views;

Figure 1 is a front elevational view of the improved cylinder sleeve removing tool constructed in accordance with the present invention illustrating its application to a cylinder sleeve and with parts broken away and in section;

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Figure 2 is a side elevational view of the improved device illustrated as applied to a cylinder sleeve and with parts in section;

Figure 3 is a cross sectional view taken on the line 3—3 of Figure 1 and looking in the direction of the arrows;

Figure 4 is a perspective view of the pivoted locking plate showing a portion of the pulling bar on which it is mounted; and

Figure 5 is a longitudinal vertical sectional view of the locking plate.

Referring more particularly to the drawings, 10 indicates a cylinder block in which is positioned a cylinder sleeve 11. The outer end portion of the sleeve 11 is provided with an annular exterior flange 12 which rests upon an interiorly extending annular flange 13 on the cylinder block 10 so that the sleeve 11 is supported in the block with its inner edge 14 free. Since these cylinder sleeves become worn or scored, it is necessary from time to time to replace them with new ones. The following described improved cylinder sleeve removing tool will readily perform this operation.

A pair of pulling bars 15 and 16 have their outer end portions connected to a crosshead 17 by welding 18 or the like. The inner end portions of the pulling bars 15 and 16 are free and have mounted thereon lugs generally indicated at 19 and 20, respectively. The lugs 19 and 20 can be formed integrally with the bars 15 and 16 or they can be secured thereto in any suitable manner. The lug 19 comprises an outwardly facing shoulder 21 which extends beyond the outer face of the bar 15 and a pair of spaced apart arms 22 and 23 which extend inwardly of the bar 15 for receiving therebetween one end portion of a lock plate 24. The lock plate 24 is provided with an elongated opening 25. The lock plate 24 is hinged or pivotally connected to the arms 22 and 23 by a cotter pin 26 which extends through the opening 25 in the plate 24 and through aligned suitable openings in the arms 22 and 23. The lug 20 is provided with an outwardly facing shoulder 27 which extends beyond the outer face of the bar 16 and an abutment 28 which extends inwardly of the inner face of the bar 16.

Stop guide blocks 29 and 30 are secured as by welding or the like 31 to the outer faces of the pulling bars 15 and 16, respectively, intermediate their ends. The blocks 29 and 30 are attached to the bars 15 and 16, respectively, at such distances from the shoulders 21 and 27 that when, upon insertion of the bars 15 and 16 into the sleeve 11, the blocks 29 and 30 contact the outer end of the sleeve 11, the shoulders 21 and 27

will be in position to engage the inner edge 14 of the sleeve 11. As will be noted from Figure 3, the outer faces of the blocks 29 and 30 are arcuate so as to conform to the inner surface of a cylindrical spacer 32 which they are adapted to engage when the spacer 32 is positioned upon the outer end of the cylinder block 10.

A conventional type of hydraulic jack or ram generally indicated at 33 is positioned with its base 34 on the outer end of the spacer 32. The ram 33 has a plunger 35, the outer free end of which is received by a counterbore 36 formed in the inner surface of the crosshead 17. A hydraulic operating pump 37 of conventional form is mounted upon the base 34 for controlling the operation of the hydraulic ram. A hydraulic release valve 38 of the conventional type is mounted upon the base 34.

In the operation of the device, assuming that it is desired to remove the sleeve 11 from the cylinder block 10, the operator will swing the lock plate 24 to the position shown in dotted lines in Figure 1. The pulling bars 15 and 16 will then be pressed towards each other sufficiently to permit the insertion of their inner free ends into the sleeve 11. When the blocks 29 and 30 come into contact with the outer edges of the cylinder block 10 and the sleeve 11, further insertion of the bars 15 and 16 will be automatically arrested. At this time, since the blocks 29 and 30 are spaced from the shoulders 21 and 27, respectively, a distance substantially equal to the length of the sleeve 11, the shoulders 21 and 27 of the bars 15 and 16 will be in a position to engage the inner edge 14 of the sleeve 11.

The operator will then release the pressure upon the pulling bars 15 and 16 and the inner free ends of the bars will immediately expand to move the shoulders 26 and 27 into engagement with the inner edge 14 of the sleeve 11. The lock plate 24 will be swung from the dotted line position to the full line position illustrated in Figure 1, so that the free edge portion of the lock plate 24 will come to rest upon the abutment of the lug 20. The lock plate 24 will hold the free end portions of the pulling bars 15 and 16 in their spread apart operative position so that the shoulders 21 and 27 of the lugs 19 and 20, respectively, will remain in firm engagement with the inner edge 14 of the sleeve 11 during the withdrawal of the sleeve.

The opening 25 is elongated longitudinally of the lock plate 24 so that shearing off of the cotter pin 26 is prevented when putting pressure to the pulling bars 15 and 16. It will be noted that the insertion of the pulling bars 15 and 16 and the movement of the lock plate 24 into its locking position are accomplished from the outer or upper side of the cylinder block 10.

The spacer 32 is now placed over the pulling bars 15 and 16 and moved inwardly until its inner edge contacts the outer surface of the cylinder block 10. At this time the inner surface of the spacer 32 will come into engagement with the outer arcuate faces of the blocks 29 and 30 and be concentrically located thereby with respect to the cylinder sleeve 11. This concentric position of the spacer 32 will be accomplished automatically without any attention on the part of the operator, thus effecting a great saving of time and labor.

The hydraulic ram 33 is now put into position with the block 34 supported by the outer end portion of the spacer 32 and the outer free end of the plunger 35 is received by the counterbore 36 of the crosshead 17. The hydraulic ram is then operated by closing the release valve 38 and operating the pump 37. The plunger 35 will then exert outward pressure upon the inner face of the crosshead 17 so that the pulling bars 15 and 16 will be moved outwardly of the cylinder block. This outward pulling force will be transmitted to the sleeve 11 through the shoulders 21 and 27 of the lugs 19 and 20, respectively, so that the sleeve will be removed from the cylinder block 10. The cylinder sleeve 11 will be retained by the pulling bars 15 and 16 until the entire tool is removed from the outer end of the cylinder block 10. A new cylinder sleeve may then be inserted in the cylinder block 10.

It is obvious that various changes and modifications may be made in the details of construction and design of the above specifically described embodiment of this invention without departing from the spirit thereof, such changes and modifications being restricted only by the scope of the following claims.

What I claim is:

1. An improved cylinder sleeve removing tool comprising a crosshead, a pair of pulling bars each having its outer end portion attached to the crosshead and its inner end portion free, a lug mounted on the inner free end portion of each pulling bar and having a shoulder for engaging the inner edge of the cylinder sleeve, one of said lugs having a pair of spaced arms, a lock plate, a pivot element mounted on the arms of said one lug for pivotally supporting said lock plate, and an abutment mounted on the other lug to limit the movement of said lock plate in one direction and for supporting said lock plate in its operative position.

2. A cylinder sleeve removing tool comprising, a pair of pulling bars connected at one end and having their opposite ends free and provided with portions for engaging the inner edge of a cylinder sleeve, stop means mounted on the pulling bars and spaced from the cylinder sleeve engaging portions of the pulling bars a distance substantially equal to the length of the cylinder sleeve so that when said stop means contact the outer end of the cylinder sleeve the sleeve engaging portions of the pulling bars will engage the inner edge of the cylinder sleeve, a lug mounted on the inner free end portion of each pulling bar and having a shoulder for engaging the inner edge of the cylinder sleeve, one of said lugs having a pair of spaced arms, a lock plate, a pivot element mounted on the arms of said one lug for pivotally supporting said lock plate, and an abutment mounted on the other lug to limit the movement of said lock plate in one direction and for supporting said lock plate in its operative position.

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