Nov. 11, 1952 M. P. D'HAEM 2,617,181

CYLINDER SLEEVE PULLER

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Fig. 1

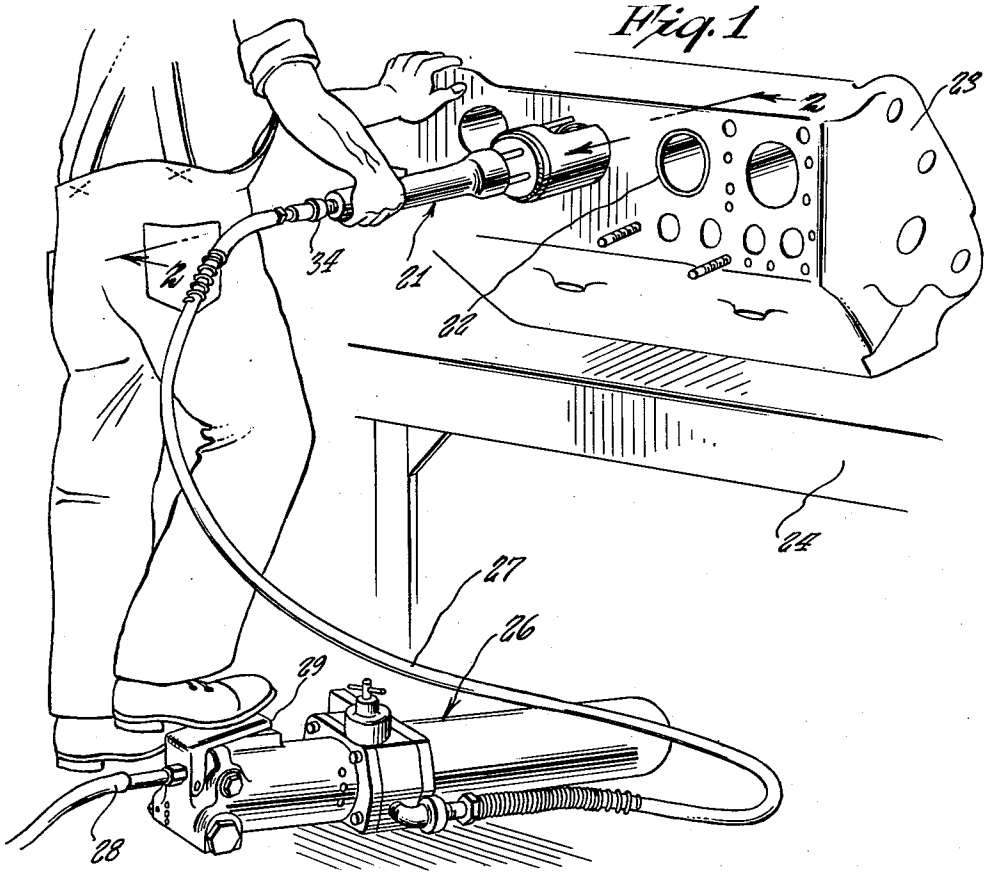


Fig. 4

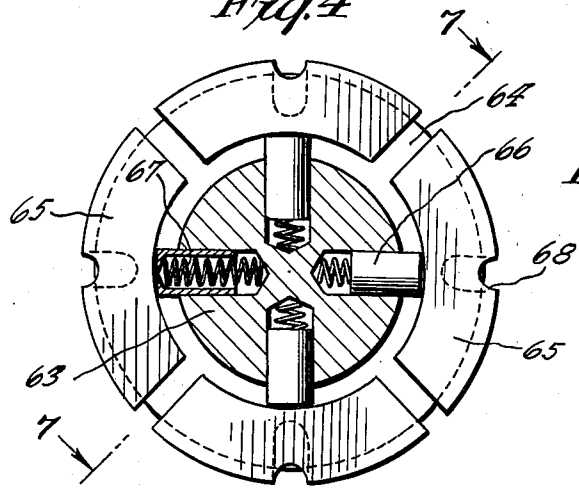


Fig. 5

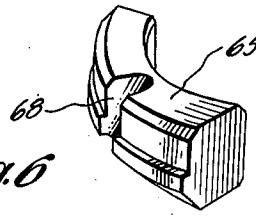
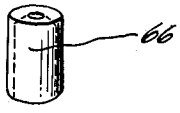


Fig. 6



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CYLINDER SLEEVE PULLER

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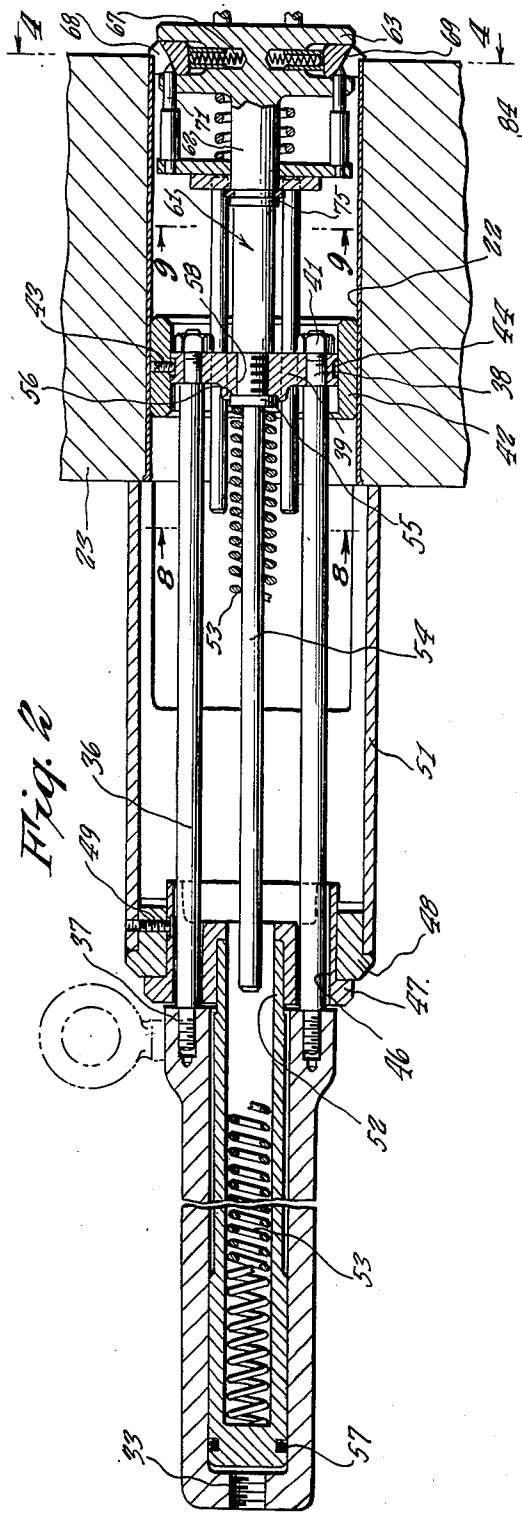


Fig. 2

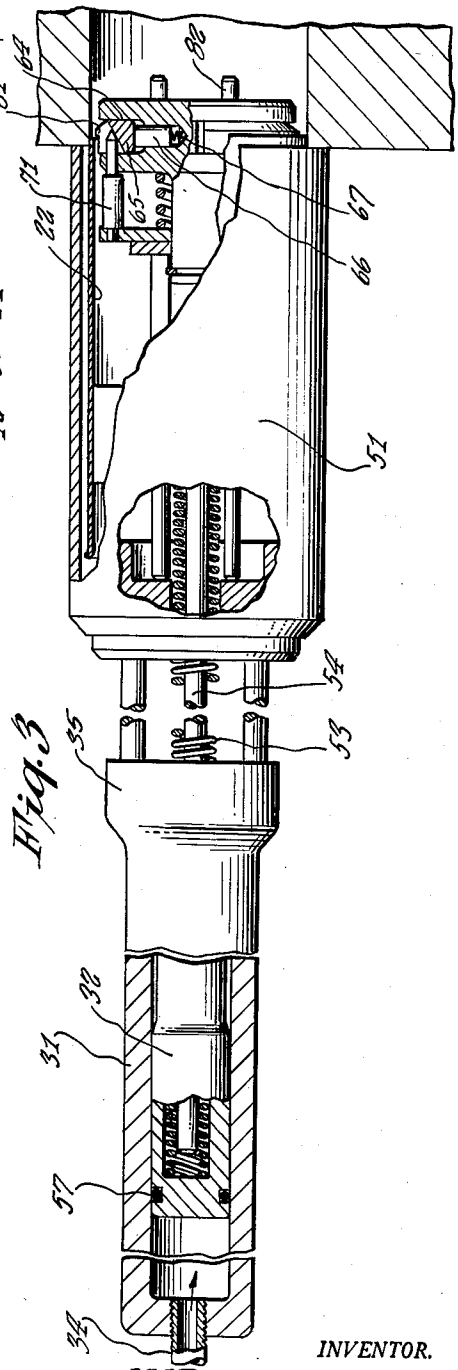


Fig. 3

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Fig. 7

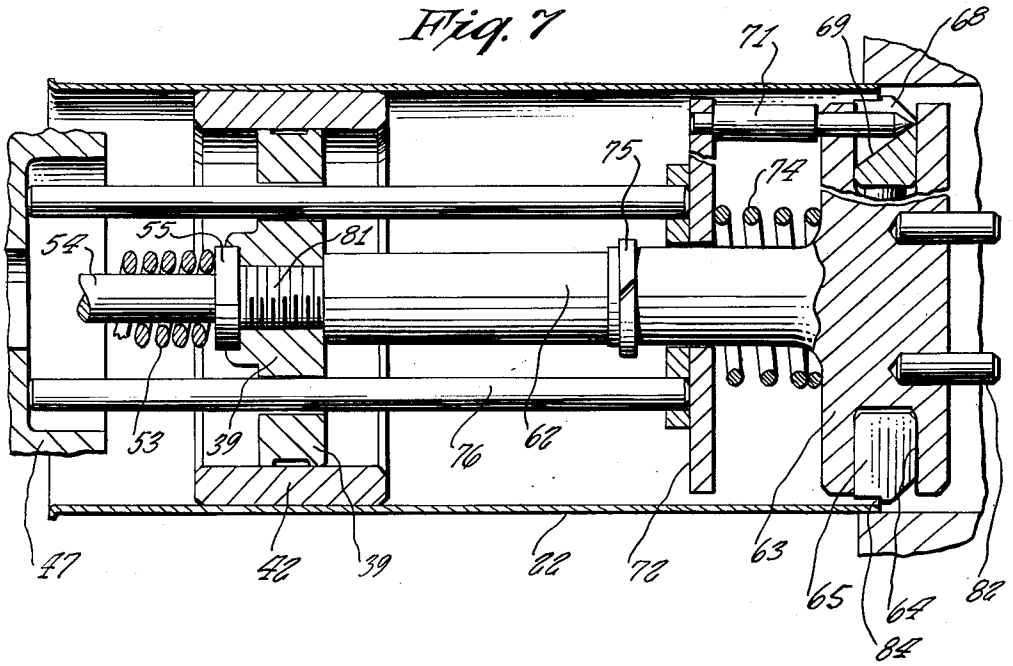


Fig. 8

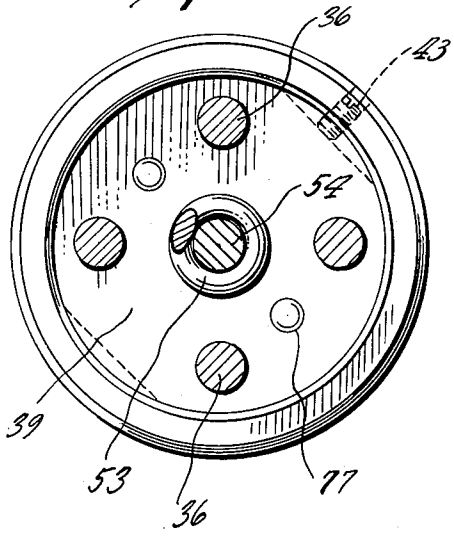
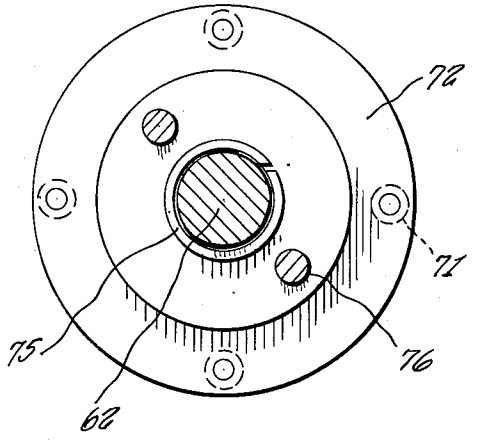


Fig. 9



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Fig. 10

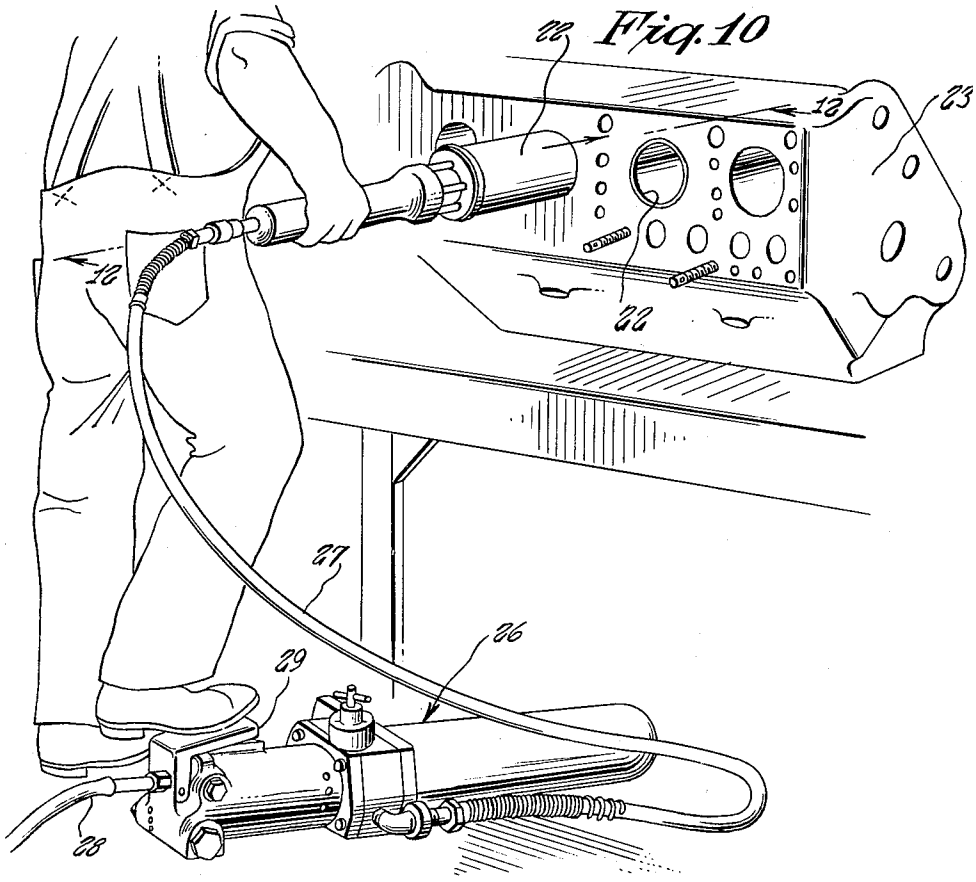
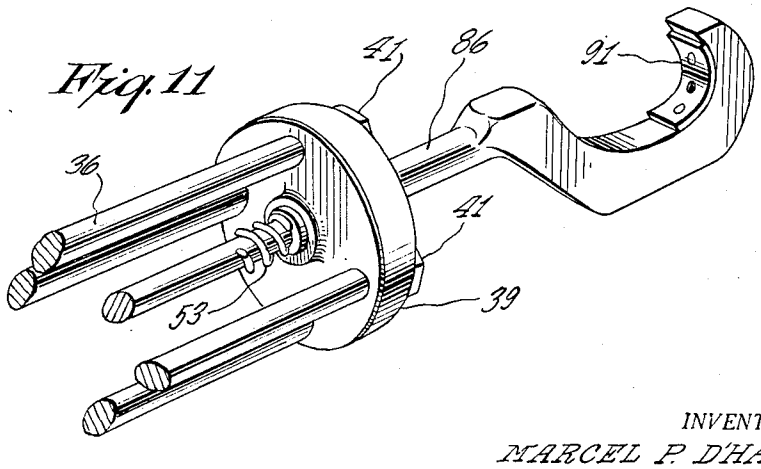


Fig. 11



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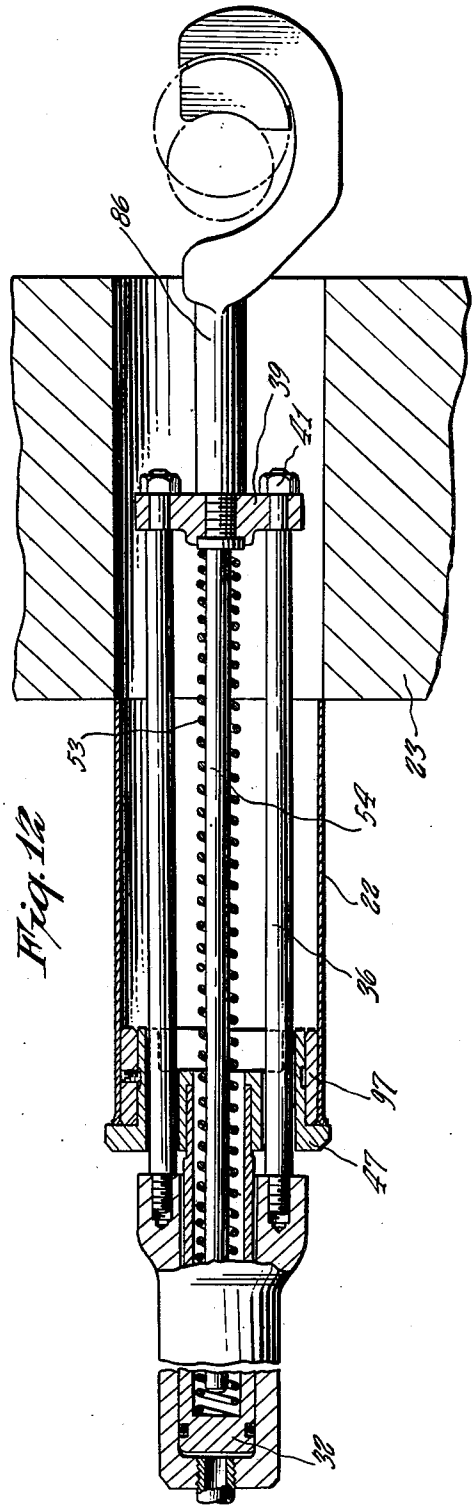


Fig. 12

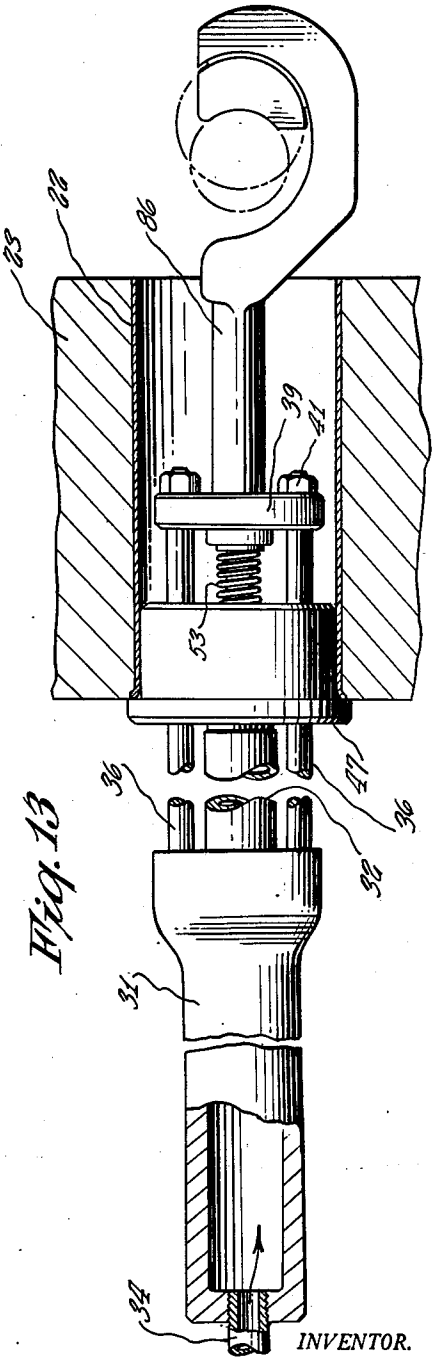


Fig. 13

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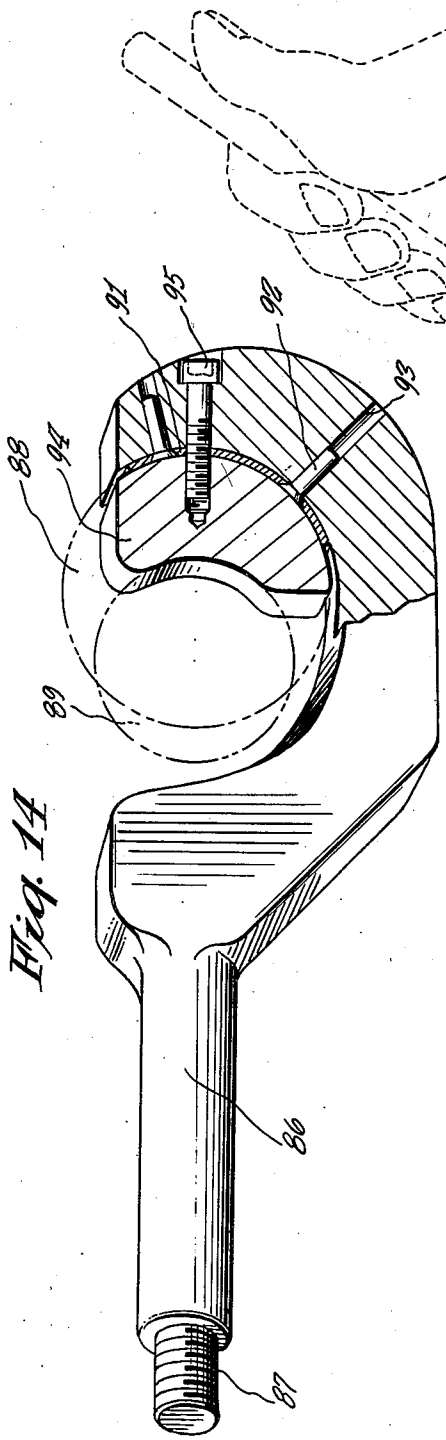


Fig. 14

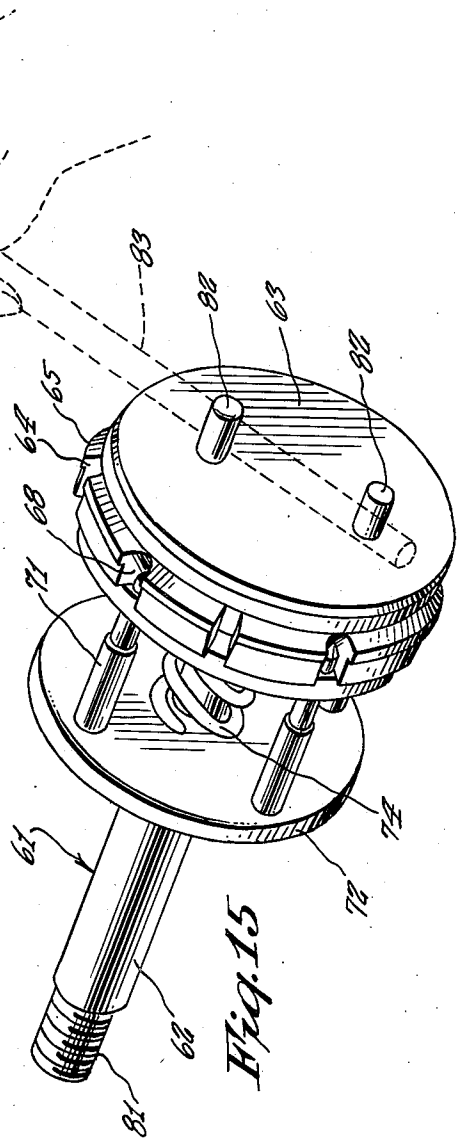


Fig. 15

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Patented Nov. 11, 1952

2,617,181

UNITED STATES PATENT OFFICE

2,617,181

CYLINDER SLEEVE PULLER

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Application April 7, 1948, Serial No. 19,477

5 Claims. (Cl. 29—252)

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This invention relates to a cylinder sleeve puller.

It is an object of the present invention to provide a cylinder sleeve puller which can be readily extended through the cylinder and engage with the inner end thereof and set up for effecting a pulling action upon the cylinder sleeve or liner wherein the tool is adapted and operable by high hydraulic pressure acting within a work cylinder of small dimension and wherein as the sleeve has been withdrawn from the engine block parts are engageable with fixed parts to cause the automatic retraction and disengagement of the engaging segments from the inner end of the sleeve to free the sleeve puller therefrom and permit the removal of the sleeve puller from the engine block so that the sleeve can be taken therefrom.

It is another object of the present invention to provide a sleeve puller which can be easily and quickly converted into a cylinder sleeve pusher or inserter by the removal of certain parts and the securement thereto of a crank shaft hook adapted to anchor the tool upon the engine so that pushing action can be effected by the movement of the piston out of the work cylinder.

Other objects are to provide a sleeve puller adapted to be converted into a pusher which is of simple construction, has minimum parts, inexpensive to manufacture, easy to operate, and efficient in operation.

For other objects and for a better understanding of the invention, reference may be had to the following detailed description taken in connection with the accompanying drawing, in which

Fig. 1 is a perspective view of the sleeve puller connected with an engine block to effect the pulling action upon a piston sleeve,

Fig. 2 is a longitudinal sectional view of the sleeve puller and of the engine block, taken on line 2—2 of Fig. 1, with the puller engaging elements abutting with the inner end of the sleeve and the puller set to effect pulling action upon the sleeve upon hydraulic pressure being applied to the same,

Fig. 3 is a side elevational view of the sleeve puller when the pulling action has been completed upon the sleeve and the sleeve withdrawn from the engine block, portions of the puller being broken away to show the positions of the internal parts at this time,

Fig. 4 is an enlarged transverse sectional view taken through the inner end of the sleeve puller and looking upon the engaging elements, the

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view being taken generally on line 4—4 of Fig. 2 and looking in the direction of the arrows thereof,

Fig. 5 is a perspective view of one of the sleeve engaging elements or segments,

Fig. 6 is a perspective view of a puller segment spring plunger,

Fig. 7 is an enlarged fragmentary and sectional view of the sleeve puller with the parts in position in the cylinder sleeve and the sleeve puller segments in engagement with the end of the sleeve, the view being taken generally on line 7—7 of Fig. 4 and looking in the direction of the arrows thereof,

Figs. 8 and 9 are respectively transverse sectional views taken on lines 8—8 and 9—9 of Fig. 2 and looking respectively in the direction of the arrows thereof,

Fig. 10 is a perspective view of the sleeve puller set up to push or insert a cylinder sleeve into an engine block, the sleeve puller being held by the operator whose foot is being applied to the pump to effect pushing action,

Fig. 11 is a fragmentary and perspective view of the puller parts arranged for use in making the insertion of the sleeve within the engine block and showing its hook member adapted for engagement within the engine block and upon the crank shaft thereof,

Fig. 12 is a longitudinal sectional view of the puller set upon the engine block for inserting a cylinder sleeve, the view being taken on line 12—12 of Fig. 10,

Fig. 13 is a fragmentary side elevational view of the sleeve puller within the cylinder sleeve and showing the positions thereof as when the sleeve has been extended home within the engine block, portions of the puller being broken away and shown in section to show interior openings of the puller,

Fig. 14 is an enlarged perspective view of the crank shaft hook removed from the other parts of the puller and with portions thereof broken away and shown in section, the hook pad being in place and with the adaptor for engagement of the hook with a small diameter portion of the crank shaft being in place within the hook pad,

Fig. 15 is a perspective view of the adaptor assembly for including the sleeve engagement segments and illustrating the manner in which the assembly is secured to the cylinder rod plate, this assembly being adapted to replace the crank shaft hook of Fig. 14 when the puller is to be set up for pulling action.

Referring now particularly to Figures 1 to 9 inclusive, and 15, 21 represents generally my sleeve puller set up for the pulling of a cylinder sleeve 22 of an engine block 23 which may be rested upon a bench 24 of convenient height for a workman. On the floor is an air operated hydraulic pump 26 adapted to extend oil under high pressure through a hose 27 to the sleeve puller 21. Air is extended to the pump through an air hose 28 at the rear end of the same and the supply of air to effect the actuation of the pump is controlled by a foot lever 29 on which the workman may step to cause the actuation of the pump parts within the pump housing. Oil from the sleeve puller can be returned to the pump through the same hose 27 upon a dump valve or other means within the pump being actuated. The pump 26 is disclosed and claimed in an application filed on April 7, 1948, Serial No. 19,478, in the names of James A. Roberts, Howard R. Fischer and Marcel P. D'Haem, said application having issued on March 4, 1952, as Patent No. 2,588,164. No further mention will be made as to construction of the pump, and for details thereof reference may be had to this copending application. The nature of the pump is such that with air pressure acting upon a large piston area and upon multiple strokes of the piston, high hydraulic pressure is produced with a pump plunger connected with the piston and acting upon oil within a hydraulic chamber. The oil pressure will run into several hundred pounds per square inch with the air pressure being less than one hundred pounds per square inch.

The sleeve puller 21 when set up to effect sleeve pulling action comprises a work cylinder having work piston 32 therein. The cylinder 31 has a thread for receiving a hose fitting 34 of the hose 27. The cylinder 31 has an enlarged forward portion 35 for receiving a plurality of circumferentially-spaced pull rods 36 screw fitted as indicated at 37, Fig. 2. The outer ends of the rods having reduced portions 38 on which is secured pull rod plate 39 by securing nuts 41. Fitted about the pull rod plate 39 is a cylinder sleeve guide bushing 42 which is made secure thereon against axial displacement by a set screw 43 entering a peripheral groove 44 in the plate 39. The pull rods 36 are slidable respectively through openings 45 of a flanged bushing 47 having a flanged ring 48 secured thereto by set screw 49, Figure 2, to which is secured a sleeve 51 adapted to surround the working parts of the puller and engage with the face of the engine block 23 exteriorly of replaceable cylinder sleeve 22 so as to permit the withdrawal of the cylinder sleeve 22 into the sleeve 51 as shown in Figure 3 as it is pulled from the engine block 23.

The piston 32 is tightly fitted in bushing 47 as indicated at 52. The piston 32 has a central opening through which is extended a piston return spring 53. This piston return spring extends from the piston through the bushing 47 and along a return spring guide rod 54 having head 55 fitted in a depression 56 on the pull rod plate 39. The guide rod 54 will be extended into the piston as the return spring is compressed at the time the fluid is admitted to the hydraulic cylinder 31. The piston 32 has a packing ring 57 to prevent leakage of the fluid past the piston.

The pulling rod plate 39 has threaded central opening 58 for receiving the puller segment holder assembly 61, Figs. 2 and 15. This puller segment holder assembly 61 comprises a puller segment holder 62 having an enlarged head 63

with a large peripheral opening 64 in which puller segments 65 are radially adjustable. These puller segments 65 are normally urged outwardly by puller segment spring plunger 66 containing respectively springs 67 adapted to react against the inner ends and extended into openings in which the plungers 66 are slidable. Each segment has a slot 68 having an inclined bottom face 69 with which there engages a retracting part 71 carried on a retracting pin plate 72 slidable on holder 62 and normally urged outwardly from the enlargement 63 by a retracting spring 74 surrounding the holder 61 and against a stop ring 75 fitted in a groove on the holder 61. The retracting pin plate 72 has push rods 76 which are adjustable through openings 77 in pull rod plate 39 for engagement with the inner face of bushing 47. When the work cylinder 31 has been extended outwardly of the piston 32 a sufficient extent for the engagement of push rods 76 with the bushing 47 as shown in Fig. 3, the retracting pins 71 will ride upon bottom surfaces 69 of slots 68 whereby to retract the segments 65 to release the same from the inner end of sleeve 22 so that the sleeve puller can be disengaged therefrom and drop from the engine block 23.

The holder 62 has a reduced threaded portion 81 for insertion within the threaded opening 58 of the pull rod plate 39. The enlargement 63 of the holder has two pins 82 extended therefrom across which can be applied a tool 83, Fig. 15, by means of which the segment holder assembly 61 can be secured upon the pull rod plate 39 or removed therefrom.

It should now be apparent that when the sleeve puller has been set up as shown upon the engine block with shoulders 84 of the segments 65 against the end of the sleeve 22 and with the operator depressing lever 29 of the pump 26, a pulling action is effected upon the sleeve 22 and the sleeve will be pulled outwardly of the engine block 23 and that the segments will be automatically retracted at the end of the pulling movement by the engagement of push pins 76 with bushing 47.

Referring now to Figures 10 to 14, the sleeve puller is shown arranged and set for a pushing action upon a sleeve to insert the same in place within the engine block. At this time the segment holder assembly 61 is removed from the pull rod plate 39 and in lieu thereof there is connected crank shaft hook 86 having a reduced threaded end 87 adapted to fit the threaded opening 81 of the plate 39. This hook is extended through the engine cylinder and fitted about either a large portion 88 of a crank shaft or a small diameter portion 89 thereof. A curved pad 91 is fixed to the hook by pins 92 extending into opening 93. If the hook is to be extended over the small diameter portion 89, an adaptor 94 is connected to the inner face of the pad 91 by a bolt 95.

The sleeve 22 is placed upon a ring 97 or bushing 47 and is started in the cylinder opening of the engine block 23 as shown in Fig. 12. The guide 42 is removed from the pull rod 39 so as to permit the free insertion of the parts within the cylinder opening.

The operator will step on the foot lever 29 of the pump 26 and the piston 32 will be moved outwardly of the cylinder 31 to cause the sleeve 22 to be extended into the cylinder opening to line the same as shown in Figure 13. Thereafter the hydraulic fluid will be released from the cylinder 31 and permitted to return to the

pump, whereby the parts can be released from the crank shaft and withdrawn from the engine block.

It should now be apparent that the sleeve puller upon effecting a small conversion job thereon is made into a pusher for the extension of the cylinder sleeve or lining into the cylinder opening of the engine block. This change can be effected with few operations and the puller readily made adaptable for use either as a pusher or puller.

While various changes may be made it shall be understood that such changes shall be within the spirit and scope of the present invention as defined by the appended claims.

What is claimed is:

1. An engine cylinder sleeve puller for removing a cylinder sleeve from an engine block comprising a work cylinder, pull rods extending from the work cylinder, a pull rod plate secured to the end of the pull rods, a pull segment holder assembly attached to the pull rod plate and having a plurality of radially movable segments adapted to engage with the end of a sleeve to be pulled, a work piston extending from the work cylinder, and sleeve means extending from the work piston and engageable with the engine about the cylinder sleeve when effecting the pulling operation and the extension of hydraulic fluid under high pressure to the work cylinder, said pull segment holder assembly having an enlargement with segment openings therein for reception of said movable segments, spring biasing means within the openings for normally urging the outward movement of the segments, and a retracting device operatively associated with the holder assembly and including retracting pins arranged for engagement with said movable segments, and push rods adapted for abutment with a portion of said puller at the end of the sleeve removal operation so that said retracting pins will be caused to force the movable segments out of engagement with the end of the sleeve.

2. An engine cylinder sleeve puller comprising a work cylinder, pull rods extending from the work cylinder, a pull rod plate secured to the end of the pull rods, a pull segment holder assembly attached to the pull rod plate and adapted to engage with the end of a sleeve of an engine to be pulled, a work piston extending from the work cylinder, and means extending from the work piston and engageable with the engine about the cylinder sleeve when effecting the pulling operation and the extension of hydraulic fluid under high pressure to the work cylinder, said pull segment holder comprising an enlargement, pull segments operable thereon, resilient means urging said pull segments outwardly toward engaging position with relation to the engine sleeve, and a retracting device comprising retracting pins, a retracting pin plate adjustable upon the holder and containing the retracting pins, push pins extending from the retracting plate, said pull rod plate having openings slidably receiving said push pins, said push pins engageable with said means connected to the piston and adapted for engagement with the engine, said segments having inclined surfaces thereon, and said retracting pins operable upon the inclined surfaces of the segments to cause their inward movement upon the engagement of the push pins with the means connected to the piston.

3. In a cylinder sleeve puller a retracting device comprising a segment holder assembly including a pull rod and an enlarged head having a plurality of movable segments being resiliently urged outwardly in a radial direction, said movable segments each having a shoulder to engage an end portion of the sleeve to be pulled, a retracting pin plate surrounding the pull rod and slidably mounted thereon for relative movement with respect to said enlarged head, push rods extending from said plate on one side, and a plurality of retracting pins extending from the other side, said retracting pins each being engageable with a movable segment, said push rods adapted to engage a portion of said puller at the end of the sleeve pulling operation to cause said retracting pins to force said movable segments from engagement with said sleeve.

4. In a cylinder sleeve puller according to claim 3, wherein a resilient means is compressively arranged between the segment holder assembly and the retracting pin plate.

5. In a cylinder sleeve puller according to claim 4, wherein each retracting pin engages a camming surface formed in each movable segment to provide for movement of the segment in an inwardly radial direction.

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