April 11, 1939. H. R. ROSENBERRY 2,153,845

HYDRAULIC JACK AND METHOD OF MAKING SAME

Filed March 4, 1936 2 Sheets-Sheet 1

Fig. 1

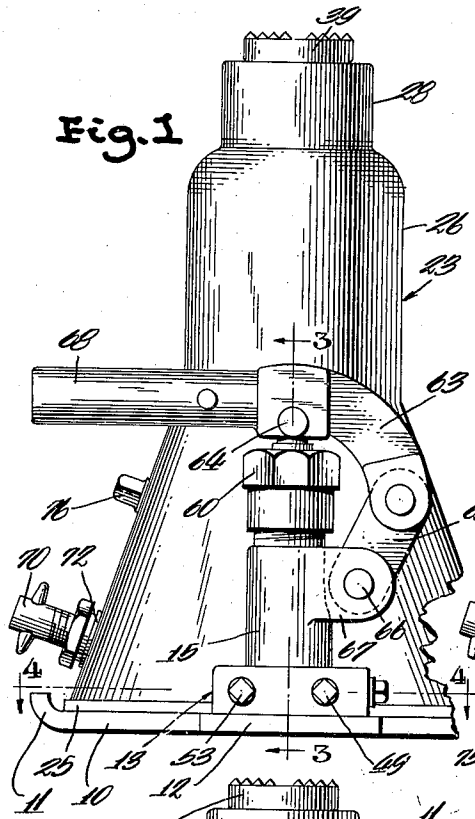


Fig. 2

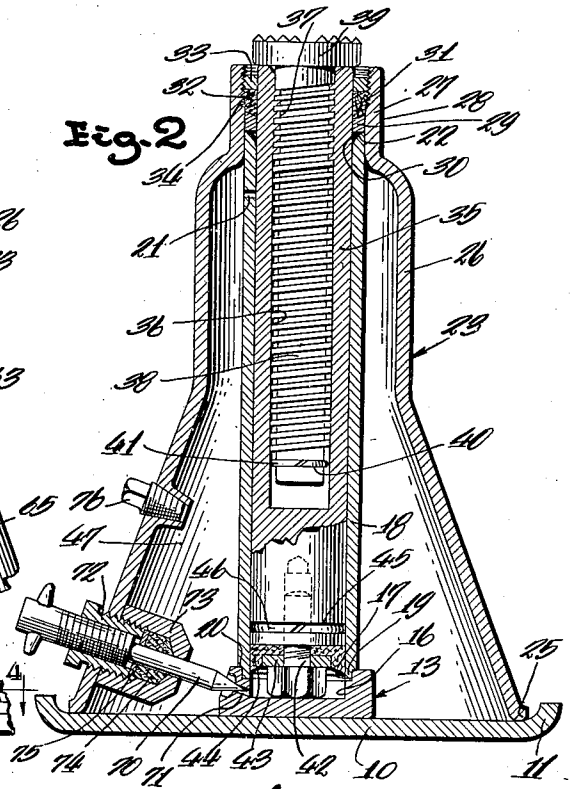


Fig. 3

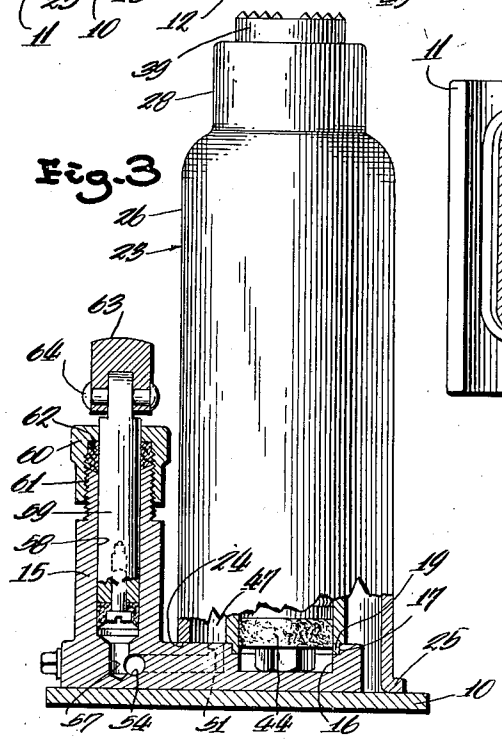
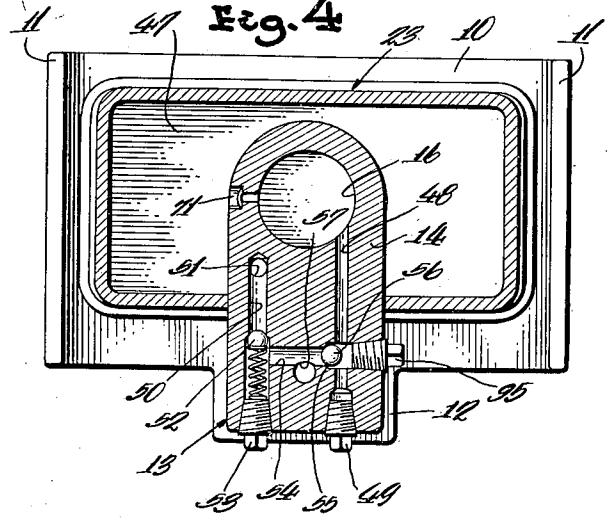


Fig. 4



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Fig. 5

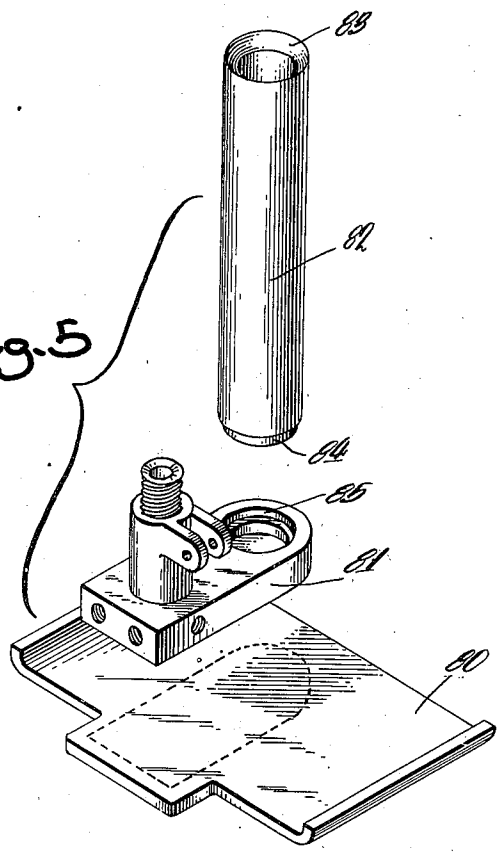
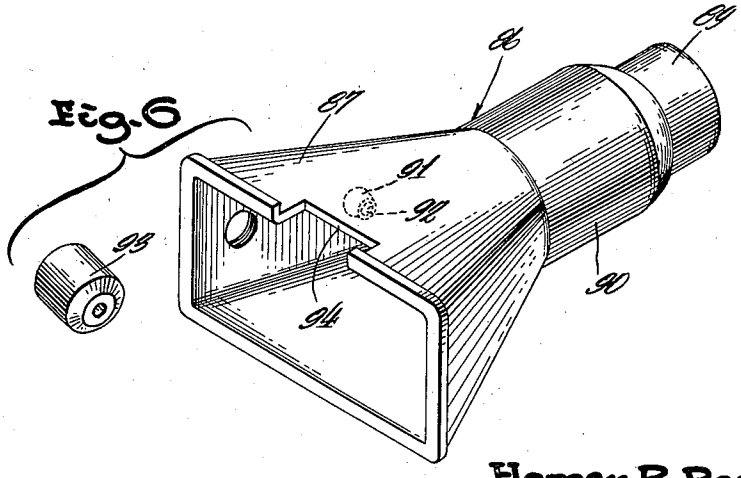


Fig. 6



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HYDRAULIC JACK AND METHOD OF MAKING SAME

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11 Claims. (Cl. 29—148)

This invention relates to hydraulic jacks, and to a process for making the same, and has for an object the production of a new and improved jack of this character through practice of a new and improved process.

In the drawings accompanying this specification and forming a part of this application, I have shown, for purposes of illustration, certain embodiments which my invention may assume, and in these drawings:

Figure 1 is a side elevational view of the invention, a part of the casing being broken away to better accommodate the view to the sheet,

Figure 2 is a vertical sectional view of said invention,

Figure 3 is an end elevational view, partly in vertical section along the line 3—3 of Figure 1, and also disclosing the lower portion of the jack in vertical section,

Figure 4 is a horizontal sectional view, corresponding substantially to the line 4—4 of Figure 1,

Figure 5 is an exploded perspective view, partially disclosing the process of making the invention, while

Figure 6 is a perspective view showing further process features of the invention.

Referring first to Figures 1 through 4 of the drawings, the invention comprises a base plate 10, preferably oblong rectangular in plan, having its ends curved, as at 11, to facilitate rocking of the plate under certain conditions, and having a lateral extension 12 projecting centrally from one side edge thereof.

Affixed to the upper surface of the plate 10 is a fitting 13, having an elongated base block 14, affixed to the plate 10, as by flash welding, in a position centrally intersecting the longitudinal center line thereof, preferably at right angles, and extending laterally onto the extension 12 of the plate 10, as best shown in Figure 4, and also having a vertically extending, preferably cylindrical portion 15; the fitting 13, including the base block 14, and the vertically extending portion 15, preferably being in the form of an integral forging.

The inner end of the block 14 has formed therein a socket 16, counterbored as at 17, for the reception of a tube 18, the lower end of said tube having a reduced portion 19 fitting into the counterbore 17, and a shoulder 20 adapted to rest upon the top surface of the block 14, the reduced portion 19 and shoulder 20 being affixed in position, as by flash welding. Adjacent to its upper end the tube 18 is provided with an aperture 21, opening laterally through the wall thereof, and the upper extremity of the tube has its edge rounded off as shown at 22, for a purpose presently to be explained.

Surrounding the tube 18 is a casing 23, the lower end of which is oblong-rectangular in cross-section, having its central longitudinal axis disposed to coincide with that of the plate 10, and the lower end of said casing is cut out along one side edge, as at 24, to accommodate the block 14. The lower margins 25 of the casing 23, are outwardly turned, and are secured to the upper surface of the plate 10, as by flash welding. The marginal edge along the cut-out 24 is also welded to the upper and side surfaces of the block 14. The casing 23 from its marginal edges 25, tapers upwardly in oblong-rectangular cross-sectional formation, and some distance from the top thereof merges into a cylindrical section 26, surrounding, and spaced from, the wall of the tube 18, and adjacent the top thereof, the casing is still further reduced as at 27, to provide a cylindrical section 28 of an inner diameter to snugly accommodate the upper end of the tube 18. The cylindrical section 28 above the upper end of the tube 18 also snugly accommodates a ring or washer 29, the lower portion of which is square in cross-section and rests upon the upper end of the tube 18, and with the beveled upper end 22 of the tube 18 provides an annular groove 30, the lower wall of which is tapered for a purpose presently to appear. The upper surface of the ring 29 is preferably beveled inwardly as at 31 and supports packing material 32, held in position by a nut 33, threaded into the threaded portion 34 of the cylindrical section 28.

A ram 35 is slidably mounted in the tube 18, which now may be called the ram cylinder 18, and the ram 35 preferably comprises an initially solid cylindrical formation, of a diameter as to snugly, slidably fit the wall of the ram cylinder 18 substantially throughout its length, and thereby to be guided in its movements without the necessity for providing a pilot for the ram, or placing strains upon the packing, as occurs in jacks employing rams of less diameter than the internal diameter of the ram cylinder.

The upper end of the ram 35 is bored out, as at 36, and threaded as at 37, for the reception of a threaded jack screw 38, the screw 38 having an enlarged head 39 at one end, and the opposite end of the screw 38 is reduced to a diameter small enough to clear the crests of the threads 37, and the reduced portion is provided with an annular groove 40 adapted for the reception of a

split ring 41, made of material to cause the ring to spring outwardly when released, the ring 41 being confined within the groove 40 during insertion of the jack screw 38, and springing outwardly after passing the threads, and thereby preventing detachment of the jack screw 38.

The lower end of the ram 35 is bored for the reception of a screw bolt 42, which carries a washer 43, adapted to rest against the head of the bolt, and between the washer 43 and the under surface of the ram 35, there is clamped a cup-shaped packing member 44. Preferably just above the bottom thereof, the ram 35 is provided with an annular groove 45, adapted to accommodate a resilient ring 46, which springs outwardly, rides into the groove 30, when the ram is elevated, and engages the stop provided by the under surface of the washer 29, to thereby limit upward movement of the ram, the inclined surfaces 22 operating to cam the ring 46 back into the groove 45 when the ram is lowered.

The fluid for operating the jack is normally housed within a reservoir 47 formed between the tube 18 and casing 23, and passage of the fluid from the reservoir 47 to beneath the ram 35 is controlled by a valve arrangement housed in the block 14. This valve arrangement comprises a bore 48 drilled from the outer end of the block 14 horizontally inward, to communicate with the socket 16 beneath the ram 35, the outer end of the bore being closed by a threaded plug 49. A second bore 50 spaced from, and generally parallel to, the bore 48, is made in the block 14, and at its inner end has a duct 51 communicating with the reservoir 47. Substantially midway of the length of the bore 50, by a reduction in the diameter of the bore, there is provided a valve seat for the accommodation of a ball valve 52, a coiled spring being interposed between the ball valve 52 and a threaded plug 53 which closes the outer end of the bore 50. A third bore 54 extends inwardly from one side of the block 14, transversely thereof, intersects the bore 48, is provided with a valve seat 55 accommodating a ball valve 56, and thence communicates with the bore 50, being closed at its outer end by a plug 95.

Communicating with the transverse bore 54 is a duct 57, communicating with a pump cylinder 58, in which is mounted a piston 59. The piston 59 extends upwardly through a cap 60, which is threaded upon a reduced threaded portion 61 of the vertically extending portion 15, packing 62 being clamped between the cap 60 and portion 15, and surrounding the piston 59. The upper end of the piston 59 is pivotally connected to an operating lever 63, as at 64, one end of said lever being curved and pivotally connected to a link 65, which in turn is pivotally connected, as at 66, between ears 67 on the portion 15, while the opposite end of the lever provides a hollow handle portion 68 into which a handle extension may be inserted.

Means for returning the fluid from the ram cylinder to the reservoir, comprise a needle valve 70, the pointed end of which controls passage of the fluid through a duct 71, communicating with the socket 16, the valve 70 being threaded into a sleeve 72, which is threaded into the wall of the casing, and into a cup-shaped part 73 positioned at the inner surface of the wall of the casing, packing 74 surrounding an adjacent portion of the needle valve 70, arranged within cup-shaped part 73 and clamped in position by the inner end of the sleeve 72, which bears upon a washer 75, the washer 75 in turn bearing upon the packing 74. A filling opening is formed in the wall of the casing and normally closed by a threaded plug 76.

In operation, assuming the ram 35 to be in its lowermost position, and the needle valve 70 closed, upward movement of the pump piston 59, through manipulation of the lever 63, sucks fluid from the reservoir 47, past the ball valve 52, which yields to permit this action, and upon a downward stroke of the piston 59, the fluid so withdrawn is forced past the valve 56, thence through the bore 48 into the socket 16 and beneath the ram 35, subsequent reciprocation of the pump piston 59 serving to elevate the ram 35 as will be readily understood. The ram 35 is guided in its movement through its snug sliding fit with the ram cylinder 18, and accordingly there is no tendency of the ram to wabble. Upward movement of the ram 35 is positively arrested through the action of the resilient ring 46 which enters the groove 30 and engages the washer 29, and once this position is reached, the aperture 21 is uncovered and excess fluid is returned therethrough to the reservoir 47. Manipulation of the needle valve 70 to open the duct 71 allows the fluid beneath the ram 35 to enter the reservoir 47 and thereby permits the ram 35 to be lowered.

Referring now to Figures 5 and 6, a process is disclosed for producing a jack of the character already described in a highly economical and efficient manner. One of the principal drawbacks to more extensive sale and use of hydraulic jacks for automobiles is the expense in producing them, and the consequent relatively high cost thereof. Through practice of my process now to be disclosed, the cost of producing hydraulic jacks of excellent quality, has been greatly reduced.

In carrying out my process I employ a metal plate 80, such as the plate 10 heretofore described in detail, and by forging and boring operations separately form a fitting 81 also identical to the fitting 13 heretofore described in detail, except that the bores 48, 50, and 54 may be formed later, if desired, and I then attach an electrode to the plate 80, and a second electrode to the fitting 81, and cause the fitting 81 to be contacted with the plate 80 so as to occupy the position shown in dotted lines in Figure 5, on the plate 80, and upon such contact the plate 80 and fitting 81 are flash welded together.

I then employ a tube 82 which may be cheaply obtained as a standard article in the open market, even to the taper indicated at 83. To prepare the tube 82 for use in my process I perform only a simple machining operation to form the shouldered reduced end 84. After preparing the tube 82 in this manner, I attach an electrode to the tube 82 and another electrode to the fitting 81, and insert the end 84 of the tube into the socket 85 of the fitting 81, and upon contact, the end of the tube 82 is welded in the socket 85.

A second tube 86, of larger diameter than the tube 82 is employed. This tube may also be obtained cheaply in the open market, and it is then subjected to a simple drawing operation which draws out the end thereof into a tapered formation oblong-rectangular in cross-section, as indicated at 87. At the opposite end of the tube 86 I perform a second simple drawing operation resulting in the production of an end section 89 of reduced diameter as compared to the original diameter of the tube 86 as exemplified in the un-

touched section 90 of the tube 86. I also preferably draw out a boss 91, surrounding a filling opening 92, and further form an aperture through the wall of the section 87, and then cover this opening at the inner surface of the casing wall with a short cylindrical section 93, which I weld in position. The section 87 is then cut out at one side, in the manner indicated at 94.

Following preparation of the tube 86 as described, I then take the formed tube 86 and slip it over the tube 82, after which I attach electrodes to the lower end of the tube 86, and to the plate 80, and flash weld the two together, the margins of the cut-out 94 being welded to the top and side surfaces of the fitting 81.

The ram 35 carrying its associated part already described, then has the washer 29, packing 32, and nut 33 placed thereon, and as a complete assembly is inserted into the ram cylinder tube 18/82, and when the nut 33 is screwed home, the ram and ram cylinder are permanently assembled and ready for operation.

With the steps of the process described entirely completed, only a few simple things remain to be done; the section 93 is drilled and threaded, and the boss 91 threaded for the reception of the plug 76, the previously prepared needle valve 70 applied, and the pump parts assembled by inserting the piston 59 in the cylinder 58, and screwing home the cap 60, all as already described.

Considerable variation of course may occur in the order of assembling the auxiliary parts, the features relating to fabricating the plate 80, fitting 81, tube 82, the formation of the tube 86, the manner of assembly, and the preparation and assembly of the ram 35, being of importance in the formation of an exceptionally cheap hydraulic ram construction of great durability and excellent operation.

It will be apparent to those skilled in the art that I have accomplished at least the principal objects of my invention, and it also will be apparent to those skilled in the art that the embodiments herein described may be variously changed and modified, without departing from the spirit of the invention, and that the invention is capable of uses and has advantages not herein specifically described; hence it will be appreciated that the herein disclosed embodiments are illustrative only, and that my invention is not limited thereto.

I claim:

1. A process for fabricating the permanent structure of a hydraulic jack, comprising: preforming a unitary member having a socket, and ducts communicating with said socket, and extending to the exterior of said member, and positioning said member on a base; affixing one end of a ram cylinder in the socket of said member; encircling said ram cylinder at a distance from said ram cylinder with a casing to be secured to said base to form a reservoir communicating through said ducts with the interior of said ram cylinder; electrically welding said unitary member, and said casing to said base; and electrically welding said ram cylinder to said unitary member.

2. A hydraulic jack, comprising: a ram cylinder and a casing surrounding said ram cylinder and cooperating therewith to form a fluid reservoir; a ram in said cylinder; valve-containing means for withdrawing fluid from said reservoir and applying the same beneath said ram to elevate said ram; said cylinder, said casing, and said valve-containing means being secured in position by welded connections.

3. A hydraulic jack, comprising: a base; a block having a socket, and ducts communicating with said socket and extending through said block and opening exteriorly thereof, said block being welded to said base with said socket uppermost; a ram cylinder seated in said socket and welded therein; a casing surrounding said ram cylinder and spaced therefrom, said casing having a flaring bottom welded to said base, and a contracted top supporting the upper end of said ram cylinder, said ducts furnishing communication between said socket and the interior of said ram cylinder and the reservoir space between said casing and said ram cylinder; and means controlling admission and withdrawal of fluid from said ram cylinder and reservoir.

4. A hydraulic jack, comprising: a base; a block having a socket, and ducts communicating with said socket and extending through said block and opening exteriorly thereof, said block being secured to said base with said socket uppermost; a ram cylinder seated in said socket and secured therein; a casing surrounding said ram cylinder and spaced therefrom, said casing having a flaring bottom secured to said base, and a contracted top supporting the upper end of said ram cylinder, said ducts furnishing communication between said socket and the interior of said ram cylinder and the reservoir space between said casing and said ram cylinder; and means controlling admission and withdrawal of fluid from said ram cylinder and reservoir.

5. A hydraulic jack, comprising: a base; a ram receiving member; a casing, secured to said base, and surrounding said member, and cooperating with said member and said base to form a fluid reesrvoir; a ram in said member; and a unitary fitting, having actuating means, and having also passage means formed only in said fitting, and so constructed and arranged that operation of said actuating means withdraws fluid from said reservoir and applies said fluid beneath said ram, to elevate said ram.

6. A hydraulic jack, comprising: a base; a ram receiving member; a casing, secured to said base, and surrounding said member, and cooperating with said member and said base to form a fluid reservoir; a ram in said member; and a unitary fitting, having pump means, and having also valve-controlled passage means carried entirely by said fitting, and so constructed and arranged that operative movement of said pump means withdraws fluid from said reservoir and applies said fluid beneath said ram, to elevate said ram.

7. A hydraulic jack, comprising: a ram receiving member; a casing surrounding said member and cooperating therewith to form a fluid reservoir; a ram in said member; and a unitary fitting, having a portion interiorly of said reservoir, and a portion exteriorly of said reservoir, said interior portion communicating with the interior of said ram receiving member, and said exterior portion having fluid actuating means, said fitting having valve-controlled passage means so constructed and arranged that operative movement of said fluid actuating means withdraws fluid from said reservoir and applies said fluid to the interior of said ram receiving member and beneath said ram, to elevate said ram.

8. A hydraulic jack, comprising: a base; a block, having an inwardly extending recess, said block being secured to said base so that access may be had to the interior of said recess; a tubular ram receiving member, having one end welded to the marginal surfaces of said recess; a casing

surrounding said ram receiving member, and cooperating therewith to form a fluid reservoir, said casing having one open end welded in fluid-tight relation to said base, and its other end supporting the other end of said ram receiving member; said block having passage means establishing communication between the interior of said ram receiving member and said reservoir; and means controlling admission and withdrawal of fluid from said ram cylinder and said reservoir.

9. A process of fabricating a permanent foundation structure for a hydraulic jack, which comprises: preforming, as separate articles of manufacture, a base, a ram cylinder, a ram cylinder supporting member, and a casing; assembling said articles in step-by-step relation, in each step affixing electrodes to the articles assembled, and bringing the articles together in the relation these articles are to assume when assembled, so as to flash-weld the contacting surfaces of the articles being assembled.

10. A process for fabricating the permanent s ructure of a hydraulic jack, comprising: preforming a unitary metallic block having first means adapted to communicate with a pump, and second means adapted to communicate with a ram cylinder, and having duct means formed in said block, certain of which provide communication between said first and second means; preforming a metallic base, and positioning said block on said base; pre-forming a ram cylinder and positioning said ram cylinder in communication with said second means; pre-forming a casing, and encircling said ram cylinder at a distance, with said casing, to define a reservoir, communicating through said duct means with the interior of said ram cylinder; welding said block and said casing to said base; and welding said ram cylinder to said block.

11. A hydraulic jack, comprising: a base; a block having first means adapted to communicate with a pumping means, and second means adapted to communicate with a ram cylinder, and duct means in said block, certain of which form communication between said first and said second means, said block being welded to said base; a ram cylinder welded to said block and communicating with said second means; a casing surrounding said ram cylinder and with said ram cylinder forming a reservoir communicating through other of said duct means with the interior of said ram cylinder, and welded to said base; and means, including said pumping means, for controlling admission to, and withdrawal from, of fluid with respect to said cylinder and said reservoir.

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