May 31, 1949. S. V. NOBLE 2,471,770

HYDRAULIC JACK

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Fig. 2.

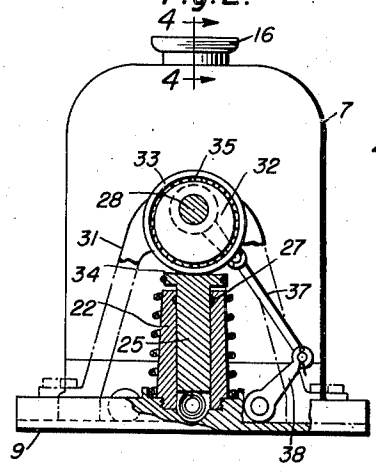



Fig. 1.

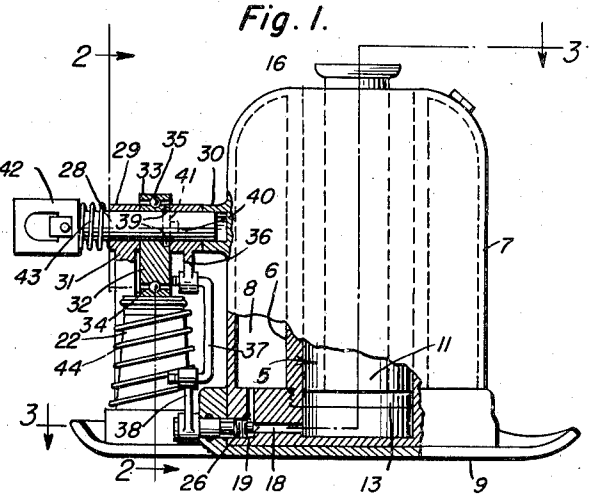



Fig. 3.

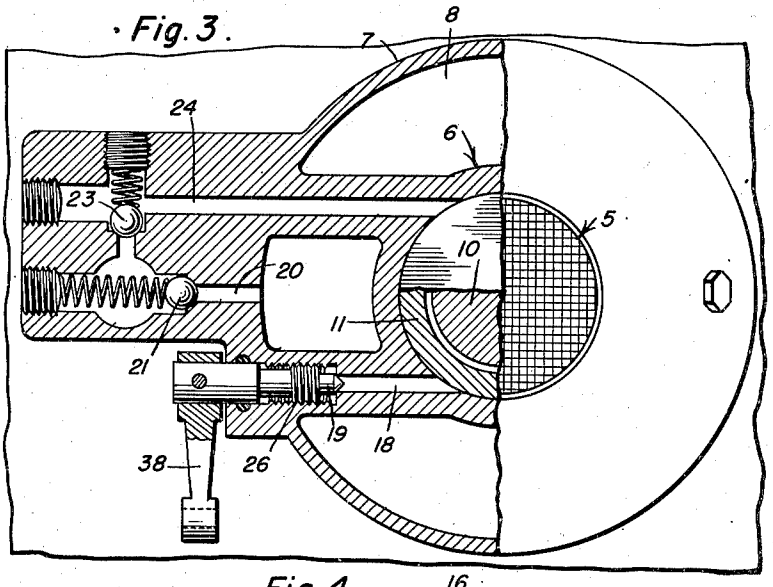
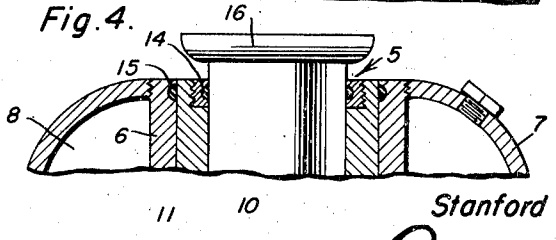



Fig. 4.




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Fig. 5.

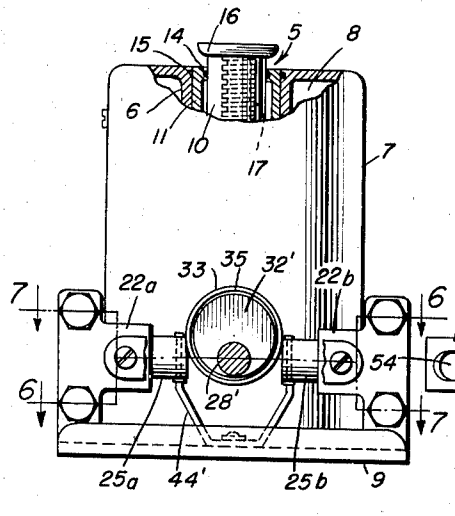



Fig. 8

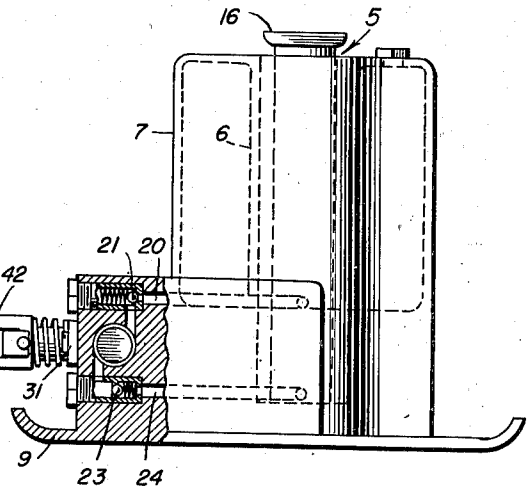



Fig. 6.

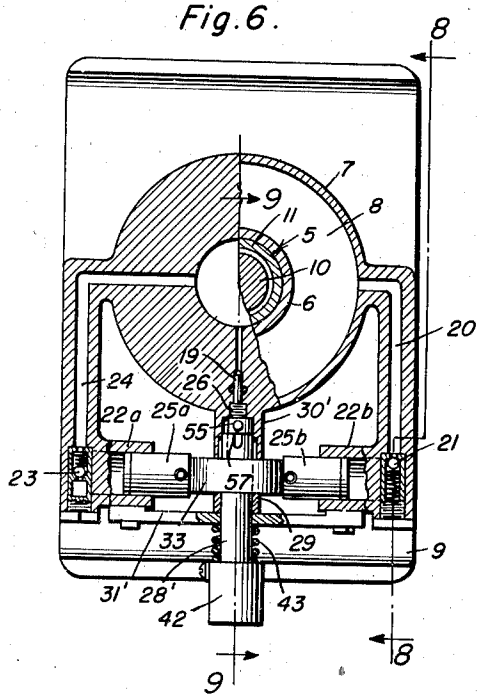
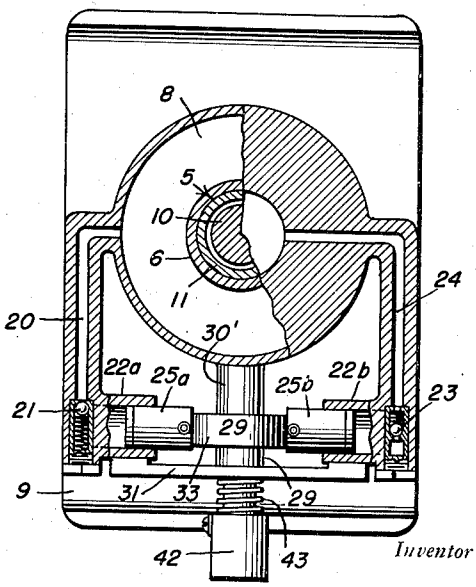



Fig. 7.




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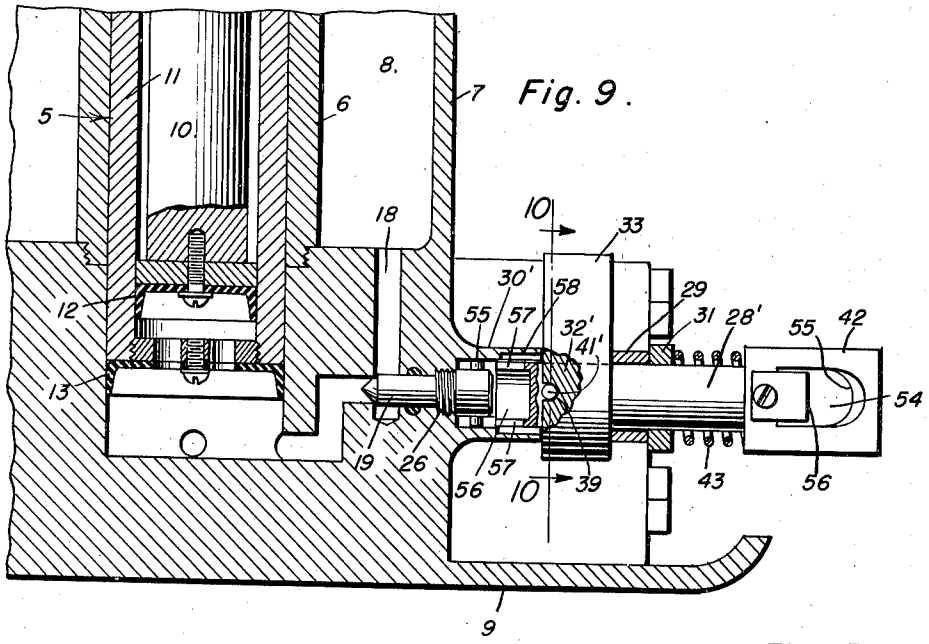



Fig. 9.

Fig. 10.

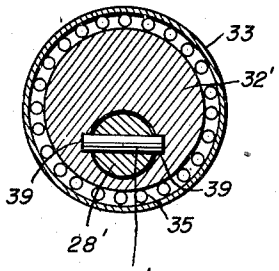



Fig. 13.

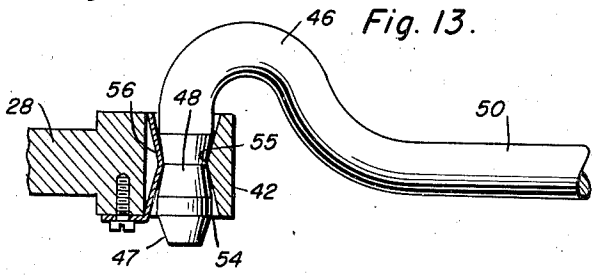



Fig. 11.

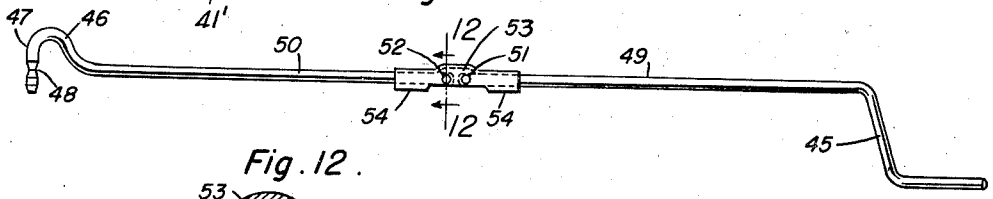
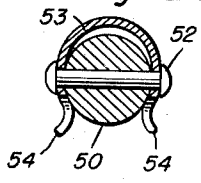



Fig. 12.




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2,471,770

# UNITED STATES PATENT OFFICE

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## HYDRAULIC JACK

Stanford V. Noble, North Hollywood, Calif.

Application August 6, 1947, Serial No. 766,661

6 Claims. (Cl. 60—52)

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This invention relates to improvements in hydraulic jacks of the type wherein a lifting ram is elevated by forcing fluid under pressure into the ram cylinder by means of a manually operable pump, and in which the fluid is bled from the ram cylinder by opening a manually operable bleed valve.

Heretofore, the pumps or jacks of the above type have been operated by means of a hand lever arranged so that use of the jack was difficult and inconvenient. Also, the prior jacks employed pump actuating hand levers having a detachable handle adapted to be removed and engaged with the bleed valve for actuating the same, thereby incurring the expenditure of a certain amount of time in transferring the handle from the lever to the bleed valve and vice versa.

The primary object of the present invention is to make the use of a hydraulic jack more easy and convenient by providing a pump whose piston is retracted by a spring and projected by the actuation of an eccentric carried on a shaft adapted to be engaged by a rotatable detachable handle.

Another object of the present invention is to provide means whereby the eccentric-carrying shaft may be moved longitudinally to disconnect the same from the eccentric and to operatively connect the same with the bleed valve, whereby the pump and bleed valve may be selectively actuated in an expeditious manner without disconnecting the handle from the eccentric-carrying shaft and engaging it with the needle valve.

Additional objects and features of the invention will become apparent from the following description when considered with the accompanying drawings, in which:

Figure 1 is a view, partly in side elevation and partly broken away and in vertical section, of a hydraulic jack constructed in accordance with the present invention;

Figure 2 is a sectional view taken substantially on line 2—2 of Figure 1;

Figure 3 is an enlarged view partly in top plan and partly in section, taken substantially on line 3—3 of Figure 1;

Figure 4 is an enlarged fragmentary vertical section taken on line 4—4 of Figure 2;

Figure 5 is a view somewhat similar to Figure 2, of a modified form of the invention;

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Figure 6 is a section taken on line 6—6 of Figure 5;

Figure 7 is a section taken on line 7—7 of Figure 5;

Figure 8 is a section taken on line 8—8 of Figure 6;

Figure 9 is an enlarged fragmentary vertical section taken substantially on line 9—9 of Figure 6;

Figure 10 is a vertical section taken substantially on line 10—10 of Figure 9;

Figure 11 is an elevational view of the type of handle preferably employed for actuating the pump of the present jack;

Figure 12 is an enlarged transverse section taken on line 12—12 of Figure 11; and

Figure 13 is an enlarged fragmentary view, partly in plan and partly in section, showing the detachable connection between the handle and the eccentric-carrying shaft.

Referring in detail to the drawings, the present hydraulic jack includes a ram 5 mounted in a cylinder 6 which is provided with a jacket 7 to form a reservoir 8 in which fluid is stored. The cylinder and jacket are provided with a suitable base 9, and the ram 5 is preferably of the multiple type comprising relatively movable inner and outer members 10 and 11 provided at their lower ends with the usual leather cups 12 and 13. The area of the inner ram member 10 exposed to the action of the fluid forced under pressure into the lower end of cylinder 6 is greater than that of the outer member 11 exposed thereto so that in operation of the jack, the inner ram member 10 will be elevated first and elevation of the outer member 11 will follow. Suitable packing rings are provided at 14 and 15, respectively between the upper end of outer ram member 11 and inner ram member 10 and between the upper end of cylinder 6 and the outer ram member 11, to prevent outward leakage of fluid between these members. The inner ram member 10 is provided at the top with a head 16 to receive the load to be lifted by the jack, and such head may be carried by an adjustable extension in threaded engagement with the inner ram member 10 as generally indicated at 17 in Figure 5. The base 9 is provided with a passage 18 that connects the bottom of reservoir 8 with the bottom of cylinder 6, and this

passage is controlled by a needle bleed valve 19 which may be opened to permit the fluid to pass from the cylinder 6 back to reservoir 8 when lowering of the ram and load is desired. Thus far described, the jack is of generally conventional construction.

In the embodiment of the invention shown in Figures 1 to 4 inclusive, fluid is drawn from the reservoir 8 through a passage 20 and past a check valve 21 of the base 9 into a vertical pump cylinder 22 mounted on the base 9, and said fluid is forced from said pump cylinder past a check valve 23 and through a passage 24 of the base 9 into the lower end of the ram cylinder 6. A piston 25 is reciprocable in the cylinder 22 to force the fluid past the check valve 23 and through the passage 24 into the ram cylinder to raise the ram. It will be seen that the needle valve 19 is threaded as at 26 and is adapted to be turned to open and close the same. The piston 25 extends past a packing ring 27 provided in the upper end of cylinder 22 and projects from the upper end of the latter.

A horizontal shaft 28 is rotatably and axially slidable in spaced bearings 29 and 30 respectively provided at the upper end of a standard 31 rigid with and rising from base 9 and fixed to the jacket 7. Journaled on the shaft 28 between the bearings 29 and 30 is an eccentric 32 surrounded by a strap 33 which bears upon a head 34 provided on the upper end of pump piston 25, antifriction bearing elements 35 being interposed between the eccentric 32 and strap 33. A crank arm 36 is journaled at one end on shaft 28 between eccentric 32 and bearing 30, and this crank arm is operatively connected by means of a link 37 with a further crank arm 38 secured on the outer end of needle valve 19. At their adjacent sides, eccentric 32 and crank arm 36 are respectively provided with recesses 39 and slots 40, and the shaft 28 carries a cross pin 41. At its outer end, shaft 28 is provided with a head 42, and a spring 43 is interposed between bearing 29 and head 42 so as to normally yieldingly move the shaft 28 to an outward position and to permit axial movement of the shaft 28 to an inward position. The arrangement is such that when the shaft 28 is in an outward position, cross pin 41 is engaged in recesses 39 so as to fix the eccentric 32 to shaft 28 for actuation by the latter and to unclutch shaft 28 from crank arm 36. Thus, when a suitable handle is engaged at one end with the head 42, rotation of such handle will be imparted to shaft 28 for rotating eccentric 32 and causing downward movement of pump piston 25. This piston is forced upwardly after each pumping stroke by a coil spring 44 surrounding the pump cylinder 22 and resting upon the base 9, as well as connected at its upper end to the head 34 of piston 25. The arrangement is also such that upon actuating the handle to force the shaft 28 inwardly, cross pin 41 is moved out of recesses 39 and into slots 40 so as to disconnect shaft 28 from eccentric 32 and connect it to the crank arm 36. While the shaft 28 is held in this inward position, the handle may be turned to rotate shaft 28 and thereby turn needle valve 19 through the connection 37, 38 so as to open said needle valve and permit the fluid to bleed from the ram cylinder 6 back to the reservoir 8 so that lowering of the ram and the load is effected. Of course, previous reciprocation of pump 25 will have caused fluid to be pumped from the reservoir 8 into the ram cylinder 6 for effecting elevation of the ram and load. As soon as the ram has completely lowered, reverse rotation of shaft 28 while clutched to the crank arm 36 will effect turning of needle valve 19 for closing the same so as to condition the jack for the next jacking operation. The preferred form of operating handle and connection thereof with the head 42 are illustrated in Figures 11 to 13 inclusive. As shown, this handle comprises an elongated shank having a crank 45 at one end, the opposite end of the shank being formed to provide a gooseneck 46 whose free laterally directed end portion 47 is formed with a circumferential recess 48. The shank is preferably composed of elongated sections 49 and 50 which are foldable so that the handle may be compactly stored when not in use. For this purpose, the adjacent ends of the shank sections 49 and 50 are separately pivoted at 51 and 52 within a longitudinally split sleeve 53 whose intermediate portion is of semi-circular cross section and whose end portions are provided with resilient extensions 54 that yieldingly hold the shank sections 49 and 50 in aligned relation when the handle is unfolded. The head 42 of shaft 28 has a transverse opening as at 54 to receive the laterally directed end 47 of the handle as shown in Figure 13, the opening 54 being formed at its outer side as indicated at 55 to seat in recess 48. The end 47 of the handle is pressed into engagement with the wall of opening 54 at 55 by means of a spring catch 56 which releasably latches the end 47 of the handle to the head 42 with the shank sections 49 and 50 axially aligned with the shaft 28. It will be apparent that the pump may be conveniently actuated even though the jack is located a considerable distance inwardly of an end of a motor vehicle beneath the latter, and the adjacent bumper and other parts of the vehicle will not interfere with ready actuation of the pump as is the case with hydraulic jacks whose pumps are actuated by vertically swinging hand levers. The rotary actuation of the handle provides a convenient and expeditious way of operating the jack with a minimum expenditure of manual effort and time.

Referring to the embodiment of the invention illustrated in Figures 5 to 10 inclusive, the pumping means or device embodies two oppositely disposed pump cylinders 22*a* and 22*b* disposed horizontally in spaced relation, and the shaft 28′ carrying eccentric 32′ is interposed midway between the cylinders. Pistons 25*a* and 25*b* are reciprocable in the cylinders 22*a* and 22*b* and actuated by the eccentric 32′, a suitable U-shaped spring 44′ being anchored intermediate its ends to the base 9 and connected at its ends to the pistons 25*a* and 25*b* for retracting the latter. In this construction, a passage 20 provided with a check valve 21 and a passage 24 provided with a check valve 23 is provided for each pump cylinder. Also, with this arrangement, the needle valve 19 is located in axial alignement with shaft 28′ and is provided with a cross pin 55. The shaft 28′ is provided at its inner end with a socket 56 to receive the outer end of valve 19, and the walls of socket 56 have slots 57 to receive the ends of cross pin 55. The pin 55 and slots 57 replace the slots 40, and the elements 37 and 38 of Figure 1 are eliminated. The arrangement is such that when shaft 28′ is in its outward position under the influence of spring 43, the cross pin 41′ is engaged in recesses 39 of eccentric 32′. The arrangement is also such that upon inward movement of shaft 28′ the outer end of needle valve 19 is received in socket 56 and the ends of cross pin 55 are engaged in slots 57. This results in disconnection

of shaft 28' from eccentric 32' and connection of shaft 28' directly with needle valve 19 whereby the needle valve may be turned to open or close the same while the pumps remain idle and fluid is bled from the ram cylinder back to the reservoir for allowing lowering of the ram and load. It will be seen that shaft 28' is coupled to needle valve 19 upon inward movement of said shaft against the action of spring 43 while uncoupling the shaft from the eccentric 32'. Also, shaft 28' is normally held in an outward position by spring 43 to couple said shaft to eccentric 32' and disconnect it from needle valve 19. When the shaft 28' is rotated in the outward position thereof the pumps are actuated to force the fluid into the ram cylinder for elevating the ram and load as with the form of Figure 1. In the embodiment of Figure 5, the inner bearing 30' of shaft 28' is counter-bored so as to accommodate the ends of cross pin 55 and permit turning of the needle valve 19, the counter-bore being indicated at 58. Other than generally described above, the construction of both forms of the invention is generally similar, and remaining similar parts of both forms are indicated by like reference numerals. While the form of Figure 5 is more complicated and expensive than that of Figure 1, it may be operated with greater ease and is more efficient and quicker in action.

As the operation of both forms of the invention has been explained during description of the construction, no further reference to the operation is deemed necessary. Other modifications and changes in details of construction are contemplated, such as fall within the spirit and scope of the invention as claimed.

Having described the invention, what is claimed as new is:

1. A hydraulic jack comprising a vertical ram cylinder, a ram in said ram cylinder, a reservoir, a pump for forcing fluid from said reservoir into said ram cylinder to raise said ram, said pump including a pump cylinder having a piston reciprocable therein, said jack including a part having a passage through which the fluid may be bled from the ram cylinder to the reservoir to allow the ram to lower, a valve rotatable to open and close said passage, means including a rotatable eccentric acting upon said piston for reciprocating the latter, a manually operable rotatable and axially movable shaft on which said eccentric is mounted, and means to simultaneously clutch said eccentric to said shaft and disconnect said shaft from said valve when said shaft is moved axially in one direction and to simultaneously unclutch said eccentric from said shaft and connect said shaft to said valve when said shaft is moved axially in the opposite direction, whereby the shaft may be selectively used to actuate the pump piston or the valve.

2. A hydraulic jack comprising a vertical ram cylinder, a ram in said ram cylinder, a reservoir, a pump for forcing fluid from said reservoir into said ram cylinder to raise said ram, said pump including a vertical pump cylinder having a piston reciprocable therein, said jack including a part having a passage through which the fluid may be bled from the ram cylinder to the reservoir to allow the ram to lower, a valve located at one side of said pump and rotatable to open and close said passage, means including a rotatable eccentric disposed above and acting upon said piston for reciprocating the latter, a manually operable rotatable and axially movable shaft on which said eccentric is mounted, a crank arm



mounted on said shaft, an operative connection between said crank arm and said valve, and means to simultaneously clutch said eccentric to said shaft and disconnect said shaft from said crank arm when said shaft is moved axially in one direction and to simultaneously unclutch said eccentric from said shaft and connect said shaft to said crank arm when said shaft is moved axially in the other direction, whereby the shaft may be selectively used to actuate the pump piston or the valve.

3. A hydraulic jack comprising a vertical ram cylinder, a ram in said ram cylinder, a reservoir, two oppositely disposed pumps for forcing fluid from said reservoir into said ram cylinder to raise said ram, each pump including a pump cylinder having a piston reciprocable therein, said jack including a part having a passage through which the fluid may be bled from the ram cylinder to the reservoir to allow the ram to lower, a valve rotatable to open and close said passage, means including a rotatable eccentric arranged between and acting upon said piston for reciprocating the latter so that the pumps alternately force the fluid from said reservoir into said ram cylinder, a manually operable rotatable and axially movable shaft on which said eccentric is mounted, and means to simultaneously clutch said eccentric to said shaft and disconnect said shaft from said valve when said shaft is moved axially in one direction and to simultaneously unclutch said eccentric from said shaft and connect said shaft to said valve when said shaft is moved axially in the opposite direction, whereby the shaft may be selectively used to actuate the pump pistons or the valve.

4. The construction defined in claim 1, in combination with yieldable means acting to normally move said shaft axially in said one direction so as to normally clutch the eccentric to said shaft and disconnect the shaft from the valve.

5. A hydraulic jack comprising a vertical ram cylinder, a ram in said ram cylinder, a reservoir, a pump for forcing fluid from said reservoir into said ram cylinder to raise the ram, said pump including a pump cylinder having a piston reciprocable therein, said jack including a part having a passage through which the fluid may be bled from the ram cylinder to the reservoir to allow the ram to lower, a valve rotatable to open and close said passage, means including a rotatable element acting upon said piston for reciprocating the latter, a manually operable rotatable and axially movable shaft carrying said element, and means to simultaneously clutch said element to said shaft and disconnect said shaft from said valve when said shaft is moved axially in one direction and to simultaneously unclutch said element from said shaft and connect said shaft to said valve when said shaft is moved axially in the opposite direction, whereby the shaft may be selectively used to actuate the pump piston or the valve.

6. A hydraulic jack comprising a vertical ram cylinder, a ram in said ram cylinder, a reservoir, a pump for forcing fluid from said reservoir into said ram cylinder to raise said ram, said pump including a pump cylinder having a piston reciprocable therein, said jack including a part having a passage through which the fluid may be bled from the ram cylinder to the reservoir to allow the ram to lower, a valve operable to open and close said passage, means including a rotatable eccentric member acting upon said piston for reciprocating the latter, a manually

operable rotatable and axially movable shaft on which said eccentric member is mounted, and means to simultaneously clutch said eccentric member to said shaft and disconnect said shaft from said valve when said shaft is moved axially in one direction and to simultaneously unclutch said eccentric member from said shaft and connect said shaft to said valve when said shaft is moved axially in the opposite direction, whereby the shaft may be selectively used to actuate the pump piston or the valve.

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REFERENCES CITED

The following references are of record in the file of this patent:



UNITED STATES PATENTS

| Number | Name | Date |
|---|---|---|
| 1,706,309 | Miller et al. | Mar. 19, 1929 |
| 1,723,131 | Burkholden | Aug. 6, 1929 |

FOREIGN PATENTS

| Number | Country | Date |
|---|---|---|
| 322,507 | Great Britain | Dec. 9, 1929 |
| 390,004 | Great Britain | Mar. 30, 1933 |
| 643,761 | France | May 21, 1928 |
| 738,613 | France | Oct. 18, 1932 |