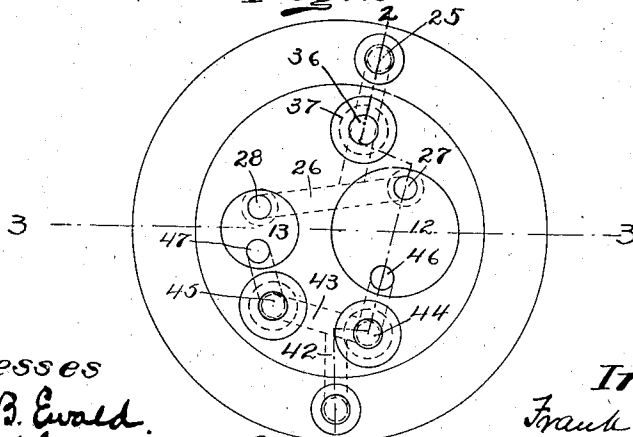
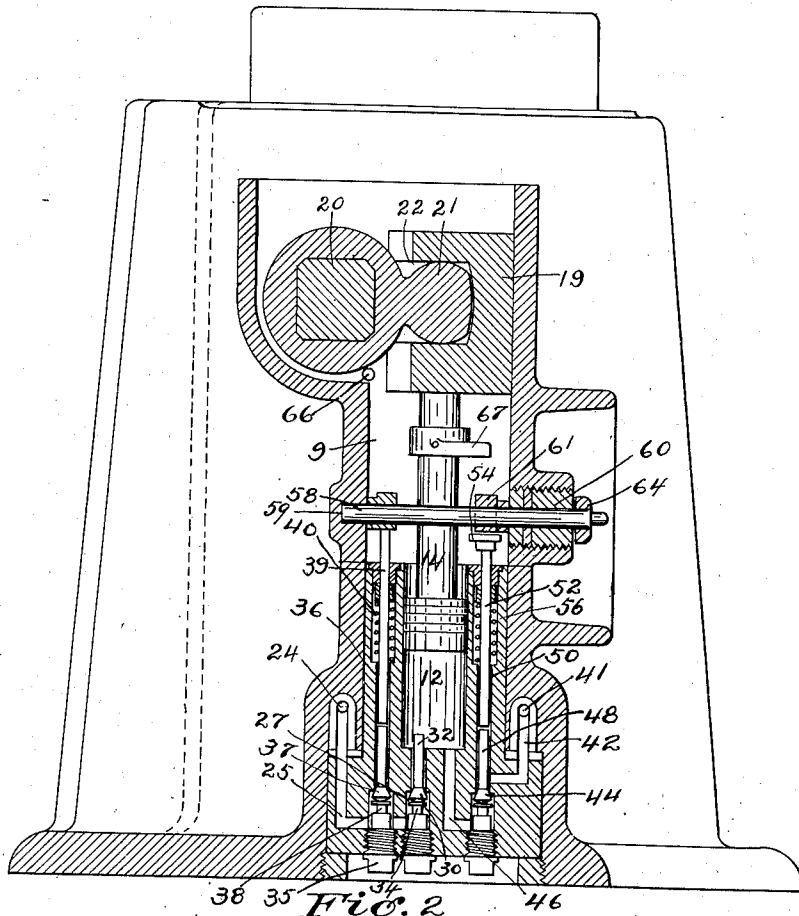


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HYDRAULIC JACK.
APPLICATION FILED JULY 6, 1910.

1,016,692.

Patented Feb. 6, 1912.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

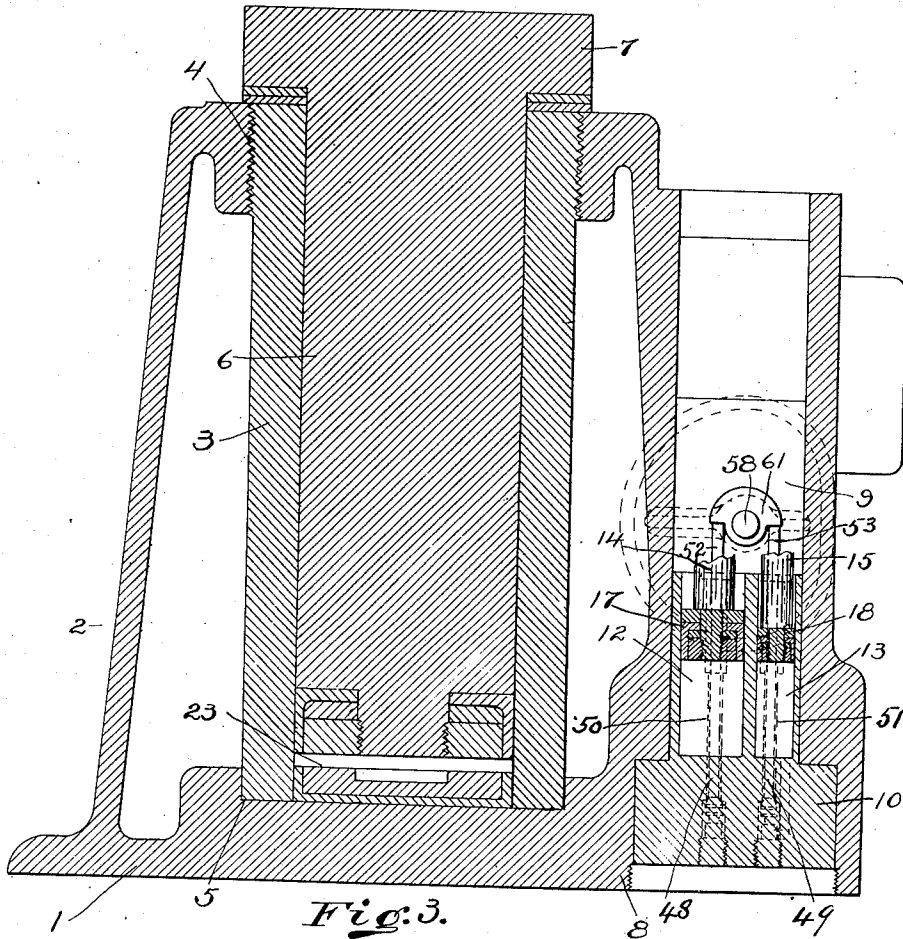


Fig. 3.

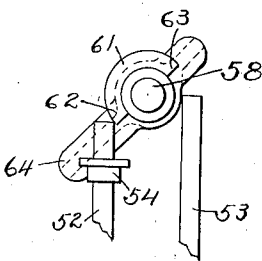


Fig. 5.

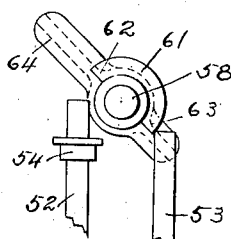


Fig. 6.

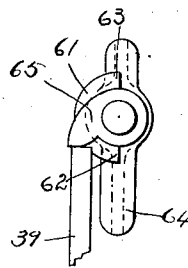


Fig. 7.

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3 SHEETS—SHEET 3.

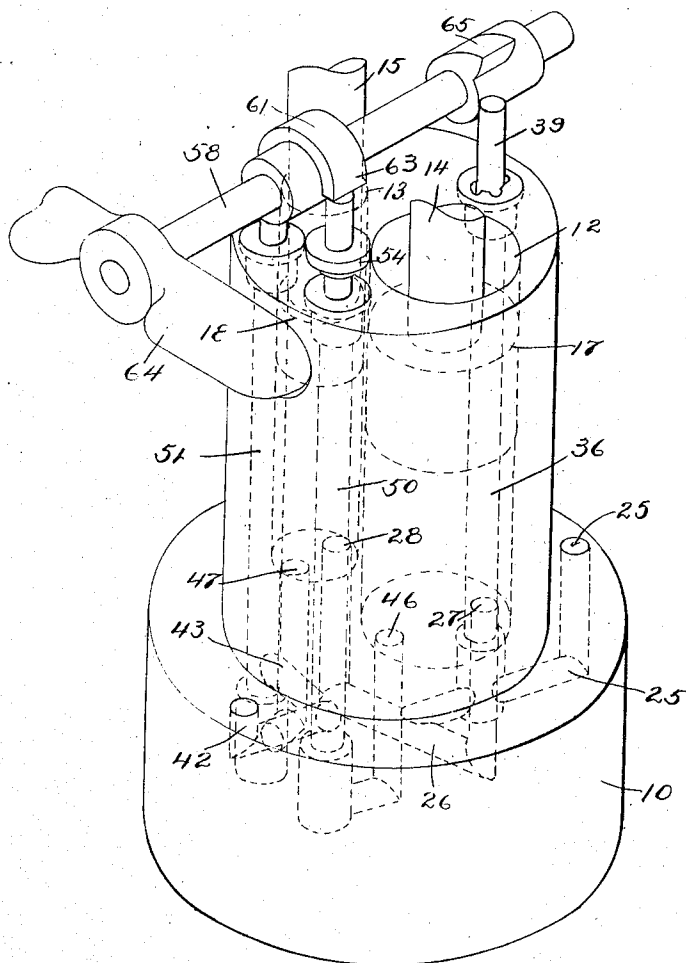


FIG. 4.

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UNITED STATES PATENT OFFICE.

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HYDRAULIC JACK.

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Specification of Letters Patent.

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Application filed July 6, 1910. Serial No. 570,665.

To all whom it may concern:

Be it known that I, FRANK I. JOYCE, a citizen of the United States, and a resident of the city of Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Hydraulic Jacks, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to improvements in hydraulic jacks, particularly of the outside pump type in which a double or multiple pump construction is provided for the purpose of speeding the movement of the ram until it has been raised to receive the full weight of the load.

The object of my invention is to provide a certain novel construction and arrangement of parts in this type of jack as will be hereinafter more particularly pointed out and claimed, in which the three speeds can be obtained with the use of two pumps; and in which the pumps may be readily and easily thrown into and out of connection and locked, and in which the jack may be tripped in any emergency and the movement of the ram shall stop automatically upon the release of the tripping mechanism.

In the drawings, Figure 1 is a plan view of the pump block removed from the pump cylinder. Fig. 2 is a vertical section of the pump cylinder and pump block, the section being indicated by the lines 2, 2, of Fig. 1. Fig. 3 is a vertical section taken through the ram cylinder and pump cylinder on a line indicated at 3, 3 of Fig. 1. Fig. 4 is a perspective view of the pump block and of the plungers and valves with the tripping mechanism in position. Figs. 5, 6 and 7 are detail views illustrating the various positions of the tripping mechanism.

1 is a solid and substantial base casting of a size and shape to hold the necessary weight and cast hollow to leave a reservoir 2 for the pump liquid surrounding the ram cylinder 3. This ram cylinder 3 is braced on all sides by being threaded into the top of the base at 4 and tightly fitted into a machine counterbore at the lower end at 5, so as to form a very solid and substantial construction. In the ram cylinder, the ram 6 is mounted, provided with the ram head 7. The base casting is formed with an exten-

sion 8 at one side cored out to form a pump cylinder 9 and to receive the pump block 10 and the operating parts of the pump.

The pump block is provided with two vertical pump chambers 12, 13, preferably of different diameters, and in these pump chambers the pump plungers 14, 15 operate, each being provided with the piston head 17, 18, suitably furnished with packing rings or otherwise packed so as to form a snug and tight fit in the pump chamber. Both of these plungers 14, 15, are secured to a yoke 19, adapted to reciprocate vertically in suitable guiding grooves in the casing wall, and the yoke and the plungers are reciprocated by the rocker shaft 20, provided with the cylindrically shaped rocker arm 21, which engages in the recess 22 in the yoke. The rocker shaft 20 is extended outside the pump and is operated by a hand lever, not shown, or in any other suitable way.

Drilled in the casing and opening at one end of the ram chamber 23, underneath the ram 6, is a passageway 24 (Figs. 1 and 2), which connects with the passageway 25, which is drilled in the pump block and extends downwardly and inwardly to connect by a branch 26 with the two vertical passages 27 and 28, which open into the base of the plunger chambers 12 and 13 respectively. The upper portions of the vertical passageways 27, 28, are contracted to form seats for the discharge valves 30 which open downwardly from the two pump chambers, and the stems 32, of these discharge valves project upwardly a short distance into their respective pump chambers, so that upon the complete depression of the pump piston, the discharge valves will be held open and away from their respective seats. The discharge valves are normally held closed by the spring actuated pins 34 mounted in the plugs 35 screwed into the base of the pump block. The passageway 25 also opens into a vertical passageway 36 drilled through the pump block and opening out into the pump cylinder 9. This passageway is for the emergency discharge and it is normally closed by the emergency discharge valve 37 held closed by the spring pin 38. 39 is the emergency trip rod which extends upwardly into the pump cylinder 9, and this emergency trip rod is normally held raised by

the coiled spring 40 engaging between the shoulder in the passageway and a sleeve on the trip rod.

For the suction end of the two pumps, a passageway 41 is drilled in the casing opening into the reservoir 2 which contains the pump liquid, and this passageway opens into the suction passageway 42 which extends downwardly and inwardly and opens into a horizontal branch 43 which in turn opens into passages above the suction valve 44, 45, beyond which connection is made with the vertical passageways 46, 47, opening into the base of the two pump chambers 12 and 13 respectively. The stems 48, of the suction valves extend upwardly through vertical bores 50, 51, which open into the pump cylinder 9, and each of these suction valve stems is provided with a rod 52, 53, one of which has a flanged top 54, and these rods are normally held up by the coiled springs 56, bearing between a shoulder in the bore and a sleeve on the rod.

58 is a cam shaft which is passed through the casing and across the pump cylinder 9 between the two plungers, and has a bearing at one end at 59 in the pump cylinder wall and at the other in the removable plug 60, by means of which the shaft is located in place. This shaft carries the double headed cam 61, the arms of which extend out over the upper ends of the two rods 52, 53 which control the suction valves of the two pumps. When the cam shaft 58 is in a position with the two arms of the cam extending horizontally, as shown in Fig. 3, both suction valves are free to move. When the cam shaft 58 is turned in the position shown in Fig. 5, the cam arm 62 holds down the rod 52 and the suction valve 44 is held open. When the cam shaft is turned in the opposite direction, as shown in Fig. 6, with the cam arm 63 in engagement with the rod 53, the other suction valve 45 for the other pump is held open. The cam shaft 58 is provided with a handle 64 outside the pump cylinder by means of which the cam shaft can be rocked. For convenience this handle is mounted in the same plane with the arms of the cam, so that when the handle is in horizontal position, the cams will be out of operation. The cam shaft 58 also extends alongside and above the emergency trip rod 39, and on the cam shaft is mounted the emergency trip cam 65, and by turning the cam shaft 58 a quarter of a turn, bringing the operating handle 64 into vertical position, this cam will depress the emergency trip rod 39 and open the valve 37, so that in this event there will be an open passageway from the ram chamber by the ducts 24, 25 and 36, into the pump cylinder 9, and thence by passage 66 into the cistern. In the event that the handle 64 is released when the emergency valve is tripped, the current of the liquid passing

by the emergency valve will be sufficient to close this valve inasmuch as with the handle 64 released, there will be no resistance to the rocking back of the tripping cam.

The operation of the device will be evident from the foregoing description.

Before the load is reached, the operation of the pump lever operates both pumps and the pump liquid is drawn from the cistern through both suction valves into the two pumps and discharged through both discharge valves into the ram cylinder, the double cam being in horizontal position, as shown in Fig. 3. When the cam is turned into the position shown in Fig. 6, the suction valve 45 will be held from its seat and in this position the liquid will flow back and forth between the small pump chamber and the cistern, putting this small pump out of operation, and the speed of the jack will be due to the action of the larger pump. When the double cam is turned into the position shown in Fig. 5, the suction valve 44 leading to the larger pump is held open and locked in that position, and the larger pump will be thrown out of operation, and the speed of the jack will be due to the action of the small pump alone. We therefore with this construction have three speeds for raising the ram,—the most rapid with both pumps acting; the second speed with the large pump acting alone, and the slowest speed with the small pump acting alone. Whenever in the course of use, it is desired to trip the jack in an emergency, the cam lever is turned so as to depress the emergency valve.

The construction is such as already stated that if the operator should become confused in any emergency and leave the jack, the load will not continue to lower and possibly do some damage, because the moment the emergency trip is released, the water current passing the emergency valve will close the valve.

For tripping in the ordinary way, I provide a trip block 67 on the large plunger 14 which is arranged to contact with the flanged head 54 on the suction rod 52 when the plunger is at the bottom of its stroke, so that the suction valve will be open at the same time that the face of the piston contacts with the stem 32 on the discharge valve.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. In an hydraulic jack, a ram cylinder with ram, a pump block outside the ram cylinder provided with a plurality of plunger chambers, a cistern for the pump liquid, a passageway from the cistern to each plunger chamber and a discharge passage to the ram cylinder from each plunger chamber, with suction and discharge valves for said passageways to and from the plunger chamber, the suction valves provided with paral-

lel stems extended upward into the space above the pump block, a cam shaft with double headed cam to engage said suction valve stems alternately to hold either of the

5 pumps out of action.

2. In an hydraulic jack, a ram cylinder with ram, a pump block outside the ram cylinder provided with a plurality of plunger chambers, a cistern for the pump liquid, a
10 passageway from the cistern to each plunger chamber and a discharge passage to the ram cylinder with branches from each plunger chamber, with suction and discharge
15 valves for said passageways to and from the plunger chambers, a passageway from said discharge passage beyond both the discharge valves into the cistern with a valve to close
20 said passageway having a stem projecting above the pump block and a lever to depress said stem to open the valve to trip the jack.

3. In an hydraulic jack, a ram cylinder with ram, a pump block outside the ram cylinder provided with a plurality of plunger chambers, a cistern for the pump liquid,
25 a passageway from the cistern to each plunger chamber and a discharge passage to the ram cylinder from each plunger chamber, with suction and discharge valves for said
30 passageways to and from the plunger chamber, a passageway from the discharge pas-

sage beyond both the discharge valves into the cistern with a valve to close said passageway and a lever to positively open said valve to trip the jack.

4. In an hydraulic jack, a ram cylinder 35 with ram, a pump block outside the ram cylinder provided with a plurality of plunger chambers, a cistern for the pump liquid, a passageway from the cistern to each plunger chamber and a discharge passage to the ram
40 cylinder from each plunger chamber, with suction and discharge valves for said passageways to and from the plunger chamber, the suction valves provided with parallel stems extended upward into the space above
45 the pump block, a passageway from said discharge passageway beyond the discharge valves into the cistern with an emergency valve to close said passageway having a
50 stem projecting above the pump block, a cam shaft with a double headed cam to engage the suction valve stems, and with a trip lever to engage the emergency valve stem whereby the pumps may be thrown out of
55 action and the jack tripped by the actuation of the cam shaft.

FRANK I. JOYCE.

Attest:

S. W. FROEHLE,
STELLA O'NEALL.