

N. KOHL & F. I. JOYCE.
HYDRAULIC JACK.

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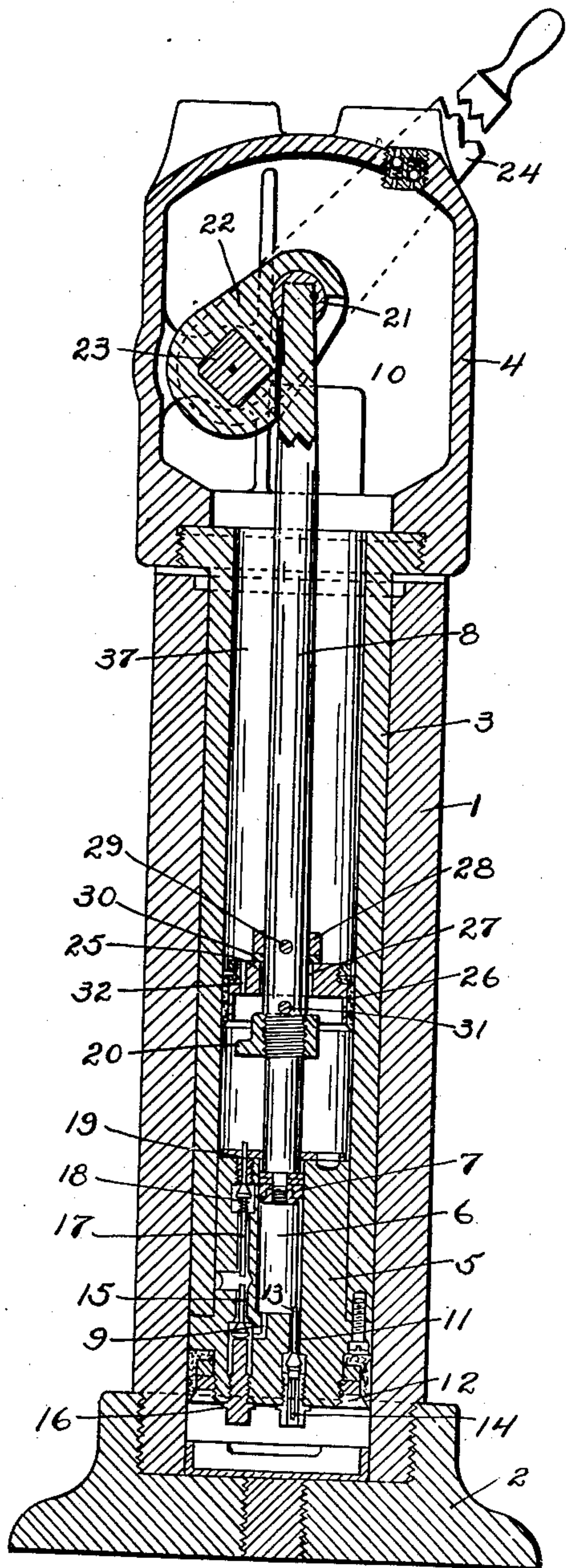


Fig. 1.

Witnesses
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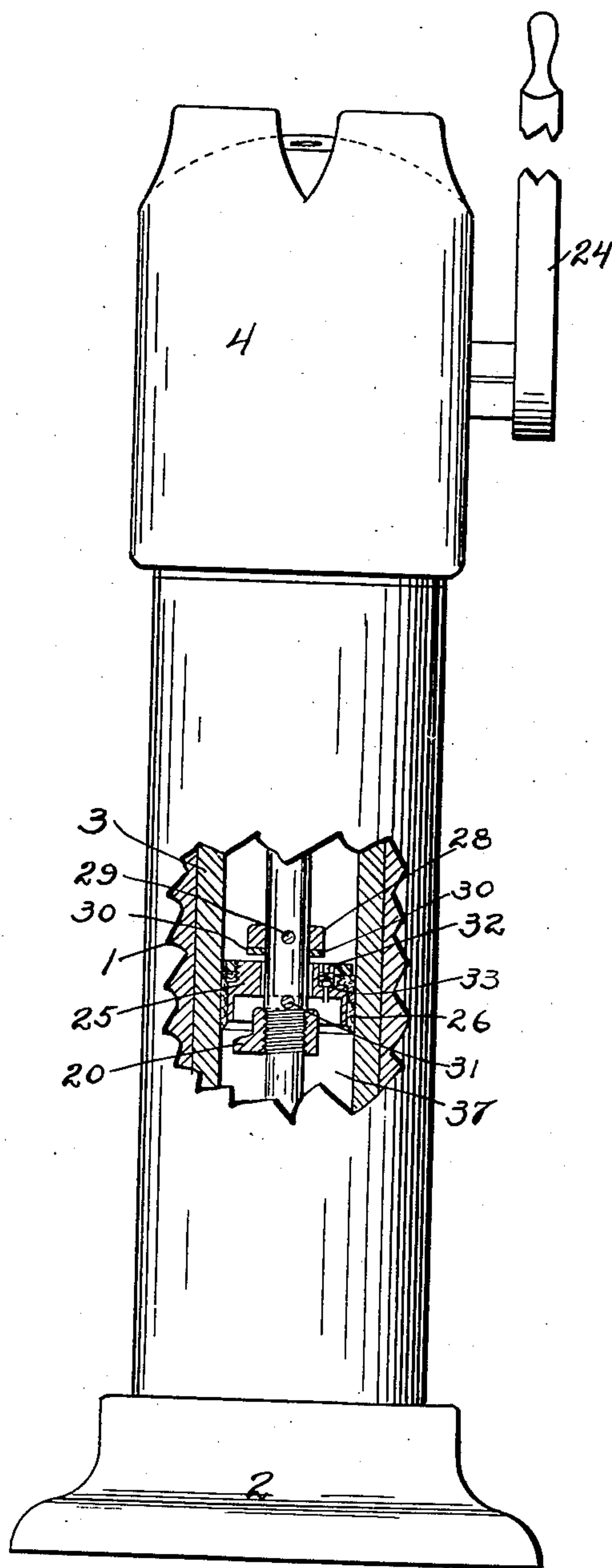


Fig. 2.

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HYDRAULIC JACK.

No. 918,167.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that we, NICHOLAS KOHL and FRANK I. JOYCE, citizens of the United States, and residents of Dayton, county of Montgomery, 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 part of this specification.

Our invention relates to improvements in hydraulic jacks more particularly in jacks designed for high tonnages, in which ordinarily the movement of the lifting head is necessarily slow, and the purpose of our invention is to provide a construction in which the ram may be moved rapidly up to the load automatically and without the necessity of any manual adjustment of the valves or levers.

In the drawings Figure 1 is a central vertical section of a hydraulic jack, embodying our improvement. Fig. 2 is a side elevation of the hydraulic jack, partly in vertical section, showing a modified form of the automatic auxiliary plunger.

1 is the cylindrical case for the operating parts, provided with the substantial base 2, into which the cylinder is screwed.

3 is the ram which carries the head 4, upon its upper end, and provided with the pump block 5, secured to the lower inner end of the ram. This pump block is provided with the usual central recess 6, within which works the piston head 7, of the pump rod 8.

9 is the suction passage from the pump cylinder 6, to the ram chamber 37, which opens into and is a continuation of the reservoir 10, in the head of the ram.

11 is the discharge passage from the pump cylinder 6, to the force chamber 12. This discharge passage is provided with the usual discharge valve 13, and the discharge stop 14, while the suction passage 9, is provided with a suction valve 15, suction stop 16, and a trip rod 17, with the trip rod spring 18, and the trip rod stop 19.

Screw threaded on the lower end of the pump rod 8, a proper distance above the pump block for the throw of the pump rod, is the trip collar 20, for tripping the jack.

The upper end of the pump rod 8, is secured by the knuckle joint 21, to the rocker arm 22, mounted on the rocker shaft 23, journaled in suitable bearing, within the ram

head 1, and extending through the case, provided on the outside with the operating lever 24, by means of which the pump rod is actuated to lift the ram.

The parts of the hydraulic jack which have been thus briefly described above, are the ordinary and usual parts of our hydraulic jack, as heretofore constructed.

The area of the pump rod in comparison with the sectional area of the force chamber, being necessarily small for jacks of high tonnages, the lift of the ram with each stroke of the pump rod, is consequently slight, and in order that the ram may be raised rapidly to the load, we provide as follows: Mounted loosely on the pump rod 8, is an auxiliary plunger 25, provided with a packing ring 26, to fit tightly in the ram cylinder. Ample space 27, is provided around the pump rod, for the normal circulation of the liquid in the ram, above and below the auxiliary plunger. 28 is a collar secured on the pump rod by the pin 29, and the lower surface of this collar is provided with a packing ring 30. 31 is a pin or stud which extends out from the pump rod 8, a short distance below the auxiliary plunger, and arranged to contact therewith in the movement of the pump rod. 32 is a small hole drilled directly through the auxiliary plunger.

Instead of providing a small opening 32, through the plunger without a check valve, this opening 32, may be provided with a check valve 33, as shown in Fig. 2, under spring tension.

Upon the up stroke of the pump rod, the collar 28 will be drawn away from the auxiliary plunger, and the auxiliary plunger will be raised by the stud 31, leaving a free circulating space 27, around the pump rod, for the circulation of the liquid, and the jack will operate in the ordinary way, the liquid being drawn through the suction passage 9, into the pump chamber 6, while on the down stroke of the pump rod, the collar 28, with its packing ring 30, will contact with the auxiliary plunger and close the opening 27, and until the head reaches the load the auxiliary plunger 25, will serve as the pump piston, and force the liquid rapidly through the suction and discharge passageways of the pump block into the force chamber, and thus the ram will be raised rapidly to the load. The size of the opening 32, through the auxiliary plunger, or the tension of the spring of the

check valve 33, when the valve construction is used, is so designed with relation to the parts, that when the jack is operated without the load, there will be ample pressure under the auxiliary plunger to force the ram up at full speed, but when the load is reached the piston head 7, of the pump rod, will continue its work and the passageway 32, will permit the surplus liquid to pass back into the main reservoir. It follows from this that during the operation of the jack in raising the load, the movement necessarily being slow, that the auxiliary plunger is without function, but that when the ram head is being raised to the load, the auxiliary plunger automatically comes into play to raise the ram at full speed.

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

1. In a jack of the class described provided with a ram, pump rod and pump, an auxiliary plunger mounted loosely on the pump rod in the ram cylinder, and fixed stops on the pump rod to engage the plunger, acting on opposite sides of the plunger, with passages through the plunger of different size, and means for closing automatically the larger passage way during the down stroke of the pump rod, to bring the auxiliary plunger into action.

2. In a jack of the class described, provided with a ram, pump rod and pump, an auxiliary plunger mounted loosely on the pump rod in the ram cylinder, with means on the pump rod to engage the plunger acting on opposite sides thereof, passageways through the plunger of different size, one passageway of a size to permit ready circulation of the pump liquid and the other adapted to impede the circulation, with means for automatically closing the larger passage way during the down stroke of the pump rod, as and for the purpose described.

3. In a hydraulic jack, the combination with the ram, pump rod and pump, with suction and discharge passages therefor, of an auxiliary plunger in the ram cylinder loosely mounted between stops on the pump rod, with passage ways through the auxiliary

plunger, one passage way larger than the suction passage from the pump, the other smaller than the discharge passage therefrom, and means for closing the larger passage way during the down stroke of the pump rod, whereby when idly acting the auxiliary plunger will be brought automatically into action.

4. In a hydraulic jack the combination with the ram, pump rod and pump, an auxiliary plunger mounted loosely on the pump rod in the ram cylinder, a stop on the pump rod for raising the plunger, and a collar secured to the pump rod above the plunger, an opening through the plunger with packing on the under surface of the collar to cut off said opening on the down stroke of the pump rod, and an additional opening through the plunger of small size, out of alinement with said collar and not affected by the movement thereof.

5. In a hydraulic jack the combination with the ram, pump rod and pump, an auxiliary plunger mounted loosely on the pump rod in the ram cylinder, a stop on the pump rod for raising the plunger, and a collar secured to the pump rod above the plunger, an opening through the plunger with packing on the under surface of the collar to cut off said opening on the down stroke of the pump rod, and an additional opening through the plunger, out of alinement with said collar and not affected by the movement thereof, and a check valve in said opening under spring tension, to retard the passage of the pump liquid on the down stroke of the pump rod.

6. In a jack of the class described, provided with a ram, pump rod and pump, an auxiliary plunger mounted on the pump rod in the ram cylinder, with passages through the plunger of different sizes, and means for closing automatically the larger passageway during the down stroke of the pump rod, to bring the auxiliary plunger into action.

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