

Nov. 5, 1929.

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1,734,816

HYDRAULIC LIFTING JACK

Filed Sept. 22, 1925

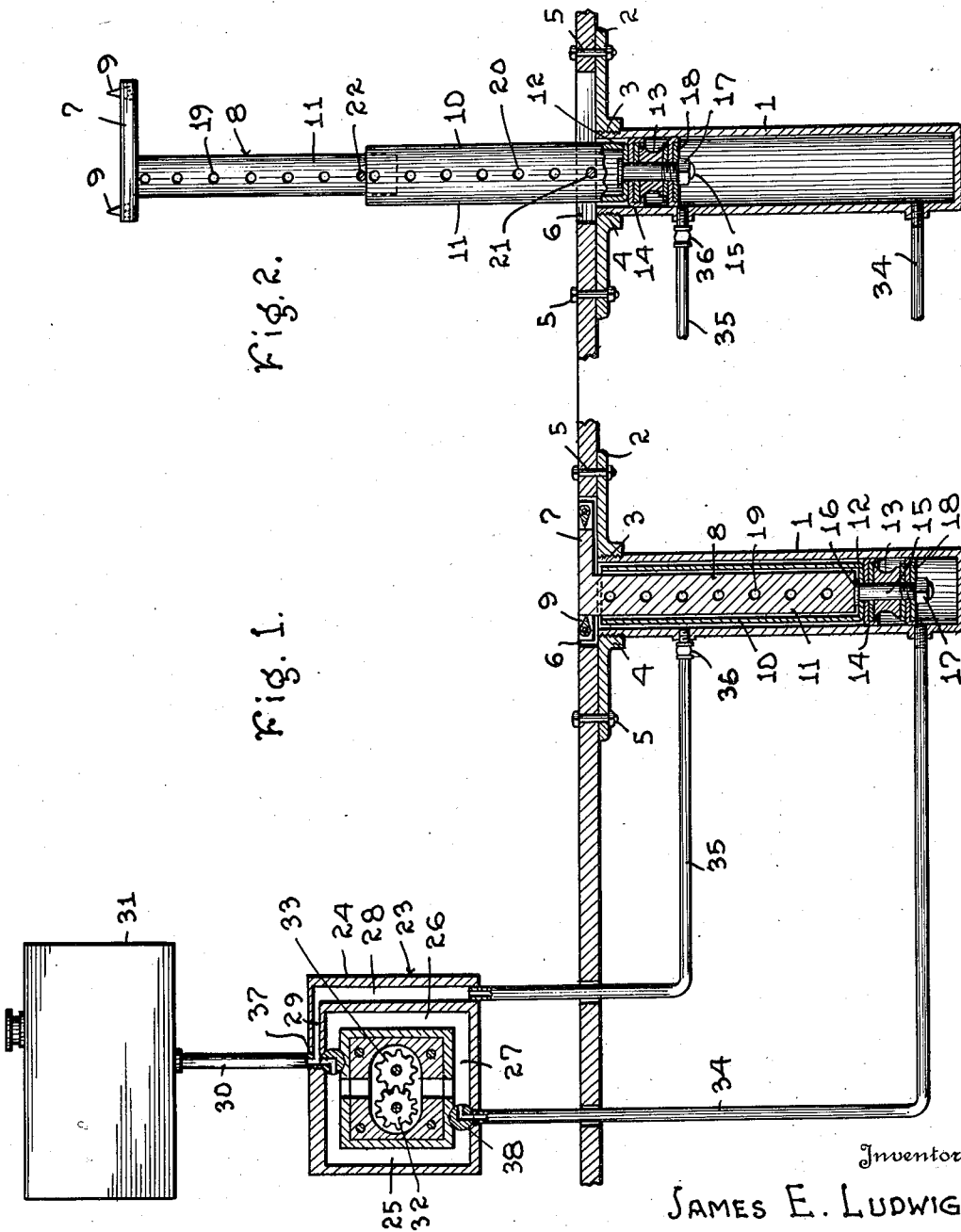


Fig. 2.

Fig. 1.

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HYDRAULIC LIFTING JACK

Application filed September 22, 1925. Serial No. 57,837.

It is a purpose of the present invention to provide, in a hydraulic jack of the concealed or disappearing type, a two-part lifting piston rod or member, so that objects which rest directly upon the floor or a very short distance thereabove may be lifted, or an object which is supported a substantial distance above the floor may be lifted, the two parts of the piston rod or lifting member being telescopically united and one part being held in different adjusted positions within the other part, so as to render the lifting piston rod extensible.

Another purpose is to provide a lifting jack wherein a gear pump is employed for forcing the lifting fluid under the piston, and after the piston is raised, to keep the fluid circulating, there being means to hold the lifting piston rod in a lifted position so as to stop the action of the pump.

Still another purpose is the provision of a hydraulic pump of the gear type including means for withdrawing the lifting fluid from under the piston and conveying it back into the tank, so as to allow the lifting piston rod to descend to its normal position provided the holding means for the lifting piston rod is removed.

It is to be understood that the particulars herein given are in no way limitative and that, while still keeping within the scope of the invention, any desired modifications of detail and desired proportions may be made in the apparatus according to the circumstances.

The invention comprises further features and combinations of parts to be hereinafter set forth, shown in the drawings and claimed.

In the drawings:

Figure 1 is a vertical sectional view through the improved hydraulic lifting pump, showing the lifting piston rod and the piston in its normal lowered position.

Figure 2 is a vertical sectional view through the lifting jack proper, showing the lifting piston rod in a raised position.

Referring to the drawings, 1 designates a cylinder provided at its upper end with a substantial circular flange 2. The flange is in the form of a plate with a central opening

3 which has an annular collar 4. The opening 3 is threaded to threadingly engage with the upper end of the cylinder 1. The flange 2 may be bolted at 5 to the under surface of the flooring of a building so as to support the cylinder in a depending position below the flooring.

The flooring is cut away or provided with an opening 6 for the reception of a radius arm 7 which is carried by the lifting piston rod 8. The radius arm carries folding safety lugs 9 which, when extended, may engage on opposite sides of an object to be lifted or under an object, thereby preventing displacement thereof during the act of being lifted. The lifting piston rod is telescopically mounted in the cylinder 1 and consists of two sections, an outer tubular section 10 and an inner rod section 11, the latter being telescopically mounted within the former which is closed at its lower end, as indicated at 12.

A piston 13 is mounted for movement in the cylinder 1 and is provided with suitable packing 14 to prevent the escape of the lifting fluid to a point above the piston. A threaded rod 15 passes through the piston and has a head 16 on one end thereof to retain the upper packing on the piston, there being a member or nut 17 threadingly engaged with the lower end of the rod 15 to hold the lower packing in position. Suitable plates 18 are interposed between the head and the nut 17 to insure clamping the packing in position. The inner and outer sections of the lifting piston rod are provided with transversely disposed openings or apertures 19 and 20 which register when the two sections are in normal lowered positions, so as to receive a pin 21 to hold the lifting piston rod in a raised position.

It is obvious that the inner section of the lifting piston rod may, as in Figure 2, be telescopically raised manually, so that the radius arm 7 may engage under an object to be lifted which stands a considerable distance from the surface of the floor, that is to say, before the outer section 10 of said rod is actuated by the hydraulically moved piston 13. However, it may be noted that

the lifting piston rod may be actuated hydraulically without first having lifted the inner section of the lifting piston rod, so that the radius arm 7 may engage under an object 5 to be lifted which either rests directly upon the floor or a very short distance above the surface of the floor.

When the inner section 11 is raised manually for the purpose of permitting the arm 10 7 to engage under an object which stands a substantial distance above the surface of the floor, a pin 22 may engage through certain of the openings or apertures 19, the pin resting upon the upper end of the section 10 of 15 the lifting piston rod so that the section 11 may be held in a raised position with respect to the section 10. The section 11 may be moved telescopically substantially half the distance of the section 10, in which case the 20 pin 22 may pass through certain of the registering openings or apertures 19 and 20. By this arrangement, the lifting piston rod is rendered extensible for lifting objects which stand at different heights from the surface 25 of the floor.

A gear pump 23 is provided which comprises a casing 24 with interior passages 25 and 26 and 27 and 28. The passage 27 is positioned substantially centrally of the casing 30 of the pump, whereas the passage 28 is formed through the pump to the right of the center of the pump and communicates at 29 with a pipe 30 leading from a tank 31. This tank contains a lifting fluid for the purpose 35 of imparting a lifting action to the lifting piston rod. Midway of the passage 27 are intermeshing gears 32 and 33, of which only one, for instance the gear 32, may be manually or automatically actuated, thereby imparting 40 ing movement to the other. The intermeshing teeth of these gears are substantially in the center of the passage 27, so as to feed the lifting fluid through the pump.

A pipe 34 communicates with the passages 45 25 and 26 and is in turn connected to the lower end of the cylinder 1 at a point to supply the lifting fluid under the piston. A pipe 35 is threaded into the casing of the pump and communicates with the passage 28 which in 50 turn, as previously stated, communicates with the pipe 30 which leads to the tank. The pipe 35 is in turn connected to the cylinder 1 in order to communicate with the interior thereof, there being a check valve 55 36 located at the point of connection of the pipe 35 with the cylinder 1, thereby preventing a backflow of the liquid fluid into the cylinder.

A two-way valve 37 is located where the 60 two passages 25 and 26 communicate with the pipe 30 while a second two-way valve 38 is positioned at the junction where the pipe 34 communicates with the passages 25 and 26.

When it is the purpose to impart movement 65 to the lifting piston rod, the system of the

pump being filled with a lifting fluid, the two-way valve 38 is set so as to communicate the pipe 34 with the passages 27 and 26 and the two-way valve 37 communicating the pipe 70 30 and the passage 27, rotating movement may be imparted to the gear 32, in which case the gears, at the point of their intermeshing, will impart movement to the lifting fluid and force it into the cylinder 1 under the piston. The piston will then rise to a position above 75 where the pipe 35 communicates with the cylinder 1. The lifting fluid will then circulate through the system of the pump, that is to say, will travel back through the pump by way of the pipe 35 and the passage 28 through 80 the pipe 30 to the tank.

After the piston has been elevated to a position just above the communication of the pipe 35 with the cylinder 1, the pin 21 may be inserted through the lifting piston rod to hold 85 the same in such supported position, as shown in Figure 2. The check valve 36 acts to prevent the lifting fluid from flowing into the cylinder 1 from the pipe 35. After the lifting piston rod has been raised and it is supported by the pin 21, the two-way valves 37 90 and 38 may be adjusted so as to communicate the passage 26 with the pipe 30 and communicate the pipe 34 with the passage 25, thereby closing communication between the 95 pipe 30 and the passage 25 and also closing communication between the passage 26 and the pipe 34. In this event, the fluid will be withdrawn from the cylinder 1 by way of 100 the pipe 34 through the passage 25, down through the passage 27, then through the passage 26 and up through the pipe 30, the gears 32 and 33 rotating in the same direction as 105 when feeding fluid from the tank through the passage 27 and through the pipe 34. When the lifting fluid is being withdrawn from the cylinder 1, the pin 21 has been previously removed, allowing the lifting piston rod to gradually descend.

The invention having been set forth, what is 110 claimed is:

A jack of the kind described comprising a cylinder, a member slidably mounted in the cylinder, a tank, a pump, a casing in which said pump is inclosed and formed interiorly 115 with a plurality of passages of which one is in constant communication with the tank and with the cylinder adjacent the upper end and the other is in valved communication with the tank and with the cylinder at the lower end, 120 and three-way valves for alternately and selectively placing either of said passages in communication with the pump.

In testimony whereof he affixes his signature. 125

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