Sept. 18, 1951 F. C. FOSS 2,568,437

HYDRAULIC SCREW JACK

Filed March 18, 1947 2 Sheets-Sheet 1

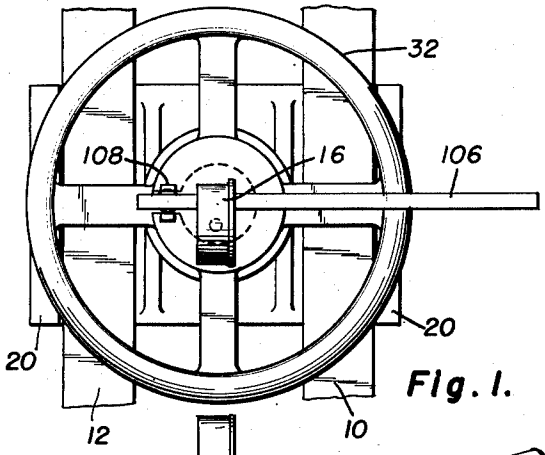


Fig. 1.

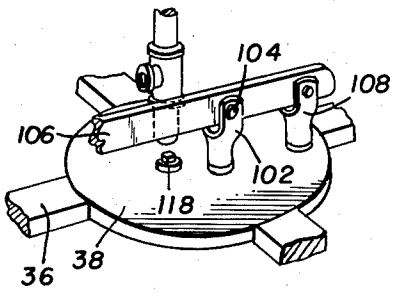


Fig. 4.

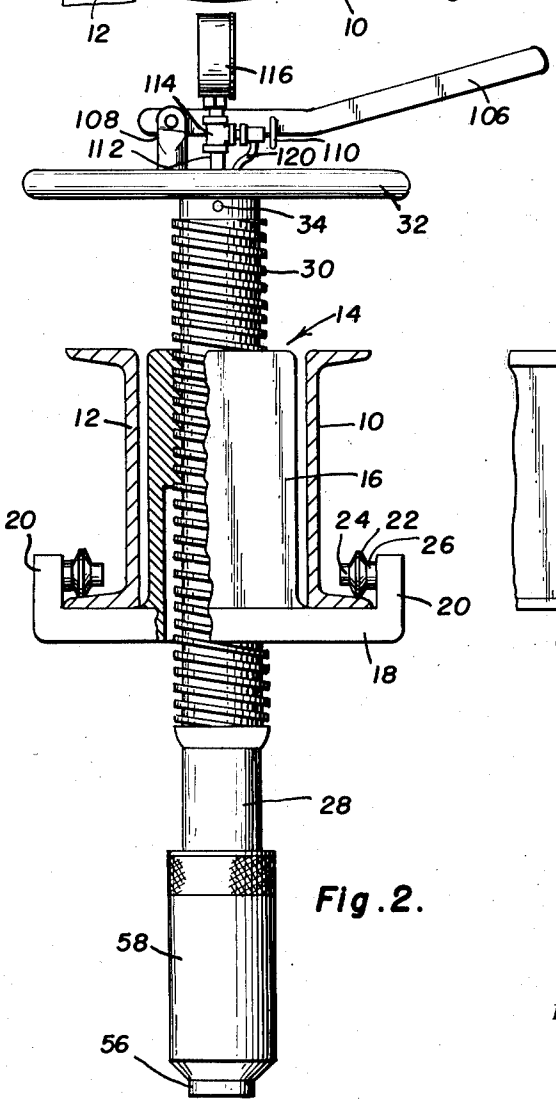


Fig. 2.

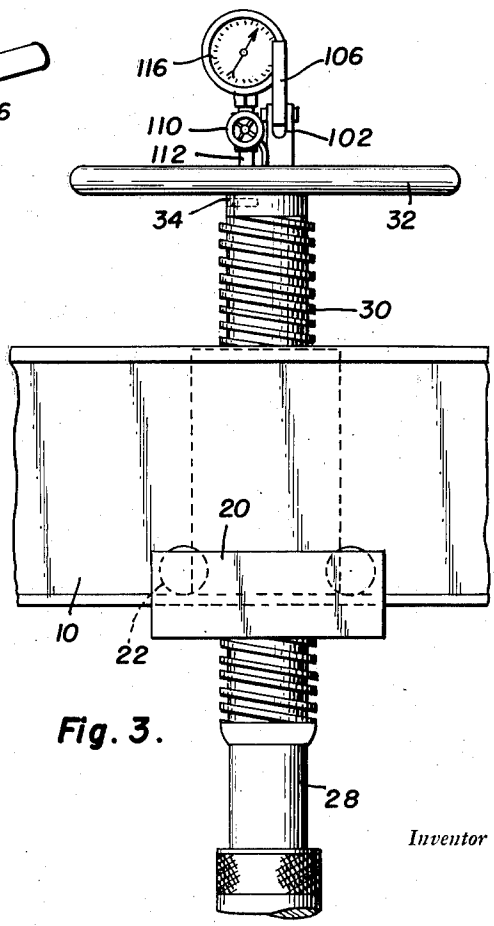


Fig. 3.

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HYDRAULIC SCREW JACK

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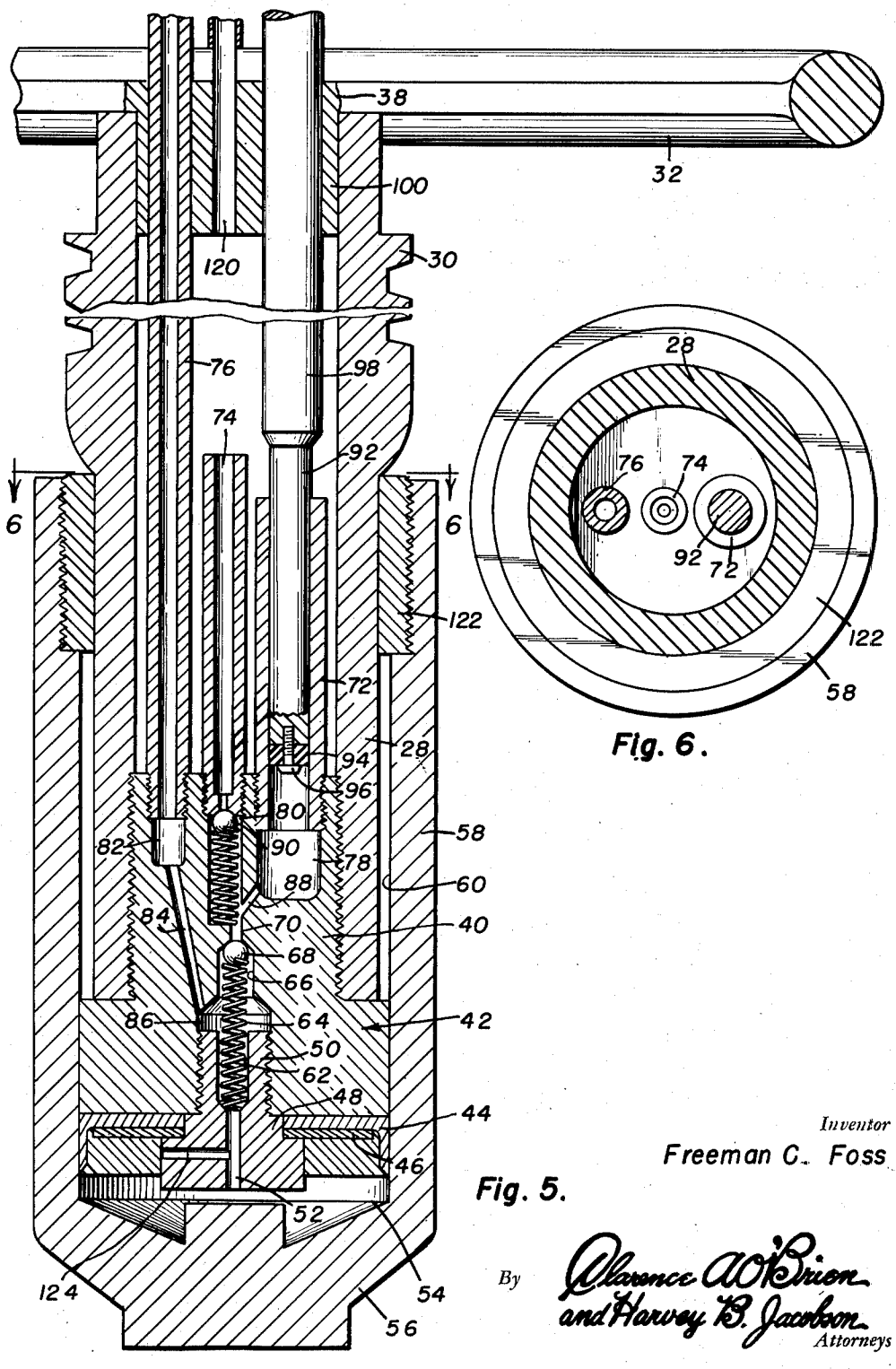


Fig. 5.

Fig. 6.

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HYDRAULIC SCREW JACK

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Application March 18, 1947, Serial No. 735,467

2 Claims. (Cl. 254—84)

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This invention relates generally to hydraulic jacks, and more particularly to a hydraulic jack adapted for suspension on an overhead supporting member such as an I-beam, the jack being adapted for hand operation, and for convenient pre-adjustment preparatory to the actual pressure operation.

It is an object of this invention to provide a jack of this general character which can be adjusted by turning a hand wheel secured to the piston portion of the jack, whereafter a hand operated hydraulic pump is used to move a load secured to the body portion of the jack which constitutes the cylinder wherein said piston moves.

Another object of this invention is to provide a simple means of releasing the jack, this releasing means being combined with a gauge which may be made to read either in weight or pressure units, this latter feature being of considerable importance as a safety factor.

Another object of this invention is to provide in a device of this character, a hydraulic system which is completely closed and in which the elements are so arranged that air is effectively excluded from the pump.

Another object of this invention is to so design a hydraulic jack that the majority of the working parts, excepting exterior portions of the pump and control valve, are grouped together on the piston head in such manner as to be readily accessible for inspection, adjustment and repair.

And a last object to be specifically mentioned is to provide a device of this character which is relatively inexpensive and completely practicable to manufacture, simple and easy to install and use, and which is sufficiently sturdy to give generally efficient and durable service.

With these and other objects definitely in view, this invention resides in certain novel features of construction, combination and arrangement of parts and portions as will be hereinafter described in detail and particularly set forth in the appended claims, reference being had to the accompanying drawings which form a material part of this application, and in which:

Figure 1 is a top plan view of this jack, operatively mounted on a pair of standard angles, disposed back to back as conventionally used to comprise means in the overhead structure of buildings of the type wherein a device of the type described herein is likely to be used;

Figure 2 is a side elevational view of this invention, the supporting angles being shown in section, to show how this jack is mounted on overhead structure, and a portion of the bracket

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member of the jack being broken away to show underlying structure in section and in elevation;

Figure 3 is another side elevational view of the same structure as that shown in Figure 2, a portion of the body member of the jack being broken away;

Figure 4 is an enlarged perspective view, fragmentary in character, of the central top portion of the jack with the gauge, valve and a portion of the handle being broken away;

Figure 5 is a vertical sectional view, the view being substantially a transverse section on the center line of Figure 2, the figure being enlarged, broken and fore-shortened to delete the bracket portion and the valve and handle mechanism at the top of the jack, and

Figure 6 is a horizontal cross sectional view taken on the line 6—6 in Figure 5.

Similar characters of reference designate similar or identical parts and portions throughout the several views of the drawings and throughout the specification.

Referring now to the drawings in detail, it will be noted that this invention is proposed to be used with overhead structure, preferably comprising two angles 10 and 12, or I-beams, arranged back to back and spaced apart to allow the insertion therebetween of the bracket supporting member, generally represented by the numeral 14, and including an interiorly threaded sleeve or collar member 16, a transverse plate member 18 and upstanding flanges 20 adapted to span the lower edges of the angles 10 and 12, and to tie the rollers 22. These rollers 22 are freely rotatably mounted on short stub axles 24 secured to the upright flanges 20 and having enlarged heads to bear against one side of each of the rollers 22, a spacer sleeve 26 being provided between each roller and the corresponding upright flange, all as illustrated in Figure 2. It will, of course, be understood that these rollers 22 will each contact a ledge of the angles 10 and 12 and that the bracket assembly, as a whole, provides for adjustability of the jack along the overhead structure provided in the building wherein the jack is to be used.

If reference is now had to Figure 5, it will be clear how the piston 28 is provided with an upwardly extending and exteriorly threaded portion 30 to engage the interiorly threaded member 16 of the above described bracket, and it will also be evident that by turning the wheel 32 this threaded extension 30 will be moved vertically with relation to the said bracket. The wheel 32 may be secured to the extension 30 by means of

set screws 34, and the structure of this wheel will be more clearly understood if reference is had to Figure 4 wherein the spokes 36 of the wheel are shown integrally connected to a central disc 38, upon which several operating units are mounted, as described hereinafter.

The lower end of the piston 28 is interiorly threaded to receive the exteriorly threaded boss portion 40 of the piston head generally indicated by the numeral 42. The piston 28 is hollow throughout the major portion of the length thereof and the piston head 42 closes the lower end of this hollow piston. The piston head is provided with a leather packing 44, held in place against the outer face of the head by a heavy washer member 46 and a stepped plug 48. Figure 5 shows clearly how a stud portion of this plug 48 is exteriorly threaded to be screwed into the lower end of a similarly threaded aperture in the piston head 42. This stud portion 50 is centrally drilled to provide for a stepped central aperture the lower end 52 of which communicates with the chamber 54 between the lower end of the piston head 42 and the lower closed end 56 of the body portion 58, it being understood that this body portion 58 has a cylindrical bore 60 to accommodate the piston portions described above.

The channel 52 communicates with the enlarged co-linear channel 62 and one end of the spring 64 is housed in this enlarged portion 62, while the upper end of this spring extends into a co-linear recess 66 to bias the ball 68 into a position closing the channel 70. The upper end face of the portion 40 of the piston head is drilled and tapped at three points to receive the threaded ends of the force pump piston cylinder 72, the pump inlet stand pipe 74 and the lower end of the pressure release tube 76. In each case the above recesses are extended downwardly beyond the threaded portions thereof to provide the chambers 78, 80 and 82, respectively. The chamber 82 communicates directly through the channel 84 with the chamber 86, while the chamber 78 communicates with the chamber 86 through the channel 88 and the ball valve 68. The inlet stand pipe 74 communicates with the channel 70 and is normally closed by the spring biased ball valve 90.

The force pump piston 92 is provided at its lower end with a packing 94 held in place by any suitable means represented at 96. The upper end of the piston, that is, the shank portion 98 extends centrally of the extended portion 30 of the piston, through any suitable gland structure, represented at 100 to terminate in the bifurcated end 102, represented in Figures 3 and 4. In order to reciprocate the piston 92, the bifurcated end 102 is secured by a pin 104 to the lever 106, at a point intermediate the ends thereof and one end of this lever is pivotally mounted on a suitable bracket member 108 secured to the disc 38.

To provide for release of the pressurized fluid from the chamber 54, when it is desired to release the jack, a manually operable valve 110 is secured to the upper end 112 of the release tube 76, that is, in the portion of this tube which extends through the disc 38, so that this valve is conveniently accessible from above the wheel 32. It is preferred that a T-joint 114 be used to facilitate the installation of this valve 110 and a pressure gauge 116, which will indicate the pressure applied. A hydraulic fluid filler hole, closed by a screw cap 118, is provided in the disc 38 and will preferably communicate with the pressure release return tube 120, which latter communicates with the interior of the piston 28 and at the upper end this tube communicates with the valve 110, it being understood that the valve 110 controls flow from the tube 112 to the tube 120. When the device is assembled, the piston 28 is guided and prevented from withdrawal from the body member 58 by a gland nut 122, which is slidably associated with said piston and exteriorly threaded to engage the upper end portion of the body portion 58, and the piston head 42 is adapted to contact the lower end of this gland nut 122 when the piston has been moved to the limit of its travel under the pressure of liquid forced into the chamber 54. In this connection, it may be noted that transversely disposed channels 124 may be provided in the stepped packing retaining nut 48, to direct a portion of the flow of the hydraulic fluid outwardly against the skirt portion of the packing 44, and the lower end 56 of the body member may be shaped in any preferred manner and provided with any suitable attaching means, whereby the loads to be lifted or compressed may be engaged.

The operation of this invention will be clearly understood from a consideration of the foregoing description of the mechanical details thereof, taken in connection with the above recitation of objects sought to be achieved thereby, but, in recapitulation, it may be noted that hydraulic fluid is inserted into the jack through the means represented at 118 and sufficient hydraulic fluid is inserted to substantially fill the cavities within the jack, the hollow portion of the piston 28 serving as a reservoir for the fluid. When the piston 28 is to be moved relative to the body member 58, the valve 110 is closed and the handle 106 is manually moved upwardly and downwardly to cause the piston 92 to force hydraulic fluid through the channel 88, past the one-way ball valve 68 and into the chamber 54, forcing the body member 58 downwardly from the position shown in Figure 5, as when the device is used as a press, to compress an object placed between the portion 56 and fixed structure located beneath the press. Other uses of this jack, both for lifting and compressing will occur to the user and need not be detailed here. When the pressure is to be released the manually operable valve 110 is opened, allowing the hydraulic fluid to escape from the chamber 54 through the channels 52, 84 and through the pressure release tube 76 and the pressure return tube 120. In this connection, it should be noted that the pumping mechanism will at all times be immersed in hydraulic fluid and that air will not be introduced into the closed system provided in this device, this feature is thought to be very important inasmuch as the inclusion of the relatively elastic air in a hydraulic pump jack causes the pump to become substantially inoperative.

Though there has been shown a particular embodiment of this invention, this application is not limited to this particular embodiment, but it is desired to include in the scope of this invention the construction, combination and arrangement of parts and portions substantially as set forth in the appended claims.

Having thus described this invention what is claimed as new and desired to be secured by Letters Patent is:

1. A hydraulic jack including a body member having a cylindrical bore closed at one end, a piston slidably mounted within said bore and having a channel leading into said bore, said piston having an extending hollow portion con-

taining hydraulic fluid, a force pump associated with said piston to pump said hydraulic fluid from said hollow portion through said channel into said bore, and means to release and return the pumped fluid to said hollow portion, said extending portion of the piston having a bracket threadedly mounted thereon, fixed rail structure having flanges, said bracket having a flat portion in superficial sliding relation with said rail structure, rollers on said bracket whereby the bracket is suspended from said rail structure, and a hand wheel fixed coaxially on said extending portion.

2. A hydraulic jack including a body member having a cylindrical bore closed at one end, a piston slidably mounted within said bore and having a channel leading into said bore, said piston having an extending hollow portion containing hydraulic fluid, a force pump associated with said piston to pump said hydraulic fluid from said hollow portion through said channel into said bore, and means to release and return the pumped fluid to said hollow portion, said extending portion of the piston having a bracket threadedly mounted thereon, fixed rail structure having flanges, said bracket having a flat portion

in superficial sliding relation with said rail structure, rollers on said bracket whereby the bracket is suspended from said rail structure, and a hand wheel fixed coaxially on said extending portion, said wheel including a central disc secured on the upper end of said extending portion, said force pump having an actuating handle operatively mounted on said disc, and said means including a manually operable valve on said disc and a channel by-passing said force pump and controlled by said valve.

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