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HYDRAULIC LIFT

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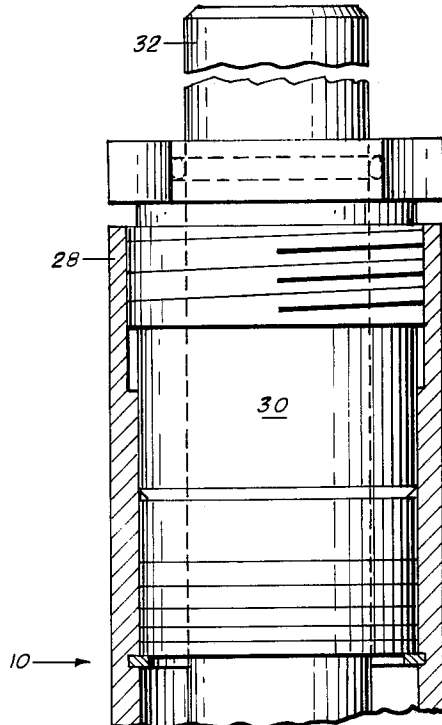


FIG. 1

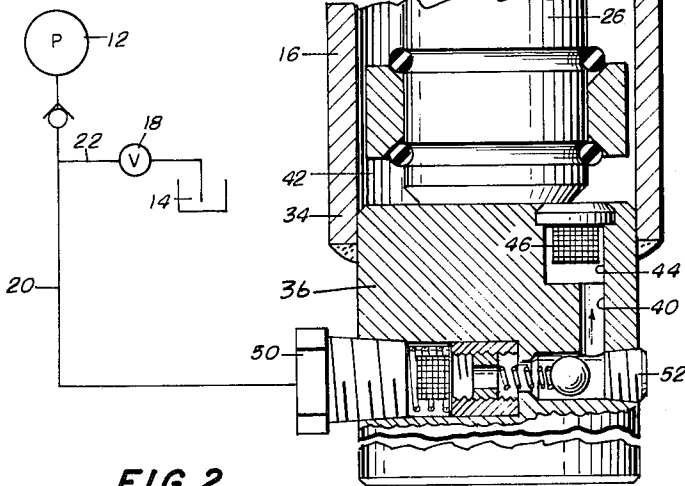
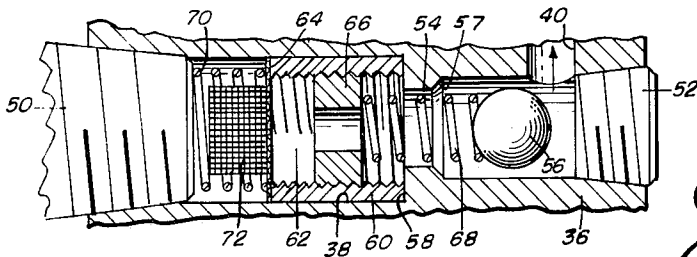


FIG. 2



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**HYDRAULIC LIFT**

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This invention relates to an improved hydraulic lift and relates more particularly to an improvement in hydraulic jack constructions wherein the safety mechanism for the system is formed as a part of the base of the cylinder.

A principal objective of this invention is to reduce the chance of accidents caused by conduit ruptures and other losses of system pressure when a load is in an elevated or otherwise supported position.

A further objective of the invention is to provide a system wherein a single manually operated release valve at the fluid source acts as a locking valve as well as a release control valve for draining fluid to the reservoir during a load lowering operation.

A still further objective of the invention is to provide a hydraulic jack assembly wherein the load can be locked into position at any pump stroke position of the power source.

Another objective of this invention is to provide a fluid locking means within a jack assembly wherein the safety locking mechanism of the assembly is constructed in the cylinder base.

A still further objective of the invention is to provide a positive operating, inexpensive, rugged and uncomplex breaking fuse for use with hydraulic lifting assemblies.

Another important objective of the invention is to provide a combined system wherein the locking arrangement is opened by merely actuating the pump to increase pressure in an expansion cylinder.

These and other important objectives and advantages of the invention will hereinafter become more fully apparent from the following description of the drawings, illustrating a presently preferred embodiment thereof, and wherein:

FIGURE 1 is a partially diagrammatic-schematic cross-sectional view of the principal elements of the invention; and

FIGURE 2 is an enlarged portion of FIGURE 1.

Referring now to the drawings wherein like elements indicate like parts, the numeral 10 indicates the jacking assembly of this invention. The assembly is comprised generally of a pump 12, a fluid reservoir 14, a hydraulic jack 16, and a manual-type adjustable opening valve 18. Valve 18 may be of the needle stem variety. A conduit 20 leads from the hydraulic jack 16 to pump 12, and a second conduit 22 from the hydraulic jack to reservoir 14. The valve 18 is across conduit 22. In common practice, the pump and fluid reservoir are in a common housing and conduit 22 is oftentimes no more than a short passageway interrupted by a valve. The reservoir pressure is normally atmospheric.

Slidably received within the cylinder 23 of jack 16 is the piston rod 26 having an outer end 32 extending through the upper end 28 of the cylinder. This upper or load end 28 of cylinder 23 defines an opening via a suitable bearing seal 30 through which the piston rod

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26 is slidably received. The outer end 32 supports a load which is moved in concert with the piston rod. The other or lower end 34 of the cylinder is closed by way of a solid base member 36.

5 Formed in base 36 is a cross bore 38 having a central axis generally perpendicular to the longitudinal axis of the cylinder. An opening 40 generally parallel to the longitudinal axis of the cylinder communicates the bore 38 with an expansion chamber 42 formed between the piston rod 26 and the base 36. Opening 40 is enlarged at 44 to receive a fluid straining or filter screen 46.

10 At one end bore 38 is equipped with a conduit plug 50 which is adapted to receive the conduit 20. The other end of the bore is closed by a standard sealing plug 52. Intermediate the plugs 50 and 52 the bore 38 is formed with a reduced annular section 54 which acts on one side thereof as a valve seat 57 for a valve ball 56. The other side of section 54 provides a ledge 58 to which a first end of the cylindrical screw plug 60 abuts. The plug 60 is interiorly threaded at 62 to receive the exteriorly threaded spring adjustment screw 66. A spring 68 extends through the valve seat and engages the ball 56 at one end and the ring 66 at the other. The spring is of sufficient length and strength to maintain the ball in spaced relationship with its valve seat under normal conditions of fluid flow. The fluid velocity necessary to seat ball 56 against the bias of spring 68 is adjustable by the longitudinal position of screw 66 along plug 60.

25 A second spring 70 serves to maintain a second fluid screening member 72 over opening 62.

30 In operation fluid is pressurized in pump 12 and is delivered to the expansion chamber 42 via conduit 20, cross-bore 38 and opening 40. By following this path, the fluid passes through the two straining members 46 and 72, through the valve seat 57, around the ball 56 and through opening 40. During the pumping operation, ball 56 will not tend to close the fluid path since fluid flow is from conduit 20 to the expansion chamber 42. Pumping is continued until the piston rod 26 raises the load to the desired level.

40 To lock the load at this desired level, the fluid in chamber 42 must be trapped. This can be accomplished by causing a full opening of valve 18 such that a reverse flow of high velocity toward the reservoir is commenced. This velocity is sufficient to overcome the bias of spring 68 and consequently ball 56 will engage with seat 54. The pressure caused by the raised load will safely position the ball against the seat as long as pressure in chamber 42 exceeds the pressure in line 20.

45 In order to unseat the ball 56, valve 18 is closed and pump 12 is given several additional strokes sufficient to exceed the pressure in chamber 42. The ball 56 is, therefore, unseated so that normal draining operations can occur through the base 36. Valve 18 is then partially opened to act as a metering device for lowering the load.

50 It will be understood that a loss of pressure in pump 12 or a rupture in any of the conduit systems will cause a reaction exactly the same as a full opening of valve 18. Indicia such as "lock," "lower" and "raise" can conveniently be applied to respectively designate the open, metering and closed positions of the valve.

55 In a general manner, while there has been disclosed in the above description what is deemed to be the most practical and efficient embodiment of the invention, it should be well understood that the invention is not limited

to such an embodiment as there might be changes made in the arrangement, disposition, and form of the parts without departing from the principle of the present invention as comprehended within the scope of the accompanying claims.

I claim:

1. A hydraulic device for loading and unloading a pressure chamber comprising a base closing one end of said chamber, said base having a bore formed therein, a fluid power source, a first fluid conduit means communicating said power source to said bore, a second conduit means communicating said first conduit means to a fluid reservoir having a reservoir pressure, an adjustable valve along said second conduit means, said base having a passageway communicating said bore with said chamber, a reduced portion along said passageway defining a valve seat, a bearing surface between said reduced portion and said first conduit means, a valve member in said passageway for closing said valve seat, a spring supported on said surface and extending into said passageway in engagement with said member for normally biasing said member in spaced relationship with said seat, said adjustable valve having a first setting wherein fluid in said chamber under pressure higher than said reservoir pressure will return to said reservoir without overcoming the bias of said spring and a second setting permitting fluid flow of sufficient velocity to overcome the bias of said spring and cause the pressure in said chamber to force said member against said valve seat and thereby close said passageway.

2. An improved hydraulic jack comprising in combination, a cylinder having a load end and a base end, a piston rod slidably received in said cylinder and extending through said load end, a base closing said base end of said cylinder and defining an expansion chamber with said piston, said base having a bore formed therein, a fluid power source, a first fluid conduit means communicating said power source to said bore, a second conduit means communicating said first conduit means to a fluid reservoir having a reservoir pressure, an adjustable valve along said second conduit means, said base having a passageway communicating said bore with said expansion chamber, a reduced portion along said passageway defining a valve seat, a bearing surface between said reduced portion and said first conduit means, a valve member in said passageway for closing said valve seat, a spring supported on said surface and extending into said passageway in engagement with said member for normally biasing said member in spaced relationship with said seat, said adjustable valve having a first setting wherein fluid under a pressure higher than said reservoir pressure in said chamber will return to said reservoir without overcoming the bias of said spring and a second setting permitting fluid flow of sufficient velocity to overcome the bias of said spring and cause the pressure in said chamber to force said member against said valve seat and thereby close said passageway.

3. The device described in claim 1 wherein said bearing surface is movable toward and away from said reduced portion.

4. An improved hydraulic jack comprising in combination, a cylinder having a load end and a base end, a piston slidably received in said cylinder, a load supporting piston rod attached to said piston and extending through said load end, a base closing said base end of said cylinder and defining an expansion chamber with said piston, said base having a bore formed therein, a fluid power source, a first fluid conduit means communicating said power source to said bore, a second conduit means communicating said first conduit means to a fluid reservoir, an adjustable valve along said second conduit means, said base having a passageway communicating said bore with said expansion chamber, a reduced portion along said passageway defining a valve seat, a bearing ledge in said passageway between said reduced portion and said power source, a valve ball in said passageway for closing said valve seat,

a spring supported on said ledge and extending into said passageway in engagement with said ball for normally biasing said ball in spaced relationship with said seat, said spring having a strength which is overcome by a predetermined fluid flow velocity from said expansion chamber to said bore whereby a loss of pressure between said bore and said pump or reservoir sufficient to cause said fluid flow velocity will cause said ball to engage said seat when said expansion chamber is pressurized.

5. An improved hydraulic jack comprising in combination, a cylinder having a load end and a base end, a piston slidably received in said cylinder, a load supporting piston rod attached to said piston and extending through said load end, a base closing said base end of said cylinder and defining an expansion chamber with said piston, said base having a bore formed therein, a fluid power source, a first fluid conduit in communication with said power source, a second conduit in communication with a fluid reservoir means communicating said first and second conduits to said bore, an adjustable valve along said second conduit, said base having a passageway communicating said bore with said expansion chamber, a first fluid filter in said bore and a second fluid filter in said passageway, a reduced portion along said passageway defining a valve seat on one side thereof and an abutment on the other side thereof, a cylindrical plug having one end against said abutment, an inwardly directed annular flange about the other end of said plug defining a pass-through aperture, a valve ball in said passageway for closing said valve seat, a spring supported by said flange and extending into said passageway in engagement with said ball for normally biasing said ball in spaced relationship with said seat, said adjustable valve having a first setting wherein fluid in said chamber under pressure higher than said reservoir pressure will return to said reservoir without overcoming the bias of said spring and a second setting permitting fluid flow of sufficient velocity to overcome the bias of said spring and cause the pressure in said chamber to force said ball against said valve seat and thereby close said passageway.

6. A hydraulic device for loading and unloading a pressure chamber comprising a base closing one end of said chamber, said base having a bore formed therein, a fluid hand pump, a first fluid conduit communicating said hand pump to said bore, a second conduit communicating said bore through a portion of said first conduit to a fluid reservoir having a reservoir pressure, an adjustable valve along said second conduit, said base having a passageway communicating said bore with said chamber, a reduced portion along said passageway defining a valve seat, a bearing surface between said reduced portion and said first conduit, a ball in said passageway for closing said first conduit, a ball in said passageway for closing said valve seat, a spring supported on said surface and extending into said passageway in engagement with said ball for normally biasing said member in spaced relationship with said seat, said adjustable valve having a "lower" setting wherein fluid in said chamber under pressure exceeding said reservoir pressure will return to said reservoir without overcoming the bias of said spring and a "lock" setting permitting fluid flow of sufficient velocity to overcome the bias of said spring and cause the pressure in said chamber to force said member against said valve seat and thereby close said passageway, and a third "raise" setting in which the path to said reservoir is completely closed and the path between said hand pump and chamber is open.

7. A hydraulic system for loading and unloading a pressure chamber comprising a base enclosing one end of said chamber, said base having a bore formed therein, a fluid power source, a first fluid conduit communicating said power source to said bore, a second conduit communicating said first conduit to a fluid reservoir, having a reservoir pressure, an adjustable valve along said sec-

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ond conduit, said base including a passageway communicating said bore with said chamber, a valve seat between said passageway and said bore, a bearing surface between said valve seat and said first conduit, a valve member in said passageway for closing said valve seat, a spring supported on said surface and extending into said passageway to engagement with said member for normally biasing said member in spaced relationship with said seat, said adjustable valve having a first setting wherein fluid under pressure in said chamber at a pressure higher than said reservoir pressure will return to said reservoir without overcoming the bias of said spring, a second setting permitting fluid flow to said reservoir of sufficient velocity to overcome the bias of said spring and cause the pressure in said chamber to force said member

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against said valve seat and thereby close said passageway, and a closed setting in which the path to the reservoir is closed and fluid from said power source, when of sufficient pressure, unseats said ball.

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