June 18, 1946. E. B. THOMPSON 2,402,265

VEHICLE LIFT

Filed Feb. 15, 1945

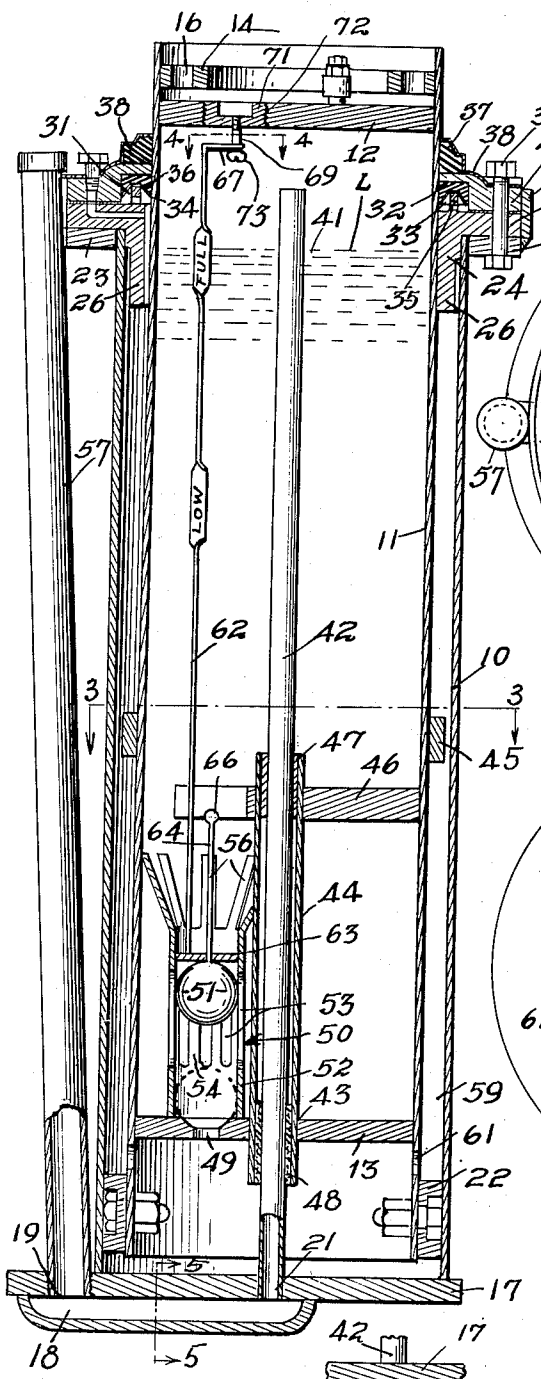

Fig. 1.

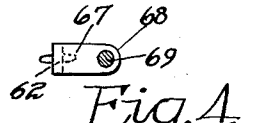

Fig. 4.

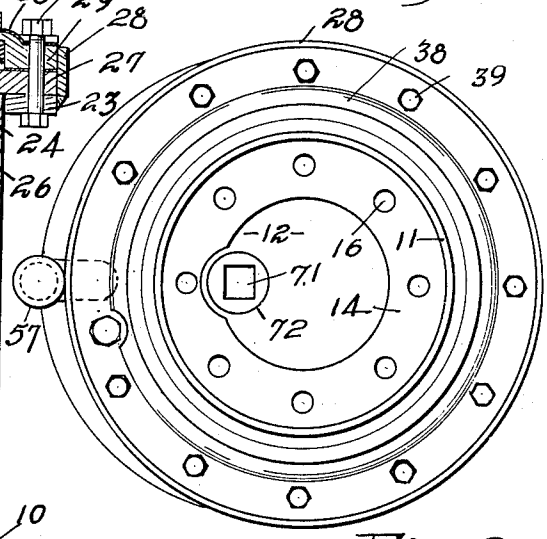

Fig. 2.

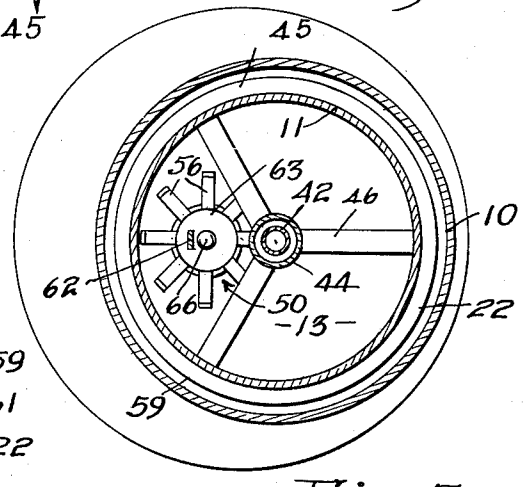

Fig. 3.

Fig. 5.

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VEHICLE LIFT

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6 Claims. (Cl. 121—46)

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This invention relates generally to vehicle hoists and in particular to an automobile lift of semi-hydraulic type.

An object of this invention is to provide an improved vehicle hoist.

Another object of this invention is to provide a semi-hydraulic hoist having a liquid containing lift piston operative in a cylinder, in which a normal level of the liquid within the piston is capable of being visually observed on a gauge member removable through the top of the piston.

A further object of this invention is to provide a vehicle hoist of semi-hydraulic type in which air under pressure is introduced into a lift piston, normally having a body of liquid therein, through an air conduit extended upwardly through the base of the hoist cylinder and through the bottom of the piston to a position above the normal level of the liquid in the piston, with the piston being movable relative to the air conduit and in liquid sealed engagement therewith.

A feature of this invention is found in the provision of a semi-hydraulic hoist having a cylinder and a hollow lift piston normally having a body of liquid therein, in which the flow of liquid between the piston and the cylinder is controlled by means located within the piston and including a float piston. An upright projection on the float piston is guidably supported within the lower end of a liquid-level indicating rod, with the upper end of the indicating rod being rotatably supported on a downward projection formed on a plug for sealing an opening in the top of the lift piston. The plug on being loosened constitutes a hand grip for lifting the indicating rod upwardly from the lift piston to provide for the visual observing on the rod of the liquid level in the piston, with a stop portion adjacent the upper end of the float piston projection being engageable with the lower portion of the indicating rod to provide for the removal of the float piston from the lift piston when the rod is raised out of the lift piston.

Further objects, features and advantages of this invention will become apparent from the following description when taken in connection with the accompanying drawing in which:

Fig. 1 is a vertical sectional view of a vehicle lift of semi-hydraulic type showing the liquid control means and the liquid level indicating means of this invention in assembly relation therein;

Fig. 2 is a plan view of the lift shown in Fig. 1;

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Fig. 3 is a sectional view on the line 3—3 in Fig. 1;

Fig. 4 is a sectional view taken on the line 4—4 in Fig. 1; and

Fig. 5 is a sectional view as seen along the line 5—5 in Fig. 1.

With reference to the drawing there is shown in Fig. 1 a vehicle lift of semi-hydraulic type including a cylinder 10 operatively associated with a hollow cylindrical lift piston 11 having a top cover or closing member 12 and a bottom cover 13 spaced upwardly from its lower end. Above the top cover 12 and within the piston 11 is an annular ring 14 having angularly spaced bolt holes 16 to provide for the securement on the piston of a vehicle supporting structure (not shown). The lower end of the cylinder 10 is closed by a base member 17 which is integrally formed with an air passage 18 having one end 19 arranged to a side of the cylinder and at an opposite end 21 open to the bottom of the cylinder at a position substantially coincident with the longitudinal axis of the cylinder.

As clearly shown in Fig. 1 the piston operates in a spaced relation within the cylinder 10. This spaced relation is maintained by means including a guide ring 22 at the lower end of the piston and in bearing engagement with the wall of the cylinder 10. Supported on an annular flange 23 about the upper end of the cylinder 10 is an annular member 24 of a substantially L shape in cross section having one leg portion 26 positioned between the piston 11 and the wall of the cylinder 10 in bearing engagement with the piston. The other leg portion 27 is extended radially from the piston 11 across the top surface of the flange 23 and against an upwardly extended outer peripheral rim member 28 on the cylinder flange 23.

In order to reduce leakage of oil about the piston and outwardly from the upper end of the cylinder 10 an oil seal is provided which comprises a clamping member 29 of an annular shape having an undercut recess 31 in its inner peripheral wall and open to the bottom side thereof, as viewed in Fig. 1. The recess 31 is of a substantially right angle shape in cross section and adapted to receive a rubber sealing member 32 formed in its bottom side, as also viewed in Fig. 1, with a concavedly shaped annular recess 33. Positioned within the recess 33 is a spring 34 having oppositely arranged fingers 36 adapted to engage opposite side portions of the concave groove 33 and to yieldably urge the side portions away from each other so that one of the side

portions is pressed in sealing engagement against the piston 11, and the other side portion against the outer wall of the recess 31.

In the assembly of the oil seal an annular upright projection 35 on the annular member 24 is received within the concave recess 33 and against the spring member 34. This assembly is accomplished by initially slipping the member 24 over the piston 11 to a position with its leg portion 26 between the piston 11 and cylinder 10, and leg portion 27 supported on the cylinder flange 23 between the piston and the rim 28. The clamping member 29 with the annular rubber member 32 and spring 34 assembled within the recess 31 is then slipped over the top of the piston 11 and is moved downwardly to a position within the rim 28 and with the bottom side against the top surface of the member 24. This engagement of the members 24 and 29 takes place concurrently with the location of the annular projection 35 within the recess 31 and against the spring 34.

To eliminate the passage of any water, dirt or the like on an extended part of the piston 11 into the cylinder 10 a piston wiper, indicated generally as 37 is assembled about the piston and on the top of the member 29. The piston oil wiper 37 is clamped against the member 29 by means including an annular cover plate 38, with the plate 38, and the members 24 and 29 being clamped together with the cylinder flange 23 by angularly spaced bolts 39 extended therethrough. It is seen, therefore, that the annular guide member 24, the piston oil seal, and the piston oil wiper 37 are arranged in that order in a superposed relation at the top of the cylinder 10 and secured as a unit to the cylinder flange 23 by the bolts 39.

The piston 11 has a normal body of liquid therein, indicated generally as 41, extended to a level shown as L. In other words the piston 11 is substantially filled with a liquid such as oil when it is in a lowered position. Connected to the opening 21 of the air passage 18 in the cylinder base 17 is an upright pipe member 42 which extends upwardly through the bottom cover plate 13 of the piston 11 and into the piston to a position above the normal level L of the oil body 41. Concentrically arranged about the pipe 42 is a tubular guide member 44 secured at its lower end within an opening 43 in the piston bottom cover 13 and supported at its upper end by angularly spaced brace members 46 welded at their inner ends to the tube 44 and at their outer ends to the inner wall of the piston 11 (Figs. 1 and 3). Within the upper end of the tube 44 is a tubular sleeve or collar 47 in contact engagement with the pipe 42. Supported within the lower end of the tube 44 and about the pipe 42 is an oil packing or seal 48 adapted to prevent any flow of oil from the piston 11 to the cylinder 10 through the tube 44.

The flow of oil from the piston 11 into the cylinder 10 takes place through an oil passage or opening 49 formed in the bottom cover 13 of the piston 11 (Fig. 1) to one side of the tubular guide member 44. The flow of oil through the opening 49 is controlled by a valve unit including a spherical float piston 51 operatively associated with an upright tube 50 located within the piston 11 and arranged in a concentric relation about the oil opening 49. The lower end section 52 of the tube 50 constitutes a cylinder for the float piston 51. Above the cylinder 52 the tube 50 is formed with angularly spaced longitudinal slots 53 for admitting oil from the piston 11 within the cylinder 52, while the solid portions 54 between the slots 53 serve as guide members for guiding the float piston 51 into and out of the cylinder 52. The upper end of the tubular member 50 terminates in upwardly and outwardly inclined fingers 56 for a purpose to be later noted.

In the operation of the hoist assume the piston 11 to be in its lowered position shown in Fig. 1. At this position of the lift piston 11 the float piston 51 is away from the opening 49 whereby oil is contained within the cylinder 10 below the piston 11, and within the space 59 between the piston 11 and cylinder 10, which space 59 is in liquid connection with the piston 11 through the opening 49 and openings 61 in the piston wall below the cover 13. To lift the piston, and in turn a vehicle supported on the piston, air under pressure is introduced into the piston, from a suitable source, such as a pressure tank or the like (not shown), through a pipe connection 57 connected with the end 19 of the air passage 18 in the cylinder base 17. The air thus introduced passes upwardly through the pipe 42 and into the piston 11 above the body of oil 41. With the application of an air pressure on the oil body 41, oil is forced through the opening 49 in the piston cover member 13 and into the cylinder 10.

On the application of an air pressure on the oil body 41, therefore, the oil within the cylinder 10 is placed under a pressure which acts against the under side of the piston cover member 13 to raise the piston. By virtue of the fact that the level L of the oil body 41 in the piston 11 is lowered concurrently with a raising of the piston the upper end of the pipe 42 is always above the liquid level in the piston. When this level approaches the top of the valve cylinder 52 the float piston 51 moves within the cylinder 52 so that the pressure of the air within the piston 11 is applied directly on the top surface of the float piston 51 to force the float piston downwardly within the cylinder 52. This downward movement of the piston 51 forces the oil within the cylinder 52 outwardly through the opening 49 and the piston 51 into seating engagement with the oil passage 49, as shown in dotted lines in Fig. 1, to stop a further flow of oil from the piston 11 into the cylinder 10, whereby the piston is stopped against further upward movement. The upward travel of the piston is limited by the engagement of a stop ring 45 on the piston 11 with the lower edge of the annular member 24. The stop ring 45 is spaced upwardly from the guide ring 22 a distance such that the piston 11 is always supported in the cylinder 10 against tilting movement.

It is seen, therefore, that the float piston 51 closes the opening 49 prior to a complete passage of oil out of the piston 11. The operation of the piston 11 is thus at a predetermined speed controlled entirely by the rate of flow of the oil through the passage 49. As a result any air under pressure within the piston 11 is prevented from entering the cylinder 10, to thereby eliminate any sudden lifting or jumping movement of the piston 11 as would occur if air did enter the cylinder 10.

The lifting action on the piston 11 by air is about ten times faster than the action by oil. It is apparent, therefore, that the sudden lifting of the piston by air in the cylinder 10 might result in the shearing or breaking of the bolts 39 by the impact of the stop ring 45 with the member 24.

To assure a proper operation of the hoist at all times it is necessary to have the piston 11 filled

with oil between predetermined levels. Thus even though an oil seal is provided between the cylinder 10 and the piston 11, some oil will seep or leak out so as to reduce the volume of the oil body 41. In order to give a quick and accurate visual indication of the level of oil within the piston 11 there is provided a flat indicating rod or oil gauge 62 having an annular member 63 secured in an offset relation at its lower end adapted to be loosely received in a centered position within the top of the upright tube 50 (Fig. 1). The float piston 51 has an upright projection or rod 64 which is slidably movable in a guided relation within the disc 63. A top portion 66 on the rod 64 maintains the rod 64 against separation from the disc 63.

The oil gauge or rod 62 is formed with a laterally bent portion 67 at its upper end (Figs. 1 and 4) having an opening 68 therein adapted to loosely receive a screw 69 which is threaded within the bottom side of a plug 71. The plug 71 is threadable within a threaded opening 72 in the piston top cover member 12. The opening 72 is of a size to permit passage therethrough of the bent rod portion 67, the disc 63 and the float piston 51. It is seen, therefore, that the screw 69 is rotatable within the opening 68 in the rod portion 67, while retaining the rod 62 in a supported position on the screw head 73.

To determine the level of oil in the piston 11 the plug 71 is loosened and then used as a hand grip by which the rod 62 is pulled upwardly through the opening 72. As shown in Fig. 1 the rod has "full" and "low" markings thereon for indicating the level of the oil body 41. It is apparent, of course, that on raising of the rod 62 the disc 63 is lifted out of the tubular member 50. However, on lowering of the rod 62 the disc 63 is guided into a centered position within the tubular member 50 by its initial reception within the upwardly and outwardly flared fingers 56 at the top of the tubular member 50. With the rod 62 in a lowered position within the piston 11 the plug 71 is threaded within the opening 72 to again close the top 12 of the piston 11.

If, for some reason it is necessary to remove the float piston 51, as for example when the piston 51 becomes oil logged or the like, this can be readily accomplished by merely removing the plug 71 and pulling the rod 62 upwardly through the opening 72. During this upward movement of the rod 62 the disc 63 engages the stop member 66 on the float piston rod 64 whereby the piston 51 is raised concurrently with the rod 62. As a result the rod 62 and float piston 51 are removable as a unit through the opening 72. On the return of the float 51 and rod 62 within the piston 11 both the float and the disc 63 are guided within the tubular member 50 by the action of the guide fingers 56.

It is seen, therefore, that the indicating rod 62 is readily accessible from the top of the piston 11 and by virtue of its rotatable connection with the plug 71 easily lifted out of the piston 11 with the plug for a reading of the markings thereon. Further the assembly of the float piston 51 with the rod 62 provides for the removal of the piston 51 with the rod 62. The disc member 63, in its centered position within the tubular member 50, constitutes a stop device for limiting the upward movement of the float piston 51 so that the float is always in a position to be guided into the cylinder 52 for movement toward and away from the oil opening 49.

Although the invention has been described with

respect to a preferred embodiment thereof, it is to be understood that it is not to be so limited since changes and modifications can be made therein which are within the full intended scope of the invention as defined by the appended claims.

I claim:

1. In a semi-hydraulic lift including a cylinder, a hollow lift piston operatively associated with said cylinder, with the lift piston and the cylinder having a body of liquid therein, a liquid passage in the bottom of said lift piston open to said cylinder, means for introducing air under pressure into said lift piston above the level of the liquid therein, means for controlling the flow of liquid through said passage including an upright cylinder positioned on the bottom of said piston about said liquid passage, a float piston for said upright cylinder movable into and out of a passage closing position, an upright liquid level indicator within said piston adapted to be raised through an opening in the top of said lift piston, means for normally closing said opening, with the lower end of said indicator being extended to a position adjacent to said upright cylinder, and means connecting said indicator with said opening closing means, and with said float piston so that said closing means, said indicator, and said float piston are removable as a unit through said opening.

2. In a semi-hydraulic lift including a cylinder with a hollow lift piston therein, with the lift piston and the cylinder having a body of liquid therein, a liquid passage in the bottom of said lift piston open to said cylinder, means for introducing air under pressure into said lift piston above the level of the liquid therein, means for controlling the flow of liquid through said passage including a float means within said lift piston movable into and out of a passage closing position, said lift piston having an opening in the top thereof, means for normally closing said opening, and lost motion means connected between said closing means and said float means to provide for the removal of said float means through said opening on removal of said closing means.

3. In a semi-hydraulic lift including a cylinder with a hollow lift piston therein, with the cylinder and the lift piston having a body of liquid therein, a liquid passage in the bottom of said piston open to said cylinder, means for introducing air under pressure into said lift piston above the level of the liquid therein, means for controlling the flow of liquid through said passage including an upright cylinder within said piston positioned about said liquid passage, a float piston for said upright cylinder movable into and out of a passage closing position, with said lift piston having an opening in the top thereof adapted to receive said float piston therethrough, means for closing said opening, means supported from said closing means and extended within said upright cylinder, with the lower end of said extended means constituting a stop to limit the upward movement of the float piston within said upright cylinder, and lost motion means connecting the lower end of said extended means with said float piston whereby said float piston is removable through said opening on removal of said closing means.

4. In a semi-hydraulic vehicle lift including a cylinder closed at its bottom end, a hollow lift piston associated with said cylinder, with the lift piston and the cylinder containing a body of liq-

uid, and the upper end of said lift piston having a threaded opening therein, a plug member for closing said opening, a bottom wall for said lift piston having a liquid passage therein open to said cylinder, an upright air conduit extended through the bottom end of said cylinder and through said bottom wall to a position above the liquid level in said lift piston, means for liquid sealing said air conduit with said bottom wall, means within said lift piston for controlling the flow of liquid through said liquid passage including an upright tubular cylinder concentrically arranged about said liquid passage, a float piston operatively associated with said tubular cylinder, means projected upwardly from said tubular cylinder for guiding said float piston into and out of the upper end of said tubular cylinder, an upright guide member on said float piston having a stop portion adjacent its top end, means for indicating a level of the liquid in said lift piston including an indicating member having one end slidably movable on said guide rod and an opposite end extended to a position adjacent said threaded opening, and a rotatable connection between said plug member and the opposite end of said indicating member, with said indicating member being movable through said threaded opening, on removal of said plug member, and having markings thereon to visually indicate the level of the liquid in said lift piston, said one end of the indicating member being engageable with said stop portion to provide for the joint removal of said indicating member and said float piston from said lift piston through said threaded opening.

5. In a semi-hydraulic lift including a cylinder, a hollow lift piston operatively associated with said cylinder, with the lift piston and the cylinder having a body of liquid therein, a liquid passage in the bottom of said lift piston open to said cylinder, means for introducing air under pressure into said lift piston above the level

of the liquid therein, means for controlling the flow of liquid through said passage including a tubular cylinder within said lift piston concentrically arranged about said liquid passage, a float piston within said tubular cylinder movable into and out of a passage closing position, an upright projection on said float piston, guide means extended upwardly from said tubular cylinder for guiding said float piston into and out of said tubular cylinder, said guide means having the top portion thereof extended upwardly and outwardly, an upright liquid level indicator in said lift piston having a guide portion at its lower end loosely receivable in a centered position within said guide means, with said projection being movably supported within said guide portion, a member for closing the upper end of said lift piston having an opening therein, a plug for closing said opening, and means for connecting said plug with the upper end of said indicator whereby said indicator is movable with said plug outwardly from said lift piston.

6. In a semi-hydraulic vehicle lift including a cylinder with a hollow cylindrical lift piston therein, with said cylinder and said lift piston containing a body of liquid, and the lift piston having a liquid passage adjacent its lower end for the flow of liquid between the lift piston and the cylinder, means within said lift piston for controlling the flow of liquid through said passage including a float piston, an upright rod member in said lift piston for indicating the level of the liquid in the lift piston and the cylinder and adapted to be raised through an opening in the top of said piston, means for normally closing said opening connected with the upper end of said rod member, and a lost motion connection between said float piston and the lower end of said rod member to provide for said float piston being lifted through said opening with said rod member on removal of said rod member from said lift piston.

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