Jan. 8, 1935. H. D. SMITH 1,987,083

HOIST

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Fig. 1.

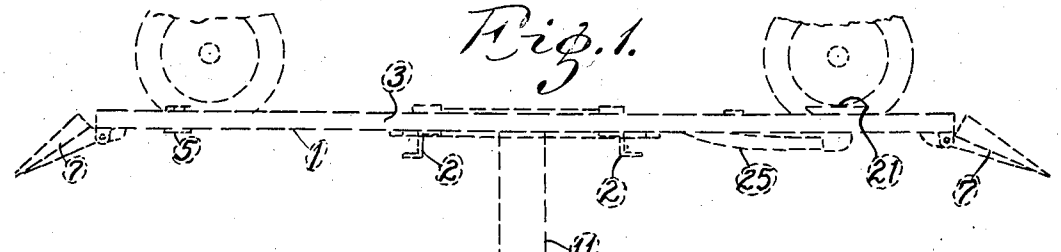


Fig. 3.

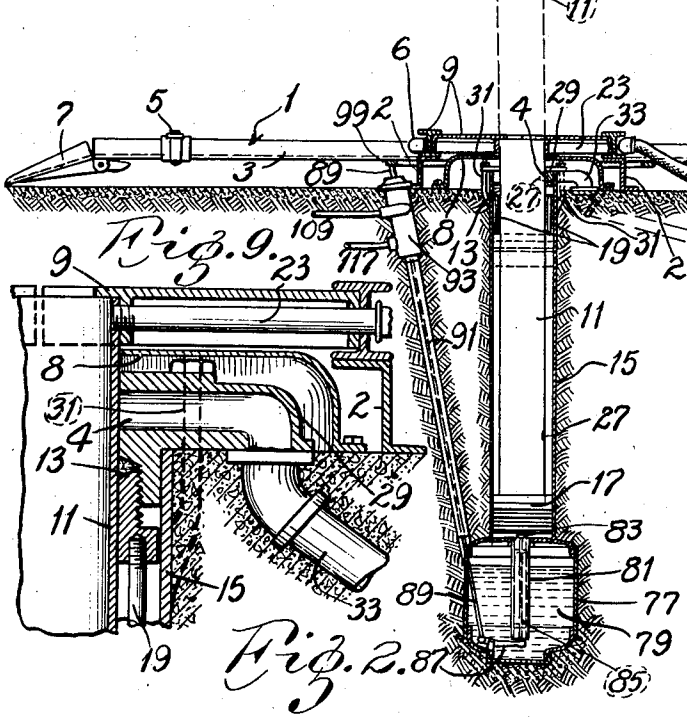
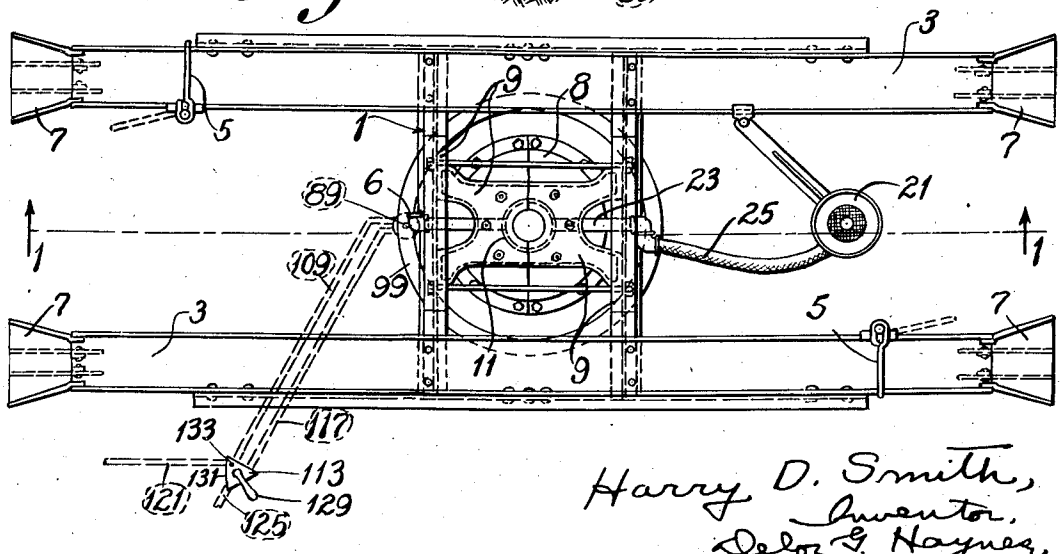


Fig. 2.



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Fig. 3.

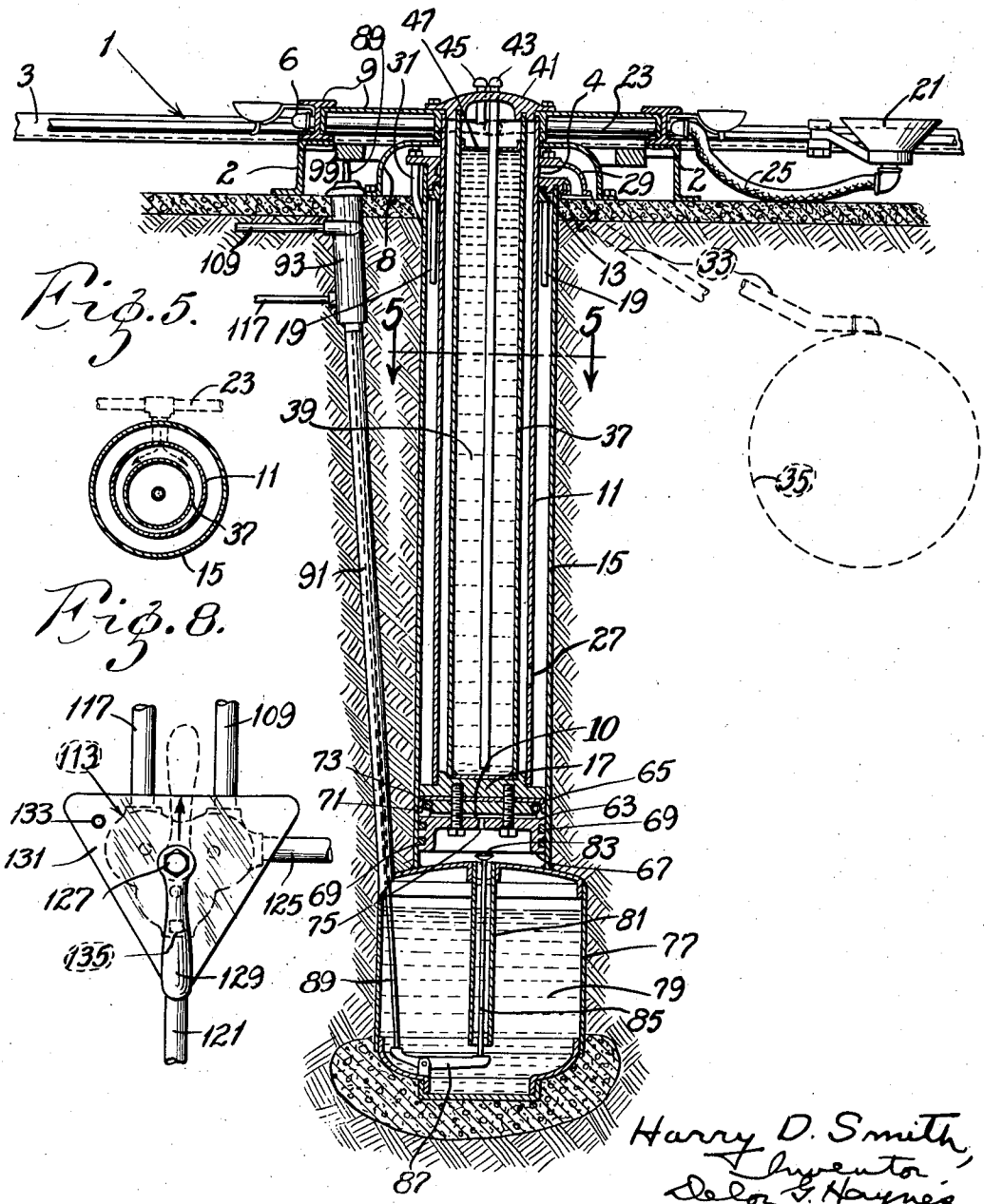


Fig. 5.

Fig. 8.

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Fig. 4.

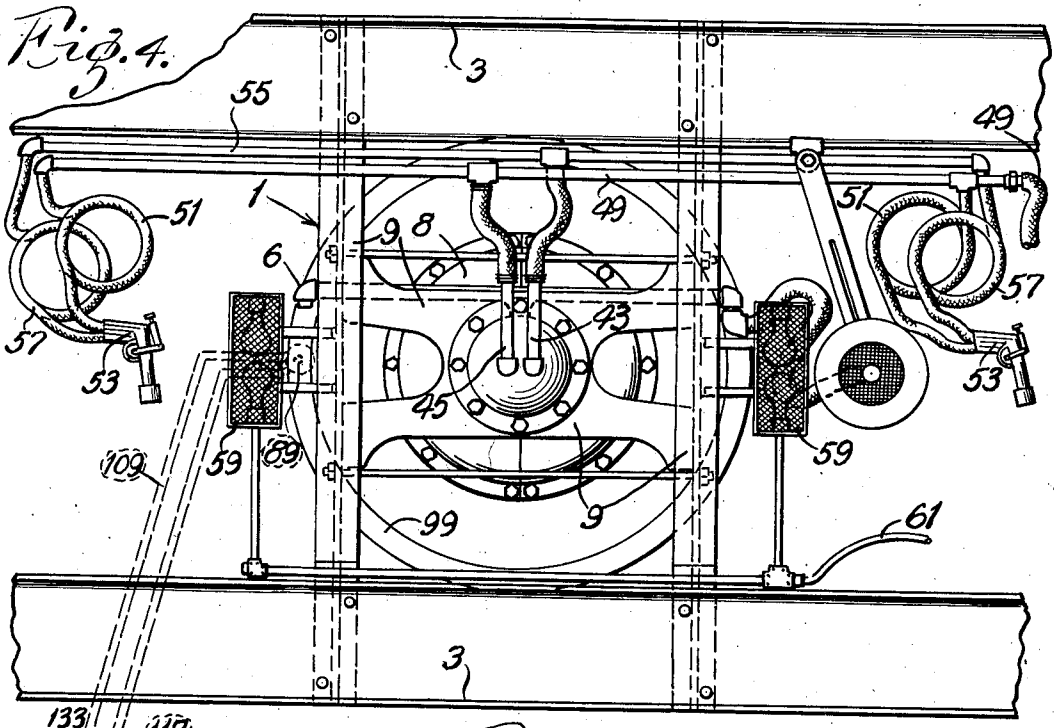


Fig. 6.

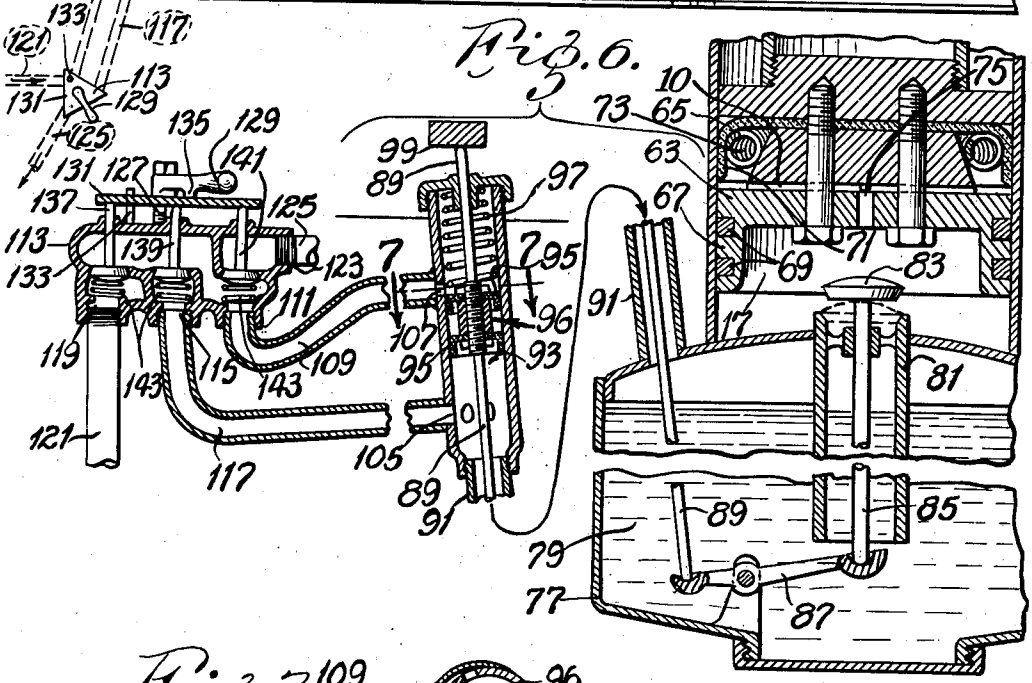
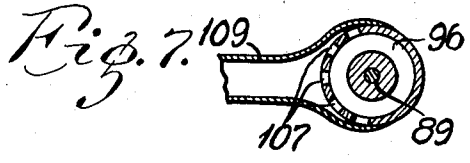


Fig. 7.



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Patented Jan. 8, 1935

1,987,083

UNITED STATES PATENT OFFICE

1,987,083

HOIST

Harry D. Smith, Philadelphia, Pa., assignor to Globe Machinery & Supply Company, Des Moines, Iowa, a corporation of Iowa

Application January 5, 1931, Serial No. 506,556

2 Claims. (Cl. 254—93)

This invention relates to hoists, and with regard to certain more specific features, to vehicle hoists.

Among the several objects of the invention may be noted the provision of a hoist for lifting automobiles and the like which includes an improved hydraulic lock; the provision of a device of the class described having an improved packing arrangement for sealing against leakage; the provision of apparatus of this class which shall include a direct drainage system for vehicles mounted thereon, without extraneous pipes, containers and the like, which system shall cause flow directly through a reservoir in the apparatus itself to a sump; the provision of this class of apparatus which may include therein greasing means for said vehicles; and the provision of apparatus having the above improvements which shall be substantial and economical to construct and simpler and safer to operate than prior structures of this class. Other objects will be in part obvious and in part pointed out hereinafter.

The invention accordingly comprises the elements and combinations of elements, features of construction, and arrangements of parts which will be exemplified in the structure hereinafter described, and the scope of the application of which will be indicated in the following claims.

In the accompanying drawings, in which are illustrated two of various possible embodiments of the invention,

Fig. 1 is a vertical section showing one form of apparatus, the dotted lines indicating a lifted position, and is taken on line 1—1 of Fig. 2;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a view similar to Fig. 1 but showing a modified form of the invention and being taken on an enlarged scale and made fragmentary;

Fig. 4 is a plan view of the form of the invention shown in Fig. 3;

Fig. 5 is a cross section taken on 5—5 of Fig. 3;

Fig. 6 is an enlarged vertical section showing the organization of certain chief combinations of elements of the invention;

Fig. 7 is a cross section taken on 7—7 of Fig. 6;

Fig. 8 is a plan view showing a valve mechanism illustrated in developed position in Fig. 6; and,

Fig. 9 is a detailed section of the head portion of Fig. 1, suitably enlarged for clarity.

Similar reference characters indicate corresponding parts throughout the several views of the drawings.

Referring now more particularly to Fig. 1, there is illustrated at numeral 1 a superstructure having runways 3, including stops 5, guides 7 and the like, onto which superstructure 1 an automobile is adapted to be driven and thereafter lifted. The side rails 3 are joined by a bolster 9 the purpose of which is to provide cross bracing and means for attachment to a hollow slidable column 11. The column 11 is slidable through a stuffing gland 13 affixed to the upper end of an underground cylinder 15, and reaches downwardly to connect with a piston 17. The piston 17 is slidable in said cylinder 15 and is adapted to be raised by lubricating oil or like fluid forced up from beneath the piston. Thus the piston 17 and the column 11 are raised so as to drive up the superstructure 1. Suitable stop pins 19 extend downwardly from the upper end of the cylinder 15 for limiting the upward movement of the piston 17, downward movement of the device being limited by rests 2.

The hollow column 11 and the piston 17 are joined in a liquid-tight manner, as illustrated in Fig. 6, so that the hollow column 11 may function as a container for crank case waste and the like. In order that said waste may be delivered to the interior of the column 11, there is provided on the superstructure 1 an oscillable and slidable funnel 21 communicating with a pipe 23 by way of a flexible hose 25. The pipe 23 communicates interiorly with the hollow column 11 and thus crank case waste may be drained into the funnel 21 and delivered to the interior of said column 11. Waste fluid is drained from the hollow column 11 through an opening 27 which, when the column is in its upper position (dotted lines, Fig. 1), registers with an opening 4 formed in a cap 29. Cap 29 is held to the upper end of the cylinder 15 by draw bolts 31. The opening in the cap 29 communicates with a pipe 33 which leads to a suitable underground sump 35. The details of this construction are shown in Fig. 9. It will be apparent that waste flows into the column 11 only when the column 11 is in its uppermost position, and it is then that the waste from the crankcase of the motor car is being drained. Hence the column 11 will carry a level of waste fluid up to the opening 27. The opening 27 is in register with the opening 4 and the overflow 33 leading to the sump 35 when added fluid is being delivered from the funnel 21. It will be clear that another connection such as 6 provides means for attaching the funnel 21 or another funnel assembly. A guard 8 protects the upper end of the cylinder 15 and its attachments.

Figs. 3, 4, and 5 show the same general form

of apparatus, like numerals designating like or corresponding parts. In this modification, however, the column 11 not only provides a reservoir into and through which liquid may be drained from the funnel 21, but it also contains an interior reservoir or chamber 37 eccentrically located as illustrated in Fig. 5. This interior reservoir 37 is for containing grease, such as illustrated at number 39. Both containers are sealed by a head 41 and attached to the bolster 9 thereby. An outlet 43 extends through the head 41 to the bottom of the interior chamber 37. An air inlet 45 is adapted to deliver compressed air to the top of a floating piston 47 riding on a grease or the like 39. From the above it will be seen that if compressed air be delivered to the port 45, that the piston 47 will be forced down to press the grease 39 up and out of the outlet 43. The draining function of the column 11 (above described) is not interfered with.

As shown in Fig. 4, the air connection 45 receives its compressed air from a suitable source of supply 49. The branches 51 also lead from said source of air supply to pneumatic grease guns 53. The guns 53 are supplied grease or lubricant by way of lines 55 and 57 leading from said grease outlet 43. The guns 53, per se need not be described herein for it suffices to say that they each receive the grease forced from the inner chamber 37 and subject it to a forcing action for purposes of delivery to the bearings or the like on the vehicle hoisted. The line 49 is flexible and lines such as 43, 45, 51, 55 and 57 may be carried with the superstructure 1. The lines 51 and the material supply lines 57 are also flexible.

For convenience, the superstructure 1 may also carry flood lights 59 receiving current from a flexible wire 61, thus permitting operations to be performed at night. This feature is shown on the modification of Figs. 3 and 4 only.

One of the features of this invention is the construction of the piston 17, shown to best advantage in Fig. 6. It comprises a head 63 having clamped thereto a cup leather 65. The clamping member comprises a skirt 67 which may include rings or like such as shown at 69. The cup leather has a lip 71 which bears against the interior of the cylinder 15 and is held in distended position by an annularly located coil spring 73.

Heretofore full pressure of the fluid operating on the piston has been applied to the lip of the cup leather such as 71. The result has been that there has been exerted too great a pressure forcing the lip 71 against the cylinder wall and hence there has been scoring of the wall and/or tearing of the leather and/or excessive wear on the cylinder wall and leather. The result has been the requirement for replacement on the cup leather about once every thirty to sixty days.

I have overcome the above difficulties by not exposing the cup leather 65 to the full oil pressure exerted on the piston 17. This is done by drilling or otherwise forming only a small passage 75 through the skirt 67 to the interior space 10 adjacent the lip 71, thereby to effect a throttle and to delay the transmission of pressure to the lip 71. Only a fraction of the full pressure is first exerted on the lip 71 as the building up of pressure sets in, the degree being such as to effect a proper seal without excessive wear. The passage also insures proper oiling of the cup leather, the oil 79 used for forcing the piston 17 finding its way through said passage to the leather. The passage furthermore permits of return drain of such liquid as may have leaked past the leather, this being done when said liquid drains past the leather, as when the piston 17 is positioned in its bottom position.

The parts of the invention thus far described are operated by fluid pressure in the following manner:

The cylinder 15 is joined to a fluid pressure reservoir 77. This reservoir 77 carries a fluid supply 79, which, when a pressure is applied thereto is forced up into the cylinder 15 by way of a delivery tube 81 which reaches into proximity with the bottom of said reservoir. A gravitationally seating valve 83 rests at the upper end of the pipe 81, its stem 85 extending downwardly into communication with a rocker arm 87. The rocker arm 87 is of a two to one arm ratio, the other end engaging with a valve stem 89. The valve stem 89 reaches upwardly through a tube 91 to a valve chamber 93 and there carries a pair of spaced cupped leather sealing means 95.

A pressure spring 97 normally resists the rise of the piston 96 (comprising the cups 95) and associated stem 89. The stem 89 extends through the piston 96 and to a point above ground where it is operated upon as shown in Figs. 3 and 4 by means of a horizontal ring 99 on the superstructure 1 or by manual pressure of an operator's foot. When the superstructure 1 is down, the ring 99 depresses the stem 89. In Fig. 6 the ring 99 is shown depressing said stem 89.

The chamber 93 has a lower port 105 and an upper port 107. The ports are arranged for ample peripheral opening as shown in Fig. 7. The upper port 107 communicates by way of a pipe 109 with one port 111 of a compound valve 113. The lower port 105 communicates with another port 115 of said valve 113, this being done by way of a pipe 117. A third port 119 of said compound valve 113 is in connection with a compressed air inlet 121. A port 123 of said valve 113 is in communication with an exhaust 125.

In Fig. 6 the compound valve 113 is shown developed, that is, diagrammatically. In Fig. 8 is shown a plan view of the valve, nondeveloped. On top of the same is tiltably and rotatably pinned at a stud 127 a handle 129. A plate 131 is also held in position tiltably and loosely by said stud 127. A loose guide stem 133 prevents rotation of the plate 131. The plate 131 is adapted to be rocked by pressure on the handle 129. From the above it will be understood that the handle 129 and the plate 131 are arranged so that the handle may be first rotated and then depressed. Therefore the plate 131 is caused to depress one or any pair of the stems of valves 137, 139 and/or 141. It will be understood that other mechanical means may be used for actuating any one or pair of the valves 137, 139 and/or 141.

The valves 137, 139 and 141 are spring returnable by the springs 143.

The inlet port 119 communicates with the port 115 by way of valves 137 and 139 (in series). It communicates with the port 111 by way of valve 137 only. The exhaust port 123 is opened by way of valve 141.

The operation of the device is as follows:

Compressed air is admitted into the pipe 121. Upon manually opening the inlet valve 137, this air flows through the pipe 109 through the upper port 107 and enters the chamber 93. The piston 96 is down below the port 107 because so depressed by the ring 99 of the descended superstructure 1. This has caused the valve 83 to open through the action of the linkages 89, 87, 85. The air entering

the pipe 109 goes past the piston 96 and moves down the pipe 91 to the interior of the chamber 77, thus forcing the fluid 79 therein up through the pipe 81 and the then open valve 83 to raise the piston 17 upwardly and raise the load. When the load has reached the desired elevation the valve 137 is shut.

After the superstructure 1 leaves the ground a short distance, the ring 99 ceases contact with the stem 39, but said stem 89 does not at this time rise, because of the excess pressure above piston 96. Only after the valve 137 is again shut does the stem 89 rise, and then only if leakage occurs above it or opening of the exhaust; otherwise it stays down, as when held down or when balanced pressure exists on both sides of it or excess pressure above it. It stays down under balanced pressure conditions because of the compression spring 97.

To lock the piston 17, the exhaust valve 141 is opened, thereby causing the piston 96 to rise due to pressure below it, so as to cut off the exhaust 107 and the pipe line 117 is closed by the closed valve 139. This action closes the valve 83 to effect a hydraulic interlock.

To permit the device to descend, the operator steps upon the stem 89 to open the liquid valve 83 and simultaneously sets the handle 129 and depresses it so as to open by-pass valve 139 and exhaust 141. He may then take his foot off the stem 89, because the balanced pressure above and below the piston 96 with the aid of spring 97 maintains the piston 96 in lowered position. Exhaust then occurs through the line 117 and open valves 139, 141. As the ring 99 approaches the then depressed stem 89, it comes in contact therewith and holds it down for the next lifting operation. This means that the valve 83 is held open.

If a partial descent has been made and a relift is desired, the operator sets the handle 129 to open valve 137, the piston 96 staying down if there is no exhaust leakage because of balanced pressure thereon. Thus the valve 83 is open and the lifting cycle can be again completed. If leakage is occurring to exhaust, it may be desirable to temporarily hold down the stem 89 while the transition is being made to the lifting position of handle 129.

From the above, it will be seen that there are three positions of the handle 129, namely:

(1) Lift; handle 129 set to open valve 137 only; stem 89 down.

(2) Lock; handle 129 set to open exhaust valve 141 only; stem 89 up.

(3) Drop; handle 129 set to open valves 139, 141 only; stem 89 down.

When the stem 89 is up, the piston 96 covers port 107.

In view of the above, it will be seen that the several objects of the invention are achieved and other advantageous results attained.

As many changes could be made in carrying out the above constructions without departing from the scope of the invention, it is intended that all matter contained in the above description or shown in the accompanying drawings shall be interpreted as illustrative and not in a limiting sense.

I claim:

1. A hoist comprising a cylinder, lifting means therein, a reservoir for liquid communicating with said cylinder, a liquid valve between the liquid reservoir and the cylinder, mechanical means manually operable from a remote point to open said valve, a pneumatic valve having inlet valve and exhaust valve and by-pass valve elements, an inlet and an exhaust associated with said inlet and exhaust valve elements, means communicating while the inlet valve is open the inlet with said liquid reservoir having a port therein, a piston valve on said mechanical operating means normally positioned between the port and the liquid reservoir, resilient means normally pressing said piston valve to the last-named position, said piston valve being packed to permit movement of pneumatic fluid to the reservoir but not reversely when the inlet valve is open, this position of the piston valve positioning the mechanical means to open the liquid valve, back pressure from the lifting means forcing said piston valve to cover said port when the exhaust valve element is open and to position said mechanical means to close the liquid valve, and a connection from a point beneath the piston and said by-pass valve permitting exhaust when said by-pass valve and exhaust valve are open, said piston valve being forced by said resilient means to effect opening of said liquid valve under the last-named conditions.

2. A hoist comprising a cylinder, lifting means therein, a reservoir for liquid communicating with said cylinder, a liquid valve between the liquid reservoir and the cylinder, mechanical means manually operable from a remote point to open said valve, a pneumatic valve having inlet valve and exhaust valve and by-pass valve elements, means communicating between the inlet valve element and said liquid reservoir having a port therein, a piston valve on said mechanical operating means positioned between the port and the liquid reservoir under balanced pneumatic pressure conditions thereon, resilient means normally pressing said piston to the last-named position, said piston being packed to permit movement of pneumatic fluid to the reservoir in this position and when the inlet valve element is open, this position of the piston valve positioning the mechanical means to open the liquid valve, back pressure from the cylinder forcing said piston valve to cover said port when the exhaust valve element is open and to position said mechanical means to close the reservoir valve, said piston valve maintaining the port-open position under action of cylinder pressure closing the liquid valve as the reservoir pressure is relieved, and a connection from a point beneath the piston valve and said by-pass valve element permitting exhaust when said by-pass valve element and exhaust valve element are open, said piston being forced by said resilient means to open said liquid valve under the resulting balanced pressure conditions thereon.

HARRY D. SMITH.