Sept. 16, 1969 R. J. HADDIX ET AL 3,467,138

CONTROL VALVE

Filed Dec. 30, 1966 3 Sheets-Sheet 1

FIG-1

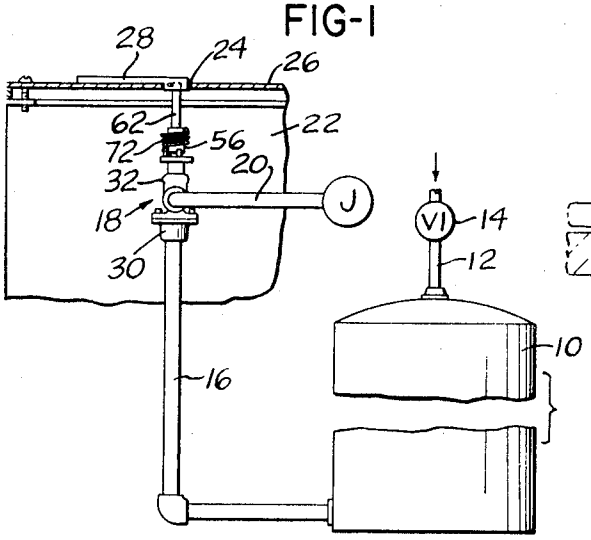
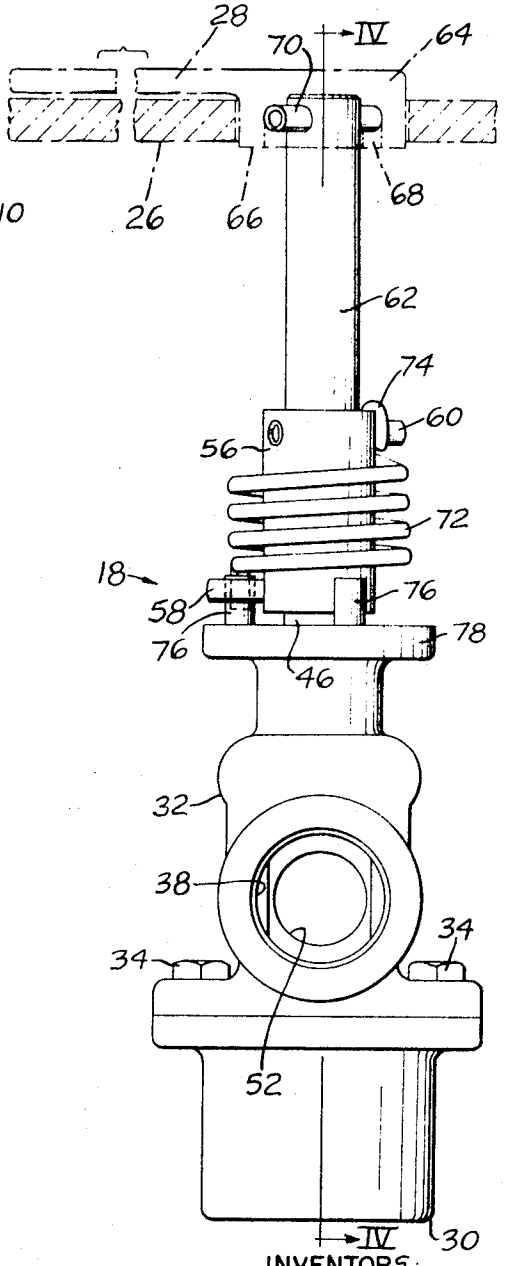


FIG-2



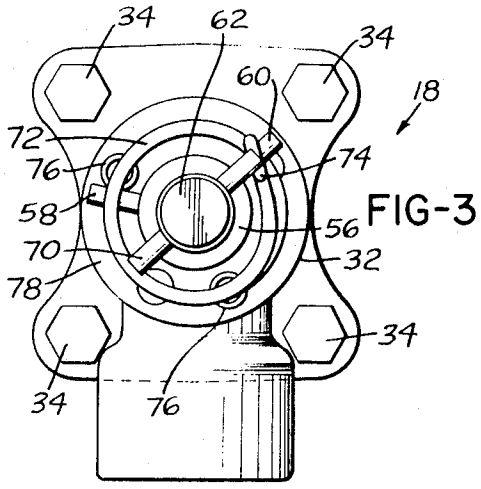


FIG-3

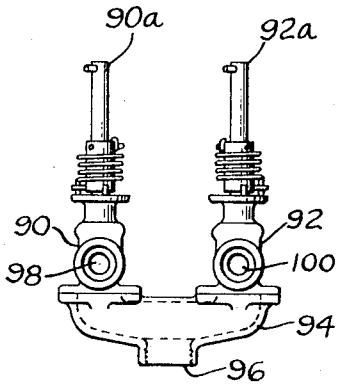


FIG-8

INVENTORS:
Robert J. Haddix
Jon V. K. Holt

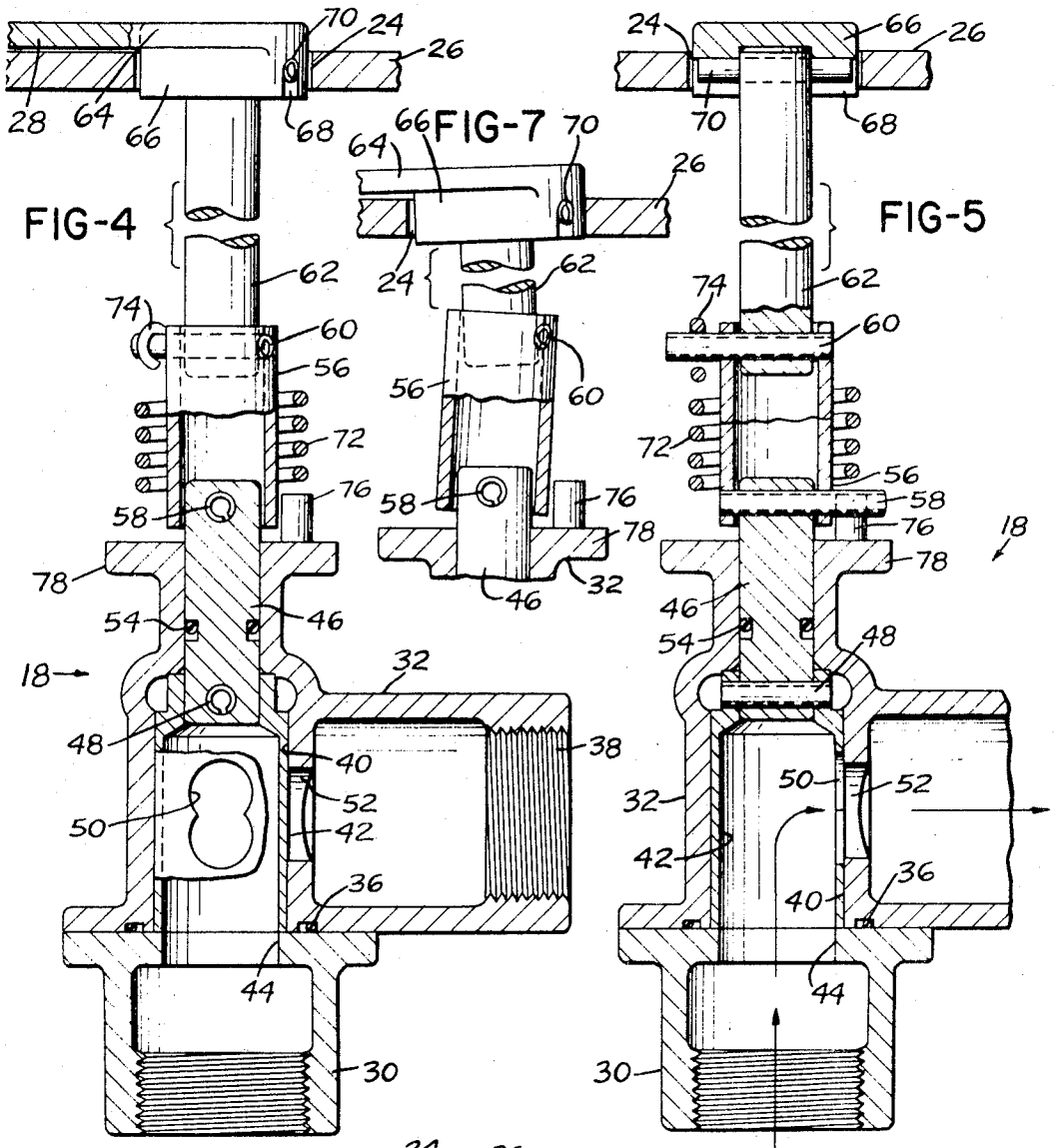
BY

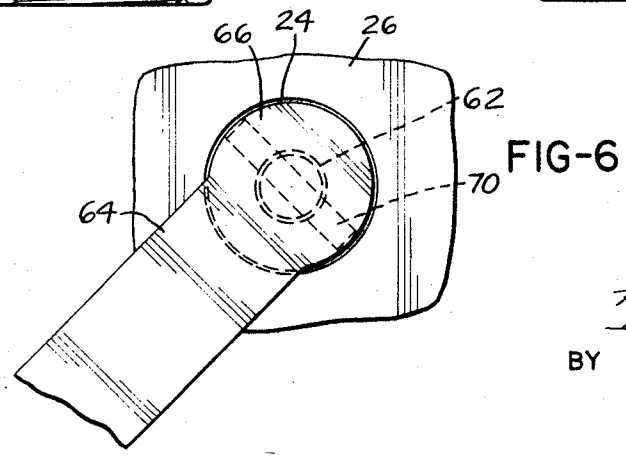
Walter Burky

Sept. 16, 1969 R. J. HADDIX ET AL 3,467,138

CONTROL VALVE

Filed Dec. 30, 1966 3 Sheets-Sheet 2





INVENTORS:
Robert J. Haddix
Jon V. H. Hoff

BY

Walter Becker.

Sept. 16, 1969 R. J. HADDIX ET AL 3,467,138

CONTROL VALVE

Filed Dec. 30, 1966 3 Sheets-Sheet 3

FIG-9

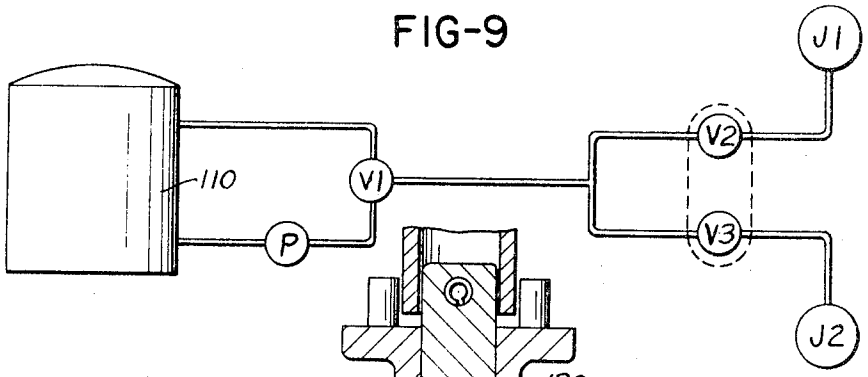
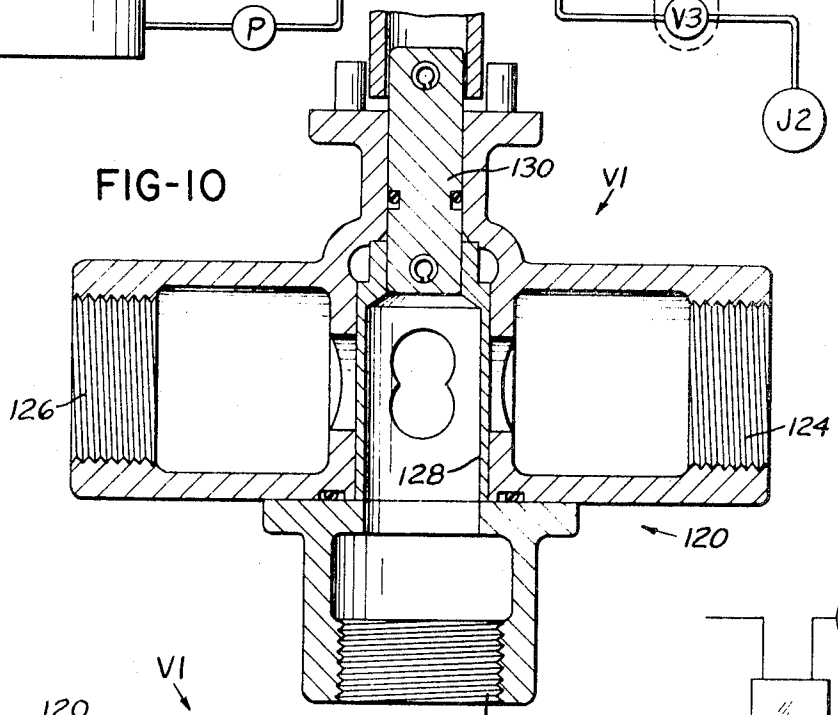


FIG-10



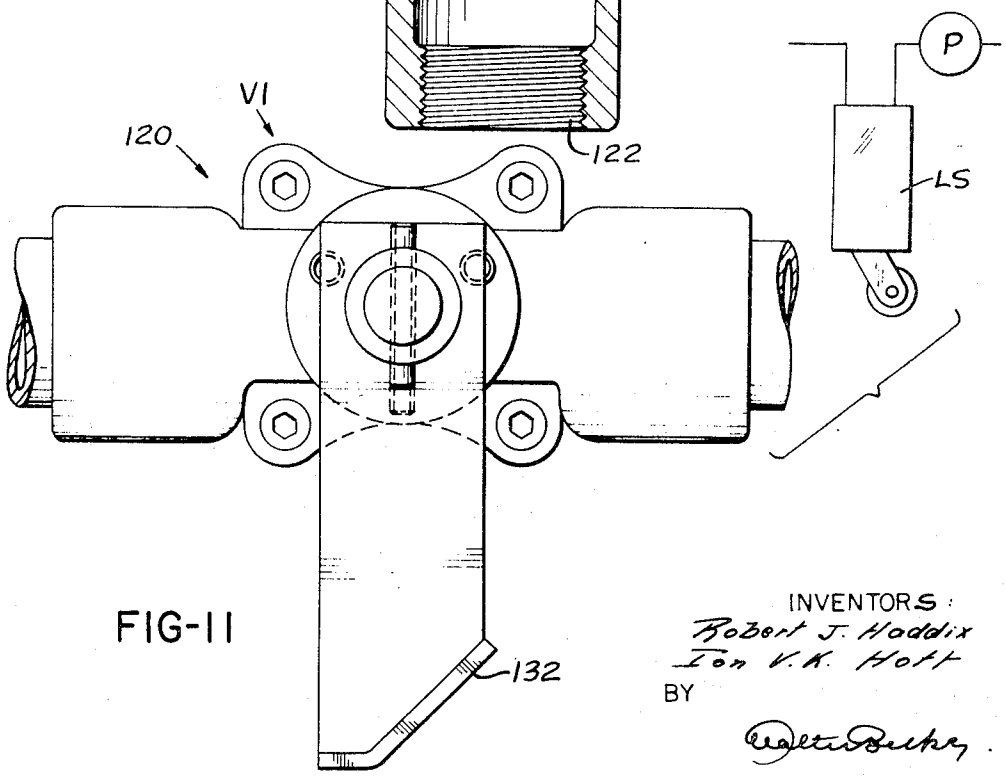


FIG-11

INVENTORS:
Robert J. Haddix
Jon V. K. Hoff
BY
Walter Burke

United States Patent Office 3,467,138
Patented Sept. 16, 1969

3,467,138

CONTROL VALVE

Robert J. Haddix and Ion V. K. Hott, Dayton, Ohio, assignors to The Joyce-Cridland Company, Dayton, Ohio

Filed Dec. 30, 1966, Ser. No. 606,438
Int. Cl. F16k 5/04, 31/44
U.S. Cl. 137—625.24 11 Claims

ABSTRACT OF THE DISCLOSURE

An operating mechanism of a valve used for controlling at least one hydraulic ram connected to load support structure to be raised and lowered. A cylindrical valve member has a valve stem connected to one end with pivot means angularly related to each other holding an axially displaceable sleeve interposed in the stem adapted to be offset during valve operation without binding of the same. Complementary abutment and stop means adjacent to the stem limit extreme rotated positions of the valve member biased by a torsion spring toward one of the extreme positions. The cylindrical valve member has an axial passage of a size for wall thinness to be somewhat flexible to assure sealing against leakage under fluid pressure.

This invention relates to valves, and particularly to valves for vehicle lift installations in the form of valves for controlling the lifting and lowering of the lifts and also for controlling the respective rates of raising and lowering of two-post hydraulic vehicle lifts.

Hydraulic vehicle lifts of the type employed in service stations are, of course, well known and may comprise single-post vehicle lifts wherein a single ram moves the vehicle support structure vertically and also two-post lifts wherein two hydraulic rams are connected to the vehicle supporting structure at spaced points.

In connection with the main control valve which controls the supply of fluid to the ram or rams of the lift installation and the exhausting of fluid therefrom, it is desired for the valve to be relatively inexpensive and easy to manipulate and to provide good sealing so that fluid once supplied to the rams will be retained therein without leakage until it is desired to lower the lift installation.

In connection with the control valves that control the rate of fluid supply to the respective rams, it is important for the valves to be easy to operate and to provide as little resistance to fluid flow therethrough as is possible.

In some types of installations of the nature disclosed, the valve equipment is placed in a pit in the floor with the valve operating members extending through access holes in a cover plate of the installation. In cases of this nature it is important for the valves to be free operating and, inasmuch as the valve structures are connected to pipes and the like it is not always the case that the valve operating members are exactly aligned with the access holes provided therefor.

With the foregoing in mind, it is the primary object of the present invention to provide an improved valve structure especially useful in connection with hydraulic valve operated vehicle lift installations.

A still further object of this invention is the provision of a relatively simply constructed valve structure of the nature referred to which is characterized in a minimum amount of leakage between the ports thereof.

A still further object of this invention is the provision of a single basic type valve structure that can be employed both as a control valve for a lift installation of the nature referred to and also as a metering valve therefor.

Still another object of the present invention is the provision of a valve structure of the nature referred to and an operating mechanism therefor which will prevent binding of the valve or difficulty of operation thereof even though the valve is installed in such a manner that the access hole through which the operating mechanism extends is not precisely aligned therewith.

The several objects referred to above as well as still other objects and advantages of the present invention will become more apparent upon reference to the following detailed description taken in connection with the accompanying drawings, in which:

FIGURE 1 shows somewhat schematically a single ram type vehicle lift actuating system;

FIGURE 2 is a side view of the main control valve of the system;

FIGURE 3 is a plan view thereof;

FIGURE 4 is a vertical section through the valve indicated by line IV—IV on FIGURE 2 and showing the valve closed;

FIGURE 5 is a view like FIGURE 4 but shows the valve open and with the upper portion of the valve stem rotated to a different degree than the valve member for illustrative purposes;

FIGURE 6 is a plan view showing the actuating lever for the valve;

FIGURE 7 is a partial view showing the operation of the flexible valve stem;

FIGURE 8 shows two of the valves of the present invention connected to a single manifold;

FIGURE 9 is a schematic showing of a lift installation having two lift rams;

FIGURE 10 is a sectional view of one of the valves of the system of FIGURE 9; and

FIGURE 11 is aplan view of the valve of FIGURE 10.

FIGURE 1 shows in simplified form a lift installation having a single lift ram. In FIGURE 1, **10** is a container of hydraulic fluid. This hydraulic fluid can be placed under pressure by air supplied thereto from a compressed air source via a conduit **12** and a valve **14**. Valve **14** in one position admits air from the air compressor to conduit **12** and in another position exhausts conduit **12** to the atmosphere. From a point near the bottom of container **10** a conduit **16** leads to a valve **18** constructed according to the present invention. From valve **18** a conduit **20** leads to the lift ram which is identified at **J**. Valve **18** is mounted in a pit or box **22** that is sunk in the floor and has an operating device extending through an aperture **24** in the lid **26** of the pit. A manual operable lever **28** is connected for moving the valve **18** between its open and closed position.

Valve **18** is shown more in detail in FIGURES 2 through 7. The valve comprises a lower body portion **30** (FIGURES 2, 4 and 5) to which conduit **16** is connected and which lower body portion is secured to main body portion **32** of the valve as by cap screws **34** which will be seen in FIGURES 2 and 3. O-ring seal means **36** will be seen in FIGURES 4 and 5 to provide tight seal between lower body portion **30** and main body portion **32**. Main body portion **32** has a threaded port **38** to which conduit **20** is connected. Main body portion **32** also has a cylindrical recess **40** therein in which a cylindrical valve sleeve **42** is mounted.

Valve sleeve **42** at its lower end is confined by the inwardly extending portion **44** of lower body portion **30** while at its upper end is confined by the upper end of recess **40** in main body portion **32**. Sleeve **42** is open at the bottom so that the interior of the valve sleeve is continuously in communication with conduit **16**. The upper end of the sleeve **42** is closed by actuating stem **46** which may be secured to the upper end of the sleeve as, for example, by a roll pin **48**. The sleeve has in its side wall

a port **50** formed by two intersecting bores so that a port is formed which is relatively small in the circumferential direction of the sleeve while being relatively elongated in the axial direction of the sleeve.

Port **50** is adapted for registration with port **52** in body portion **32** which continuously communicates with threaded discharge port **38** and, thus, with conduit **20**.

The advantage of the port arrangement shown in the valve sleeve is that it offers very little restriction to fluid flow through the valve while at the same time when the valve is closed with port **50** being disposed 90 degrees away from port **52**, there is a long leakage path from port **52** to port **50** so that leakage through the valve is held at a minimum when the valve is closed. However, it is a simple matter to form the valve sleeve and the cylindrical recess in body portion **32** so that the sleeve fits relatively closely therein, while at the same time being easy to turn between its open and closed positions.

The manufacture of the sleeve and the recess therefor in body portion **32** is quite simple and inexpensive so that, even though the valve has improved operating characteristics, it is relatively inexpensive to manufacture.

Cylindrical valve stem **46** extends out the top of body portion **32** and within body portion **32** is sealed thereto by the O-ring **54**. Above the top of body portion **32** stem **46** is connected with a tubular element **56** as by roll pin **58**. It will be observed that tubular element **56** is larger in internal diameter than stem **46** so that it can rock thereon about the axis of pin **58**. At its upper end tubular member **56** is connected by roll pin **60** with a stem **62** which is about the same size as stem **46**. Stem **62** can thus rock relative to tubular element **56** about the axis of roll pin **60**.

By setting pins **58** and **60** at angles to each other, a sort of universal joint is established between stems **46** and **62** so that stem **62** can tilt relative to stem **46** and shift laterally relative thereto somewhat. Thus, if the aperture **24** in cover plate **26** is not exactly aligned with the valve, there will still be no binding of the operating mechanism of the valve in the cover plate and the valve will remain easy to operate at all times.

According to the present invention, the upper end of stem **62** terminates at about the upper level of cover plate **26** so that there is no objectionable protrusion of the stem above the floor level. Operation of the valve is accomplished by a lever **64** having a cap-like end **66** with slots **68** for receiving a roll pin **70** in the upper end of stem portion **62**.

The valve is continuously biased toward its closed position by a torsion spring **72** which takes an anchor at its upper end at **74** on one end of roll pin **60**. At its other end the spring takes an anchor in one or the other of a pair of roll pins **76** pressed into bores provided therefor in a flange **78** on the upper end of body portion **32**. The pins **76** are provided to serve as stops for the rotary portion of the valve so that valve sleeve **42** will have two distinctly defined positions, namely, a fully open position and a completely closed position.

The roll pin **58** is extended, as will be seen in FIGURE 5, so that it will abut the stop pins **76** in its two positions. Stop pins **76** are spaced apart, as will be seen in FIGURE 3, so that the valve member will take about 90 degrees of movement between its fully open and its fully closed position.

The spring **72**, as mentioned, continuously biases the valve member toward its closed position and because of this, anytime the lever **64** is released, either delibrately or accidentally, the valve will snap closed and interrupt the supply of actuating fluid to the lift ram. This safety feature is particularly important in connection with the vehicle lifts and it will be seen at this point that the floating or universal connection placed in the actuating stem of the valve is of importance because there is never any binding of the valve stem and the spring **72** will always immediately snap the valve closed if lever **64** is released or, for any reason, becomes disengaged from the valve stem.

In the drawings FIGURE 4 shows the valve in closed position and FIGURE 5 shows it in open position.

FIGURE 7 shows what occurs when the aperture **24** in cover plate **26** is not exactly aligned with the valve body.

The same basic valve structure can be employed for either normally opened or normally closed valves so that the valve structure can either be used as a valve for controlling the supply of fluid to a lift ram and the discharge of fluid therefrom, or it can be controlled to regulate the rates of supply to a pair of lift rams. As shown in FIGURE 8 two of the valve units, according to the present invention are indicated at **90** and **92** and have their respective upper valve portions secured to a manifold unit **94**. Manifold unit **94** can have hydraulic fluid under pressure supplied thereto by a port **96** and this fluid will be supplied through port **98** of valve unit **90** to one ram and through port **100** of valve unit **92** to another ram. In this case, the valves are normally sprung to a wide open position and are respectively rotated to restrict fluid flow to their respective rams by rotation of their respective stems **90***a*, **92***a*.

The stems of the respective valve units can be independently operated or they can be arranged to be operated in unison so that simultaneously with the increase in restriction to the fluid flow to one of the rams, the restriction to the fluid flow to the other ram is reduced.

In general, however, it is preferred for each of the valve units to be normally sprung to a wide open position and for the individual valve units to be operated to slow down their respective rams to hold the vehicle lift structure supported on the rams level during its movement upwardly and downwardly.

FIGURE 9 shows somewhat schematically a somewhat different type of installation wherein container **110** contains hydraulic fluid. This hydraulic fluid is adapted to be supplied under pressure by a pump P via a valve V1 to two rams which are indicated J1 and J2 and which are connected to a single vehicle engaging structure of the lift installation. Metering valves V2 and V3 are serially connected with the rams J1 and J2 respectively. Each of the metering valves V2 and V3 can correspond to a valve unit of the nature described previously and which are sprung toward a fully open position. The valves V2 and V3 may, for example, be manifolded as shown in FIGURE 9 so that the rate of fluid flow to the respective rams is under selective control.

The valve V1 has one position wherein the discharge side of the pump is connected to the conduit leading to metering valves V2 and V3 and has an intermediate position wherein the conduit leading to valves V2 and V3 is blocked off and has a third position wherein the conduit leading to valves V2 and V3 is connected to another conduit leading back to the reservoir. The construction of valve V1 will be seen in FIGURES 9 and 10. This valve unit is quite similar to the valve unit previously described except that it includes another valve port.

In FIGURE 10 it will be seen that valve V1 comprises a body generally designated **120** and having a fluid inlet port **124**, a port **122** leading to the metering valves, and a port **126** leading back to the reservoir. The valve has a cylindrical valve sleeve **128** therein which in one position connects ports **122** and **124** and in another position seals the ports off from each other, and in a third position connects port **122** with port **126**. Actuating stem means **130** similar to the actuating stem means of the previously described valve is connected to valve sleeve **128**. The valve of FIGURES 10 and 11 may be spring biased toward position where all of the ports of the valve are disconnected from each other.

Normally, the valve is manually operated towards its up or down position and is sprung toward its intermediate position when the lift is stationary.

Inasmuch as it is desired for pump P to operate only when the lift is moving upwardly, stem **130** may carry a cam **132** which cooperates with a limit switch LS in circuit with pump P so that when the valve is shifted to up position, the motor will be energized to supply fluid under pressure to valve V1. When the valve is shifted to halt the lift it is, of course, not necessary for pump P to operate and at this time switch LS will open and the pump will halt. When the valve is shifted to down position it is not necessary for pump P to operate so that in this position also switch LS is open and the pump is not running.

All of the valves of the present invention are characterized with the provision of the cylindrical valve sleeve rotatably mounted in the cylindrical bore in the valve body and having a port in the valve sleeve which is elongated in the axial direction of the sleeve. Each valve is characterized in a flexible connection between the upper portion of the valve operating stem and that portion of the valve operating stem that extends directly into the valve body.

A feature of the valve of this invention will be seen in connection with FIGURE 10. As soon as pressure is trapped between the valve and the jack with the valve closed, a sealing effect is obtained in the valve because the cylindrical valve member is thin and pressure exerted thereon will tend to cause it to engage the bore in the valve body in a fluid tight manner.

All of the valves are relatively simple and inexpensive to construct but all thereof are easy to operate and have improved sealing characteristics to keep to a minimum any fluid leakage from one port to another when the valves are in operation.

It will be understood that this invention is susceptible to modification in order to adapt it to different usages and conditions; and accordingly, it is desired to comprehend such modifications within this invention as may fall within the scope of the appended claims.

What is claimed is:

1. A valve comprising: valve body means having a first port and second port means; a cylindrical cavity in said body means communicating with said port and port means, a cylindrical valve member rotatably fitted in said cavity, said body means including a first portion containing said cavity and a second portion secured to said first portion and extending radially inwardly from the periphery of said cavity so as to confine said valve member in said cavity, said first port being in said second portion of said body means and said second port means being in said first portion of said body means, said valve member having an axial passage extending therein from one end and continuously communicating with said first port and having a lateral hole leading from said axial passage to the outer periphery of said valve member and adapted in a predetermined rotated position of said valve member to communicate with said second port means, a valve stem connected to the other end of said valve member and projecting from said body means, said hole in said valve member being substantially longer in the axial direction than in the circumferential direction to provide for an elongated leakage path between said first port and said port means when said valve member is rotated out of said predetermined rotated position, said stem including a first portion which extends into said body means and a second portion outside the body means arranged in spaced coaxial relation with said first portion, a sleeve loosely receiving the adjacent ends of said stem portions, and pivot means angularly related to each other and tiltably connecting opposite ends of said sleeve to the respective ends of said stem portions.

2. A valve according to claim **1** in which said stem includes a first portion which extends into said body means and a second portion outside the body means axially displaceably connected to the first portion so the said stem portion can be offset in operation without binding of the stem.

3. A valve according to claim **1** which includes circumferentially spaced stop means adjacent said first stem portion, and an abutment on said first stem portion adapted to engage said stop means in extreme rotated positions of said valve member.

4. A valve according to claim **1** which includes circumferentially spaced stop means adjacent said first stem portion, said pivot means joining said sleeve to said first stem portion extending radially from said sleeve so as to abut said stop means in extreme rotated positions of said valve member.

5. A valve according to claim **3** which includes a torsion spring acting between said stem and said body means and continuously biasing said valve member toward one of its extreme positions.

6. A valve according to claim **5** in which said abutment is in the form of an extension of the pivot means joining said sleeve to said first stem portion, said pivot means joining said sleeve to said second stem portion also having an extended end, said torsion spring having one end anchored on the extended end of pivot means joining said sleeve to said second stem portion and its other end anchored on one of said stop means.

7. A valve according to claim **1** in which said second port means comprises a single port opening laterally from said first body portion in the central plane of the said hole in said valve member.

8. A valve according to claim **1** in which said second port means comprises a pair of diametrically opposite ports opening laterally from said first body portion in the central plane of the said hole in said valve member.

9. A valve according to claim **1** in which said second portion of said body means is in the form of a unitary manifold adapted for directly receiving a pair of said first body portions in side by side relation, said manifold having a pair of the said first ports therein each communicating with a respective one of the axial passages in the valve members pertaining to said first body portion, and a single further intermediate port in said unitary manifold communicating with both of the said first ports therein.

10. A valve according to claim **1** in which the axial passage in said valve member is of such a size that an integral wall of the cylindrical valve member surrounding the passage is of such thinness as to be somewhat flexible under the pressure of the fluid in the system in which the valve is mounted.

11. A valve according to claim **10** in which said axial passage in said valve member extends from the said one end past said hole to near the other end thereof so the valve member is characterized in a degree of flexibility on both axial sides of said hole.

References Cited

UNITED STATES PATENTS

255,881	4/1882	Morrison	251—310
516,534	3/1894	Hodges et al.	251—310
865,216	9/1907	Ullmann	251—310 XR
873,476	12/1907	Woods	137—625.24
1,224,959	5/1917	Rosenfeld	251—235 XR
1,791,914	2/1931	Tomlinson	251—310 XR
2,220,479	11/1940	De Bell	137—625.23 XR
2,259,439	10/1941	De Ganahl	137—625.23 XR
2,451,671	10/1948	Feucht	137—625.24

FOREIGN PATENTS

168,960	9/1921	Great Britain.

DANIEL BLUM, Primary Examiner

U.S. Cl. X.R.

137—608; 251—235, 310