Aug. 30, 1949. L. W. WACHTER 2,480,527

HYDRAULIC DRIVE FOR REFUSE BODY AND SAFETY CONTROL THEREFOR

Filed June 15, 1945

4 Sheets-Sheet 1

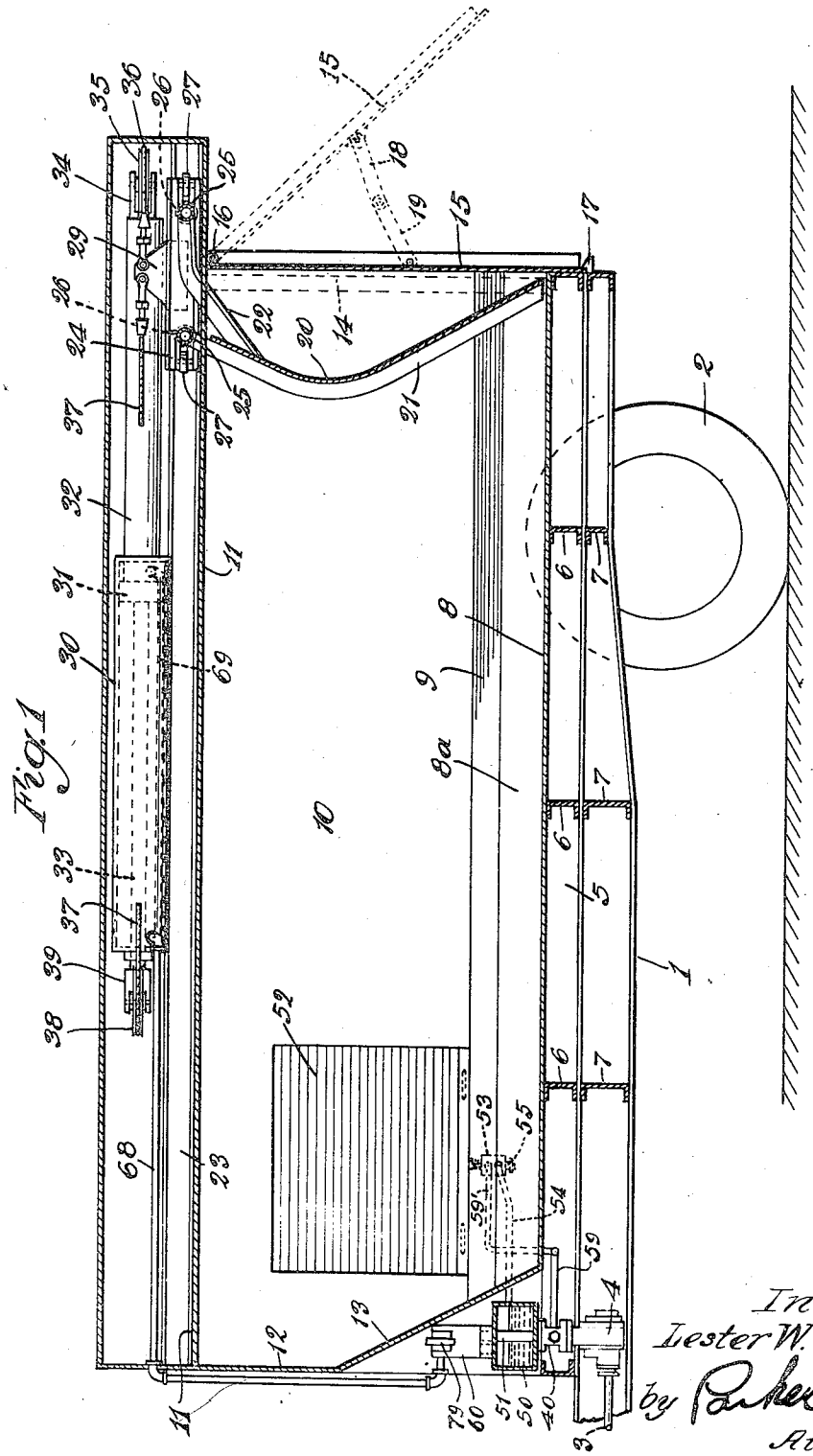


Fig. 1

Inventor
Lester W. Wachter
by Parker & Carter.
Attorneys.

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4 Sheets-Sheet 2

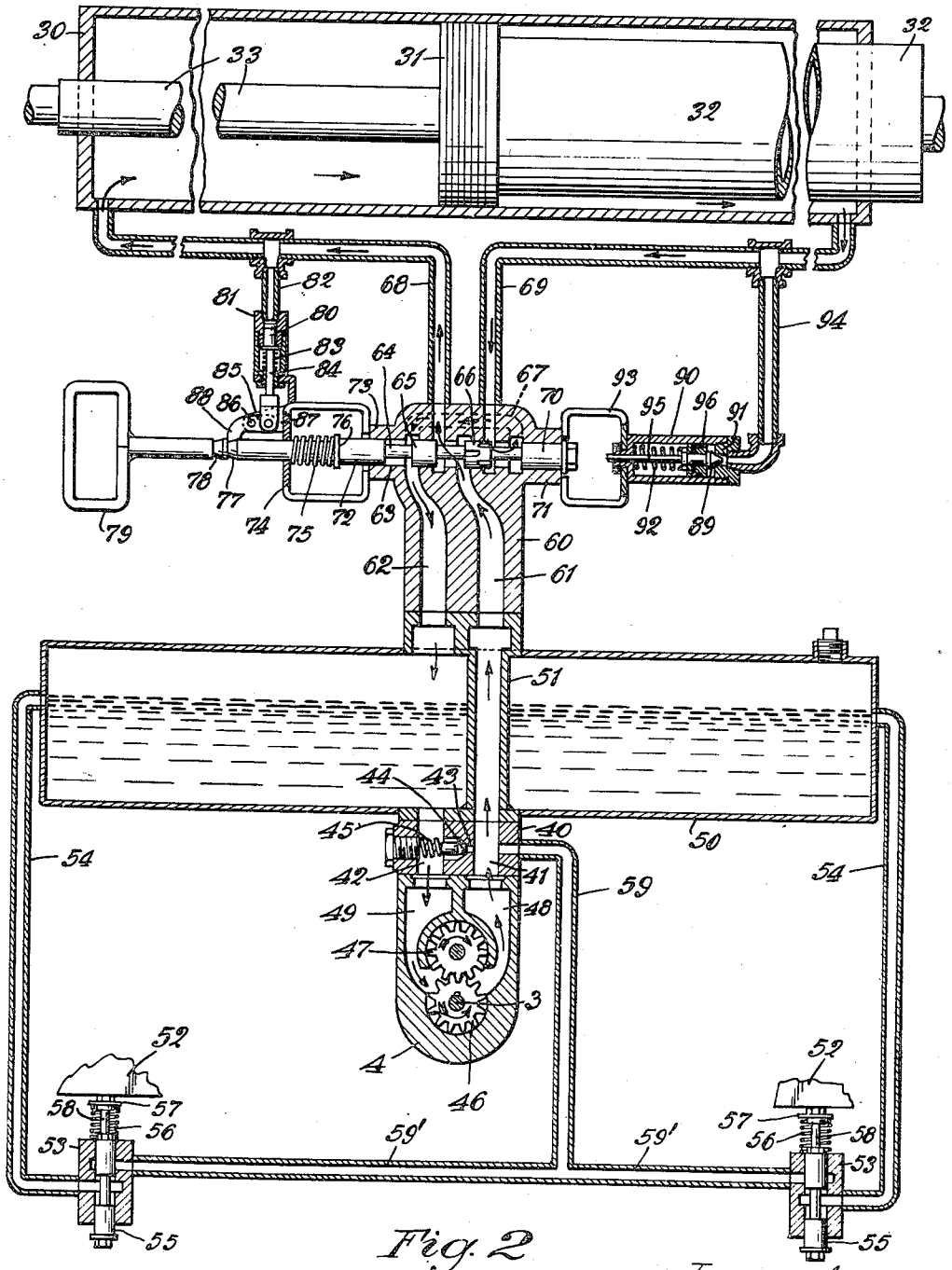


Fig. 2

Inventor
Lester W. Wachter
by Parker & Carter.
Attorneys.

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Filed June 15, 1945 4 Sheets-Sheet 3

Fig. 3

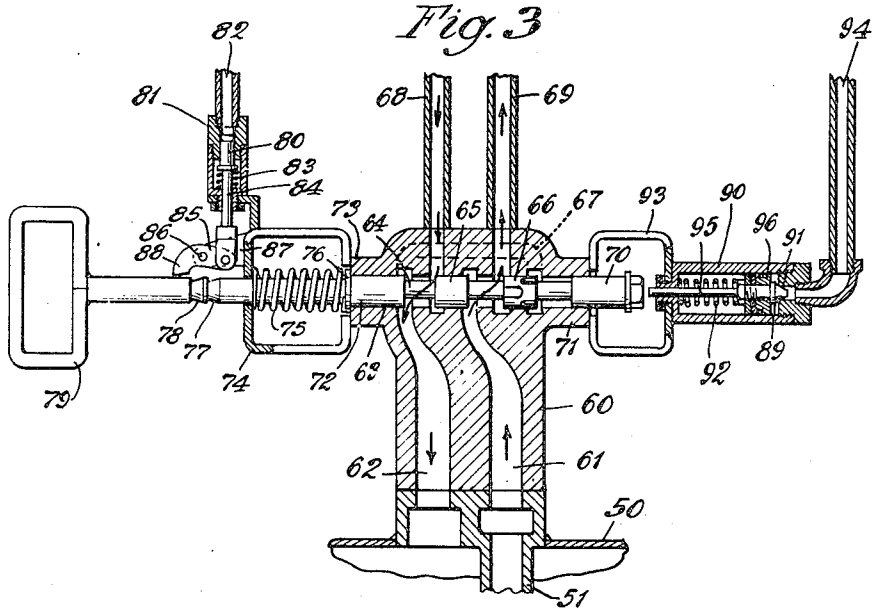
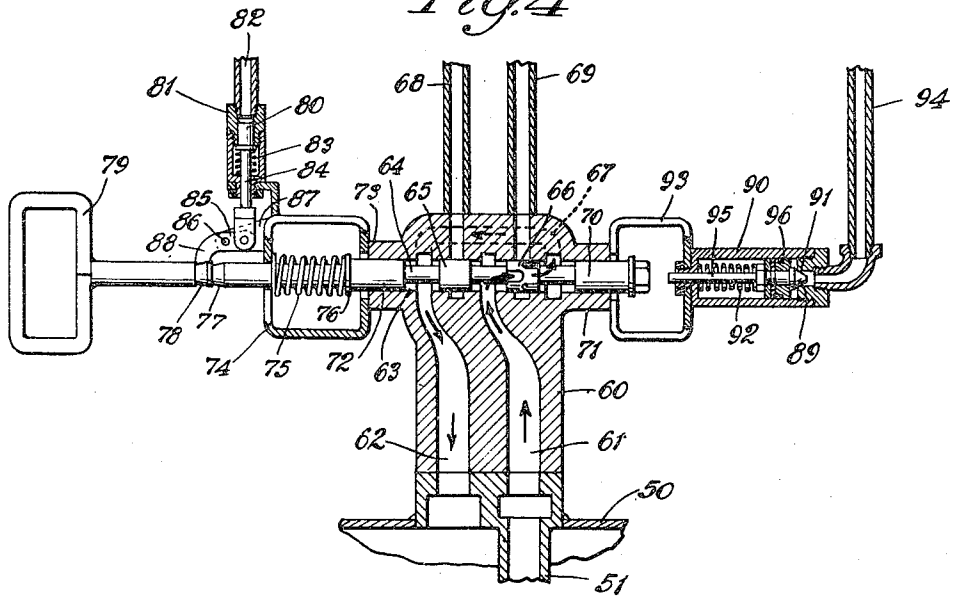


Fig. 4



Inventor
Lester W. Wachter
by Parker & Carter
Attorneys.

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4 Sheets-Sheet 4

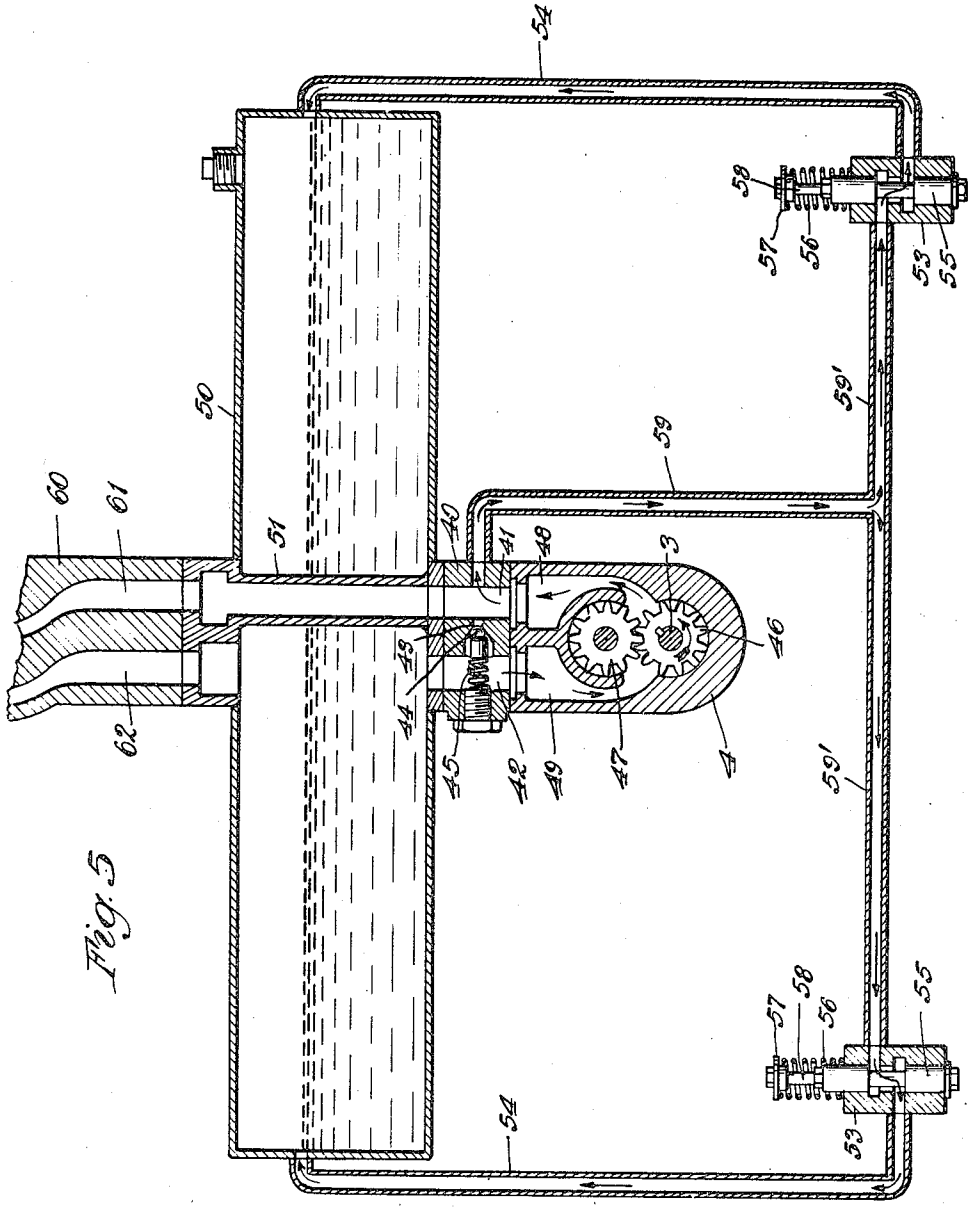


Fig. 5

Inventor
Lester W. Wachter
by Parker & Carter
Attorneys.

Patented Aug. 30, 1949

2,480,527

UNITED STATES PATENT OFFICE

2,480,527

HYDRAULIC DRIVE FOR REFUSE BODY AND SAFETY CONTROL THEREFOR

Lester W. Wachter, Streator, Ill., assignor to Anthony Company, Streator, Ill., a corporation of Illinois

Application June 15, 1945, Serial No. 599,568

5 Claims. (Cl. 214—82)

1

This invention relates to a container and to means for packing a load in said container and for discharging it from said container. It relates particularly to a mechanism for moving said discharging means. It has for one object to provide a power system for moving the packing and discharging means and for automatically setting up and carrying out a complete cycle of operation of the moving means.

Another object is to provide a hydraulic drive in connection with a reciprocating load handling means, whereby said handling means can be caused to move in one direction and automatically to reverse its direction in movement in response to predetermined conditions and to return to an initial position and stop automatically in that position.

Although the device is illustrated in connection with a garbage or refuse body, it may be used in many different sorts of associations and the drive illustrated may be used for almost any purpose in which it is desirable to have a means for moving a given member in one direction and for reversing its movement automatically in response to predetermined conditions, and thereafter for returning it to its original position, and thereafter stopping it automatically.

Other objects will appear from time to time throughout the specification and claims.

One particular refuse body for which the drive is adaptable is illustrated in application Serial No. 568,534, filed December 16, 1944, by William C. Anthony, now Patent No. 2,408,284, granted September 24, 1946. One of the figures of the present application is based upon the showing of that application. Only so much of the mechanism is illustrated as to indicate the location of the driving assembly and to illustrate one possible use of the device of the present invention.

This invention is illustrated more or less diagrammatically in the accompanying drawings, wherein:

Figure 1 is a vertical section with parts omitted illustrating one form of device with which the structure of the present invention may be used;

Figure 2 is a diagrammatic showing of the hydraulic system used for moving the load propelling member of Figure 1;

Figure 3 is a detailed sectional view of the control valve of Figure 2 in position for return;

Figure 4 is a vertical section of the same valve in the neutral position; and

Figure 5 is a diagrammatic showing of a portion of the circuit with the safety valves in the open position.

2

Like parts are indicated by like characters throughout the specification and the drawings.

In the particular form here shown, 1 is a truck frame which may be of any desired form and is supported upon wheels 2. 3 is a driving shaft from which a pump 4 is driven. The pump may be of any desired form and will be described more in detail below.

Body frame or sill members 5 may be positioned on the truck frame 1 and they may be connected by transverse members 6. The truck frame members 1 may also be connected by transverse members 7. A container portion may include a floor member 8, generally vertical portions 8a, an inclined portion 9 and side portions 10. A top portion 11 may be applied to the side walls or portions 10 and it may, if desired, be flat or slightly curved. The details and shape of the container portion form no essential part of the invention. In general, the container is closed at the forward end by a wall 12, which may have an inclined portion 13 to provide a space in which the valve and reservoir assembly may be positioned.

At its opposite end the container is open and may have a frame portion 14 closed by a gate 15, which is preferably hinged at its upper end, as at 16, and may be provided with a closing latch 17 of any desirable shape. 18 and 19 together define a prop or stop which holds the door 15 in the open or dotted line position of Figure 1.

A material moving member 20 which may be reinforced by one or more ribs 21 and strengthened by one or more braces 22 is arranged to run along tracks 23 by being mounted upon a dolly 24 which is provided with shafts 25 which carry rollers 26. The rollers 26 engage the tracks 23. Rollers 27 may also be provided on the dolly to engage the tracks 23 in a plane at right angles to the plane of the rollers 26 which engage the track flanges. A cylinder 30 is fixed above or within the upper part of the container and is provided with a piston 31 from which piston rods 32 and 33 project. A cross head 34 is connected to the piston rod 32 and may carry sheaves 35. One or more cables 36 are positioned to engage the sheaves 35 and are secured at one end to the members 29. Additional cables 37 are also secured to the members 29 and pass about sheaves 38 mounted on a cross head 39 secured to the piston rod 33. The complete details of the cable and sheave assembly are not shown, as they form no essential part of this invention and

are shown in the Anthony application, Serial No. 568,534, above mentioned. Suffice it to say that a double acting piston and cylinder assembly is shown, together with means for supplying pressure fluid to one or the other side of the piston. This means causes the piston to move in one direction or the other in response to the operation of the control mechanism which will be described below.

In the diagram of Figure 2, the hydraulic system is shown and the piston and cylinder assembly which appears generally in Figure 1 is shown in greater detail. In addition to the piston and cylinder assembly and the pump which appear in Figure 1, a reservoir, a pump valve and valve housing and control valves and safety valves appear. Thus a valve housing 40 is secured to the pump housing 4 and is provided with a high pressure passage 41. It is also provided with a low pressure passage 42. A by-pass passage 43 connects the passage 41 with the passage 42 and is provided with a check valve 44 which is normally held seated by a spring 45. The pump may be of a standard gear pump type or may be of other types. As shown, it includes gears 46 and 47 which are driven in the direction of the arrows marked upon them. Fluid under pressure may flow through the high pressure passage 48 of the pump, and low pressure fluid enters through the passage 49.

Mounted upon or adjacent the valve housing 40 is a reservoir 50 with which the low pressure passage 42 of the valve housing is connected. The high pressure passage 41 is by-passed around or through the reservoir 50 by means of a conduit or pipe 51.

Safety valve means are provided in connection with the vehicle and are shown in Figures 1 and 2. The vehicle itself is provided with doors 52 which, as shown, slide up and down. They could be otherwise made and the invention is not limited to sliding doors. Whatever the type of door shown, a safety valve is positioned to be operated by each door when the door is closed, and this valve is of such construction that it will automatically open and stop the operation of the system whenever either of the doors is open. The valves are identical in form and each of them includes a housing 53. Low pressure conduits 54, 54 lead from the reservoir to each of the housings 53. Valve members 55 are mounted in each of the housings 53 and are normally moved to an open position by springs 56 which bear upon flanges 57 mounted upon the stems 58 of the valves 53. As shown in Figure 2, the safety valves are closed, and as shown in Figure 5 they are open. When either door is closed, it contacts one of the valve stems 58 and moves the valve to the position of Figure 2 and closes it. Each of the valves is connected with the high pressure side of the valve housing 40 by means of a conduit 59 and branch conduits 59', 59'. When the valves are in the position of Figure 5, the high pressure fluid is bypassed through the conduits 59 and 59' through the valves 55 and through the conduits 54 back to the reservoir 50 and operation of the piston 31 is prevented.

In communication with the reservoir 50 and the conduit 51 is a valve housing 60 containing a passage 61 which is in communication with the conduit 51 and a passage 62 which is in free communication with the reservoir 50. A valve housing 60 contains a passage 63 of generally cylindrical shape within which a valve rod 64 is mounted.

This valve rod has on it two valve enlargements 65 and 66.

A by-pass passage 67 may connect the two ends of the passage 63. Leading from the passage 63 is a conduit 68 which is connected to one end of the cylinder 30. Pressure fluid flows through the conduit 68 to move the piston in the packing or discharging direction. A conduit 69 is connected generally to the opposite end of the cylindrical cavity 63 and leads to the opposite end of the cylinder 30. Pressure fluid flows through the conduit 69 to effect the return movement of the piston 31. The valve rod 64 is provided with an enlargement 70 which fits snugly in a portion 71 of the housing 60. The valve rod 64 is also provided with an enlargement 72 which fits snugly in an enlargement 73 of the valve housing 60. A frame member 74 is secured to the enlargement 73 and a spring 75 is positioned within this frame member and bears at one end against it and at the other end against an enlargement 76 on the valve rod portion 72. The valve rod 64 or its enlargement 72 is provided with grooves 77 and 78 and with a handle 79.

A latch control plunger 80 is positioned in a valve housing 81 to which pressure fluid may be directed by a conduit 82 which is in circuit with the conduit 68. The plunger 80 is normally held seated by a spring 83, but may be unseated by pressure in the conduit 82. The plunger stem 84 is connected to one end of a latch lever 85 which is pivoted at 86 upon a member 87 which is mounted on the frame portion 74. The nose 88 of the latch 85 may engage one or another of the grooves 77, 78 or may be held out of contact with the grooves.

A pilot valve 89 is mounted within a housing 90 and is normally held seated on a seat 91 by a spring 92 which is mounted within the housing 90. The housing itself is secured to a frame member 93. A conduit 94 leads from the conduit 69 to the valve 89. A valve stem 95 is connected to the valve 89 and extends outwardly beyond the housing 90. The valve portion 89 has positioned about it a piston 96. The valve and piston are normally held seated by a spring 92. The housing 90 acts as a cylinder for the piston 96.

The Figures 2, 3 and 4 illustrate valve seatings of the valves 65 and 66 for three different conditions of operation. As shown in Figure 2, pressure fluid is passed from the pump to the left-hand end of the cylinder 30 and therefore to the left hand side of the piston 31 to move the piston to the right in what may be called the packing or discharge direction. The words "packing" and "discharge" in this connection refer to the fact that the blade or member 20 is moved to pack material in the container as the latter is loaded and is finally moved to discharge the material from the container. The movement of the piston 31 to the right from the position shown in Figure 2 is therefore a packing or discharging movement. With the valves as set in Figure 2, low pressure fluid is forced outwardly through the system and returns to the sump or reservoir 50.

Although I have shown an operative form of my invention, it will be recognized that many changes in the form, shape and arrangement of parts can be made without departing from the spirit of the invention, and my showing is therefore to be taken as, in a sense, diagrammatic.

In general, in any situation in which this invention is used the stroke of the piston in one direction may be considered as a working stroke and the movement of the piston in the opposite direc-

tion may be considered as a return stroke. In the particular case described herewith the movement of the piston which carried the blade 20 in the packing or discharging direction has been considered a working stroke and the movement of the blade in reverse toward its initial position has been considered a return stroke. Where the words "working" or "return" occur in the specification or claims, they are to be understood with this meaning and not as limiting the invention because obviously some work might be done by the piston when moving in either or both directions.

The use and operation of this invention are as follows:

With the parts as shown, it will be assumed that the hydraulic system illustrated is mounted to operate a blade or packing and discharge member such as the member 20. At the outset, the body or container will be empty and material will be put into it, usually through the doors 52 when the latter are open. After loading has stopped, the material may be packed toward the discharging end. This is accomplished by pulling the handle 79 to the position of Figure 2. In that position the latch 88 engages the groove 77 and holds the valves 65 and 66 in the position shown in that figure. Pressure fluid then flows through the conduit 51, the passage 61 and the passage 68 to the left-hand end of the cylinder 30 and moves the piston 31 to the right, thus carrying the blade toward the rear of the body or container and moving the load with it.

When the load contacts the closed gate 15, it will be packed against that gate and pressure will build up. When pressure builds up sufficiently, it will be exerted through the conduit 82 and will force the plunger 80 downwardly, tilting the latch 85, 88 out of engagement with the groove 77 into the position shown in Figure 3. When the latch is disengaged from the groove 77, the spring 75 is free to expand and moves the valve rod 64 with the valves 65 and 66 from the position of Figure 2 to the position of Figure 3. Thus the flow of pressure fluid is reversed and it now flows through the conduit 15, the conduit 61 and the conduit 69 to the right-hand end of the cylinder 30 and reverses the direction of movement of the piston 31 and consequently carries the blade back to its original position. When the blade reaches its original position and can go no further, pressure will build up in the right-hand end of the cylinder 30 and will be effective through the conduit 69 and the conduit 94 and will open the valve 89 against the resistance of the spring 92.

As soon as the valve has been cracked open the pressure may be reduced but will be sufficient to move the piston 96 further away from the sealing position and the stem 95 will contact the portion 70 and will carry the valve rod 64 and the valves 65 and 66 to the neutral position of Figure 4. In that position the latch portion 88 will engage the groove 78 and will hold the valve parts in neutral position. When they are in that position and while the pump continues to operate, pressure fluid moves from the pump through the conduit 51, the passage 61, the by-pass passage 67 and the passage 62 back to the reservoir 50, and no movement of the piston occurs.

The cycle above described is carried out automatically. The only thing that is required of the operator is to start the pump and move the valves to the initial packing position of Figure 2. Thereafter automatically the piston moves in one direction packing the load and when pressure is sufficient, the piston travel is reversed and the blade is restored to its original position at which it automatically stops.

When the load is to be discharged, the gate 15 is open and the same cycle is initiated. The blade moves to the rear, discharging the load. When the dolly reaches the end of its travel, it can go no farther and pressure builds up in the cylinder 30 just as it did during the packing operation and the movement of the piston is reversed when the load has been completely discharged, the piston returning to its initial position and stopping.

I claim:

1. In combination, a closed container having an opening for filling and an opening for discharging, a combined packing and discharging member mounted within said container, moving means for movably supporting and moving said member, said moving means including a hydraulic mechanism for moving said member within said container, said hydraulic mechanism including a hydraulic piston and cylinder assembly, and means for furnishing pressure fluid to move said piston selectively within said cylinder, and means for establishing and carrying out a cycle of operations including means for initiating the movement of said piston in one direction, means for reversing said piston upon the occurrence of predetermined conditions upon one side thereof, to cause said piston to move, and means for stopping said piston in response to conditions on the opposite side of said piston a movable door positioned to close said filling opening, a valve positioned to be moved by said door to closed position, by-pass conduits connecting said valve to said hydraulic mechanism, and a spring biased to open said valve, whereby when said door is open pressure fluid is by-passed from said moving means.

2. In combination, a closed container having an opening for filling and an opening for discharging, a combined packing and discharging member mounted within said container, moving means for movably supporting and moving said member, said moving means including a hydraulic mechanism for moving said member within said container, said hydraulic mechanism including a hydraulic piston and cylinder assembly, and means for furnishing pressure fluid to move said piston selectively within said cylinder, and means for establishing and automatically carrying out a cycle of operations including means for initiating the movement of said piston in one direction, means for reversing said piston upon the occurrence of predetermined conditions upon one side thereof, to cause said piston to move in an opposite direction, and means for stopping said piston in response to conditions on the opposite side of said piston a movable door positioned to close said filling opening, a valve positioned to be moved by said door to closed position, by-pass conduits connecting said valve to said hydraulic mechanism, and a spring biased to open said valve, whereby when said door is open pressure fluid is by-passed from said moving means.

3. In combination, a closed container having an opening for filling and an opening for discharging, a combined packing and discharging member mounted within said container, moving means for movably supporting and moving said member, said moving means including a hydraulic mechanism for moving said member within said container, said hydraulic mechanism including a piston and cylinder assembly, a pump, a valve assembly including a valve housing, two

conduits leading from said valve housing, said conduits being arranged to discharge fluid into said cylinder on opposite sides of said piston, and a valve member in said housing, manual means for giving said valve an initial setting, and pressure responsive means for reversing the setting of said valve to reverse the direction of movement of said piston, and a second pressure responsive means, and a part associated with said second pressure responsive means for moving said first-mentioned valve to a neutral position, said second pressure responsive means being connected to the opposite side of said cylinder, and adapted to operate to carry said first-mentioned valve to a neutral position a movable door positioned to close said filling opening, a valve positioned to be moved by said door to closed position, by-pass conduits connecting said valve to said hydraulic mechanism, and a spring biased to open said valve, whereby when said door is open pressure fluid is by-passed from said moving means.

4. In combination, a closed container having an opening for filling and an opening for discharging, a combined packing and discharging member mounted within said container, moving means for movably supporting and moving said member, said moving means including a hydraulic mechanism for moving said member within said container, said hydraulic mechanism including a piston and cylinder assembly, a pump, a valve assembly including a valve housing, two conduits leading from said valve housing, said conduits being arranged to discharge fluid into said cylinder on opposite sides of said piston, and a valve member in said housing, manual means for giving said valve in initial setting, and pressure responsive means for reversing the setting of said valve to reverse the direction of movement of said piston, and a second pressure responsive means, and a part associated with said second pressure responsive means for moving said first-mentioned valve to a neutral position, said second pressure responsive means being connected to the opposite side of said cylinder, and adapted to operate to carry said first-mentioned valve to a neutral position upon the occurrence of a predetermined pressure a movable door positioned to close said filling opening, a valve positioned to be moved by said door to closed position, by-pass conduits connecting said valve to said hydraulic mechanism, and a spring biased to open said valve, whereby when said door is open pressure fluid is by-passed from said moving means.

5. In combination, a closed container having an opening for filling and an opening for discharging, a combined packing and discharging member mounted within said container, moving means for movably supporting and moving said member, said moving means including a hydraulic mechanism for moving said member within said container, said hydraulic mechanism including a piston and cylinder assembly, and means for supplying pressure fluid selectively to either side of the piston to cause it to move in a predetermined direction, and automatic control means operated in response to conditions within said cylinder, said control means including members effective to reverse the movement of said piston upon the occurrence of predetermined conditions to restore said piston to its initial position and to stop its movement at said initial position a movable door positioned to close said filling opening, a valve positioned to be moved by said door to closed position, by-pass conduits connecting said valve to said hydraulic mechanism, and a spring biased to open said valve, whereby when said door is open pressure fluid is by-passed from said moving means.

LESTER W. WACHTER.

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