May 9, 1967 W. M. FELTS 3,318,231

PACKING CONTAINER WITH REMOTE POWER UNIT

Filed Oct. 11, 1965 2 Sheets-Sheet 1

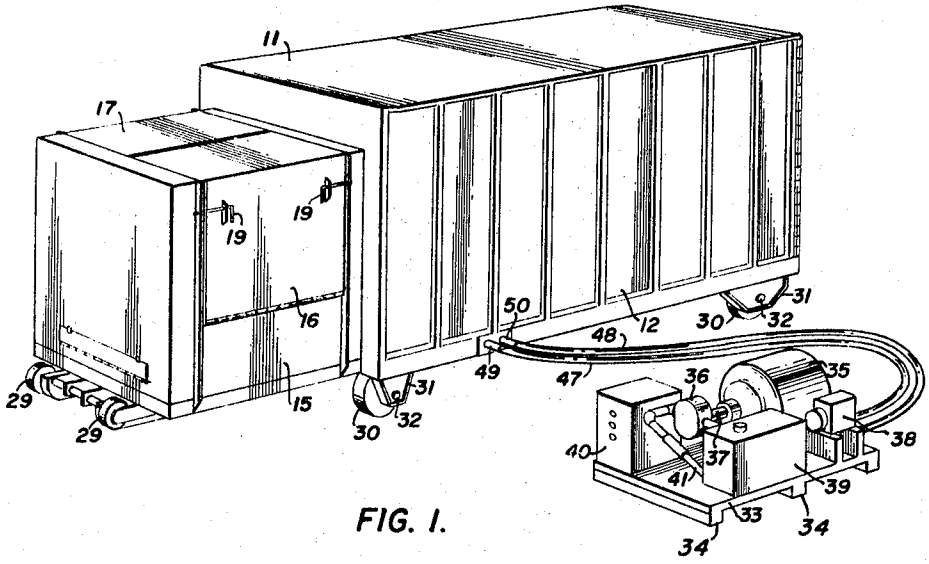


FIG. 1.

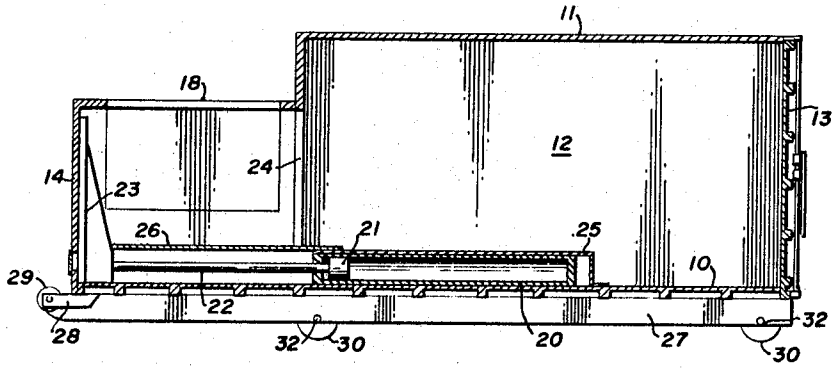


FIG. 2.

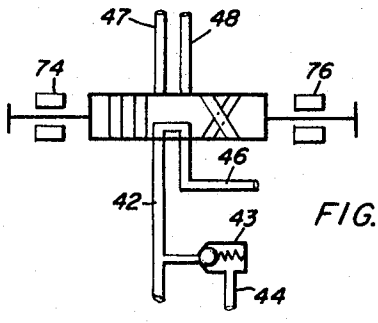


FIG. 5

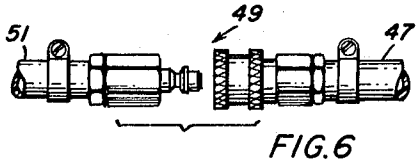


FIG. 6

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May 9, 1967 W. M. FELTS 3,318,231

PACKING CONTAINER WITH REMOTE POWER UNIT

Filed Oct. 11, 1965 2 Sheets-Sheet 2

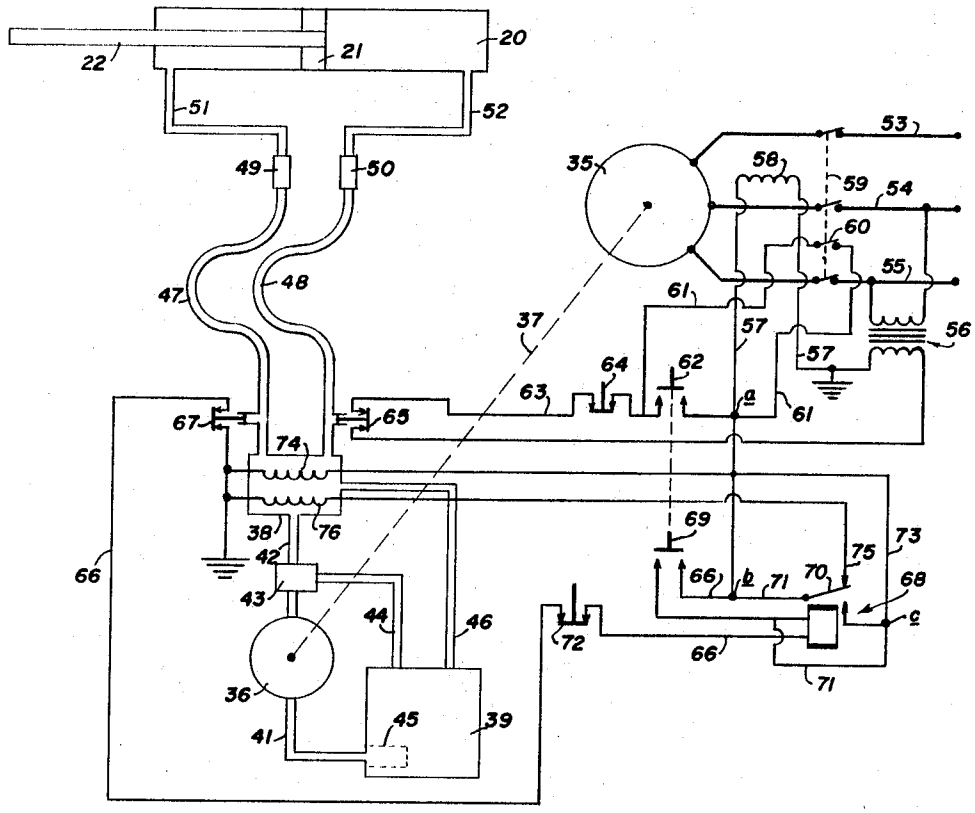


FIG. 3.

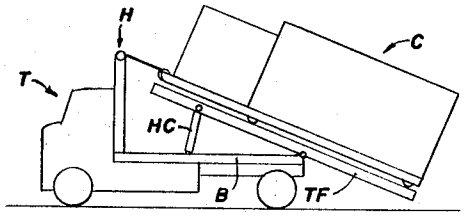


FIG. 4.

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3,318,231

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PACKING CONTAINER WITH REMOTE POWER UNIT

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1 Claim. (Cl. 100—52)

This invention relates to collecting and transporting refuse and has reference to a stationary or semi-stationary power unit for use in conjunction with portable containers having packer blades therein.

The disposal of refuse collected in large quantities at certain places, for example at supermarkets and industrial plants, has been expedited by placing large containers at such locations and subsequently dumping the contents into disposal trucks or trailers. Most modern disposal trucks or trailers have packer means for compacting the refuse, but ordinarily the collecting containers do not. It has been proposed that the containers have pusher blades for compacting the refuse at the collection locations and then hauling the containers to disposal areas or incinerator plants. The proposed containers included power units therein for operating the blades and which power units were transported along with the containers.

An object of the invention is to provide a portable container for collecting refuse including a packer blade therein and a separate stationary power unit for operating said blade.

Another object of the invention is to provide improved hydraulic packing means for a container, either portable or stationary, including an arrangement of pressure switches whereby the pusher blade automatically reverses its direction when a predetermined pressure of the blade on the refuse is attained.

A further object of the invention is to provide a construction and arrangement whereby a single stationary power unit may, in turn, operate a multiple of containers having hydraulic pusher blades therein and whereby one container may be filled while another is being transported.

These and other objects of the invention will become apparent from the following description and the accompanying drawings, wherein:

FIGURE 1 is a perspective view of a portable container and stationary power unit in accordance with the invention.

FIGURE 2 is a longitudinal vertical sectional view of the container illustrated in FIGURE 1.

FIGURE 3 is a combined hydraulic and electrical diagram according to the invention, and

FIGURE 4 is a reduced scale schematic side elevational view of a truck having a tilting frame for loading and unloading containers such as herein described.

FIGURE 5 is a schematic view of a double solenoid valve and a pressure relief valve, first shown in FIGURE 3 between the pump and operating lines.

FIGURE 6 is an exploded elevational view of a conventional quick disconnect coupling used in the present invention.

Referring now to FIGURES 1 and 2, the container body shown includes a floor **10**, a top **11**, side walls **12**, rear doors **13**, and a latch mechanism for the latter, not numbered. Forwardly of the container body and including the same floor **10**, there is a loading hopper comprised of a front wall **14**, side walls **15**, side doors **16** in the side walls, and top members **17** which may be hinged, not shown, to the tops of the side doors to provide a top access opening **18**, FIGURE 2, in the hopper. Latch means **19** are provided for the doors **16**. The thus far described container, which includes the loading hopper, is conventional and is not, therefore, herein described in detail.

Within the body and mounted on the floor **10**, there is a longitudinally disposed hydraulic cylinder **20** having a piston **21** therein, a forwardly extending piston rod **22** and a pusher blade **23** on the extending end of the piston rod. The stroke of the cylinder **20** is such that the blade **23** is moved the length of the hopper to pull refuse through an opening **24** in the forward end of the body. There is a stationary housing **25** over the cylinder **20** and a movable housing **26** attached to the blade **23**. The movable housing **26** is in sliding engagement with the outer surface of the first said housing **25**. In transit, the blade **23** serves as a closure for the body opening **24**, but within the scope of the invention the blade and cylinder assembly may be of the type, not shown, wherein the blade operates inside of the body for compacting refuse therein.

Parallel sills **27**, running the length of the body, support the floor **10**, and at the forward ends of the sills there are spaced parallel stub sills **28** for supporting loading rollers **29** therebetween. Primary rollers **30** are mounted between pairs of depending journal blocks **31** at the four corners of the body. Axles **32** for the primary rollers **30** extend through the journal blocks **31** and the sills **27**.

The power unit shown in FIGURE 1 is mounted on a rectangular base **33** and has parallel skids **34** therebeneath so that the unit may be lifted and moved, when required, by a fork lift truck, not shown. The primary components of the power unit shown in FIGURE 1 include an electric motor **35**, a pump **36** driven by the motor shaft **37**, a double solenoid valve **38**, a reservoir **39** and a control box **40**. However, other parts and the relation of parts of the power unit are best shown in FIGURE 3.

Referring now to the hydraulic system, the intake line **41** of the pump **36** is connected with the bottom of the reservoir **39**, and a discharge line **42** connects the pump with the double acting solenoid valve **38**. Interposed in the discharge line **42** there is a relief valve **43** which has a by-pass line **44** to the reservoir **39**. A filter **45** may be provided in the reservoir **39** around the opening of the pump intake line **41**.

The double solenoid valve **38** is of the open center type with spring return to neutral position. Thus, when not actuated, and if the pump **36** is operating, oil is returned to the reservoir **39** by way of a return line **46**. The side of the solenoid valve **38** opposite the pump discharge line **42** has "pack" and "extend" operating lines **47** and **48** which are connected, by quick disconnect couplings **49**, **50**, with lines **51**, **52** in the container body, and which last said lines are connected with opposite ends of the cylinder **20**. The operating lines **47**, **48** are schematically shown in FIGURE 3, but it is to be understood that the extending lengths of these lines are flexible as shown in FIGURE 1.

Referring now to the electrical circuits illustrated in FIGURE 3, the motor **35** is supplied by three leads **53**, **54** and **55**. Two of the leads **54**, **55** connect with the primary of a step-down transformer **56** which supplies lower voltage to several circuits to be described. One such circuit **57**, referred to as the motor starting circuit, extends from the secondary of the transformer **56** to a junction point *a*, and includes a coil **58** for closing a normally open quadruple pole single throw switch **59** across the motor leads **53**, **54**, **55** and a switch **60** in a by-pass circuit **61**. The by-pass circuit **61** includes a manually operated momentary starter switch **62**. Connected in parallel with the by-pass circuit **61** and around the manual starter switch **62**, there is an "extend" stop circuit **63** including a normally closed manually operated emergency stop switch **64** and a normally closed pressure operated limit switch **65** which opens when the pressure in the "extend" hydraulic line **48** reaches a predetermined value, for example, when the piston **21** fully extends the piston rod **22** within the cylinder **20**.

Similarly, there is a "pack" stop circuit **66** including a normally closed pressure operated limit switch **67** which opens when the pressure in the "pack" hydraulic line **47** reaches a predetermined value, for example when the refuse becomes packed to a certain degree or when the piston **21** reaches the end of the cylinder **20**. One end of the circuit **66** is connected with ground and other end is connected with a junction point *b* by way of a coil of a relay **68** and a normally open momentary pack switch **69**. The last referred to switch **69** is mechanically linked with the first described starter switch **62**. When the coil of the relay **68** is energized, the armature **70** thereof closes and maintains contact with line **71**. Line **71** is in parallel with the momentary switch **69** and the junction point *b*. Between the relay **68** and the normally closed pressure switch **67** there is a normally closed manual switch **72** whereby the operator may reverse the direction of the blade **23** during the "pack" cycle of operation.

The position of the armature **70** of the relay **68** controls the direction of flow of hydraulic fluid through the double solenoid valve **38**. When the starter switch **62** is pressed the pack switch **69** closes and energizes the coil of the relay **68**. This closes the armature **70** which makes contact with line **71**. There is a junction point *c* in the contacted side of line **71** from which a line **73** extends to a coil **74** in the double solenoid valve **38**. The coil **74** is grounded to complete the circuit. When the coil **74** is energized it actuates a valve element, not shown, and directs flow from the pump **36** to the "pack" hydraulic line **47**. When the armature **70** of the relay **68** is open it makes contact with a line **75** which extends to a coil **76** in the double solenoid valve **38** for operating an element, not shown, which directs fluid to the hydraulic extend line **48**. Like the first solenoid coil **74**, the second solenoid coil is grounded to complete the circuit.

In operation, the pusher blade **23** is normally in an extended position, that is, adjacent the forward wall **14** of the loading hopper. The refuse to be collected is placed in the hopper by way of the side doors **16** or the top opening **18**. In order to push the refuse into the body through opening **24**, the starter button **62** is manually closed. This starts the motor **35** which drives the hydraulic pump **36**, and at the same time closes the momentary "pack" switch **69**. Closing of the pack switch **69** energizes the pack stop circuit **66**, the relay **68** and the line **71** by-passing the pack switch, and the line **73** to the coil **74** which directs flow from the pump **36** to the "pack" hydraulic line **47**. When the packer blade **23** reaches the end of its stroke, or if it engages a previously compacted mass of refuse of high density, then the pressure switch **67** opens and de-energizes the coil of the relay **68**. The relay **68** then opens and causes the armature **70** to make contact with and energize the line **75** to the "extend" coil **76** of the double solenoid valve **38** thereby directing fluid from the pump **36** into the hydraulic "extend" line **48** which causes the blade **23** to return to its starting position. When the piston **21** in the cylinder **20** reaches its limit, there is a surge of pressure which opens the pressure switch **65** in the extend line **48**. The opening of pressure switch **65** de-energizes the connected stop circuit **66** which, in turn, de-energizes the by-pass circuit **61** and the coil **58** controlling the quadruple pole switch **59**. The latter switch **59** then opens and the power unit is then completely de-energized with the pusher blade **23** in its starting position.

Reference is now made to FIGURE 4, wherein the truck T shown includes a hoist H at the front of the bed B. Pivotally mounted at the rear of the bed B there is a tilting frame TF operated by a hydraulic cylinder HC for loading and unloading the container C described in the foregoing. Not shown, the titting frame TF has tracks for guiding the rollers **30** of the container C. The raised rollers **29** on the front of the container C contact the rear of the tilting frame TF to lift the forward end of the container into position for loading.

When the container C is disconnected from the power unit, the quick disconnect couplings **49**, **50** may be fitted to each other by a short length of pipe, not shown, having corresponding coupling members on the ends thereof.

The invention is not limited to the exemplary construction herein shown and described, but may be made in various ways within the scope of the appended claim.

What is claimed is:

In a hydraulic assembly including a portable container, a hydraulic cylinder having an extending piston rod and a packer blade on the extending end thereof, all within said container, a remote power unit adapted to be positioned outside of said container, said unit including a motor and a pump driven thereby, a double solenoid valve of the open center type having separate actuating coils, a reservoir, an intake line connecting the bottom of said reservoir with said pump, a discharge line connecting said pump with said solenoid valve, a return line connecting said solenoid valve with said reservoir, operating lines connecting said solenoid valve with opposite ends of said hydraulic cylinder, means directing flow to one or the other of said operating lines, said means including a pressure operated switch in each said operating line and electrically connected by a circuit with a said coil of said double solenoid valve, a quick disconnect coupling in each said operating line between the pressure switch mounted therein and said cylinder whereby said container may be readily removed without moving said power unit, said means also including a relay, the armature of which alternately connects one and the other of said circuits with a source of power when one or the other of said pressure switches is closed by pressure in the operating line in which it is mounted.

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