

Sept. 27, 1966

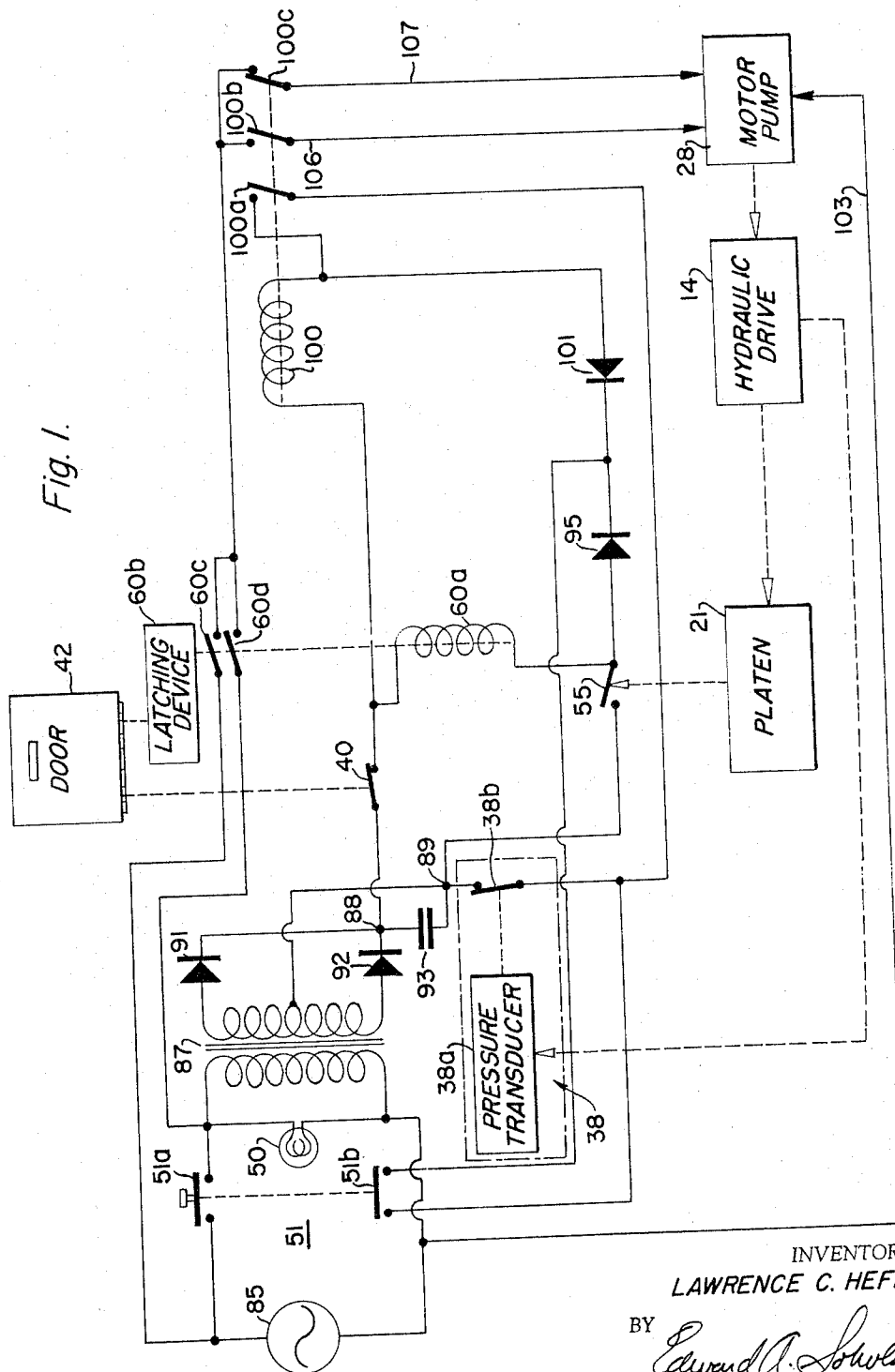
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3,274,922

REFUSE COMPACTOR

Filed June 19, 1964

3 Sheets-Sheet 1



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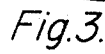
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REFUSE COMPACTOR

3 Sheets-Sheet 2



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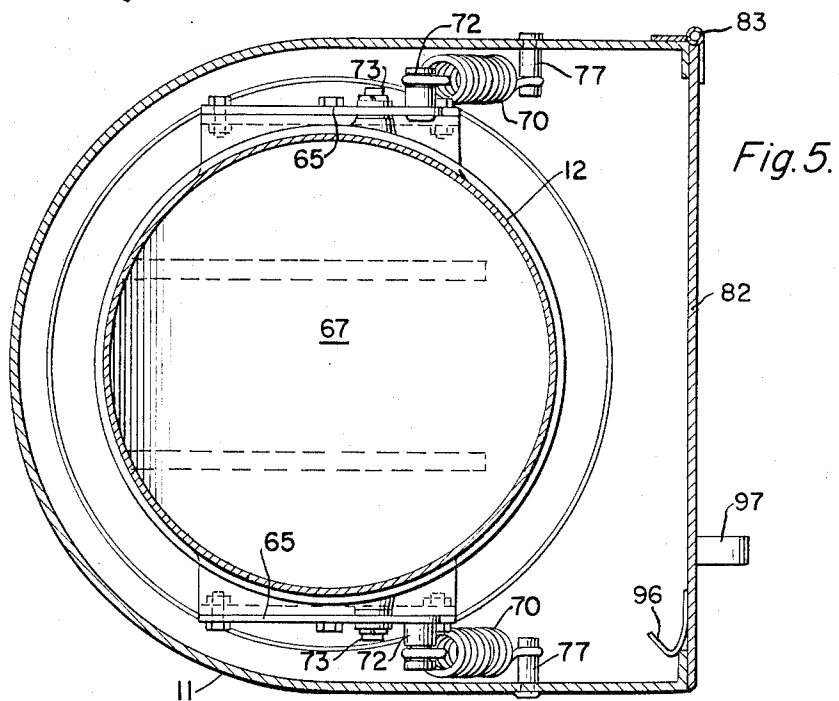
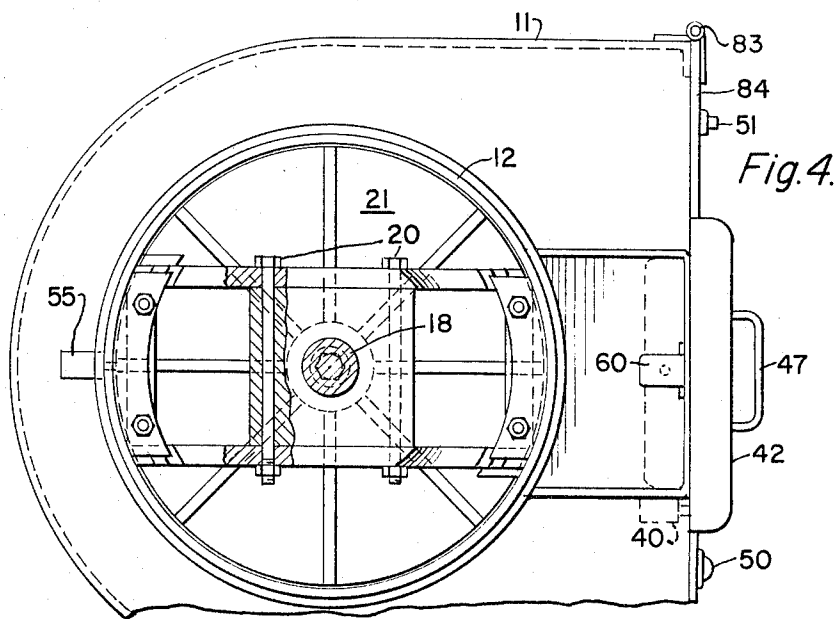
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3 Sheets-Sheet 3



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3,274,922

REFUSE COMPACTOR

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7 Claims. (Cl. 100—52)

This invention relates to a refuse compactor and more particularly to such a device suitable for compacting dry refuse so that it can be more easily handled and disposed of.

The disposal of dry refuse in the home and business establishments often involves the handling of cartons, boxes, cans and other such bulky objects which are rather cumbersome to handle and somewhat space consuming. The handling of dry refuse is particularly bothersome in apartment houses where the refuse from a great number of apartments is collected in one central location for disposal, and in factories and stores where a great number of bulky cartons, containers, and boxes must be disposed of. In some instances, this problem has been solved by the use of incinerators. This however, involves the soot and smoke of the burning operation as well as the maintenance and handling expense and hazards incidental thereto. The breaking up and compacting of refuse by hand is a time consuming operation that at best only reduces the volume of the refuse to be handled to a small degree.

The device of this invention provides means for compacting refuse so that it has a minimum bulk and is in a form suitable for easy handling. The necessity for over brimming waste containers is eliminated in that refuse can be disposed of immediately and compacted quickly and safely in an automatic operation that requires the mere momentary actuation of a starter button. The compacted material occupies a minimal amount of space and can readily be handled for final disposition.

The device of the invention utilizes a compacting platen which rides up and down inside a container into which the material to be compacted is placed. Means are provided to drive the platen from the initial resting position at the top of the container down onto the refuse to be compacted, and when a particular desired degree of compaction has been achieved, the drive means automatically causes the platen to be restored to its original position. Unique control circuit means are provided to effect such automatic operation of the platen in response to the momentary actuation of a push button switch. Such control circuit means further provides a safety mechanism so that the motion of the platen cannot be initiated unless the access door is properly closed and so that once such motion has been initiated, the access door is properly latched and held in such latched condition until the entire operation has been completed and the platen returned to its starting point. The device of this invention thus provides an efficient and safe means for handling refuse which requires a minimal effort to operate and utilize.

It is therefore an object of this invention to facilitate the handling of refuse.

It is another object of this invention to provide an improved device for handling refuse which operates automatically to compact such refuse to a predetermined degree.

It is still another object of this invention to provide a refuse compactor having a unique control circuit which provides maximum safety to the operator and requires a minimal effort in achieving the desired end results.

Other objects of this invention will become apparent

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from the following description taken in connection with the accompanying drawings, of which,

FIG. 1 is a functional schematic drawing illustrating the control system of a preferred embodiment of the device of the invention.

FIG. 2 is an elevation cross sectional view of a preferred embodiment of the device of the invention,

FIG. 3 is an elevation view showing the refuse removal door of the preferred embodiment of the device of the invention in position to permit removal of refuse.

FIG. 4 is a cross sectional view of the embodiment shown in FIG. 2 as taken along the plane indicated by the line 4—4 in FIG. 2, and

FIG. 5 is a cross sectional view of the embodiment of FIG. 2 as taken along the plane indicated by the line 5—5 in FIG. 2.

Referring to FIGS. 2—5, a preferred embodiment of the device of the invention is illustrated. Fixedly mounted on frame member 11, is a container member 12 which is substantially cylindrical in shape. Hydraulic cylinder 14 is attached to support member 16 by any suitable means, such as, for example, bolts 20, support member 16 in turn being fixedly attached to the top portion of the container 12 and support frame 11 by any suitable means such as, for example, by bolting. One end of piston rod 18 of hydraulic cylinder 14 is fixedly attached to platen 21, the other end of piston rod 18 being fixedly attached to piston 23.

Fixedly attached to cylinder 14 by means of bracket 25 is motor-pump unit 28. Motor-pump unit 28 may comprise any suitable hydraulic pump and associated drive motor such as, for example, a turbine vane hydraulic pump available from the Densmore-Holland Co., Compton, California. Motor-pump unit 28 utilizes a reversible electric motor so that it is capable of providing hydraulic pumping in either one direction or the other depending upon the control of the motor. One of the pump outlets or inlets as the case may be, depending on the direction of pumping, is connected to hydraulic line 32, while the other of these outlets-inlets is connected to hydraulic line 35. Hydraulic line 32 is connected to the top end of cylinder 14 while hydraulic line 35 is connected to the bottom end thereof to permit the hydraulic drive of piston 23 in either direction, depending upon the direction of rotation of the motor of motor-pump unit 28. Pressure sensitive switch 38 is connected to sense the hydraulic pressure in line 32. This switch, as to be explained in connection with FIG. 1, operates to actuate an electrical switch when the pressure in the line exceeds a predetermined value. Any suitable pressure sensitive switch may be utilized for switch 38. The pressure sensitive switch manufactured by the aforementioned Densmore-Holland Co., Compton, California, has been found to operate satisfactorily.

Fixedly mounted on frame 11 is door interlock switch 40. This switch is positioned so that the actuator button thereof is controlled by door 42 so that when the door is open, switch 40 is likewise open and the switch contacts are closed only when door 42 is fully closed.

Access door 42 is mounted on hinges 45 and is opened downwardly by means of handle 47 which is fixedly attached to the door. Fixedly mounted on one side of front panel 44 is indicator lamp 50 and fixedly mounted on the other side thereof is push button switch 51. An electrical switch 55 is fixedly mounted on the back portion of container 12 and is positioned for actuation by platen 21 so that the switch is actuated by the platen and closed as the platen descends and remains closed until the platen again rises and passes by the switch to drive it back to the open position. A suitable commercially available electrical limit switch may be utilized for switch 55. Door

latching assembly 60 is fixedly mounted on frame 11 above door 42 and includes a latching pin 60b which is driven by a solenoid to engage a mating receptacle 42a formed in the top of door 42, thereby latching the door. The details of the operation of the various switching control members will be explained fully in connection with FIG. 1.

Pivotaly mounted on container 12 by means of bracket members 65 is refuse removal door 67; the door being fixedly attached to the brackets and the brackets being pivotaly mounted on the container by means of hinge pins 73. This removal door covers the bottom of the container and has a curvature. Springs 70 are connected at one end thereof to pin members 72 which are fixedly attached to brackets 65 and at the other end thereof to pins 77 protruding from the walls of frame 11. Springs 70 hold door 67 in the position indicated in FIG. 2. The door may be readily swung open, however, as indicated in FIG. 3 by means of handle 80, in removing compacted refuse from the container.

Referring to FIGS. 4 and 5, access to refuse removal door is provided by means of access door 82 which is mounted on frame member 11 below door 42 by means of hinge member 83. Door 82 is normally held closed by means of spring latch 96 and may be opened, when necessary, by means of handle 97.

In utilizing the device, door 42 is opened and refuse to be compacted is placed within container 12. With door 42 firmly closed and removal door 67 in the position indicated in FIG. 2, push button switch 51 is momentarily actuated. This, as to be explained fully in connection with FIG. 1, provides power to drive motor-pump unit 28 so as to drive piston 23 and its associated rod 18 and platen 21 downward. As platen 21 starts to move downward, it mechanically closes switch 55 whereupon door latching mechanism 60 is actuated to latch the door closed. Platen 21 moves all the way downward and compacts the refuse in the container against door member 67. Such compacting action continues until the hydraulic back pressure which is a function of the degree of compaction, reaches a magnitude sufficient to actuate pressure sensitive switch 38 whereupon, as to be explained in connection with FIG. 1, this switch reverses the electrical connections to the motor-pump unit 28 so as to cause the pumping action to reverse and drive piston 23 back to its starting position. As platen 21 again passes switch 55, the switch is actuated to the open condition thereupon unlatching door latching mechanism 60 and permitting door 42 to be opened for a subsequent compacting operation.

Let us now refer to FIG. 1 which illustrates in schematic form the control mechanism utilized in the preferred embodiment of the device of the invention. At the start of the operating cycle, with door 42 closed, interlock switch contact 40 is closed, switch contact 55 is open and pressure switch contact 38b is closed. To start the cycle, the operator depresses push button 51 which causes switch arms 51a and 51b to momentarily bridge their associated contacts. Power is thereby momentarily applied through switch arm 51a to the primary winding of transformer 87 from A.C. power source 85. The power applied to transformer 87 is rectified by means of diode rectifiers 91, 92 and filtered by means of capacitor 93, the D.C. output voltage of the rectifier appearing between points 88 and 89. This D.C. voltage is applied from point 88 through switch 40 to one side of door latch solenoid 60a and from point 89 through switch arms 38b and 51b and diode 95 to the other side of solenoid 60a. Solenoid 60a, thus energized actuates latching device 60b to latch door 42 closed. Solenoid 60a also when so energized closes switch contact arms 60c and 60d. Contacts 60c and 60d effectively operate as a latching mechanism to keep transformer 87 energized when push button arm 51a is released, these contacts effectively bridging the contacts associated with switch arm 51a.

When switch contact arm 51b is momentarily closed, D.C. power is also applied to relay 100 from point 89

through switch arms 38b, 51b and diode 101 and from point 88 through switch arm 40. With the energization of relay 100, contacts 100a and 100b, which are normally open, close and normally closed contact 100c opens. Contact 100a functions as a latching contact for relay 100, supplying power thereto from point 89 after contact arm 51b has been released. An A.C. power connection is provided from power source 85 through contact 100b to motor-pump 28. An A.C. power connection is also continually provided to the motor-pump through line 103. Motor-pump 28 is a bidirectional device having an A.C. motor which rotates in one direction when power is applied thereto on line 106 and in an opposite direction when power is applied thereto on line 107. Such opposite motor rotation also effects an opposite pumping action so that with A.C. power applied to line 106, the pumping action is such to cause hydraulic drive 14 to drive platen 21 downward.

As platen 21 starts to descend, it mechanically actuates switch 55, closing this switch and thereby providing a power path from point 89 to solenoid 60a after contact arm 51b is released. In this manner, the latching of the door is assured with the start of the downward motion of platen 21. Hydraulic drive 14 continues to drive platen 21 downward towards the bottom of the container. As platen 21 descends, the compacting pressure is sensed by pressure transducer 38a, which as noted in connection with FIG. 2, is located in the hydraulic input line to hydraulic drive 14.

When the hydraulic pressure as sensed by pressure transducer 38a reaches a predetermined point, indicating a particular compacting force, pressure transducer 38a actuates its associated switch contact 38b to open this contact. With contact 38b opened, the power path from point 89 through latching contact 100a to relay coil 100 is broken and relay 100 is deenergized. This results in power now being applied from A.C. source 85 through contact 100c, which is now closed, and line 107 to motor-pump unit 28 rather than through line 106. This causes the motor and pump to reverse direction which results in hydraulic drive 14 now driving platen 21 upward to its original starting position. Means are preferably provided for adjusting the sensitivity of pressure transducer 38a so that the compacting force at which it will actuate its associated switch can be varied as desired for different operating situations.

Platen 21 now rises until it arrives at the top of its stroke at which time switch contact 55 is driven to the open position, thereby deenergizing solenoid 60a and simultaneously unlatching door 42 and removing the A.C. power supplied through contact arm 60c to motor-pump 28. It is to be noted that latching device 60b and contact 60c and 60d are all tied together for simultaneous operation by solenoid 60a to assure that the motor cannot operate to drive the platen unless the door is simultaneously latched closed.

The device of this invention thus provides a safety locked refuse compactor which goes through a complete compacting cycle automatically and then automatically shuts down, such operation being in response to an instantaneous push button actuation. A door latching safety mechanism is provided so that the access door is positively latched closed throughout the operating cycle. Means are further provided to automatically terminate the compacting operation when a predetermined compacting force has been reached.

While the invention has been described and illustrated in detail, this is intended by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the invention being limited only by the terms of the following claims.

I claim:

1. A refuse compactor comprising:
 - a support frame,
 - a container fixedly mounted on said frame having a pivotally supported door member covering the bottom

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end thereof and an access door near the top end thereof,
 a platen member,
 means for slidably supporting said platen member within said container for motion along the longitudinal axis thereof,
 hydraulic drive means for driving said platen along said longitudinal axis, said drive means including a hydraulic pump and a reversible electrical motor for driving said pump,
 an electrical power source connected to said motor,
 means for maintaining said access door locked when said platen is in other than a predetermined position, and
 means for automatically reversing the driving direction of said hydraulic drive when the compacting force applied by said platen exceeds a predetermined magnitude, said reversing means including a pressure sensitive switch responsive to the hydraulic pressure in the output of said hydraulic drive means and electrical switch means responsive to said pressure sensitive switch for changing the connections between said power source and said motor to reverse the rotation direction thereof.

2. The device as recited in claim 1 wherein said means for maintaining said access door locked includes a door latching device, solenoid means for controlling said latching device and switch means interposed between said solenoid means and the power source for controlling the energization of said solenoid means.

3. The device as recited in claim 2 wherein said switch means includes a first switching unit mounted for actuation in response to the closing of said access door and a second switching unit mounted for actuation by said platen member.

4. The device as recited in claim 1 and additionally including means for preventing actuation of said drive means when said access door is not locked.

5. In a refuse compactor including a container having an access door, a platen for compacting the refuse slidably mounted in said container and drive means for driving said platen, a control system for controlling the operation of said compactor comprising,
 an electrical power source,
 push button switch means for momentarily connecting said power source to said drive means,
 direction control switch means interposed between said push button switch means and said drive means for controlling the drive direction of said drive means,
 latching means for latching said access door,
 platen operated switch means for connecting power from said power source to operate said latching means in response to a downward motion of said platen and for disconnecting the power to said latching means to deactuate said latching means in response to an upward motion of said platen,

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latching contact means for providing power to said drive means and to said latching means after said push button switch means has been deactuated, and pressure sensitive switch means for operating said direction control means to reverse the drive direction of said drive means when the compacting pressure applied by said platen to the refuse being compacted reaches a predetermined magnitude.

6. The device as recited in claim 5 wherein said drive means includes a hydraulic drive, a pump for driving said hydraulic drive, and a reversible electrical motor for driving said pump, said pressure sensitive switch means including a hydraulic pressure transducer for sensing the hydraulic pressure in said hydraulic drive.

7. In a device for compacting refuse,
 a support frame,
 a container mounted fixedly on said frame and having an access door near the top end thereof,
 a platen member,
 means for slidably supporting said platen member within said container for motion along the longitudinal axis thereof,
 drive means for driving said platen along said longitudinal axis,
 means for maintaining said access door locked when said platen is in other than a predetermined position and for preventing actuation of said drive means when said access door is not locked comprising a door latching device, switch means for controlling said drive means, and solenoid means responsive to motion of said platen member for simultaneously controlling said latching device and said switch means whereby said latching device and said switch means are both opened and closed together, and
 means for automatically reversing the driving direction of said drive means when the compacting force applied by said platen member exceeds a predetermined magnitude.

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