United States Patent [19]

Ligh

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[45] **Jan. 15, 1974**

[54] **REFUSE COMPRESSOR**

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[22] Filed: **Mar. 10, 1972**

[21] Appl. No.: **233,807**

Related U.S. Application Data

[62] Division of Ser. No. 884,178, Dec. 11, 1969, abandoned.

[52] **U.S. Cl.** ..... **100/116,** 100/50, 100/53, 100/102, 100/215, 100/218, 100/250, 100/269 R, 100/295

[51] **Int. Cl.** **B30b 9/06**

[58] **Field of Search** ..... 100/52, 250, 126, 100/110, 116, 269 R, 295, 53, 102, 215, 218, 50

[56] **References Cited**

UNITED STATES PATENTS

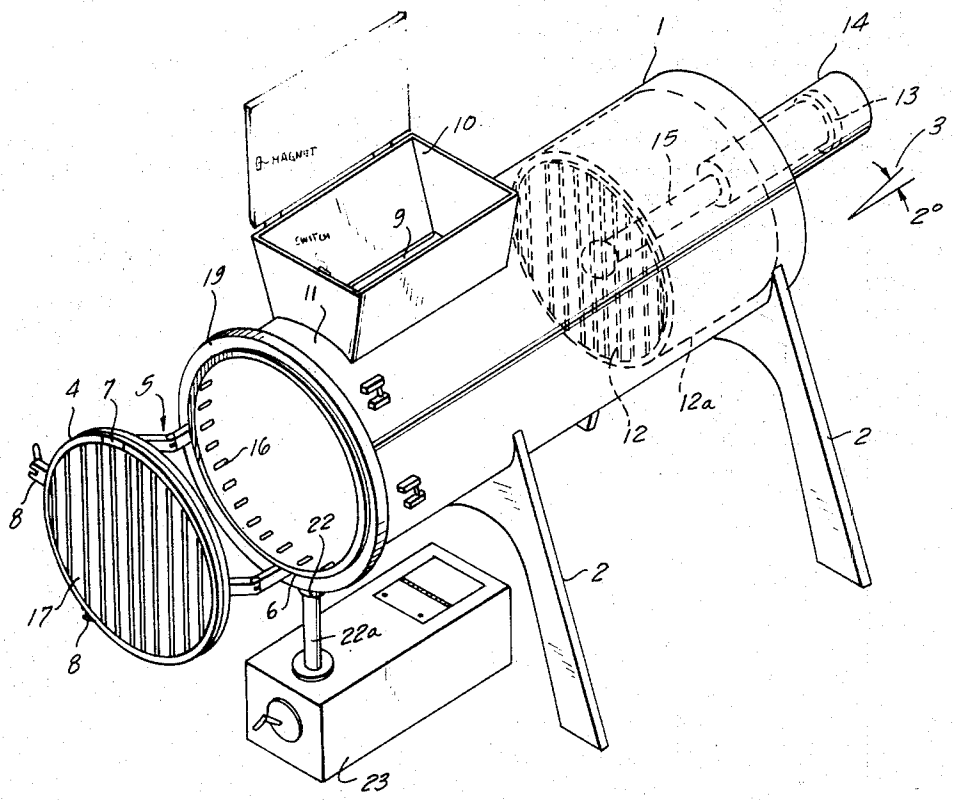
1,182,369	5/1916	Haniquet	100/250 X
2,705,916	4/1955	Milligard	100/52 X
2,763,202	9/1956	Gramelspacher	100/52
3,228,323	1/1966	Schohl	100/52 X
2,068,013	1/1937	Fridlender et al.	100/116 X

Primary Examiner—Billy J. Wilhite
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[57] **ABSTRACT**

A refuse compressor has a housing provided with inlet means through which quantities of refuse to be compressed may be admitted into the interior chamber of the housing. A platen is received in this chamber for sliding forward movement towards one end wall of the chamber to thereby compress the refuse, and for return movement away from the end wall of the chamber. An operating arrangement is associated with the platen and serves to cause the latter to move forward at a first speed and under a first pressure, and to cause the platen to return to its starting position at a higher second speed but under a lower second pressure. Drain openings are provided in the region of a door of the housing, through which liquid expressed from the refuse may leave the housing.

6 Claims, 13 Drawing Figures



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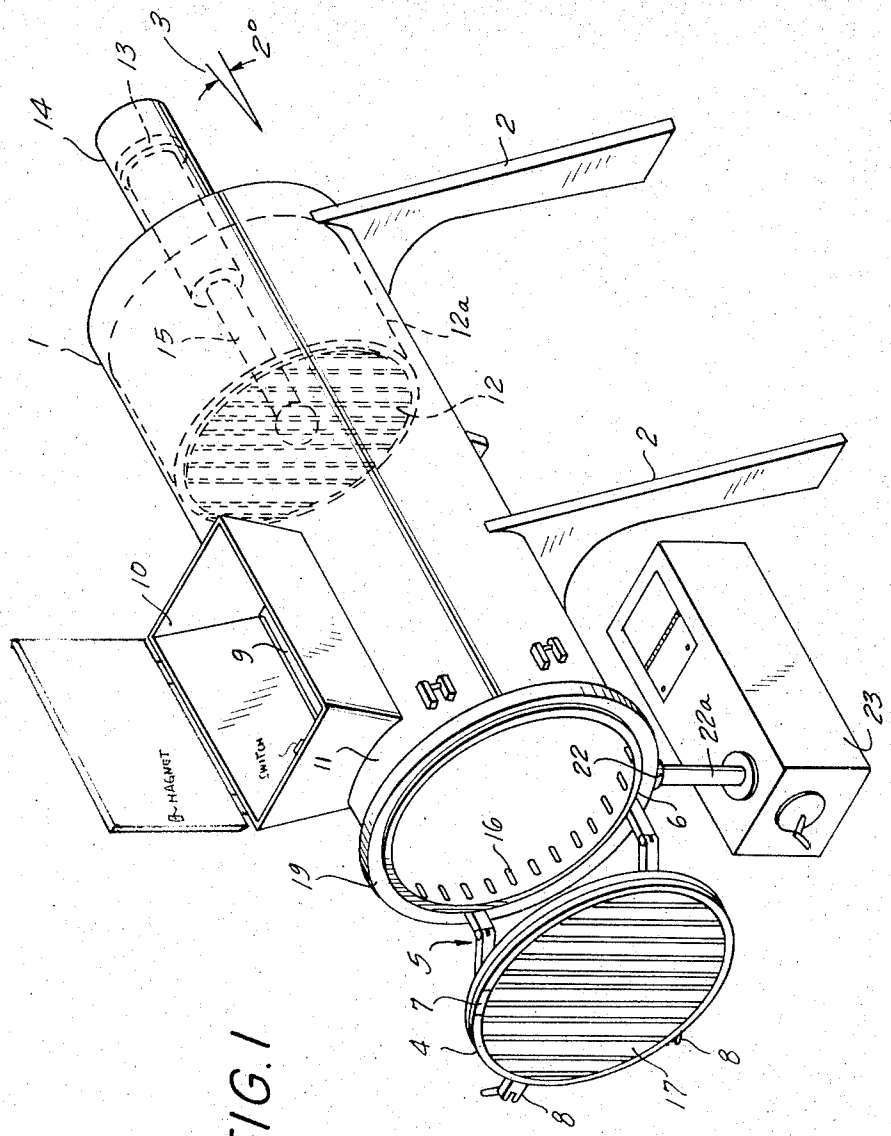


FIG. 1

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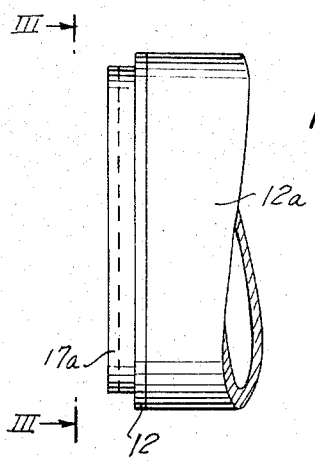


FIG. 2

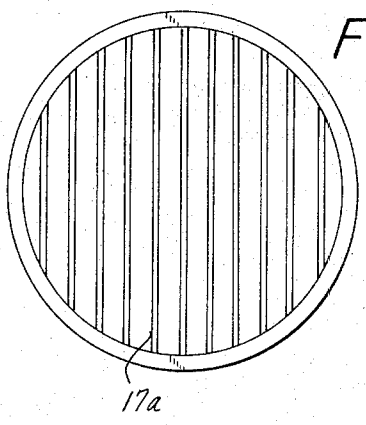


FIG. 3

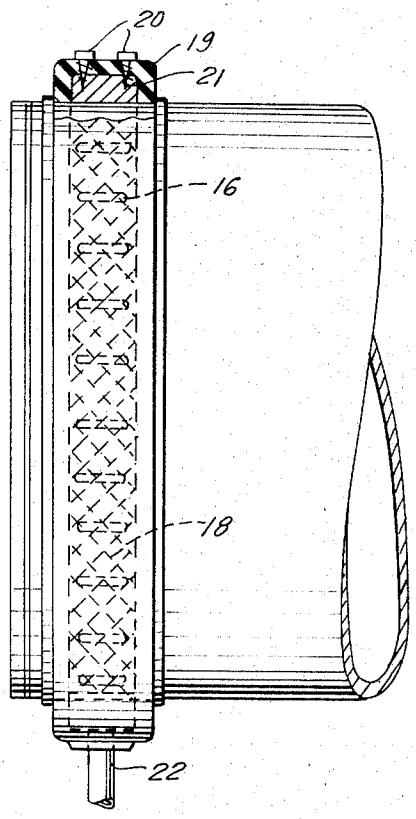


FIG. 4

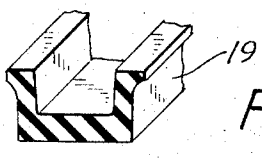


FIG. 5

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FIG.6

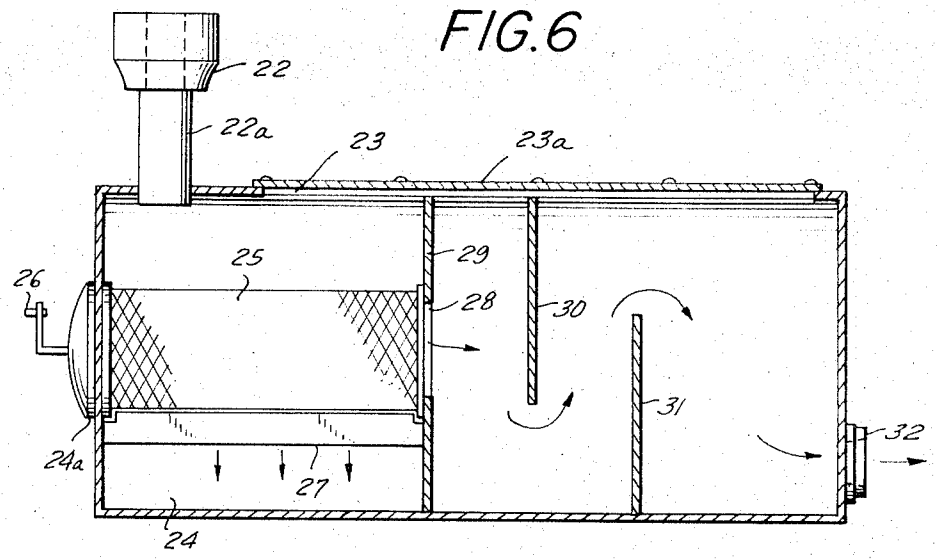
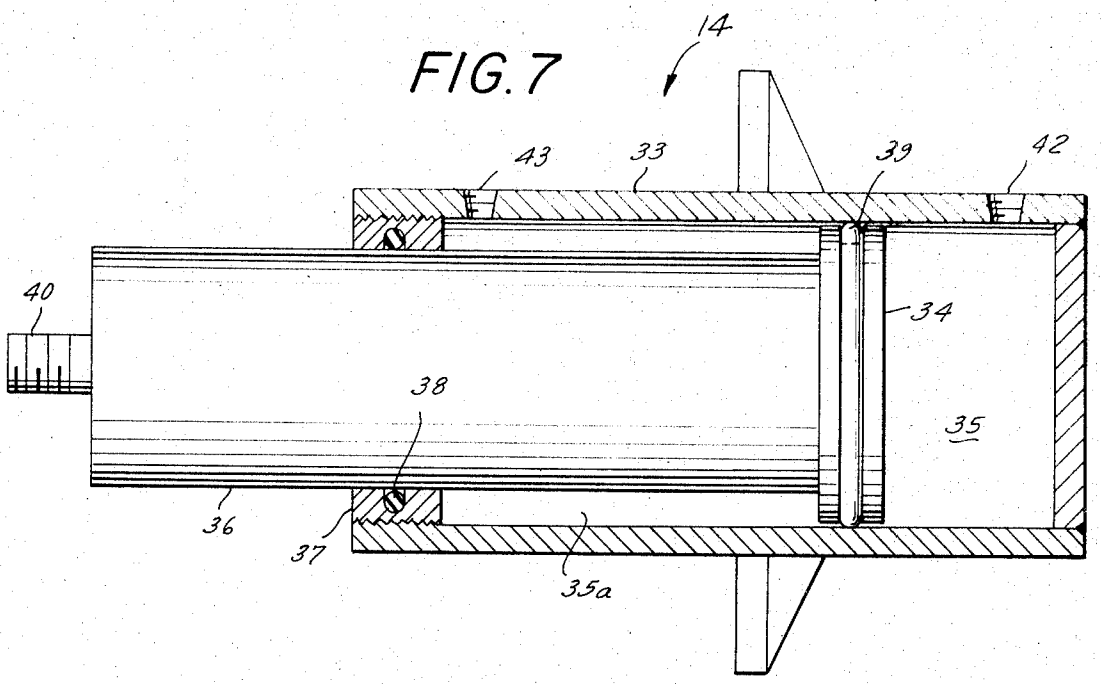
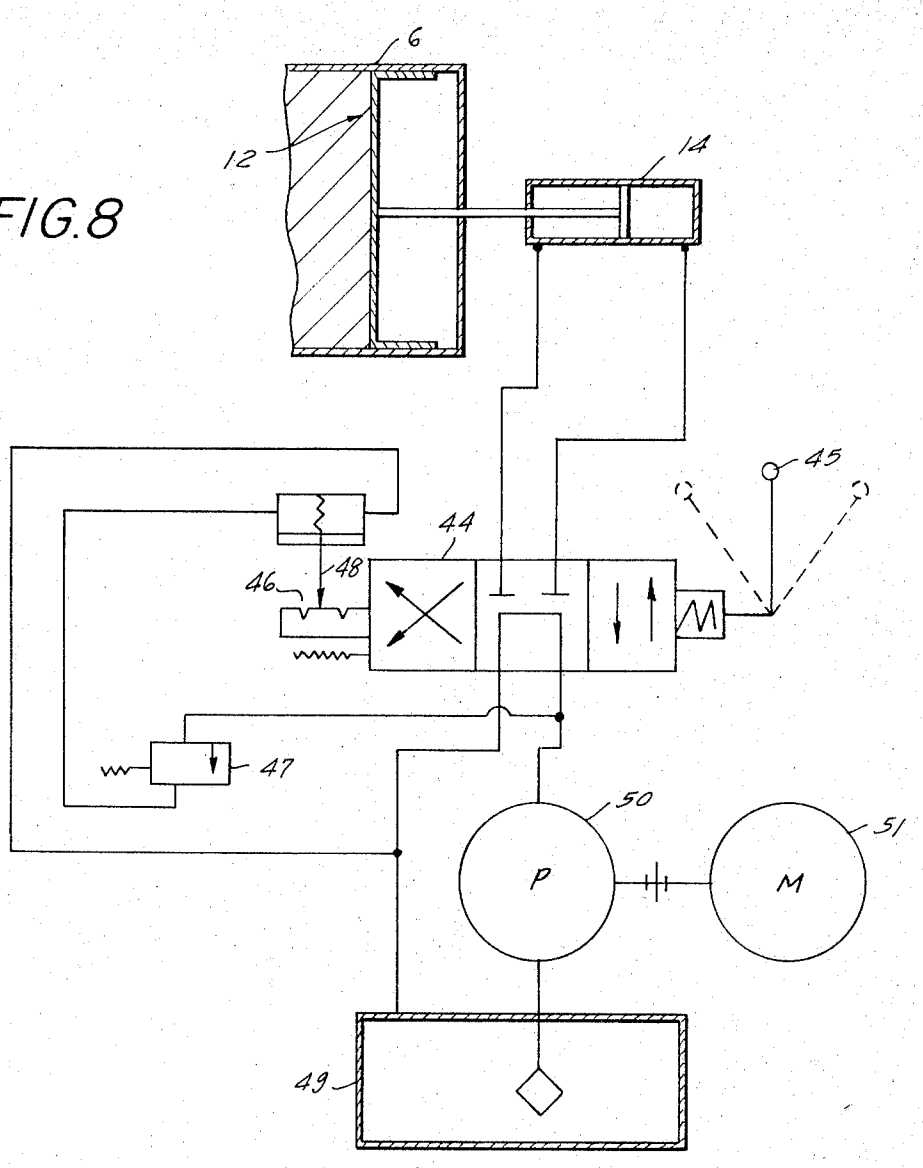


FIG.7



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FIG.8



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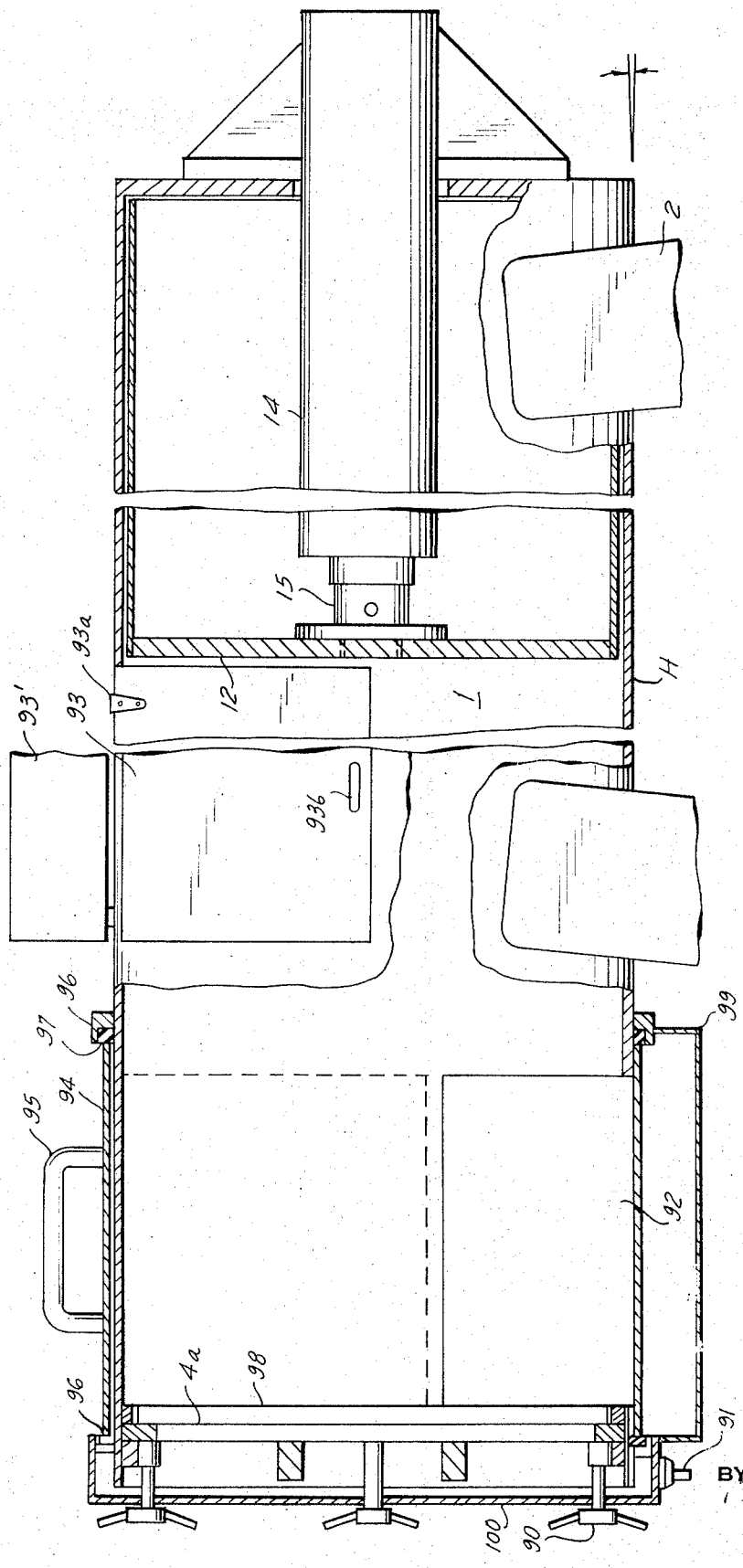


FIG. 9

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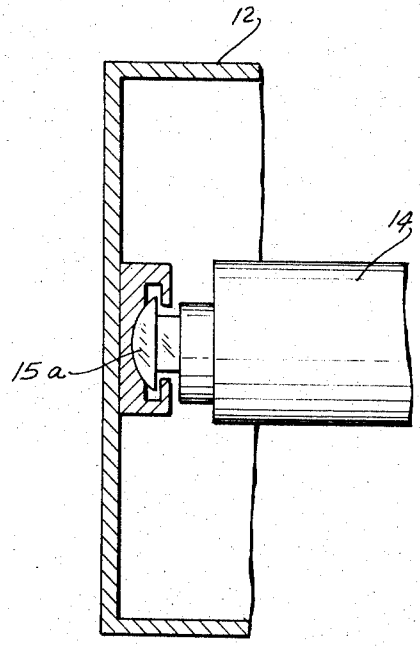
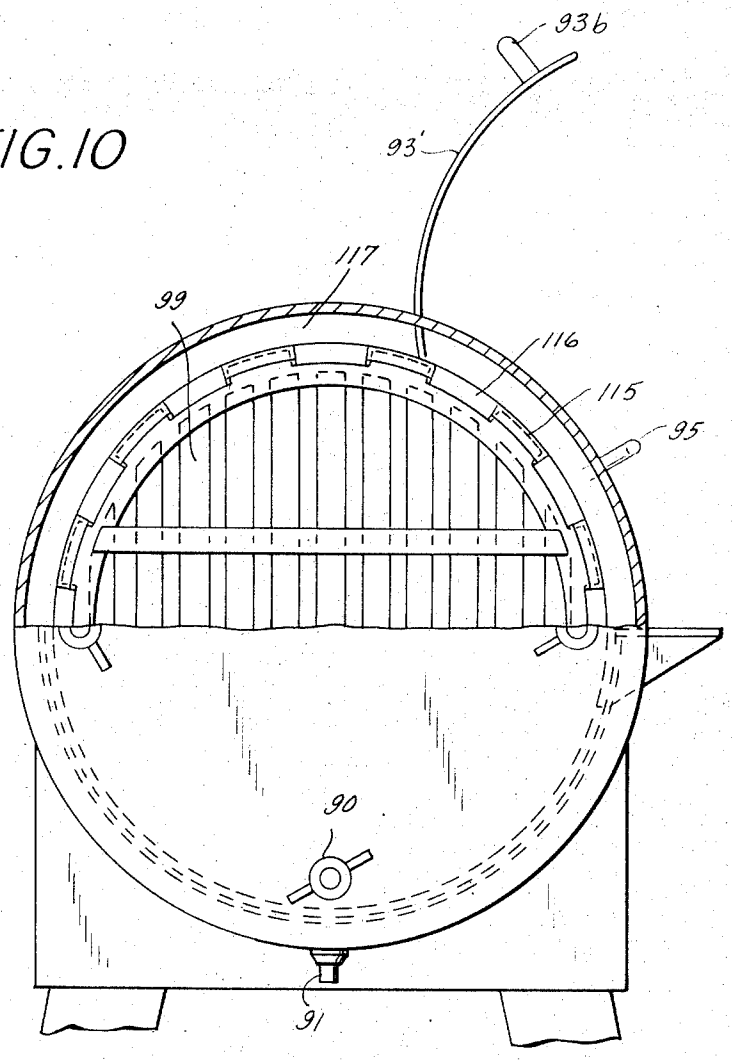


FIG. 9a

FIG. 10



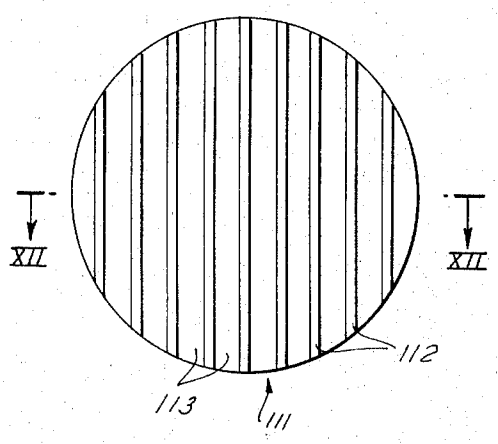


FIG. 11

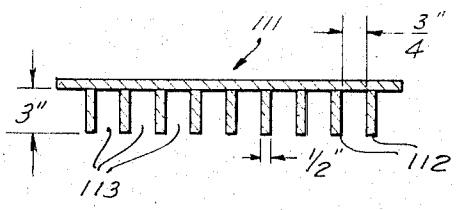


FIG. 12

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REFUSE COMPRESSOR

This application is a division of application Ser. No. 884,178, filed Dec. 4, 1969 and now abandoned.

BACKGROUND OF THE INVENTION

The present invention relates generally to refuse compressors, and in particular to refuse compressors which are suitable for both household and commercial use.

The disposal of refuse, particularly in urban areas, is a problem which is becoming more and more critical. Aside from increasing population density there is the fact that more and more items are packaged in every more elaborate packaging material and manner. Many articles which conventionally were supplied in containers returnable to the manufacture for reuse, such as milk, carbonated beverages and the like, are now supplied in so-called "one-way" containers which are discarded by the purchaser when they are emptied. Other articles are packaged in cans, in molded or extruded plastic packages, in cardboard, in metal foil, in packages utilizing composites of these materials, in bulky foam-plastic packages, glass bottles and the like. None of these packaging materials are as readily destroyed or reduced in bulk as the simpler types of packaging materials which were customary until even a few years ago, such as bags or paper wrappings.

The result of all this is a refuse mix--both in household use and in commercial establishments--which requires for storage until its collection a much greater volume of space than was heretofore necessary. Added to this is the fact that the disposal of such refuse presents refuse-collecting services--whether private or municipal--with ever-increasing disposal problems.

One way to alleviate this problem is to compact the refuse, that is to compress it whereby to reduce its bulk with simultaneous elimination of the voids between the constituent components of refuse. Thus compacted refuse can then be loaded on trucks for carting, in a more advantageous manner also, because voids are then also eliminated or substantially reduced in loading the trucks. However, equipment available for this purpose heretofore has not been entirely satisfactory for a variety of reasons, including the fact that it has been very complicated and therefore expensive, and also quite bulky. For this reason such equipment has not been practical for many applications, for instance for household use and for such commercial establishments as do not have available the necessary space for installation of the equipment and/or were unable for economic reasons to obtain such equipment.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to overcome the aforementioned disadvantages.

More specifically it is an object of the invention to provide a refuse compressor which is rather simple in its construction but reliable in its operation, and comparatively inexpensive because of its simplicity.

A further object of the invention is to provide such a refuse compressor which is capable of drastically reducing the bulk of refuse and express and remove from the compacted refuse such liquids as may have been originally contained in the refuse mix.

In pursuance of the above objects, and others which will become apparanet hereafter, one feature of my invention resides in the provision of a refuse compressor which is provided with a housing having an elongated internal chamber bounded in part by two longitudinally spaced opposite walls. Inlet means communicates with this chamber for admitting into the latter quantities of refuse to be compressed. Platen means is received in the chamber for sliding forward movement therein from a retracted position closer to one of the walls to an advanced position closer to the other of the walls for compressing the admitted refuse between the other wall and the platen means during such forward movement, and the platen means is further capable of sliding return movement from the advanced position to its retracted position. Finally, I provide operating means for effecting the forward movement of the platen means to the advanced position at a first speed and under a first pressure, and for effecting the return movement of the platen means to its retracted position with a higher second speed and under a lower second pressure.

The novel features which are considered as characteristic for the invention are set forth in particular in the appended claims. The invention itself, however, both as to its construction and its method of operation, together with additional objects and advantages thereof, will be best understood from the following description of specific embodiments when read in connection with the accompanying drawing.

BRIEF DESCRIPTION OF THE DRAWING

FIG. 1 is a diagrammatic perspective view, partly broken away, of one embodiment of a refuse compressor according to the present invention;

FIG. 2 is a fragmentary detail view illustrating in side-elevation a feature of the embodiment in FIG. 1;

FIG. 3 is an end elevational view of FIG. 2;

FIG. 4 is a view similar to FIG. 2 but illustrating a further feature of the embodiment shown in FIG. 1;

FIG. 5 is a fragmentary section through the liquid collecting member as used in the embodiment of FIG. 1;

FIG. 6 is a longitudinal sectional elevation through the strainer, grease trap and clean-out unit of the apparatus shown in FIG. 1;

FIG. 7 is a fragmentary detail view, on an enlarged scale, of a cylinder and piston arrangement according to the present invention for propelling the platen;

FIG. 8 is a diagrammatic lay-out of a hydraulic system for use in a refuse compressor according to the present invention;

FIG. 9 is a side elevational view, partly in section, of a refuse compactor representing a further embodiment of my invention;

FIG. 9*a* is a fragmentary detail view, on an enlarged scale, showing a further embodiment;

FIG. 10 is an end elevational view of the embodiment of FIG. 9, looking toward the right in the latter Figure;

FIG. 11 is a plan view of a platen according to yet a further embodiment of the invention; and

FIG. 12 is a section on line XII—XII of FIG. 11.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Discussing now the invention in detail, and firstly discussing FIG. 1, it will be seen that the novel refuse compressor comprises a housing 1 which in the illustrated

embodiment is mounted on legs or supports 2 of suitable type. One type is illustrated and is so clearly shown as not to require detailed discussion. As is evident from FIG. 1, the axis of the housing 1 is generally horizontal but the housing 1 shown in FIG. 1 is slightly downwardly inclined towards the door 4 which constitutes one of its end walls. The degree of inclination is indicated with reference numeral 3. It is emphasized, however, that the degree of inclination to the horizontal, whose purpose will become apparent subsequently, may differ from that which has been shown in the drawing and that, furthermore, the housing could also be arranged in upright position instead of being substantially horizontal.

As pointed out, at the lower end of the housing 1 there is provided a door 4 which is connected to the housing by sturdy hinges 5 whose particular construction is not part of the invention. Suitable reinforcements are provided, for instance at the exterior of the door 4, so that the latter can withstand the pressures which develop against it when refuse is being compressed, as will be discussed subsequently. The reinforcements, also, are not a part of the invention and are not illustrated.

Reference numeral 6 identifies the open end of the housing 1, and reference numeral 7 a cylindrical seal of suitable material, such as rubber or elastomeric material of a synthetic nature, which is compressed against the end face of the housing 1 when the door 4 is moved to closed position, to prevent leakage between the end face of the housing 1 and the door 4. Reference numeral 8 identifies diagrammatically-illustrated latches of any suitable type; their construction forms no part of the invention and it need simply be remembered that on the one hand they must be strong enough to hold the door 4 in closed position against the internal pressure developing in the housing 1, and on the other hand they should advantageously be of the quick-acting type to permit rapid latching and unlatching of the door 4.

The housing 1 is provided with a cut-out opening 9 and a hopper 10 is mounted on the housing 1 so as to communicate with this cut-out 9. The hopper 10 is advantageously of generally funnel-shaped configuration and refuse introduced into the hopper 10 is channeled by it through the cut-out 9 into the interior of the housing 1.

It is emphasized that the cut-out 9 and the associated hopper 10 are axially spaced from the end face 6 by a predetermined distance, so that a circumferentially complete cylindrical portion 11 of the wall of the housing 1 remains between the cut-out 9 and the end face 6, rather than having the cut-out 9 extend all the way or substantially all the way to the end face 6. The reason for this is that a full load of refuse introduced into the housing 1 is compressed—assuming the compression chamber in the housing 1 to be substantially of twenty-inch diameter—to make a package of between approximately three and five inches axial length. This package is completely accommodated in the cylindrical section 11, which means that when the refuse of any given load is compressed into this cylindrical section 11, none of it can escape through the cut-out 9.

Located closer to the opposite end wall of the housing 1 there is provided a circular platen 12 which is supported on a plunger 12a to guide and maintain its relative vertical position and is connected with the piston rod 15 of a piston 13, the latter being associated with a cylinder 14, preferably of the hydraulically-activated type. The cylinder and piston arrangement 13, 14 is double-acting as will be described later, and when the platen is moved forwardly to a compacting position, that is towards the door 4, it compresses the refuse introduced through the cut-out 9 against the closed door 4. The platen 12 is connected with the piston rod 15 via a swivel joint to enable it to perform self-aligning movements, meaning that it has limited freedom of pivoting movement with respect to the piston rod 15 so as to accommodate itself to the refuse which is being compressed and to take up any misalignments of component parts.

The section 11 of the housing 1 is provided, inwardly adjacent the end face 6, with a plurality of apertures—which may be slots or the like--identified with reference numeral 16 and distributed circumferentially of the section 11. As shown in FIG. 4, these apertures 16 are covered at the exterior of the housing 1 with a strong coarse-mesh screen 18 which is connected in suitable manner to the housing 1, for instance with screws or the like. Applied exteriorly over the screen so as to engage the exterior of the housing 1 and overlie the screen and the apertures 16, is a rubber or synthetic elastomeric shoe or collecting channel 19 whose cross-section will be evident from FIG. 5. Of course, the cross-section may be different from that shown in FIG. 5 and it is only essential that it be generally trough-shaped. The side edges of the member 19 sealingly contact the outer surface of the housing 1 at opposite axial sides of the apertures 16 and the screen 18; the member 19 is advantageously provided in form of a strip whose opposite ends are secured, as by bolts 20, to a mounting block 21 which is provided on the housing 1 at what is the upper side thereof in the illustrated embodiment. Because of the aforementioned inclination 3 of the housing 1 to the horizontal in direction towards the door 4, any liquid expressed from the refuse will drain to the apertures 16 and through these into the interior of the member 19. The coarse screen retains larger-sized particles which manage to escape through the apertures 16.

To facilitate flowing of expressed liquid towards the apertures 16, the door 4 is provided on its inner side which in closed condition faces the interior of the housing 1, with a strainer or drain plate 17 provided with corrugations extending vertically or at least substantially vertically in the illustrated embodiment. A similar strainer or drain plate 17*a* is provided on the platen 12. A side-elevational view of the strainer plate 17*a* secured to the platen 12 is shown in FIG. 2; an end elevational view of the strainer plate 17*a* is shown in FIG. 3. It will be understood that the strainer or drain plates 17 and 17*a* may be of identical construction and that expressed liquid can flow in the depressions of the corrugations of these plates 17, 17*a* and subsequently along the bottom of the housing 1 towards the apertures 16. Further, the strainer plates may also be of other construction; a waffle grid, or even a heavy screen could be utilized instead of the corrugations.

From the apertures 16 the expressed liquid moves into the interior of the member 19 which latter is provided, as shown in FIGS. 1 and 4, at or near its lowest point with a discharge port 22, and from there through a suitable conduit 22*a* into a strainer, grease trap and clean-out unit 23.

For sanitary reasons the apparatus in question should of course be readily cleanable. It is for this reason that the member **19** is preferably made of elastomeric material because one end of it can then be unfastened from the associated bolt **20** and the member bent to straight or more nearly straight shape, whereupon its interior can then be flushed with water or the like; also, it can be readily inspected.

Details of the device **23** are shown in FIG. **6.** As pointed out before, expressed liquid passes from the member **19** through the outlet port **22** thereof into the conduit **22a** and from there into the device **23.** The device **23** comprises a settling box **24** into which the expressed liquid initially passes. Located in the settling box **24** is a strainer **25** provided with a small-mesh screen which screens out any solid particles still contained in the liquid. The screen may be rotated by a crank **26** against a doctor blade **27,** to thereby clean off the accumulation of solid material which will then drop to the bottom of the settling box **24.** The screen or strainer **25** may be inspected and removed, and solid material withdrawn from the bottom of the settling box **24,** through a clean-out **24***a* located in the manner illustrated. The precise configuration, and the manner in which the clean-out **24***a* is normally maintained closed, are of no importance for purposes of the present invention.

Solid matter having been retained by the strainer **25,** the clear remaining liquid will flow out of the interior of the strainer **25** through an opening **28** in the wall **29** which separates the settling box **24** from the remainder of the device **23.** The liquid flows through the opening **28,** thereupon downwardly around and upwardly beyond a partition **30,** and subsequently above a further partition **31,** downwardly and out through the outlet **32** which is connected in suitable manner with a receptacle, a sewer, or any other way of disposing of the liquid. In passing around the lower end of the partition **30** the liquid is freed of any grease, because this portion of the device serves as a grease trap where grease rises to the top. A clean-out plate **23***a* closes an aperture provided at the top of the device **23** so that grease caught in the grease trap may be readily removed when necessary.

In accordance with my invention it is also desirable that a strong pressure be applied upon the platen **12** during the compression stroke thereof, utilizing the maximum hydraulic pressure and pump volume of the hydraulic unit. On the return stroke, however, very little pressure is required only such as is necessary to move the unloaded platen and piston; it is desirable to have a quick return stroke as opposed to a slow compression stroke. An arrangement for achieving this is illustrated in FIG. **7.** The cylinder or the cylinder and piston arrangement which moves the platen **14** is here identified with reference numeral **33.** It shall be assumed for purposes of explanation that the diameter of the cylinder **33,** that is the internal diameter, is 4.5 inches. The piston **34** is received in the cylinder **33** and a seal **39** is provided to prevent communication between the spaces in the cylinder **33** located at opposite axial sides of the piston **34.** Such seals are well known. Reference numeral **36** is a piston rod carried by the piston **34,** reference numeral **37** an end gland and reference numeral **38** an O-ring, that is another seal preventing the escape of fluid at the illustrated location. Reference numeral **40** identifies screw threads provided at the free end of the piston rod **36** and enabling connection of the platen to it.

Using a constant-flow hydraulic pump, the piston **34** will move at a constant slow rate towards the end gland **37,** hydraulic fluid being introduced in known manner into the chambers or compartments **35** and **35a** through the inlet port **42** and **43.** The diameter of the piston rod **36** shall be assumed for purposes of this explanation to be 3.25 inches. Accordingly, the surface exposed by the piston **34** to the fluid in chamber **35** will be 15.9 square inches, assuming the dimensions mentioned above, whereas the surface upon which fluid acts which is in the chamber **35***a* and admitted thereto through the port **43,** is 6.28 square inches. The relative speed of the high pressure slow-motion stroke towards the gland **37** versus the low-pressure but fast-motion return stroke away from the gland **37** will be proportional to the relative areas exposed to the action of the constant-flow hydraulic fluid. Taking into account that on the return stroke the piston is not loaded, the time of the return stroke will be only 39½ percent of the time required for the compression stroke in the illustrated exemplary embodiment. This saving of time is most desirable as an operational advantage and permits economical sizing of the pumping equipment.

A further desirable feature is to assure that the pressure in the hydraulic system be limited so as to safeguard and prevent damage to the equipment. The shut-off pressure should be controlled to provide for uniform compacting or compressing of the refuse without requiring attention or control by the operator. Furthermore, when the selected pressure is reached, the valve utilized in the hydraulic equipment should automatically serve to "unload" the system to prevent overheating of the oil in the reservoir.

I achieve these features with a system which is diagrammatically illustrated in FIG. **8.** The hydraulic cylinder **14** is of double-acting type and actuates the platen **12** which is slidably arranged in the housing **6** which has the door **4** provided at its one end. This is as in the embodiments already discussed.

In order to assure relatively uniform density of compression of the refuse before the refuse is discharged from the device, the maximum pressure in the hydraulic system is limited to a preset pounds-per-square-inch value in accordance with the arrangement shown in FIG. **8.** To achieve this I use a directional control valve **44** provided with a control handle **45** which is movable from a center or neutral position (illustrated in full lines) to two opposite positions (illustrated in broken lines) in which it respectively causes the piston associated with the cylinder **14** to travel in opposite directions, that is to perform the compression stroke and the return stroke. The control valve mechanism is spring-loaded loaded towards the neutral position and can be maintained in either of the positions selected with the handle **45** by means of detents **46;** it will remain in the selected position until the pressure in the hydraulic system builds up to a preselected value of pounds-per-square-inch as determined by the setting of a conventional relief valve **47.** When the selected pressure is reached the latch **48** releases and the spring-loaded valve mechanism moves to neutral position, terminating the flow of fluid to the cylinder **14.**

When the handle **45** is in the central or neutral position, to which it is restored when the latch **48** releases the detents, the hydraulic fluid flows directly to the

tank **49** at an unloaded pressure. Therefore, the pump **50** and the electric motor **51** are under very small running load and the oil in the tank **49** will not overheat. It will be appreciated that if continuous high pressure were to be maintained in the system, the latent pressure energy would be dissipated by heating the oil to an undesirably high temperature.

This system achieves the aforementioned advantages, and in addition assures that specific attention on the part of the operator is not required in order to maintain operation of the hydraulic system or to shut off the system when the end of the compressing or return stroke is reached.

Of course, a system utilizing electric pressure switch means and relays can also be employed for this purpose but would be more complicated and more expensive than the construction shown in FIG. **8.**

The operation of my novel device will be evident from what has been set forth and from a consideration of the drawing. Refuse is simply introduced through the hopper **10** into the cut-out **9** and thus into the housing **1.** The hydraulic power unit associated with the apparatus, not shown but of conventional type, is then turned on and the platen is caused to move to its advanced compressing position. The refuse will thereby be compacted into a small pack, and any liquids expressed will drain into the unit **23,** with particulate matter and grease being retained so that only clear liquid will leave the unit **23** to enter into a sewer or the like. Now the door **4** is unlatched and opened, and the compacted refuse pack of refuse tends to stay together, that is little or none of the compacted refuse will become separated from the package when it is handled. If the door cannot be readily opened, the platen may be slightly retracted to relieve pressure on the door, and the platen may be moved forwardly beyond its end position of the compression stroke in order to facilitate expulsion of the package of compressed refuse from the housing **1** and allowed to fall into a suitable container.

Subsequently the door is closed, the platen returned to its retracted or starting position, and new refuse can then be introduced.

Coming to the embodiment illustrated in FIGS. **9** and **10** it is emphasized that this concerns a refuse compactor which is of particular advantage when the refuse contains very significant amounts of liquid which are to be removed. This is the case, for instance, in school and commercial cafeterias and similar establishments where cups and other containers are frequently discarded with at least some of their liquid contents, e.g. milk containers in school cafeterias.

Refuse of this type presents a special problem in that it merely is necessary to separate the liquids from the solids—i.e., the containers--but requires no straining, filtering or other processing of the expressed liquids. The compactor of FIGS. **9** and **10** is intended for this particular use, but not for applications—as in restaurants, for example—where the expressed liquid is admixed with semi-solids which must subsequently be separated from the liquid.

The compactor shown in FIGS. **9** and **10** fulfills the above outlined requirements. Its compression chamber, in the housing H, is again identified with reference numeral **1.** As shown, the housing H is inclined downwardly towards the left (FIG. **9**) at a small angle relative to the horizontal. Reference numeral **2** identifies the legs on which the housing H is supported. Reference numeral **12** is the platen which corresponds to the one described with reference to FIG. **1** and which preferably carries a strainer plate (not shown) similar to the plate **17**; of course, the corrugations which are provided by the separate strainer plate **17** may instead be directly and integrally provided on the platen **12.**

The hydraulic cylinder and piston unit is designate with reference numeral **14** and is preferably constructed and controlled in the manner discussed with reference to preceding embodiments. According to FIG. **9***a* it may also utilize a swivel joint **15**a as shown, so as to be capable of performing the earlier-mentioned self-aligning movements.

In place of the door **4** of FIG. **1** the embodiment of FIGS. **9** and **10** has a transverse end wall **4**a which is held in place in a slot of retaining ring **117.** Alternate projecting radial lugs **116** and outwardly projecting radial lugs **115** engage behind one another after end wall **4** has been given a simple twist in circumferential direction to lock the end wall in place. Its inner side, facing the interior of the compression chamber **1,** may be provided with a strainer plate **17** (see FIG. **1**) or analogous means having the ribs **98** thereon (FIG. **9**). The end wall has slots **99.**

Adjacent the middle of the housing H there is provided an opening **93** which may be closed by a curved door **93'** hingedly connected to the housing H for movement about the axis **93***a;* a handle **93***b* is provided to permit lifting and lowering of the door **93'.** It is through the opening **93** that refuse to be compacted is introduced into the chamber **1.**

A cut-out **92** is provided in the housing H intermediate the door **93** and the end wall **4***a.* The housing H being of circular cross-section, this cut-out **92** extends over almost 180° of the bottom one-half of the housing. A cylindrical door **94** circumscribes the housing H and therefore also the cut-out; it is guided in the guides **96** which exteriorly surround the housing H. Thus, the door **94** can be rotated about the exterior of housing H by gripping the handle **95.** Sealing strips **97** prevent the escape of matter from the interior of the chamber **1.** The door **94** itself has a further cut-out (not shown) which registers with the cut-out **92** in the housing H when the door is in a predetermined position relative to the latter; in other positions of the door **94** the cut-outs are out of registry and therefore the opening is closed.

Reference numeral **91** identifies a drain for expressed liquids. A chute **99** surrounds the cut-out **92** and is preferably of one piece with-or fastened to—the end cover **100** so as to be removable with the latter for ease in assembling and disassembling of the unit. Wing nuts **90** are secured to ring **117** and hold the cover in place.

Suitable safety interlocks of well-known type may be provided on the doors to prevent operation of the cylinder and piston unit when either of the doors **93'** and **94** is open.

Refuse introduced through opening **93** is compacted in the manner described with reference to the preceding embodiments. Liquids expressed flow to and through the drain **91.** Compacted solids remain at the left-hand end (see FIG. **9**) of the chamber **1** and are discharged under the influence of gravity by rotating the door **94** until its cut-out is in registry with the cut-out **92.**

It will be appreciated that in operation of the compactor disclosed herein, the plunger and platen move relatively quickly during the compacting stroke, although not as quickly as they may move during the return stroke. Nevertheless, their increment during the compacting stroke is such as to expel liquids from the refuse at a rapid rate. Assuming, for instance, that the compactor is supplied with the contents of a standard-size 32-gallon capacity refuse container, and that this refuse contains 15 percent liquids, then the quantity of liquid expelled from such a load during the compacting stroke will be 4.82 gallons. Evidently, unless sufficiently rapid drainage is available this liquid will tend under the influence of pressure exerted upon it, to escape wherever it can find an outlet. Because no tight seal is provided between the plunger and the housing—as evident from the preceding Figures—the liquid would ordinarily be able to escape in this direction, a clearly undesirable contigency.

To avoid this possibility, and to reduce the buildup of pressure in the compacting chamber, I have provided the apertures **16** shown in FIG. **4.** However, in accordance with a further embodiment I may eliminate these apertures and replace them--or else supplement them, if I so desire—with liquid-storage voids as shown in the embodiment of FIGS. **11** and **12.** Reference numeral **111** identifies a platen analogous to those shown in the preceding Figures. It is provided with ribs **112,** a concept which is also shown in the preceding Figures. However, according to the embodiment of FIGS. **11** and **12** the ribs **112** are so deep and so spaced that they define between themselves grooves **113** which can serve as temporary storage voids or spaces of sufficient capacity to hold at least most of the liquid which is usually expected to be expelled during one compression stroke, to allow sufficient time for the liquid to drain off by gravity.

Thus, to accommodate the above-mentioned quantity of liquid, the ribs **112** could for instance be three inches deep and one-half inch wide, being provided over the entire width of platen **111.** The spaces between ribs **112** would in this case be ¾ inches wide, thus accounting for 60 percent of the surface area of the platen. Assuming that the latter has a diameter of 20 inches, and given the above dimensions, it may be ascertained that 314 sq.in. × 60 percent × 3 inches = 564 cu.in. of void space. Dividing this by the 231 cu.in. content of liquid per gallon yields a storage capacity in the spaces **113** —which may be considered recesses, grooves or generally voids— of 2.43 gallons. If the door **4** —which closes off the end of the compacting chamber opposite to the platen **111**— is of similar dimensions and provided with similar ribs **112** and grooves **113,** then the combined temporary storage capacity of the voids or grooves **113** in platen and door is 4.86 gallons, namely the equivalent of the liquid which would normally be expected to be expressed from the contents of a 32-gallon capacity refuse container. This liquid will flow into the grooves **113** during the compacting stroke of the platen **111,** and then gradually drain off through the outlet which is provided in the usual manner.

It will be understood that each of the elements described above, or two or more together, may also find a useful application in other types of constructions differing from the types described above.

While the invention has been illustrated and described an embodied in a refuse compressor, it is not intended to be limited to the details shown, since various modifications and structural changes may be made without departing in any way from the spirit of the present invention.

Without further analysis, the foregoing will so fully reveal the gist of the present invention that others can by applying current knowledge readily adapt it for various applications without omitting features that, from the standpoint of prior art, fairly constitute essential characteristics of the generic or specific aspects of this invention and, therefore, such adaptations should and are intended to be comprehended within the meaning and range of equivalence of the following claims.

What is claimed as new and desired to be protected by Letters Patent is set forth in the appended claims:

1. A refuse compressor comprising, in combination, a housing provided with an elongated internally unobstructed chamber having one end closed by an end wall and an opposite open end longitudinally spaced from said one end; inlet means communicating with said chamber for admitting into the latter quantities of refuse to be compressed; closure means movable from and to a closure position closing said open end, so as to permit removal of compressed refuse from said chamber; platen means mounted in said chamber for sliding forward movement therein from a retracted position closer to said one end to an advanced position closer to said other end for compressing the admitted refuse between said closure means and said platen means during said forward movement, and for sliding return movement from said advanced position to said retracted position; operating means including a constant-flow hydraulic pump for effecting forward movement of said platen means to said advanced position at a first speed and under a first pressure, and for effecting return movement of said platen means to said retracted position at a higher second speed and under a lower second pressure; and drain means communicating with said chamber in the region of said closure means for permitting draining of expressed liquids prior to movement of said closure means from said closure position, said drain means including a compression-resisting cover plate on an inwardly directed side of said closure means and having corrugations and drain apertures for receiving liquid, including any liquid flowing in said corrugations, and for conducting such liquid to the exterior of said chamber.

2. A refuse compressor as defined in claim **1,** said operating means comprising a cylinder, a piston received for reciprocation in said cylinder and dividing the same into two axially spaced compartments, said piston having oppositely directed endfaces one of which is located in one of said compartments and has a first cross-sectional area and the other of which is located in the other compartment and has a second substantially larger cross-sectional area, a piston rod projecting axially from said one endface and out of said cylinder into connected engagement with said platen means, and first and second pressure-fluid conduit means each adapted to be connected with a source of pressure fluid and respectively communicating with said one and said other compartment.

3. A refuse compressor as defined in claim **2;** and further comprising a source of pressure fluid communicat-

ing with said conduit means for supplying fluid under pressure thereto.

4. A refuse compressor as defined in claim **1**, wherein said second cross-sectional area is equal to at least double said first cross-sectional area.

5. A refuse compressor as defined in claim **1**; and further comprising screen means covering said drain apertures for preventing passage of solids therethrough.

6. A refuse compressor as defined in claim **1**; and further comprising perforations in said cover plate so that expressed liquid may pass through such perforations and flow in the space between said cover plate and said closure means.

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