United States Patent

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[54] **REFUSE COMPACTOR**
4 Claims, 8 Drawing Figs.

[52] U.S. Cl. **100/139,**
100/142, 100/215, 100/218, 100/229, 110/245, 100/251, 100/269, 100/295
[51] **Int. Cl.** **B30b 7/00**
[50] **Field of Search** 100/218, 142, 232, 240, 245, 249, 295, 142, 229, 215; 141/31; 53/124, 137, 138, 139, 251, 269

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ABSTRACT: A refuse compactor in which a hydraulic cylinder, pivot mounted at the rear, compacts refuse fed to a compacting space in front of the cylinder, from a chute. A flap mounted within the chute serves to force the refuse into the compacting space from the chute. A fully encased ejection piston operated by a hydraulic cylinder ejects the compacted mass from the compacting space. Guide tracks prevent wobbling of the compacting piston when encountering large-sized obstructions within the refuse.

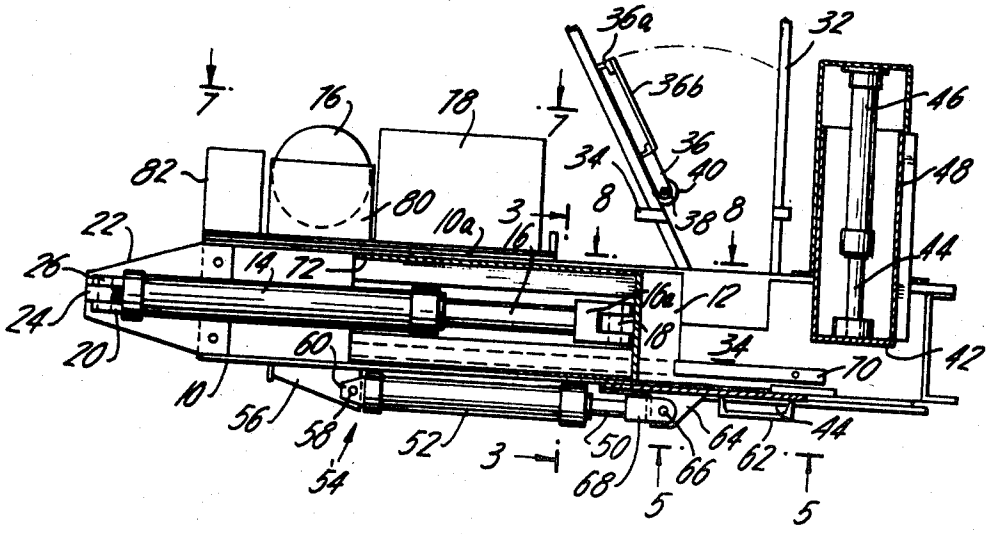


FIG. 1

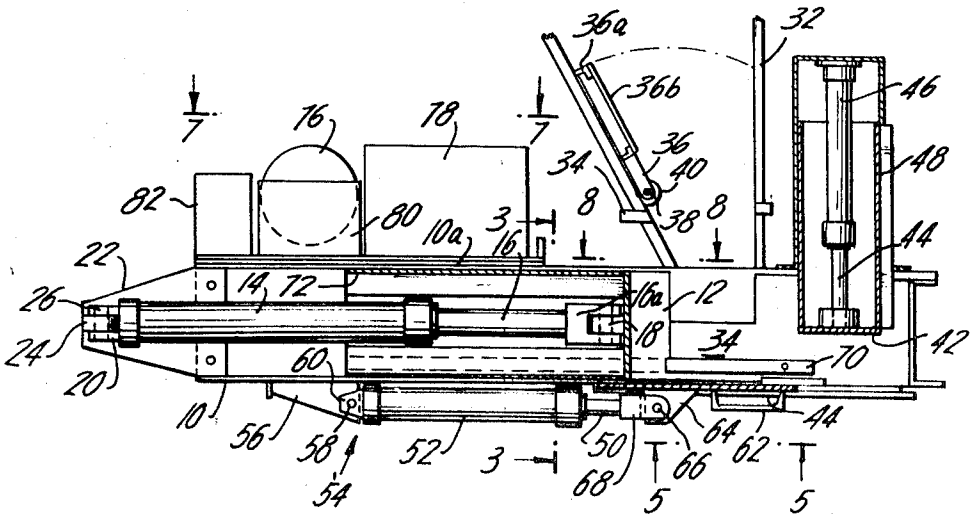


FIG. 2

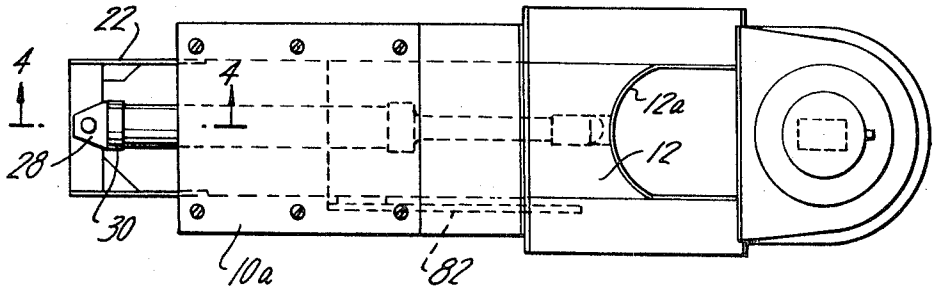


FIG. 3

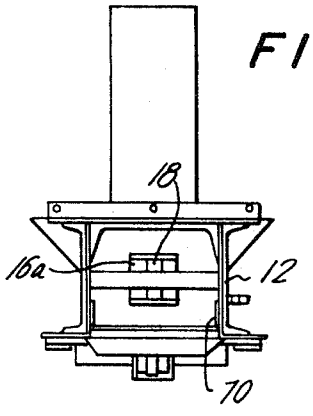
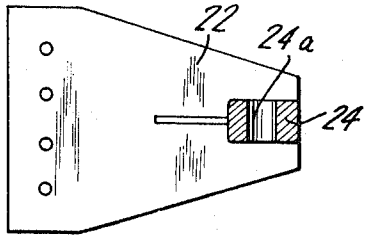


FIG. 4



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FIG. 5

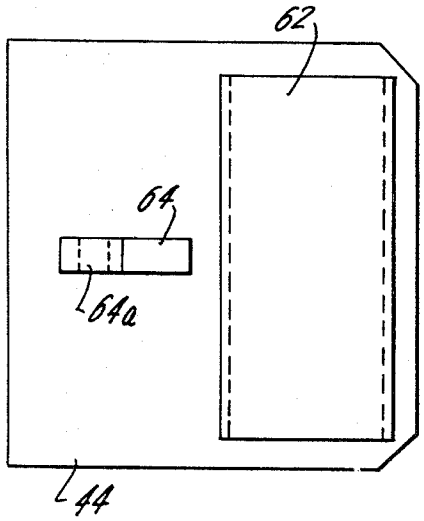


FIG. 6

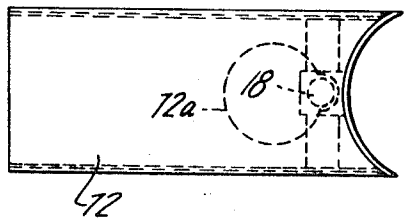


FIG. 7

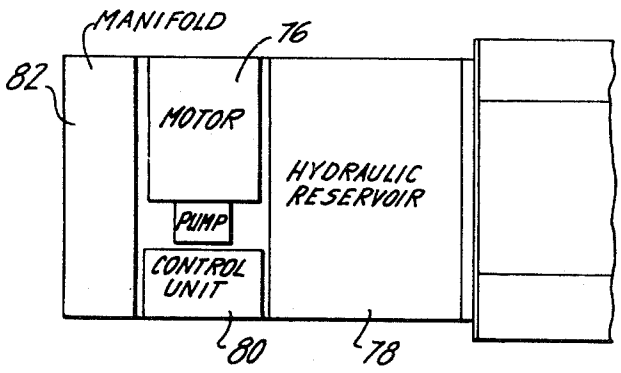
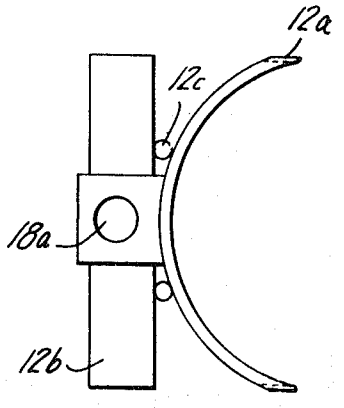


FIG. 8



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REFUSE COMPACTOR

BACKGROUND OF THE INVENTION

In refuse compactors known in the art, the compacting piston which is driven against the refuse to compress the latter into a reduced volume, is operated by a hydraulic cylinder which is stationary and mounted in the front and in proximity of the piston head when retracted. With such mounting of the hydraulic cylinder for the compacting piston, the latter would be subjected to bending when encountering an object within the refuse, which is difficult to break and compact. Thus, when a metal bar, for example, would be included within the refuse, the piston in the conventional apparatus, heretofore, would buckle and thereby bend as a result of the resistance offered by the metal bar. As a result of such bending of the piston, the latter would tend to jam within the cylinder, and thereby give rise to mechanical operating difficulties.

Conventional refuse compactors, furthermore, incur wobbling of the compacting piston when encountering objects within the refuse, which are difficult to compact or reduce in volume. Wobbling of the piston under such conditions, serves to damage the interior walls of the compacting device, resulting in eventual jamming of the piston along its path of motion.

The ejection piston used to eject the refuse from the apparatus after having been compacted, moreover, has been difficult to maintain clean and free from clinging refuse in the conventional design, heretofore. The refuse compactors, as known in the art, also do not have provision for forcing the refuse from the chute into the compacting space directly in front of the piston.

SUMMARY OF THE INVENTION

A refuse compactor in which the hydraulic cylinder for compacting the refuse is pivot-mounted at its rear, to prevent bending and jamming of the piston when encountering substantially incompressible objects within the refuse. A flap or blade mounted within the chute feeding refuse into a compacting space in front of the compacting piston, is hydraulically operated to force the refuse into the compacting space. After the refuse has been compacted, it is ejected from the apparatus through a fully encased piston which is self-cleaning. A reinforced baseplate is hydraulically removed from beneath the compacted mass prior to ejection from the apparatus by the ejecting cylinder. The baseplate is also moved through a hydraulic cylinder mounted at its rear through a pivot. The compacting piston is prevented from wobbling and cutting into the interior walls lining its path of motion, through guide tracks extending along the path of the compacting piston.

It is an object of the present invention to provide a refuse compactor in which the compacting piston is free of bending and jamming during its cycle of operation.

Another object of the present invention resides in providing an ejecting piston in the refuse compactor, of the aforementioned character, which is self-cleaning.

A still further object of the present invention is to provide a reinforced base member beneath the ejecting piston and the compacted mass, which serves as a movable base for retaining the refuse while being compacted into reduced volume by the compacting piston.

Various further and more specific purposes, features and advantages will clearly appear from the detailed description given below taken in connection with the accompanying drawing which forms part of this specification and illustrates merely by way of example embodiments of the device of the invention.

BRIEF DESCRIPTION OF THE DRAWING

In the following description and in the claims, parts will be identified by specific names for convenience, but such names are intended to be as generic in their application to similar parts as the art will permit. Like reference characters denote like parts in the several figures of the drawing, in which

FIG. 1 is a sectional elevational view of the refuse compactor, in accordance with the present invention;

FIG. 2 is a plan view of the refuse compactor in FIG. 1 with the controlling elements of the compactor removed;

FIG. 3 is an end view taken along line 3—3 in FIG. 1;

FIG. 4 is a view taken along line 4—4 in FIG. 2;

FIG. 5 is a view taken along line 5—5 in FIG. 1;

FIG. 6 is a side view of a casing member used for the reciprocating piston of the refuse compactor, of the present invention;

FIG. 7 is a partial plan view taken along line 7—7 in FIG. 1, and shows the layout of the controlling elements for the refuse compactor;

FIG. 8 is a plan view taken along line 8—8 in FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawing, the housing **10** of the refuse compactor constrains the movement of the compacting piston **12**. The latter is reciprocated horizontally through a hydraulic cylinder **14**. The piston rod **16** connects the piston head **12** to interior of the hydraulic cylinder **14**. The piston **12** is coupled to the rod **16** through a pivot joint consisting of a bearing portion **16***a* joined to the piston rod **16**, and a pin **18** passing through bores of the bearing portion **16***a*. The hydraulic cylinder **14** is mounted at its rear through a pivot or clevis joint **20**.

This rear-mounting construction of the hydraulic cylinder **14** for compacting the refuse has mounting brackets **22** supporting a pin-retaining portion **24**. A pin **26** passes through the bore **24***a* of the pin-retaining portion **24**. The pin **26** secures pivotably the fork projections attached to the end of the hydraulic cylinder **14**. These fork portions **28** may be constructed integrally with the end cap **30** of the cylinder **14**. As a result of this rear mounted pivot device for the hydraulic cylinder **14**, the piston head **12** may move transversely to the longitudinal axis of motion of the piston rod **16**.

The piston **12** has a curve-shaped face **12***a* through which the refuse is compacted into a cylindrically shaped structure. The refuse is introduced into the compactor through a chute **32** which communicates with the compacting space **34** directly in front of the piston head **12**. A photoelectric device **35** mounted within the walls of the chute **32**, emits signals indicating that refuse has passed through the chute and into the compacting space **34**.

To aid the transfer of the refuse into the space **34** in front of the piston head **12**, a feed blade or flap **36** is mounted within the chute **32**. The feed blade **36** is rotatably mounted on a shaft **38** which is turned through the action of a hydraulic actuator **40**. The latter rotates the blade through an angle of 90°, when actuated, and thereby serves to force the refuse from the chute, and directly in front of the piston head **12**, to facilitate the compacting processes. The feed blade **36** may consist of a plurality of bars to form a fork-shaped structure which presses upon the refuse in the chute. For purposes of reinforcing such fork-shaped prongs, angles **36***a* may be provided with a bar-shaped member **36***b* straddling across them. At the same time, the feed blade **36** may be in the form of a simple blade-shaped member such as a plate.

After the refuse has been compacted into a cylindrical mass, the latter is located at the end of the compacting space **34**, and directly beneath the ejection piston head **42**. During the compacting process, the piston head **42** is retracted, so that the space **34** is entirely clear of the ejecting piston.

To eject a compacted mass from the refuse compactor of the present invention, a bottom sliding door **44** is moved from underneath the compacted mass. This door **44** maintains an opening beneath the ejecting piston head **42** closed during the compacting process, and thereby supports the refuse while being compacted. After the compacting process has been concluded, the sliding door **44** is withdrawn from the opening, so

that the compacted refuse may be ejected from the space **34** through downward travel of the ejecting piston head **42**.

The ejecting piston head **42** is attached to a piston rod **44** which extends into a hydraulic cylinder **46**. A casing **48** fully encloses the hydraulic operating mechanism, as well as the piston head **42**. Through the casing design **48**, of the present invention, the actuating mechanism for the ejecting piston is maintained clean. Furthermore, through the wiping action of the casing **48** in its vertical travel, the ejecting piston is self-cleaning, since any refuse adhering to the piston will drop off as the latter is retracted.

The bottom door **44** is pivotably mounted to the piston rod **50** of a hydraulic cylinder **52** which is also mounted at its rear through a pivot joint **54**. This pivot joint includes a supporting member **56** which retains a pin **58** within bores of fork-shaped portions **60** extending from the rear of the cylinder **52**. The purpose of this rear mounting of the cylinder **52** is to prevent bending and jamming of the rod **50** within the cylinder, in the event that the sliding door **44** encounters a substantially incompressible object while closing.

For the purpose of further reinforcing the sliding door **44**, a channel-shaped member **62** is secured to the bottom surface of the sliding door. This channel-shaped member **62** prevents buckling of the sliding door when encountering high resistance while the door is being closed. Through a bracket bearing member **64** mounted on the plate **44**, the latter is pivotably joined to the piston rod **50** by means of the pin **66** inserted through bores within the piston head **68** and the bore **64***a* in the bearing bracket **64**.

As a result of the rear-mounting of the cylinders **52** and **14**, smooth translational motion is realized of the reciprocating piston heads **68** and **12**, respectively. Thus, any resistance encountered by these pistons during their cycles of motion, will not cause the piston rods to bend and thereby incur jamming within the cylinders. Any deflections which might be forcibly imposed upon the pistons due to resistance within their paths of motion, are sustained through the pivot actions at the rear of the cylinders. Guides **70**, furthermore, provide additional stability of the piston head **12** during its reciprocating motion, and prevent wobbling of this piston head when encountering high resistance during the compacting process.

To maintain the compacting pistons and hydraulic actuating mechanism free from clinging refuse, a casing **72** encloses surroundingly the movable portions of the compacting members. The casing has an opening **72***a* at its bottom, which serves as an access opening through which it is possible to gain access to the pivot portions **16***a* and **18**.

Mounted on top of the housing **10**, and on the supporting base **10***a*, are the hydraulic pump **74** and motor **76** for circulating the hydraulic fluid through the actuating cylinders of the refuse compactor, of the present invention. The motor **76** drives the pump **74** which in turn circulates fluid to and from the hydraulic reservoir **78**. A control unit **80** applies the necessary electric signals to the hydraulic valves used to control the fluid flow to the cylinders. Through limit switch bars **82**, electrical switches are operated when the actuating pistons are at predetermined positions, and the desired sequence of operation of the cylinders, in the compactor, is thereby maintained. Thus, control over the compacting piston **12** is obtained, for example, through the limit switch bar **82** connected to the piston through a slot in the casing **72**. This limit switch bar **82** then actuates limit switches when the piston **12** is, for example, at its terminal position in its path of motion.

In a preferred construction of the piston **12**, a curved frontal plate **12***a* is secured to the piston head portion **12***b*, as shown in FIG. **8**. Rods **12***c* interposed between the plate **12***a* and the piston head portion **12***b*, prevent the plate from wobbling and deflecting when encountering high resistance during the compacting process.

While the invention has been described and illustrated with respect to a certain preferred embodiment, it will be understood by those skilled in the art after understanding the principle of the invention, that various changes and modifications may be made without departing from the spirit and scope of the invention.

What is claimed is:

1. In a refuse compactor including a housing, a compaction zone within said housing, reciprocal compacting means within said housing in communication with said compaction zone and discharge means connected to said compaction zone within said housing to discharge the compacted refuse therefrom, the combination comprising; said reciprocal compacting means, a horizontally disposed pivotally mounted hydraulic compaction ram having a piston, rod, and cylinder portion, said cylinder portion pivotally mounted at one end to said housing, said piston rod reciprocally carried by said cylinder for moving said piston between extended compacting and retracted positions, said piston pivotally attached to said rod and including a substantially tubular protective casing portion open at one end thereof and closed at the opposite end to define an arcuate compacting face, means defining an opening in the wall of said protective casing adjacent the pivotal attachment between said piston and said rod for access thereto, feeding means carried by said housing including a feed chute, feed opening in said housing connected to said chute, a combination hydraulic feed actuator and precompactor means mounted on said chute to feed and precompact said refuse from said chute into said housing for further compaction therein, means moving said piston between retracted and compacting positions within said housing, ejecting means carried by said housing in communication with said compaction zone including pressure-operated cylinder, piston rod, and ejection piston means selectively operable between extended ejecting and retracted positions, said ejection piston including a substantially tubular protective body open at one end thereof and closed at the opposite end to define an ejection face, means defining a discharge opening in said housing beneath said compaction zone and said ejecting means, door means complementary to said discharge opening, said door movable between open and closed positions to selectively retain or discharge a compacted quantity of refuse from within said compaction zone, and control means to selectively and sequentially actuate said feed means, said compaction means, said door means and said ejecting means.

2. The refuse compactor as defined in claim **1** wherein said mounting means for pivotably mounting said reciprocable compacting means includes a bracket member secured to said housing and having a bored bearing portion; a bored bearing portion secured to said reciprocable compacting means and cooperating with said bored portion of said bracket means; and pin means passing through said bored portions of said bracket means and said reciprocable compacting means.

3. The refuse compactor as defined in claim **1** wherein said reciprocable compacting means includes guide means for guiding said piston along said path of motion, said piston being in contact with said refuse during compacting thereof.

4. The refuse compactor as defined in claim **1** wherein said door means comprises a plate member; and a channel member secured to said plate member for reinforcing said plate member.