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Engerbretsen

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[54] COMPACTOR AND DRIVE ASSEMBLY

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[52] **U.S. Cl.**.....**100/229 A,** 100/290, 100/295

[51] **Int. Cl.** **B30b 15/06**

[58] **Field of Search** .....100/229 A, 229 R, 100/295, 289, 290

[56] **References Cited**

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[57] **ABSTRACT**

A trash compactor including a housing, a trash receptacle movable into and out of the housing and a hollow ram which is vertically reciprocal into and out of the trash receptacle when the receptacle is positioned fully within the housing. The motor, drive sprockets, chains, etc. are all mounted on the ram structure, with the motor actually positioned within the hollow ram to provide an exceptionally compact construction. The drive assembly drives three, triangularly oriented sprockets which are internally threaded and threadably engage stationary jack screws correspondingly positioned within the housing. Driving the three sprockets, therefore, causes the ram and drive assembly to move upwardly and downwardly on the stationary jack screws.

12 Claims, 5 Drawing Figures

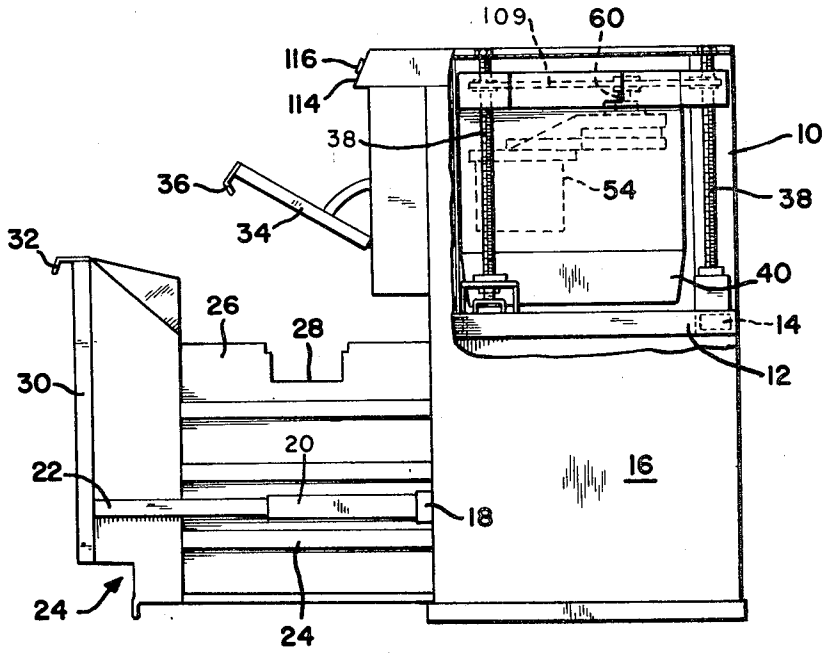


FIG-1

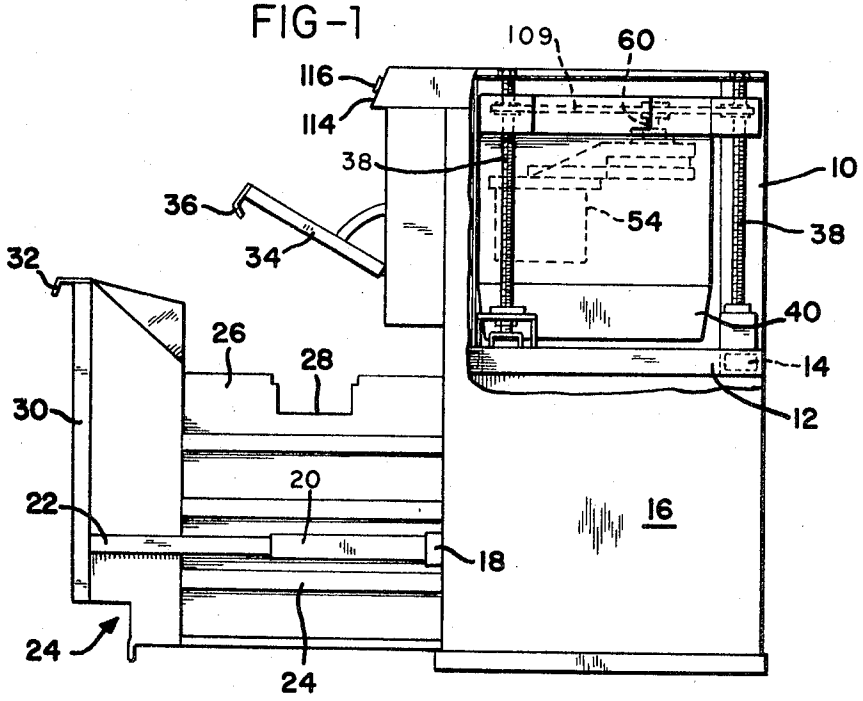


FIG-2

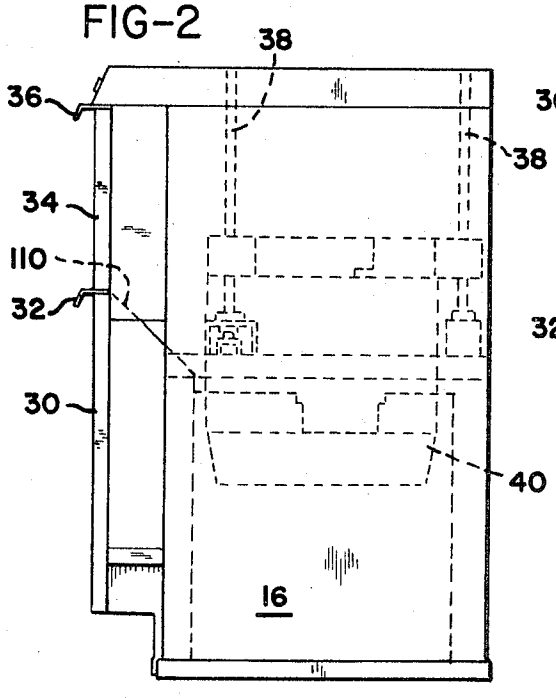
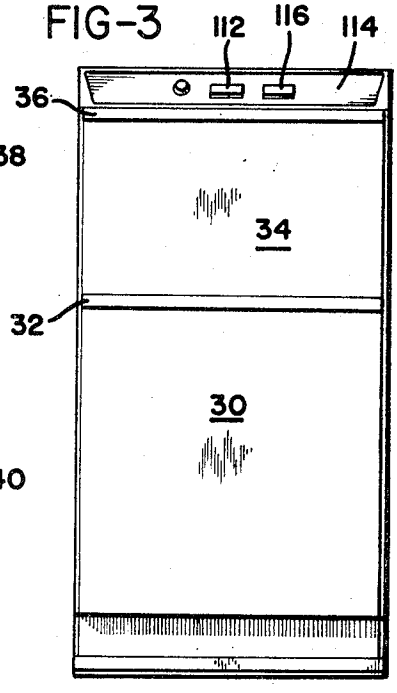


FIG-3



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FIG-4

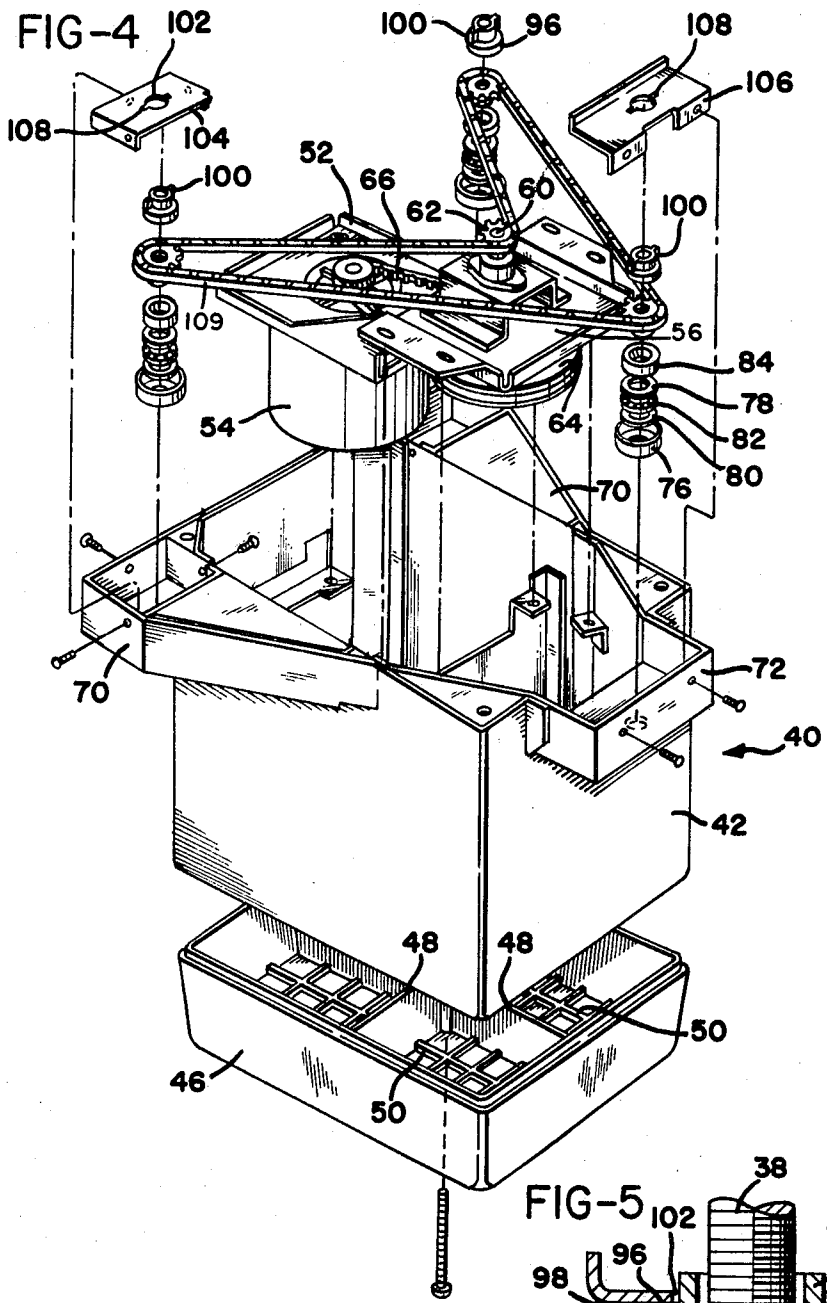
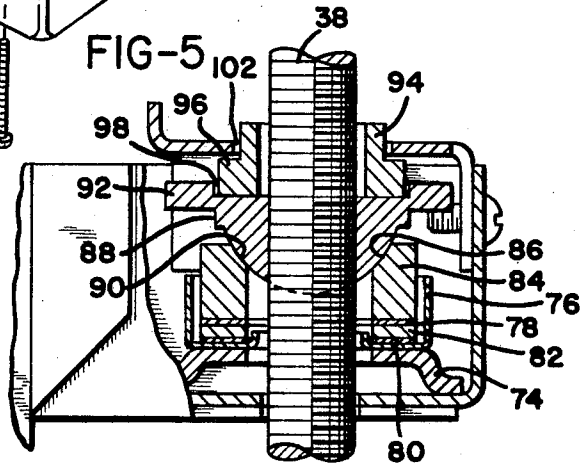

102
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FIG-5


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COMPACTOR AND DRIVE ASSEMBLY

BACKGROUND OF THE INVENTION

One method of combating the rapidly increasing solid waste disposal problem precipitated by rising standards of living and an increasing population is compaction of the solid waste materials at the point of origin. In addition to fairly large scale compaction units intended primarily for commercial operations such as restaurants, institutions, apartment houses, etc., smaller compaction units have been designed for home use.

Of these latter compactors some are intended only for use as tin can crushers. Examples of these are disclosed in U.S. Pat. No. 3,079,856 and 3,352,230. Other home type compactors are intended for more general use and have the capacity to permit an accumulation of solid waste materials as well as compacting the materials within the unit. Examples of these latter type of compactors are shown in U.S. Pat. No. 3,353,478 and 3,537,390.

In all of the above units the compactor rams are driven by movable jack screws with the screws engaging threaded sockets and being driven to cause the rams to move into and out of compacting positions. Additionally, U.S. Pat. No. 1,576,234 discloses a fruit press in which a stationary screw is mounted in a stationary tube for receiving the fruit to be pressed and the press is driven up and down the screw by means of a spring and limit switch controlled drive system.

SUMMARY OF THE INVENTION

The present invention provides a compactor which includes a solid waste material receptacle movable between a compacting position within the compactor and a non-compacting position outside of the compactor. A ram is movable along stationary jack screws positioned outwardly of the receptacle when the receptacle is in the compacting position to substantially reduce the volume of waste materials deposited therein.

The ram carries outwardly projecting mounting brackets, each of which carries a spherically shaped seat. Internally threaded sprockets having external, spherically shaped surfaces engaging the seats are positioned therein and engage the stationary jack screws, so that upon rotation of the sprockets the ram moves upwardly and downwardly along the screws and into and out of the movable trash receptacle. The drive for the ram is mounted within the ram itself and thereby provides an exceptionally compact construction.

The mating spherical seats and spherically shaped surfaces of the internally threaded sprockets serve to prevent jamming of the unit as it compacts solid waste materials. Thus, if an object with high compression resistance is positioned within the receptacle adjacent one of the jack screws, as the ram descended there would be a tendency for the sprocket engaging that jack screw to be retarded in its travel, resulting in skewing of the ram and possible binding. However, with the drive assembly of the present invention the internally threaded sprockets remained aligned with the screw jacks even though there is some skewing of the ram as it descends.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a side view of a compactor in accordance with the present invention showing the drawer and door thereof in their open positions and with portions broken away to show the ram structure;

FIG. 2 is a view similar to FIG. 1 but with the door and drawer of the compactor closed and the ram shown in dotted lines in a partially descended position;

FIG. 3 is a front elevational view of the compactor;

FIG. 4 is an exploded perspective view of the ram and drive assembly therefor; and

FIG. 5 is a cross sectional view through a portion of a jack screw, an internally threaded sprocket and the supporting structure therefor.

DESCRIPTION OF THE PREFERRED EMBODIMENT

As seen in FIG. 1 of the drawings the compactor of the present invention comprises a supporting framework, including vertically oriented supporting members **10** and horizontally extending support members **12** and **14**. Additionally, a back wall and a pair of side walls, one of which is shown at **16**, are attached to the supporting framework to form an enclosure. Mounted on the interior of the enclosure are a pair of stationary slides, one of which is shown at **18**, and which receive movable slides **20**. The latter also engage slides **22** fixed to either side of a drawer type receptacle **24**.

The drawer **24** is provided with side walls **26** having cut out portions **28** to facilitate removal of a liner therefrom, a front wall **30** and a handle **32** to facilitate sliding the drawer into and out of the compactor enclosure. Additionally, the upper portion of the enclosure is provided with a small door **34** having a handle **36** and pivotable between the open position shown in FIG. **1** and the closed position shown in FIGS. **2** and **3**.

Positioned within the compactor housing and mounted on the horizontal support members **12** and **14** are guide means in the form of three, triangularly disposed jack screws **38** which extend from approximately the mid-point of the compactor to the top thereof in parallel relationship to each other. Thus, a pair of jack screws **38** are positioned at the front section of the compactor near the corners thereof and a third jack screw is positioned near the back section of the compactor equally distant from each of the jack screws of the front pair.

Also positioned within the housing and disposed inwardly of the three jack screws **38** is a hollow ram **40**. Ram **40**, as best seen in FIG. **4** of the drawings, includes a hollow main frame **42** having attached to its lower end by means of the bolt **44** a ram cap **46**. Cap **46** may be of molded construction and is provided with main reinforcing ribs **48** and secondary reinforcing ribs **50**.

Fixed to the upper end of the frame **42** by means of bolts or the like is a supporting bracket **52** on the front end of which is mounted a motor **54**. Bracket **52** is also provided with an upwardly stepped portion **56** at the rear thereof and on the upper surface of the stepped portion **56** a substantially U-shaped bearing support is provided, rotatably mounting a shaft **60**. At its upper end the shaft **60** is provided with a toothed sprocket **62** while at its lower end a pulley **64** is fixed with a timing belt **66** wrapping the pulley **64** and a second pulley **68** driven by the motor **54**. The entire drive assembly, therefore, is received within the hollow ram **40**, as best seen in FIGS. **1** and **4**, thereby appreciably reducing the space requirements of the unit.

Projecting outwardly from the upper end of the frame **42** are a pair of front mounting brackets **70** and

a rear mounting bracket **72.** Received within each of the mounting brackets are sprockets and bearing assemblies, identical in construction with each other and only one of which will be described for purposes of illustration.

As best seen in FIGS. **4** and **5,** each sprocket and bearing assembly includes a bearing support **74** upon which is seated a grease retainer cup **76.** Positioned within each grease retainer cup is a bearing including spaced upper and lower bearing races **78** and **80** and an intermediate roller bearing **82.** Seated on the upper race **78** is a universal **84** having a spherical surface **86** which supports a sprocket **88** having a correspondingly shaped lower surface **90** and teeth **92.**

Positioned above the sprocket **88** is a washer **94** having a flanged lower portion **96** received in a recess **98** in the sprocket **88** and radially projecting locking fins **100.** Each of the washers **94** projects through an opening **102** formed in front and rear coverplates **104** and **106,** respectively, with each of the openings being provided with opposed slots **108** to receive the locking fins of the washers **94.** The sprockets **88** are internally threaded and, as seen in FIG. **5,** engage the complementarily threaded jack screws **38.** As seen in FIG. **4** of the drawings, a chain **109,** is trained about each of the sprockets **88** and the sprocket **62.**

In operation, it will be seen that small articles of waste material may be placed in the compactor through the door **34** and they will lay on the sloping surface **110** of the drawer **24** until the drawer is moved to the open position shown in FIG. **1** of the drawings. As the drawer is moved outwardly, articles placed on the surface **110** will fall into the drawer or a liner or other container placed therein. Larger articles, of course, may be deposited in the drawer when it is in the position shown in FIG. **1** of the drawings.

Thereafter, the drawer **24** is closed and the motor **54** energized by, for example, energizing the start button **112** on the control panel **114** as seen in FIG. **3** of the drawings. Additionally, although not shown, it will be apparent that suitable safety interlocks may also be utilized to prevent actuation of the ram when the drawer **24** is in other than the fully closed position.

Upon actuation of the motor **54** the pulley **68** will drive the belt **66** which in turn drives the pulley **64** mounted on the shaft **60.** This in turn drives the sprocket **62** which, through the chain **109** drives the three sprockets **88.** Rotation of the sprockets **88** in one direction will cause the entire ram assembly to move downwardly into the drawer **24** in the manner shown in FIG. **2** of the drawings. The downward movement of the ram can be stopped at any time by depressing the stop button **116** on the control panel **114.**

Additionally, suitable reversing means may be provided which will cause the ram to reverse and retract to the FIG. **1** position when a predetermined load is placed on the motor **54** due to the compaction of waste material in the compactor. While not specifically shown, such reversing means may take the form of the reversing relay described in U.S. Pat. No. 3,401,892. Therefore, after the waste material within the drawer **24** has been compacted by some predetermined pressure the load imposed upon the motor will cause the reversing relay to reverse the motor direction and retract the ram assembly to the position shown in FIG. **1** of the drawings.

As the ram descends in its compacting stroke it may often be the case that some relatively unyielding object may be positioned adjacent one of the jack screws so that as the ram descends there is a tendency for it to become skewed. This in turn would result in a tendency for the sprockets to jam on the jack screws. However, with the spherical seat and matching surface indicated at **86** and **90** in FIG. **5** of the drawings, the ram can shift slightly while the sprockets remain aligned on the jack screws.

From the above it will be apparent that the present invention provides a compactor with a self-contained, ram mounted drive system.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise form of apparatus, and that changes may be made therein without departing from the scope of the invention.

What is claimed is:

1. A compactor comprising:

a. a hollow compacting ram,

b. a receptacle having a capacity sufficient to receive said hollow ram therein,

c. means mounting said ram and said receptacle relative to each other for reciprocating movement of said ram into and out of said receptacle to compact material therein,

d. drive means mounted wholly within said hollow ram for causing said reciprocal movement,

e. said mounting means including:

i. guide means extending between said ram and said receptacle,

ii. means mounted on said ram and engaging said guide means for relative movement therebetween, and

iii. means for transmitting driving force from said drive means to said engaging means to cause said reciprocating movement of said ram along said guide means into and out of said receptacle.

2. The compactor of claim **1** wherein:

a. said guide means are fixed with respect to said receptacle, and

b. said engaging means are rotatively mounted on said ram for movement along said guide means.

3. The compactor of claim **2** wherein:

a. said guide means comprises externally threaded jack screw means, and

b. said engaging means comprises internally threaded sprocket means movable along said jack screw means upon rotation of said sprocket means.

4. A compactor comprising:

a. a supporting framework having spaced front and a back sections,

b. a pair of jack screws fixed to said front section adjacent opposite side edges thereof,

c. a third jack screw fixed to said back section at a point equally spaced from each of the jack screws of said pair,

d. said jack screws extending vertically in parallel spaced relationship to each other from adjacent the top of said framework to adjacent a point intermediate the top and bottom thereof,

e. an internally threaded sprocket threadably engaging each of said jack screws,

f. a vertically reciprocal ram positioned within said framework,

g. mounting brackets fixed to and projecting outwardly of said ram adjacent an upper end thereof,
h. means defining a spherical seat attached to each of said mounting brackets and rotatably mounting said sprockets with a complementary, spherically shaped surface on each of said sprockets engaging one of said spherical seats,
i. a motor mounted in said ram,
j. means for transmitting drive from said motor to said sprockets, and
k. a drawer slidably received in said framework beneath said intermediate point thereof.

5. A compactor comprising:
a. a support ing framework,
b. stationary, threaded, jack screw means mounted on said supporting framework in fixed relationship thereto,
c. an open top receptacle movable between a compacting position within said supporting framework and a noncompacting position in which material can be removed from said receptacle,
d. a reciprocating ram positioned within said framework in opposition to the open top of said receptacle when said receptacle is in said compacting position,
e. sprocket means threadably engaging said jack screw means and movable axially thereof upon rotation of said sprocket means,
f. means rotatably mounting said sprocket means on said ram adjacent the periphery thereof, and
g. drive means mounted in said ram for rotating said sprocket means and driving said ram along said jack screw means into and out of said receptacle.

6. The compactor of claim **5** further comprising:
a. a drive sprocket,
b. a drive chain wrapping said drive sprocket and said sprocket means, and
c. said driving means driving said drive sprocket.

7. The compactor of claim **5** wherein:
a. said jack screw means are positioned outwardly of said receptacle.

8. The compactor of claim **7** wherein:
a. said jack screw means comprises a plurality of jack screws mounted on said framework outwardly of said receptacle.

9. The compactor of claim **8** further comprising:
a. a drive sprocket,
b. a drive chain wrapping said drive sprocket and said sprocket means, and
c. said driving means driving said drive sprocket.

10. The compactor of claim **8** wherein said means for mounting said sprocket means comprises:
a. mounting brackets fixed to said ram adjacent an upper end thereof and projecting outwardly thereof,
b. means defining spherical seats attached to said bearing supports and rotatably mounting said sprocket means with complementary, spherically shaped surfaces of said sprocket means engaging said spherical seats.

11. The compactor of claim **10** wherein:
a. said jack screws are disposed in a substantially triangular arrangement.

12. The compactor of claim **11** wherein:
a. said compactor is substantially rectangular in cross section, and
b. two of said mounting brackets are fixed to said ram at a pair of adjacent corners thereof and a third mounting bracket is fixed to said ram at a point equally distant from said two mounting brackets.

* * * * *