United States Patent [19]

Difley et al.

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[45] **Nov. 20, 1973**

[54] **REFUSE COMPACTOR DRIVE SYSTEM**

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[73] Assignee: **Whirlpool Corporation**, Benton Harbor, Mich.

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[52] **U.S. Cl.**..... **100/290**, 74/242.13 A, 100/229 A

[51] **Int. Cl.**..... **B30b 1/18**

[58] **Field of Search**..... 74/242.13 A; 100/229 A, 290; 151/41.75

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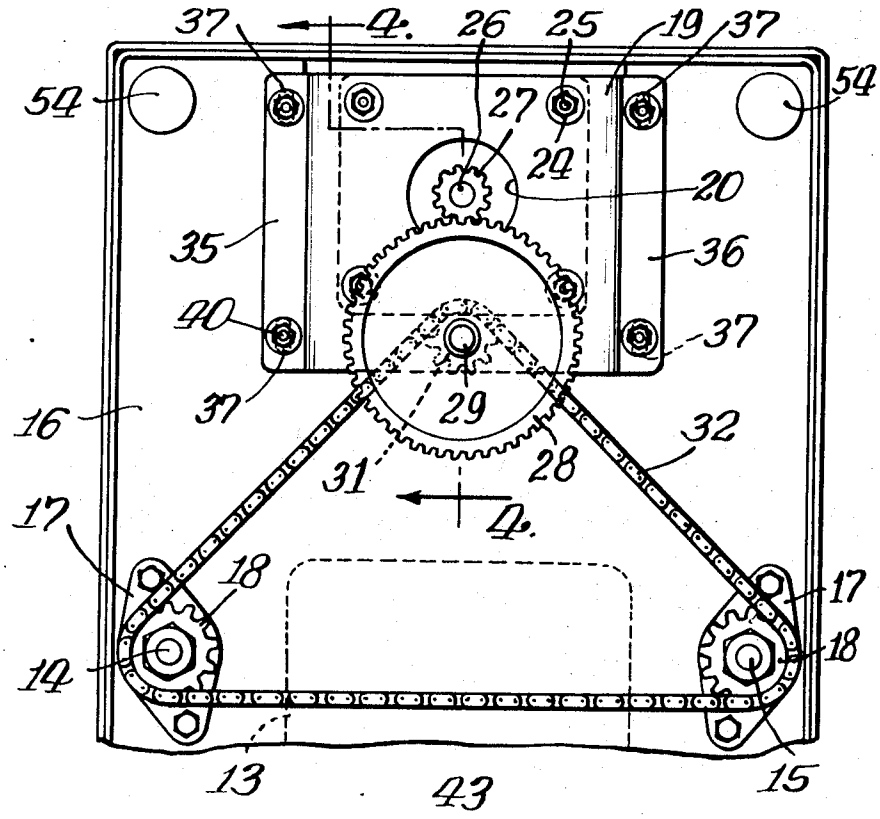
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Attorney—James S. Nettleton et al.

[57] **ABSTRACT**

A refuse compactor having a cabinet provided with a bottom base wall and a mounting member removably secured to the base wall for carrying a drive means including a drive motor above the base wall and a power take-off means connected to the ram drive means below the base wall. The mounting member is adjustably positionable on the base wall for adjusting the tension in a chain drive portion of the power take-off means. The drive means may be mounted in the refuse compactor with the cabinet in an inverted position for facilitated installation and servicing.

12 Claims, 5 Drawing Figures



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Fig. 1.

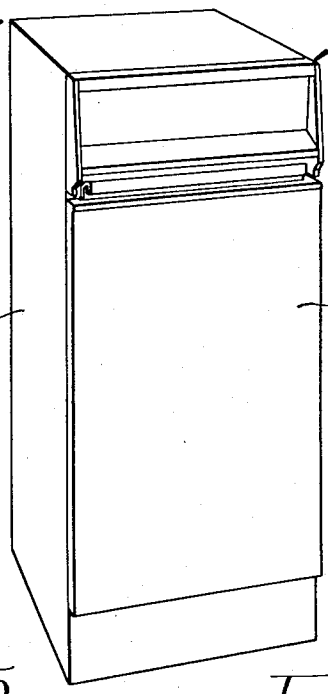


Fig. 2.

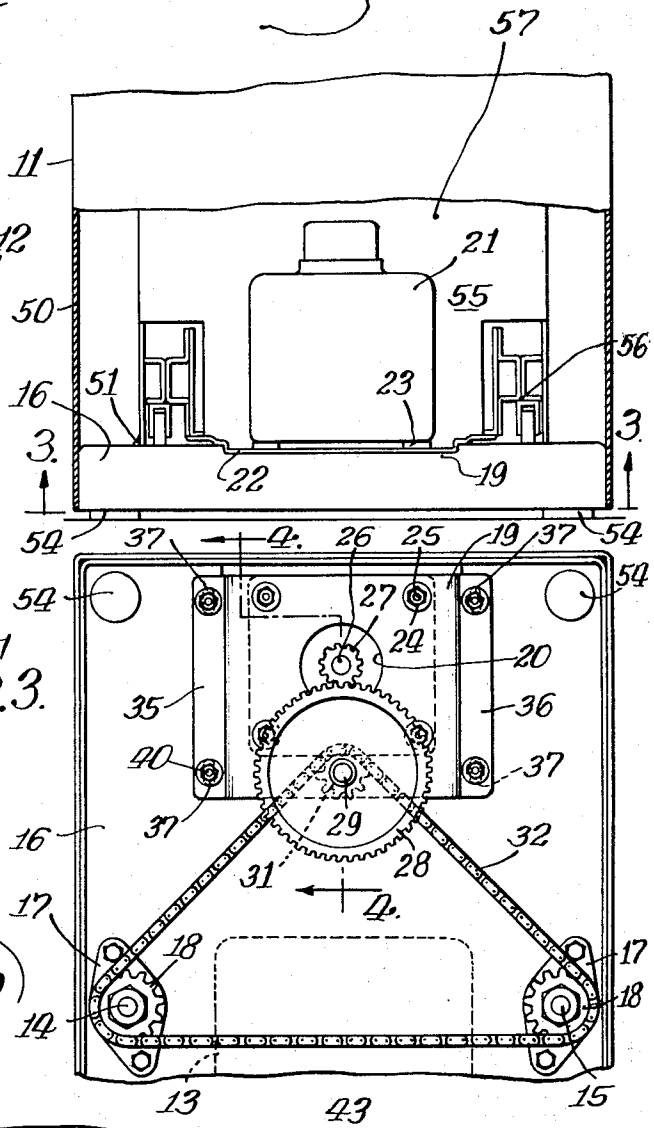


Fig. 5.

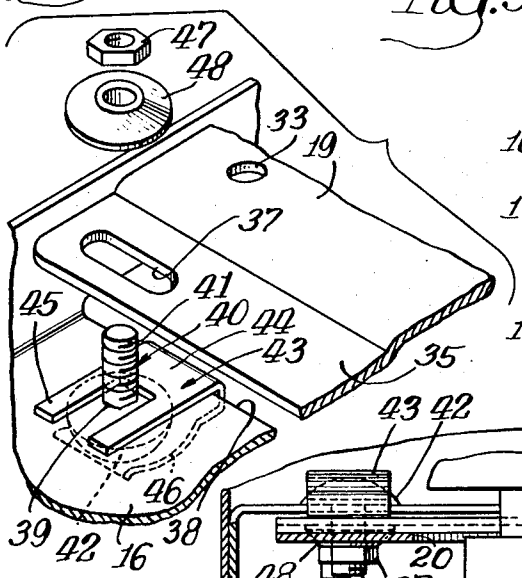
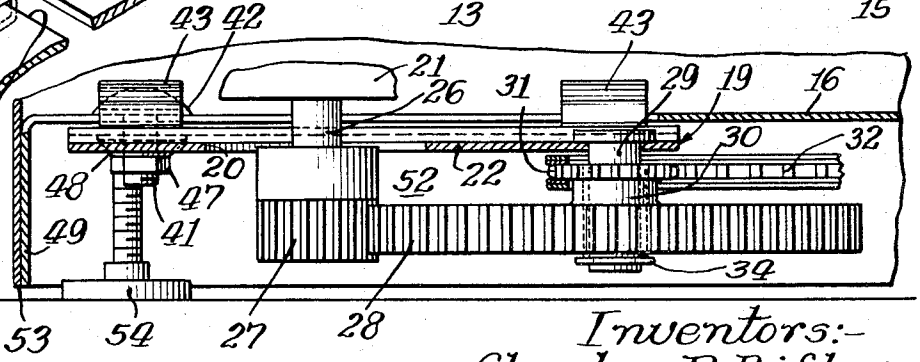


Fig. 3.

Fig. 4.



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REFUSE COMPACTOR DRIVE SYSTEM

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to refuse compactors and in particular to refuse compactors wherein a power drive is provided in the bottom portion of the cabinet carried on a base wall.

2. Description of the Prior Art

In one form of improved refuse compactor shown in Lester H. Hinkel et al U. S. Letters Patent No. 3,537,390 for a Refuse Compactor, owned by the assignee hereof, a ram is provided within an outer cabinet for compacting refuse in a movable drawer. The ram is powered by an electric motor carried on a portion of the frame and provided with a depending drive shaft for driving a power take-off system disposed below a bottom wall portion of the cabinet connected to a pair of drive screws extending upwardly from the base wall to the ram.

In another form of refuse compactor shown in Hopkins U. S. Letters Patent No. 3,353,478 for a Waste Collecting and Compacting Unit, a drive motor is mounted integrally with a speed reducer unit having an output coupled to one of the ram worm shafts with a chain drive being interconnected between the worm shafts by means of sprockets carried thereon. In Schohl U. S. Letters Patent No. 3,228,323, for a Garbage Compressor and Compactor Device, a drive motor is mounted on one side of the body of the compactor with the refuse receiving housing mounted on the other side.

SUMMARY OF THE INVENTION

The present invention comprehends an improved refuse compactor drive means and method of mounting the drive means therein wherein the drive motor is carried on a mounting member which is adjustably removably secured to the base wall of the compactor with the drive motor extending upwardly from the base wall and the motor shaft extending downwardly therefrom for driving a power take-off disposed below the base wall and interconnected with the ram drive means. The power take-off includes gearing carried by the motor and base member and a chain drive connected between the gearing and the ram drive shafts. More specifically, the invention comprehends providing in such a refuse compactor having a base, a compacting ram, and means carried by the base for driving the ram including a driven sprocket, drive means for driving the driven sprocket including a mounting member, an electric drive motor having an output shaft, means securing the drive motor to the mounting member, a drive sprocket rotatably carried by the mounting member, means for driving the driver sprocket from the motor shaft, a chain interconnecting said driver sprocket and the driven sprocket for driving the ram as an incident of rotation of the motor shaft, and means for adjustably securing the mounting member to the compactor base with the driver sprocket aligned with the driven sprocket and providing for adjustment of the tension in the chain between the driver and driven sprockets.

The means for adjustably securing the mounting member to the compactor base herein comprises a plurality of first connecting elements carried by the compactor base, a plurality of slots in the mounting member disposed to align with the threaded connector elements carried by the compactor base, and a plurality of second threaded connector elements engaging the mounting member at the slots and disposed for threaded association with the first threaded connecting elements for adjustably fixedly securing the mounting member to the compactor base.

The drive means structure of the present invention permits a facilitated installation thereof wherein the cabinet is disposed in an inverted position with the base wall uppermost. The drive member, with the motor thereon, is adjustably secured to the base wall with the motor extending downwardly through an opening in the base wall. The chain drive may then be connected from the driver sprocket of the power take-off to the driven sprockets of the ram drive shafts with the chain in a continuous loop form. The adjustment of the mounting member on the base member is utilized to provide the desired tension in the chain. The cabinet may then be returned to the upright position with the drive means disposed at the bottom thereof in the normal arrangement in the operation of the compactor. The drive means of the present invention provides a desired speed reduction from the drive motor with a minimum vertical space requirement. The tension of the chain may be readily adjusted as desired originally in the manufacture of the compactor and subsequently in the maintenance thereof by means of the improved drive mounting member. The drive means is extremely simple and economical of construction while yet providing the highly desirable features discussed above.

BRIEF DESCRIPTION OF THE DRAWING

Other features and advantages of the invention will be apparent from the following description taken in connection with the accompanying drawing wherein:

FIG. 1 is a front perspective view of a refuse compactor having a drive means embodying the invention;

FIG. 2 is a fragmentary rear elevation with lower portions broken away of the lower portion of the compactor showing the drive means;

FIG. 3 is a fragmentary bottom plan view thereof;

FIG. 4 is a fragmentary enlarged vertical section taken substantially along the line 4—4 of FIG. 3; and

FIG. 5 is a fragmentary perspective view of the means for securing the mounting member to the cabinet base wall.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as disclosed in the drawing, a refuse compactor generally designated **10** is shown to include an outer cabinet **11**. Refuse deposited in a drawer **12** of the compactor is compacted by means of a ram **13** which is disposed in the upper portion of the cabinet in an upper, retracted position and which is selectively driven downwardly into the drawer by a power drive including a pair of upright threaded shafts **14** and **15**. As shown in FIG. **3**, the shafts extend downwardly through a base wall **16** extending across the bottom of cabinet **11** with the lower ends of the shafts being journalled in suitable bearing supports **17** and each carrying a driven sprocket **18** below base wall **16**. Rotation of the shafts about the vertical axis thereof imparts a selective downward and upward movement to the ram, depending on the direction of rotation of the shafts, in a manner similar to that disclosed in the above identified Hinkel et al. U.S. Pat. No. 3,537,390, which patent is incorporated by refer-

ence herein as a disclosure of such ram operating means.

As indicated briefly above, the present invention comprehends providing an improved means for effecting the driving rotation of shafts **14** and **15**. More specifically, the present invention comprehends providing a mounting member **19** in the form of a plate having a central opening **20**. The electric drive motor **21** is mounted on a depressed central portion **22** of the mounting plate by means of suitable resilient grommets **23** and securing nuts **24** threaded to depending screws **25** on the motor **21**. The motor drive shaft **26** extends downwardly through mounting plate opening **20** and carries at its lower end a drive gear **27** which is disposed below the mounting plate (as shown in FIG. **4**) for meshed engagement with a driven gear **28** rotatably journalled on a stub shaft **29** depending from the mounting plate **19**. Gear **28** includes a hub **30** and a driver sprocket **31** for driving a chain **32** trained around the ram drive shaft sprockets **18**, as shown in FIG. **3**. The location of the motor screw holes **33** relative to the stub shaft **29** may be accurately preselected for accuracy in the disposition of driver gear **27** on motor shaft **26** and driven gear **28** on stub shaft **29**. The integral driven gear **28**, hub **30**, and driver sprocket **31** may be rotatably retained on stub shaft **29** by a suitable retaining ring **34**, as shown in FIG. **4**.

Mounting plate **19** includes a pair of flat edge portions **35** and **36**, each of which is provided with a pair of aligned slots **37** for use in adjustably positioning the mounting plate **19** on the base wall **16**. Referring more specifically to FIG. **5**, the base wall is provided with an opening **38** slightly smaller than the periphery of the mounting plate **19** for facilitated extension of the motor **21** therethrough. The base wall is further provided with a plurality of square openings **39** adjacent the edge of opening **38** disposed in conformity with the arrangement of the slots **37** in mounting plate **19**. Screws **40** having a square shoulder are arranged with the threaded shank portion **41** thereof extending one each through the respective four holes **39** and with the head portion **42** thereof engaging the base wall **16** and the square shoulders engaging square holes **39**. The screws are retained in association with the base wall by means of spring clips **43** each having an upper leg portion **44** having a bifurcated end **45** straddling the screw shank **41**, and an opposite concave leg **46** abutting the screw head **42**. The spring clip effectively defines a U-member extending about the edge of the base wall defining opening **38** and may be installed in association therewith by simple lateral movement thereof over the edge of opening **38** subsequent to the insertion of the screw **40** through the opening **39**. The mounting plate **19** is secured to the base wall **16** by passing of the screw shanks **41** upwardly through the slots **37** permitting the mounting plate to be fixedly retained in association with the base wall by means of a suitable nut **47** and friction washer **48**. Alternately, nut **47** and friction washer **48** may be replaced by a self-locking nut of the type generally available. The elongated slots **37** permit an adjustable positioning of the mounting plate **19** on the base wall so that chain **32** may be readily installed and the tension thereof adjusted by suitable positioning of the mounting plate over the screws **40**. The drive may be then readily secured in the adjusted position by the suitable tightening of nuts **47** against the mounting plate edge portions **35** and **36** to complete the installation of the ram drive means.

As shown in FIG. **4**, the base wall **16** of cabinet **11** defines a downturned edge **49**. An upstanding frame structure **50** is carried on the base wall **16** to receive thereacross the cabinet **11** where the refuse compactor is a free-standing refuse compactor, as shown in FIG. **1**. Where the compactor is an under-the-counter compactor, the outer cabinet **11** may be omitted. The frame **50** is secured to flange **49** by suitable means, such as welding **51**. Downturned edge **49** defines a drive space **52** in which the drive gear **27**, driven gear **28**, sprockets **18**, **31**, and **32** are disposed above the lowermost distal edge **53** of the cabinet sidewall at the bottom of flange **49**. As further shown in FIG. **4**, levellers **54** may be threaded to the base wall for permitting levelling of the cabinet **11** as desired. As shown in FIG. **2**, base wall **16** carries, in the space **55** thereabove, suitable roller guide means **56** for movably carrying the drawer **12** forwardly of the motor **21** with the forward end of the space **55** being closed by an upright wall **57** rearwardly of the drawer **12** in the retracted, or compacting, position thereof within cabinet **11**. Thus the mounting plate **19** effectively carries the drive motor **21** in space **55** superjacent the base wall **16** and the drive gear, sprockets, and chain in space **52** subjacent the base wall for facilitated installation and maintenance.

As the drive motor and drive gears are mounted as a unit on the mounting plate, installation of the drive means is facilitated. Thus, the frame **50** may be inverted so as to dispose the base wall **16** uppermost permitting the drive assembly to be installed thereon by mounting the threaded shafts **14**, **15** together with bearing supports **17** and sprockets **18**, then by movement of the drive motor secured to the mounting plate downwardly through the opening **38** in the base wall with the mounting plate being secured to the base wall by means of the screws **40** and nuts **47**, as illustrated in FIG. **5**. Screws **40** are retained in upstanding relationship to the base wall **16** at this time by the clips **43**. The chain **32** is then installed around sprockets **18** and **31** and the mounting plate **19** positionably adjusted by virtue of the movement permitted by slots **37** relative to screw shanks **41** to provide the desired tension in chain **32**. The nuts **47** may then be tightened to fixedly secure the drive assembly in the compactor in the adjusted position. The frame **50**, with the drive now fully installed therein, may be then returned to the upright position for completion of assembly and for installation of the cabinet **11** thereon, if desired, as discussed above.

Servicing of the drive means is facilitated by virtue of the fully accessible arrangement of the drive means, as best seen in FIG. **3**. Thus, in servicing the drive, the user need merely invert the compactor so as to once again place the drive means in the uppermost position for free accessibility to all portions thereof as desired.

By virtue of maintaining the fixed centers of the gears **27** and **28**, improved accuracy in the power transmission to the sprocket and chain drive is maintained.

As the clips **43** may be retained in place on the base wall with the legs **44** disposed between the base wall and the mounting plate portions **35** and **36**, removal of the nuts **47**, such as in removing the motor drive portion of the structure, does not affect the retention of the screws on the base wall notwithstanding the inverted disposition of the frame during such servicing. Further, by utilization of the gear power take-off

means, a speed reduction to the chain sprocket **31**, such as a reduction of 6-to-1, is readily obtained with minimum cost. The entire power drive between the motor shaft **26** and ram drive shafts **14** and **15** may have effectively minimum vertical dimension for simplified installation in the compactor while yet providing accurate laterally spaced relationships between the elements of the drive for facilitated accessibility as discussed above.

The foregoing disclosure of specific embodiments is illustrative of the broad inventive concepts comprehended by the invention.

We claim:

1. In a refuse compactor having a base, a compacting ram, and means carried by the base for driving the ram including a driven sprocket, drive means for driving the driven sprocket comprising: a rigid mounting member; an electric drive motor having an output shaft; securing means securing the drive motor to said mounting member; a driver sprocket rotatably carried by said mounting member for rotation about an axis having a fixed spaced relationship to the axis of said shaft; means for driving said driver sprocket from said motor shaft; means interconnecting said driver sprocket and the driven sprocket for driving the ram as an incident of rotation of the motor shaft; and adjustable means for adjustably securing said mounting member to the compactor base with said driver sprocket laterally aligned with and adjustably spaced from said driven sprocket and providing for adjustment of the tension in said interconnecting means between said driver and driven sprockets without affecting the spaced relationship between said driver sprocket axis and shaft axis and thereby concurrently maintaining accurately the relationship of said means for driving said driver sprocket to each of said shaft and driver sprocket.

2. The refuse compactor means of claim **1** wherein said means for driving said driver sprocket from said motor shaft comprises a speed reduction means

3. The refuse compactor means of claim **1** wherein said means for driving said driver sprocket comprises a driver gear on said motor shaft and a larger driven gear coaxially fixed to said driver sprocket and meshing with said driver gear.

4. The refuse compactor means of claim **1** wherein the compactor base comprises a horizontal wall defining a superjacent space and a subjacent space, said motor securing means disposing said motor in said superjacent space with said output shaft projecting downwardly through said mounting member into said subjacent space, said sprockets and interconnecting means being disposed in said subjacent space.

5. The refuse compactor means of claim **1** wherein a stub shaft is fixed to said mounting member and rotatably coaxially carries said driver sprocket and a portion of said means for driving said driver sprocket from said motor shaft.

6. The refuse compactor means of claim **1** wherein said means for driving said driver sprocket from said motor shaft comprises a driver gear on said motor shaft, and a driven gear coaxially fixed to said driver sprocket and drivingly connected to said driver gear.

7. The refuse compactor means of claim **1** wherein said motor securing means comprises resilient mounting means.

8. In a refuse compactor having a base, a compacting ram, and means carried by the base for driving the ram including a driven sprocket, drive means for driving the driven sprocket comprising: a rigid mounting member; an electric drive motor having an output shaft; securing means securing the drive motor to said mounting member; a driver sprocket rotatably carried by said mounting member for rotation about an axis having a fixed spaced relationship to the axis of said shaft; means for driving said driver sprocket from saidmotor shaft; a chain interconnecting said driver sprocket and the driven sprocket for driving the ram as an incident of rotation of the motor shaft; a plurality of first threaded connector elements carried by the compactor base; a plurality of slots in said mounting member disposed to align with said threaded connector elements carried by the compactor base; and a plurality of second threaded connector elements engaging said mounting member at said slots and disposed for threaded association with said first threaded connector elements for adjustably fixedly securing said mounting member to the compactor base with said driver sprocket aligned with and adjustably spaced from said driven sprocket and providing for adjustment of tension in said chain between said driver and driven sprockets without affecting the spaced relationship between said driver sprocket axis and shaft axis and thereby concurrently maintaining accurately the relationship of said means for driving said driver sprocket to each of said shaft and driver sprocket.

9. The refuse compactor means of claim **8** wherein said first threaded connecting elements comprise screws retained on the compactor base and extending through said slots and said second threaded connecting elements comprise nuts threaded to said screws laterally of said drive motor shaft.

10. The refuse compactor means of claim **8** wherein said first threaded connecting elements comprise screws retained on the compactor base and extending through said slots, said second threaded connecting elements comprise nuts threaded to said screws laterally of said drive motor shaft, and means are provided for retaining said screws on the compactor base prior to the threading of said nuts thereto with the shanks of the screws projecting from the base for passage through said mounting member slots.

11. The refuse compactor of claim **10** wherein the compactor base defines an opening, said mounting member extending transversely across said opening, and said screw retaining means comprising U-clips straddling the edge of said opening and having a leg portion received between the base and mounting member.

12. The refuse compactor of claim **10** wherein the compactor base defines an opening, said mounting member extending transversely across said opening, and said screw retaining means comprising U-clips straddling the edge of said opening and having a first leg portion received between the base and mounting member and a second leg portion abutting the head of the screw to preclude axial withdrawal of the screws from the compactor base.

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