

[54] **COMPACTOR APPARATUS**
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 Harbor, Mich.

[22] Filed: **Sept. 4, 1973**

[21] Appl. No.: **394,332**

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Primary Examiner—Billy J. Wilhite
Attorney, Agent, or Firm—Hofgren, Wegner, Allen,
 Stellman & McCord

[52] **U.S. Cl.**..... **100/53; 53/124 B; 141/73;**
 141/390; 100/229 A; 100/289
 [51] **Int. Cl.**..... **B30b 1/18**
 [58] **Field of Search**..... 141/73, 316, 390;
 53/124 B; 100/229 A, 53, 229 R, 289; 220/65

[56] **References Cited**

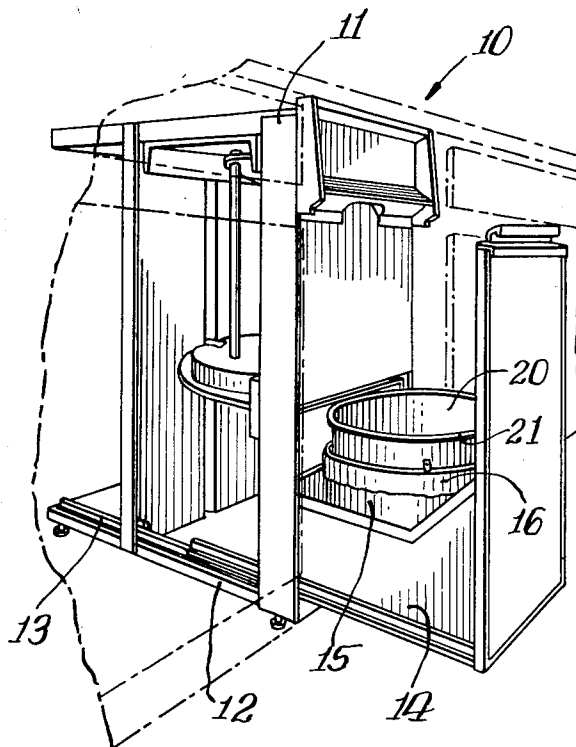
UNITED STATES PATENTS

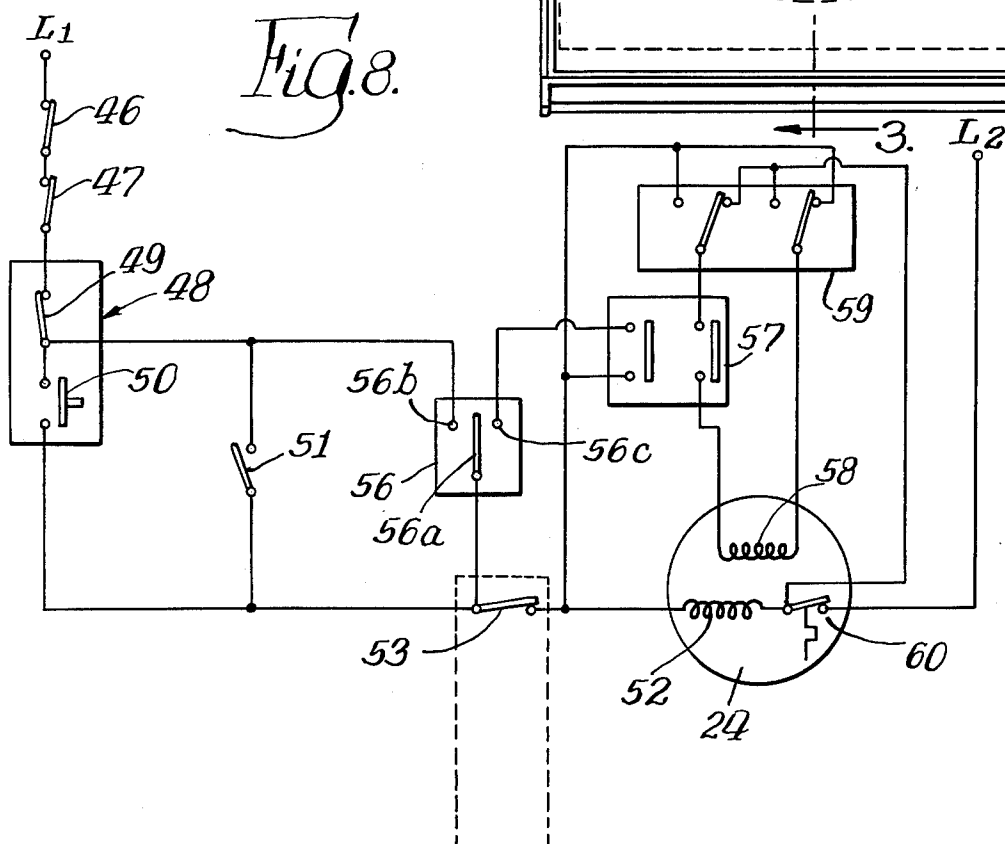
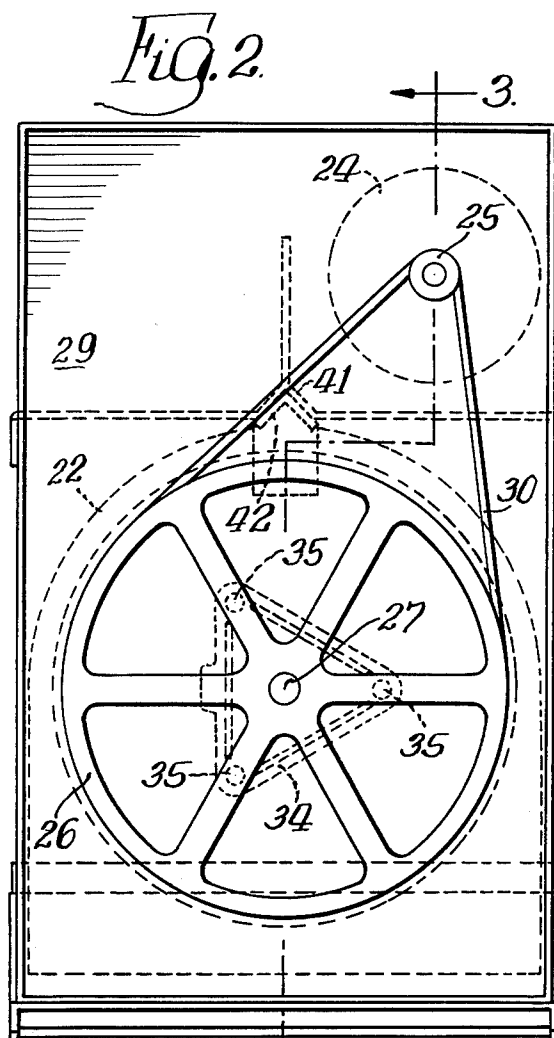
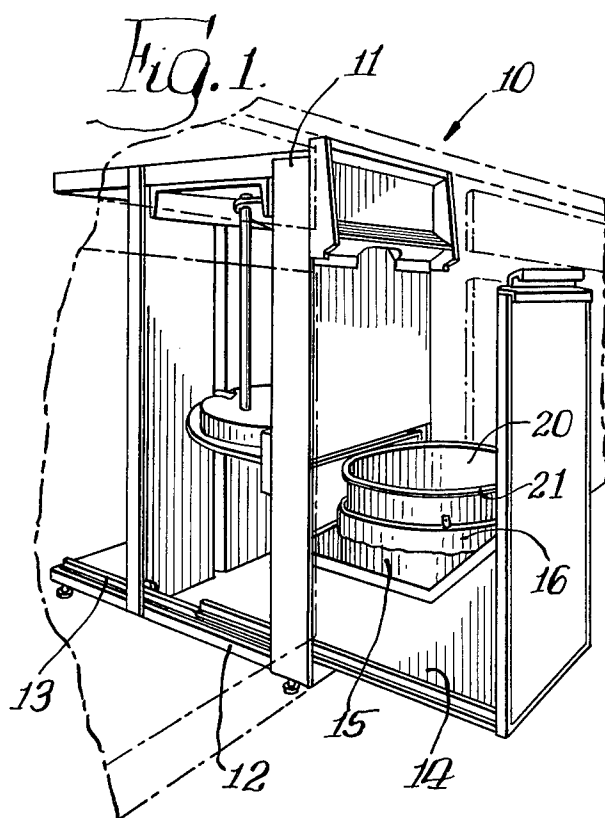
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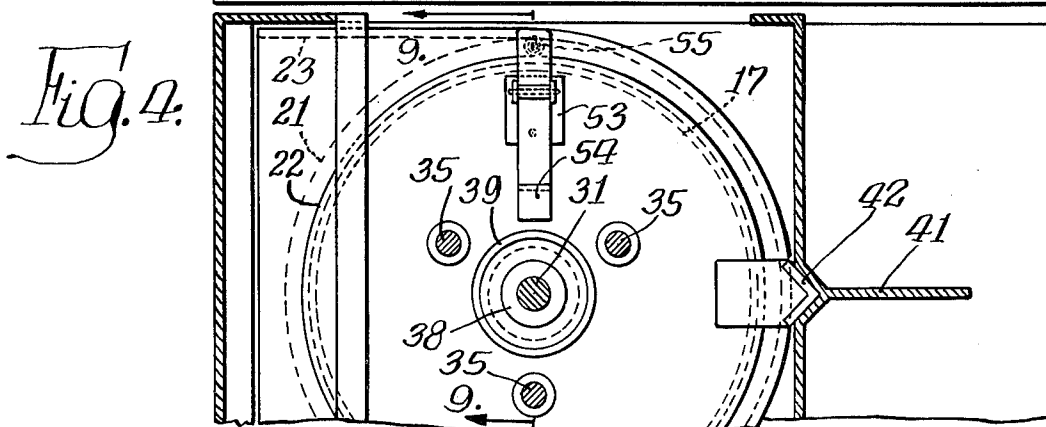
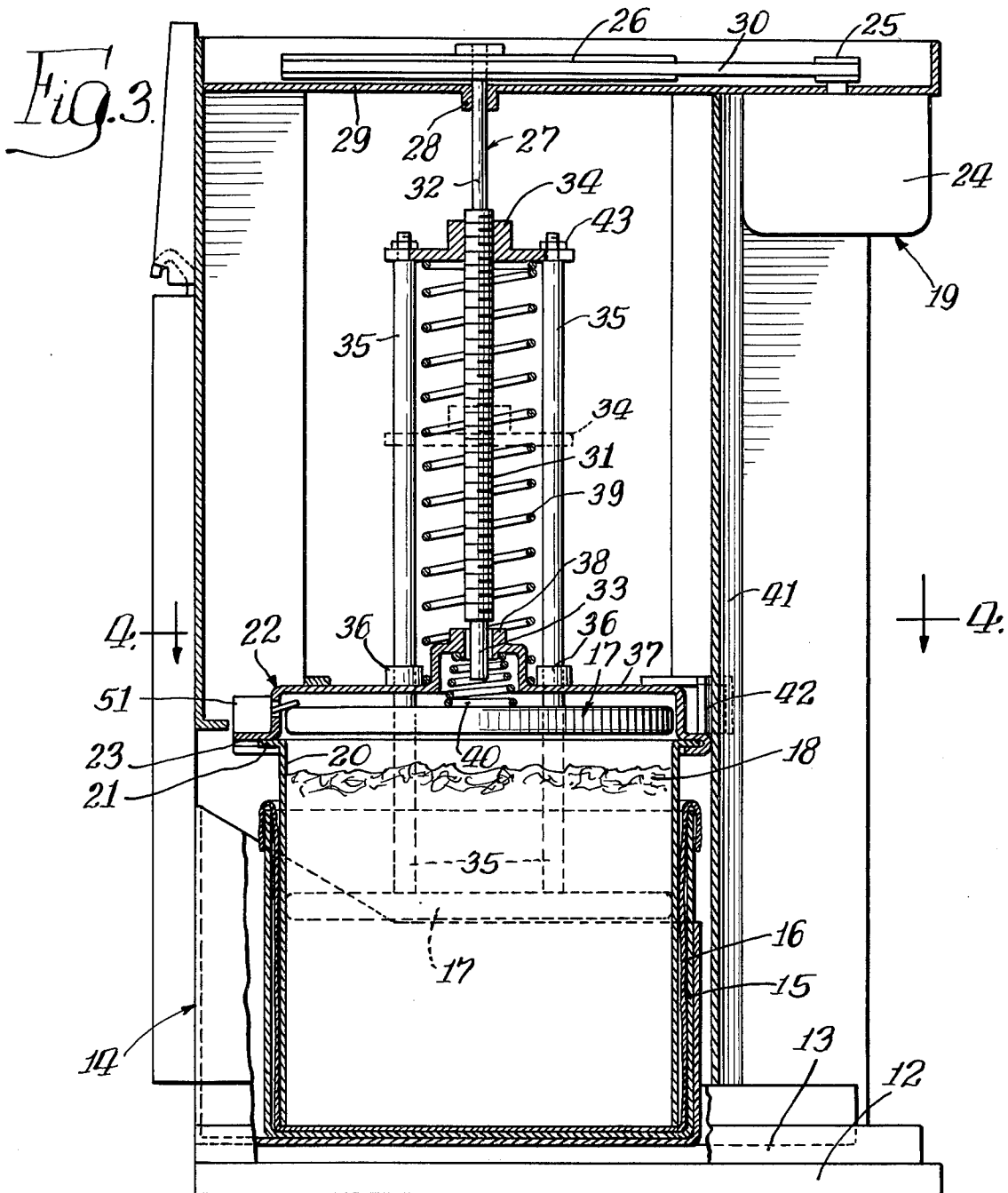
[57] **ABSTRACT**

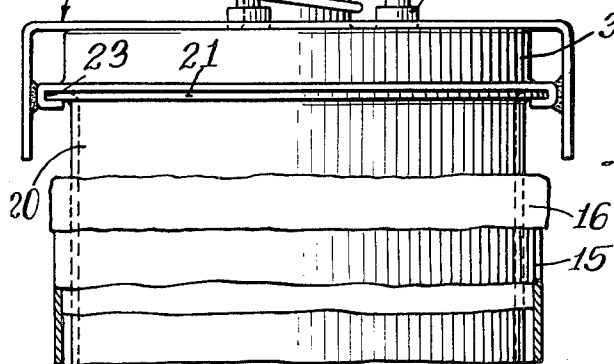
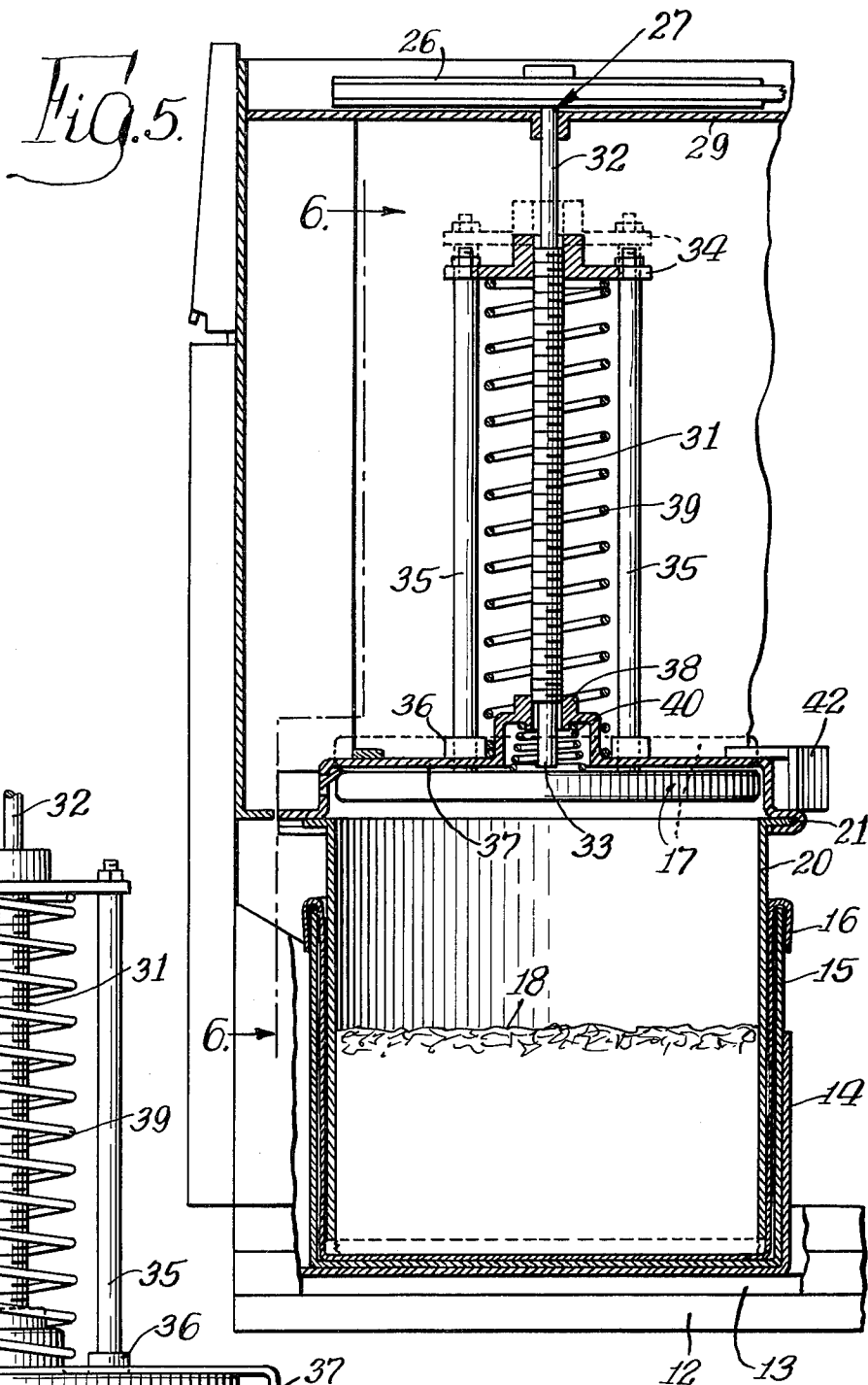
Apparatus for compacting material such as refuse including a sleeve for receiving the refuse to be compacted. The sleeve is used to line the inside of a bag so that upon completion of the compacting operation, removal of the sleeve from the bag leaves the compacted refuse in the bag for disposal as desired. The apparatus includes powered means for compacting the refuse in the bag and for withdrawing the sleeve from the bag.

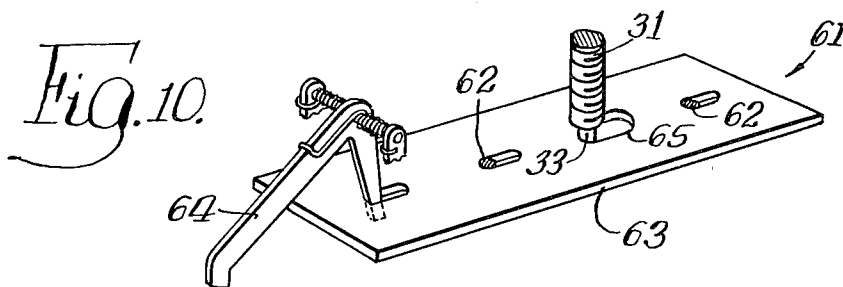
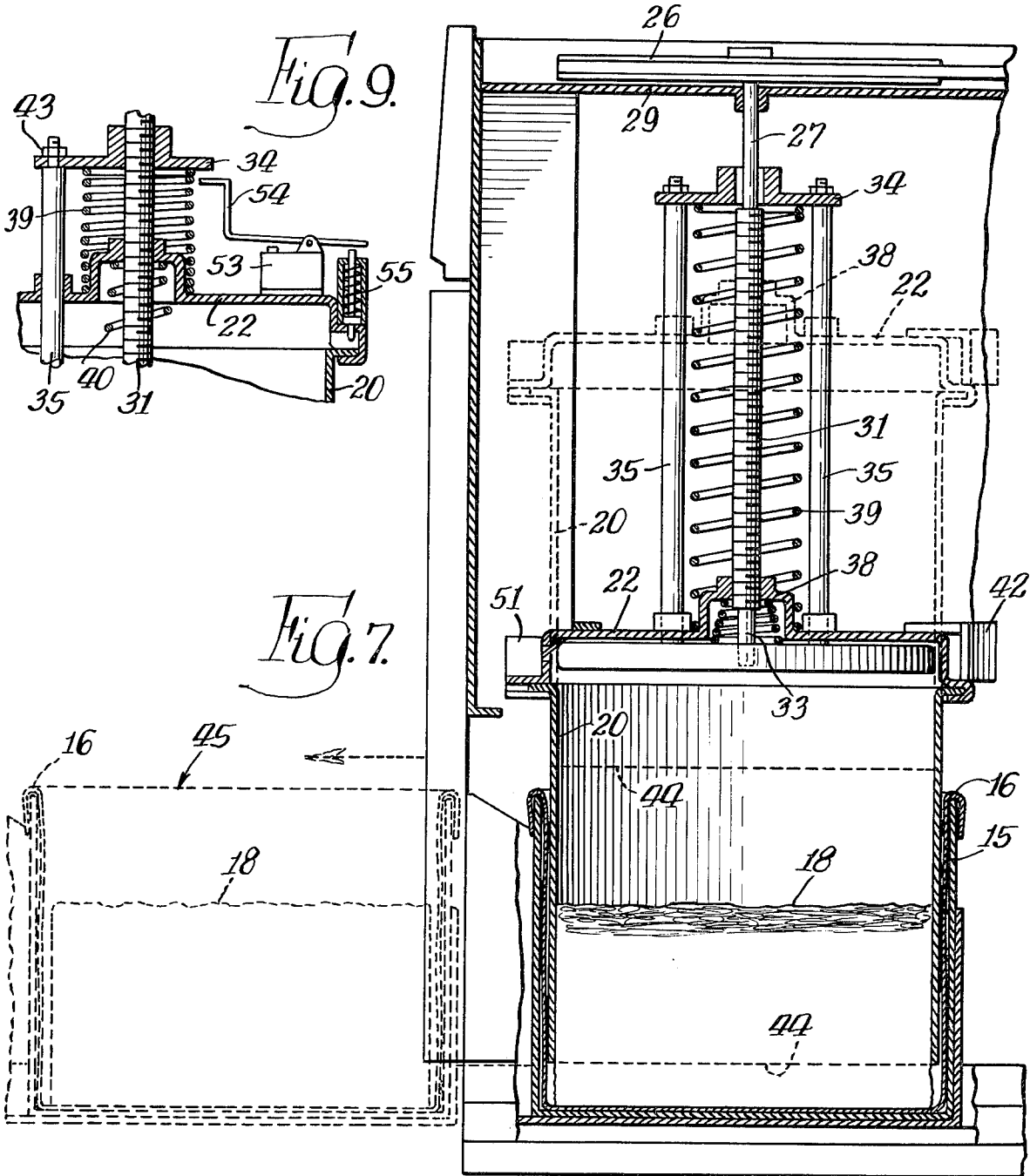
15 Claims, 10 Drawing Figures











COMPACTOR APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to compacting devices, and in particular, to refuse compactors wherein refuse is compacted in a bag for facilitated disposal.

2. Description of the Prior Art

Recently, trash, or refuse, compactors have been developed for household use wherein household trash, or refuse, is placed in a bag carried in a drawer and subsequently effectively compacted within the bag. Thus, a substantial amount of refuse may be so compacted before the bagged refuse is removed from the apparatus and transferred to suitable disposal means.

In such refuse compactors, the compacting of cans and glass bottles tends to tear or cut the bag. As moist materials may also be placed in the compactor, a cut bag may result in a messy condition which may also make removal of the bag from the holder difficult as a result of adhesion caused by the drying of liquid passed therebetween. One solution to the problem has been to provide tough, tear resistant bags capable of effectively resisting the cutting and tearing action of the compacted bottles and cans. Such bags, however, are quite costly and may, nevertheless, sometimes be torn in the normal use of the apparatus so as to not fully prevent the leakage and adhesion problem.

More recently, the use of a liner for the bag to protect the side walls of the bag during the compacting operations has been introduced. Such liners may be formed of tough material, such as plastic, and are inserted into the bag after it is placed in the holder in an open disposition. Upon completion of the compaction of the desired amount of refuse, the user manually withdraws the liner from the bag for reuse. While such liners are subject to cutting and wear, they provide a substantial useful life and, thus, provide an improvement over the use of tear resistant bags in effectively positively preventing the cutting or tearing of the bag while yet being relatively inexpensive per compacting operation because of their extended life.

SUMMARY OF THE INVENTION

The present invention comprehends an improved refuse compactor wherein a sleeve is provided for protecting the bag during the compacting operation and powered means are provided for compacting the refuse in the bag within the sleeve and withdrawing the sleeve from the bag upon completion of compaction of a preselected quantity of refuse.

The bag may be lightweight, and illustratively, may comprise a thin plastic bag which, without the use of the sleeve, would be subject to severe tearing and cutting. The sleeve may be formed of sheet metal so as to effectively preclude cutting or tearing of the bag. The powered means is arranged to hold the sleeve in a withdrawn position during the unloading and bag replacement operations and to insert the sleeve into the replacement bag prior to the introduction of refuse thereinto. The powered means further is arranged to withdraw the sleeve from the bag after the compaction of the preselected amount of refuse and to hold it in the retracted position to permit withdrawal of the bagged refuse.

In the illustrative embodiment, the bag holder comprises a horizontally movable drawer whereby refuse is

introduced into the lined bag in a forward, exposed position. Upon moving of the drawer to the closed position underlying the ram, the ram is disposed for movement into the bag to compact the refuse therein. Thus, during the movement of the drawer between the compacting position within the apparatus and the refuse-receiving, exposed position upwardly of the apparatus, the sleeve is retained in the bag. When, however, the user wishes to dispose of the bagged refuse, the powered apparatus is operated to withdraw the sheath from the bag as discussed above.

In the illustrated embodiment, the holder and bag are circular in cross section, it being obvious that any suitable cross section may be utilized. The control for the powered means automatically effects the above discussed operation in a novel and simple manner.

Thus, the refuse compactor of the present invention is extremely simple and economical of construction.

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 perspective view of a refuse compactor embodying the invention illustrated as installed in a kitchen counter shown in broken lines;

FIG. 2 is a top plan view of the compactor;

FIG. 3 is a vertical section taken substantially along the line 3—3 of FIG. 2, showing the ram in the compacting position in dotted lines;

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

FIG. 5 is a fragmentary vertical section similar to that of FIG. 3, but with the apparatus arranged as at the beginning of a sleeve withdrawal;

FIG. 6 is a fragmentary vertical section taken substantially along the line 6—6 of FIG. 5;

FIG. 7 is a fragmentary vertical section similar to that of FIG. 3 but with the sleeve disposed in a partially withdrawn position in full lines and a fully withdrawn position in dotted lines and with the drawer shown in exposed bag-removing position in dotted lines;

FIG. 8 is a schematic wiring diagram of the control circuit of the apparatus;

FIG. 9 is a fragmentary vertical cross section illustrating a portion of the control including means for preventing operation of the compactor in the event of improper insertion of the sleeve into the container; and

FIG. 10 is a perspective view of a control mechanism for use in latching the head.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In the exemplary embodiment of the invention as shown in the drawing, a refuse compactor generally designated 10 is shown to comprise a frame 11 having a base 12 provided with suitable tracks 13 for movably guiding a drawer 14 for movement between an exposed position shown in FIG. 1 and a closed, compacting position as shown in FIG. 3. The drawer includes a bag holder 15 which removably receives a refuse holding bag 16.

As shown in FIG. 3, a ram 17 is movable downwardly into the open bag for compacting refuse 18 which is placed therein when the drawer is in the open position. The ram is withdrawn to a retracted position, as shown in full lines in FIG. 3, upon completion of each com-

packing operation to permit the movement of the drawer to the open position of FIG. 1 for receiving further refuse as desired. The apparatus includes powered drive means 19 for effecting the desired drive of the ram.

The invention further comprehends providing a sleeve 20 means for lining bag 16 during the compacting operation to effectively protect the bag against cutting, tearing, abrasion, etc., during the compacting operation. Sleeve 20 permits the bag to be an extremely lightweight, thin bag such as a conventional thin plastic garbage bag which is commercially available at low cost.

The invention comprehends providing in the powered means 19 means for selectively disposing the sleeve in an upper retracted position about the withdrawn ram, as shown in dotted lines in FIG. 7, or disposing the sleeve in bag-lining disposition as shown in FIG. 1. Sleeve 20 includes an outturned flange 21 which defines means for cooperation with a head member 22 for moving the sleeve between the inserted and retracted positions as best illustrated in FIG. 7. Head 22 defines a forwardly opening slot 23 through which flange 21 may move horizontally between the compacting position of FIG. 3 and the exposed position of FIG. 1.

More specifically, powered means 19 includes an electric drive motor 24 provided with an output pulley 25. A driven pulley 26 is fixed to a shaft 27 journaled in a bearing 28 in the top wall 29 of the apparatus frame 11. Pulley 26 is driven from pulley 25 by means of a belt 30 to effect rotation of shaft 27 reversibly under the control of motor 24.

Shaft 27 includes a central threaded portion 31, an upper unthreaded portion 32, and a lower unthreaded portion 33. A nut member 34 is threaded to mid-portion 31. Three rods 35 extend downwardly from nut member 34 and slidably through corresponding slide portions 36 in the top wall 37 of the head 22 to engage ram 17.

Head 22 further defines a nut portion 38 selectively concentrically surrounding lower shaft portion 33 and adapted to threadedly engage threaded shaft portion 31 in the sleeve moving disposition as will be brought out more fully hereinafter. A first coil spring 39 extends between nut member 34 and head wall 37 and a second coil spring 40 extends between ram 17 and nut portion 38 of head 22.

The frame includes a vertical angle guide 41 at the rear thereof and head 22 includes a guide member 42 which slides on guide 41 and prevents rotation of the head about the vertical axis of shaft 27 during the threading and unthreading operations. Rods 35 are secured to nut member 34 by suitable means such as screws 43 for movement of the screws and ram with nut member 34.

Movement of nut member 34 is effected by rotation of shaft 27. In one direction of rotation, the nut member is caused to move downwardly along the threaded portion 31 to compact refuse 18 previously deposited in bag 16, as shown in dotted lines in FIG. 3. Reverse rotation of shaft 27 causes nut member 34 to move up along the threaded portion 31 to the retracted position shown in full lines in FIG. 3 wherein the ram is above bag holder 15 and sleeve 20 permitting the drawer to be moved to the open position of FIG. 1 with the sleeve maintained in the bag 16 for receiving further refuse as

desired. Spring 39 cooperates with a latch mechanism 61 to maintain head 22, as shown in FIG. 3, with the nut portion 38 below the threaded portion 31 during the compacting cycles.

When the preselected amount of refuse has been compacted in bag 16, automatic withdrawal of sleeve 20 from the bag is effected for facilitated disposal of the bagged refuse. In the sleeve withdrawal operation, ram 17 is raised above the normal retracted position of FIG. 3 to the position of FIG. 5 whereby spring 40 is compressed sufficiently to overcome spring 39 and urge nut portion 38 onto threaded portion 31. Continued rotation of shaft 27 in this direction causes nut member 34 to ride off the upper end of threaded portion 31 onto unthreaded portion 32. Further continued rotation causes nut portion 38 to ride up on threaded shaft portion 31 raising head 22 and carrying the sleeve 20 with it as a result of the interengagement between flange 21 of the sleeve and slot portion 23 of head 22. The upward movement continues until the lower end 44 of sleeve 20 is disposed above the upper end of the bag holder 15 and bag 16, as shown in FIG. 7, whereupon movement of the drawer to the exposed forward position provides access to the bagged refuse generally designated 45 as shown in FIG. 7 for removal from the apparatus and disposal as desired.

Upon placement of a new bag 16 in the bag holder drawer 15, the drawer may then be returned to the compacting position whereupon head 22 is lowered by reverse rotation of shaft 27 to cause nut portion 38 to move downwardly along shaft portion 31 and back to the lower portion shown in FIG. 3 wherein nut portion 38 has run off the lower end of shaft portion 31 onto the unthreaded portion 33. In this arrangement, sleeve 20 is fully inserted into the bag for a new cycle of compaction in apparatus 10.

Referring now to FIG. 8, the apparatus may include conventional safety switches, such as DRAWER SAFETY switch 46 and KEY LOCK SAFETY switch 47 connected in series from power supply lead L1 to the manually operable START-STOP control switch 48. Control switch 48 includes a STOP switch 49 and a START switch 50. A single pole switch 51 may be connected in parallel with START switch 50 to define selectively a RAM TOP LIMIT switch or DRAWER TILT switch as desired. START switch 50 is connected in series with the run winding 52 of motor 24 through a normally closed RAM BOTTOM LIMIT switch 53 which is mounted on head 22 as shown in FIG. 9. Switch 53 includes an operator 54 which engages the nut member 34 to open the switch. A spring biased plunger 55, also mounted on head 22, engages the opposite end of operator 54. Plunger 55 causes operation of switch 53 in the event that sleeve 20 is obstructed in being inserted into the bag and holder during a bag replacement operation.

A single pole, double throw switch 56 is connected in parallel with START switch 50 and effectively defines a "mode" switch. Thus, switch 56 includes a moving contact 56a which, when closed with a first fixed contact 56b, arranges the control in a condition for removing or inserting the sleeve, and when in contact with a second fixed contact 56c, arranges the control for compacting operation. Conventional motor centrifugal switch 57 is mounted on motor 24 and is connected to the start winding 58 of the motor for controlling the starting operation thereof in the normal man-

ner. A directional switch 59 provides for directional control of the motor rotation by selectively switching the start winding 58 in the normal manner. Switch 59 effects an automatic reversal of the connections to the start winding when the ram reaches either the top or bottom of its stroke. Motor 24 may further be provided with an overload protector switch 60 connecting the motor to the other power supply lead L2 to complete the circuit.

To insert sleeve 20 in the automatic operation of apparatus 10, mode switch 56 is manually positioned to cause moving contact 56a to engage fixed contact 56c. The START switch 50, which may comprise a manually operable pushbutton, is then depressed whereupon motor 24 is energized so as to rotate the shaft 27 suitably to lower head 22 from the upper retracted position thereof, as shown in dotted lines in FIG. 7, and thereby move the sleeve 20 downwardly into the bag 16 held on the holder 15. Upon energization of motor 24, switch 53 is closed by nut member 34 and RAM TOP LIMIT switch 51 is then closed to provide a holding circuit to the motor about START switch 50.

As shown in FIG. 10, a latch mechanism generally designated 61 may be attached to the bottom of the head 22 by pins 62. Mechanism 61 includes a plate 63 and a torsion spring biased latch lever 64. Plate 63 has an opening 65 through which shaft 27 passes freely whereby plate 63 may move up and down with respect to the shaft. When head 22 moves down so as to position threaded nut portion 38 below threaded portion 31 of the shaft, latch lever 64 moves plate 63 laterally, whereby the opening 65 is displaced transversely to the axis of shaft 27 sufficiently to cause the edge of the opening to underlie threaded portion 38 so that nut portion 38 can no longer move upwardly. Thus, head 22 is maintained in the position of FIG. 3 during normal operation of the compactor.

When the sleeve is fully inserted into the bag, continued rotation of motor 24 causes nut member 34 to move down on threaded portion 31 until nut member 34 engages switch actuator 54 to open switch 53. This causes reversal of motor 24 to raise the ram back to the full line position of FIG. 3 whereupon the compactor is ready for the normal cycle of trash compaction in bag 16.

To effect normal trash compaction, START switch 50 is pressed whereupon operation of motor 24 causes the downward movement of the nut member 34 and ram 17. When the ram reaches the bottom of its movement, limit switch 53 opens causing reversal of the motor rotation and ram 17 is returned to the retracted uppermost position of FIG. 3.

By setting the mode switch 56 with moving contact 56a in engagement with fixed contact 56b, a sleeve withdrawal operation is effected wherein upward movement of the ram continues notwithstanding the opening of the RAM TOP LIMIT switch 51 at the retracted position of the ram, as shown in FIG. 3, because of the maintained parallel circuit by switch 56. Such continued upward movement of the ram repositions the latch mechanism 61 by engagement with lever 64 to permit the upward movement of nut portion 38 of head 22 onto shaft threaded portion 31 until switch 53 is again opened at the upper end of the travel of head 22.

The bagged refuse may then be removed as discussed above. Should the user inadvertently attempt to operate the apparatus to lower the sleeve before the bagged

refuse is removed, spring biased plunger 55 operates switch 53 to prevent motor operation.

Thus, the present invention comprehends an improved refuse compactor wherein a sleeve is positioned relative to the bag automatically in the operation of the compactor so as to permit facilitated removal of the compacted refuse when desired and replacement of the bag.

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

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. Apparatus for compacting and bagging refuse comprising: means for removably holding a lightweight bag in an upwardly open refuse receiving disposition; a tough sleeve removably lining the inside of the bag; and a single powered means including a ram for compacting refuse in the bag within said sleeve, said powered means being arranged to withdraw the ram from the compacted refuse and subsequently withdraw the sleeve from the bag upon completion of a compaction of a preselected quantity of refuse in the bag effectively without tearing the bag whereby the compacted refuse is retained in said bag substantially solely by the weight thereof as the sleeve is withdrawn.

2. The compacting and bagging apparatus of claim 1 wherein said powered means defines means for moving said from above the open end of the bag downwardly thereto to effect compaction of the refuse in the bag within said sleeve.

3. The compacting and bagging apparatus of claim 1 wherein said powered means defines means for holding the sleeve above the open end of the bag upon withdrawal therefrom to permit horizontal movement from the apparatus of the bag with the compacted refuse therein.

4. The compacting and bagging apparatus of claim 1 wherein said powered means defines means for selectively moving the ram downwardly through the sleeve with the sleeve disposed in lining relationship to the bag to compact refuse in the lined bag, and moving the sleeve and ram upwardly from the bag to a position above the open end of the bag to permit removal of the bagged compacted refuse from the apparatus.

5. The compacting and bagging apparatus of claim 1 wherein said holding means defines a circular horizontal cross section and said bag and sleeve are correspondingly round.

6. The compacting and bagging apparatus of claim 1 wherein said holding means comprises movable means for selectively disposing the bag in a compacting position within the apparatus and an exposed removal position outwardly thereof.

7. The compacting and bagging apparatus of claim 1 wherein said holding means comprises horizontally movable drawer means for selectively disposing the bag in a compacting position within the apparatus and an exposed removal position outwardly thereof.

8. The compacting and bagging apparatus of claim 1 wherein said sleeve includes an engagement portion at its upper end and said powered means includes means for engaging said engagement portion in withdrawing the sleeve from the bag.

9. The compacting and bagging apparatus of claim 1 wherein said sleeve includes an outturned flange por-

tion at its upper end and said powered means includes means for engaging said outturned flange portion in withdrawing the sleeve from the bag.

10. The compacting and bagging apparatus of claim 1 wherein said sleeve is formed of metal.

11. Apparatus for compacting refuse comprising: a tubular sleeve; means defining an end wall; means for disposing the sleeve with one end adjacent the end wall; a ram; means for moving the ram through the sleeve for compacting refuse placed therein; and single powered means for moving the ram to a retracted position spaced from the compacted refuse and subsequently moving the sleeve from about the compacted refuse to about the retracted ram to dispose the sleeve in a withdrawn disposition permitting access to the compacted refuse for withdrawal from the apparatus.

12. The apparatus of claim 11 wherein means are providing for containing the refuse in a bag in the apparatus.

13. The apparatus of claim 11 wherein said powered means defines means for moving the ram away from the compacted refuse to a retracted position following each compacting operation for permitting placement of further refuse in the sleeve for compaction thereof.

14. The apparatus of claim 11 wherein said powered means defines means for moving the ram away from the compacted refuse to a retracted position following compacting operation for permitting placement of further refuse in the sleeve for compaction thereof and said powered means disposes said ram in said retracted position prior to the movement of the sleeve to said withdrawn disposition.

15. The apparatus of claim 11 wherein means are provided for moving the sleeve selectively below a compacting position adjacent the ram and a refuse receiving exposed position spaced from the ram.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,882,771

DATED : May 13, 1975

INVENTOR(S) : EDWIN H. FROHBIETER

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Claim 2, line 30, after "said" insert --ram--.

Signed and Sealed this

tenth Day of February 1976

[SEAL]

Attest:

RUTH C. MASON

Attesting Officer

C. MARSHALL DANN

Commissioner of Patents and Trademarks