May 26, 1959 C. B. GRAVES ET AL 2,888,307

SELF OPENING RECEPTACLE FOR REFUSE AND SOILED ARTICLES

Filed July 16, 1956 2 Sheets-Sheet 1

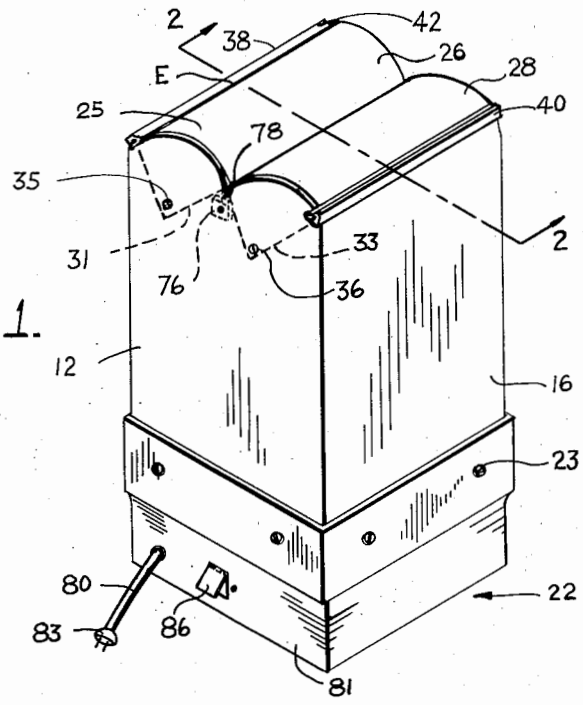

Fig. 1.

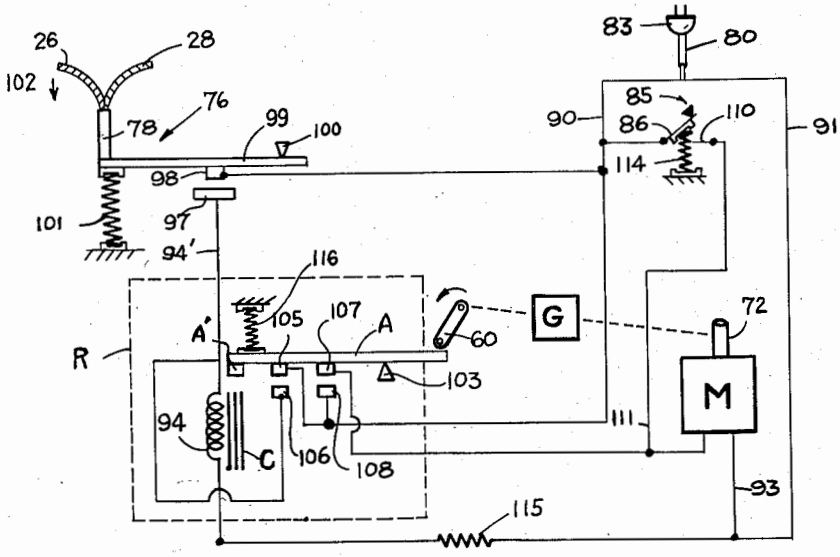

Fig. 5.

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VOLUME DISTRIBUTOR, Ex. 1012
VOLUME DISTRIBUTOR, INC. v. SIMPLEHUMAN LLC, IPR2024-00050

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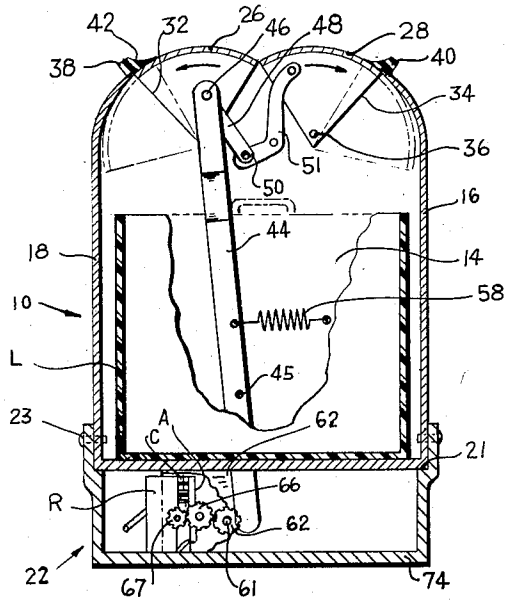

Fig. 2.

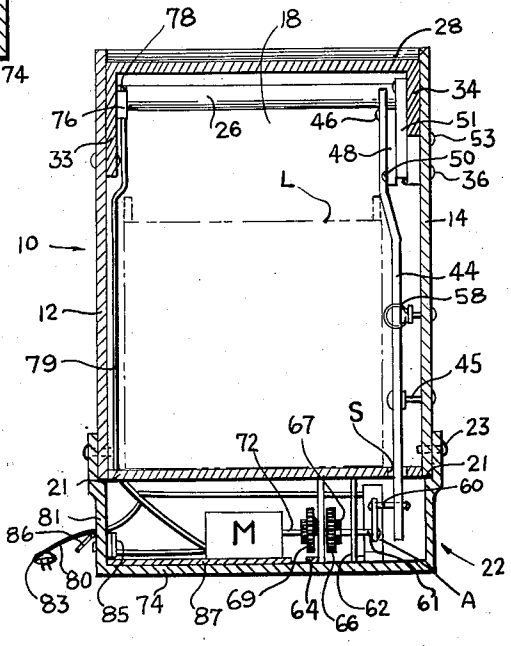

Fig. 3.

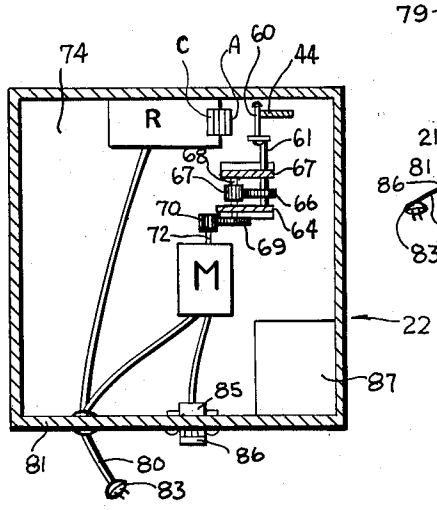

Fig. 4.

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2,888,307

SELF OPENING RECEPTACLE FOR REFUSE AND SOILED ARTICLES

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Application July 16, 1956, Serial No. 597,916

4 Claims. (Cl. 312—211)

This invention relates to the art of receptacles and particularly concerns a self-opening and closing receptacle useful for holding refuse, soiled articles, laundry, and the like.

Heretofore, receptacles and containers used for waste, laundry, etc., have been provided with weighted doors which are either manually or pedally opened or opened by hand or foot operated means such as levers.

In the present invention the doors of the receptacle are automatically opened and closed by electromechanical means actuated by the weight of the articles deposited upon them.

It is therefore a principal object of the invention to provide a receptacle for refuse or other articles, said receptacle having means for automatically opening and closing doors or covers of the receptacle.

It is a further object to provide a container with electromechanical means for opening and closing covers thereof, said means being actuated by the presence of an article on the covers.

It is a further object to provide means for automatically depositing refuse in a container when the refuse is placed on a self-opening closure of the container.

The device embodying the invention is intended to receive waste such as food, trash, etc., in homes, schools factories, hospitals, shops, and other places where a waste receiver is required. The device may resemble a conventional garbage can to some extent in outward appearance. The device is provided with a pair of curved covers pivotally mounted above an electric switch so that when any waste or other article to be deposited in the device is placed on the covers, the covers separate and the waste falls into a removable liner.

The container is provided with scraping means for cleaning the tops of the covers as they pivot open. The electric motor, electrical circuitry and mechanical components which actuate the covers are disposed so that they are not contacted or contaminated by waste deposited on the covers and falling into the liner. Suitable deodorizing means are provided to render the device free of unpleasant odors.

For further comprehension of the invention, and of the objects and advantages thereof, reference will be had to the following description and accompanying drawings, and to the appended claims in which the various novel features of the invention are more particularly set forth.

In the accompanying drawings forming a material part of this disclosure:

Fig. 1 is a perspective view of a receptacle embodying the invention.

Fig. 2 is a central longitudinal view of the device taken on lines 2—2 of Fig. 1.

Fig. 3 is an elevational sectional view taken on lines 3—3 of Fig. 2.

Fig. 4 is a cross-sectional plan view taken on lines 4—4 of Fig. 2.

Fig. 5 is a schematic diagram of the electrical circuitry employed in the device.

In Figs. 1 to 4 is shown a generally cubical hollow container 10 having an open top. The container has side walls 12 and 14, and end walls 16 and 18. The bottom 20 of the container fits snugly on a rectangular ledge 21 formed by the outwardly extending upper sides of a base member 22. This base member is a rectangular hollow container with an open top in which the container 10 is removably disposed. Screws 23 may be used to secure the container 10 to the base 22. Sides 12 and 14 have curved upper sides 25 disposed in a cusp-like arrangement. Pivotally mounted at these edges are a pair of curved doors or covers 26, 28 which serve as a closure for the container 10. These covers extend angularly about 90°. Each cover has a pair of depending vertically disposed lateral walls. Walls 31, 32 are attached to cover 26 and walls 33, 34 are attached to cover 28. The covers pivot on pins 35, 36 respectively mounted in the side walls 12 and 14. Elongated flexible rubber or plastic scrapers 38, 40 are disposed transversely across the upper curved edges of walls 18 and 16, respectively. These scrapers are generally wedge-shaped and have upper curved sides 42 which taper to fine edge E and serve to scrape the upper surfaces of the covers cleans when they pivot open. A removable plastic or paper liner L is shown disposed in the container 10 beneath doors 26, 28 in Fig. 2. The liner is shown in dotted lines in Fig. 3.

In order to pivot the doors open and closed there is provided a lever 44. This lever is pivotally mounted on a pin 45 attached to wall 14. The lever is pivotally attached near its upper end to a pin 46 which pivotally joins wall 32 and link 48. Link 48 is attached pivotally at its lower end by pin 50 to a bell crank lever 51. The crank lever is pivotally attached to wall 14 by pivot pin 53. At its upper end the crank 51 is pivotally attached by pin 56 to wall 34 of the closure 28. A coil spring 58 has one end attached to an intermediate point on lever 44 and the other end attached to wall 14. This spring assists in restoring the lever 44 to the position shown in Fig. 2 after the doors are opened. The lower end of the lever 44 is disposed to be contacted by a rotatable crank 60 located in the base 22. The lever 44 passes through a slot S in the bottom 20 of container 10. The crank 60 is carried on a rotatable shaft 61 supported in journal plates 62 and 64. A spur gear 66 is mounted on shaft 61 and is engaged by a pinion gear 67 mounted on shaft 68 which is also journalled in plates 62, 64. A spur gear 69 is mounted on the end of shaft 68 and is engaged by pinion gear 70 mounted on the end of the motor shaft 72. The motor M which is of conventional type, is mounted on the floor 74 of the base 22. Plates 62 and 64 have lower flanges by which the plates are secured to floor 74. Relay R having a stationary core C and pivotally mounted armature A is disposed so that the crank 60 contacts the lower end of the armature at one point during rotation of the crank. A portion of the plate 62 is broken away in Fig. 2 to show the disposition of the relay components.

A plunger type normally open switch 76 is mounted on wall 12. This switch has an upwardly extending contact finger or button 78. The inner contacting ends of the covers 26 near wall 12 are disposed just above contact finger 78 so that any weight placed on the covers causes them to touch the contact finger and close the switch 76. An insulated electrical cord 79 extends from switch 76 to relay R and power cable 80. The power cable extends through vertical wall 81 of base 22. This cable terminates at one end in a plug 83 and at the other end in relay R and motor M. The details of the electrical

VOLUME DISTRIBUTOR, Ex. 1012
VOLUME DISTRIBUTOR, INC. v. SIMPLEHUMAN LLC, IPR2024-00050

connections are shown in Fig. 5 and are described more fully below. A foot operated switch 85 is mounted on wall 81. This switch has a pedal or movable contact 86 extending out from wall 81. This switch is electrically connected to motor M and the power cord 80. A cloth pad 87 impregnated with a suitable deodorant is located on the floor 74 of the base. The volatile deodorant seeps through slot S to deodorize the chamber in which the liner L is disposed.

In Fig. 5 is shown the power cord 80 which consists of two electrical wire conductors 90, 91. Wire 91 is connected to wire 93 which terminates at motor M. Wire 91 is also connected to one terminal of relay coil 94 via a voltage dropping resistor 115. The relay has a soft iron core C which is magnetizable by the coil 94 when it is energized. The other end of the coil 94 is connected by wire 94' to stationary contact 97 of switch 76. The movable contact 98 is mounted on an insulated bar 99 pivoted at 100 and biased away from contact 97 by spring 101. Contact finger 78 is mounted on bar 99 and is disposed so that either or both of the cover members 26, 28 may close the switch as indicated by arrow 102.

Armature A of the relay R is a lever bar pivoted at point 103 so that crank 60 can open the contacts 105, 106 and 107, 108 at one point in its rotation. Armature A is an insulated rod or bar carrying an armature element A' of magnetizable material for attraction to core C. Contacts 105 and 107 are carried on bar A. Stationary contact 106 is connected by a wire to wire 94' and contact 97. Stationary contact 108 is connected to contact 105 and to power wire 90. Wire 90 is also connected to movable contact 98 by wire 109. Foot switch 85 has its movable pedal contact 86 connected to wire 90 and its stationary contact 110 is connected by wire 111 to motor M. Contact 107 is also connected to motor M. Crank 60 is operatively connected to motor shaft 72 by a reducing gear train G which consists of the gears 66, 67, 69, 70 shown in Figs. 2, 3 and 4. Spring 116 is connected to armature bar A and serves to hold contacts 105, 106 and 107, 108 open except when coil 94 is energized.

In operation, the covers 26, 28 are normally closed. When any waste material, article of laundry or the like is placed on the covers they lower slightly by bending at their inner edges to move the plunger or finger 78 and close contacts 97, 98. The plug 83 should be connected to a suitable power source. Then electrical energy will be supplied to coil 94 through contacts 97, 98 so that the armature A' is attracted to core C. This causes contacts 107, 108 to close and energy is applied to the motor to rotate shaft 72. The motor causes the crank 60 to rotate via the gear train G to pivot lever 44 which swings cover 26 to the dotted line open position shown in Fig. 2. At the same time cover 28 is swung to the dotted line open position via link 48 and bell crank lever 51. The waste material on the covers then falls into the liner L. Any material remaining on the covers is scraped off by scrapers 38, 40 as the covers open. As the covers 26, 28 begin to open the contact with plunger 78 is removed and switch 76 opens. This will not affect the power supply to motor M since the contacts 107, 108 will remain closed because the self-sealing circuit of coil 94 is now energized via the closed contacts 105, 106. When the crank 60 rotates about 180° it loses contact with lever 44 which is restored to its normal upright position by spring 58 to close covers 26, 28. The crank 60 now reaches and pivots the free end of armature bar A to open the contacts 105, 106 and 107, 108 so that the motor circuit is broken and the relay becomes de-energized.

The motor armature (not shown) continues rotating by its own inertia a short time after the circuit is broken just long enough to rotate the crank 60 to a position near to or touching lever 44 so that the mechanism is in a condition to open the covers or doors 26, 28 the next time any pressure is placed on them. Switch 85 provides a means to open the doors without utilizing switch 76, so that the liner L may be removed and access may be had to the interior of container 10. When switch contacts 86, 110 are closed, the motor is energized via wires 90, 111 and 91, 93. Upon release of the movable contact 86 the spring 114 opens the switch. To close the doors after switch 85 is operated it is necessary to cause the crank 60 to rotate until the lever can be restored to its normal upright position by spring 58.

There has thus been provided a self-opening and self-closing receptacle for waste material or any other articles it may be desired to deposit therein without requiring manual or pedal operation as in conventional receptacles for refuse. The operation is wholly automatic and is initiated solely by the weight of the material to be deposited in the receptacle. The receptacle can, of course, be made in various sizes. The shapes of the covers may be varied to suit different types of waste materials. Various types of deodorizing means may be used in the receptacle instead of the deodorant pads 87. The containers 10 and 22 may be made of sheet metal but can be made of suitable plastic materials if desired.

While we have illustrated and described the preferred embodiment of our invention, it is to be understood that we do not limit ourselves to the precise construction herein disclosed and that various changes and modifications may be made within the scope of the invention as defined in the appended claims.

Having thus described our invention, what we claim as new, and desire to secure by United States Letters Patent is:

1. A receptacle for waste articles or the like, comprising a substantially closed container having an open top, a pair of curved covers disposed with adjacent edges abutting and arranged horizontally, said covers being depressible in the open top of the container and being pivotable on horizontal axes, each of said covers having a pair of depending vertical walls, a pair of flexible scrapers disposed transversely across said top to scrape upper surfaces of said covers, a first lever pivotally joined to one wall of one of the covers, a link pivotally joined to said lever, a bell crank lever pivotally joined to said link and a wall of the other of said covers so that both of the covers pivot simultaneously to clear said top when said first lever is pivoted, a hollow base member with an open top and a rectangular ledge, said container being disposed on said base member and resting on said ledge, a motor having a rotatable shaft disposed in said base member, a gear train mechanically connected to the motor, said gear train terminating in a crank, said crank being disposed to rotate and pivot said first lever during rotation of the crank, a relay having a movable armature bar disposed for movement by said crank at a point in the rotation thereof when the crank is out of contact with the first lever, said relay including a fixed and movable contact in electrical circuit with said motor, said movable contact being carried by said bar, said relay including electromagnetic means for pivoting said armature bar, whereby the contact between the fixed and movable contacts is closed when the armature bar is moved magnetically to close said electrical circuit and the armature bar is pivoted by said crank to open said electrical circuit and stop rotation of the motor, and a switch disposed adjacent the covers and actuatable thereby when an article is placed on the covers to depress them into contact with the switch, said switch being in circuit with said relay, whereby the motor is actuated to open and close said covers automatically after said article is placed on the covers.

2. A receptacle according to claim 1, wherein said relay includes self-sealing means, and wherein the relay is energized when said switch is closed and the relay remains energized after said switch is opened.

VOLUME DISTRIBUTOR, Ex. 1012
VOLUME DISTRIBUTOR, INC. v. SIMPLEHUMAN LLC, IPR2024-00050

3. A receptacle for waste articles or the like, comprising a substantially closed container having an open top, a pair of curved covers pivotally mounted at the top of the container, said covers having abutting inner edges depressible by the weight of said articles when placed thereon, a pair of flexible scrapers disposed transversely across said top to scrape upper surfaces of said covers, a first lever pivotally joined to a wall of one of the covers, a link pivotally joined to said lever, a bell crank lever pivotally joined to said link and a wall of the other of said covers so that both the covers pivot simultaneously to open and clear said top when said first lever is pivoted, a rectangular base member having a ledge, said container being disposed on said base member and resting on said ledge, a motor having a rotatable shaft disposed in said base member, a gear train operatively connected to the motor and said first lever for opening said covers, a switch carried by the container and disposed for actuation by the covers when depressed by the weight of said articles, said switch being connected in circuit with said motor, said gear train terminating in a crank, said crank being disposed to rotate and pivot said first lever during rotation of the crank, a relay having a movable armature bar disposed for movement by said crank at a point in the rotation thereof when the crank is out of contact with the first lever, said relay including a fixed and movable contact in electrical circuit with said motor and switch,

said movable contact being carried by said bar, said relay including electromagnetic means for pivoting said armature bar, whereby the contact between the fixed and movable contacts is closed when the armature bar is moved magnetically to close said electrical circuit and the armature bar is pivoted by said crank to open said electrical circuit and stop rotation of the motor, and a spring connected between said first lever and a wall of said container to restore the first lever to an upright position after said crank moves said armature bar.

4. A receptacle according to claim 3, wherein said relay includes self-sealing means, and wherein the relay is energized when said switch is closed and the relay remains energized after said switch is opened.

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VOLUME DISTRIBUTOR, Ex. 1012
VOLUME DISTRIBUTOR, INC. v. SIMPLEHUMAN LLC, IPR2024-00050