Office de la Propriété Intellectuelle du Canada
Un organisme d'Industrie Canada

Canadian Intellectual Property Office
An agency of Industry Canada

CA 2486136 A1 2005/05/06

(21) 2 486 136

(12) DEMANDE DE BREVET CANADIEN
CANADIAN PATENT APPLICATION

(13) A1

(22) Date de dépôt/Filing Date: 2004/10/28

(41) Mise à la disp. pub./Open to Public Insp.: 2005/05/06

(30) Priorité/Priority: 2003/11/06 (10/714,381) US

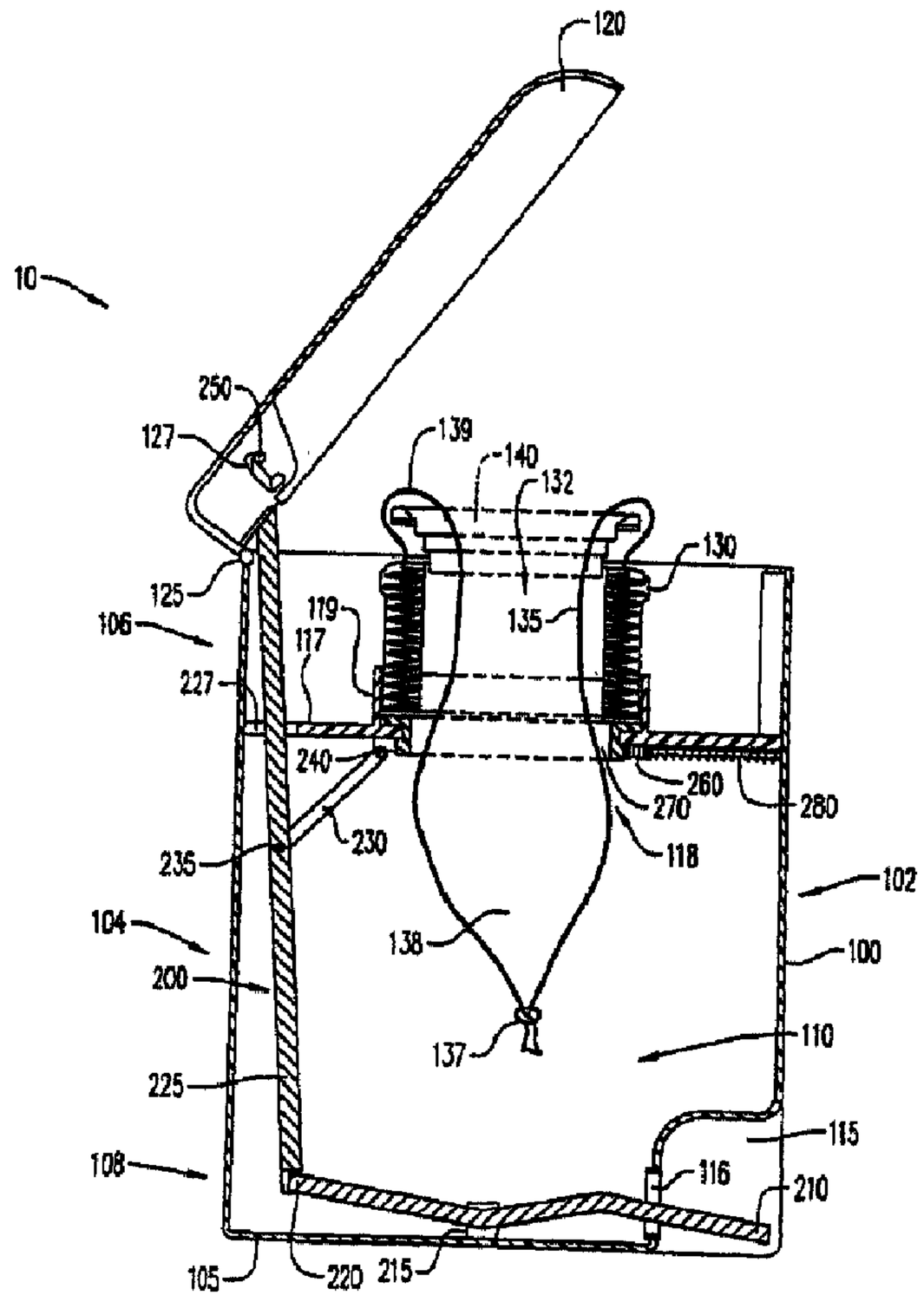
(51) Cl.Int.^{7}/Int.Cl.^{7} B65F 1/16, B65F 1/14, B65F 1/06

(71) Demandeur/Applicant:
PLAYTEX PRODUCTS, INC., US

(72) Inventeurs/Inventors:
CHOMIK, RICHARD S., US;
LESLIE, STUART, US;
PETRIE, AIDAN, US;
YOHO, MARK, US;
KIM, TAEK, US;
SEJNOWSKI, JOE, US

(74) Agent: SMART & BIGGAR

(54) Titre : DISPOSITIF DE STOCKAGE DES DECHETS
(54) Title: WASTE STORAGE DEVICE



(57) Abrégé/Abstract:
The present invention discloses an automated sealing waste disposal apparatus using tubular material.

Attorney Docket No.: PLA-116(CIP)

ABSTRACT OF THE INVENTION

The present invention discloses an automated sealing waste disposal apparatus using tubular material.

Attorney Docket No.: PLA-116(CIP)

WASTE STORAGE DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation-in-part application of U.S. Patent Application Serial No. to be assigned, which claims benefit of priority from U.S. Provisional Patent Application Serial No. 60/282,808, filed on 10 April 2001. This application further claims benefit of priority from U.S. Provisional Patent Application Serial No. 60/499,443, filed on 02 September 2003.

BACKGROUND OF THE INVENTION

1. Field of the invention

[0002] The present invention relates to a waste storage device or container. More particularly, the present invention relates to a waste storage device having an automated mechanism for twisting a tubular sealing material about waste, deposited in such tubular sealing material.

2. Description of the Related Art

[0003] Waste receptacles are generally fitted with a lid designed to contain odors when the lid is closed. However, most lids are not designed to be perfectly air-tight in respect of their receptacles, or after repeated use become less-than air tight, permitting malodor to emanate from the receptacles even when they are closed. Even with the most air-tight containers, upon opening the container, noxious odors escape into the ambient environment giving an extremely unpleasant sensation to the person attempting to add more trash to the receptacle. Location of the receptacles in a remote location is inconvenient and generally unsatisfactory.

[0004] A particularly difficult trash to retain for ultimate disposal is odoriferous trash. The cumulative odor of odoriferous trash being stored within the container frequently reaches such an offensive level that the trash must be disposed of before the container is full. The latter problem typically results in excessive emptying operations. In the case of odoriferous soiled diapers, for example, excessive emptying operations can be of particular concern as one hesitates to leave an infant unattended or to carry an infant and the soiled diapers to a remote location. A further problem associated with such containers is that the containers themselves over time tend to retain the malodor even when no diapers are present in the containers. Therefore, a thorough and complete cleaning of such containers is often necessary to reduce the lingering odor. Furthermore, as most disposal receptacles are not child-proof, toddlers playing around such containers may inadvertently open a container to allow odors to escape, or the child may reach in to touch the undesirable trash.

[0005] There are a number of waste disposal systems for disposing of odiferous waste materials such as soiled diapers. The systems are often touted as a convenient way to dispose of such waste materials and reduce or eliminate any odor that may emanate from the materials. An example of such systems is U.S. Patent No. 5,147,055 which discloses a container that includes an activated charcoal filter to retain and absorb odors within the container.

[0006] Other trash receptacles employ one of several approaches to reduce the emanation of malodor from the receptacle, including the use of masking agents, odor sorbent material, inner lids or seals, air locks or sealed packaging. Scented trash receptacles have been commercially available for many years. Scent is added to the diaper pail in the hope of hiding the smell of the malodor by producing a smell that masks the malodor to the olfactory senses. The problem with such receptacles is that the masking smell itself can often become irritating to the consumer, as well as the fact that most scented diaper pails loose their masking effect after a period of time.

[0007] European patent application No. 0005660, the contents of which are incorporated by reference herein, describes a device for disposing kitchen refuse in packages enclosed by flexible tubing derived from a tubular pack of tubing surrounding a tubular guide. The device includes a sealing mechanism for sealing along the tubular material. The tubing passes from the pack over the top of and then down a guide to a position beneath the guide where it is closed by fusion to provide a receptacle. When this receptacle is full of refuse, a lever is manually operated to actuate an electro-mechanical apparatus including clamping and fusion devices that travel round closed tracks to perform the four-fold task of drawing the receptacle down below the tubular guide, fusing the tubing walls together to seal the top of the receptacle, sealing the tubing walls together to provide the closed base of the next receptacle and dividing the tubing by heat at a location between these two fusion locations to separate the filled package. There are a number of disadvantages with this device including the need for latches to prevent the wheels extending from the heating elements from inadvertently returning up the central track portions (as opposed to following the outer track portions as they should. A further disadvantage is that the heating element must be at least the width of the tube in order to seal the tube all the way across thereby preventing, for example, the escape of odors from the waste.

[0008] A popular approach for disposing of diapers has been a device using, for example, a tube twisting mechanism to form a pouch about a diaper. As an example, see the disclosures of U.S. Patent Nos. 4,869,049, 5,590,512, and 5,813,200, the contents of all of which are incorporated by reference herein. The '049 patent discloses an apparatus to form packages containing disposable diapers comprising a tubing which passes through the top edges of a core and then down through the core. The core is turned by means of a lid about a cylinder to twist the flexible material. Similarly, the '512 patent discloses an apparatus for disposing objects in packages formed by pushing the objects in series into a funnel-shaped portion of flexible tubing

drawn from pack over the rim of the funnel. The patent also discloses that each package is closed at the top by twisting the tubing by turning the funnel fixed to the pack about its axis. As disclosed in the '049 and '512 patents, the process of sealing the tubing to form the packages is performed manually and requires the use of both hands.

[0009] U.S. Patent No. 5,813,200 to Jacoby, *et al.* discloses a device for disposing of soiled diapers in twisted packages. The device has a container body with a hinged base, a hinged lid, and an upward cylinder secured within the container body. A tubular core rests on a portion of the upward cylinder to allow rotation there between. A flexible tube or sleeve rests on a portion of the tubular core with the tubing being circumferentially pleated as stored. Springs are fixed to the container and project radially inward to engage a package formed from the tube. The springs are equally spaced around the interior of the container to hold the package during the forming of a twist in the tube.

[00010] The device disclosed in U.S. Patent No. 5,813,200 is used to form a series of packages enclosing objects. The top of the flexible tubing is pulled upwards and tied into a knot. The closed end formed by the knot can then form the bottom of a package with the sidewalls formed by the tubing. The object is inserted and rests against the tubing near the knot. A rotatable interior lid is put into place and rotated such that the unused tubing and the tubular core rotate with respect to the package that is being formed. The package being formed does not rotate because it is held in place by friction between it and springs. Thus a package is formed between the knot and a first twist. Subsequently, objects are disposed and twisted in a like manner to form discrete packages with twists between them.

[00011] Devices such as that disclosed in U.S. Patent No. 5,813,200 are a convenient way of disposing of soiled diapers. A disadvantage of the system is that the twists between packages may become unraveled, thereby allowing groups of diapers to collect within the tubing, which makes emptying the container more difficult. Further,

the twists may not create a continuous, complete seal and, therefore, may allow odor to escape from a package. Increasing the twists between packages may eliminate the above disadvantages, however, this requires the use of additional tubing.

[00012] Another example of a device used to decrease odors that emanate from diaper waste is disclosed in U.S. Patent Nos. 6,370,847 and 6,516,588, both issued to Jensen, *et al*. These related patents disclose a sealable diaper-disposal system that includes a container body, a tubular core on which flexible tubing is stored, and a tube-sealing mechanism having a pair of heating elements. The flexible tubing is pulled from the tubular core and passed between the pair of heating elements. The tube-sealing mechanism operates to move the pair of heating elements toward each other to fuse the width of the tubing, and away from each other to allow the tubing to be pushed into the lower portion of the container body.

[00013] Commercial waste storage devices for disposal of baby diapers, are known. One such device is the Playtex Diaper Genie®. In the Diaper Genie®, a film cartridge having a hole concentrically located therein, is positioned in a waste container body. The film cartridge has a top surface from which a storage film extends and has a twist ring secured in the concentric hole of the cartridge. The storage film extends from the film cartridge, over and then down through the twist ring, down through the hole in the film cartridge and into the waste container body. The user manually opens the lid assembly by hand and places waste such as a diaper through the twist ring and hole in the film cartridge, into the storage film. The twist ring is then manually rotated by the user's hand, which causes the film cartridge and storage film to rotate, tying off and sealing the disposed waste in the storage film. The storage film is continuously fed from the film cartridge. The commercial Diaper Genie® device requires the user to rotate the twist ring by hand to seal the storage film about the waste to form a waste product.

[00014] The contents of all of the prior art references cited herein are incorporated by reference. From the above it can be understood by those having ordinary skill in the art that there are a number of disadvantages associated with prior art waste disposal devices using flexible tubing and tubular sealing material to form packets for disposal of waste materials. It is clear that a device is needed that will eliminate the disadvantages described above. Such a device should be relatively economical to purchase, and consistently make the seals between packets complete so that they cannot become undone, and it is easy to operate.

SUMMARY OF THE INVENTION

[00015] The present invention is directed to a waste storage or waste disposal device or container employing tubular sealing material/flexible tubing, wherein the sealing operation of the tube about a waste load is performed mechanically, electrically and electro-mechanically. More particularly, embodiments of the present invention provide a waste storage device that has an automated operated sealing mechanism.

[00016] The present invention provides automated mechanisms for sealing waste in a tubular storage material, in particular a film. The automated sealing mechanism, preferably seals by activation of a mechanical, electrical, or electro-mechanical actuator which causes a twisting of the tubular material in which waste is placed so as to form a sealed waste package. Such twisting of the tubular storage material may be caused, for example, by rotating the cassette in respect of a retention mechanism for the tubing, rotating the retention mechanism with respect to the cassette, rotating the tubular storage material with respect to the cartridge and/or retention mechanism. In a preferred embodiment, one part is mobile while the other parts in the system remain static or substantially static.

[00017] In one embodiment, the sealing mechanism allows a first actuation of an actuator to open the lid and a second actuation of an actuator to seal the tubular storage material.

[00018] In yet another embodiment, the sealing mechanism comprises a rack gear operably connected to an actuator, a clutch, and a spring connected to the rack gear. Actuation of the actuator causes the rack gear to move in a first direction against the bias of the spring and release of the actuator causes the rack gear to move in a second direction under the bias of the spring, which causes the clutch to rotate the cartridge. A locking mechanism optionally is operably connected to the spring with a first actuation of the actuator locking the spring in a compressed position while a second actuation of the actuator unlocks the spring.

[00019] In one embodiment of the present invention there is disclosed a waste container for sanitary disposal of waste including a container body defining a waste bin and an opening that provides access to the waste bin; a support mounted to the container body adjacent the opening, the support having a flange extending therefrom that is configured for mounting a tubing cassette above the waste bin, wherein the support encloses less than all of the opening to the waste compartment so that waste can be passed through the opening and into the waste chamber; a tubing cassette mounted to the flange of the support; and a tube twisting/sealing means for forming individual waste packets from tubing that is dispensed from the tubing cassette.

[00020] According to another embodiment of the invention there is provided a waste container with an automated twisting feature, a tubing cassette rotationally mounted to a flange support; and a retention means for preventing rotation of a waste packet contained in a portion of the tubing when the tubing cassette is rotated, such that a twist is efficiently created in the tubing. The flange may be configured to allow rotation of the tubing cassette. The cassette may be rotated by electrical power as for

example by a motorized rotating grip to create a closure twisting action of the flexible tubing when sequestering a waste packet. A motorized apparatus of this embodiment of the invention may optionally provide a plunging device for downwardly pushing the flexible tubing a predetermined distance, thereby providing sufficient space for depositing a waste packet.

[00021] Another embodiment of the present invention comprises an upper or head compartment located on top of the waste container encompassing an apparatus comprising a drive plate mounted to the tubing cassette, a drive gear assembly engaged with the drive plate, and a motor mounted to the upper compartment apparatus and having an output shaft that rotates the drive gear when the motor is activated, the power from the motor being transmitted through at least one gear or a series of gears. A timing circuit may be employed for activating the motor to rotate the tubing cassette one of a predetermined amount of time or a predetermined number of times. A sensing detection device, as for example by electro-optical means, counting physical disruptions, for example, marks on the rotating component may also be employed. A manually operated switch may be used for activating the motor.

[00022] The upper or head portion of the waste container may also serve as lid over the lower receptacle compartment or waste bin of the waste container. The lid or upper compartment of the waste container of the invention may be hingedly attached to the container body for enclosing the opening to the waste bin. The lid or head portion of the container may be secured with a latch device. In addition, the hinge itself may include a latching mechanism or a biasing means to retain the lid in an open position when desired. A foot pedal assembly may be attached to the lid for opening the lid. Such assemblies are well known to those of ordinary skill in the art.

[00023] Another embodiment of the present invention is a waste container including a container body defining a waste bin and an opening that provides access to the waste bin; a support mounted to the container body adjacent the opening, the

support having a flange extending therefrom that is configured for rotational mounting of a tubing cassette above the waste bin, wherein the support encloses less than all of the opening to the waste bin so that waste packs can be passed through the opening and into the waste bin.

[00024] In one embodiment of the invention there is provided a downward thrust plunging portion attached by a scissor slat assembly to a screw-type gear drive which is powered by an electrical motor through a gear transmission assembly; the activated thrust plate may be extended downwardly to push onto a twist-locked flexible tubing sequestering a waste pack; the waste pack thereby being urged into the container waste bin compartment.

[00025] Embodiments of the invention may be equipped with a thrust plate to effect a downward thrusting motion at the twist-tightened upper end of the flexible tubing enclosing the waste pack pulling additional tubing from the refill cassette so as to provide a pouch-like space below the cassette core opening in order to receive the next waste pack to seal waste in the pouch-like space. A twist-tightening motion may then be effectuated to seal waste in the pouch-like space.

[00026] In another embodiment there is an automatically controlled apparatus for individually sequestering packs of odorous waste in a length of flexible tubing which is dispensed and depending from a core tube portion inside a tubular refill cassette. Such apparatus may combine a lower compartment or bin for receiving and storing the tubing enclosed waste packs; and an upper compartment for accommodating and securing the electronically powered and controlled system for sequestering each pack of waste in the flexible tubing (of course such control systems may be found in other areas of the container or outside of the container). Preferably, the waste packet sequestering part of the tubing may be held by a retention or clamping device. The sequestering event may be initiated by an electrical actuator causing a rotational movement of the tubing refill cassette or dispenser, the tube itself, or the

tubular retention mechanism/device, so as to effect a twist tightening of the flexible tubing which depends downward from the tubing cassette into the lower compartment of the waste receptacle. The activator may activate downward motion of a thrusting plate to urge the twist-locked waste packet into the waste receiving bin and simultaneously provide another length of flexible tubing for the next deposit of a waste packet.

[00027] Embodiments may further provide a means for cutting the twist-tightened upper portion of the flexible tubing individually enclosing and sequestering a series of waste packs. Such cutting means preferably are suitably located at a position above the twisted portion of the tubing and below the refill cassette enabling removal of the tubing sequestered waste pack from receptacle bins.

[00028] The rotational twist-tightening of the flexible tubing so as to lock can be reinforced by an adhesive containing device, ribbon, marks, etc., *e.g.*, microbeads that encapsulate adhesives, segmentally positioned on the inside surface of the tubing material, said adhesive being activated by the twisting of the flexible tubing. Alternatively, the flexible tubing material can comprise clinging properties for reinforced twist stabilization and sealing effect. The adhesive location can be placed on the inside of the flexible tubing at predetermined intervals or segments suitable for sequestering the waste packets.

[00029] Embodiments may optionally comprise a film grip ring for gripping or holding the flexible tubing in place in order to prevent the inadvertent release of the stored tubing from the rotating cassette during the twisting operation. This advantageous aspect assists in creating a measurably effective tight twist lock of the sequestered waste packet in the tubing segment.

[00030] Embodiments may optionally comprise a trigger mechanism for actuating the thrust mechanism determining the start of the downward motion of the

thrusting plate at the end or completion of rotational motion the core tube, effecting the twist closure of the flexible tubing above the sequestered waste packet. The trigger mechanism may be initiated by a timing device or optical counter which actuates the thrust mechanism after a preset interval of rotational movement, of for example, the cassette or retention mechanism. The optical counter can be aided, for example, by a laser-optical detection device.

[00031] The present invention provides an automatic device for the convenient and hygienic sequestering of waste packets. Waste packets may comprise any material, for example, nursing home and hospital waste products, diapers, smelly food, *etc*.

[00032] For the purpose of this invention, any device that closes off flexible tubing at a point along the length of the tubing is considered a "tube-sealing means." Therefore, for example, fusion devices, which close off tubing with heating elements, and twisting devices, which close off tubing by inducing a twist, are considered "tube-sealing means." Several tube-sealing means are disclosed herein above in the background of the invention. Other exemplary tube-sealing means are disclosed in U.S. Patent Nos. 6,128,890 and 6,065,272, the contents of all of which are incorporated by reference herein.

[00033] In one embodiment of the invention, the waste storage device comprises an automatically controlled mechanism for sequestering the waste packets individually inside a flexible tubing bay of some length dispensed from a refill cassette. The hands-off embodiment features a motor-driven rotation of the refill cassette inner core tube portion thereby twisting the tubing the waste packet which may be held in place by, for example, spring-aided holder/brackets. Moreover, the embodiment may comprise a driveshaft connected to the motor through a gear assembly or transmission. The driveshaft may be activated when the tubing twisting rotation is completed and the waste packet is closed off or sequestered in the tubing material. The driveshaft may be

connected by a pinion through the connecting scissor slats to the thrust plate of the plunger. The rotation of the driveshaft, i.e. a rod with a screw-type outer ridge, may wind through the nut-like center hole of the pinion, which is thereby slideably moved along holding or locating means or rod causing the scissor connectors to extend and vertically move the thrust plate plunging or pressing down onto the twist-closure of the tubing portion sequestering the waste packet, which is consequently placed down deeper in the waste bin of the container.

[00034] In another embodiment, there is a motorized two-step mechanism controlling the twisting and plunging of the automated waste sequestering operation. Such mechanism may be manually turned on by, for example, pushing a button, *e.g.*, on top of the lid or head portion of the container. A depressed button may contact electrically the actuator of the apparatus motor, causing an initial twisting rotation of the cassette core tube. Other actuation mechanisms such as a foot operated switch or lever may be used. The rotation of the motor driveshaft, for example, may be transmitted through at least one gear or a set of gears to a rotatory ring that engages the cassette rim by was of small ridges projecting therefrom a top on the cassette, the bottom of the cassette, side of the cassette, or other portion of the casette when the upper head or lid compartment of the waste receptacle is closed. The second step of the automated control of the waste sequestering mechanism of this embodiment may cause a plunging/thrusting device or plate to downwardly thrust and extend onto the twist-locked waste packet. Thus, the flexible tubing is pulled from the storage compartment of the cassette through a gap between the inner core tube and the rim atop the refill cassette.

[00035] In one embodiment, the lid is opened by foot operated or activated mechanism which acts upon the lid at the latch mechanism which causes the lid to be in the open position. A waste load is deposited into the open center of the cassette. Upon release of foot-operated mechanism, the lid is caused to close so that the motorized actuator mechanism acts by a cog gearing system causing it to rotate a cassette holding

a tubing bag receptacle. The rotation accomplishes two activities for sequestering a diaper or similar waste load and dropping or moving the same downwardly into the tubing bag. At the closed lid position, the actuator initiates the rotation placing a force on the tubing cassette by a cassette twister exerting pressure on the beveled ring surface of the cassette. The rotational movement is measured to continue until sufficiently tight twisting has been effected on the tubing bag so as to close the top opening and thereby retain the waste load. At the moment when the twisting or tightening by cassette rotation is complete for sufficient closure of the tubing tubular bag, a vertically dispensed gearing mechanism, for example, may be turned on and cause a downward movement of the thrust plate. This downward thrust may be mediated through a scissor link assembly which stretches out to extend along the axis of the cassette opening, moving the sequestered waste load downward. Simultaneous to the motorized rotational force applied on the cassette rim, a film grip ring may be activated to contact and clamp down on to the flexible tubing emanating and hanging over the top edge of the inner core tube of the tubing cassette. This contact prevents release of tubing from the storage compartment of the cassette during the rotational twisting operation.

[00036] In another embodiment, there is disclosed a waste disposal device comprising a cassette housing flexible tubing and an automated twist mechanism wherein the twist mechanism is operationally structured to twist and untwist a portion of dispensed flexible tubing so as to open and close the tube for further disposal of waste product upon opening and closing of the lid. Such automated twist/untwist function may also have application to waste disposal devices comprising conventional garbage bags or similar bags.

[00037] In yet another embodiment, the waste disposal device comprises a container defining a waste chamber for receiving encapsulated waste packages; a lid coupled to the container and movable between an open position in which the chamber is accessible and a closed position in which the chamber is covered; a cartridge arranged in the container and containing a length of flexible tubing arranged to receive

waste packages, the cartridge being maintainable in a stationary position; a retention mechanism for holding a waste package received in the tubing; and a rotation mechanism arranged to rotate the retention mechanism, and thus a waste package when held by the retention mechanism, while the cartridge is stationary in order to twist the tubing and encapsulate the waste package. In this aspect of the invention, the waste disposal device can further comprise an anti-rotation mechanism for holding the cartridge stationary during rotation of said retention mechanism.

[00038] In one embodiment, the waste disposal device comprises a retention mechanism comprising a gear rim, the rotation mechanism engaging with the gear rim to cause rotation of the gear rim and thus the retention mechanism.

[00039] In a further embodiment, the waste disposal device comprises a container defining a waste chamber for receiving encapsulated waste packages; a lid coupled to the container and movable between an open position in which chamber is accessible and a closed position in which the chamber is covered; a cartridge arranged in the container and containing a length of flexible tubing arranged to receive waste packages; a retention mechanism for holding a waste package received in the tubing, the retention mechanism being fixed to the container; a rotation mechanism arranged to rotate the cartridge relative to the retention mechanism in order to twist the tubing and encapsulate a waste package when held by the retention mechanism; and a toothed member attached to the lid, the cartridge comprising a gear rim, the rotation mechanism engaging with the toothed member and the gear rim during movement of the lid and comprising at least one gear arranged in the container for enabling the conversion of movement of the lid to rotational movement of the gear rim.

[00040] In yet another embodiment, the waste disposal device comprises a container defining a waste chamber for receiving encapsulated waste packages; a lid coupled to the container and movable between an open position in which said chamber is accessible and a closed position in which said chamber is covered; a cartridge

arranged in the container and containing a length of flexible tubing arranged to receive waste packages; a retention unit for holding a waste package received in the tubing; and rotation means for rotating the retention unit, and thus a waste package held by the retention unit, relative to the cartridge in order to twist the tubing and encapsulate the waste package.

[00041] In another embodiment of the invention, the waste disposal device rotation mechanism comprises a motor having a shaft and providing rotational movement to said shaft; a gear arranged on said shaft and in engagement with said gear rim; and a motor actuation mechanism for actuating said motor to rotate said shaft. In this aspect of the invention, the motor actuation mechanism may comprise, for example, a foot pedal coupled to the motor and arranged such that upon depression of said foot pedal, the motor is actuated.

[00042] In another embodiment, the waste disposal device comprises a motor actuation mechanism comprising a pushbutton coupled to said motor such that upon depression of said pushbutton, said motor is actuated. In this aspect of the invention, the motor actuation mechanism may comprise a switch arranged on the container and coupled to the motor, optionally it may include and a plunger arranged on the lid to engage said switch when the lid is closed, the switch being arranged to actuate the motor upon pressured being applied by said plunger.

[00043] In yet another embodiment, the waste disposal device comprises a rotation mechanism comprising a pedal arranged in a slot partially outside of the container, a pulley connected to the pedal and a movement converting mechanism for converting unidirectional movement of the pedal in the slot and thus movement of the pulley into rotation of the gear rim.

[00044] In a further embodiment, the waste disposal device further comprises a compacting mechanism for compacting the waste packages which is capable of rising from the base of the device.

[00045] In yet another embodiment, the waste disposal device comprises a rotation mechanism, which comprises: a frame defining a waste passage through which the waste packages pass; resilient members connected to the frame and extending inward into the waste passage to engage with the waste packages; a handle situated at least partially outside of the container, the handle being movable in a slot in an outer wall of container; and movement converting means for converting movement of the handle into uni-directional rotational movement of the frame to thereby rotate the frame, the resilient members and a waste package engaged by the resilient members relative to the tubing in the cartridge.

[00046] In a further embodiment, the waste disposal device comprises a retention mechanism comprising a pail having a retention member extending upward from a base of the pail and adapted to hold the waste package between said retention member and walls of said pail, said rotation mechanism comprising a turntable arranged below the pail to selectively engage the pail. The turntable may be moved by way of a motor or manually, for example, by a string wound partially about the turntable to cause rotation of the turntable, and thus the pail, when the string is pulled.

[00047] In another embodiment. the waste disposal device comprises a container comprising a cylindrical outer wall, further comprising an access door formed and pivotally connected to the outer wall.

[00048] In yet another embodiment, the waste disposal device comprises a container comprising a cylindrical outer wall and a hamper defining the waste chamber and having an outer wall constituting part of the outer wall of the container, said hamper being removable from the container.

[00049] In another embodiment, the waste disposal device comprises a retention mechanism comprising: a frame defining a waste passage through which the waste package passes; resilient springs connected to the frame and extending inward into waste passage to engage with and hold the waste package; a support flange connected to frame for supporting cartridge.

[00050] In another embodiment, the waste disposal device further comprises means for holding the cartridge stationary during rotation of the retention mechanism.

[00051] In yet another embodiment, the waste disposal device comprises a rotation mechanism constructed to convert movement of the lid in a downward direction to rotational movement of a gear rim and constructed to prevent movement of the lid in an upward direction from being converted to rotational movement of the gear rim.

[00052] In another embodiment, the waste disposal device comprises means for holding the cartridge stationary during rotation of the retention unit.

[00053] In another embodiment, the waste disposal device comprises a retention unit comprising a gear ring and a plurality of resilient springs adapted to engage with the waste package, the rotation means engaging with the gear ring to cause rotation of gear ring and thus the retention unit. In this aspect of the invention, the gear ring comprises a gear rim engaging with the rotation means and an adapter rim interposed between and coupled to the gear rim and the cartridge for coupling the cartridge to the gear rim.

[00054] In a further embodiment, the waste disposal device comprises a rotation means comprising a motor having a shaft and providing rotational movement to the shaft, a gear arranged on the shaft and in engagement with the gear ring and a motor actuation mechanism for actuating the motor to rotate the shaft. In this embodiment, the motor actuation mechanism may comprise a foot pedal coupled to the

motor and arranged such that upon depression of the foot pedal, the motor is actuated. The motor actuation mechanism may also, for example, comprise a pushbutton coupled to the motor such that upon depression of the pushbutton, the motor is actuated. In an alternate aspect of this embodiment of the invention, the motor actuation mechanism may comprise a switch arranged on said container and coupled to the motor and a plunger arranged on the lid to engage the switch when the lid is closed.

[00055] In another aspect of the invention, the waste disposal device comprises a retention unit comprising a frame defining a waste passage through which the waste package passes; resilient springs connected to the frame and extending inward into the waste passage to engage with and hold the waste package; a support flange connected to the frame for supporting the cartridge.

[00056] In another embodiment, the waste disposal device comprises a container defining a waste chamber for receiving encapsulated waste packages; a lid coupled to the container and movable between an open position in which the chamber is accessible and a closed position in which the chamber is covered; a toothed member attached to the lid; a cartridge arranged in the container and containing a length of flexible tubing arranged to receive waste packages; a retention mechanism for holding a waste package received in the tubing, the retention mechanism comprising a gear rim; and a rotation mechanism for rotating the retention mechanism relative to the cartridge in order to twist the tubing and encapsulate a waste package received in the tubing, the rotation mechanism engaging with the toothed member and the gear rim during movement of the lid and comprising at least one gear for enabling the conversion of movement of the lid to rotational movement of the gear rim and thus the retention mechanism. The toothed member can comprise a rack gear having a series of teeth on an outer or inner arcuate surface.

[00057] In yet another embodiment. the waste disposal device comprises a retention mechanism further comprising a frame attached to the gear rim and including

a plurality of resilient springs adapted to engage with the waste package. In this aspect of the invention, the rotation mechanism is constructed to convert movement of the lid in a downward direction to rotational movement of the gear rim and prevent movement of the lid in an upward direction from being converted to rotational movement of the gear rim. The waste disposal device may comprise an anti-rotation mechanism for holding the cartridge stationary during rotation of the retention mechanism.

[00058] In a further embodiment, the waste disposal device comprises a container defining a waste chamber for receiving encapsulated waste packages; a lid coupled to the container and movable between an open position in which the chamber is accessible and a closed position in which the chamber is covered; a cartridge arranged in the container and containing a length of flexible tubing arranged to receive waste packages; a retention mechanism for holding a waste package received in the tubing; a rotation mechanism for rotating the retention mechanism relative to the cartridge in order to twist the tubing and encapsulate a waste package when held by the retention mechanism; and compacting means for compacting the waste packages.

[00059] The invention also provides a waste storage device comprising a container comprising a receptacle and a lid attached to the receptacle, a retention mechanism and a rotation mechanism for rotating the cassette or cartridge, the cassette or cartridge comprising a flexible tubing for packaging waste material, the cassette further comprising a sensing mechanism for activating an electronic detection mechanism for counting revolutions of the cassette during operation of the device to ensure consistency of the sealing mechanism after each use.

[00060] Other and further objects, advantages and features of the present invention will be understood by reference to the following.

BRIEF DESCRIPTION OF THE DRAWINGS

[00061] A more complete appreciation of the invention and the advantages thereof will be more readily apparent by reference to the detailed description of the preferred embodiments when considered in connection with the accompanying figures, wherein:

Fig. 1 is a cross-sectional plane view of a waste storage device having the sealing mechanism of the present invention;

Fig. 2 is a cross-sectional plane view of a portion of the sealing mechanism of *Fig 1*;

Fig. 3 is a perspective view of the waste storage device of *Fig. 1*;

Fig. 4 is a top view of the waste storage device of *Fig. 1* without the lid;

Fig. 5 is a cross-sectional plan view of a waste storage device having a second embodiment of the sealing mechanism of the present invention;

Fig. 6 is a cross-sectional plan view of a portion of the sealing mechanism of *Fig. 3*;

Fig. 7 is a cross-sectional plan view of the waste storage device of *Fig. 5* with the lid closed.

Fig. 8 is an elevational side view of one embodiment of the present invention;

Fig. 9 is a sectional side view of the embodiment of *Fig. 8*;

Fig. 10 is an elevational view of a refill cassette embodiment of the invention;

Fig. 11 is a sectional side view of the refill cassette of *Fig. 10*;

Fig. 12 is an elevational view of an embodiment of the refill twister apparatus;

Fig. 13 is a sectional view of the refill twister embodiment of *Fig. 12*;

Fig. 14 is a sectional view of an extended plunger mechanism embodiment;

Fig. 15 is a schematic representation of an automated waste storage device embodiment of the invention;

Fig. 16 is a schematic representation of an embodiment of the invention showing a door/drawer-like access to the interior of the storage compartment of the device;

Fig. 17 is a sectional view along a longitudinal plane of the upper portion of a motorized device of the invention showing a retention mechanism and the cassette in place, wherein the motor is place in the rear of the device;

Fig. 18 is a sectional view along a longitudinal plane of a electronic device of the present invention comprising a motor, cassette, retention means and impulse heat sealer of the invention;

Fig. 19 is a schematic representation of the interior of a device of the invention showing a power switch, motor and electrical parts for rotating a cassette;

Fig. 20 shows the device of *Fig. 19* provided with an access door for easy access to the waste storage compartment;

Fig. 21 shows a sectional view along a longitudinal plane of a device of the invention adapted with a roller mechanism;

Fig. 22 depicts a general cassette having application to a mechanical, electrical, or electromechanical twisting mechanism of the present invention;

Fig. 23 depicts a device of the invention showing a waste package retention portion attached to the bottom portion of the cassette; and

Fig. 24 shows an embodiment of the invention in which the rotation mechanism comprises a gear rack for engaging with the cassette during rotation is provided on the retention mechanism.

Figs. 25 shows an embodiment of the invention wherein the device is provided with an electrically operated turntable at the base of the container for twisting and sealing the waste package.

Fig. 26 shows an embodiment of the invention wherein the device is provided with a mechanical turntable at the base of the container which can be operated manually.

[00062] It is notable that like items depicted in different figures may be referred to by the same reference numbers.

DETAILED DESCRIPTION OF THE INVENTION

[00063] Referring to *Fig. 1*, there is shown an embodiment of a waste storage device having the sealing mechanism of the present invention, generally represented by reference numeral **10**.

[00064] Waste storage device **10** has a body **100**, a lid **120**, a storage film cassette **130**, a film ring **140** and a sealing mechanism **200**. Body **100** has a base **105**, an inner volume **110**, front and rear portions **102**, **104**, and upper and lower portions **106**, **108**. Body **100** is substantially cylindrical in shape to maximize inner volume **110**. However, alternative shapes for body **100** can also be used including rectangular or cubical. Lower portion **108** of body **100** has an indentation or pedal housing **115** that will be described later in greater detail. Preferably, pedal housing **115** is positioned along front portion **102**.

[00065] . Lid **120** is substantially cylindrical in shape and has a diameter substantially the same size as the diameter of body **100** to provide a sealing engagement of the lid with the body along upper portion **106**. If an alternative shape of body **100** is used, such as rectangular or cubical, then the corresponding shape would also be used for lid **120** to provide a sealing engagement of the lid and the body along upper portion **106**. Lid **120** is pivotally connected to body **100** by lid hinge **125**. Preferably, lid hinge **125** is positioned along rear portion **104**. Lid **120** has a lid slot **127** formed therein. Lid slot **127** is a u-shaped channel that is operably connected to sealing mechanism **200** to allow a user to open and close lid **120**, which will be discussed later in greater detail.

[00066] Body **100** further has a cassette flange **117** with a center hole **118** and a circular wall **119**. Flange **117** is circumferentially formed along the inner wall of body **100** in proximity to upper portion **106**. Flange **117** engages with a clutch **270** of sealing mechanism **200**, which will be discussed later in greater detail. Center hole **118** provides a support for clutch **270** and for cassette **130**, which is seated on the clutch. Circular wall **119** extends substantially vertically upward from flange **117**. As used herein, vertical refers to the direction between upper an lower portions **106, 108**, which is substantially parallel with the sidewalls defining body **100**. Horizontal refers to the direction between front and rear portions **102, 104**, which is substantially perpendicular to the sidewalls defining body **100**. Circular wall **119** has a diameter larger than the diameter of cassette **100**. Circular wall **119** provides support for cassette **130** to prevent it from moving in a horizontal direction yet allowing it to rotate in center hole **118**.

[00067] Cassette **130** preferably has a cylindrical or ring-like shape with a center opening **132**. Film **135** is a continuous sheet of film having a cylindrical shape that is stored in cassette **130**. Cassette **130** also has a film ring **140** that is positioned in center opening **132**. Film **135** is dispensed from the top of cassette **130** over the outside of film ring **140** and then down through the film ring and down through center opening **132** into inner volume **110**. Film **135** is tied off or sealed at lower end **137** of the film in inner volume **110** to provide a storage volume **138**. As will be discussed later in

greater detail, in the preferred embodiment, after a diaper is inserted in storage volume **138**, sealing mechanism **200** rotates cassette **130** to seal film upper end **139**.

[00068] Referring to *Figs. 1* through *4*, a sealing mechanism **200** of the present invention is shown. Sealing mechanism **200** has an actuator **210** a foot pedal linkage **225**, a rack linkage 230, a rack gear **260**, a clutch **270** and a biasing mechanism **280**. In the preferred embodiment, actuator **210** is a foot pedal and is angled downward for facilitating operation by a user's foot. Pedal **210** protrudes out from body **100** through pedal orifice **116** and into pedal housing **115**. Pedal housing **115** has a height that allows a user to slide his or her foot into the housing and onto pedal **210**. Pedal **210** is pivotally connected to base **105** of body **100** at pedal pivot **215**. This pivotal connection translates the user's downward force into an upward force for opening lid **120**.

[00069] Pedal **210** is pivotally connected to foot pedal linkage **225** at pedal linkage pivot **220**. This pivotal connection translates the rotational movement of pedal **210** into a substantially vertical movement of pedal linkage **225**. Pedal linkage **225** extends substantially vertically from lower portion **108** of body **100**, through flange opening **227**, through upper portion **106** of body **100**, to lid **120**. Pedal linkage **225** is pivotally secured to lid **120** such that an upward force along the pedal linkage causes the lid to rotate about lid hinge **125**. In this embodiment, pedal linkage **225** is operably connected to lid **120** by lid slot **127** and lid tongue **250**. Lid slot **127** is preferably a u-shaped channel formed in lid **120**. Lid tongue **250** is preferably a cylindrical tongue that engages with lid slot **127**. Preferably, lid tongue **250** has a cap to secure the tongue in lid slot **127**.

[00070] Pedal linkage **225** is also pivotally connected to rack linkage **230** at rack pivot **235**. Rack linkage **230** is pivotally connected to rack gear **260** at rack pivot **240**. The pivotal connections at rack pivots **235**, **240** translate the substantially vertical

movement of pedal linkage **225** into a substantially horizontal movement of rack linkage **230** and rack gear **260**.

[00071] Rack gear **260** is operably connected to clutch **270** so that a horizontal movement of the rack gear causes the clutch to rotate. In this embodiment, clutch **270** has gears (not shown) that engage with gears **262** of rack gear **260**. Rack gear **260** is further connected to a biasing mechanism **280** positioned on the opposite end of the rack gear from rack pivot **240**. In this embodiment, biasing mechanism **280** is a coil spring that biases rack gear **260** toward rear portion **104** of body **100**.

[00072] Clutch **270** is removably connected to cartridge **130**. Clutch **270** is a one-way clutch that only permits rotation of cartridge **130** in one direction. Thus, rack gear **260** can horizontally move in two directions and clutch **270** can rotationally move in two directions. However, cassette **130** can only rotate in one direction.

[00073] In operation, when a user depresses pedal **210**, pedal linkage **225** moves in an upward direction. This upward movement of pedal linkage **225** causes lid **120** to rotate about lid hinge **125** toward rear portion **104** of body **100**. Thus, depressing pedal **210** causes the lid to open.

[00074] Simultaneously, the upward movement of pedal linkage **225** causes rack linkage **230** to move substantially horizontally toward front portion **102** of body **100**. This causes rack gear **260** to move horizontally toward front portion **102**. Rack gear **260** is operably connected to clutch **270**, which causes the clutch to rotate in a first direction. Cassette **130** remains stationary because clutch **270** is a one-way clutch and prevents the cassette from rotating in this first direction. The horizontal movement of rack gear **260** towards front portion **102** also causes spring **280** to compress.

[00075] With lid **120** in an open position and storage volume **138** accessible to the user, waste storage, such as a diaper, can be inserted through film ring **140** into the storage volume. The user then releases pedal **210** to commence the sealing

operation. The force of compressed spring **280** against rack gear **260** causes the rack gear to horizontally move back toward rear portion **104**. The horizontal movement of rack gear **260** toward rear portion **104** causes clutch **270** to rotate in a second, opposite direction. Cassette **130** rotates in this second direction. The rotation of cassette **130** causes film **135** to tie off or seal near film upper end **139**. Thus, release of pedal **210** causes sealing mechanism **200** to seal film **135**.

[00076] Simultaneously, the horizontal movement of rack gear **260** toward rear portion **104** causes rack linkage **230** to move toward rear portion **104**. The horizontal movement of rack linkage **230** toward rear portion **104** causes movement of pedal linkage **225** in a substantially downward direction toward base **105**. The movement of pedal linkage **225** in a substantially downward direction causes lid **120** to rotate about lid hinge **125** toward front portion **102**. Thus, release of pedal **210** causes sealing mechanism to close lid **120**.

[00077] Referring to *Figs. 5* through *7*, in an alternative embodiment, sealing mechanism **200** also has a locking mechanism **300**. Locking mechanism **300** is operably connected to spring **280**. When a user first actuates pedal **210** causing rack gear **260** to move toward front portion **102** and compressing spring **280**, locking mechanism **300** is triggered and locks spring **280** in a compressed position. Thus, lid **120** remains in an open position and a user can release his or her foot from pedal **210**. When a user actuates pedal **210** for a second time causing rack gear **260** to move further toward front portion **102** and further compressing spring **280**, locking mechanism **300** is again triggered and unlocks spring **280** from a compressed position. Rack gear **260** is moved back toward rear portion **104** under the force of spring **280** causing rotation of clutch **270** and cassette **130**, as well as downward movement of pedal linkage **225**. Thus, film **135** is sealed by the rotation of cassette **130** and lid **120** is closed by the downward movement of pedal linkage **225**. Pedal **210** returns to its upper position for the sealing operation to be repeated by a first and second downward depression of the pedal.

[00078] The automated twist waste disposal apparatus useful for sequestering waste packets such as diapers in twist-sealable flexible tubing is illustrated in one embodiment of the invention by taking reference to *Figs. 8* through *12*.

[00079] Referring to *Fig. 8*, a waste container **310** is shown comprising a lower or waste storing bin compartment **315** and an upper lid or head compartment **320** with an optional activation start button **305**.

[00080] The disposal device **310** comprises a top or lid portion **320**, which comprises hingedly attached and latch-secured pivoting lid or cover configuration and a bottom or bin portion **315**, comprising an approximately cylindrical or cone-like shape.

[00081] In *Fig, 9*, the lid portion **320** is shown to contain an apparatus for automatic control of twisting and lowering of tubing below the refill cassette, the apparatus comprising an upper body portion **321** and a lower body portion **322**. More specifically, the lid **320** houses or contains the apparatus upper body **321**, comprising an electronic motor-driven control gear assembly **410**, an actuator **345**, a rotatory grip ring or refill twister **335** for contacting and rotating the tubing refill cassette body **350** effectively twisting the flexible tubing **352** which emanates through a gap **354** between the rim **357** of the cassette **350** and the core tube **361**, and is folded down through the open cassette tube core area **351** into the interior bin space **316** as partially shown in *Figs. 10* and *11*.

[00082] The lower body of apparatus **322** encompasses the removable refill cassette **350** (*Fig. 10*) as well as a retaining means or spring assembly **355** positioned to hold the flexible tubing **352** which encloses a waste pack (not shown) in the bin space **316** during the twist-closure operation. The tubing cassette **350** houses a length of tubing material **352** for sequestering the waste packets sequentially in the waste bin space **316**.

[00083] A lid **320** secured by a hinge **381** to the waste bin **315** includes a latch **382**. The waste bin **316** also includes a hinged base **319** for providing access to the lower interior of the second waste bin **316**. The hinged base **319** (*Fig. 9*) includes a latch (not shown) for securing the hinged base **319** in a closed position (*Fig. 11*).

[00084] The bottom rim **358** of the tubing refill cassette body **350** rests on a flange support or holding ring **370** which is affixed to the internal wall side of the bin **315** of the device **310**. The flexible tubing material **352** is stored in a continuously folded manner in the tubing storage compartment **359** of the cassette **350**.

[00085] Referring to *Fig. 12*, the apparatus embodiment of the gear assembly **410** in a housing or cap structure **455** of the upper body portion **321** of the electronic motor-driving apparatus **330** has a motor **347** located near the gear idler **325**, which motor **347** is started when the manually depressed button **305** on the lid **315** makes contact with the switch **395**. The first action of the motor-driven gear assembly causes rotation of the refill twister **334** comprising a tubular ring structure 336 which exhibits a notched bottom surface **430** that is situated to make contact with the top ring or collar of the refill cassette **350** so as to propel the cassette into rotational motion. The tubular refill twisting device **336** is provided with a ridge **450**.

[00086] Referring to *Figs. 13 and 14*, an embodiment of the invention is represented showing a scissor link assembly **420** linked to a slideable U-joint type linkage **415**. The pinion is saddled on a radially positioned carrier device **336** with a bracket **425** while at one point attached to a linkage **420** connecting assembly holder **415**, and at another point attached to a drive rod **435**. The drive rod **435** comprising a screw-like wound surface is inserted into the nut-type center of the which can be centrally moved along the carrying means or rod **336** by the revolutions of the screw-type positioning rod so that the drive rod **435** rotations cause the scissor link connecting linkage **415** to move towards the center so as to move the plunger plate **440** vertically

downward through open central portion **337** of the upper apparatus configuration **321** and the cassette core opening **362**.

[00087] The twisting operation may further facilitated by the film grip ring **335** which, during the twisting operation, acts as a brake pressing onto the flexible tubing **352** atop the cassette core tube **361**, and prevents the tubing **352** from being pulled out of the refill cassette **350** storage compartment **360** during the cassette rotation.

[00088] A revolution counting mechanism may optionally provided in an embodiment of the invention. In this embodiment of the invention, the revolution counting mechanism can be in the form of an electronic sensing device (not shown), for example, which utilizes a laser beam mechanism. As seen in *Fig. 10*, a series of small apertures **349** can be incorporated, for example, into the cassette **350** which can be detected by a laser beam as the cassette rotates on a stationary retention mechanism. The small aperture **349** or other types of sensing devices such as strips, bars, and/or motion detecting mechanisms and the like can be applied to the rotating portion of the device for counting the revolutions executed by the rotating system. In this manner, the total number of revolutions required to secure the sealing on the encapsulated waste package can be set on the electronic device and the sealing process can be executed with precision at each time waste is disposed into the device. In this aspect of the invention, the electronic sensing system can be set automatically to control the sealing process. Additionally, this electronic sensing system on the device can also control, for example, the downward motion of the plunger **340**.

[00089] Referring again to the illustrations of *Figs. 10 and 11*, the refill cassette **350** stores the flexible tubing **352** which emanates from the storage compartment **359** through the gap **354** between the rim **357** and the cassette's core tube wall **361** and then fords into the inner core area **362**, hanging into the bin space 316 below. The rim **357** is provided with small ridges for effectively engaging the refill

twister 334, in particular, the gear surface said refill twister **430** when rotating the cassette **350** and the top portion of the flexible tubing enclosing the diaper deposit (not shown). The cassette further may comprise slits **356** on its upper rim **357** for engaging with the bottom portion of the lid to form a secure fit.

[00090] Taking reference again to *Fig. 9*, the lid portion **320** of this embodiment **310** can be opened by depressing a foot pedal arrangement **365** which acts through a push rod **366** on the hinge assembly **381** of the lid **320**, exposing the open core area **362** of the refill cassette **350** for depositing a waste packet.

[00091] As further illustrated in *Fig 9*, the retention springs **355** are attached to the flange **370** and retain or hold a waste package (not shown) stationary while the rotating refill twister **334** causes the cassette collar or rim **357** to rotate the tubing cassette **350** inducing a twisting motion in the flexible tubing **352**. As used herein, the term "retention means" shall include any retention device for retaining or restraining a waste package (not shown). The term shall include, for example, retention devices as disclosed in U.S. Patent Nos. 4,869,049, 5,590,512, 6,170,240, 6,128,890, 6,370,847, and JP 592039015 (P2000 – 247401 A), the contents of all of which are incorporated by reference herein.

[00092] An embodiment of the invention can be further illustrated with reference to *Fig. 15*. As demonstrated in *Fig. 15*, the sealing and packaging mechanism of the waste material in the waste storage device is motorized. This device is provided with a pedal 570 for opening the top or lid **500** of the device. Pedal **570** comprises a child-proof mechanism which operates by releasing the spring on the spring-loaded top or lid **500**. The spring on the spring-loaded top allows for the top to remain open for a period of time while the device is in used and the spring mechanism closes the lid **500** automatically after the waste material is placed in the tubing. In *Fig. 15* the device is provided with a motor **540** which is battery-operated, however, the system can also be powered by alternating (AC) current.

[00093] As seen in *Fig. 15*, the waste storage device can also be provided with a rubber diaphragm rotation mechanism **530** which prevents the backflow or escaping of odors emanating from the waste contained in the storage compartment of the device, and a projecting retention mechanism shown in the drawing in the form of a bar or rod **560** for preventing the bottom portion of the encapsulated waste package **510** from untwisting during the packaging of the another waste material. Thus, the rod **560** operates as an anti-untwisting mechanism a previously encapsulated waste **510**. *Fig. 15* also shows a push button **520** that can be incorporated into the tubing cutting system of the waste storage device to facilitate the cutting of the tubing prior to disposal of the stored waste. A window **550** can also be designed into the body **505** of the storage compartment for allowing the user to determine when the storage compartment is full.

[00094] In one embodiment of the invention shown in *Fig. 16*, the waste storage device, either mechanical or motorized, can be provided in many different sizes and shapes and the body **505** of the storage compartment can be adapted with, for example a drawer-like space **590** for easy access and emptying of the stored waste and such access can comprise a door **580** with a handle which glides outwardly from the device and can have a secure mechanism for engaging and disengaging with the body of the device.

[00095] *Fig. 17* shows another embodiment of the motorized waste storage device of the invention. In this aspect of the invention, the motor of the rotation mechanism is placed at the top rear end of the unit for the automatic opening and closure of the lid **500,** of course, the motor may be located in other places on or in the container. *Fig. 17* also shows an aspect of the invention wherein a plunger **545** comprising part of the lid **500** is pushed downwardly to activate power switch **610** and activate the system. Additionally, plunger **545** pushes down the cassette on the retention ledge **535** to make the cassette stationary in the retention mechanism, while the rotation mechanism turns the flexible tubing containing the waste material. Additionally, *Fig. 17* shows a rotatable turntable **620** which rests on a flange extending

inwardly from the wall of the body **105**. Turntable **620** has a center opening for allowing the passage of the tubing with or without waste material, and can also contain toothed structures (not shown) for frictionally engaging with cassette **525**. In this aspect of the invention, the retention mechanism also forms part of the rotation mechanism and turntable **620** can rotate the cassette and seal the tubing.

[00096] *Fig. 18* shows a further aspect of the invention in which an electrical waste storage device is provided with an impulse heat-sealing means 555 adapted to the turntable 620. In this embodiment, the motor 575 is placed on the inner surface of the wall of the body of the device above the turntable 620.

[00097] In *Fig. 19*, an alternate embodiment of the invention is illustrated in which the retention mechanism **623** is stationary and is adapted to hold the rotating mechanism comprising a motor **575** with electrical parts and gear as seen in *Fig. 19* which form the mechanism for rotating the cassette **525**. The motor **575** is activated by the manual action of closing lid **500** which actuates power switch **610** by the downward movement of the lid **500** on the button **610**. *Fig. 19* also shows that the central portion of lid **500** can be adapted with a cutting mechanism **585** for trimming the tubing prior to disposal of the waste packages. *Fig. 20* shows the embodiment illustrated in *Fig. 19* further adapted with a door **580** attached to the waste storage compartment designed for easy emptying of the stored waste.

[00098] A further embodiment of the invention is illustrated in *Fig. 21* in which the waste storage device is provided with a roller means **630** for compacting the waste material and aid in pulling the tubing from the cassette. The roller means **630** can also form part of the retention mechanism and aid in stabilizing the encapsulated waste during rotation while sealing the package.

[00099] *Fig. 22* shows an embodiment of the invention in which the cassette **525** comprising the tubing is provided with a gear **650** along the outer circumference of

the cassette **525** for engaging and to be rotated with the rotation mechanism. In this aspect of the invention, the gear **650** is provided on middle of the exterior surface of the cassette **525**, however, the gear **650** can be provided on other parts of the cassette, for example, on the upper or lower rim of the cassette **525**. *Fig. 22* also shows that the cassette **525** is provided with a frame defining waste passage **655**, which is also shown with reference to *Fig. 3*, **140**.

[000100] In a further embodiment of the invention, the powered rotation mechanism **575, 650** for rotating the cassette **525** can be provided to the retention mechanism **670** as shown in *Fig. 24*. In this embodiment, at least one gear can be arranged in the waste container and the cassette **525** is provided with means for securely engaging with the retention mechanism. In this aspect of the invention, the retention mechanism **670** would remain stationary during rotation of the cassette **525**.

[000101] *Fig. 23* illustrate an alternate retention mechanism of the invention. As seen in *Fig. 23*, retention mechanism **675** is provided to the lid **500** portion of the device below the cassette compartment, and is in the form of a tube which protrudes laterally from the center aperture of the cassette. The retention mechanism aids in preventing the previously encapsulated waste package **510** from untwisting during sealing of the next waste package.

[000102] In another embodiment shown with reference to *Fig. 25*, the waste storage device is provided with a rotating mechanism in the form of a turntable **700** at the base of the device. The turntable **700** is electrically driven to rotate and seal an encapsulated waste product resting on its surface. The turntable **700** can also serve as a retention mechanism during sealing of the waste product. *Fig. 26* shows a similar embodiment comprising a turntable **700** as shown in *Fig. 25*, except that the sealing mechanism can be operated manually.

[000103] Although the present invention and its advantages have been described in detail, it should be understood that various changes, substitutions and alterations can be made therein without departing from the spirit and scope of the invention as defined by the appended claims. For example, components in one figure can be combined with components shown in another figure.

STATEMENT REGARDING PREFERRED EMBODIMENTS

[000104] While the invention has been described with respect to preferred embodiments, those skilled in the art will readily appreciate that various changes and/or modifications can be made to the invention without departing from the spirit or scope of the invention as defined by the appended claims. All documents cited herein are incorporated in their entirety herein.

Attorney Docket No.: PLA-116(CIP)

WHAT IS CLAIMED IS:

1. A sealing mechanism for a waste storage container, said waste storage container having a body, a lid and a storage film cartridge adapted to be positioned in said body, said cartridge having a continuous length of storage film therein, said sealing mechanism comprising:

an actuator operably connected to said lid and said cartridge, wherein actuation of said actuator opens said lid and seals said storage film.

2. The sealing mechanism of claim 1, wherein a first actuation of said actuator opens said lid and a second actuation of said actuator seals said storage film.

3. The sealing mechanism of claim 2, wherein said second actuation of said actuator closes said lid.

4. The sealing mechanism of claim 1, wherein said actuator is operably connected to said cartridge by a series of linkages.

5. The sealing mechanism of claim 1, wherein said body has a bottom, and wherein said actuator is positioned substantially near the bottom of said body.

6. The sealing mechanism of claim 5, wherein said actuator protrudes from said body.

7. The sealing mechanism of claim 1, wherein said actuator seals said storage film by rotating said cartridge.

8. The sealing mechanism of claim 7, further comprising a clutch operably connected to said actuator and said cartridge, said clutch allowing said cartridge to rotate in only one direction.

9. The sealing mechanism of claim 8, further comprising a rack gear operably connected to said actuator and said clutch, and a spring connected to said rack gear, wherein actuation of said actuator causes said rack gear to move in a first direction against the bias of said spring and release of said actuator causes said rack gear to move in a second direction under the bias of said spring to cause said clutch to rotate said cartridge.

10. The sealing mechanism of claim 9, further comprising a locking mechanism operably connected to said spring, wherein said actuator locks said spring in a compressed position upon a first actuation and said actuator unlocks said spring upon a second actuator.

11. The sealing mechanism of claim 5, wherein said actuator is pivotally connected to a first linkage and said first linkage is pivotally connected to a second linkage, said first linkage being operably connected to said lid to allow a user to open and close said lid and said second linkage being operably connected to said cartridge to allow a user to seal said storage film.

12. A waste container, comprising:

a container body defining a waste bin, a lid and an opening that provides access to the waste bin;

a support mounted to the container body adjacent the opening, the support having a flange extending therefrom that is cylindrically configured for mounting a tubing cassette above the waste bin, wherein the support encloses less than all of the opening to the waste bin so that a waste packet can be passed through the opening and into the waste bin;

a tubing cassette mounted to the flange of the support; and

a tube sealing means for forming waste packets by twisting a flexible tubing that is dispensed from the tubing cassette; and

the lid portion enclosing an apparatus for controlling twisting the flexible tubing to form a tubing bag enclosing a waste packet.

13. A waste container as recited in claim 12, further comprising a waste bag mounted in the waste bin in which waste packets are sequentially collected.

14. A waste container as recited in claim 12, wherein the flange is configured so that the tubing cassette is rotated by a motor to create a twist closure in the tubing when enclosing a waste packet.

15. A waste container as recited in claim 14, wherein the tubing cassette is rotationally mounted to the flange, and further including a drive plate mounted to the tubing cassette, a drive gear drivingly engaged with the drive plate, and a motor mounted to the waste container lid and having an output shaft that rotates the drive gear when the motor is activated.

16. A waste container as recited in claim 15, wherein a timing circuit activates the motor to rotate the tubing cassette for a predetermined amount of time or a predetermined number of times.

17. A waste container as recited in claim 15, further comprising a manually operated switch for activating the motor.

18. A waste container as recited in claim 12, wherein the lid is hingedly attached to the container body.

19. The waste container of claim 12, further comprising a plunging device for moving of the twist-closed waste packet downwardly into the bin to create a tubing-lined space for a deposit of another waste pack.

20. The waste container of claim 12, further comprising:

a retention means for preventing rotation of a waste packet when the tubing cassette is rotated to create a twist in the flexible tubing; and

wherein the retention means also prevents the release of stored flexible tubing from the tubing cassette during the twisting rotation.

21. A waste container as recited in claim 14, further including a drive plate mounted to the tubing cassette, a drive gear drivingly engaged with the drive plate, and a motor mounted to the composite waste container and having an output shaft that rotates the drive gear when the motor is activated.

22. A waste container as recited in claim 21, wherein a timing circuit activates the motor to rotate the tubing cassette one of a predetermined amount of time or a predetermined number of times.

23. A waste container, comprising:

a container body defining a waste bin and an opening that provides access to the waste bin;

a support mounted to the container body adjacent the opening, and configured to enclose less than all of the opening to the waste chamber so that waste can be passed through the opening and into the waste chamber;

a tubing cassette rotationally mounted to the support above the waste chamber; and

a retention means for preventing rotation of a waste packet when the tubing cassette is rotated to create a twist in the tubing; and

a plunging means for moving the twisted tubing downwardly to create new space for enclosing another waste packet.

24. The waste container of claim 23, comprising further, a tubing gripping means to prevent release of tubing from the cassette during rotation for twist-closure of the waste content.

25. The waste container of claim 23, further comprising an apparatus for automated sequestering of individual waste packets deposited and enclosed in the flexible tubing by means of motor-powered twisting of the flexible tubing and moving the waste packet enclosure into the waste container bin.

26. The waste container of claim 12, wherein the flexible tubing is equipped with adhesive means for enhanced stabilization of the twisted tubing.

27. A waste disposal apparatus as recited in claim 12, wherein the waste packet deposit is a soiled diaper.

28. A method for disposing of waste material, comprising:

providing a length of tubing having a first sealed portion of the tubing at a location along its length and an open end of the tubing;

inserting waste material through the open end of the tubing until it contacts the first sealed portion of the tubing to form a waste package;

retaining the waste package such that the waste package does not rotate in relation to the open end of the tubing;

rotating the open end of the tubing such that a twist is formed in the tubing between the open end of the tubing and the waste package; and

sealing at least a portion of the twisted tubing to form a second sealed portion located above the waste packet enclosure.

29. A method for disposing of waste material as recited in claim 28, further including the step of moving the length of tubing in a direction away from the open end of the tubing in preparation for the waste packet deposit step.

30. A method for disposing of waste material as recited in claim 28, wherein the sealing step includes sealing at least a portion of the twisted tubing to form a second sealed portion by optionally electro-thermally heating or chemical adhesive application to at least a portion of the twisted tubing.

31. A method for disposing of waste material as recited in claim 28, wherein the retaining step includes retaining the waste package by gripping the waste package enclosure, such that the waste packet does not rotate in relation to the open end of the tubing.

32. A method for disposing of waste material as recited in claim 28, wherein the inserting step includes inserting or depositing a soiled diaper through the open end of the tubing until it contacts the first sealed portion of the tubing to form a waste package.

33. A container for automated diaper disposal, comprising:

a container bin compartment for diaper deposits;

a container top compartment enclosing an apparatus for automated sequestering of diapers in the container bin;

a combination of an automatically controlled motor-driven twisting operation which sequesters each deposited diaper individually in flexible tubing into a container bin compartment; and

an automatically controlled motor-driven plunging operation which moves the twist-locked diaper into the container and creates a predetermined length of the

flexible tubing so as to provide space for the next following diaper deposit within the flexible tubing.

34. A waste disposal device, comprising:

a container defining a waste chamber for receiving encapsulated waste packages;

a lid coupled to said container and movable between an open position in which said chamber is accessible and a closed position in which said chamber is covered;

a cartridge arranged in said container and containing a length of flexible tubing arranged to receive waste packages, said cartridge being maintainable in a stationary position;

a retention mechanism for holding a waste package received in said tubing; and

a rotation mechanism arranged to rotate said retention mechanism, and thus a waste package when held by said retention mechanism, while said cartridge is stationary in order to twist said tubing and encapsulate the waste package.

35. The waste disposal device of claim 34, further comprising an anti-rotation mechanism for holding said cartridge stationary during rotation of said retention mechanism.

36. The waste disposal device of claim 34, wherein said retention mechanism comprises a gear rim, said rotation mechanism engaging with said gear rim to cause rotation of said gear rim and thus said retention mechanism.

37. The waste disposal device of claim 36, wherein said rotation mechanism comprises:

a motor having a shaft and providing rotational movement to said shaft;

a gear arranged on said shaft and in engagement with said gear rim; and

a motor actuation mechanism for actuating said motor to rotate said shaft.

38. The waste disposal device of claim 37, wherein said motor actuation mechanism comprises a foot pedal coupled to said motor and arranged such that upon depression of said foot pedal, said motor is actuated.

39. The waste disposal device of claim 37, wherein said motor actuation mechanism comprises a pushbutton coupled to said motor such that upon depression of said pushbutton, said motor is actuated.

40. The waste disposal device of claim 37, wherein said motor actuation mechanism comprises a switch arranged on said container and coupled to said motor and a plunger arranged on said lid to engage said switch when said lid is closed, said switch being arranged to actuate said motor upon pressured being applied by said plunger.

41. The waste disposal device of claim 36, wherein said rotation mechanism comprises a pedal arranged in a slot partially outside of said container, a pulley connected to said pedal and a movement converting mechanism for converting unidirectional movement of said pedal in said slot and thus movement of said pulley into rotation of said gear rim.

42. The waste disposal device of claim 34, further rising a compacting mechanism for compacting the waste packages.

43. The waste disposal device of claim 34, wherein aid rotation mechanism comprises:
a frame defining a waste passage through which the waste packages pass;

resilient members connected to said frame and extending inward into said waste passage to engage with the waste packages;

a handle situated at least partially outside of said container, said handle being movable in a slot in an outer wall of said container; and

movement converting means for converting movement of said handle into uni-directional rotational movement of said frame to thereby rotate said frame, said resilient members and a waste package engaged by said resilient members relative to said tubing in said cartridge.

44. The waste disposal device of claim 34, wherein retention mechanism comprises a pail having a retention member extending upward from a base of the pail and adapted to hold the waste package between said retention member and walls of said pail, said rotation mechanism comprising a turntable arranged below said pail to selectively engage said pail and a string wound partially about said turntable to cause rotation of said turntable and thus said pail when said string is pulled.

45. The waste disposal device of claim 34, wherein said container comprises a cylindrical outer wall, further comprising an access door formed in and pivotally connected to said outer wall.

46. The waste disposal device of claim 34, wherein said container comprises cylindrical outer wall and a hamper defining the waste chamber and having an outer wall constituting part of the outer wall of said container, said hamper being removable from said container.

47. The waste disposal device of claim 34, wherein said retention mechanism comprises:

a frame defining a waste passage through which the waste package passes;

resilient springs connected to said frame and extending inward into said waste passage to engage with and hold the waste package;

a support flange connected to said frame for supporting said cartridge.

48. The waste disposal device of claim 34, further comprising means for holding said cartridge stationary during rotation of said retention mechanism.

Attorney Docket No.: PLA-116(CIP)

49. A waste disposal device, comprising:

a container defining a waste chamber for receiving encapsulated waste packages;

a lid coupled to said container and movable between an open position in which said chamber is accessible and a closed position in which said chamber is covered;

a cartridge arranged in said container and containing a length of flexible tubing arranged to receive waste packages;

a retention mechanism for holding a waste package received in said tubing, said retention mechanism being fixed to said container;

a rotation mechanism arranged to rotate said cartridge relative to said retention mechanism in order to twist said tubing and encapsulate a waste package when held by said retention mechanism; and

a toothed member attached to said lid,

said cartridge comprising a gear rim,

said rotation mechanism engaging with said toothed member and said gear rim during movement of said lid and comprising at least one gear arranged in said container for enabling the conversion of movement of said lid to rotational movement of said gear rim.

50. The waste disposal device of claim 49, wherein said rotation mechanism is constructed to convert movement of said lid in a downward direction to rotational movement of said gear rim and prevent movement of said lid in an upward direction from being converted to rotational movement of said gear rim.

51. A waste disposal device, comprising:

a container defining a waste chamber for receiving encapsulated waste packages;

a lid coupled to said container and movable between an open position in which said chamber is accessible and a closed position in which said chamber is covered;

a cartridge arranged in said container and containing a length of flexible tubing arranged to receive waste packages;

a retention unit for holding a waste package received in said tubing; and

rotation means for rotating said retention unit, and thus a waste package held by said retention unit, relative to said cartridge in order to twist said tubing and encapsulate the waste package.

52. The waste disposal device of claim 51, further comprising means for holding said cartridge stationary during rotation of said retention unit.

53. The waste disposal device of claim 51, wherein said retention unit comprises a gear ring and a plurality of resilient springs adapted to engage with the waste package, said rotation means engaging with said gear ring to cause rotation of said gear ring and thus said retention unit.

54. The waste disposal device of claim 53, wherein said gear ring comprises a gear rim engaging with said rotation means and an adapter rim interposed between and coupled to said gear rim and said cartridge for coupling said cartridge to said gear rim.

55. The waste disposal device of claim 53, wherein said rotation means comprise a motor having a shaft and providing rotational movement to said shaft, a gear arranged on said shaft and in engagement with said gear ring and a motor actuation mechanism for actuating said motor to rotate said shaft.

56. The waste disposal device of claim 55, wherein said motor actuation mechanism comprises a foot pedal coupled to said motor and arranged such that upon depression of said foot pedal, said motor is actuated.

57. The waste disposal device of claim 55, wherein said motor actuation mechanism comprises a pushbutton coupled to said motor such that upon depression of said pushbutton, said motor is actuated.

58. The waste disposal device of claim 55, wherein said motor actuation mechanism comprises a switch arranged on said container and coupled to said motor and a plunger arranged on said lid to engage said switch when said lid is closed.

59. The waste disposal device of claim 51, wherein said retention unit comprises a pail having a retention member extending upward from a base of the pail and adapted to hold the waste package between said retention member and walls of said pail, said rotation means comprising a turntable arranged below said pail to selectively engage said pail and a string wound partially about said turntable to cause rotation of said turntable and thus said pail when said string is pulled.

60. The waste disposal device of claim 51, wherein said retention unit comprises:

a frame defining a waste passage through which the waste package passes;

resilient springs connected to said frame and extending inward into said waste passage to engage with and hold the waste package;

a support flange connected to said frame for supporting said cartridge.

61. A waste disposal device, comprising:

a container defining a waste chamber for receiving encapsulated waste packages;

a lid coupled to said container and movable between an open position in which said chamber is accessible and a closed position in which said chamber is covered;

a toothed member attached to said lid;

a cartridge arranged in said container and containing a length of flexible tubing arranged to receive waste packages;

a retention mechanism for holding a waste package received in said tubing, said retention mechanism comprising a gear rim; and

a rotation mechanism for rotating said retention mechanism relative to said cartridge in order to twist said tubing and encapsulate a waste package received in said tubing, said rotation mechanism engaging with said toothed member and said gear rim during movement of said lid and comprising at least one gear for enabling the conversion of movement of said lid to rotational movement of said gear rim and thus said retention mechanism.

62. The waste disposal device of claim 61, wherein said retention mechanism further comprises a frame attached to said gear rim and including a plurality of resilient springs adapted to engage with the waste package.

63. The waste disposal device of claim 61, wherein said rotation mechanism is constructed to convert movement of said lid in a downward direction to rotational movement of said gear rim and prevent movement of said lid in an upward direction from being converted to rotational movement of said gear rim.

64. The waste disposal device of claim 61, wherein said toothed member comprises a rack gear having a series of teeth on an outer or inner arcuate surface.

Attorney Docket No.: PLA-116(CIP)

65. The waste disposal device of claim 61, further comprising an anti-rotation mechanism for holding said cartridge stationary during rotation of said retention mechanism.

66. A waste disposal device, comprising:

a container defining a waste chamber for receiving encapsulated waste packages;

a lid coupled to said container and movable between an open position in which said chamber is accessible and a closed position in which said chamber is covered;

a cartridge arranged in said container and containing a length of flexible tubing arranged to receive waste packages;

a retention mechanism for holding a waste package received in said tubing;

a rotation mechanism for rotating said retention mechanism relative to said cartridge in order to twist said tubing and encapsulate a waste package when held by said retention mechanism; and

compacting means for compacting the waste packages.

67. A waste storage device comprising a container comprising a receptacle and a lid attached to said receptacle, a retention mechanism holding a cassette or cartridge, and a rotation mechanism for rotating the cassette or cartridge, said cassette or cartridge comprising a flexible tubing for packaging waste material, said cassette further comprising a sensing mechanism for activating an electronic detection mechanism for counting revolutions of the cassette during operation of the device.

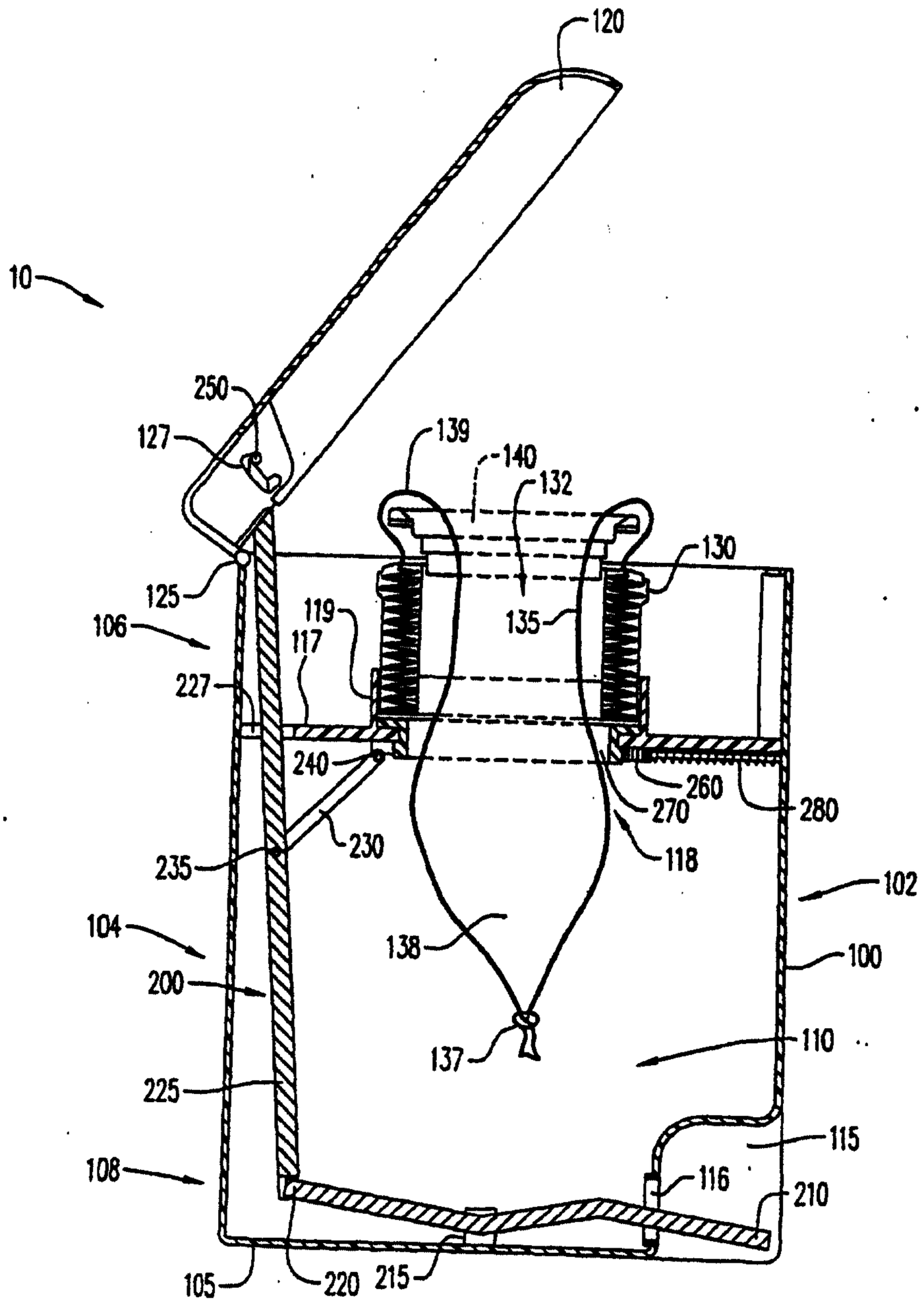

120
10
250
127
139
140
132
130
125
106
119
117
135
227
240
260
270
280
230
235
118
102
104
138
100
200
137
110
225
115
108
116
210
105
220
215

FIG. 1

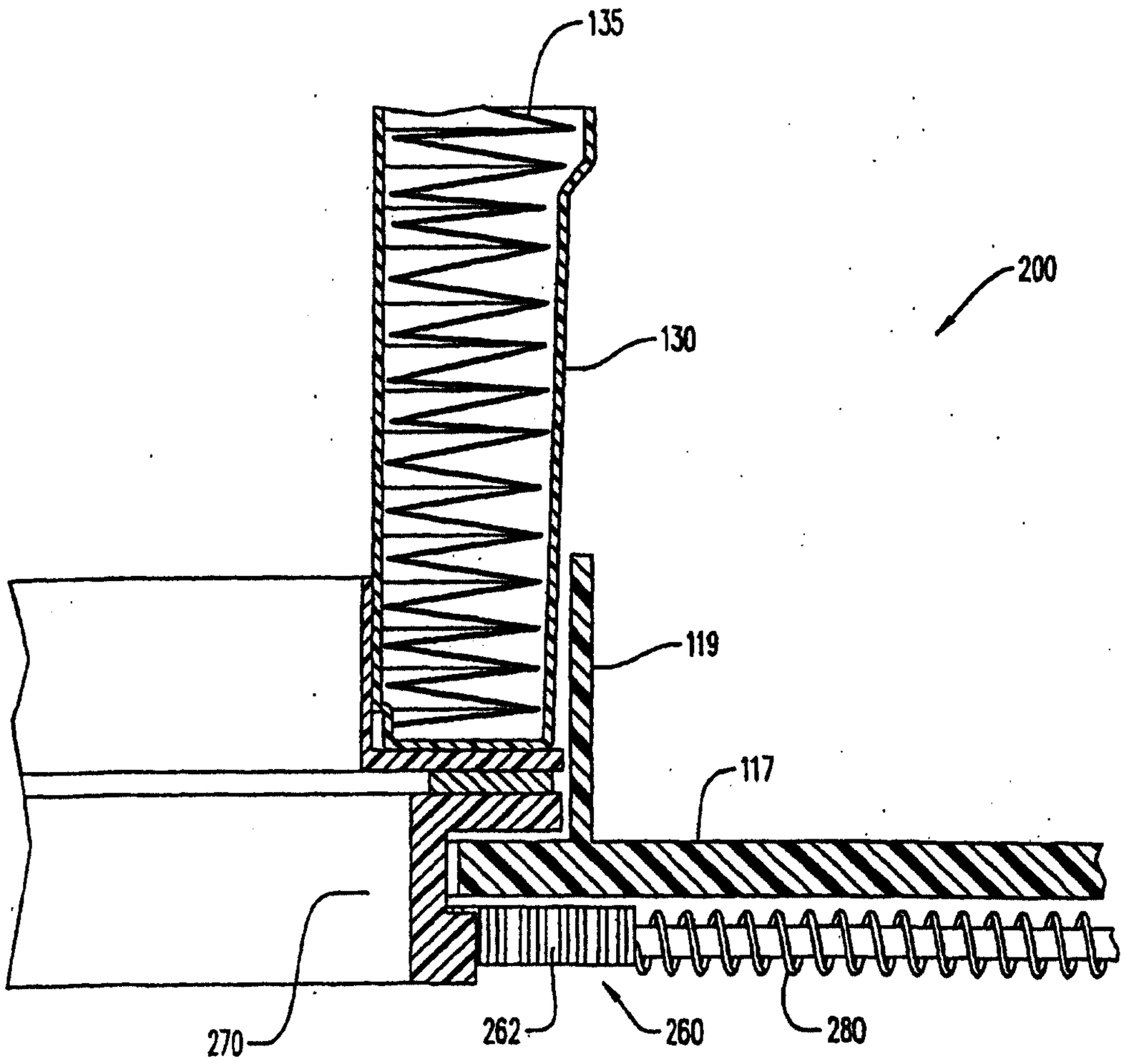


FIG. 2

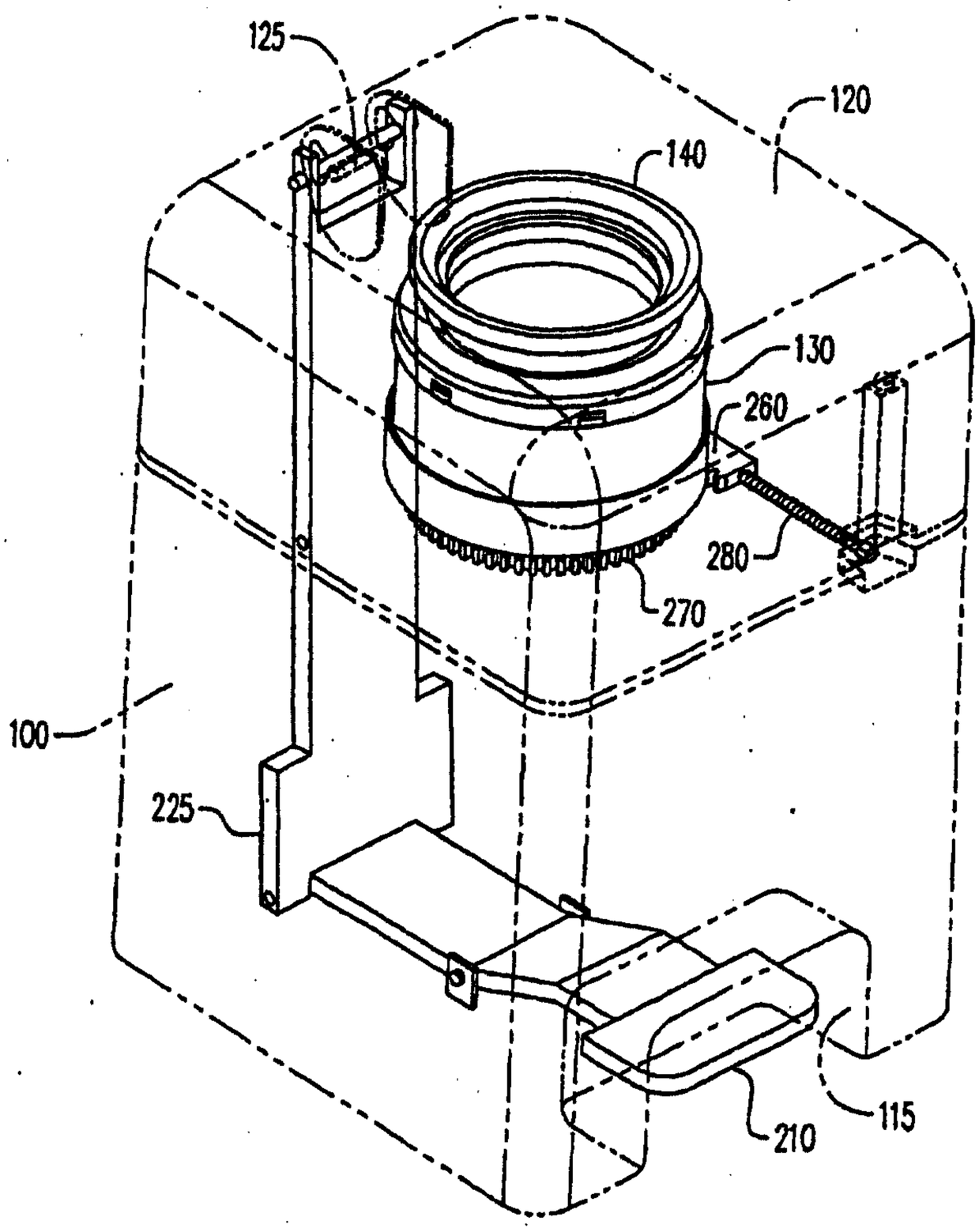


FIG. 3

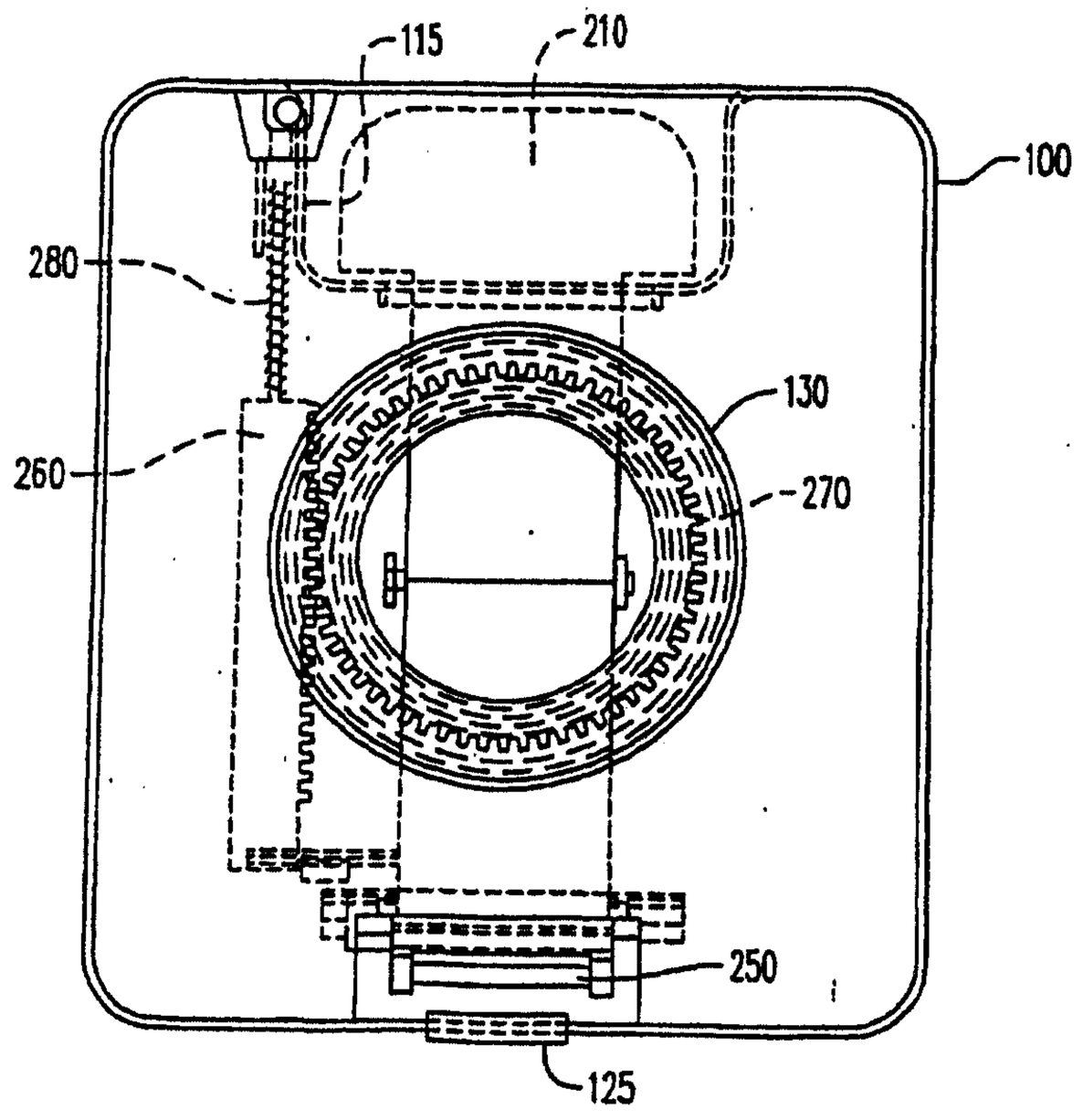


FIG. 4

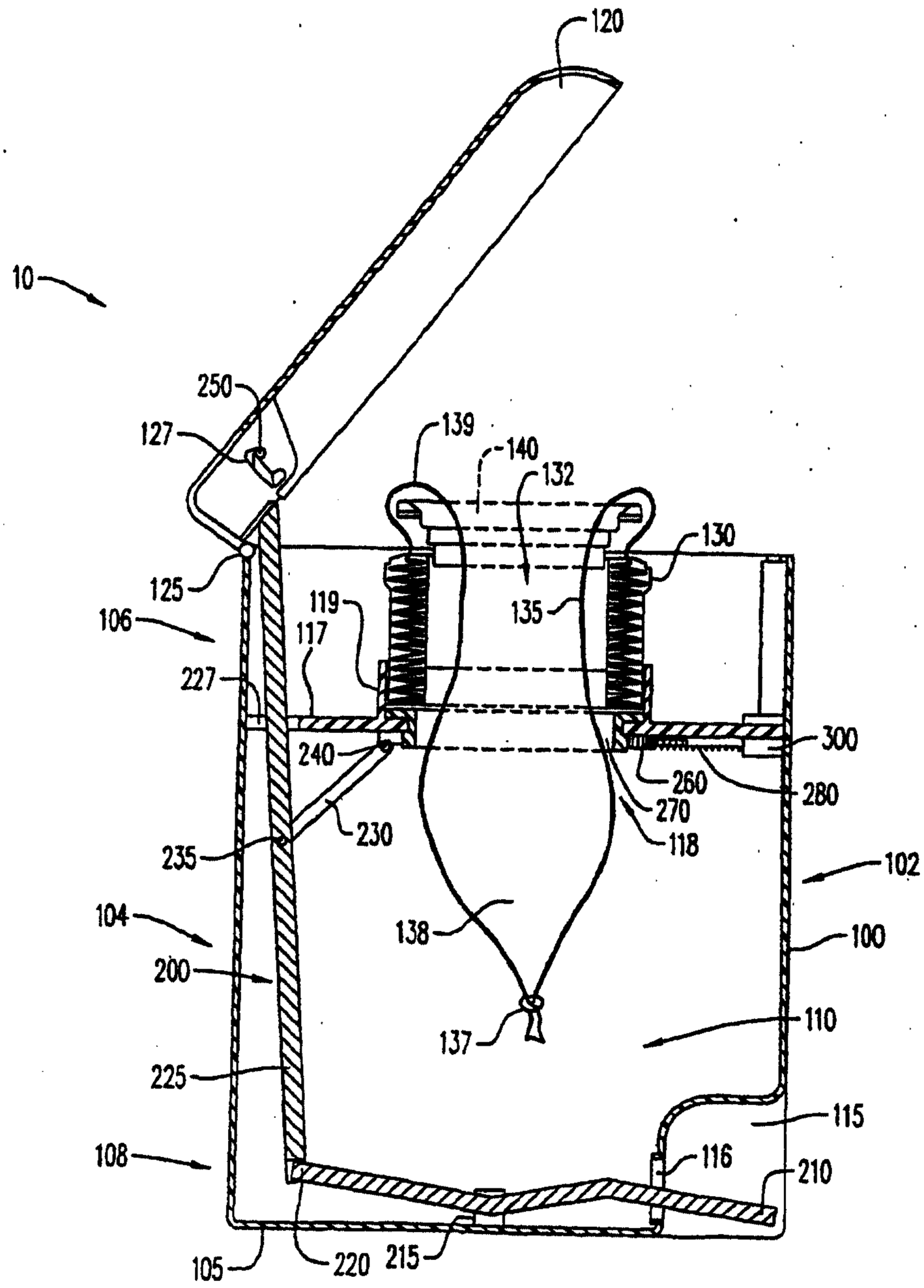

120
10
250
127
139
140
132
130
125
119
135
106
117
227
300
240
260
280
270
230
118
235
102
104
138
100
200
110
137
225
115
108
116
210
105
220
215

FIG. 5

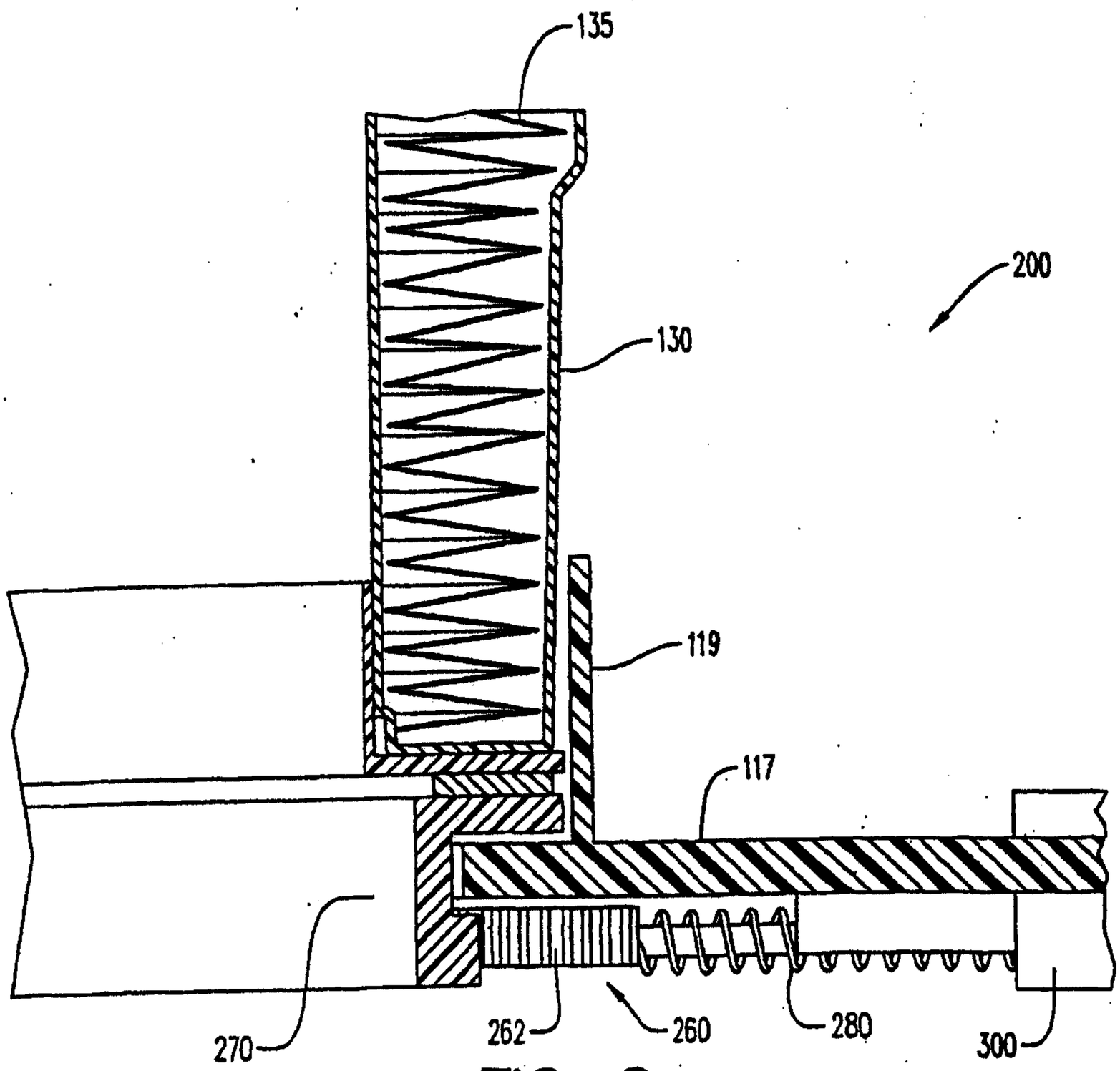


FIG. 6

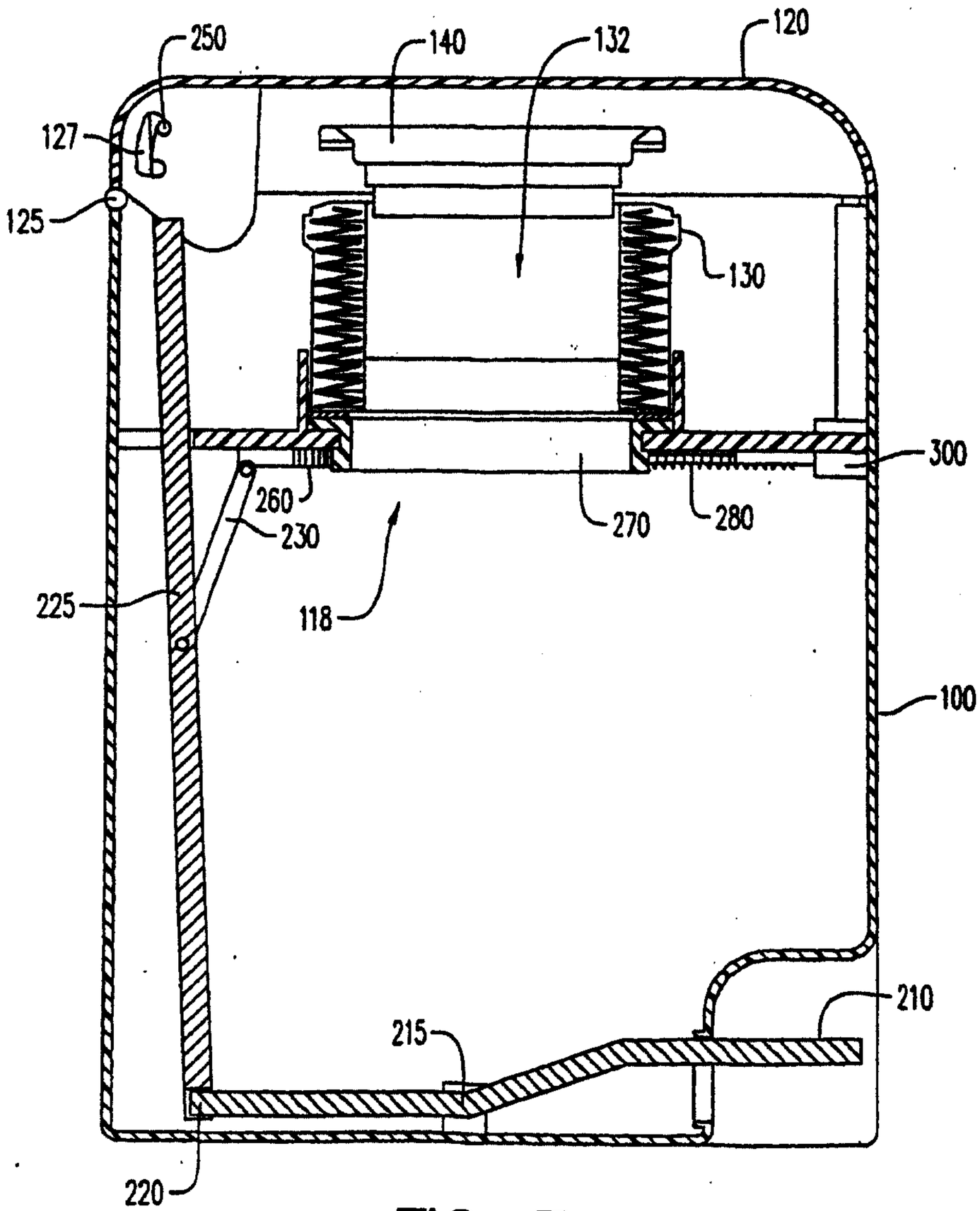

250
140
132
120
127
125
130
300
260
230
270
280
225
118
100
210
215
220

FIG. 7

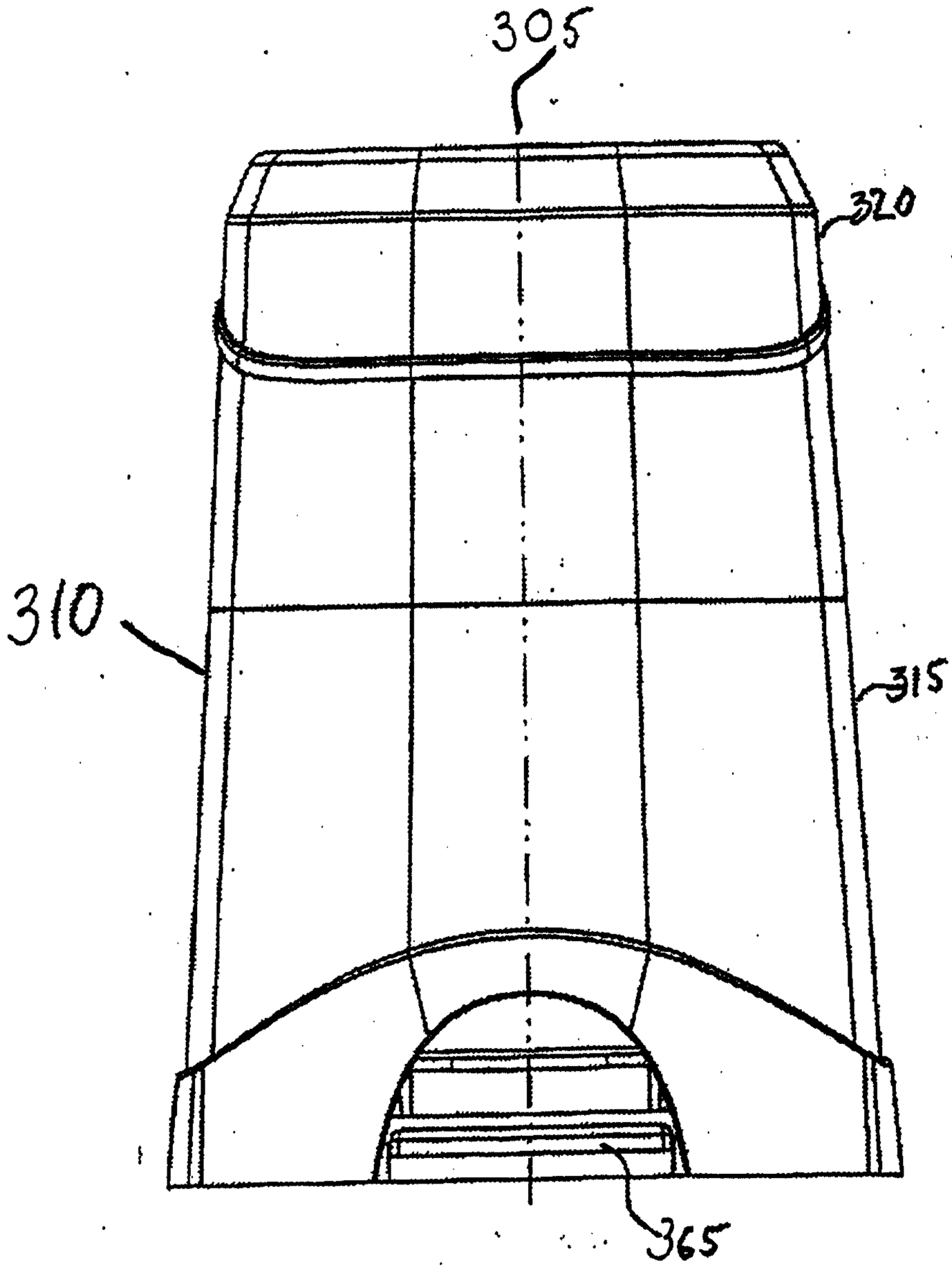


FIG. 8

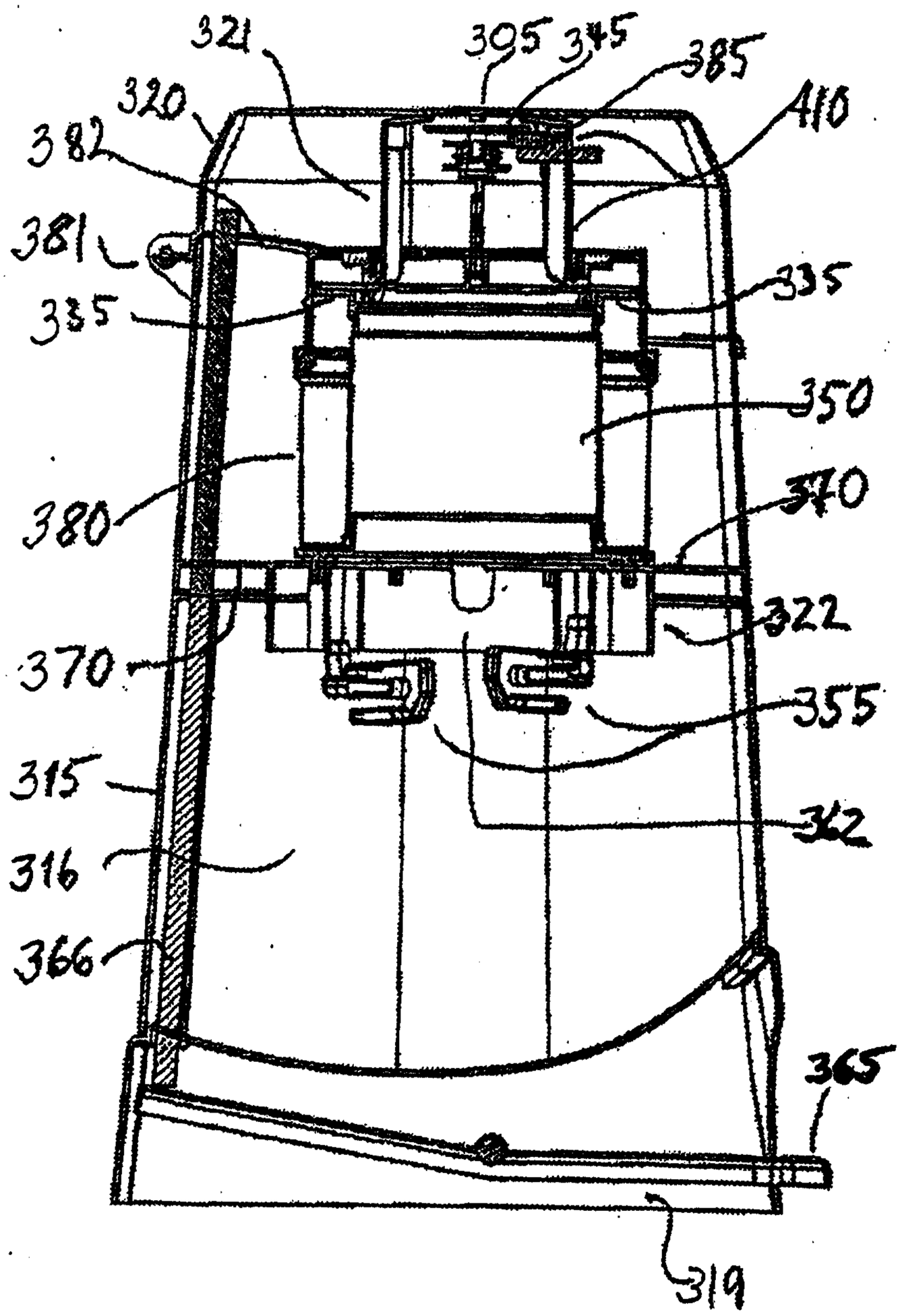

321
305
345
385
320
410
382
381
335
335
350
380
370
322
370
355
315
342
316
366
365
319

FIG.9

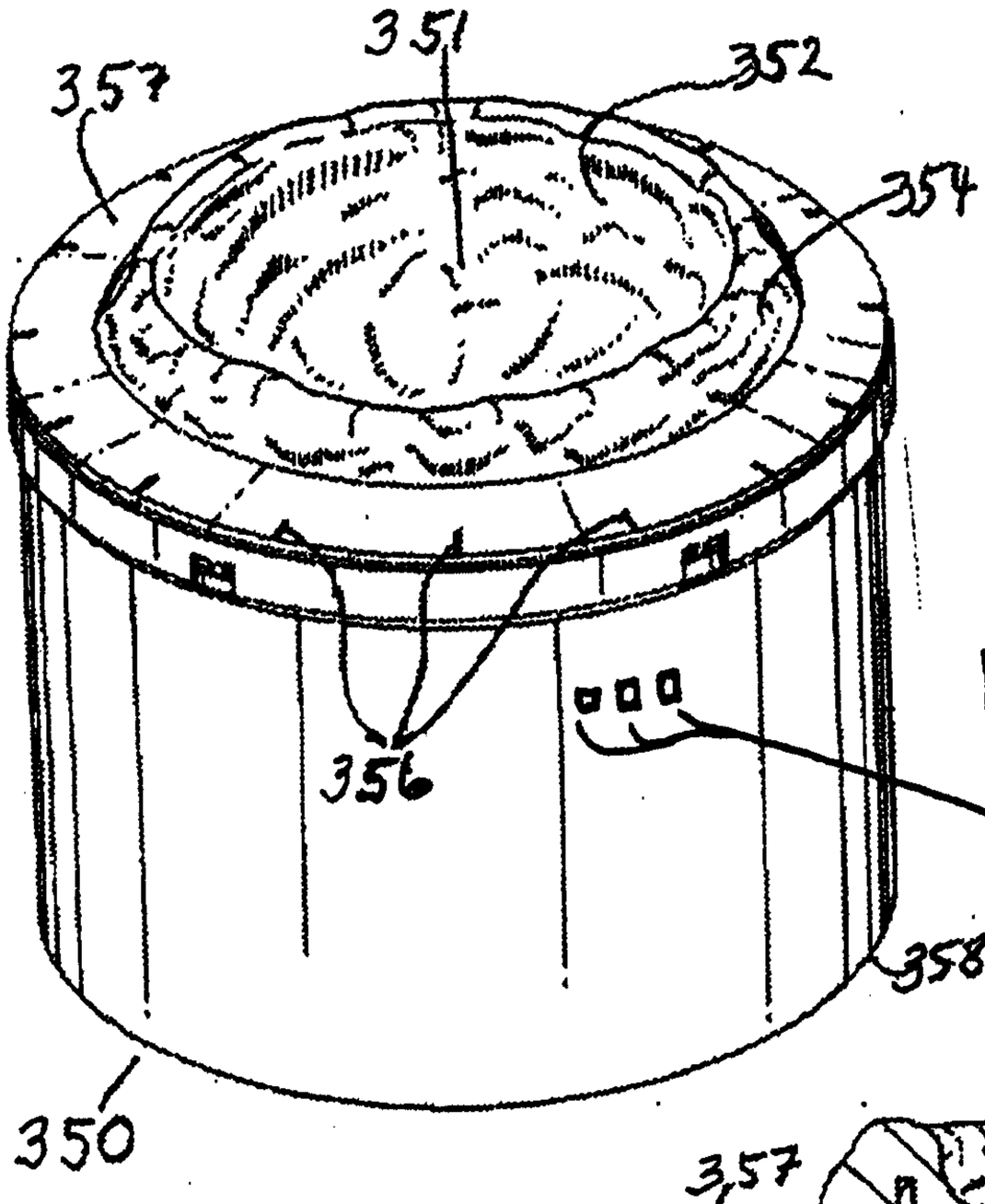


FIG. 10

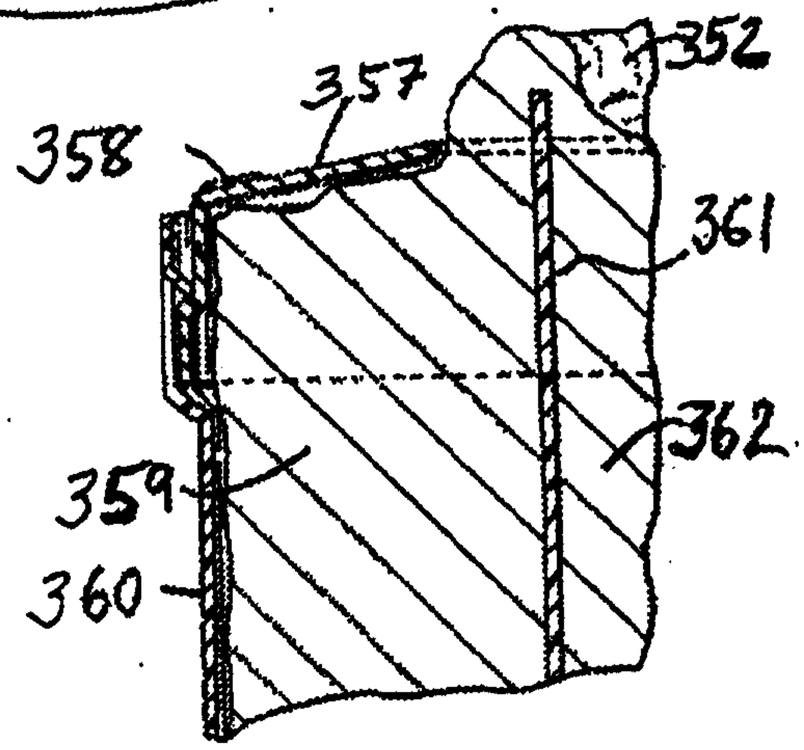


FIG. 11

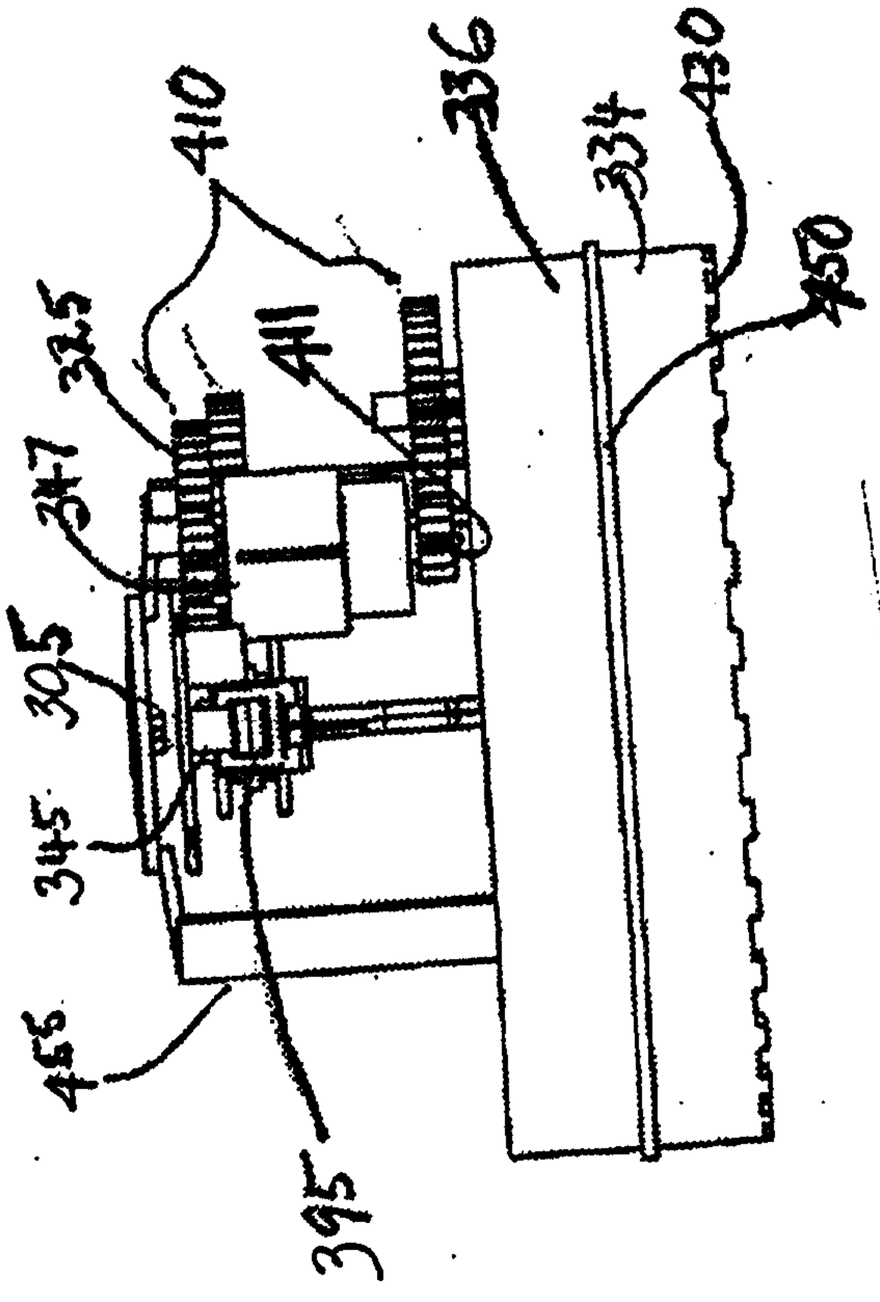


FIG. 12

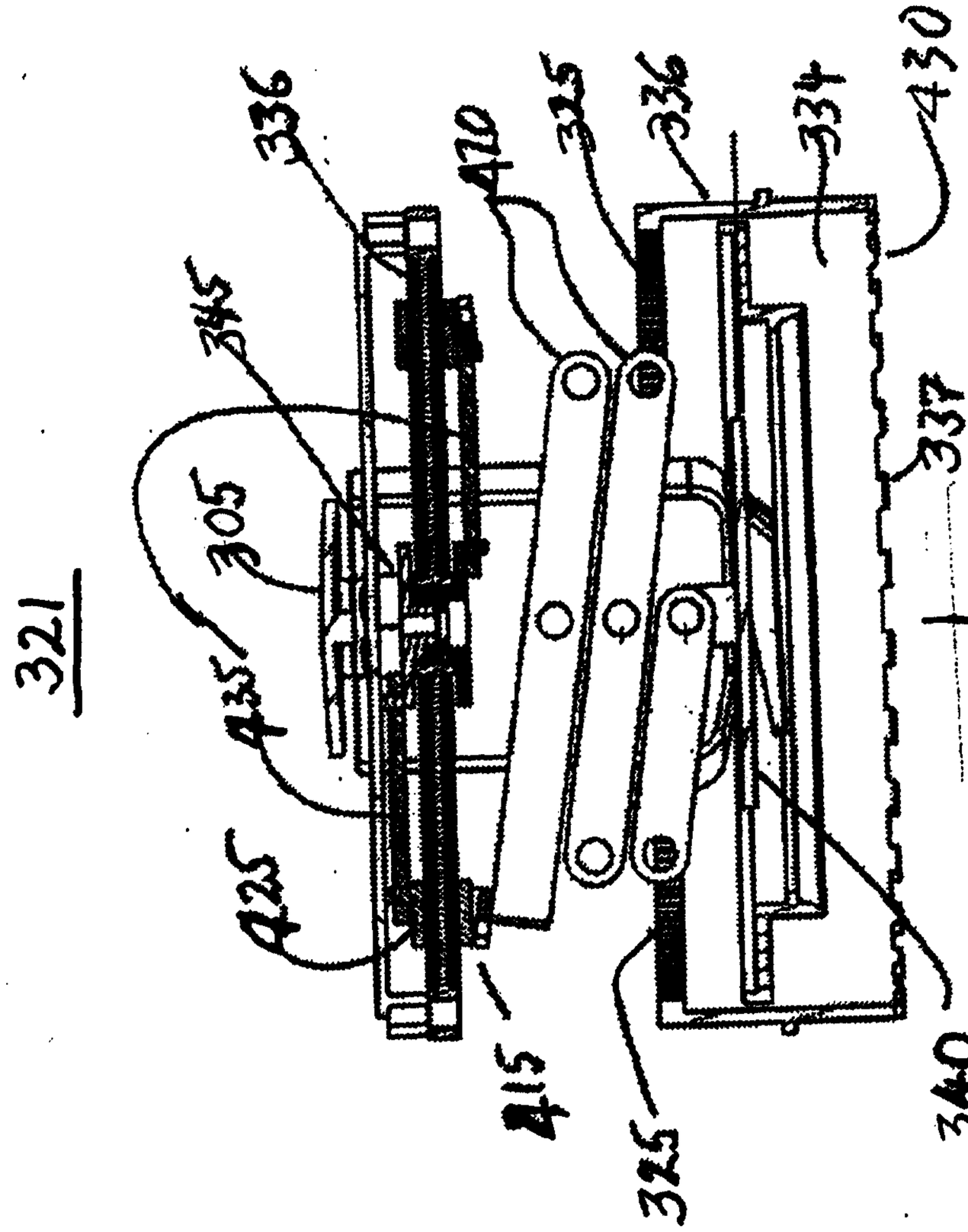


FIG. 13

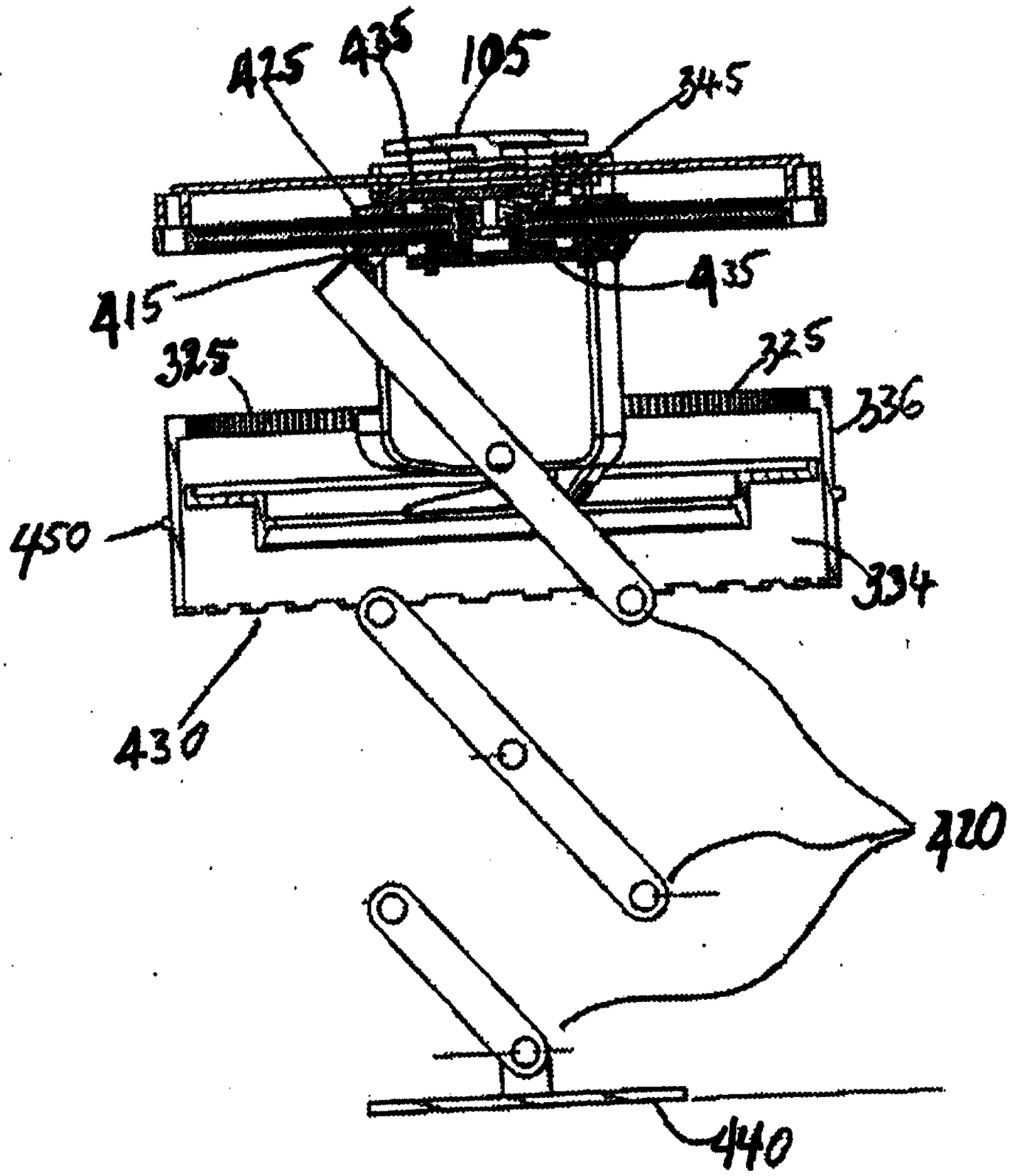


FIG. 14

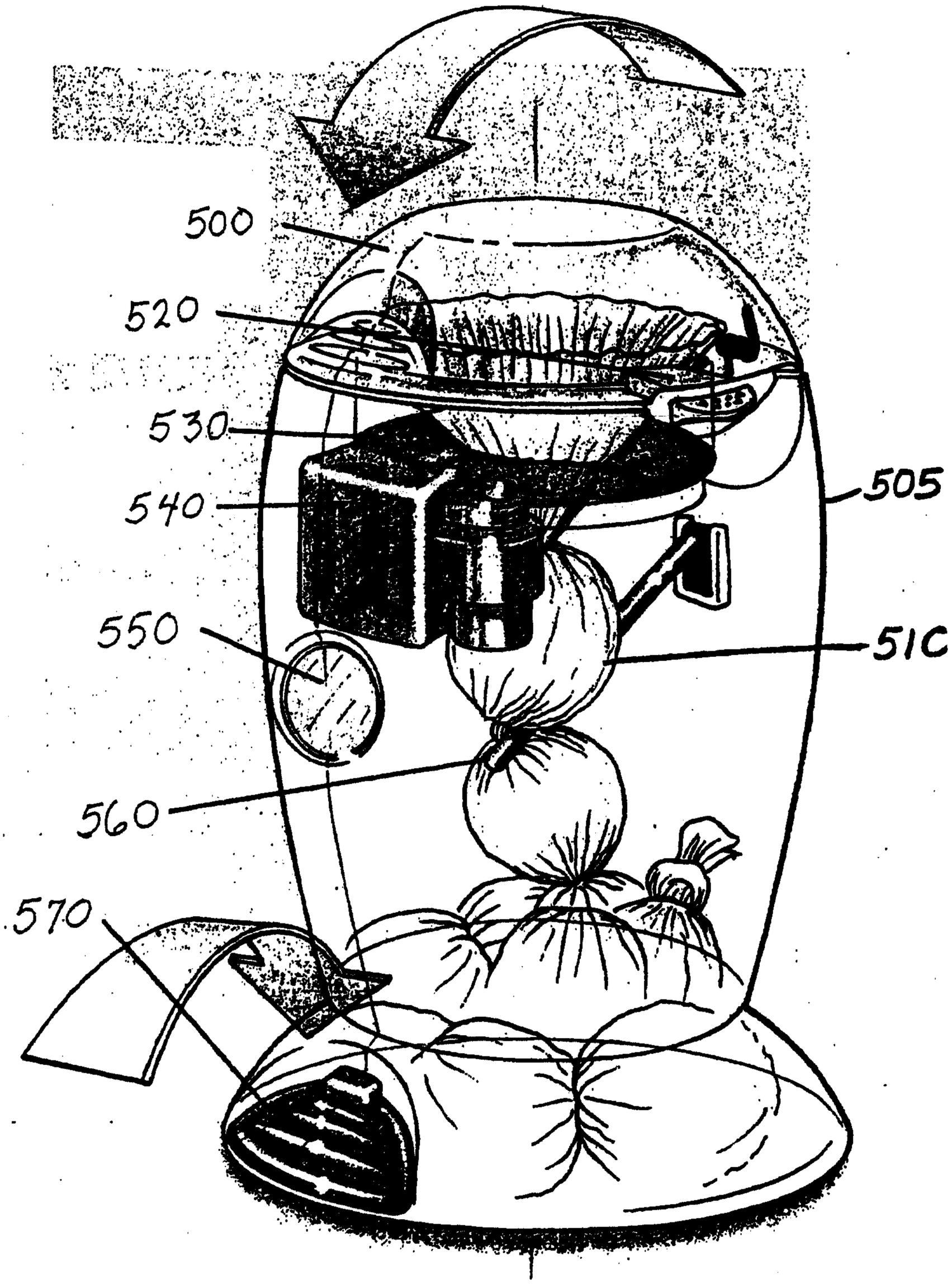


FIG. 15

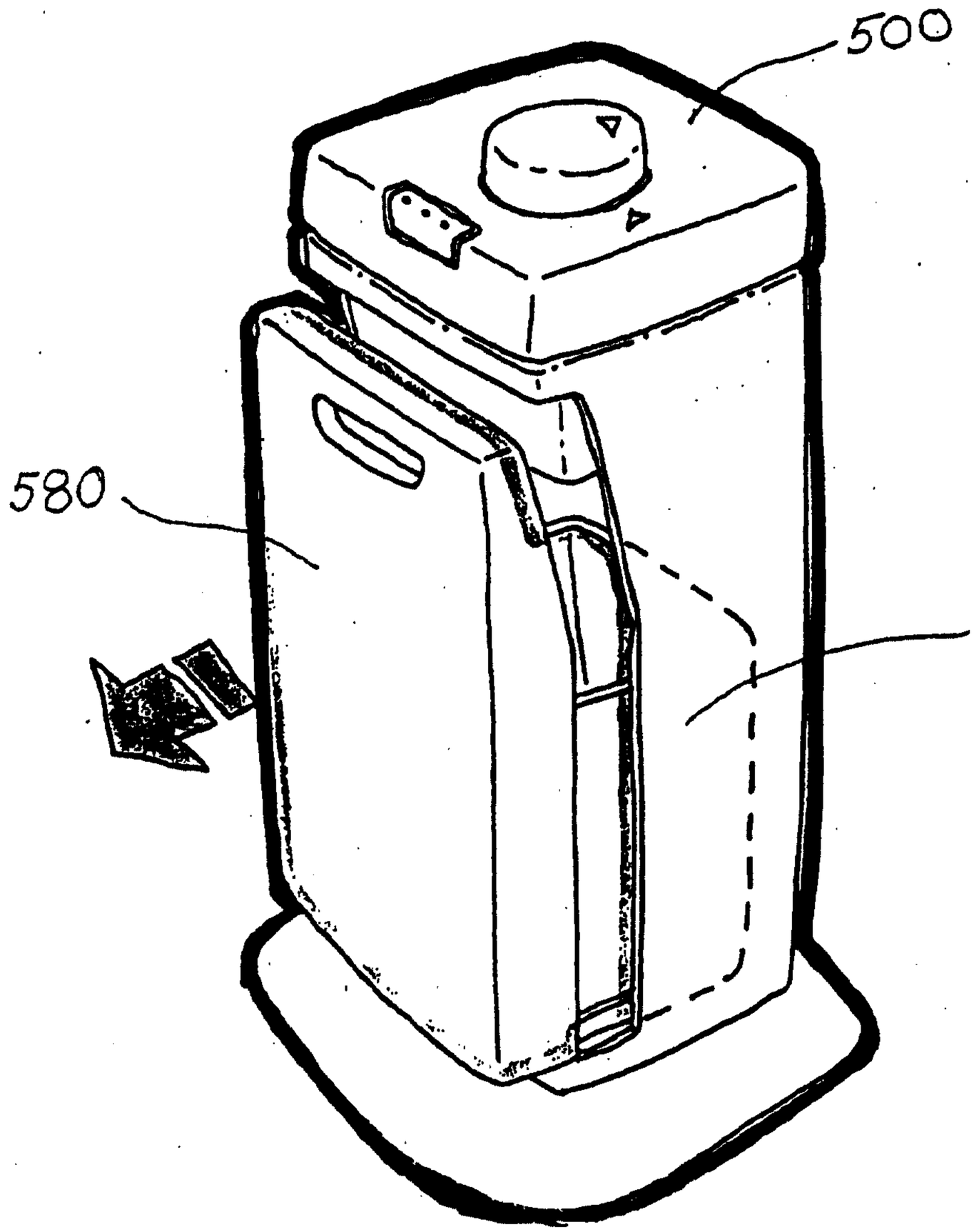


FIG. 16

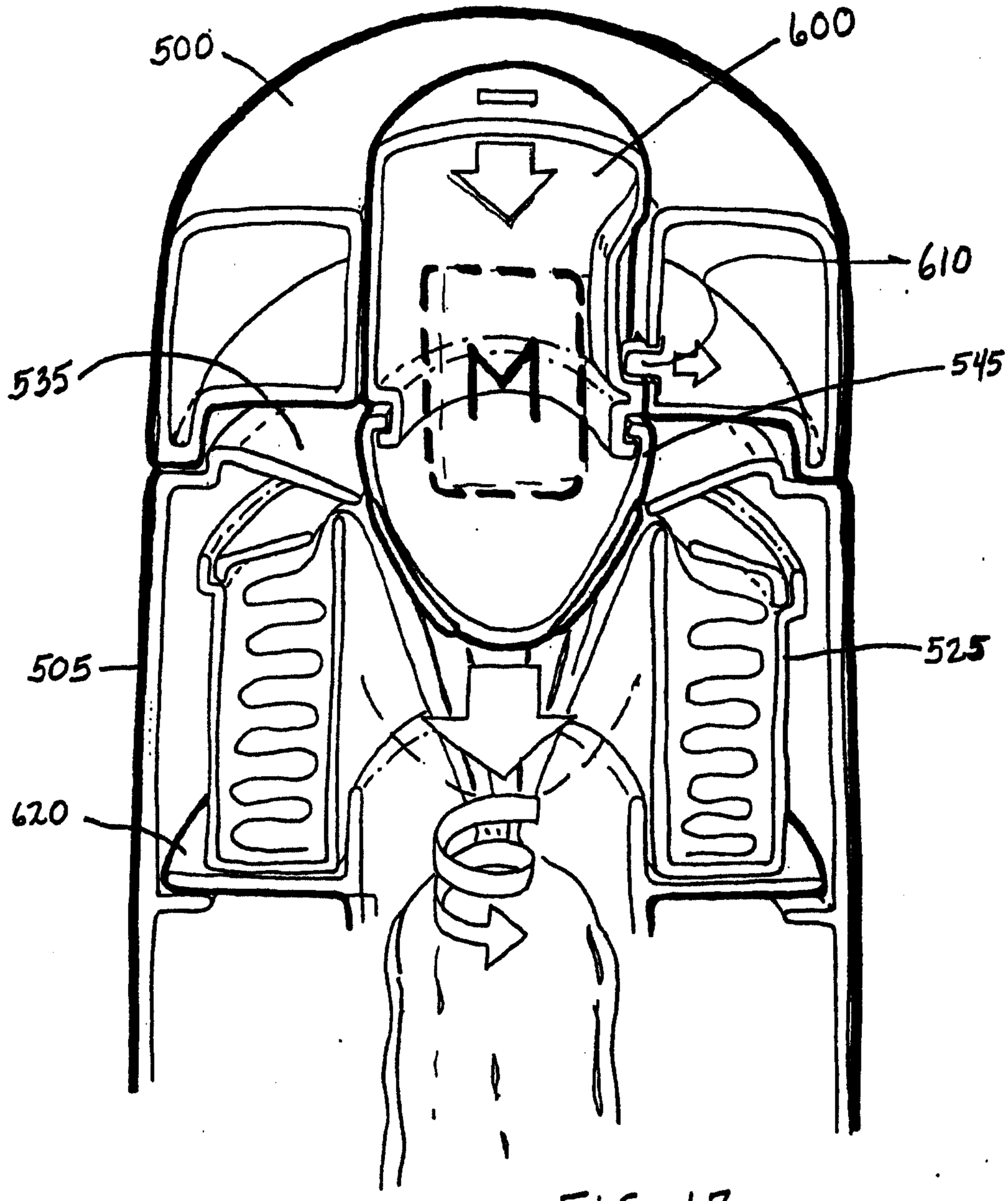


FIG. 17

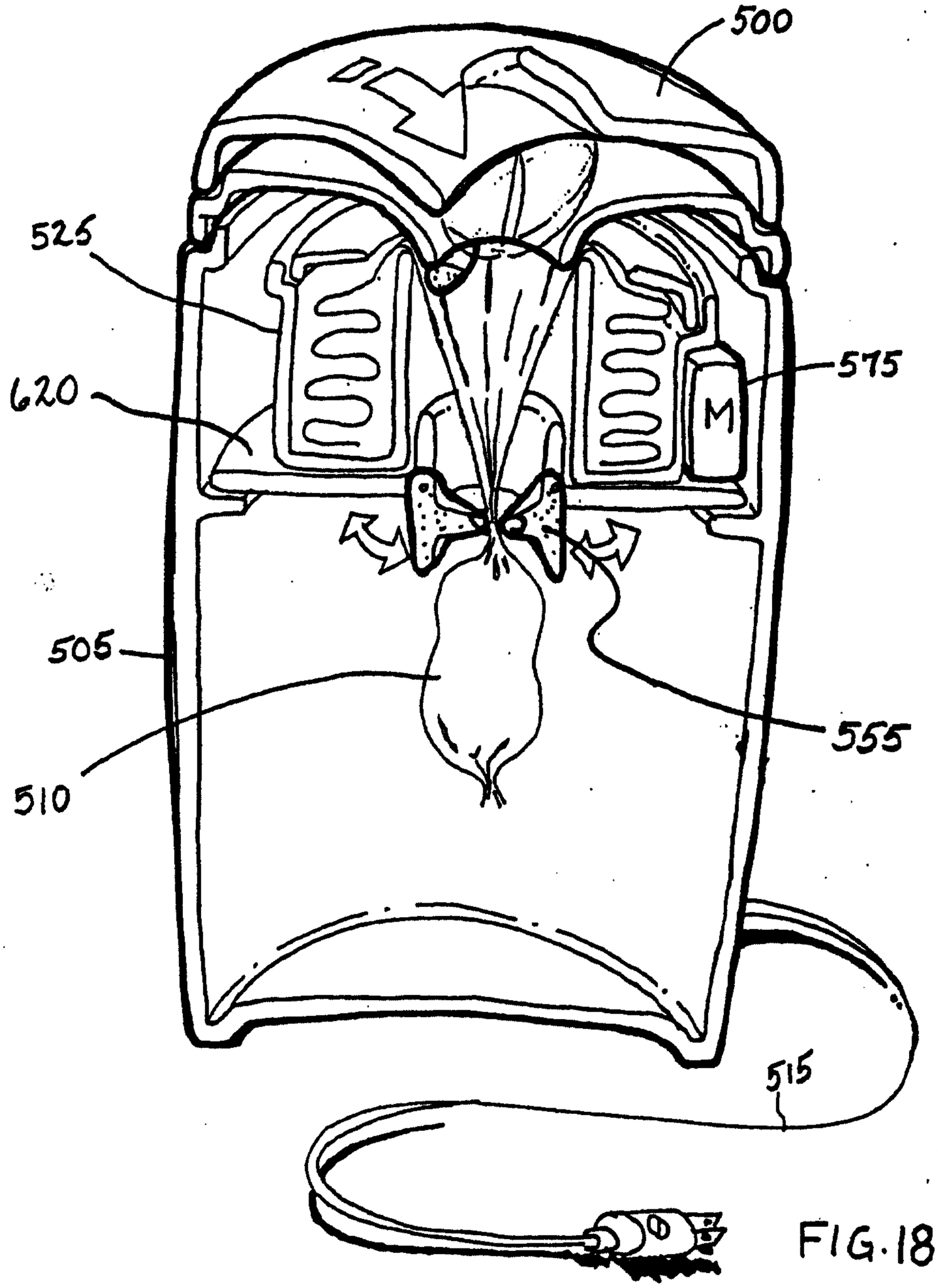


FIG.18

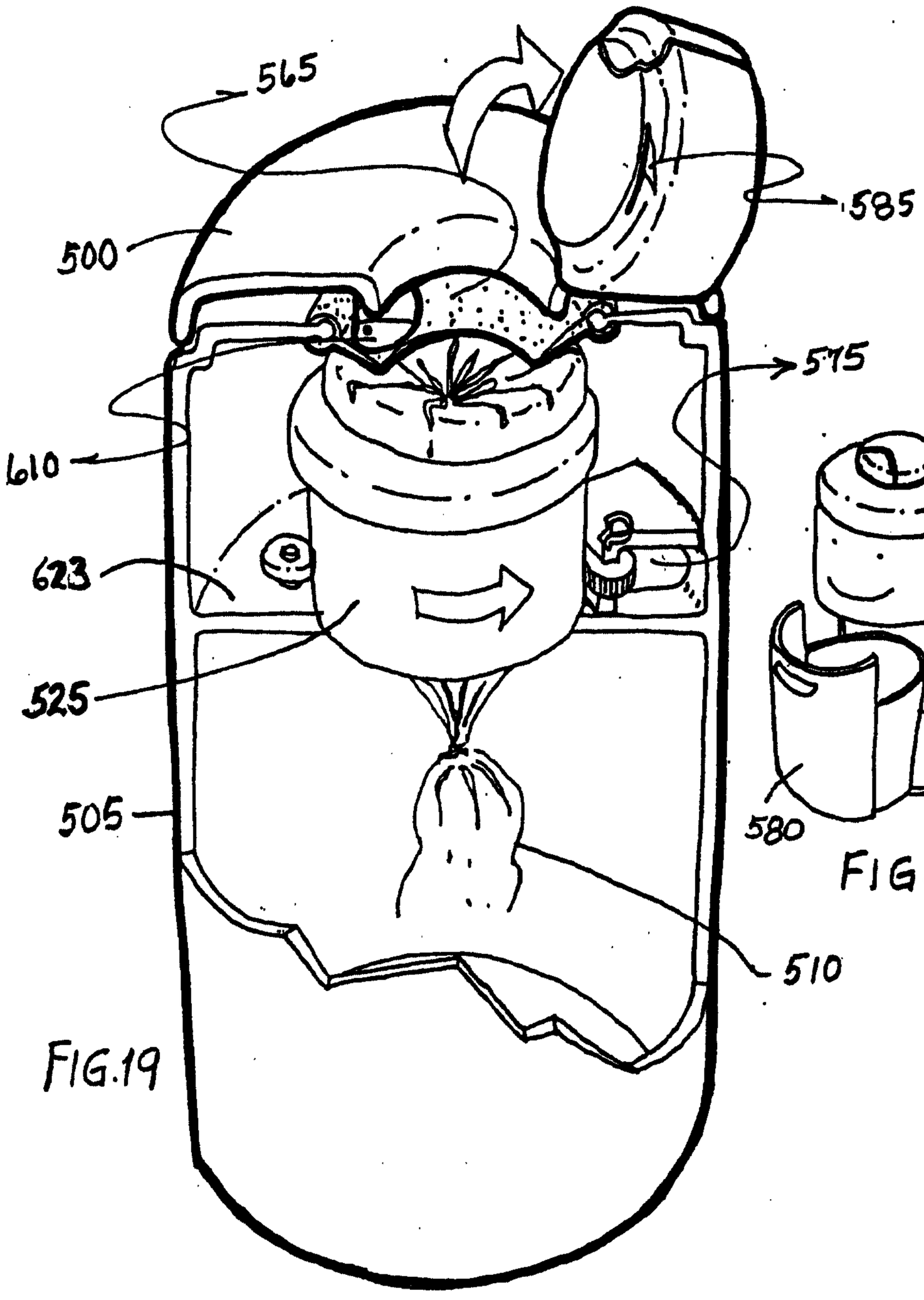


FIG.19

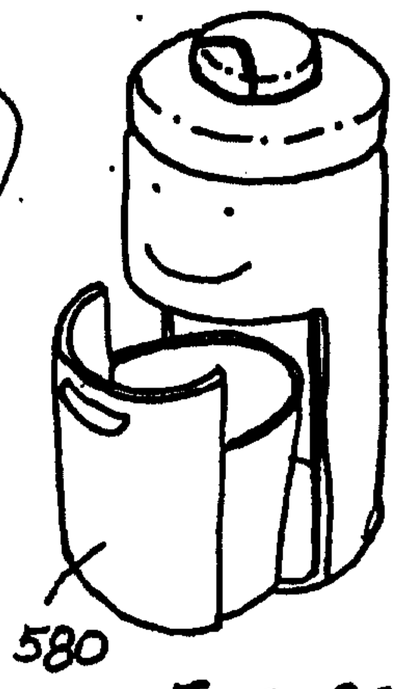


FIG.20

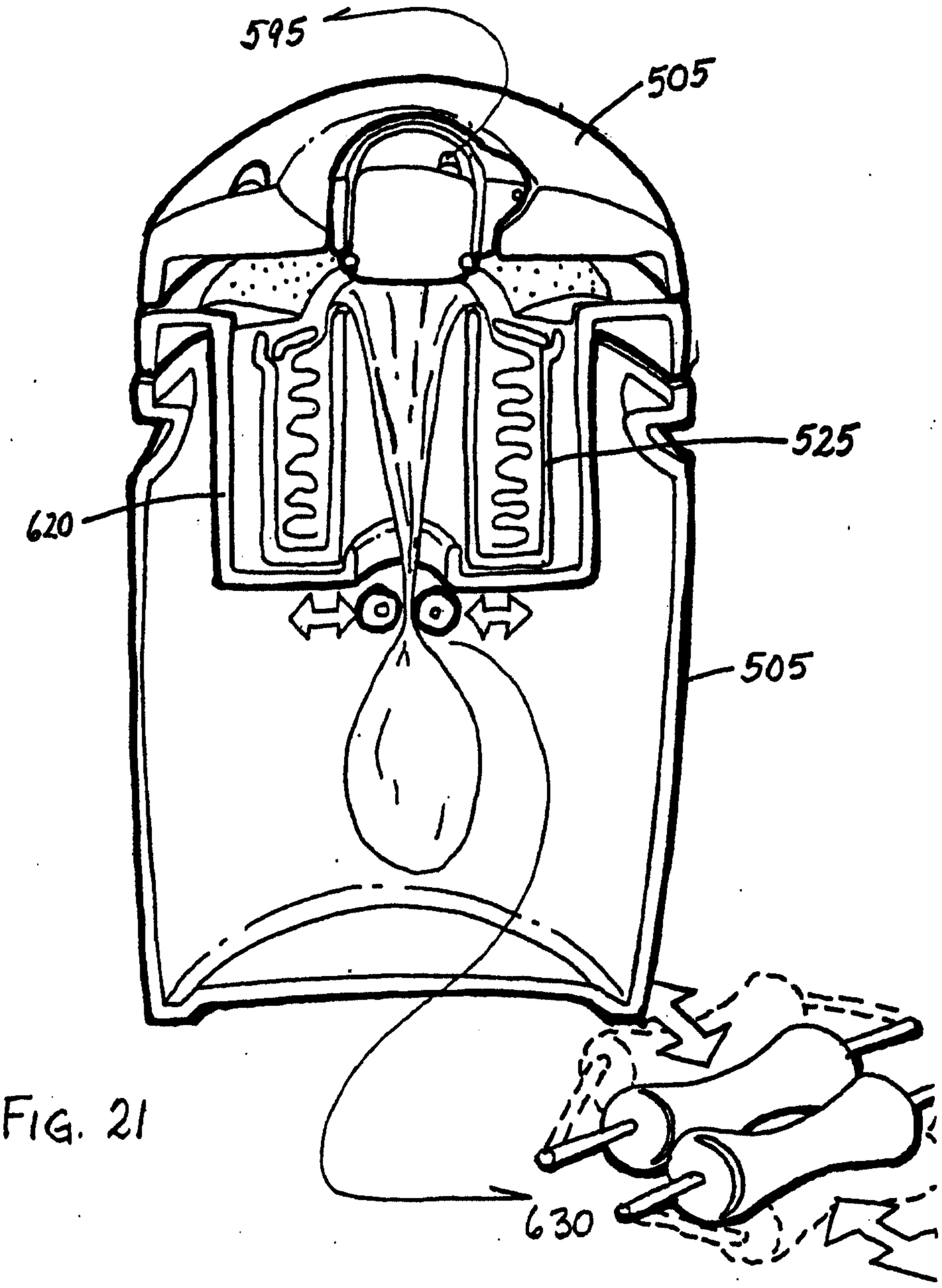


FIG. 21

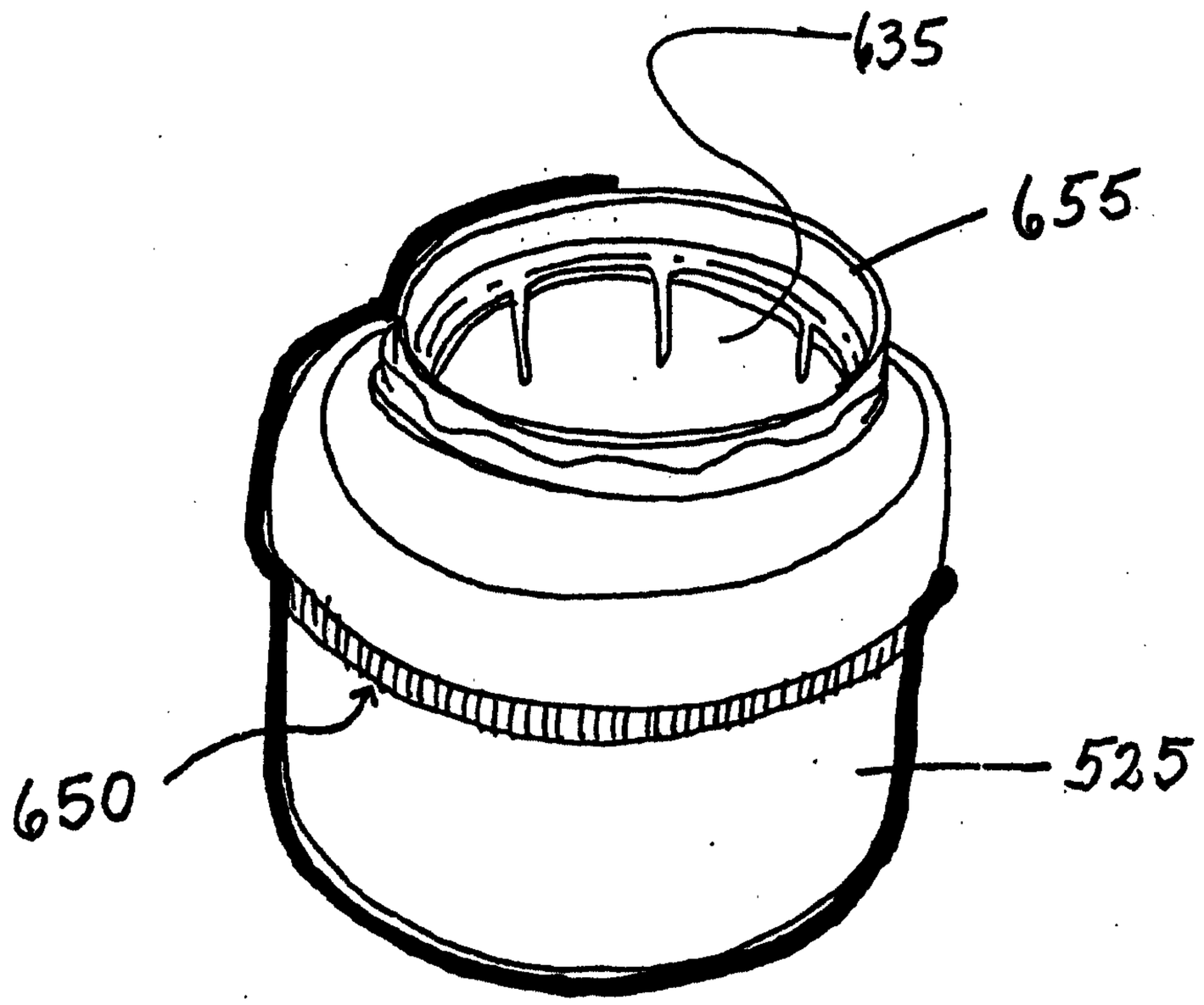


FIG. 22

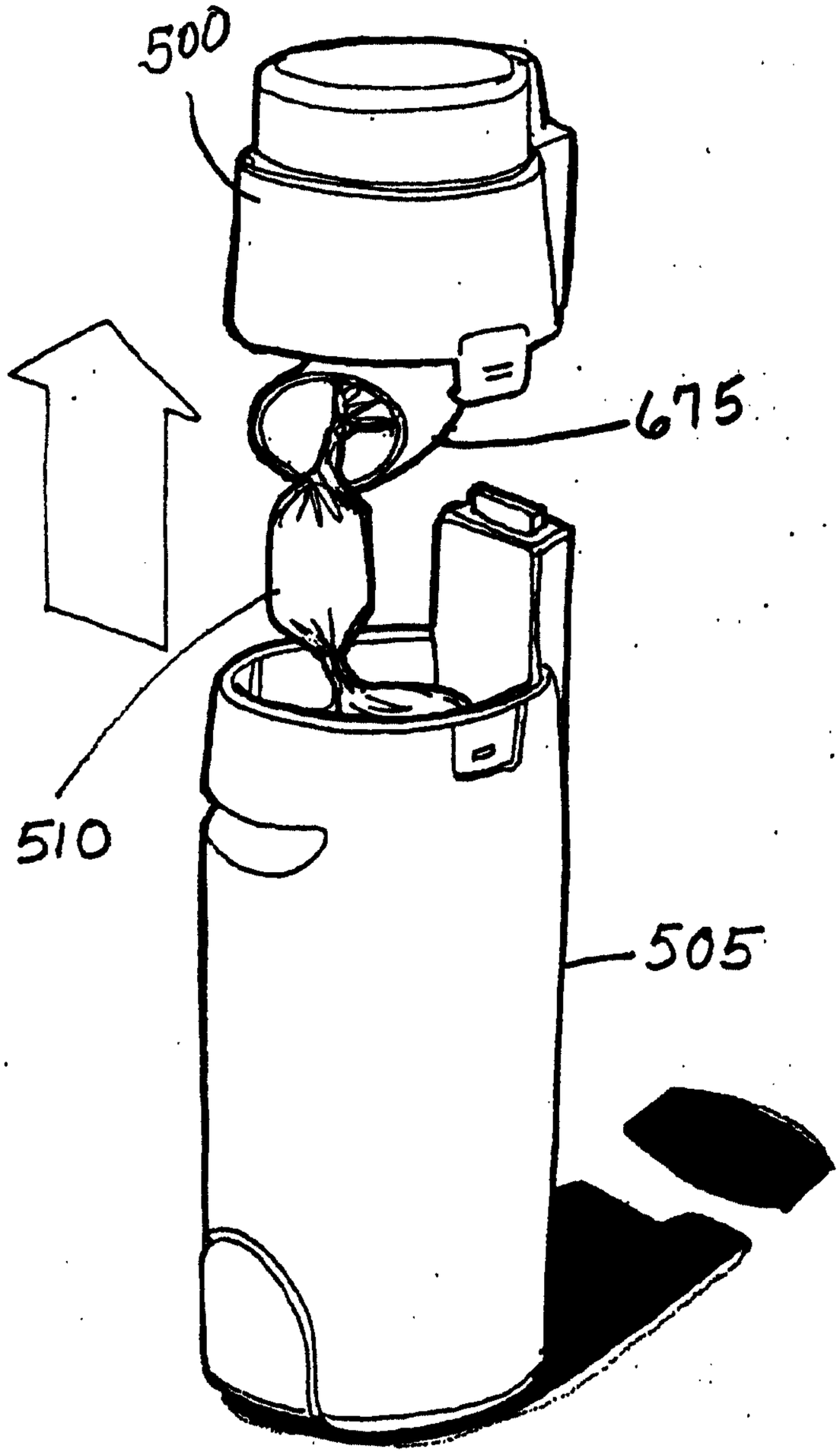


FIG. 23

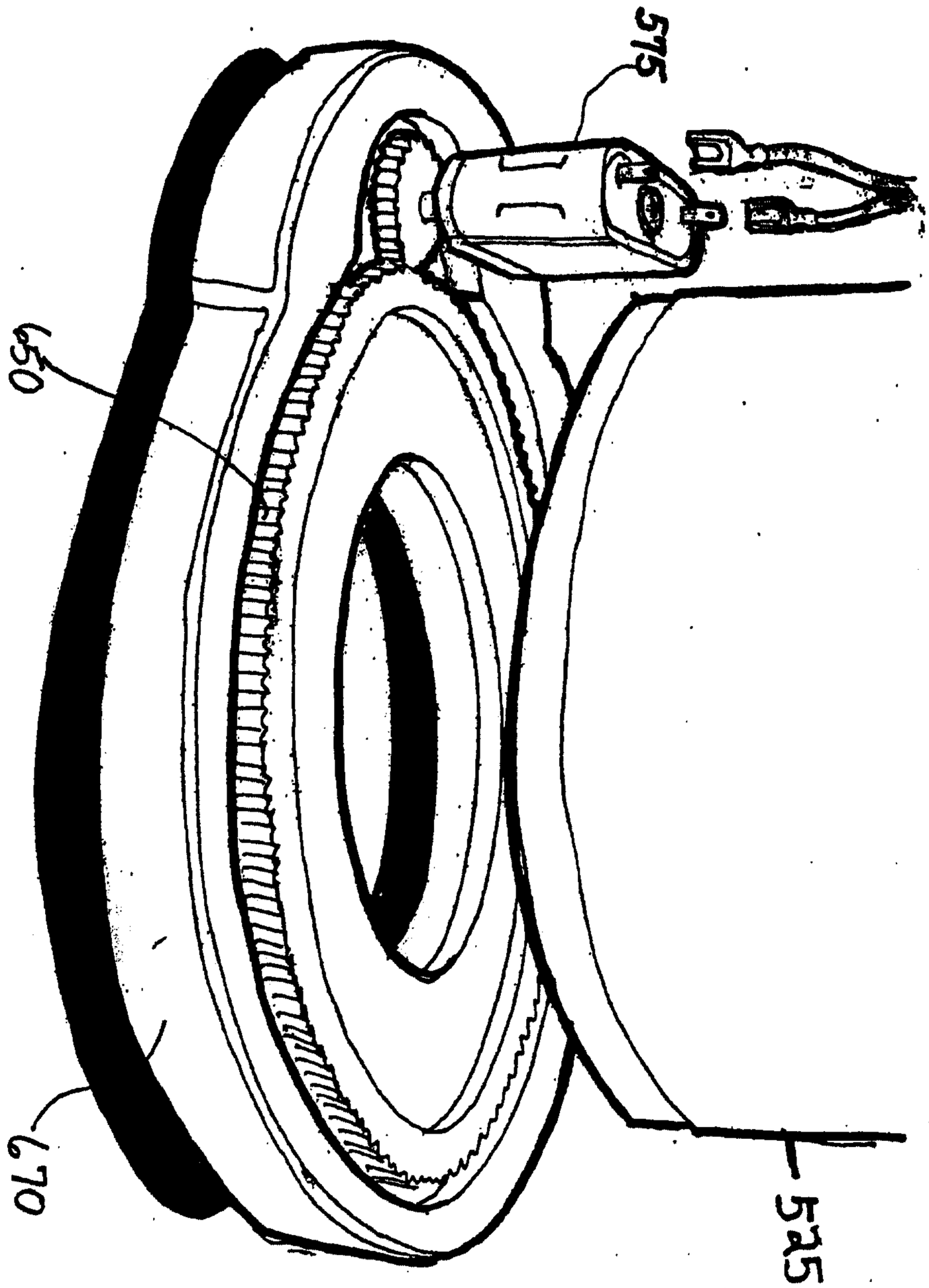


FIG. 24

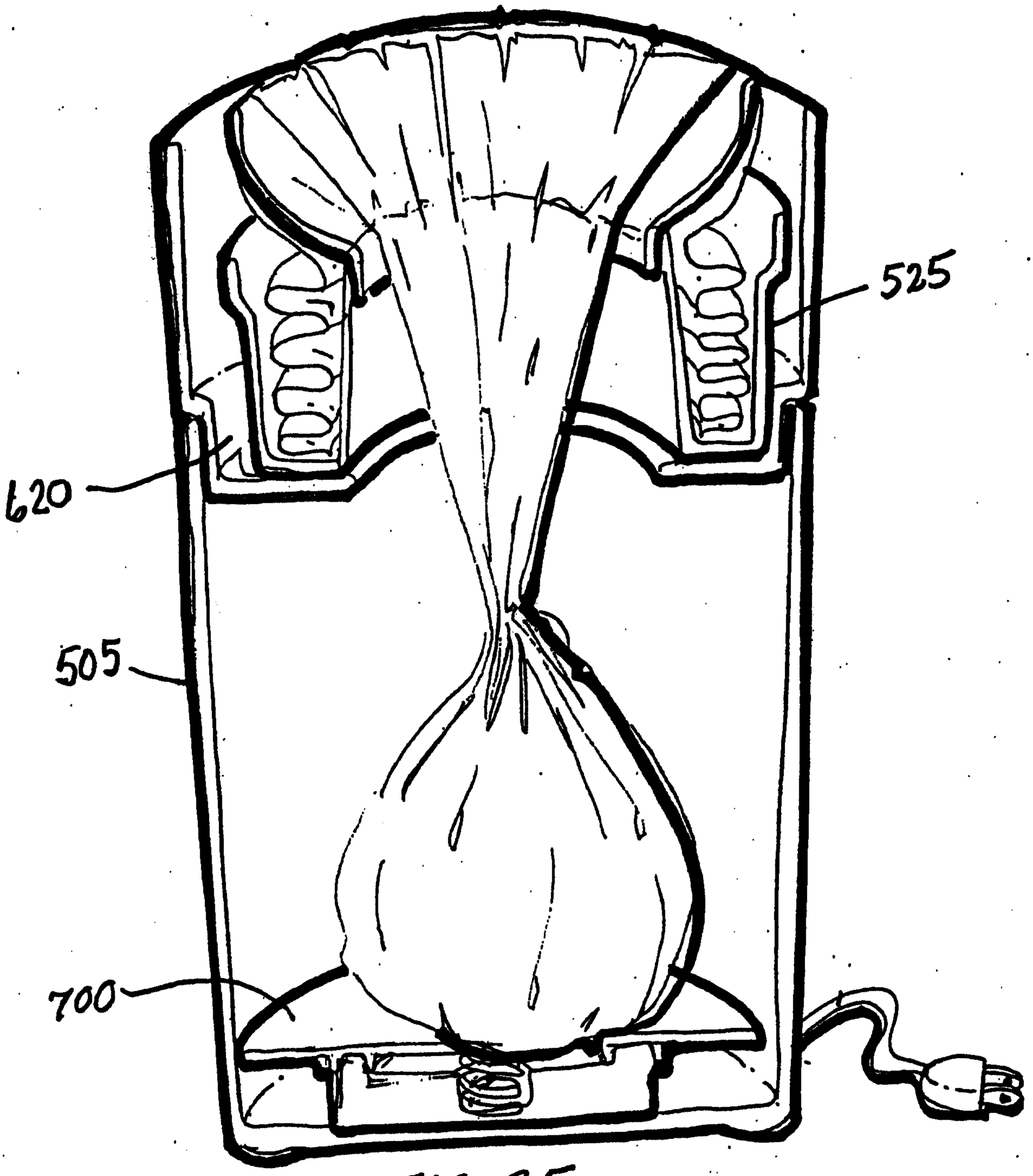


FIG. 25

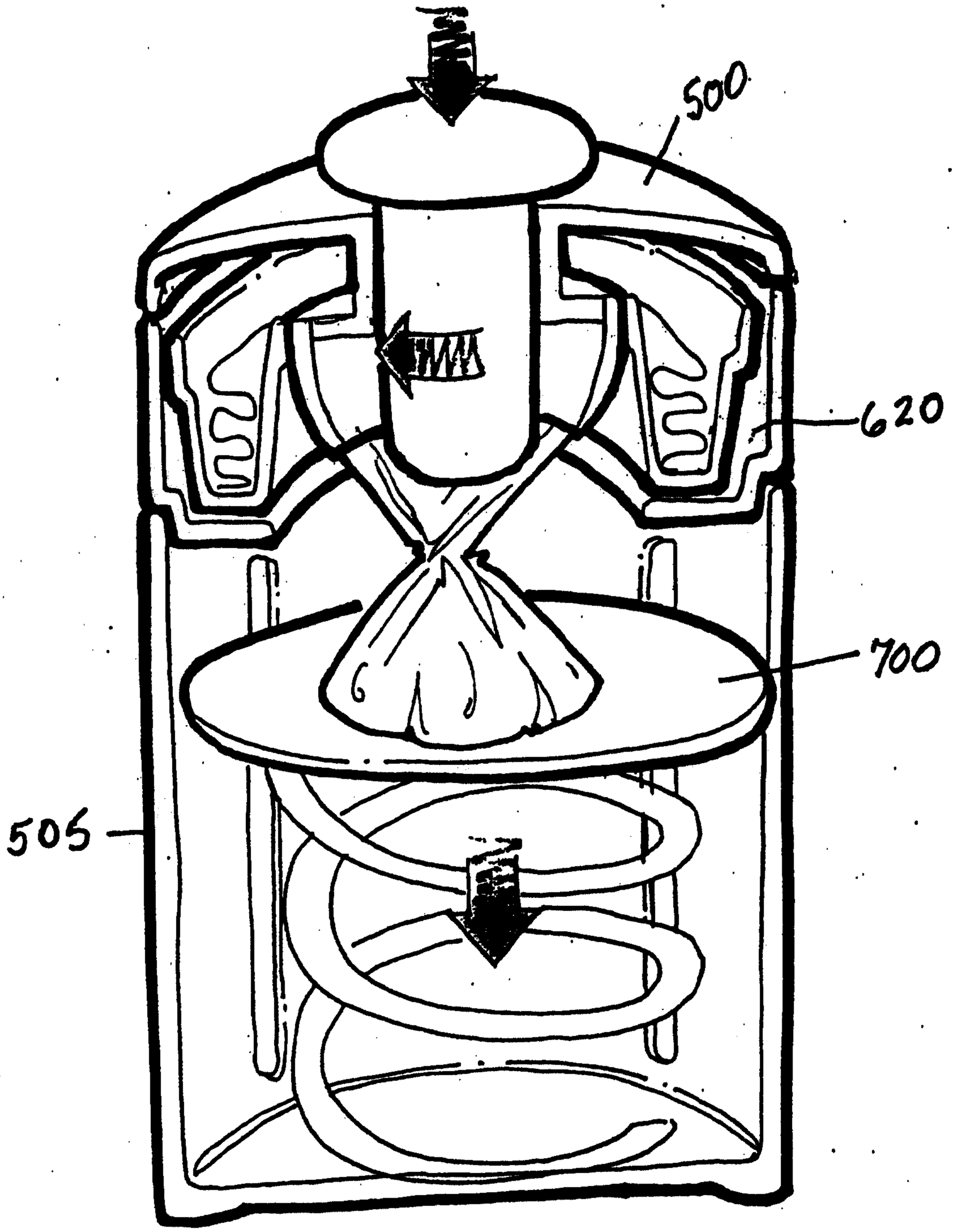
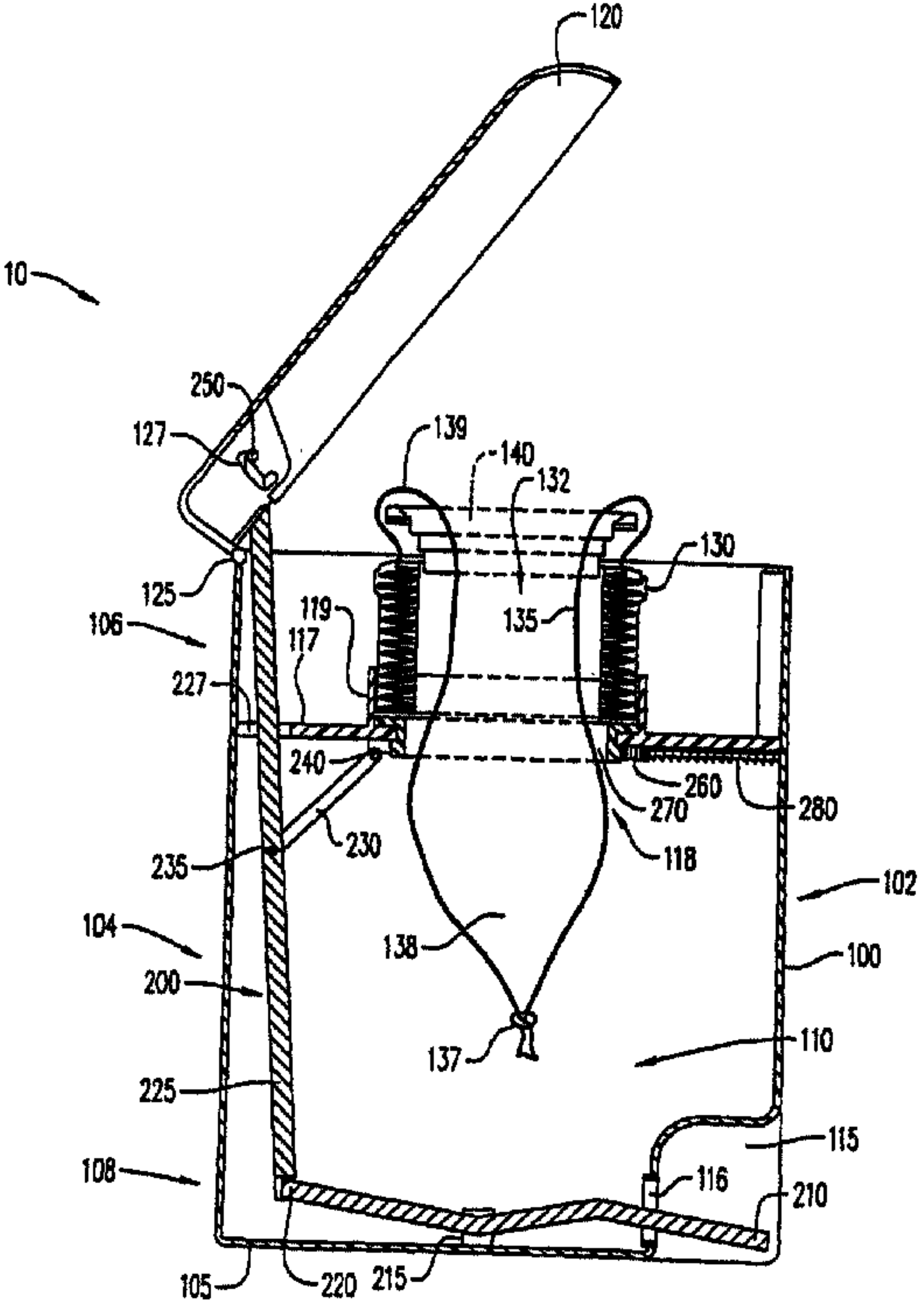


FIG. 26


120
10
250
127
139
140
132
130
125
119
135
106
117
227
240
260
270
280
230
235
118
102
104
138
100
200
137
110
225
115
108
116
210
105
220
215