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Acosta

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[54] **COUNTERBALANCE APPARATUS FOR A REFUSE CONTAINER LID**

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[51] **Int. Cl.** **B65d 43/16**

[58] **Field of Search** 220/35, 30, 30.5, 30.6, 220/36; 49/386

[56] **References Cited**

UNITED STATES PATENTS

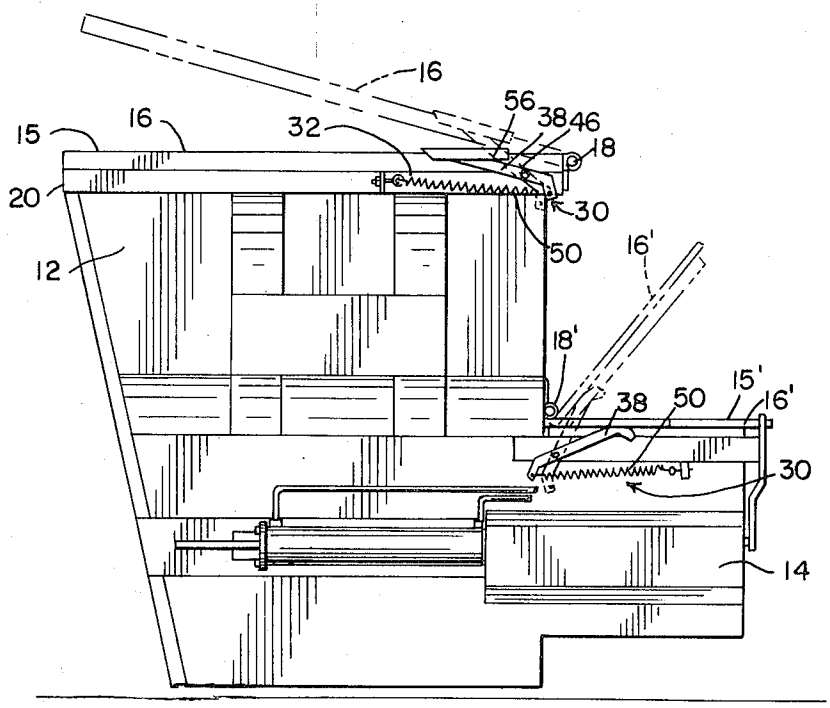
1,716,394	6/1929	Trammel	49/386 X
2,358,561	9/1944	Davis	220/35
2,686,340	8/1954	Shepard et al.	328/267
2,827,003	3/1958	Stetson	220/35 X
2,888,162	5/1959	Herpich	220/35

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[57] **ABSTRACT**

A counterbalance apparatus particularly adapted for use in controlling the closing of metal lids on large refuse containers having a lift arm means pivotally mounted on an upper portion of the container, and a resilient means connected to the container at one end and having its opposite end connected to a first end of the lift arm means. The resilient means acts to move the lift arm means angularly about its point of mounting on the container to urge a second end of the lift arm means into sliding engagement with the lid with a sufficient upward force to balance the downward effect of gravity on the mass of the lid and thereby permit controlled opening and closing of the lid.

8 Claims, 3 Drawing Figures



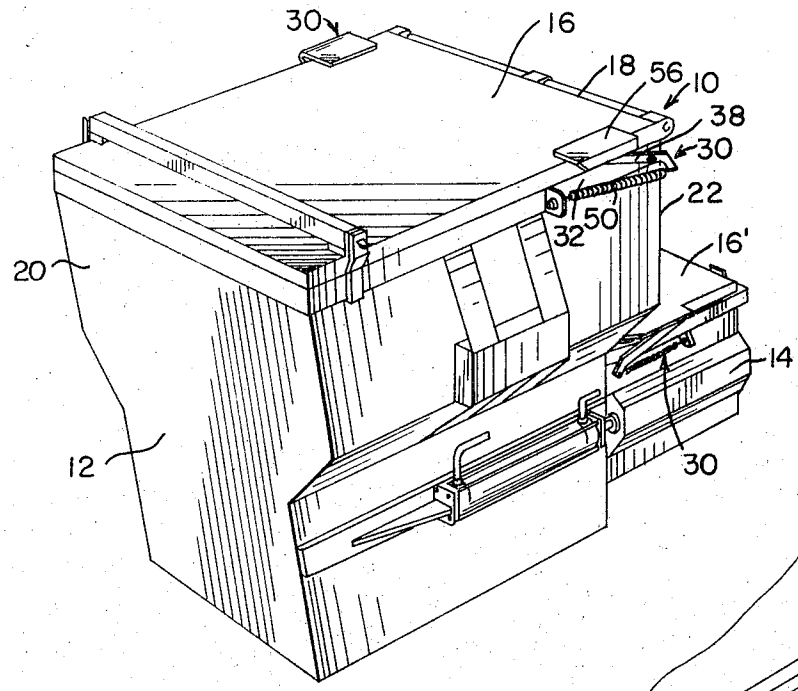


FIG. 1

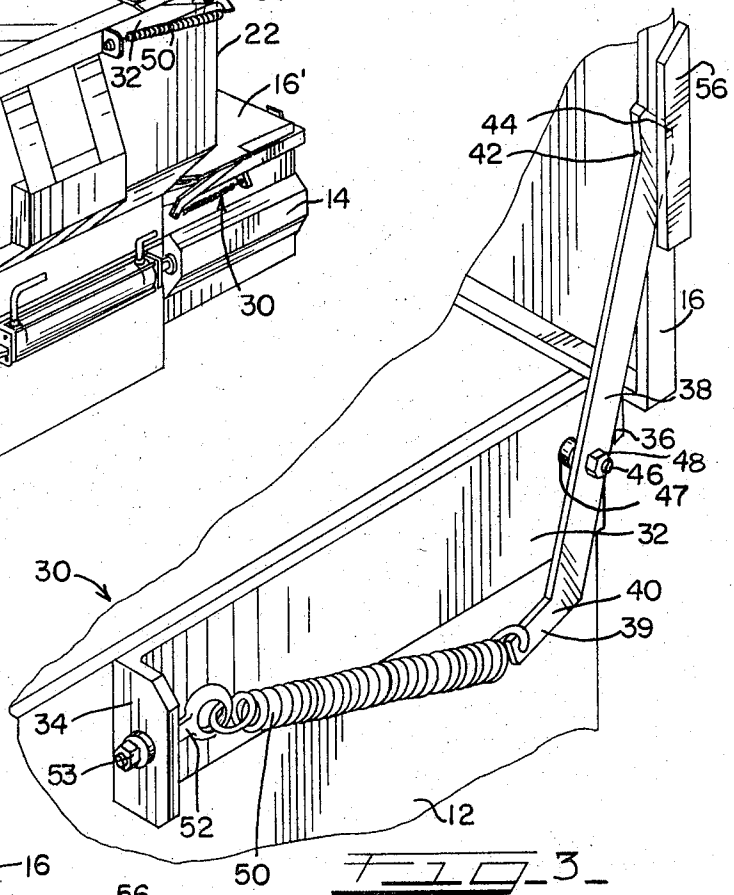


FIG. 3

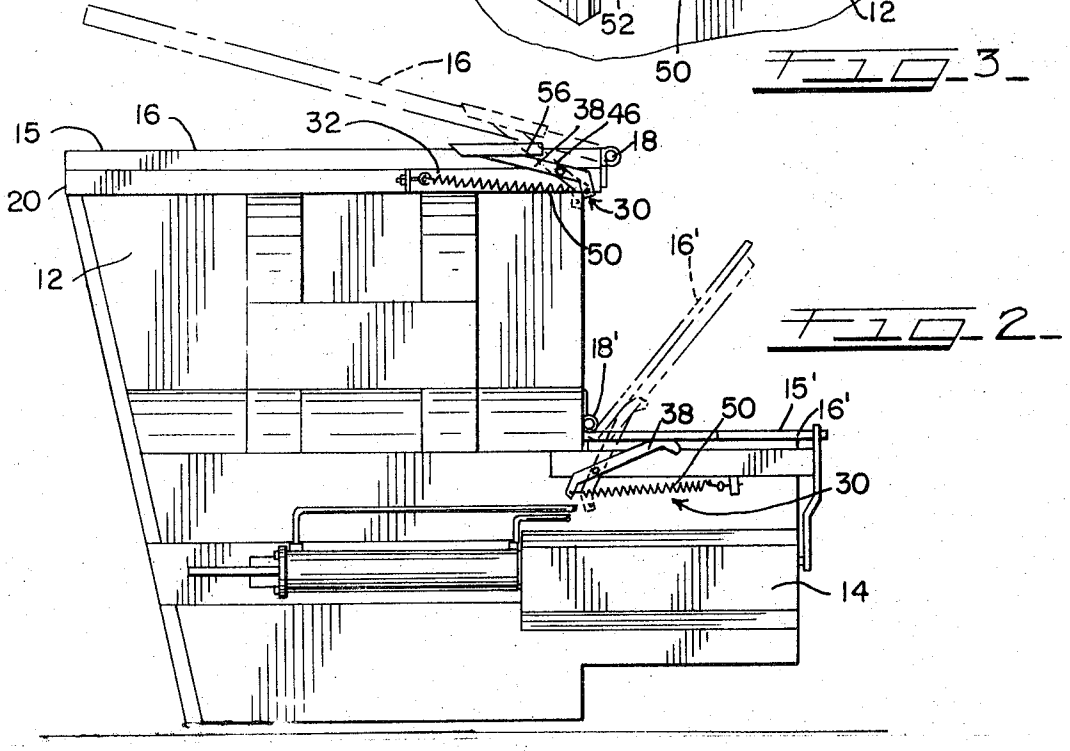


FIG. 2

COUNTERBALANCE APPARATUS FOR A REFUSE CONTAINER LID

BACKGROUND OF THE INVENTION

This invention relates to containers for receiving and/or compacting refuse and the like, and, in particular, to a means for controlling the opening and closing of the container lid.

Industrial and commercial refuse containers and/or compacters are normally constructed having a large generally rectangular container portion having an access opening at its top with a lid hingedly mounted on the container for movement over the access opening. The volume of waste produced in restaurants, apartments, factories and the like, requires that these refuse containers be of large volume having access openings large enough to easily receive refuse and also to permit mechanical emptying of the contents. Since, the lid covering such a large access opening must necessarily be large in area, lids in present refuse containers must be substantial enough to be self supporting and also to absorb the abuse experienced in loading or dumping of the refuse. Such lids are, therefore, normally made of steel plate or similar heavy materials which are sufficiently strong to resist such abuse. However, such lids, because of their size and weight, present a hazard to anyone loading refuse into the container or emptying the container itself, since they rotate freely on hinges and tend to fall easily from an upstanding position. Such uncontrolled movement may cause the lid to slam with terrific impact on the fingers or arms of an unwary operator. Moreover, the sheer weight of the lid makes it difficult for even a strong and careful operator to control its closing movement. The construction of present lids and the size of the containers used to collect waste, require an agile operator to reach the lid in its upright position and lower it from an upright position to a closed position, and yet be able to step back quickly enough so as to not be caught by the falling lid. Likewise, when the containers are unloaded by lift trucks and the like, present free-swinging lids tend to bang against the truck or the container and cause damage to themselves or the container or endanger the operators further.

Attempts at solving the above problems by making lids out of lightweight materials such as plywood or aluminum have been completely unsatisfactory primarily because of the failure of such materials to withstand the abuse to which such lids are subjected.

DESCRIPTION OF THE INVENTION

The present invention involves a spring counterbalance mechanism which is mounted on the refuse container and engages the container lid to provide an upward counter force to the downward force exerted on the lid by gravity. The use of this invention overcomes the problems of present refuse container lids because it requires the container lid to be manually pulled to a down position and controls closure of the lid at all times to prevent damage to the container or the lid or injuries caused by the heavy, free-falling lid.

This invention accomplishes controlled closing of a refuse container lid by a lift arm which is pivotally mounted on an upper portion of a refuse container adjacent the upper edge of the container and near the hinged junction of the container and the lid. The lift arm is pivotally mounted on the container at a point between the opposite ends of the lift arm for angular movement relative to the container. A resilient means, such as a spring, is connected at one end to the container and at its opposite end to a first or lower end of the lift arm. The second or opposite end of the lift arm is thereby pivotally urged by the spring in a generally upward direction into engagement with a slide track positioned along the outside edge of the lid.

The point around which the lift arm pivots is disposed toward the hinged junction of the container and the lid and near the lower or first end of the lift arm to assure continuous contact of the upper or second end of the lift arm with the slide track throughout the opening and closing of the lid.

Accordingly, it is an object of the present invention to provide a counterbalance means for a refuse container lid which is simple in construction, durable, inexpensive to manufacture, and which allows controlled closing of the lid to prevent damage to the lid or container or possible injury to the operator.

It is also an object of this invention to provide a counterbalance means for a refuse container lid which may be mounted on a conventional refuse container to engage the lid in a manner which does not interfere with the normal loading or unloading of the refuse container.

It is a further object of this invention to provide a couterbalance means for a refuse container lid which permits use of strong, sturdy, heavy materials in the construction of the lid while eliminating problems normally caused in the closing of the lid by the weight of such materials.

These and other objects of this invention will become evident from the following detailed description of the invention taken in conjunction with the drawings wherein:

FIG. 1 is a perspective view of a heavy-duty refuse container and self-contained compacter having the counter-balance lid closure apparatus of the present invention;

FIG. 2 is a side elevational view of the refuse container shown in FIG. 1 showing the opening operation of the counterbalance lid closure apparatus in broken lines; and,

FIG. 3 is an enlarged fragmentary view showing, in detail, the construction of the counterbalance lid closure apparatus of the present invention.

Referring now to the drawings, and, in particular, to FIG. 1, a combined refuse container and compaction apparatus is shown generally at **10.** This particular apparatus **10** includes a large volume container **12** and a receiving and compacting chamber **14,** each having their low lid or closure means controlled by the counterbalance apparatus of this invention, shown generally at **30.** It is clear, however, that the present invention is useful with many different types and sizes of refuse containers such as front or rear load containers.

Both the large volume container **12** and the receiving and compacting container **14** have top access openings **15** and **15'**, respectively, which are covered by closure means or lids **16** and **16'**, respectively. These lids **16** and **16'** are mounted adjacent a rear edge of containers **12** and **14,** respectively, by suitable heavy-duty hinge connections **18** and **18'** for opening and closing movement relative to top access openings **15** and **15'**.

Since the operation of lids **16** and **16'** relative to their respective containers is similar, the description of counterbalance **30** will be limited to its use in connection with container **12** and lid **16,** for the sake of brevity. Container **12** will be referred to as having a forward end **20** from which it is generally loaded and a rearward end **22** along which the lid **16** is hingedly joined to the container. The counterbalance apparatus **30** is easily mounted along the upper edge of the container **12** adjacent top access opening **15** and disposed toward the rearward end **22** of container **12.** As will be seen, the counterbalance apparatus **30** is extremely simple in manufacture and operation so that it may be easily installed on presently operating containers in addition to being included as a part of new containers during thier manufacture.

As shown in FIGS. **2** and **3,** the counterbalance apparatus **30** of this invention, includes a mounting or base plate **32** which is mounted adjacent the upper edge of a side wall of container **12** so that the top edge of the mounting plate **32** lies in approximately the same plane of the top edge of the container **12.** Mounting plate **32** is fixedly attached to the side wall of container **12** by welding or other suitable methods. This mounting plate **32** has an outwardly extending forward flange **34,** preferably integrally formed with it, and a similar, outwardly extending rearward flange stop **36,** also integrally formed with it. Rear flange stop **36,** however, only extends vertically along an upper portion of the rearward end of the mounting plate **32,** for reasons which will be explained below.

A lift arm **38** is pivotally mounted on the rearward end of mounting plate **32** over a suitable axis such as an outwardly extending, threaded pivot bolt **47.** A nut **48** engages the threaded portion of bolt **47** on the outside of lift arm **38** to maintain the lift arm in position. The lift arm **38** moves pivotally around the pivot point **46** thus formed. The lift arm **38** has a first end **39** having a connecting finger **40** which is formed integrally with the left arm **38** at a slight angle with respect to the lift arm **38,** as shown in FIG. **2.** Lift arm **38** has an opposite or second end **42** having a lid engaging edge **44** formed as a portion thereof. The lift arm **38** may be stamped or formed from any suitable material such as steel or steel alloys which is resistant to the stresses and abuse to which it will be subjected during use of the refuse container.

A suitable resilient means, such as a spring **50,** is connected to the mounting plate **32** at a forward end thereof by a threaded eyebolt **52** which is inserted through forward flange **34** and engaged by a retaining nut **53,** as shown in FIG. **3.** The opposite end of spring **50** is connected to the first end **39** of lift arm **38** through an opening formed in the connecting finger **40.** The spring **50,** when connected between the mounting plate and the lift arm, as described above, will act to move the first end **39** of lift arm **38** toward the forward flange **34** of mounting plate **32** and thereby move the second end **42** of the lift arm **38** in the upward direction toward lid **16.**

This upward angular movement of the second end **42** of the lift arm **38** will cause the lid engaging edge **44** of lift arm **38** to engage a slide track or angle **56** which is mounted on lid **16.** This slide track **56** may be simply a flat plate having an edge portion extending beyond the outer edge of the lid **16.** It may also be any suitable equivalent means such as an angle having one leg mounted on the top surface of the lid **16** and a downwardly extending leg spaced from the edge of the lid to receive the width of the lift arm **38** between the downward leg and the edge of the lid, as shown in FIG. **3.** Since the lift arm **38** is urged to move angularly about pivot point **46** relative to the container **12** and lid **16,** the second end **42** and lid engaging edge **44** are urged into contact with the underside of the top leg of slide track or angle **56.** Use of an angle **56** having a downwardly extending leg, as shown in FIG. **3,** will serve to maintain the engaging edge **44** of the lift arm **38** in contact with slide track **56** and to guide the movement of end **42** of lift arm **38** along the slide track **56** during movement of lid **16,** as will be explained below.

The spring **50** is chosen according to the size of the container, and, particularly, the size and weight of the lid **16;** a larger container lid requiring use of a spring with a greater spring constant "k". The choice of the spring may be readily established for various sizes of containers and lids by simple trial and error experimentation. A spring having suitable spring constant k will exert a sufficient force on the first end **39** of lift arm **38** to cause the lift arm **38** to be angularly moved around pivot point **46** so that lid engaging edge **44** will engage the slide track **56** to exert an upward force on the edge of lid **16** sufficient to create an effective upward movement about the axis of hinge **18** to approximately balance the downward movement created by the force of gravity through the center of gravity of lid **16** about the same axis at any desired position of the lid **16** between fully open and fully closed. Such force created by the spring **50** and lift arm **38** is, of course, not great enough to cause the lid **16** to open, but merely sufficient to control the free movement of the lid about hinge **18** and prevent accidental falling and slamming of the lid as is common in present refuse containers.

In the operation of the counterbalance apparatus of this invention, when lid **16** is in a closed position, as shown in FIG. **2,** spring **50** is stretched to its greatest extent and therefore, exerts through lift arm **38,** its greatest upward force upon lid **16** to assist in opening the lid or the damp downward acceleration. Connecting finger **40** is extended downwardly to move the point at which the spring **50** is connected to lift arm **38** out of the line of pivot point **46,** to more easily overcome the spring force during initial opening of the lid.

As the lid **16** is moved to an upward, open position, spring **50** will retract, moving lift arm **38** about pivot point **46,** and keeping the engaging edge **44** always in contact with the slide track **56** and lid **16.** The second end **42** of lift arm **38** amy be formed so that the engaging edge **44** has a relatively flat, elongated surface in contact with slide track **56,** as shown in FIG. **3,** to distribute the upward force exerted through it over a broad surface area of the slide track **56.** Engaging edge **44** may also, however, be simply a rounded corner on lift arm **38.**

As lid **16** is moved upwardly, the engaging edge **44** of lift arm **38** slides rearwardly in the slide track **56** to essentially shorten the moment arm between the point where the upward force is applied and the axis formed by hinge **18.** When the lid has been brought to a full open position, as shown in FIG. **3,** the counterbalance apparatus **30** is essentially in the position shown there, with spring **50** in its most retracted position and lid engaging edge **44** of lift arm **38** disposed at its most rearward extent of travel in slide track **56.**

Rear stop **36** is formed on mounting plate **32** to prevent overtravel of the lift arm **38** by stopping further rotational movement of the lift arm in the upward position of the lid, as shown in FIG. **3**. Stop **36** does not, however, extend below the pivot point **46** of the lift arm **38**, so that it will not interfere with opposite rotational movement of the lift arm.

It is clear that the second end **42** of lift arm **38** could be slidably joined to slide track **56** along the downwardly extending legs thereof to prevent any possibility of separation of the lift arm **38** from the lid **16**. Also, as shown in FIG. **1**, counterbalance apparatus **30** may be disposed on opposite sides of a large lid **16** to develop a force couple to aid in maintaining a balanced support for such a lid.

It has been found that when the counterbalance apparatus **30** is to be installed as original equipment on refuse containers during their actual manufacture, the mounting plate **32** may be omitted and the spring **50** and lift arm **38** mounted directly on the side of a container through suitable openings or flanges formed to receive them. With existing refuse units, however, it has often been found easier and less time consuming to mount the spring and lift arm first on a mounting plate **32** and then attach the mounting plate to the side of the refuse container.

Materials suitable for use in this invention include any materials which may be easily formed or stamped to the shapes required, and which are resistant to severe stresses and abuse and to corrosion by the elements, such as steel, stainless steel and steel alloys.

While the above invention has been described in relation to a preferred embodiment thereof, it will be apparent to those skilled in the art that the structure is capable of wide variation without departing from the principles of the invention.

I claim:

1. In an apparatus for storing and/or compacting refuse or the like and including container means for receiving such refuse, said container means having an access opening for receiving such refuse at its top, and closure means hingedly mounted on said container means and movable with respect to said container means to cover said access opening, the improvement comprising, closure balance means to control the closing movement of said closure means relative to said container means to prevent said closure means from abruptly slamming or falling freely to a closed position means and/or said container means and injury to operating personnel, said closure balance means including lift arm means pivotally mounted on said container means and resilient means, said resilient means having one end connected to said container means and the opposite end connected to said lift arm means, said resilient means thereby urging said lift arm means to move pivotally relative to said container means such that a portion of said lift arm means engages a portion of said closure means with sufficient force balancing the gravitational pull on said closure means that the closing movement of said closure means is thereby controlled, said closure balance means further including mounting plate means mounted on said container means and extending along and adjacent an upper edge thereof, said mounting plate means having outwardly extending flange means formed at its opposite ends, a rearward end of said mounting plate means being disposed adjacent the hinged junction of said closure means and said container means, the outward flange of said mounting plate means disposed at the opposite, forward end of said mounting plate means having an opening formed therein to receive adjustable bolt means therethrough, said bolt means being mounted on said flange means through said opening by fastening means at one end, the opposite end of said bolt means being attached to one end of said resilient means, said lift arm means being pivotally mounted on said mounting plate near said rearward end of said mounting plate means, one end of said lift arm means being connected to the end of said resilient means opposite said bolt means, said resilient means thereby urging said lift arm means to move pivotally relative to said mounting plate means, said flange disposed at said rearward end of said mounting plate means functioning as a stop means to prevent pivoting movement of said lift arm means therebeyond.

2. In an apparatus for storing and/or compacting refuse or the like and including a container for receiving such refuse, the container having an access opening for receiving such refuse at its top, and a lid hingedly mounted on the container and movable with respect to the container to cover the access opening, the improvement of a counterbalance apparatus for a container lid comprising:

a rigid lift arm pivotably mounted at a pivot point intermediate the ends thereof, said lift arm being mounted on a side of the container adjacent the hinged mounting of the lid on the container;

energizing means to force a first end of said lift arm positioned below said pivot point away from the hinged mounting of the lid on the container;

a slide track located on the underside of the container lid, a second end of said lift arm formed to slidably engage said slide track for sliding movement therealong during opening and closing of the lid, said second end of said lift arm being forced against said slide track by said energizing means;

whereby the downward force of the container lid as a result of gravity is in opposition to the force exerted by said energizing means to permit the lid to be easily opened and closed with the operator having full control at all times.

3. Apparatus as claimed in claim **2** wherein said energizing means is a resilient source of static energy.

4. Apparatus as claimed in claim **3** wherein said resilient source of static energy is an expansion spring extending substantially parallel to the plane of the container lid, with one end of said spring rigidly mounted to the container and the other end thereof fixedly connected to said first end of said lift arm.

5. Apparatus as claimed in claim **2** and further comprising a second lift arm, a second energizing means and a second slide track on the other side of the container.

6. Apparatus as claimed in claim **2** wherein said slide track comprises an angle member connected to the lid, with said second end of said lift arm slidably engaging a first portion of said angle member that is parallel to the plane of the lid and a second portion of said angle member transverse to the plane of the lid to maintain said second end of said lift arm in engagement with said first portion.

7. Apparatus as claimed in claim **2** wherein said lift arm and said energizing means are mounted on a

mounting plate fixedly attached to the side of the container.

8. In an apparatus for storing and/or compacting refuse or the like and including container means for receiving such refuse, said container means having an access opening for receiving such refuse at its top, and lid means hingedly mounted on said container means and movable with respect to said container means to cover said access opening, the improvement comprising lid balance means to control the closing movement of said lid means relative to said container means to prevent said lid means from abruptly slamming or falling freely to a closed position from an open position and thereby prevent damage to said lid means and/or said container means and injury to operating personnel, said lid balance means including mounting means mounted on said container means adjacent and extending along an upper edge thereof, a rearward end of said mounting means being disposed adjacent the hinged junction of said lid means and said container means, lift arm means having a first end and a second end, said lift arm means being pivotally mounted on said mounting means at a point between its first end and its second end for angular movement relative to said container, resilient means having one end connected to said mounting means and the opposite end connected to said first end of said lift arm means positioned below said pivot point for movement therewith, and slide track means mounted on said lid means and receiving said second end of said lift arm means for sliding movement therewith relative to said lid means as said lid means is pivoted with respect to said container means, said resilient means urging said lift arm means to move pivotally relative to said container means such that said second end of said lift arm means will be maintained within said slide track means engaging said lid means thereby with an upward force acting on said lid means sufficient to balance the downward pull of gravity on said lid means and permit controlled closing of said lid means.

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