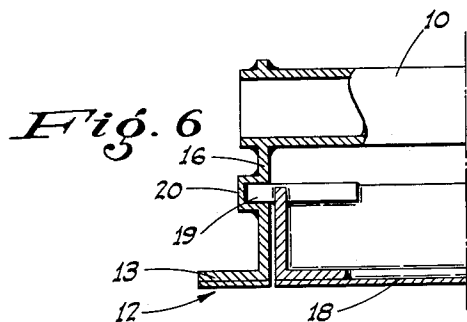
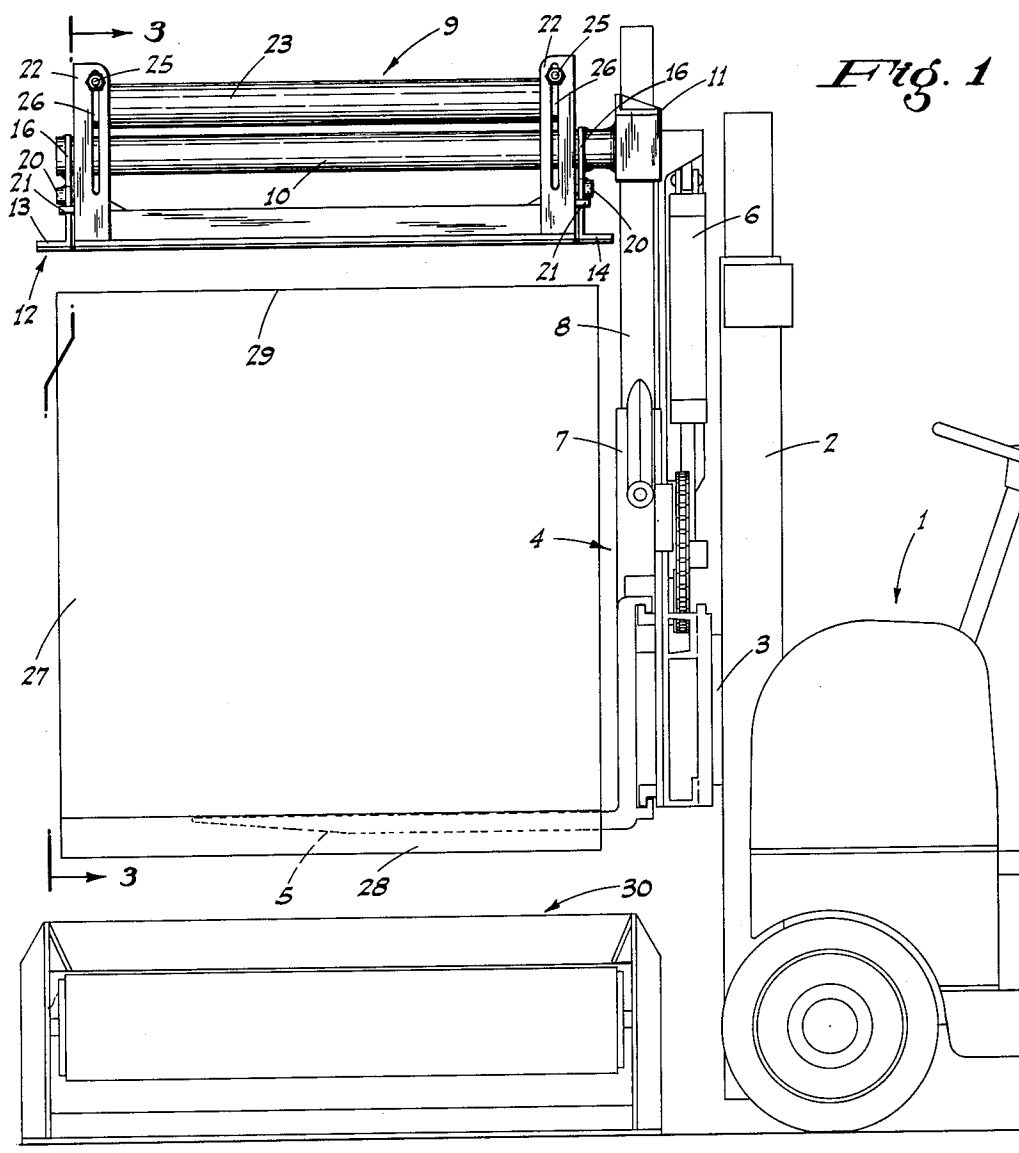


W. L. SHIMMON
SELF-OPENING BIN LID

3 Sheets-Sheet 1

Filed June 7, 1962



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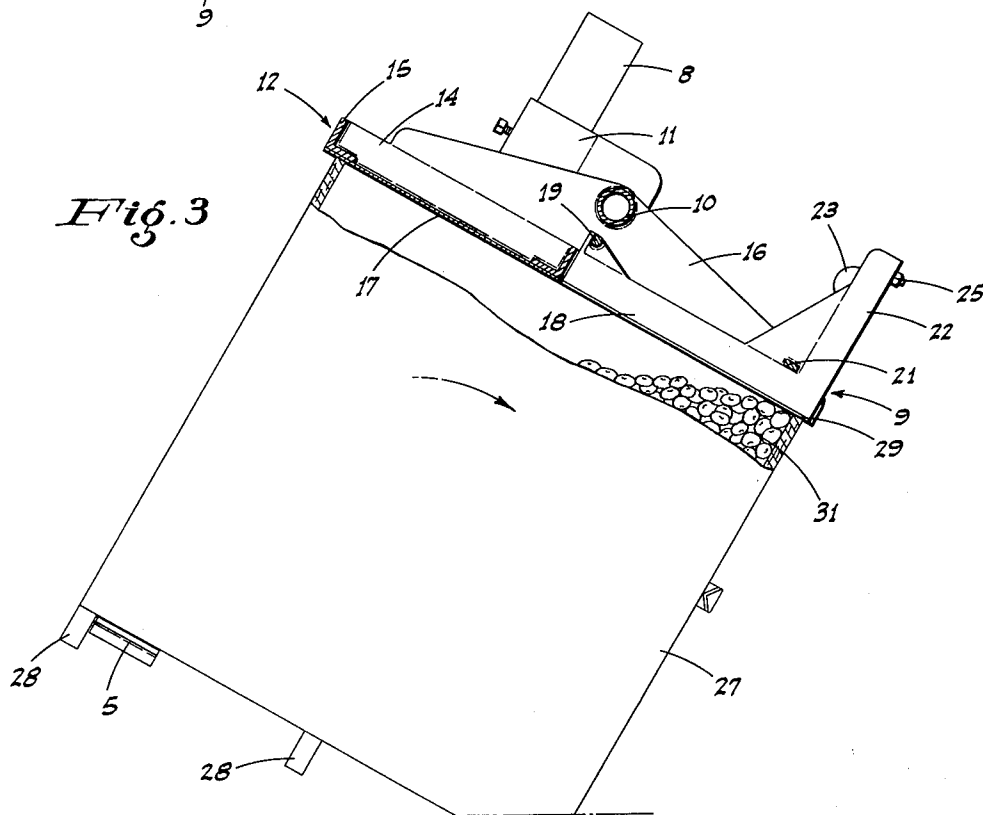
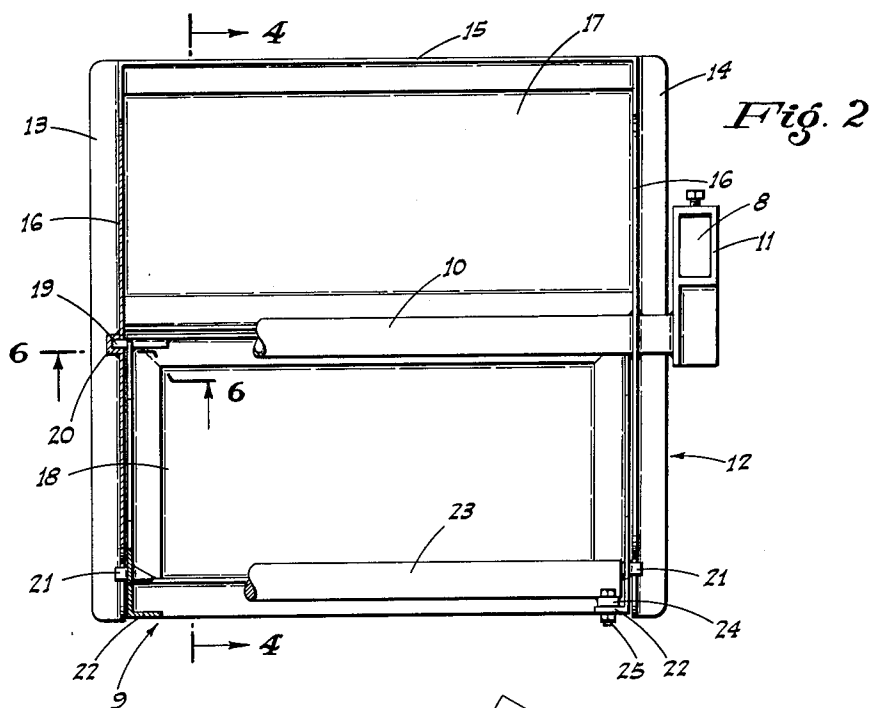
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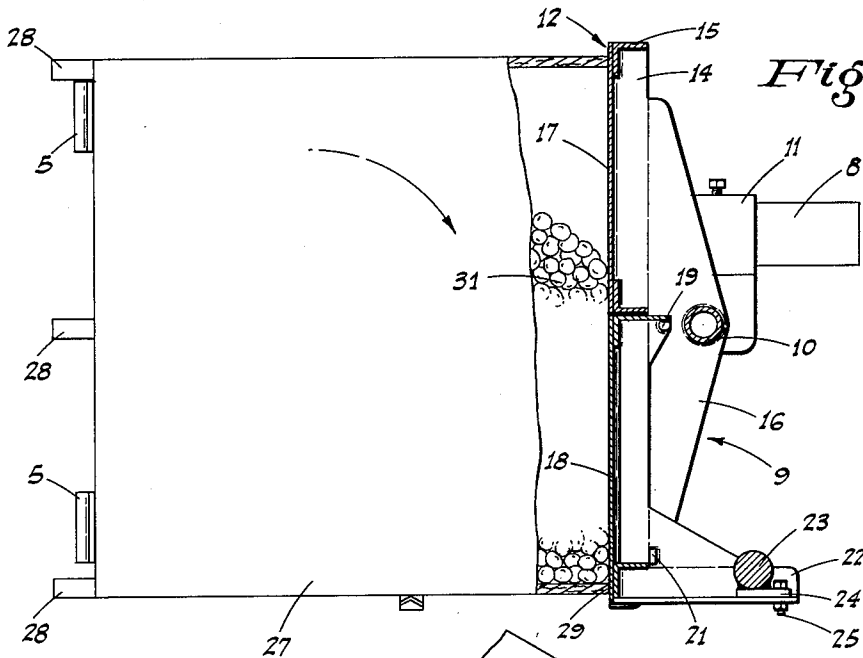


Fig. 4

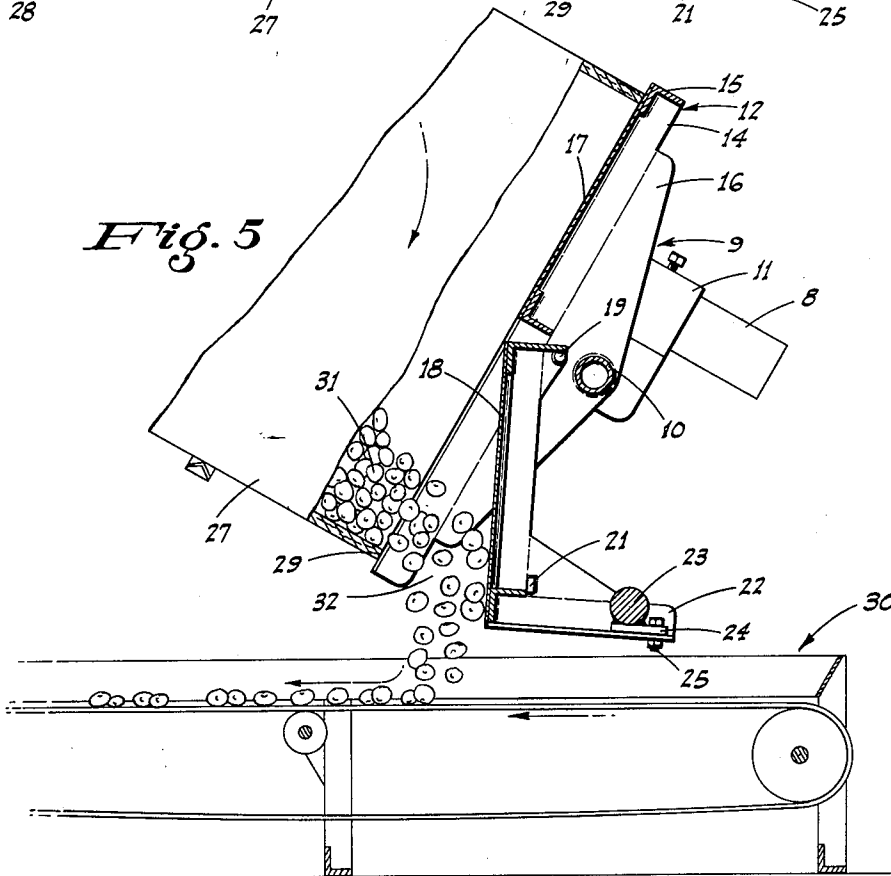


Fig. 5

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3,136,437

SELF-OPENING BIN LID

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4 Claims. (Cl. 214—307)

This invention relates in general to an improvement in a fork-lift truck of the type which includes, on a power actuated rotary mount, forwardly projecting forks adapted to support a loaded, initially upright, produce bin from below, and a clamping structure to engage the top of the bin whereby the latter is effectively held against escape from the forks and can then be inverted—by said rotary mount—from such upright position for the purpose of dumping the load. Such a fork-lift truck is shown, for example, in my United States Patent No. 3,024,929, dated March 13, 1962.

In a fork-lift truck, as above, the top of the bin remains substantially open, and as a consequence the produce—such as fruit, vegetables, or nuts—tends to objectionably surge out of the bin as it turns toward an inverted position. It is thus desirable to dump the load progressively, or with a controlled even flow from the bin; this being especially true when the produce is being discharged directly onto a conveyor delivering into a canery or the like.

It is therefore the major object of this invention to provide, with the bin clamping structure, a novel, self-opening bin lid arranged to control the flow of produce from the bin as it turns toward an inverted position.

Another important object of the present invention is to provide a self-opening bin lid, as in the preceding paragraph, which is arranged to remain closed until the bin is turned from its initial upright position to a point part way toward its fully inverted position, and to then progressively relatively open as the bin continues to be turned, by increments if necessary to regulate the volume of produce flow, toward said fully inverted position.

An additional object of the invention is to provide a self-opening bin lid, as above, wherein the lid opens by gravity; the lid being counter-weighted so as to assure that it remains closed until such part-way point is reached, and to thereafter prevent the opening of the lid from becoming excessive under the pressure of the produce flowing from the bin.

A further object of the invention is to provide a practical, reliable, and durable self-opening bin lid, and one which will be exceedingly effective for the purpose for which it is designed.

These objects are accomplished by means of such structure and relative arrangement of parts as will fully appear by a perusal of the following specification and claims.

In the drawings:

FIG. 1 is a side elevation of the device as mounted on a fork-lift truck; the bin hold-down and lid assembly being shown in its initial clearance position above a fork-supported, upright bin, and the latter being disposed above a receiving conveyor.

FIG. 2 is a plan view, partly broken away and partly in section, of the device.

FIG. 3 is a transverse sectional elevation on line 3—3 of FIG. 1; the view showing the bin hold-down and lid

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assembly in engagement with the bin, and as the latter is just starting to turn.

FIG. 4 is a similar view, but shows the bin as turned approximately 90 degrees from upright or to a horizontal position; the lid remaining closed in such position.

FIG. 5 is also a similar view, but shows the bin as further turned; i.e., downwardly beyond such horizontal position, and with the lid open and produce flowing from the bin onto the adjacent conveyor.

FIG. 6 is a fragmentary longitudinal sectional elevation on line 6—6 of FIG. 2.

Referring now more particularly to the drawings, and to the characters of reference marked thereon, the fork-lift truck is indicated generally at 1, which truck includes an upstanding elevator frame 2 having a power actuated elevator carriage 3 thereon; such carriage 3 being run up and down the frame 2 in a conventional manner.

A rotary mount, indicated generally at 4, is secured to the elevator carriage 3, and such rotary mount is provided with a pair of transversely spaced, forwardly projecting forks 5. The rotary mount is actuated through the medium of a double acting power cylinder 6; such rotary mount being constructed substantially as in my above identified patent, and thus is not here described in detail.

The rotary mount 4 includes an initially vertical sleeve 7 in which a post or standard 8 is slidably engaged; such post or standard extending upwardly a substantial distance from the sleeve. As in my above identified patent, such post or standard 8 is automatically retracted part way into the vertical sleeve 7 upon actuation of the rotary mount 4; the purpose of such retraction having been to engage a bin hold-down or clamping structure with the top of a bin carried on the fork. In the present invention such structure is substituted by a bin hold-down and lid assembly, indicated generally at 9. For the purpose of clarity such bin hold-down and lid assembly 9 will now be described with reference to the initial positions of the parts, and as shown in FIGS. 1, 2, and 6.

A horizontal beam 10 is fixed to and projects forwardly from a collar 11 surrounding and secured to the upper portion of the post or standard 8; the beam 10 being disposed in substantially the central longitudinal vertical plane of the fork-lift truck; i.e., in a plane substantially half way between the transversely spaced, forwardly projecting forks 5.

A bin hold-down frame, indicated generally at 12, occupies a horizontal position adjacent but below the beam 10; such frame 12 being rectangular and symmetrically disposed relative to said beam 10. The frame 12 includes a front transverse hold-down bar 13, a rear transverse hold-down bar 14, and—at one side—a longitudinal hold-down bar 15. At the side opposite the longitudinal hold-down bar 15 the frame 12 is open.

Front and rear transversely extending attachment plates 16 of elongated triangular shape in elevation are fixed to, and upstand from, the front and rear transverse hold-down bars 13 and 14; such attachment plates 16 being fixedly secured at their apex to the beam 10.

The area of the beam hold-down and lid assembly 9 within the confines of the beam 10, bars 13 and 14, and bar 15, is permanently closed by a fixed closure plate 17; such closure plate thus embracing substantially one transverse half of the frame 12.

The other transverse half of such frame carries a rec-

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tangular swingable lid 18; the ends of such lid being adjacent corresponding portions of the bars 13 and 14, while the inner side edge of the lid lies closely adjacent the corresponding edge of the fixed closure plate 17. The outer side edge of the swingable lid 18 extends across the open side of said frame 12. At the corners, and at slightly elevated but longitudinally aligned points, the swingable lid 18 is provided with outwardly projecting trunnions 19 carried in sockets 20 formed in the attachment plates 16. As so pivotally mounted, the lid 18 is swingable outwardly from a normally closed position.

In order to prevent the lid 18 from swinging downwardly below its normally closed position—i.e. below the plane of the frame 12—such lid is provided, at its outer corners, with stop pins 21 which bear against the upper edge of corresponding attachment plates 16.

The fixed closure plate 17 and the lid 18 form a full closure for the frame 12; the lid 18, as aforesaid, being initially or normally in its closed position.

A pair of longitudinally spaced standoff arms 22 are fixed on and project upwardly from the lid 18 at its outer side, and a counterweight 23, in the form of a heavy, elongated cylindrical member, spans between such arms outwardly of said lid 18. The counterweight member 23, which extends parallel to the beam 10, is attached to the standoff arms 22 by ears 24 and bolts 25; such bolts engaging through elongated slots 26 cut lengthwise in said standoff arms 22. By securing the counterweight member 23 in this manner, such member can be adjusted to alter the spacing between said member and the lid 18.

In operation, the rotary mount 4 is disposed with the transversely spaced forks 5 lowermost, and the bin hold-down and lid assembly 9 in an elevated position a considerable distance thereabove. The fork-lift truck 1 is then manipulated to engage the forks 5 beneath a loaded open-top produce bin 27; the forks 5 engaging between the usual bottom cleats 28 of such bin.

Nextly, the elevator carriage 3 is run upwardly a distance sufficient that the forks 5 lift the produce bin 27 off the ground, and at which time the top of the bin is adjacent but spaced below the bin hold-down and lid assembly 9.

The rotary mount 4 is then operated to start the bin 27 turning or rotating laterally in the direction indicated by the arrow in FIG. 3. With such initial rotation of the bin by the rotary mount 4, the latter—through the medium of the mechanism described in detail in my herein-before identified patent—forcefully moves the post or standard 8 into the vertical sleeve 7, with the result that the beam 10 moves downward and forcefully clamps the bin hold-down and lid assembly 9 on top of the bin 27. As so engaged, the bin is held on the forks 5 against accidental escape as such bin is further rotated, and to its inverted position, by continued operation of the rotary mount 4.

Upon the bin hold-down and lid assembly 9 being forcefully engaged with the top of bin 27, the bars 13, 14, and 15 bear against corresponding upper edges of the bin; such bars being of a length to embrace such edges from end to end thereof. When the bin hold-down and lid assembly 9 is so engaged with the top of bin 27, the upper side edge 29 of the bin—and which edge leads upon rotation of said bin—is disposed at, and extends between, the open side of the frame 12. Also, in the closed position of the lid 18 the outer side portion thereof laps said leading upper side edge 29 of the bin.

After the bin hold-down and lid assembly 9 is clamped against the top of the produce bin 27, and which—as aforesaid—occurs upon initiation of the turning movement of said bin by the rotary mount 4, the following occurs with continuance of such turning movement:

As the bin 27, which is disposed above a conveyor 30 or other carry-off apparatus, continues to turn from its upright position and to a point approximately ninety degrees from said position—i.e. to a substantially hori-

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zontal position as in FIG. 4—the lid 18 remains closed against the pressure of the load of produce 31 in the bin; such closure of the lid 18 being maintained by reason of the counterweight member 23 acting through the standoff arm 22 to resist opening of the lid.

Upon further turning of the bin 27 toward an inverted position the lid 18 becomes suspended from its axis and remains substantially perpendicular. As a result, there is a progressive relative opening of such lid whereby to define a discharge throat 32 between the suspended lid 18 and the leading edge 29 of the bin 27. See FIG. 5. With such progressive relative opening of the lid 18 the produce 31 flows from the bin 27, over the leading edge 29, and downwardly through the discharge throat 32, with controlled flow, onto the conveyor 30.

As the lid 18 is counter-weighted against the pressure of the out-flowing produce and thus remains substantially perpendicular, said lid effectively baffles the out-flowing produce against surging.

Additionally, by slowly rotating the bin 27—by increments if necessary—after the initial relative opening of the lid 18, the volume of flow of produce 31 from said bin can be effectively regulated by the operator.

Thus, by the time the bin 27 reaches its fully inverted position all of the produce has been dumped from such bin without undesirable surging, and at all times under effective and regulated flow. By so controlling the flow of the produce, and with the point of discharge from the bin relatively close to the conveyor 30, the fall of such produce onto the conveyor is minimized and prevents impact damage, as by bruising.

Depending on the nature and weight of the produce 31, it may be desirable to vary the spacing between the lid 18 and the counterweight member 23, and in such event said member is adjusted, either toward or away from the lid 18, by the simple expedient of loosening the bolts 25 and sliding them in the slots 26 in the standoff arms 22.

The described self-opening bin lid, as embodied particularly in the bin hold-down and lid assembly 9, provides a device which serves to fulfill the objects of this invention, as set forth herein, in a very practical and efficient manner.

While especially designed for use with a bin containing produce, such as fruit, vegetables, or nuts, it is to be recognized that the self-opening bin lid is usable with a bin containing other kinds of similar and flowable material.

While this specification sets forth in detail the present and preferred construction of the self-opening bin lid, still in practice such deviations therefrom may be resorted to as do not form a departure from the spirit of the invention, as defined by the appended claims.

Having thus described the invention, the following is claimed as new and useful, and upon which Letters Patent are desired:

1. A lid assembly for an open-top bin loaded with flowable material, there being means to support the bin for rotation in one direction about a horizontal axis; said lid assembly including a bin-engaging frame, an initially closed lid extending laterally inwardly from the upper side edge of the bin which leads upon rotation thereof in said direction, means pivoting the lid on the frame laterally inwardly from said bin edge for swinging about an axis parallel to the axis of rotation of the bin and relative outward opening movement, and means weighting the lid in a position relative to the pivot means so that the lid remains closed against the pressure of the load until the bin is rotated to a point wherein the lid is suspended from its axis; the lid remaining so suspended, progressively relatively opening, and controlling the gravitational flow of material from the bin upon continued rotation thereof from such point toward an inverted position; said lid weighting means comprising a counterweight disposed in spaced relation outwardly of the lid, and a

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rigid arm structure mounting the counterweight in unitary connection with the lid.

2. A lid assembly, as in claim 1, in which the counterweight is adjustable on the arm structure to vary the spacing between said counterweight and lid.

3. A lid assembly, as in claim 1, in which said counterweight is in the form of a heavy longitudinal member disposed in spaced relation outwardly of the lid and substantially parallel to its axis; and said arm structure comprises transversely spaced arms fixed on the lid and projecting outwardly to said counterweight member, the latter spanning between the arms, and means securing the counterweight member to said arms.

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4. A lid assembly, as in claim 3, in which the arms are slotted lengthwise, and said securing means being bolts extending through the slots whereby the counterweight member is normally rigid with but adjustable lengthwise of said arms.

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