

June 16, 1964

G. GUNN, JR
BIN TILTING DEVICE

3,137,402

Filed Dec. 29, 1960

9 Sheets-Sheet 1

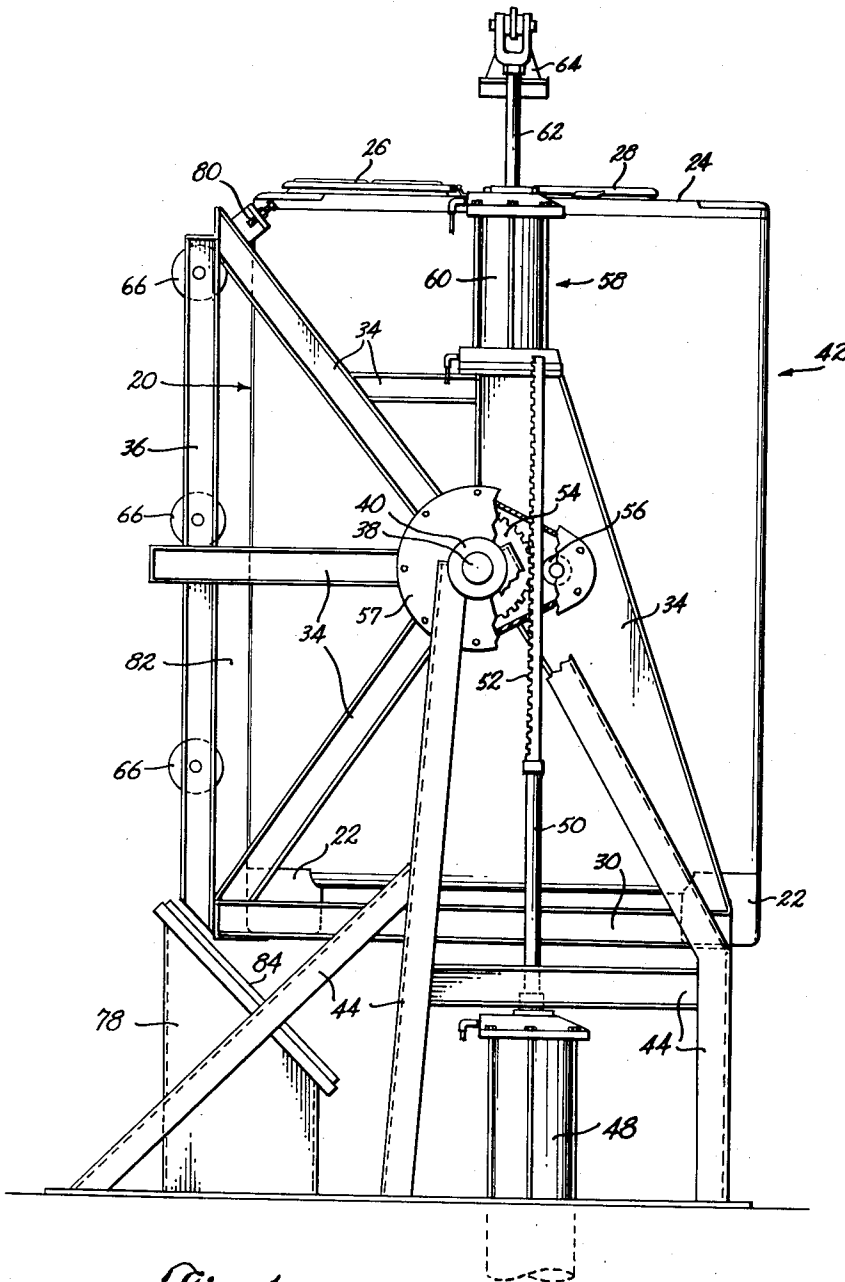


Fig. 1.

INVENTOR.
GEORGE GUNN JR.

BY
Mathis & Graybeal
ATTORNEYS

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9 Sheets-Sheet 2

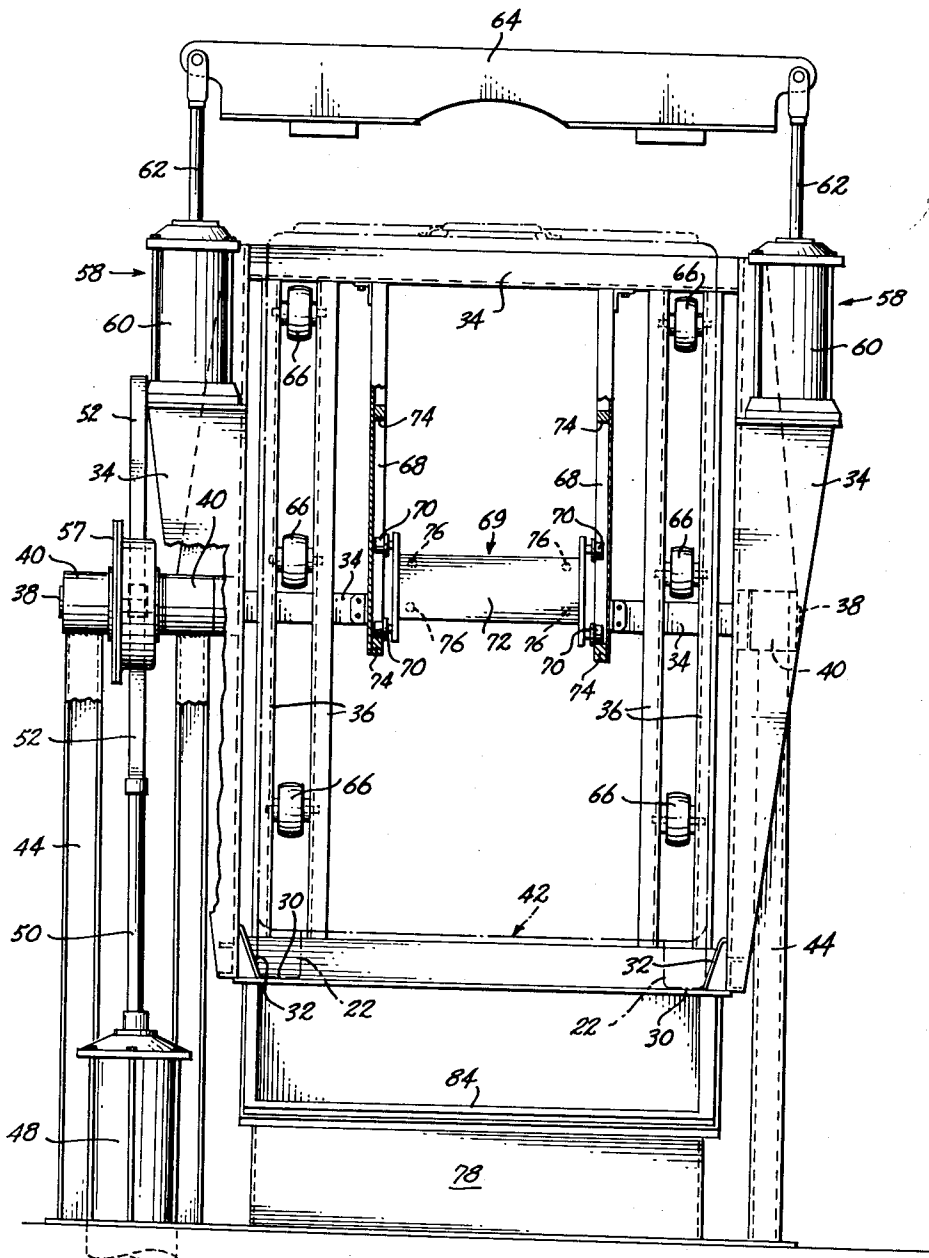


Fig. 2.

INVENTOR.
GEORGE GUNN JR.

BY
Metzger & Graybeal
ATTORNEYS

June 16, 1964

G. GUNN, JR
BIN TILTING DEVICE

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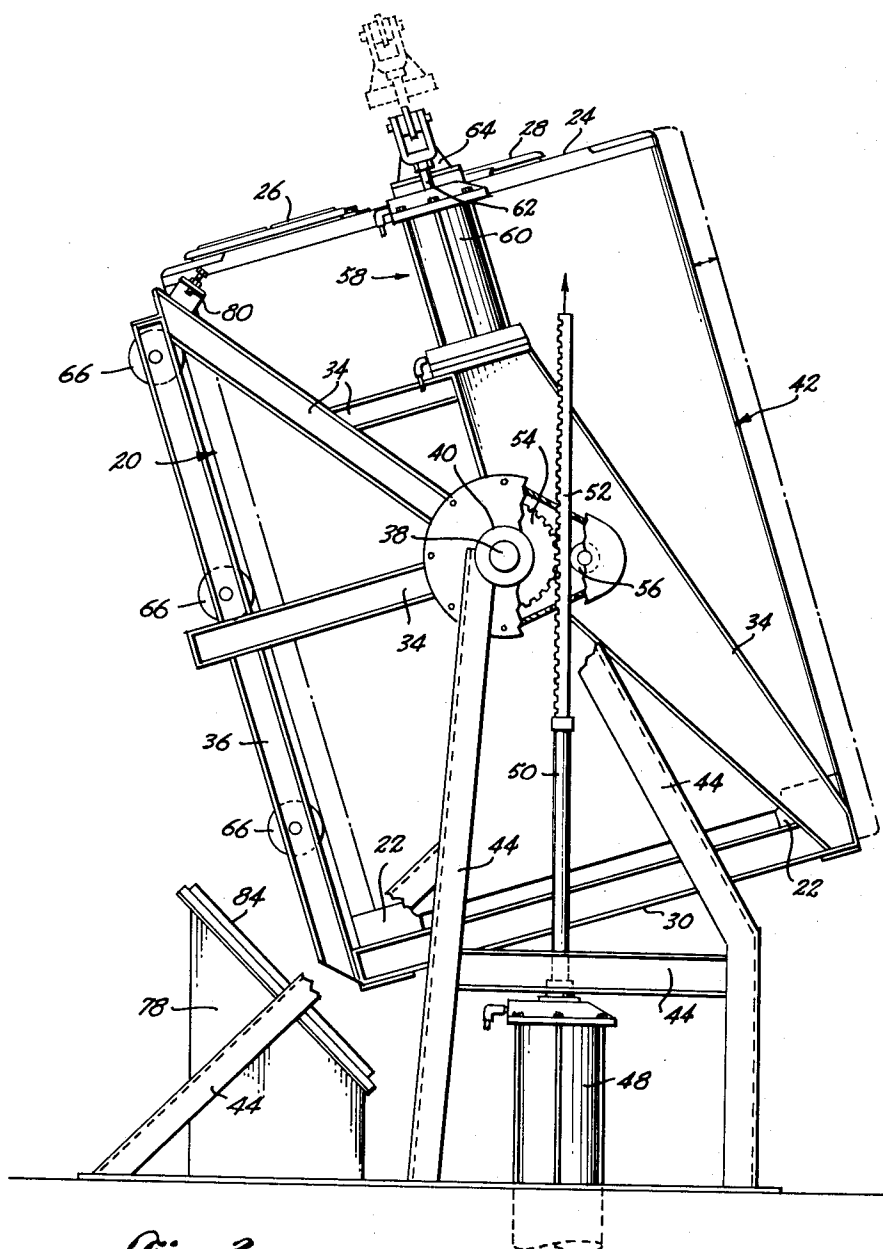


Fig. 3.

INVENTOR.
GEORGE GUNN JR.

BY
Martin & Graybeal
ATTORNEYS

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G. GUNN, JR

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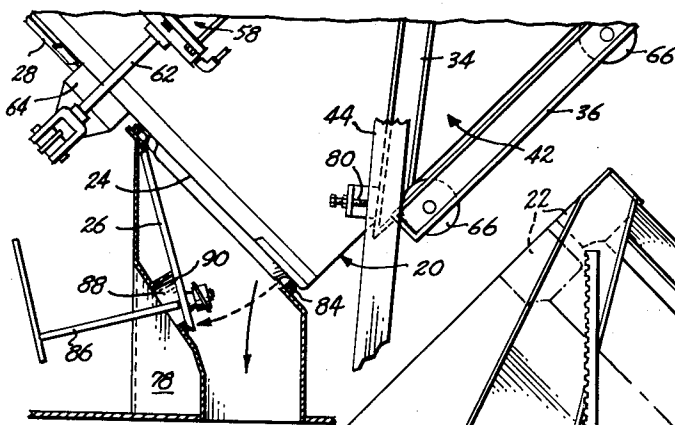


Fig. 5.

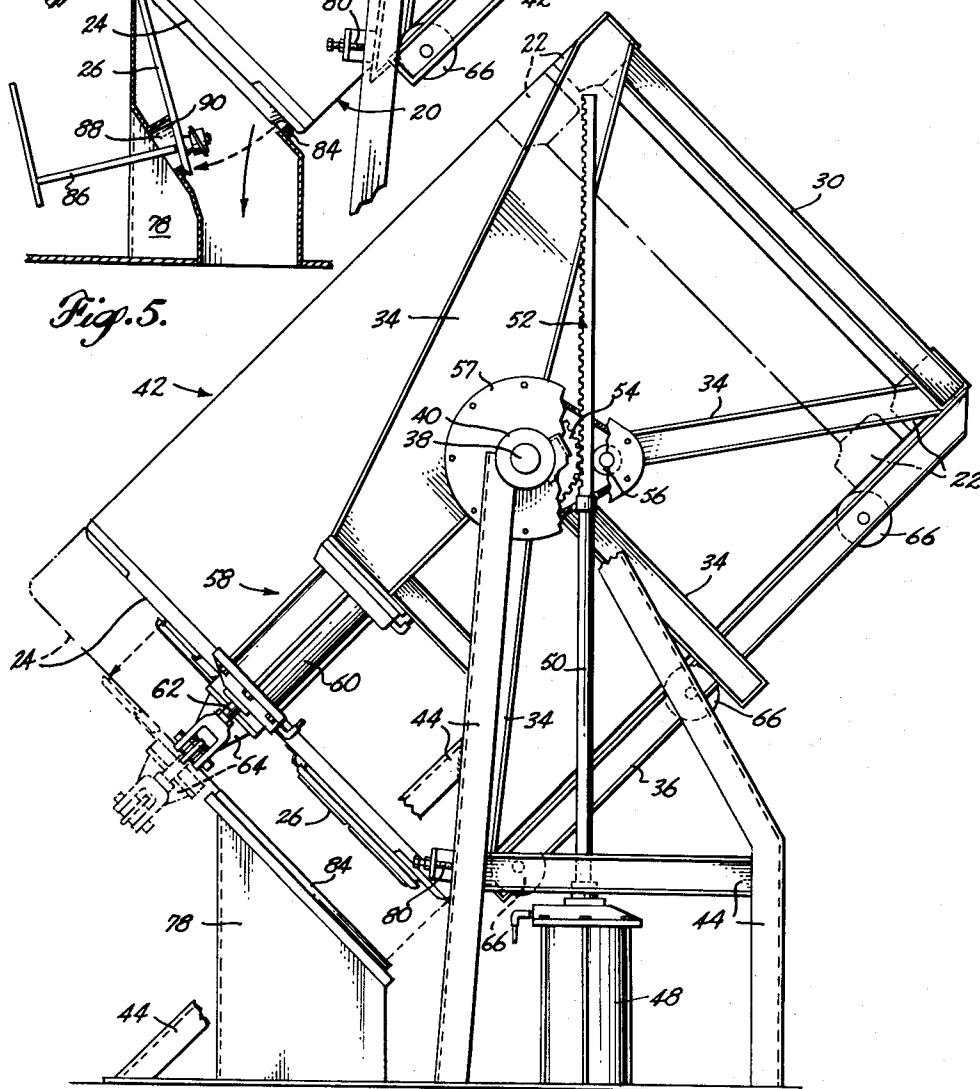


Fig. 1.

INVENTOR.
GEORGE GUNN JR.

BY
Mallory and Graybeal
ATTORNEYS

Filed Dec. 29, 1960

BIN TILTING DEVICE

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BY
Mathis & Graybeal
ATTORNEYS

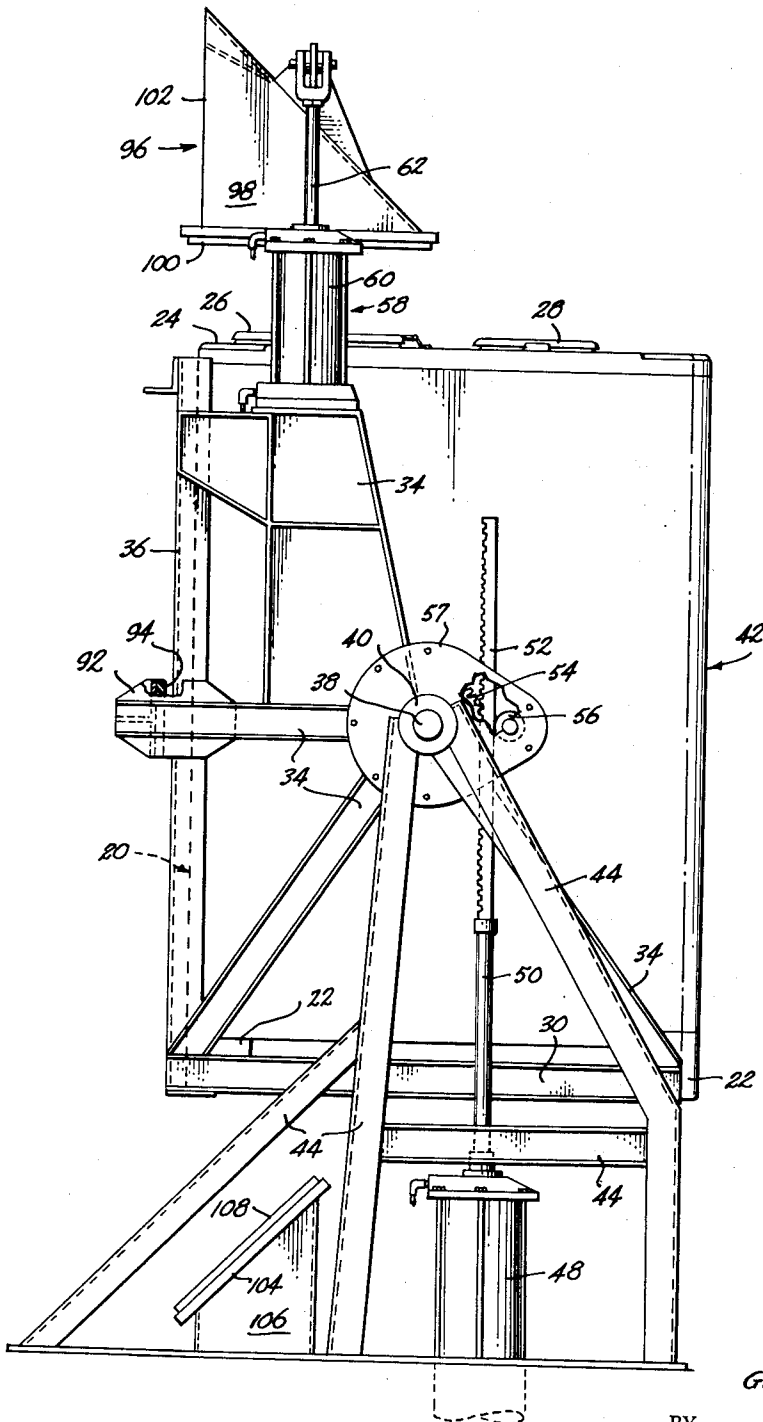
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INVENTOR.
GEORGE GUNN JR.

BY
Mathis and Graybeal
ATTORNEYS

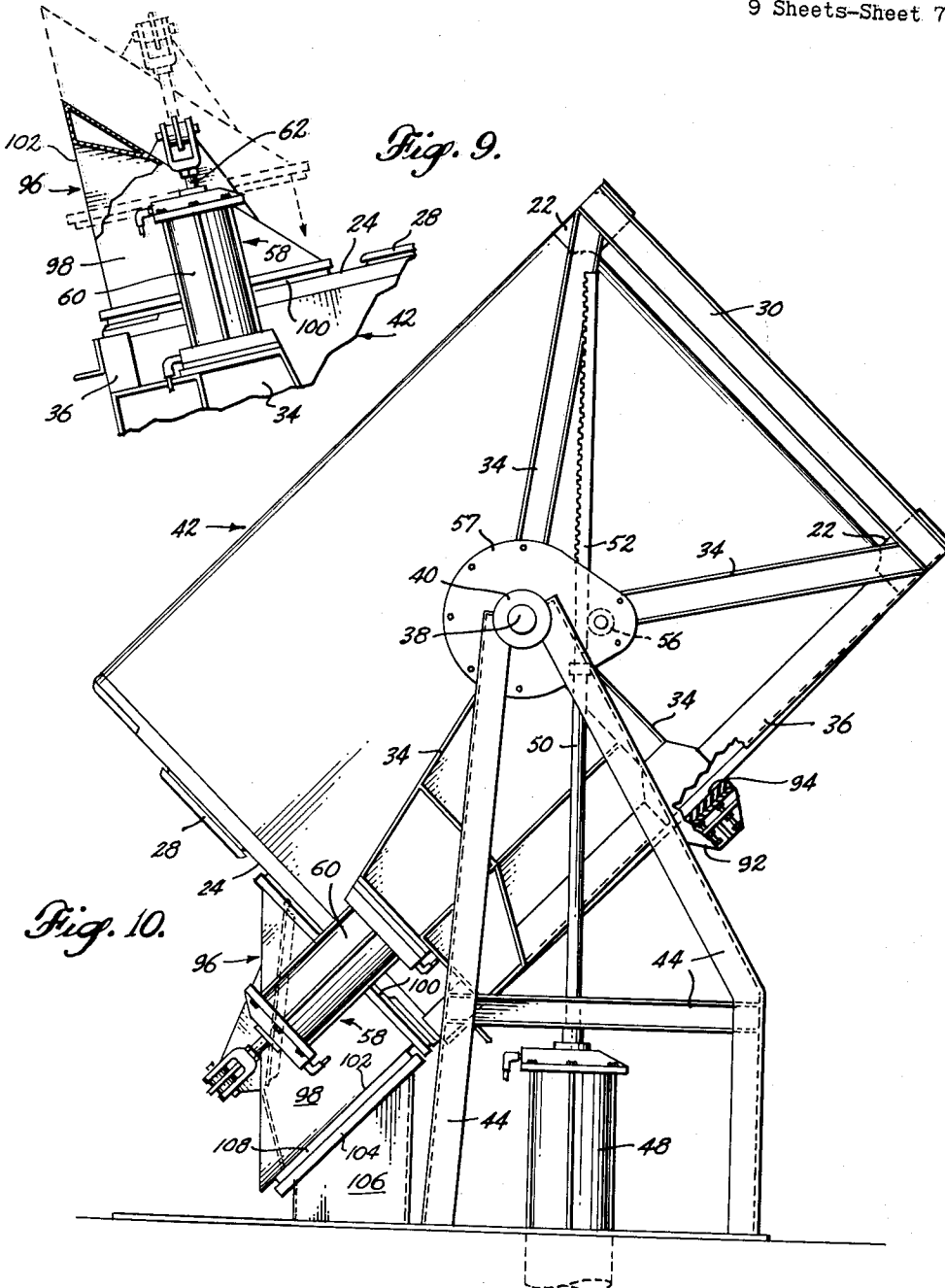
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G. GUNN, JR
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INVENTOR.
GEORGE GUNN JR.

BY
Melvin and Graybeal
ATTORNEYS

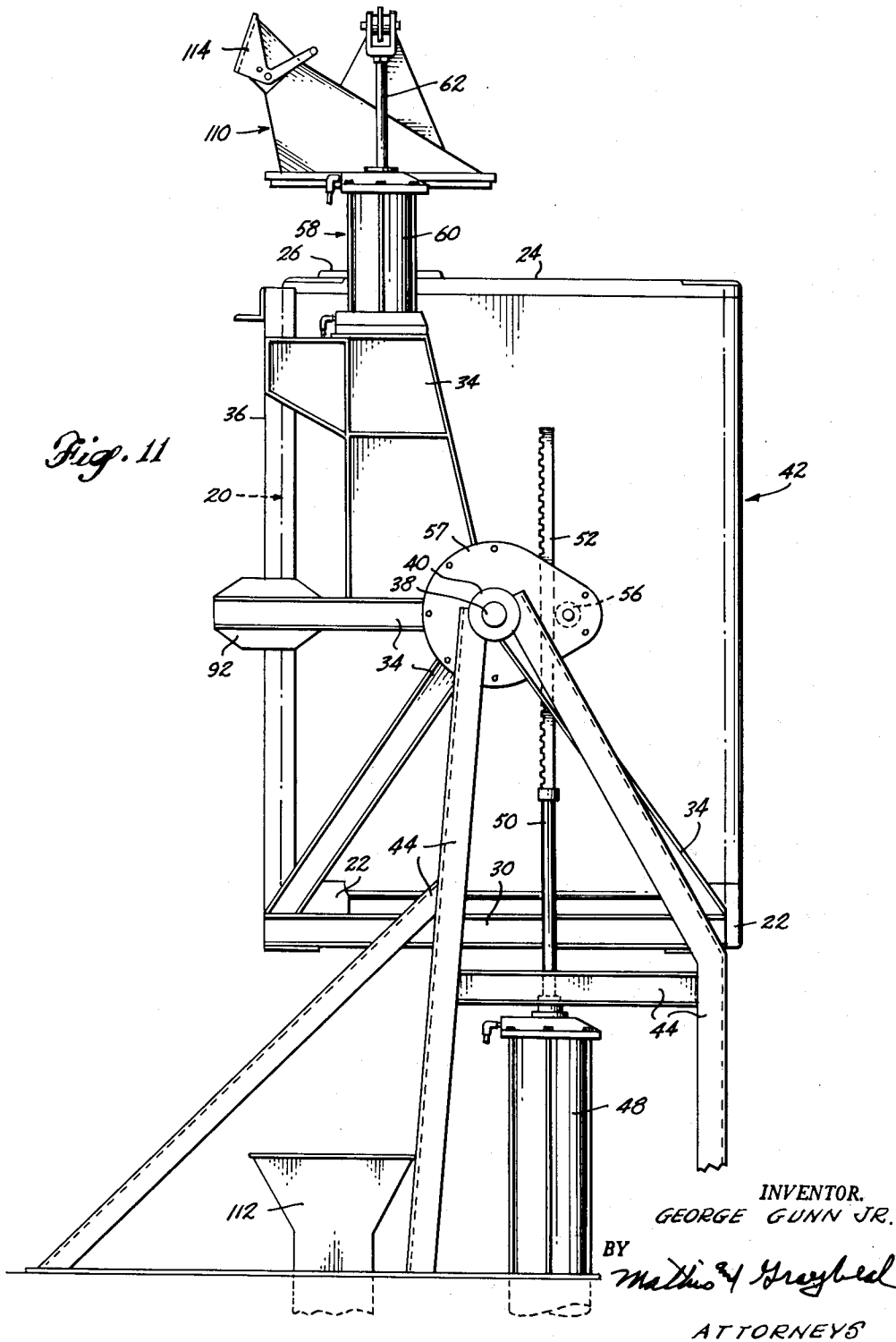
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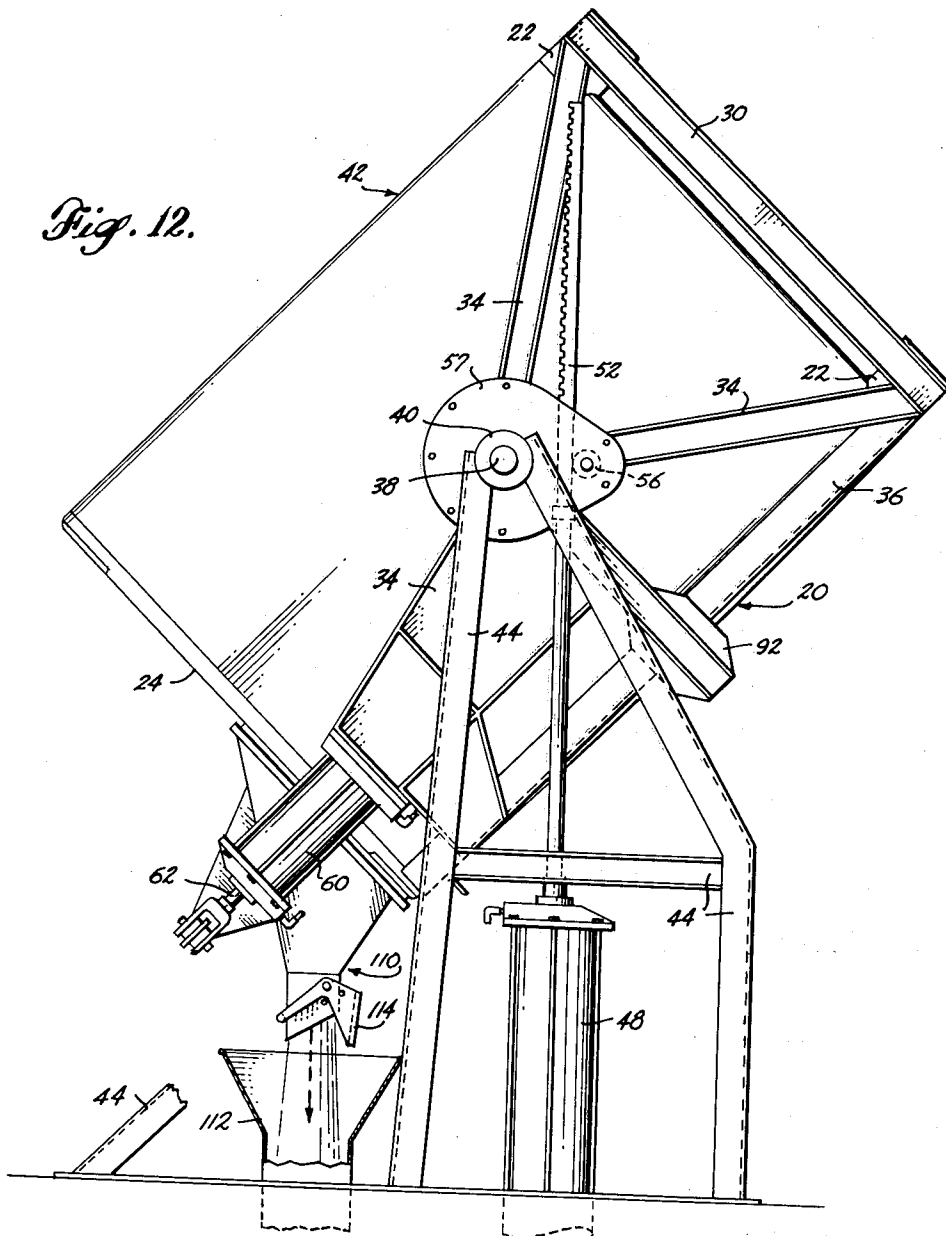
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Fig. 12.



INVENTOR.
GEORGE GUNN JR.

BY
Malcolm Graybeal

ATTORNEYS

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3,137,402

BIN TILTING DEVICE

George Gunn, Jr., Seattle, Wash., assignor, by mesne assignments, to Hoover Ball and Bearing Company, Saline, Mich., a corporation of Michigan
Filed Dec. 29, 1963, Ser. No. 79,213
2 Claims. (Cl. 214-314)

This invention relates to a tilting device and particularly for tilting bins of the character described in my copending application Serial No. 74,623, filed December 8, 1960, for Shipping Container.

One of the objects of my present invention is to rotate a bin an amount such as 135° to unload a top opening bin such as that described in my said copending application.

Another object of my invention is to provide means for positive registration of the walls surrounding the top opening and align the same with a fixed material receiving hopper.

Another object of my invention is to provide clamping means which are operable against the top of a bin so that a bin may be rotated 135°, for example, and hold the bin on the tilting device.

Another object of my invention is to provide a clamping means which will cooperate in connection with the tiltable member so that a bin may be rotated a desired amount, and then allowed to travel longitudinally with the top of the bin downward so as to precisely register with the wall portion surrounding an opening in a material receiving hopper, which hopper is in a fixed position.

Another object of my invention is to provide a combination clamp and discharge spout means so that said discharge spout can be moved into registration with the opening in a material receiving hopper.

Another object of my invention is to provide a combination clamp and discharge means which is suitable for use in connection with any hopper receiving means.

Other objects and advantages of this invention will become apparent as the description of the same proceeds and the invention will be best understood from the consideration of the accompanying detailed description, taken in connection with the accompanying drawings forming a part of the specification, with the understanding, however, that the invention is not to be limited to the exact details of construction shown and described since obvious modifications will occur to a person skilled in the art.

FIGURE 1 is a view in side elevation and with parts broken away illustrating a device of my invention and with a bin in place to be tilted;

FIG. 2 is a view in front elevation of the structure of FIG. 1 and with portions broken away and is taken substantially looking from the right to the left of FIGURE 1 and with a pin to be tilted shown in phantom;

FIG. 3 is a view in side elevation and with the tilting part of the device moved substantially 15° over the showing in FIG. 1 of the drawings;

FIG. 4 is a view in side elevation and the tilting part of the device has moved substantially 135° over the showing in FIG. 1 of the drawings;

FIG. 5 is a fragmentary view showing that the bin disposed on the tilting device in FIG. 4 of the drawings has slid or the bin has moved lengthwise over the showing in FIG. 4;

FIG. 6 is a fragmentary view of parts shown in FIG. 4 of the drawings and with the parts substantially in the same position;

FIG. 7 is a view similar to FIG. 6 showing the bin after it has slid lengthwise or moved into contacting position with a discharge hopper;

FIG. 8 shows a view in side elevation of modified form of my invention;

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FIG. 9 is a fragmentary view in side elevation of the structure of FIG. 8 showing the relative position of the parts after the tilting part of the device has moved substantially 15°;

FIG. 10 is a view in side elevation of the structure of FIG. 8 showing the relative position of the parts after the tilting part of the device has turned substantially 135°;

FIG. 11 is a side elevation of another modified form of my invention; and

FIG. 12 is a side elevation of the structure of FIG. 11 indicating the relative position of the parts after the tilting part of the device has turned approximately 135°.

The tilting device of the present invention is designed to tilt and unload transfer and storage bins such as those disclosed in my copending application Serial No. 74,623, entitled Shipping Container, filed December 8, 1960.

Thus the bin will comprise sides including a side 20; legs 22; a top 24; a discharge door 26 which is hingedly connected with the top 24; and a fill hole cover 28.

The tilting apparatus comprises a floor having two channels 30 which are preferably provided with inwardly covering side walls 32. The purpose of the inwardly converging side walls 32 in that if the legs 22 are not lowered properly relative to the center line of the channels 30, the bin legs 22 will be urged because of the weight of the bin and the walls 32 centrally crosswise of the floor. Truss members 34 form, with the floor including said channels 30 and braces 36, an integral unit which is connected with spaced apart stub shafts 38. The stub shafts 38 are mounted for rotary movement in spaced apart bearings 40. Thus an open structure is provided in the form of substantially a U in plan and a bin such as bin 42 will be supported by this structure with the legs 22 thereof resting in the laterally spaced apart channels 30.

Suitable support is provided for the bearings 40 by various structural members 44 so that a bin may be supported above a floor at a desirable elevation and a bin 42 may be loaded on the tilting part of the device by suitable means such as a fork lift truck. When the tilting part of the structure is in the position shown in FIG. 1 of the drawings, it is to be noted that a bin need not be moved precisely in place and the end wall 20 of the bin is removed from the brace 36 of the tilting device. Thus the operator of the lift truck need only be sure that the legs 22 are lowered above the channels 30 and the bin will center itself crosswise of the device. It is not necessary to attempt to firmly butt the wall 20 of the bin against suitable supporting means carried by the braces 36.

It is often desirable to rotate the tilting part of the device approximately 135° in a clockwise as well as a counter-clockwise direction from the vertical position shown in FIG. 1. This permits the bin to rotate a desired amount to unload the same and to be rotated back and forth in order to dislodge and free material which may tend to stick to the sides or bottom of the bin. A means for turning the tilting part of the device and a bin thereon the desired amount may include a fluid operated piston and cylinder means 48 to reciprocate piston rod 50 and rack 52 carried thereby. The rack 52 meshes with a pinion 54 carried by a stub shaft 38. A back-up roll 56 maintains the rack 52 in mesh with the pinion 54 and the back-up roll 56 is held in place by one of the plates 57 which are fixed to stationary structural members 44.

In operation the movable parts of the tilt rack are truss members 34, the floor including the channels 30, braces 36, stub shafts 38, pinion 54, and clamping structure 58 which will be shortly described. The stationary parts which support the moving parts may comprise the structural members 44, spaced plates 57, and bearings 40. Also the piston and cylinder means 48, piston rod 50, and rack 52 are non-rotative but of course the piston rod 50 and

rack 52 reciprocate to provide the desired turning force.

Carried by the truss members 34 and thus rotatable with the moving parts of the tilt rack are spaced apart piston and cylinder means 60 and spaced apart movable piston rods 62. The piston rods 62 carry a yoke or hold down means 64 which hold down means engage the top of the bin so that if the bin is rotated, vertical displacement of the bin from the movable parts of the tilt rack is prevented. The shape of the yoke 64 is such and may be in contact with the top 24 of the bin so that the yoke does not interfere with manipulation of the discharge door 26 or the fill hole cover 28.

Carried by the brace members 36 are a plurality of rollers 66. The rollers 66 are spaced at a distance so they will engage the edges of the bin side 20 and thus support the bin for longitudinal movement relative to the braces 36 when desired.

As the bins may be of the structure disclosed in U.S. Letters Patent No. 2,648,428 and have flexible sides, the bins may "belly out" and thus need support intermediate the edges of a side 20. Tracks 68 are carried by the truss members 34. Rollers 70 are mounted for traveling movement on tracks 68. A dolly 69 is supported by rollers 70 and the bin supporting plate 72 is adjustable toward and away from dolly 69 by adjusting screws 76. The plate 72 is designed to support the "bellying" or mid-portion of a bin side 20 which may "belly out," as is best taught by said Patent 2,648,428. Limit stops 74 are provided to determine the maximum extent of travel of the rollers 70 in either direction on tracks 68. The amount of belly in a particular bin or the extent thereof will of course depend upon the weight of the material in the bin and hence the reason for the adjusting screws 76 so that the amount of load carried by the plate 72 and the rollers 66 can be determined.

In the form of my invention disclosed in FIGS. 1 to 7, it is desired to discharge the contents of the bin against a fixed hopper, such as hopper 78, and have a sealing engagement with the top of the bin around the discharge door 26 and with suitable gasket means 84 on said hopper 78. Also I provide an adjustable stop 80 which is carried by the turning portions of the tilt rack and which will function as a fine adjustment to limit maximum turning movement of the turning parts of the tilt rack in one direction as is best illustrated in FIGS. 4 and 5 of the drawings.

In operating the structure of this form of my invention as illustrated in FIGS. 1 to 7 inclusive, the bin is loaded with the legs 22 in the channels 30 and leaving the space 82 (see FIG. 1) between the wall 20 of the bin and the braces 36. Next the device is rotated an amount such as 15° as it best illustrated in FIG. 3 of the drawings, and the rotation is sufficient so that the legs 22 slide down the channels 30 and the bin moves toward the left, as indicated in FIG. 3 of the drawings, and the edges of the wall 20 of the bin will engage with rollers 66 and the mid or "belly" portion of the side wall 20 will rest against plate 72. At this time the clamping device 58 is operated so that the yoke 64 engages with the top 24 of the bin and the relative size and position of said yoke is such that there is no interference with the manipulation of the door 26 nor the fill hole cover 28.

Once the bin is clamped so there can be no relative longitudinal movement of the bin, the bin may be rotated to the position shown in FIGS. 4 and 6 of the drawings. Now the clamping mechanism 58 is released and the bin will slide lengthwise from the position shown in FIGS. 4 and 6 of the drawings to that shown in FIGS. 5 and 7 or from the full line position to the dash line position shown in FIG. 4 of the drawings. The gasket 84 is carried by the hopper 78 and thus the bin slides lengthwise into sealing position against said gasket and the size of the opening in the hopper 78 is such that the door may be unlatched after the gasket 84 is in sealing position around the door 26.

In FIG. 5 of the drawings I have shown a key member

86 which will operate through a suitable port 88 in the hopper 78 and thus the door can be permitted to move to open position and the contents of the bin discharged into the hopper 78 with sealing relation around the edges of the door and the opening in the hopper.

A stop 90 is provided with a mating alinement with door 26 (when in open position as shown in FIG. 5) and thus the door functions to cover port 88 when the key 86 is removed.

As shown in connection with FIGS. 4 and 5 of the drawings, the limiting stop 80, which is adjustable, will provide for precise alining before the clamp means 58 moves to open position and thus a very precise fit obtains and thus eliminates loss of material.

In the form of my invention shown in FIGS. 8, 9 and 10, parts which are the same as those illustrated in FIGS. 1 to 7 inc. are given like numbers and thus the previous description is incorporated by reference and without repetition.

The truss member 34 carries a cross brace 92 which has cushioning means such as rubber means 94 to support a "belly" in the wall 20. This construction of supporting the "belly" is used in lieu of the previous construction of FIGS. 1 to 7 inclusive where there is illustrated tracks 68, dolly 69, rollers 70, bin support plane 72, limit stops 74, and adjustable screws 76.

Furthermore in FIGS. 8, 9 and 10, there is illustrated a combination clamping structure and discharge spout numbered generally 96. This member 96 may be operated into and out of clamping and unclamping positions by piston and cylinder means and piston rods 62 similar to the constructions of FIGS. 1 to 7 inclusive. In the structure of FIGS. 8 to 10 inclusive, the piston rods 62 are pivotally connected with a hopper 98. Hopper 98 is movable toward and away from the bin and may be urged into sealing relation around the door 26 of a bin with a gasket 100 between the discharge spout around the door 26 and against the top 24 of the bin. The relative sizes of parts are such that the door 26 may be opened after the combination clamping and discharge spout is in sealed position.

The mode of operation of the structure of FIGS. 8, 9 and 10 in first loading, then permitting the bin to shift after approximately 15° of tilting and then clamping will be the same in connection with FIGS. 8, 9 and 10 as it was in connection with FIGS. 1 to 7 inclusive.

However, instead of allowing for the longitudinal shifting movement of the bin after the bin has been tilted approximately 135°, the edges 102 of clamp 96 made with the edges 104 of the discharge hopper 106 and with a gasket 108 carried by either the edges 102 or 104 so that we have a sealed arrangement between the clamping and discharge spout 96 and the discharge hopper 106.

Thus the principal differences between the structure of FIGS. 8, 9 and 10 over FIGS. 1 to 7 inclusive, is that the tilting portion of the device rotatively moves the device into sealed discharge relation with a fixed hopper 106 rather than providing for the sliding movement which is best depicted by a comparison between FIGS. 8, 9 and 10 and FIGS. 6 and 7 of the drawings.

The structure illustrated in FIGS. 8 to 10 of the drawings can be employed in connection with a modified combination clamping and discharge spout. In other words, the assembly indicated generally by 96 in FIGS. 8 to 10 inclusive may be modified to form the combination clamping and discharge spout 110 of FIGS. 11 and 12. In the form of the structure of FIGS. 11 and 12, we are dealing with a load or bin content which does not require a sealed relation between the bin and the discharge hopper and hence hopper 112 may be a barrel or a hopper or any desired place the discharge can flow without sealed relation to the discharging spout from the bin.

Hence similar parts in FIGS. 11 and 12 to those in FIGS. 8 to 10 inclusive are given similar numbers and

the description is incorporated by reference and without repetition.

The combination clamp and discharge spout 110 is self sealing with a discharge gate 114. Thus the bin is provided with any suitable gate or cover for the discharge opening thereof which is first removed. Then the tilting part of the device is turned about 15° as in the other figures to permit the bin to slide on its legs. Then the clamping and discharge spout 110 is moved into sealing relation around the discharge opening in the bin.

Then as the device is rotated into place, the discharge gate may be opened at suitable times when the discharge flow of material from the bin is alined with a suitable discharge location such as the hopper 112.

From the foregoing it will now be apparent that I have disclosed a tilting device for tilting a bin having a discharge gate or opening on the top side thereof. This tilting device comprises a fixed base structure which may comprise the structural members 44 which carry a suitable bearing on which the tilting rotor assembly may be mounted such as bearings 40. The rotor assembly is U-shaped in plan thus leaving a front opening through which a bin may be loaded and a top opening in connection with which clamping devices may be operable. The rotor assembly will comprise the floor channels 30, truss members 34, braces 36 and suitable shafts mounting the rotor member for rotation such as stub shafts 33 operating within bearings 40 carried by the fixed base structure. Next suitable means are provided to rotate the rotor assembly through preferably 135° in either direction. Next clamping means are carried by the rotor assembly and either provide the type of clamp shown in FIGS. 1 to 7 inclusive, 8 to 10 inclusive, or 11 and 12.

After a bin has been loaded on the rotor assembly, then the rotor assembly is turned an amount to provide for shifting of the bin and thus positively aligning the bin relative to a clamping means or a discharge spout.

In FIGS. 1 through 10 of the drawings, the alignment is such that the bin is discharged through a fixed material receiving hopper such as 73, or 106. In FIGS. 1 through 7 inclusive, registration with the fixed hopper is provided by traveling movement of the bin on its side 20 whereas registration in FIGS. 8 through 10 inclusive is provided by the combination clamp and discharge spout 96. In the form of the device shown in FIGS. 11 and 12, positive registration with a receiving hopper is not indicated.

In the form of the invention shown in FIGS. 1 to 7 inclusive, the "belly" of a bulging bin is supported by a dolly 69 whereas the edge portions of the bin are supported by rollers 66.

Obviously changes may be made in the dimensions, arrangements and parts of my invention without departing from the principle thereof, the above setting forth only preferred forms of embodiment of my invention.

I claim:

1. Apparatus for tilting to discharge a bin having a bottom, side walls and a top wall provided with a discharge opening adjacent one of said side walls and a closure door movably mounted on said top wall for movement to a position closing said opening; said apparatus comprising fixed supporting means, a supporting frame for said bin rotatably supported on said fixed supporting means and having base means which in one position of said frame is substantially horizontal for supporting the bottom of said bin, frame members secured to said base means and extending upwardly therefrom in said one

position thereof, roller means on said frame members engageable with said one side wall of said bin in a supported position of said bin on said frame, clamp means engageable with said top wall at a position to one side of said discharge opening, extensible and contractible means mounted on said frame for moving said clamp means toward said base means into clamping engagement with said top wall and for moving said clamp means in a direction away from said base means, fixed hopper means disposed adjacent said fixed supporting means and having an inclined open upper end of a size larger than said bin door, power means operatively associated with said frame for rotating said frame to a position in which said frame members are inclined downwardly at a position below said bin and said discharge opening is substantially aligned with said hopper open upper end so that on movement of said clamp means in a direction away from said base means said bin is slidable downwardly on said roller means to a position in which said hopper upper end engages said bin top wall at a position surrounding said discharge opening.

2. Apparatus for tilting to discharge a bin having a bottom, side walls and a top wall provided with a discharge opening and a closure door movably mounted on said top wall for movement to a position closing said opening; said apparatus comprising fixed supporting means, a supporting frame for said bin rotatably supported on said fixed supporting means and having base means which in one position of said frame is substantially horizontal for supporting the bottom of said bin, frame members secured to said base means and extending upwardly therefrom in said one position thereof, roller means on said frame members engageable with one side wall of said bin in a supported position of said bin on said frame, clamp means engageable with said top wall and movable toward said base means into clamping engagement with said top wall and movable in a direction away from said base means, fixed hopper means disposed adjacent said fixed supporting means and having an open upper end of a size larger than said bin door, power means operatively associated with said frame for rotating said frame to a position in which said frame members are inclined downwardly at a position below said bin and said discharge opening is substantially aligned with said hopper open upper end so that on movement of said clamp means in a direction away from said base means said bin is slidable downwardly on said roller means to a position in which said hopper upper end engages said bin top wall at a position surrounding said discharge opening.

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