Feb. 14, 1950 C. H. GRAHAM 2,497,406

SOYA BEAN STORAGE BIN EQUIPMENT

Filed May 8, 1947 4 Sheets-Sheet 1

Fig. 1.

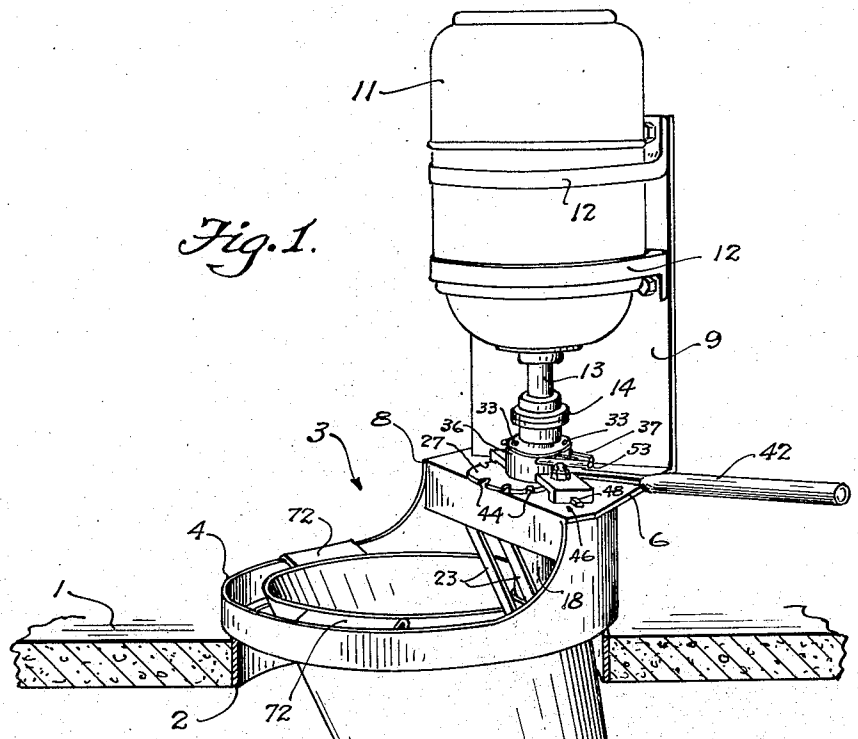
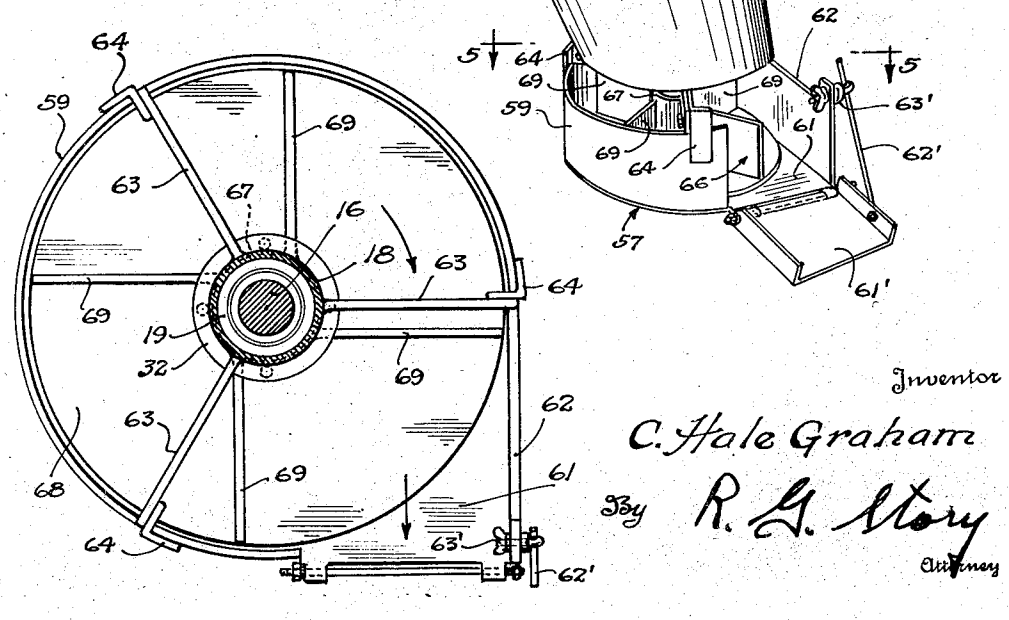


Fig. 5



Inventor

C. Hale Graham

By R. G. Story

Attorney

Feb. 14, 1950 C. H. GRAHAM 2,497,406

SOYA BEAN STORAGE BIN EQUIPMENT

Filed May 8, 1947 4 Sheets-Sheet 2

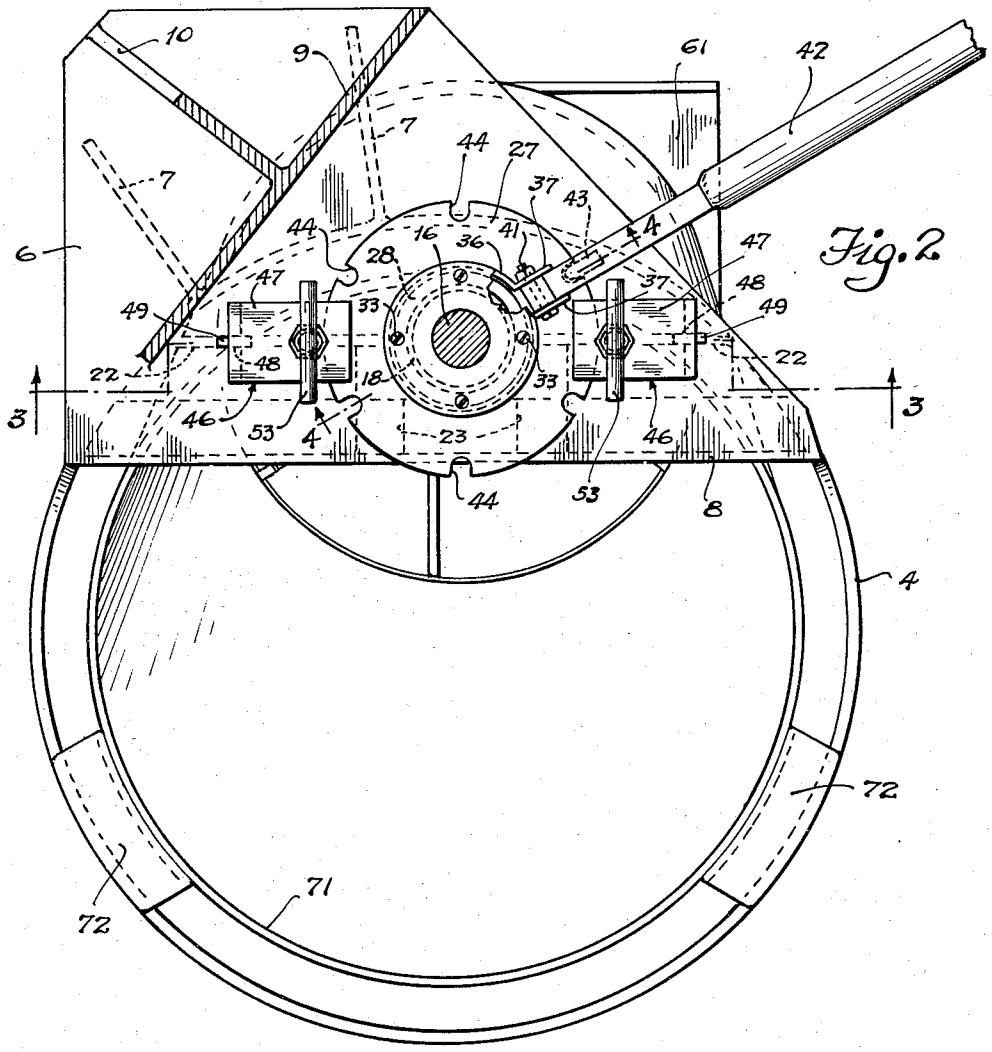


Fig. 2.

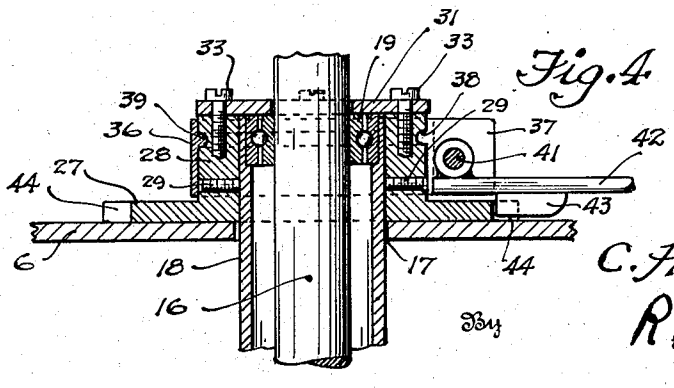


Fig. 4.

Inventor

C. Hale Graham

By

R. L. Story

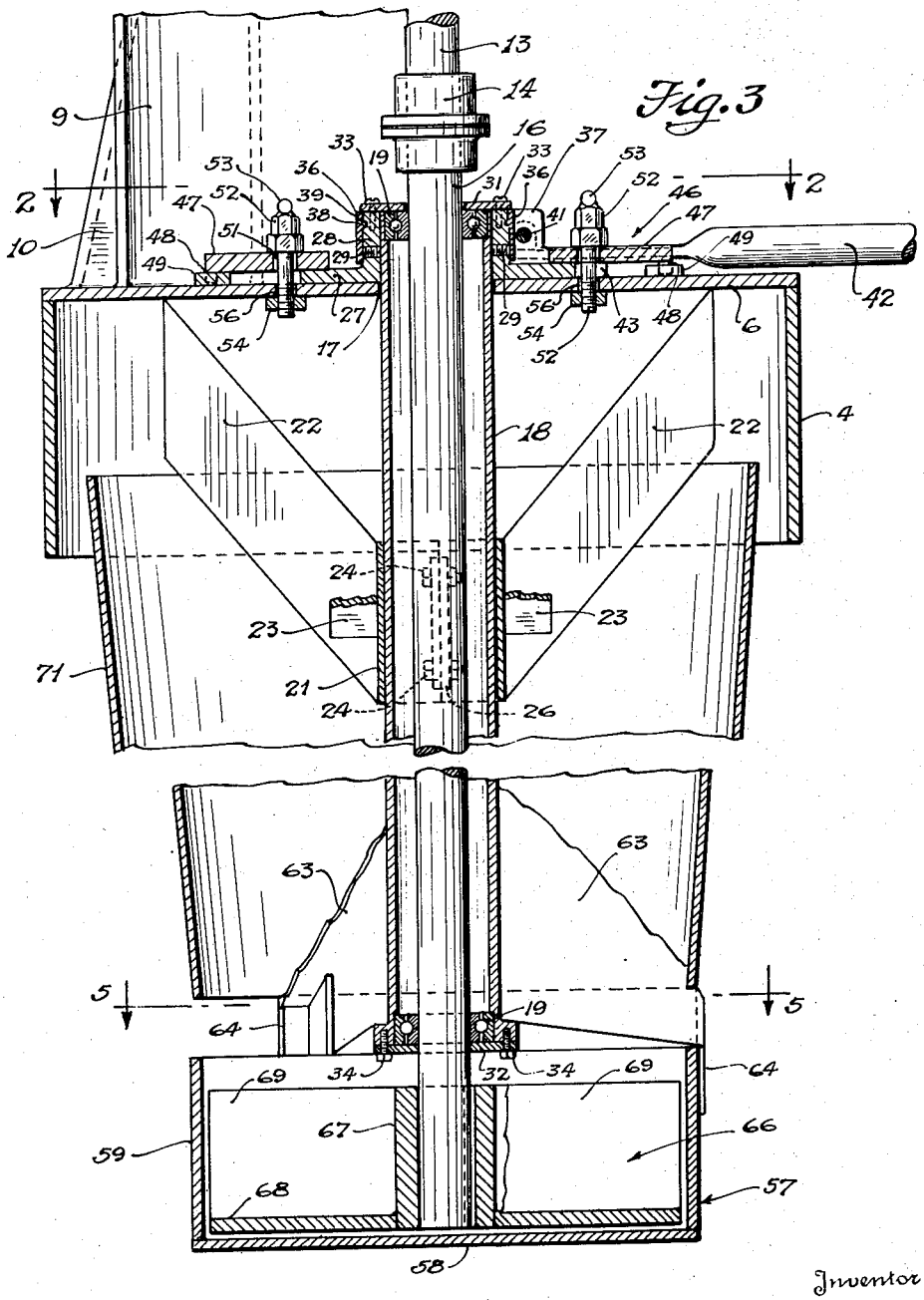
Attorney

Feb. 14, 1950 C. H. GRAHAM 2,497,406

SOYA BEAN STORAGE BIN EQUIPMENT

Filed May 8, 1947 4 Sheets-Sheet 3

Fig. 3



Inventor

C. Hale Graham

By R. G. Story

Attorney

Feb. 14, 1950 C. H. GRAHAM 2,497,406

SOYA BEAN STORAGE BIN EQUIPMENT

Filed May 8, 1947 4 Sheets-Sheet 4

Fig. 6

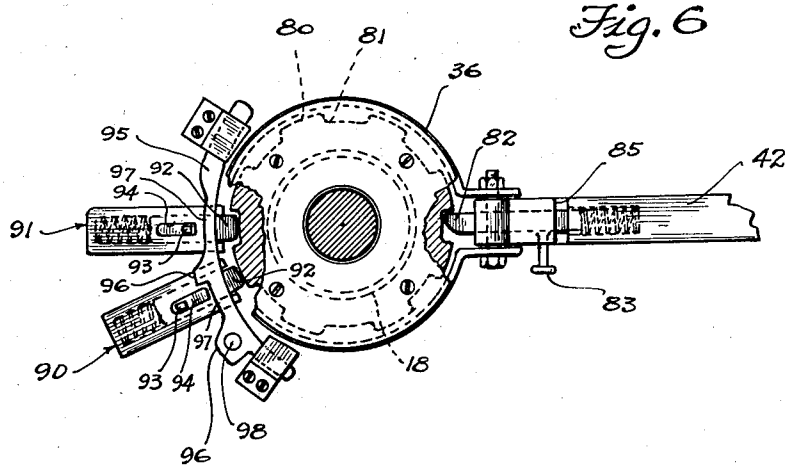
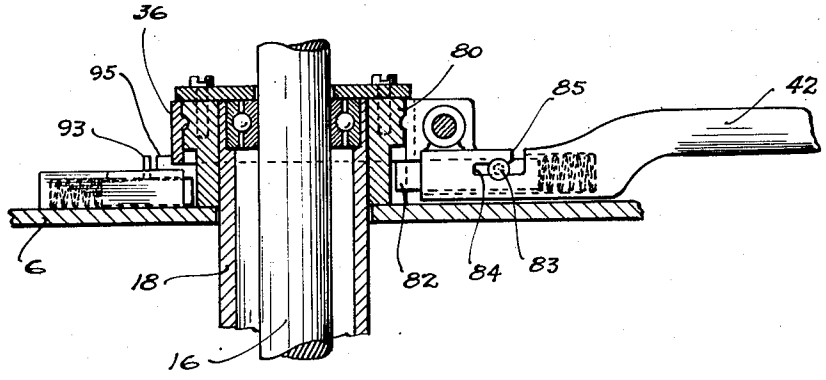


Fig. 7



Inventor
C. Hale Graham

By R. G. Story
Attorney

Patented Feb. 14, 1950 2,497,406

UNITED STATES PATENT OFFICE

2,497,406

SOYBEAN STORAGE BIN EQUIPMENT

Clarence Hale Graham, Champaign, Ill., assignor to Swift & Company, Chicago, Ill., a corporation of Illinois

Application May 8, 1947, Serial No. 746,685

3 Claims. (Cl. 214—17)

1

The present invention relates to a device for loading a bin or other large container with particulate material such as grain or beans; for example, soya beans, and more particularly to such a device in which the particulate material is thrown forcibly to all parts of the bin.

It is a primary object of the present invention to provide a loader for bins in which it will be unnecessary to resort to manual labor to level off the surface of the particulate material with which the bin is being filled so as to insure the filling of the same to its maximum capacity.

Still another object of the present invention is to provide a bin loading apparatus of simple and economic construction, which will be of relatively light weight and readily portable from one bin to another.

Still another and important object of the present invention is to provide a bin loading device in which the particulate material with which the bin is being filled may be forcibly ejected in any desired direction into the bin or container.

Other and further objects of the instant invention will be readily apparent from the detailed description of the same taken in conjunction with the drawings, in which:

Figure 1 is a perspective view showing the apparatus mounted over the manhole of a bin;

Figure 2 is a sectional plan view taken on the line 2—2 of Figure 3;

Figure 3 is a vertical sectional view taken on the line 3—3 of Figure 2 looking in the direction of the arrows;

Figure 4 is an enlarged sectional view taken on the line 4—4 of Figure 2, illustrating particularly the means employed for adjusting the direction of discharge of the material being loaded;

Figure 5 is a sectional plan view taken on the line 5—5 of Figure 3 looking in the direction of the arrows and showing in detail the impeller portion of the apparatus;

Figure 6 is a sectional side elevation of a modified construction of the means for adjusting the direction of the discharge means, and

Figure 7 is a sectional plan view of the modified construction shown in Figure 6.

Now referring with greater particularity to the drawings, the numeral 1 generally denotes a bin or container, shown in fragmentary form, having a manhole portion 2 secured in the upper surface thereof by any suitable means.

The loading device itself generally designated by the numeral 3 comprises a frame portion 4 of similar configuration but of slightly larger dimensions than the manhole portion 2 so that it may

2

readily be placed thereover and position the loading device for filling the bin. The upper edge of the frame portion 4 preferably slopes upwardly at the rear thereof to form a level surface upon which is mounted, preferably by welding, a platform 6 of trapezoidal configuration, which overhangs the frame portion 4. The overhanging portion of the platform 6 is strengthened by rib members 7, secured to the platform 6 and frame portion 4 preferably by welding. The platform 6 is further strengthened by a ledge member 8 secured, preferably by welding, to the front surface of the platform 6 and opposed portions of the frame portion 4.

Rising vertically from the platform 6 is a metallic plate 9. The plate 9 is preferably welded along its lower edge to the platform 6 and is strengthened by a rib member 10 of generally triangular outline which may also be welded to the platform 6 and plate member 9.

The plate 9 serves as a standard upon which may be mounted an electric motor generally designated by the numeral 11 by means of metal straps 12.

From the electric motor 11 depends a drive shaft 13 which is connected by a conventional flexible coupling 14 to a shaft 16 which extends through an aperture 17 in the platform 6 to a point a substantial distance below the frame portion 4. Surrounding the shaft 16 and also extending through the aperture 17 in contacting and rotatable relationship with the platform 6 is a hollow shaft or tube 18. Conventional ball bearings 19 are preferably mounted in the upper and lower ends of the hollow shaft 18 to position the shaft 16 centrally of the hollow shaft 18 and provide for relative rotation between the two about a given axis.

Positioning of the hollow shaft 18 is accomplished by means of an adjustable clamp member 21 to which is rigidly secured by welding or other suitable means a pair of strengthening ribs 22 extending outwardly and upwardly in opposite directions from the adjustable clamp 21 to the frame portion 4 to which they are rigidly secured, also preferably by welding. Additional strengthening of the shaft 18 is accomplished by means of strap members 23, one of the ends of which are secured to the lower ends of strengthening ribs 22 and the other ends of which are secured to the ledge portion 8, preferably by a welding operation. The clamp 21 is made adjustable by means of bolts 24 passing through flange portions 26, and should be tightened to a degree that while sufficient rigidity is imparted to the hol-

low shaft 18 yet the hollow shaft is capable of being rotated within the clamp for a reason which will be apparent hereinafter.

Surrounding the upper end of the hollow shaft 18 is a flat plate 27 of circular configuration having an upstanding circular flange portion 28 contacting the hollow shaft 18, the plate 27 resting upon the platform 6. The flange portion 28 is rigidly secured to the hollow shaft 18 to prevent relative rotation between the two by means of symmetrically arranged set screws 29.

Cover members for the bearings 19 are provided by apertured plates 31 and 32, the former being secured by bolts 33 to the upper edge of the flange portion 28 of the plate 27 and the latter being secured by bolts 34 to the lower edge of hollow shaft 18.

Surrounding the upstanding flange portion 28 is a rotatable sleeve 36 having outwardly extending lugs or flange portions 37. Sleeve member 36 is conveniently positioned for rotation with respect to flange portion 28 by the reception in an annular recess 38 in the flange 28 of an annular bead portion 39 projecting from the sleeve 36.

Between the outwardly extending lugs or flange portions 37 of the sleeve 36 is mounted by means of a nut and bolt 41 a vertically swinging handle 42. The handle 42 has depending from the lower surface thereof a lug member 43. In the outer edge of the circular plate 27 are provided a plurality of symmetrically arranged recesses 44, which are positioned to receive the depending lug 43 of handle 42 as is clearly shown in Figure 4. The number of these recesses is immaterial except that there should be a sufficient number that the space between any two adjacent recesses will be within the range of movement of the lug 43.

Plate 27 may be secured in any desired position upon the platform 6 by means of a pair of oppositely disposed clamp members generally designated by the numeral 46. The clamp members 46 comprise a body portion 47 of L-shaped configuration having a recess 48 provided in the shorter leg of the L. Adapted to be received by recess 48 is a lug member 49 rigidly secured to the platform 6 preferably by welding.

The longer leg of the L of clamp 46 is provided with an aperture 51 intermediate its ends through which extends a threaded bolt 52 to the top of which may be rigidly secured a handle portion 53. A threaded nut 54 is rigidly secured as by welding immediately below an aperture 56 in the platform 6 so that by screwing home of the bolt 52 therein the undersurface of the body portion of the clamp is caused to engage the upper surface of the plate 27 and rigidly clamp the same against platform 6.

To the lower end of the hollow shaft 18 is rigidly secured an open topped casing generally designated by the numeral 57 and comprising a bottom portion 58 having an upstanding side wall 59 secured thereto as by welding. A spout portion 61 is formed in casing 57 by extending side wall 59 outwardly in a straight line as shown at 62.

An adjustable lip element 61' may be hinged at the outer end of the spout 61 for a purpose to be described below. The lip may be set in any position throughout a wide range of angles by means of the adjusting strut 62'. This strut is pivotally connected to the lip and is conveniently anchored to the wall 62 by means of the threaded wing nut means 63'.

The rigid securing of the casing 57 to the hollow shaft 18 is preferably accomplished by means of symmetrically disposed web members 63 which are secured at one end thereof by welding or other suitable means to the hollow shaft 18 and at the other end thereof in a similar manner to brackets 64 which are in turn rigidly secured as by welding to the side wall 59 of the casing 57.

Rotatably mounted within the casing 57 is an impeller generally designated by the numeral 66, which comprises a hub portion 67 rigidly secured by any suitable means to the lower end of the shaft 16. Rigidly secured to the lower end of the hub portion 67 as by welding is a disc 68 and rising vertically from the disc 68 and symmetrically disposed are a plurality of blades or vanes 69 which may also be secured by welding to the disc 68 and hub portion 67 with ends of the blades or vanes extending nearly to the side wall 59 of the casing 57 but allowing a small clearance therebetween. It has been found that an impeller having four blades operates very efficiently in the instant device, but it is to be understood that any other convenient number of vanes may be employed as desired. Also, it is preferred that the vanes be mounted tangentially with respect to the hub portion 67 but again it is to be understood that applicant's invention is not limited to such a construction.

In order to direct the particulate material being transferred to a bin or container into the casing 57 and onto the impeller disc 68, a chute or funnel 71 is mounted by means of web members 72 with its mouth portion within the frame portion 4 and its spout portion directed into the top of the casing 57, the web portions 72 being rigidly secured as by welding to both the frame portion 4 and funnel 71.

From the above detailed description, the operation of the device will be readily apparent. The particulate material to be loaded is directed by means of a spout, not shown in the drawings, into the funnel 71 and thence upon the impeller 66 within casing 57 from which the material is rapidly and forcibly ejected in the direction of the spout 61.

After the portion of the bin or container toward which the spout 61 is directed has been filled to a desired degree, the spout may be rotated to any new position desired by rotation of the handle 42 while lug 43 is in registry with one of the recesses 44 in the plate 27 as the upstanding flange 28 of plate 27 is rigidly secured to hollow shaft 18 to which the casing 57 is in turn rigidly and non-rotatably secured. It is to be understood, of course, that before this rotation may be accomplished, clamps 46 will have to be loosened, the same again being retightened when the desired positioning of spout 61 has been attained.

To transfer lug member 43 to the next succeeding recess 44, it is merely necessary to swing the handle 42 upwardly until the lug is out of registration with the recess and then swing the handle horizontally by means of rotatable sleeve 36 until lug 43 has reached a position directly above this next succeeding recess at which time the handle may be lowered so that the lug 43 is received thereby. It is only necessary, as pointed out above, that the recesses 44 be close enough together that they are within the range of movement of handle 42, which in the form of the invention illustrated by the drawings is limited on the one hand by the standard plate 9 and on the other hand by one of the clamp members 46.

When this distributing means is being used in

a circular bin no problem arises as to even distribution of the particulate material over the entire surface of the bin. In some cases, however, it is desirable to spread the material throughout a differently shaped storage means as a railway car or the like. To effect proper control of the stream flowing from the distributing device when this is necessary, the adjustable lip 61' is brought into play. During normal use, the lip hangs downwardly from the floor of spout 61 and does not come in contact with the material, but when it is desired to project the material farther away from the distributing means, as when loading a box car, the lip is lifted up and fixed in such position by means of the strut 62' so that after leaving the floor of spout 61 the stream of material is turned upwardly. By arching the stream up more or less, the material can be thrown to the more distant parts of various other types of storage bins from a single filling hatch.

Thus, it is seen that by the use of the apparatus of the present invention a bin or container may be loaded so that the material with which it is filled is provided with a substantially level surface, and no manual labor whatever is necessary to trim off the upstanding cone of material which would be present if the material were merely added directly through the manhole or opening of the bin.

An alternate form of device for shifting the spout is shown in Figures 6 and 7 wherein use is made of a ratchet mechanism. With this means, the upper end of the tube or hollow shaft 18 is splined or preferably, a separate collar 80 may be integrally assembled around the upper end of the tube 18, the collar 80 being provided with vertically extending slots 81, which correspond to the spline slots mentioned above. The collar 80 rides upon the upper surface of plate 6 and aids in the support of tube or shaft 18. If a splined shaft 18 is to be used, a separate support collar must be locked to the shaft 18 in position to cooperate with the upper surface of plate 6.

With either the splined shaft or collar 80, the rotatable sleeve 36 is used to support the handle 42 so that its inner end can be moved against the outer surface of the slotted collar 80 or outer surface of the splined portion of the shaft 18. This inner end of the handle 42 carries a spring pressed pawl 82 which is adapted to fit into the slotted arrangement at the end of shaft 18 and the handle may be turned to drive the shaft in a given direction of rotation to turn spout 61 in the desired direction as described above.

The pawl 82 of the ratchet mechanism is beveled on the trailing side so that the handle can be quickly turned back to engage in a following notch when turning the shaft 18. The pawl 82 is also mounted in handle 42 so that it can be reversed 180° to drive the shaft 18 in the opposite direction if desired. For this purpose, the pawl 82 is provided with a knob 83 that rides in a pair of slots 84 extending in a direction generally longitudinally of the handle on each side, the slots 84 being connected at their outer ends through a cross slot 85.

When using the ratchet turning device, the pawl 82 engages in the slots at the upper end of the shaft 18 to drive the shaft in one direction and as the handle is returned to get another hold on the shaft, the knob 83 reciprocates on one or the other of the slots 84 as the pawl rides over the tops of the teeth. In order to reverse the direction of drive against shaft 18 with handle 42, the knob 83 is retracted to the outer end of slot 84 to disengage pawl 84 completely from the slots associated with shaft 18, then the knob is pushed through slot 85 to the other slot 84, and after turning the pawl through 180°, the knob is released so that the pawl can be urged by its spring into engagement with the slots.

In order to fix the spout in any given position, a pair of latching elements 90 and 91 are provided which also cooperate with the slots provided for the ratchet device. Each latch includes a spring pressed plunger or bolt element 92 that fits into any slot in front of the latch and each latch element is integrally fixed to plate 6 to hold shaft 18 immobile when one of the bolts is engaged in a slot.

The latches 90 and 91 are offset with respect to the spacing of the slots circumferentially around shaft 18 such, for example, that when the bolt of latch 90 is engaged in a slot, the latch 91 is positioned midway between two other slots.

The plungers 92 of the latches are each provided with knobs 93 operating in slots 94 and of course the plungers must be held retracted while shaft 18 is being turned to position spout 61. To assist in holding the bolts retracted in the latches against the pressure of their springs, a slide member 95 is provided. The slide is mounted to have limited oscillatory movement around the periphery of the slotted portion of shaft 18 and suitable cam surfaces 96 are formed on the slide which cooperate with knobs 93 to hold the bolts retracted. The cam surfaces are relieved at 97 to permit knobs 93 to reciprocate inwardly when it is desired to lock shaft 18. A handle 98 may be provided on slide 95 to shift it into position to engage or release knobs 93 as desired.

The latching means is of course situated on plate 6 in a position to be readily accessible and yet not to interfere with the free movement of the ratchet device. It is also apparent that the ring or strap 36 must be undercut for an appreciable distance adjacent the latch means so that it can be rotated freely over the latching devices.

The above described ratchet and latching means may be substituted in whole or in part for the means best shown in Figures 2 and 3, for rotating shaft 18 to position spout 61. The ratchet device is much more rapid in operation as compared with the clamping arrangement shown in Figures 1 to 4; however, the latter is a most serviceable heavy duty device.

It has been found in practice that if the particulate material being loaded is of an abrasive character, the inner surfaces of the walls of casing 57 should be hardened by special treatment at least at the points of greatest contact. As an alternative method, inserts of very hard material may be provided at these points.

The above shows one embodiment of this invention, but many modifications thereof may occur to those skilled in the art which will fall within the scope of the following claims.

I claim:

1. A compact and self-contained unit for loading bins with grains, beans, and the like, comprising: a rigid frame adapted to be supported in an opening at the top of the bin to be filled; a funnel member having a large generally circular inlet opening and a smaller generally circular outlet opening, said openings being disposed in spaced and approximately parallel planes and being also eccentrically arranged with respect to each other, said outlet opening being positioned under the inlet opening with the center of the outlet opening lying in a vertical plane approxi-

mately tangent to the periphery of the inlet opening; said funnel member extending downwardly from the frame and into the top of the bin; a rotatably mounted distributing spout supported from said frame immediately below the outlet opening of said funnel member; said spout having a generally horizontal floor and being shaped to direct the grain and the like outwardly from the funnel member in a horizontal direction; a motor mounted on the frame and being positioned above the plane of the inlet opening to the funnel; and said motor being generally concentrically arranged above the outlet opening of the funnel; a rotatable impeller mounted in the spout to forcibly drive the grain therefrom; a drive shaft extending approximately vertically and closely along the wall of the funnel adjacent said vertical plane for connecting the motor to the impeller to effect rotation thereof; and a handle and latch means mounted on the frame and operatively connected with the spout to cooperate therewith whereby the spout may be turned to any one of a number of positions and may then be held fixed with the latch while the grain is being driven out horizontally from the spout after the motor becomes energized.

2. A compact and self-contained unit for evenly loading a bin with grain or the like through a manhole in an upper portion of the bin, said unit including a frame adapted to be supported on the bin outside the periphery of the manhole, an offset chute supported from the frame and adapted to extend down into the bin through the manhole, and distributing means including an impeller rotatable about an axis, said impeller being adapted to extend within the bin through the manhole with said axis extending adjacent one side of said chute where the latter passes through the manhole, and power means outside the bin and operatively connected to said impeller along said axis, said chute being so shaped and positioned that the lower end thereof is above said impeller and substantially evenly spaced about said axis with the portion of the chute through the manhole being only slightly smaller than said periphery whereby the impeller may be rotated to distribute the grain without materially obstructing the flow of grain which may be fed through the manhole.

3. A compact and self-contained unit for evenly loading a bin with grain or the like through a manhole in an upper portion of the bin, said unit including a frame adapted to be supported on the bin outside the periphery of the manhole, an offset chute supported from the frame and adapted to extend down into the bin through the manhole, a shaft, a tube about said shaft, said shaft being rotatable with respect to said tube, said tube being rotatable with respect to said frame, said shaft and tube being mounted from said frame in such a position that they will extend substantially vertically within the bin through the manhole and will be adjacent one side of the chute where the latter passes through the manhole, an impeller on the lower end of the shaft and rotatable therewith, power means operatively connected to the upper end of the shaft to rotate the shaft and impeller, a casing about a portion of said impeller and defining a grain outlet, said casing being attached to and rotatable with said tube, said chute being so shaped and positioned that the lower end thereof is above said impeller and substantially evenly spaced about the axis of said shaft with the portion of the chute through the manhole being only slightly smaller than said periphery whereby the impeller may be rotated to distribute the grain from the outlet without materially obstructing the flow of grain which may be fed through the manhole, and means above the manhole for rotating said tube to position said outlet to distribute grain in a desired direction.

C. HALE GRAHAM.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
614,891	Reynolds	Nov. 29, 1898
834,331	Skillin	Oct. 30, 1906
853,870	Ellerton	May 14, 1907
1,763,396	Howland	June 10, 1930