May 16, 1933. D. B. FEGLES ET AL 1,909,258

APPARATUS FOR EMPTYING BINS

Filed May 12, 1930 2 Sheets-Sheet 1

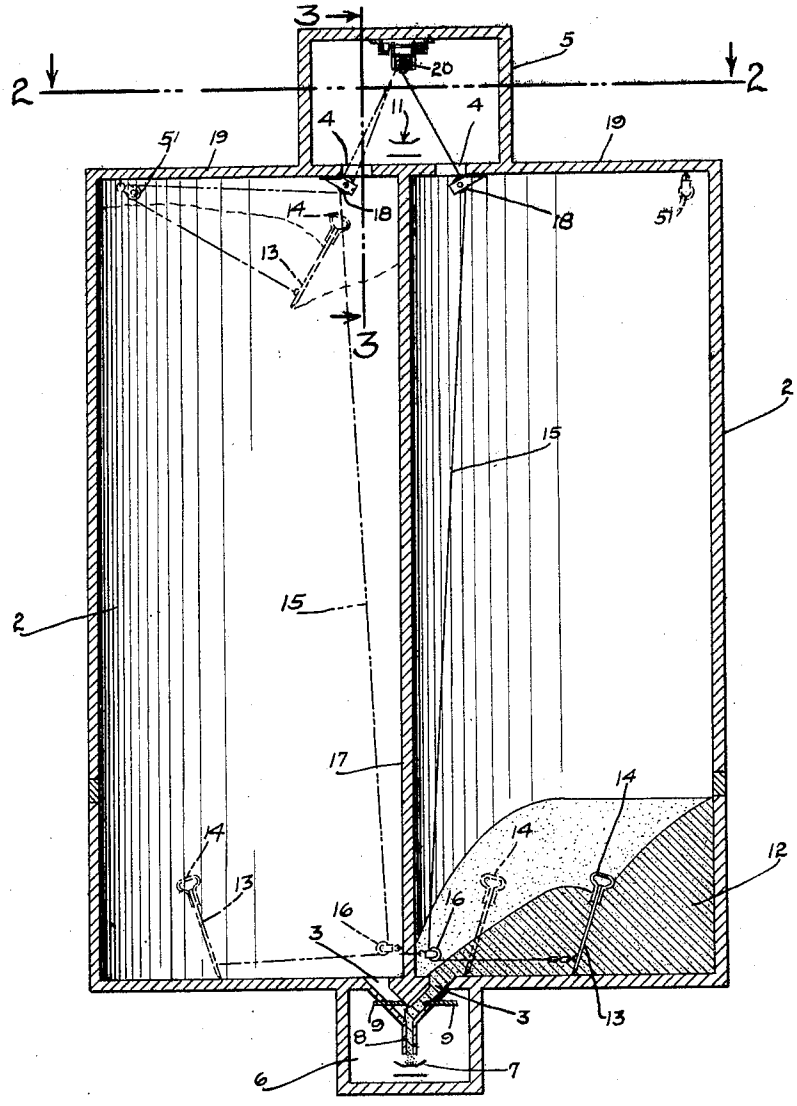


Fig. 1

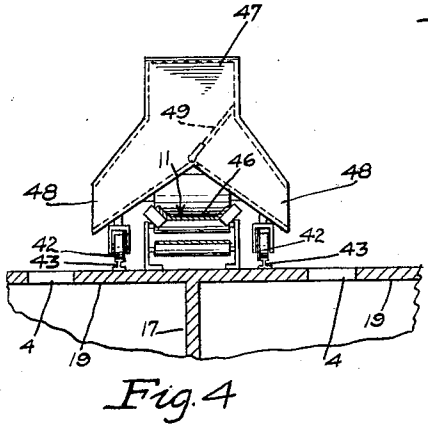


Fig. 4

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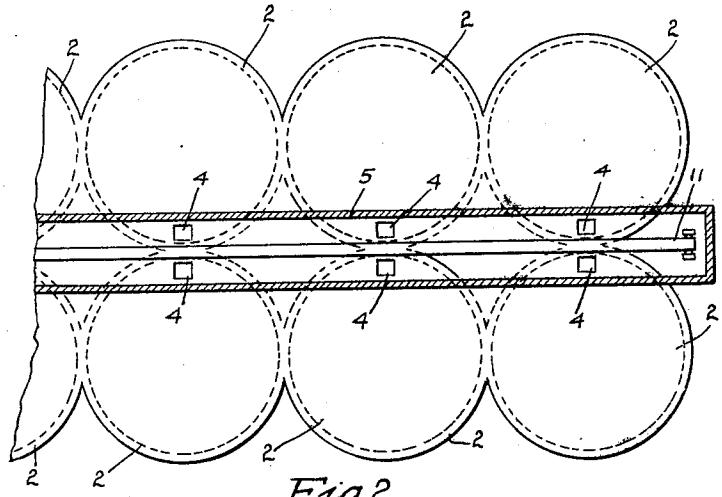


Fig. 2

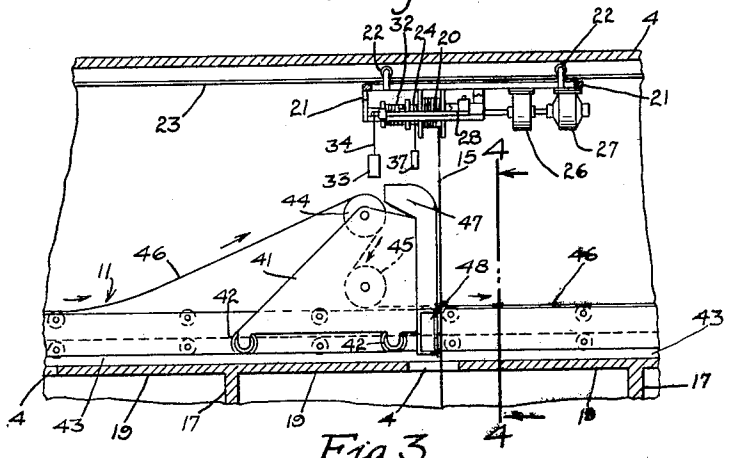


Fig. 3

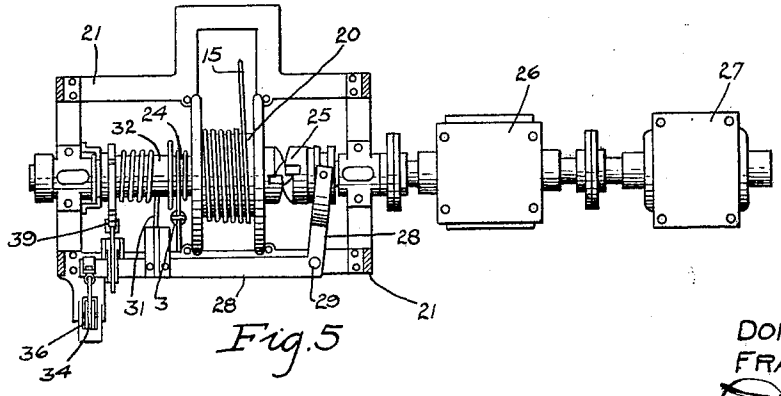


Fig. 5

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UNITED STATES PATENT OFFICE

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APPARATUS FOR EMPTYING BINS

Application filed May 12, 1930. Serial No. 451,826.

This invention relates to an improved apparatus for emptying bins, particularly storage bins having flat bottoms.

An object of the invention is to provide an improved apparatus capable of quickly removing from a flat bottomed bin the residue of grain or other material remaining therein after the usual discharge opening of the bin has been opened and the major portion of the grain discharged from the bin by gravity.

A further object of the invention is to provide an apparatus for conveniently and effectively removing residue material from flat bottomed bins, and which apparatus may also be used for trimming or completely filling the upper portions of grain bins, thereby increasing their capacity.

A further object is to provide in a grain storage bin having a suitable discharge opening at its lower portion and provided at its upper portion with an intake, a scoop movable within the bin and provided with a cable having a running connection with a sheave located adjacent to said discharge opening; and a cable operating or winding mechanism being located at the upper portion of the bin and having an operative connection with the cable whereby the latter may be operated to move the scoop in a direction towards said discharge opening to cause the removal of grain from the bottom of the bin, the operation of said winding mechanism being adapted to be controlled by an operator manipulating the scoop within the bin.

Other objects of the invention will appear from the following description and accompanying drawings and will be pointed out in the annexed claims.

In the accompanying drawings, there has been disclosed a structure designed to carry out the various objects of the invention, but is is to be understood that the invention is not confined to the exact features shown as various changes may be made within the scope of the claims which follow.

In the drawings:

Figure 1 is vertical sectional view showing a conventional form of grain storage elevator with the invention applied thereto;

Figure 2 is a sectional plan view on the line 2—2 of Figure 1;

Figure 3 is an enlarged detail sectional view on the line 3—3 of Figure 1;

Figure 4 is a detail sectional view on the line 4—4 of Figure 3; and

Figure 5 is a view showing a conventional form of operating mechanism commonly known as an "automatic power shovel."

Grain storage elevators such as are usually erected at terminal points where turnover in grain is slow, or where the grain is sometimes kept in storage for a considerable time, often comprise a plurality of grain storage bins now commonly made cylindrical in cross section and constructed of such materials as concrete, steel or tile. The bottoms of such storage bins are usually made substantially flat in order to reduce construction costs, and, as the grain is usually discharged from the bins by gravity, a certain portion of the grain stored in each bin will not discharge therefrom by gravity. Other means must therefore be provided to remove this residue of grain in order to completely empty the bins, and, at present, manual labor is usually employed to remove this grain from the bins when it becomes necessary to completely empty them or their contents.

In some instances, the bottoms of the bins are sloped or inclined substantially equal to the natural slope of the residue of grain which would remain in the bin, were the latter provided with a flat bottom. To thus hopper or slope the bottom of a bin reduces the capacity thereof, and it also greatly increases the constructional cost of the bin. The present invention discloses an apparatus particularly applicable in connection with grain storage bins provided with flat bottoms for quickly removing from the bin the sloped residue of grain remaining on the bottom thereof, after the major portion of the grain has been discharged from the bin by gravity.

In the present embodiment of the invention, there is diagrammatically disclosed in Figures 1 and 2, a grain elevator comprising a plurality of storage bins 2, here shown as being cylindrical in cross-section and each

provided at its bottom with a suitable discharge opening 3. Suitable intake openings 4 are provided in the upper portions of the bins through which grain may be delivered into the bins. The elevator here shown is of the cupola type and is provided at its top with an elongated cupola 5, preferably extending the entire length of the two rows of bins, as shown in Figure 2, and providing a closure for the intake openings 4 and also a means for housing the usual grain handling apparatus provided at the tops of the bins for delivering grain into the tanks 2 through the intakes 4—4. A tunnel 6, of ordinary construction, is shown beneath the bins 2—2 which extends lengthwise of the bins and has mounted therein a suitable conveyer 7, diagrammatically indicated in Figure 1 which, it will be noted, is positioned directly beneath discharge spouts 8 communicating with the discharge openings 3—3 of the bins 2—2. A suitable slide valve 9 is provided for controlling the discharge of the grain from the bins onto the conveyer 7.

A conventional type of conveyer is also provided in the cupola 4 onto which the grain to be stored in the bins 2—2 is delivered from a suitable means not shown in the drawings. This conveyer is diagrammatically indicated at 11 in Figure 1.

A feature of the invention resides in the means provided for removing the residue of grain indicated at 12 in Figure 1, from the bottoms of the bins 2—2. As shown in Figure 1, a suitable scoop 13, preferably in the form of a flat plate and provided with suitable hand grips or handles 14 at its upper edge, has a cable 15 attached thereto which has a running connection with a sheave 16, preferably demountably connected with the intermediate wall 17 of the bin adjacent to the discharge opening 3 provided in the bottom of the bin. From the sheave 16, the cable 15 extends upwardly and engages a sheave 18, which is suitably secured to the upper wall 19 of the bin adjacent to the intake opening 4 so that the cable may pass upwardly through the intake 4, as shown in Figure 1.

The means provided for operating the cable 15, in the present instance, consists of an operating mechanism commonly known as an "automatic power shovel", which includes a winding drum 20 with which the cable 15 is operatively connected as shown in Figures 3 and 5. The power shovel, as this mechanism will hereinafter be termed, has a frame structure 21 provided with carrying wheels 22 adapted to travel upon suitable tracks 23 secured to the top wall or ceiling of the cupola, as indicated in Figures 1 and 3. By thus supporting the power shovel, the latter may readily be moved from one bin to another as will readily be understood by reference to Figure 3, it being necesary, of course, that the cable 15 be removed from the bin each time the power shovel is moved from one bin to another.

The power shovel herein disclosed is a common well-known apparatus and it is therefore thought unnecessary to describe the same in detail. Briefly, it comprises the winding drum 20 having a relatively smaller winding drum 24 connected with one side thereof, as indicated in Figure 5. A suitable clutch 25 provides means for operatively connecting the winding drum 20 with a speed reduction mechanism 26 having an operative connection with a suitable motor 27. A clutch operating lever 28 is pivoted at 29 to the frame structure 21 and has one end of a flexible element 31, such as a chain, connected with the free or swinging end thereof. This element is coiled about a cylinder 32 and has its opposite end suitably secured thereto. A weight 33 is connected by a cable 34 to the terminal 35 of the clutch lever 28. This cable 34 passes over a sheave 36, indicated in Figure 5, so that the weight 33 constantly exerts a pull upon the clutch lever in a direction to move the clutch into driving engagement with the winding drum 20.

A relatively smaller weight 37 is movably connected with a cable 38 having one end secured to the frame 21 and its opposite end portion coiled about the relatively smaller drum 24 and secured thereto. This cable is wound upon the drum 24 in a direction opposite to that of the main operating cable 15 so that the weight 37 constantly tends to rotate the cylinder 20 in a direction to wind the cable 15 thereon and, at the same time, to wind the chain 31 onto the cylinder 32 with the result that the clutch arm 28 is moved to the position shown in Figure 5, against the action of the weight 33 whereby the clutch is moved out of driving engagement with the winding drum 20. An automatic trip 39 is shown located at one end of the cylinder 32 and is adapted to normally hold the clutch arm 28 in the position shown in Figure 5. The length of the cable 15 which may be unwound from the winding drum 20 when the scoop 13 is moved backwardly away from the sheave 16 or discharge opening 3, is controlled by the length of the chain 31. The connection of the drum with the clutch arm 28 is therefore adjustable so that its effective length may be varied. When the clutch 25 is operatively engaged with the winding drum 20, the latter may rotate in one direction until the chain 31 moves the clutch arm 28 to the position shown in Figure 5, whereupon the winding drum will come to rest, until the trip 39 is again actuated to release the clutch arm 28.

In the operation of the above described mechanism, the operator or workman within the bin will manually pull the scoop away from the discharge opening 3 to a remote corner of the bin, after which he will release the tension in the cable 15 to cause it to become

slack. Such action of the cable will cause the weight 37 to operate the cylinder 32 in the opposite direction, whereupon the trip 39 will be actuated to release the clutch arm 28 and permit the clutch 25 to operatively engage the drum 20, whereupon the scoop will be pulled forwardly through the grain to the dotted line position indicated in Figure 1. When the scoop reaches the dotted line position indicated in this figure, the clutch will automatically be rendered inoperative because of the chain 31 being wound upon the cylinder 32 and returning the clutch arm 28 to its normal inoperative position, shown in Figure 5.

Means are indicated in the drawings for delivering the grain from the conveyer 11 to a selected bin 2. The means commonly employed for this purpose is known as a "belt conveyer tripper", and such a tripper is diagrammatically illustrated in Figures 3 and 4 and comprises a frame 41 provided with suitable wheels 42, movable upon rails 43 shown supported upon the upper wall 19 of the bins within the cupola 5. A pair of cylinders or rollers 44 and 45 are mounted upon the frame 41 and the upper run 46 of the conveyor 11 engages these rollers as shown in Figure 3. A hopper 47 is also mounted upon the frame 41 and is positioned to receive the grain carried upwardly over the roller 44 by the belt 46, as will readily be understood by reference to Figure 3. Discharge spouts 48 are connected with the hopper 47, and a gate valve 49 is provided at the juncture of the two discharge spouts whereby the discharge of the grain from the hopper 47 may be directed to a selected bin. This conveyer tripper, like the power shovel, is movable lengthwise of the cupola 5 so that it may be positioned to direct the grain into a selected bin as will readily be understood by reference to Figures 3 and 4.

By means of this novel apparatus, the residue of grain in a bin after the remaining portion has been emptied therefrom by gravity, may be quickly removed from the bin by a single workman operating the scoop at the bottom of the bin. In some instances, it may be desirable to have a watchman stationed at the intake opening 4 to observe the operations of the workman at the bottom of the bin, and also the operation of the mechanism situated in the cupola.

A suitable sheave 51 may also be provided at the upper portion of each bin 2 with which the cable 15 may be engaged to provide means for filling the upper portions of the bins, as indicated in the upper left hand corner of Figure 1. It will therefore be seen that the apparatus may be utilized for emptying a bin of the residue of grain remaining therein after the valve 9 has been opened to permit the grain to flow from the bin. It also provides means for filling the upper portion of the bin, thereby increasing the capacity of the bin. This apparatus therefore obviates the necessity of a sloping or hopper shaped bottom and provides means whereby the bin may be completely emptied of its contents.

We claim as our invention:

1. A grain storage bin having a substantially flat bottom and a discharge opening at the bottom, the top of the bin being formed with an intake, a traveling cable winding mechanism mounted to travel transversely of the bin, a cable connected to said winding mechanism positioned to pass through the intake at the top of the bin and hanging in a pendant position within the bin, a scoop detachably attached to the end of the cable within the bin, and guides for the cable positioned within the bin, one of the guides being positioned adjacent to its bottom discharge, a second guide positioned within the interior of the bin adjacent to the top intake, for guiding the scoop transversely across the interior of the bin in directing material to the discharge, and a third guide disposed in the upper part of the bin to serve in conjunction with the adjacent upper guide to direct the scoop across the interior of the upper portion of the bin to distribute material within the bin.

2. A grain storage elevator comprising a plurality of bins each having a substantially flat bottom formed with a discharge opening, the tops of the bins being formed with intakes arranged substantially in alinement, a traveling cable winding mechanism mounted to travel transversely of the bins, the cable being disposed to pass through the top intake of a selected bin and hanging in a state of suspension within the bin above the level of the grain, a scoop detachably attached to the cable within the selected bin, a guide secured within the bin adjacent to the bottom of the bin, and another guide positioned adjacent to the intake in the top of the bin to receive said cable, said guides directing the scoop for moving material to the bottom discharge opening and maintaining the cable in a state of suspension between said guides, means operable from within the bin to control the winding mechanism, and means forming part of the scoop for manually positioning the scoop within the bin.

3. A grain storage elevator comprising a group of bins each formed with a substantially flat bottom having a discharge opening for material in the bin, the tops of the bins being formed with intakes arranged in substantial alinement, a power-operated winding mechanism mounted to travel transversely of the bins, a cable connected with said winding mechanism and passing through the intake of a selected bin and standing in a state of suspension within the bin, a scoop within a bin detachably connected to the end of the cable within the selected bin, guides po-

sitioned within the bins, one adjacent the intake and another adjacent the bottom for guiding the scoop across the flat bottom for directing the material to the bottom discharge opening, means operable from within the bin to control the winding mechanism, and means forming part of the scoop for manually positioning the scoop for moving material to the discharge opening.

In witness whereof, we have hereunto set our hands this 2d day of May 1930.

DONALD B. FEGLES.
FRANK L. NEMEC.