

April 10, 1934.

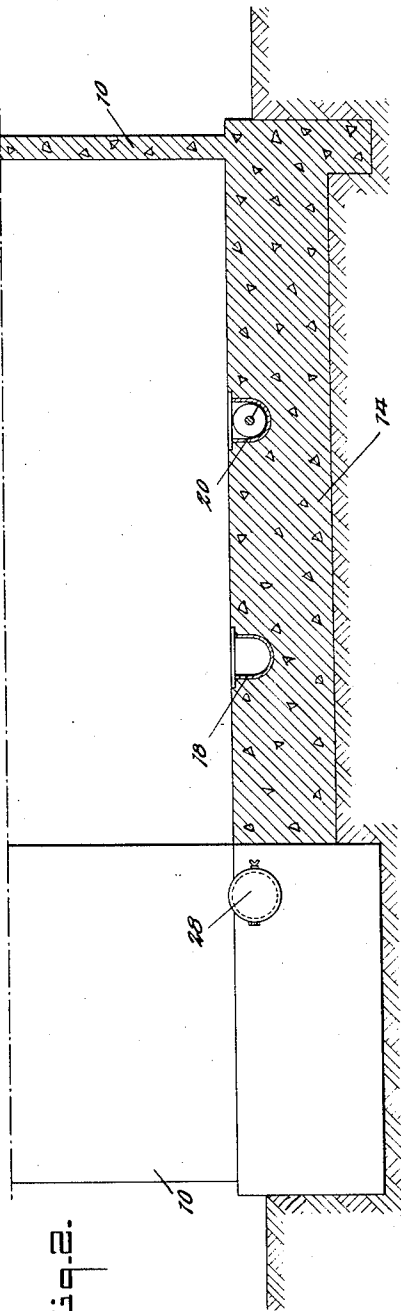
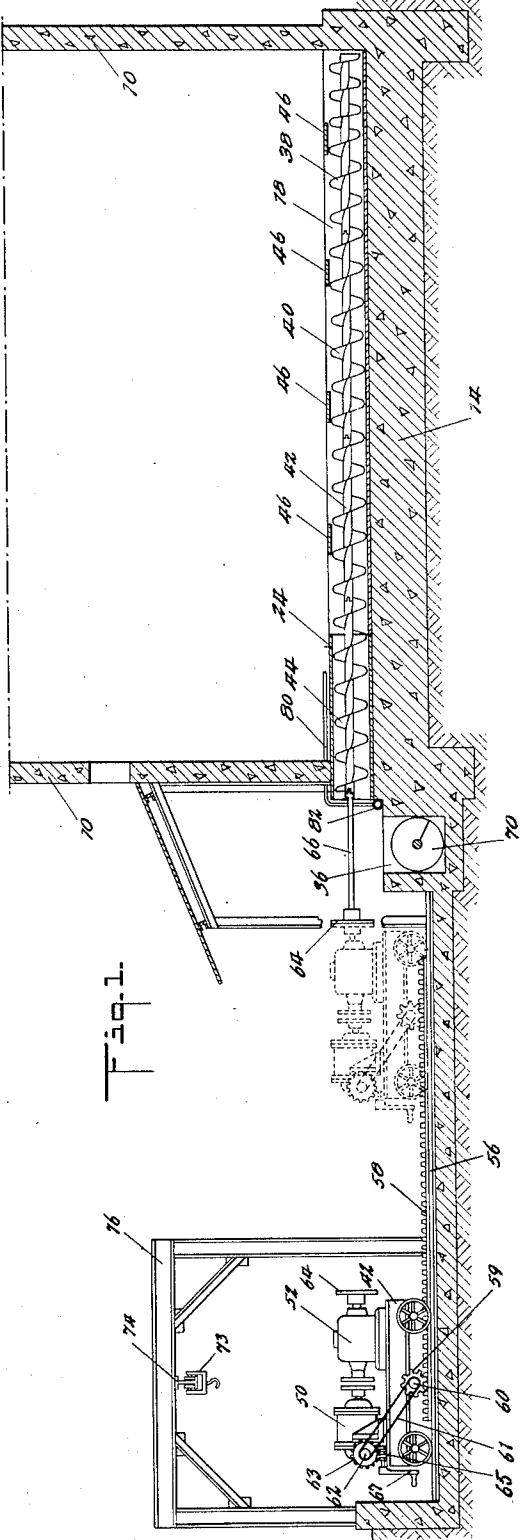
W. H. KLEIN

1,954,703

BIN AND MEANS FOR REMOVING MATERIAL THEREFROM

Filed Feb. 15, 1933

2 Sheets-Sheet 1



INVENTOR
WILLIAM H. KLEIN
BY HIS ATTORNEYS

Howson and Howe

April 10, 1934.

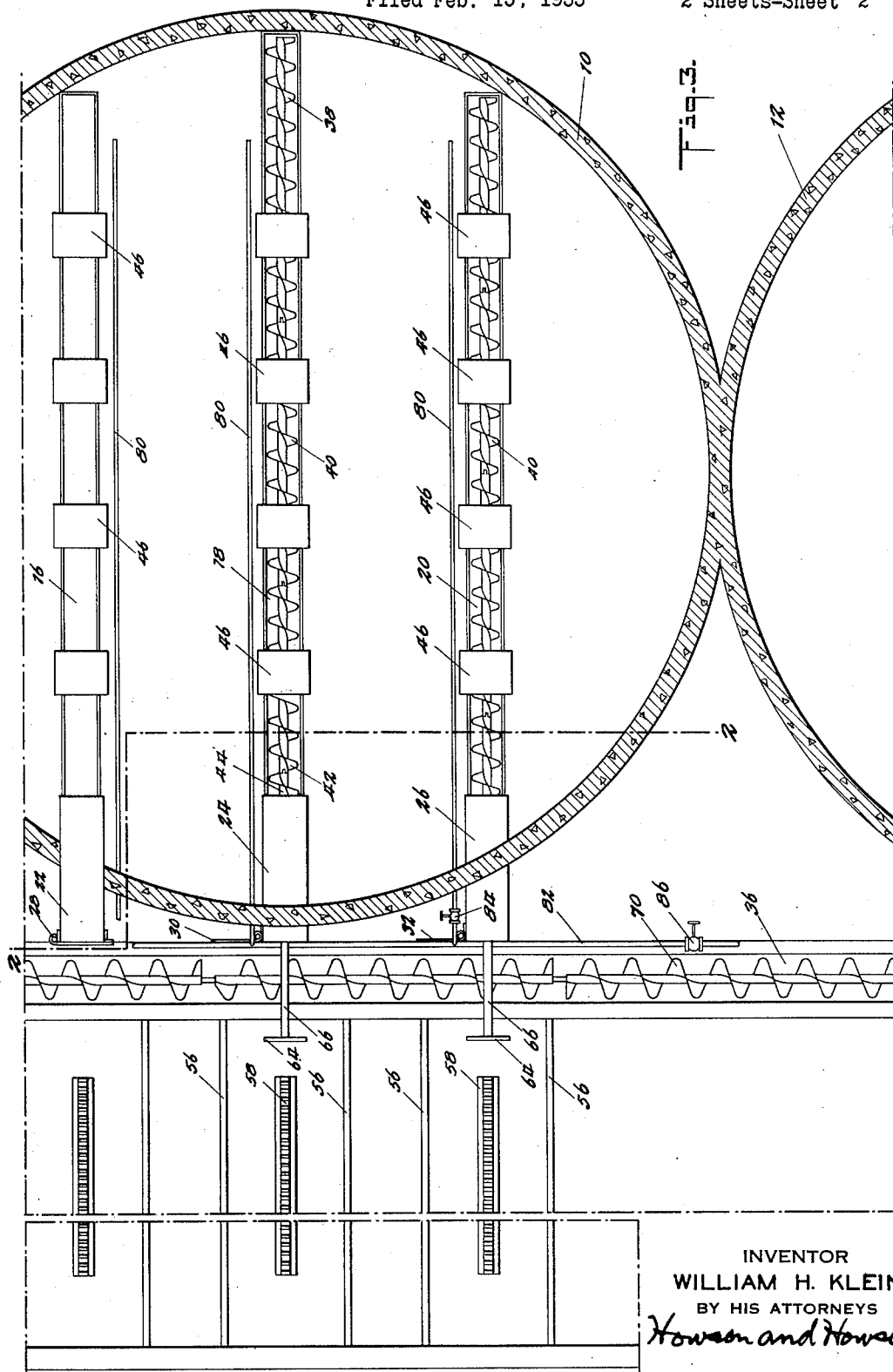
W. H. KLEIN

1,954,703

BIN AND MEANS FOR REMOVING MATERIAL THEREFROM

Filed Feb. 15, 1933

2 Sheets-Sheet 2



UNITED STATES PATENT OFFICE

1,954,703

BIN AND MEANS FOR REMOVING MATERIAL THEREFROM

William H. Klein, Chattanooga, Tenn.

Application February 15, 1933, Serial No. 656,943

6 Claims. (Cl. 214-17)

This invention relates to storage bins or silos for powdered or finely granulated materials such, for example, as cement. The invention also relates to means for removing such materials from the bin. More particularly, this invention relates to a novel construction of a bin of the silo type and the combination with it of means for removing material therefrom at a regular rate, the means employed for such removal being itself removable from the bin.

It is an object of my invention to reduce the cost of the silo type of bin construction by eliminating the necessity for a basement or tunnels which have been common heretofore.

Another object of my invention is to provide means for removing materials from a bin in a regulated flow which may be increased or decreased according to the demand.

Another object of my invention is to provide means of the above type for removing the material from a bin, which means may be removed and used interchangeably in one or more bins.

Other objects and advantages of my invention will become apparent as it is described in connection with the accompanying drawings.

Referring to the drawings:—

Figure 1 is a central vertical section through a circular bin which is constructed according to the principles of my invention and provided with my novel means for removing material therefrom.

Figure 2 is a section view taken on line 2-2 of Figure 3, but with only one of the channels containing a conveyor screw.

Figure 3 is a fragmentary plan view of two adjoining circular bins constructed, as in Figures 1 and 2.

Referring to the drawings it will be noted that the bins 10 and 12 are shown as of cylindrical construction and are preferably formed of concrete. The bins are seated directly upon a base or mat 14 which rests directly on the ground, by reason of which the weight of the silo and its contents is transmitted directly to the ground. This avoids the necessity of building expensive sub-structure to transmit the weight of the silo and its contents to the ground. The floor, or top surface of the base or mat 14, is provided with a plurality of spaced, parallel channels 16, 18 and 20 each of which has parallel straight side walls and a semi-circular bottom. For the purposes of illustration I have shown three such channels, but a greater or less number may be used as the conditions of use may require. The channels 16, 18 and 20 exit through the side wall of the bin by merging into delivery tubes in the form

of tubular sleeves or pipes 22, 24 and 26 respectively, the axes of which delivery tubes, when they are in assembled position, being coincident with the axes of the semicircular bottoms of the channels from which they proceed. The outer ends of the delivery tubes 22, 24 and 26 are provided with suitable closure members such as plates or doors 28, 30, 32 which may be hinged to the tubes or secured in any suitable manner. Preferably the outer ends of the delivery tubes 22, 24 and 26 are aligned and extend sufficiently far out from the side of the bin so as to cause material issuing from the tubes to fall into a collecting trough 36 which may collect the material from several openings and several bins.

For the purpose of moving the material from the bins I provide screw conveyors which may be formed of connectible sections 38, 40, 42 and 44 and whose diameter is approximately equal to twice the radius of the curved bottoms of the channels 16, 18 and 20. In order to hold the screw conveyors in the channels 16, 18 and 20 in case the conveyors have a tendency to rise I have provided a plurality of narrow spaced plates 46, which lie across the tops of the channels and are flush with the floor or top surface of the base of the bin. The space in between the plates 46 may be open to permit ready access to the material to the screw conveyors, or the spaces may be screened over with a screen having openings of sufficient size to permit the ready flow of material into the channels.

In operation the bin will be filled with material while the screw conveyors are withdrawn from the channels. When it is desired to remove some of the material one of the doors 28, 30 or 32 may be opened and one section of the conveyor introduced into one of the sleeves 22, 24 and 26. In order to rotate the screw conveyor there will be provided an electric motor 50 which is connected to a suitable gear reduction mechanism 52, both the motor and gear reduction mechanism being mounted upon a movable platform or truck 54 which is provided with wheels that can ride along upon a pair of parallel rails 56 laid parallel to the axes of the channels 16, 18 and 20. A rigid or a universal joint 64 of any suitable construction may be provided for coupling the gear reduction mechanism 52 with the end shaft or axle 66 of the screw conveyor section 44. Conventional adjustment devices may be provided for adjusting the motor and gear reduction 52 upon its platform to compensate for settlement of the bins. In order to move the truck along the rails, there is provided a rack 58 between the rails 56

which is adapted to be engaged by a pinion 59 mounted on and beneath the truck platform and driven by a suitable sprocket and chain mechanism 60, 61 and 62, which in turn is driven by a worm wheel 63 engaging a worm gear 65 mounted upon a crank 67, all of which are mounted on the truck. Or a suitable power driven mechanism may be provided, instead of the crank. It will be understood of course that rails for the truck will be provided for each of the channels of the bin. In lieu of the rack and pinion, any other suitable means may be provided to move the truck and hold it in the desired position against the thrust of the screw conveyor.

If the motor and gear reduction mechanism illustrated is used it may be moved from one set of rails to another by supporting it upon a trolley 73 and moving it along an I-beam trolley rail 74 which may be provided above the gear reduction and motor mechanism in a shed or house 76 which may be provided for the motor mechanism. If desired the motor and gear reduction apparatus need not be mounted upon the rails 56 but may be mounted upon flat tread wheels which are swivelly mounted, and maneuvered in a conventional manner into position for use with any one of the channels 16, 18 and 20. In that case advancement and withdrawal of the truck could be accomplished by means of a cable attached to fixed objects at opposite ends of the truck runway and reeved over a suitable winch on the truck. In this type of drive the trolley for moving the truck from one opening to another, would not be necessary. If the winch and cable drive are used, the winch should be driven by a worm or provided with a friction brake or ratchet and pawl lock or any other like device to overcome the pull of the screw conveyor upon the truck. This is true whether the winch is mounted on the truck or elsewhere.

Thus, taking tube 24 as an example, as the material is removed through the delivery tube 24 by the rotation of one section of the screw conveyor (only one section being connected to shaft 66 and that section being in the position occupied by section 44 in the drawings) the section will be fed into the tube by moving the truck 42 toward the bin. When this section has removed all the material of which it is capable, shaft 66 may be disconnected therefrom and other sections 40, 42 etc. may be interposed until all of the material which is able to flow into the channel 18 has been removed. The whole screw conveyor may then be removed from the channel and the operation repeated in another of the channels. The material issuing from the mouth of the tube 24 will fall into the trough 36 and from there it may be conveyed to any desired point by means of the screw conveyor 70 which is shown as located in trough 36. Or any other suitable conveying means may be provided to convey the material to the desired point from the delivery tubes. Screw conveyors and means for driving them may be provided for each of the channels so that the material may be more rapidly removed from the bins, if desired.

Although I have shown bins of cylindrical form, it will be obvious that the square or other forms may be used if desired. The bins may be joined together or spaced in any desired manner.

It has been found that cement and other finely divided or powdered material has a tendency to pack while standing so that it becomes difficult with a conveyor mechanism of ordinary strength to start operation if the conveyor is left in the bin

when the bin is filled. It is therefore a great advantage for the screw conveyor to be removable since less torque will be required to start removing the material out.

In case the material should fail to start moving into the troughs 16, 18 and 20 I have provided pipes 80 running parallel to the channels and these may be provided with openings at spaced points along the pipe. These pipes will be connected with a header 82 running parallel to trough 36 to which header compressed air may be supplied. The air will start the material moving into the channels from which it will be conveyed by the screw conveyors. Valve 84 may be provided for controlling the flow of air in the pipes 80 and a main valve 86 for controlling the flow in the header 82.

Many modifications within the scope of my invention will occur to those skilled in the art therefore I do not limit myself to the specific form of the invention as illustrated in the drawings.

I claim:—

1. A bin comprising a side wall, a base having channels therein with outlets for the removal of material from said bin, in combination with conveyor means adapted to be inserted in said channels and removed therefrom through said outlets, said conveyor means being insertible interchangeably in any of said channels, and means extending across the tops of said channels for holding said conveyor means therein but permitting access of material within the bin to said channels.

2. A bin comprising a side wall, a base having channels therein with outlets for the removal of material from said bin, in combination with conveyor means, said conveyor means being insertible interchangeably in any of said channels and removable therefrom through said outlets, power operated means detachably connected with said conveyor means, a truck carrying said power means, means connected to said truck for moving it along a predetermined path, and a trolley mechanism for moving said truck from a predetermined path in front of one channel outlet to a predetermined path in front of another channel outlet.

3. A bin comprising a side wall, a base having a channel therein with an outlet for the removal of material from said bin, in combination with conveyor means in said channel and removable therefrom through said outlet, power operated means detachably connected with said conveyor means, a truck upon which said power means is mounted, tracks for said truck adjacent the channel outlet, and rack and pinion means for moving the truck along said tracks toward said bin while said power means is operating said conveyor means.

4. A bin comprising a side wall, a base having channels therein with outlets for the removal of material from said bin, in combination with conveyor means, said conveyor means being insertible interchangeably in any of said channels and removable therefrom through said outlets, power operated means detachably connected with said conveyor means, a truck upon which said power means is mounted, tracks for said truck adjacent each channel outlet, and rack and pinion means for moving the truck along said tracks, and trolley mechanism for moving said truck from one set of tracks to another.

5. A bin comprising a side wall, a base having a plurality of channels therein with outlets for the removal of material from said bin in combination with conveyor means insertible interchangeably in any of said channels and removable therefrom

through said outlets, power operated means detachably connected with said conveyor means, a truck upon which said power means is mounted, tracks for said truck adjacent each channel outlet, and rack and pinion means for moving the truck along said tracks toward said bin while said power means is operating said conveyor means.

6. A bin comprising a base having channels therein with an outlet for the removal of material

from said bin, in combination with conveyor means insertable in said channel and removable therefrom through said outlet, power operated means detachably connected with said conveyor means, a truck carrying said power means, and means connected to said truck for moving it along a predetermined path toward said bin while said power means is operating said conveyor means.

WILLIAM H. KLEIN.

10	85
15	90
20	95
25	100
30	105
35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150