United States Patent

Louks

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[54] CONTINUOUS-FLOW DRYER FOR GRANULAR MATERIAL

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[52] **U.S. Cl.** **34/174**

[51] **Int. Cl.** **F26b 17/14**

[58] **Field of Search** 34/64, 65, 102, 168, 174, 46, 34/48, 54; 98/55

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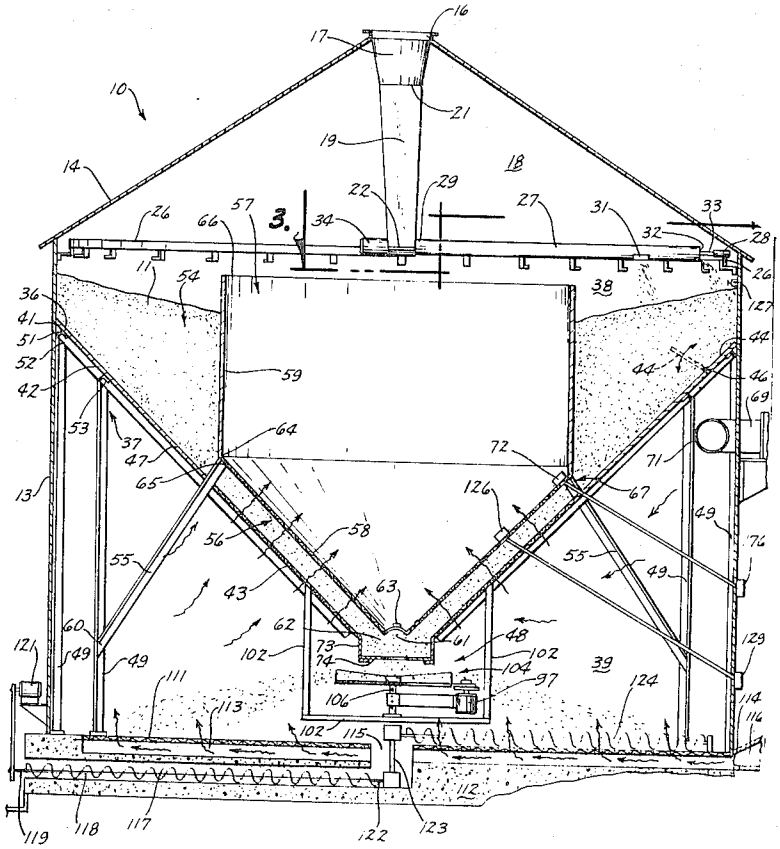
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[57] **ABSTRACT**

This invention relates to a continuous-flow dryer apparatus for granular material for use within a conventional circular storage bin having a floor and a material-evacuating unit: the apparatus having a reservoir for receiving moist granular material, the reservoir disposed above the bin floor and about the periphery of the bin and fluidly communicating with a drying column having perforated walls, the reservoir funnelling the material through the column toward the axis of the bin; having further a heater-blower device for supplying heated air fro percolation through the perforated walls of the column and material therein for absorbing moisture therefrom; and having also a discharge unit connecting the column for removing the dried material from the column and spreading the material upon the bin floor for evacuation therefrom.

12 Claims, 9 Drawing Figures



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SHEET 1 OF 2

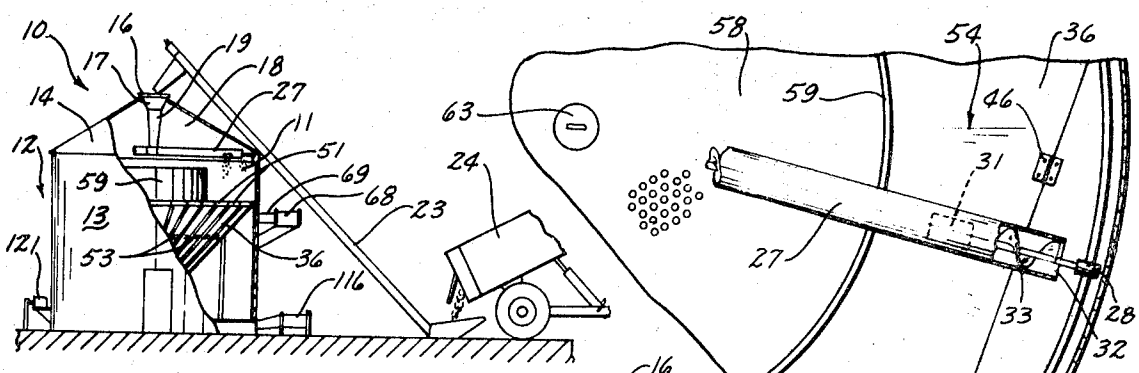


Fig. 1

Fig. 3

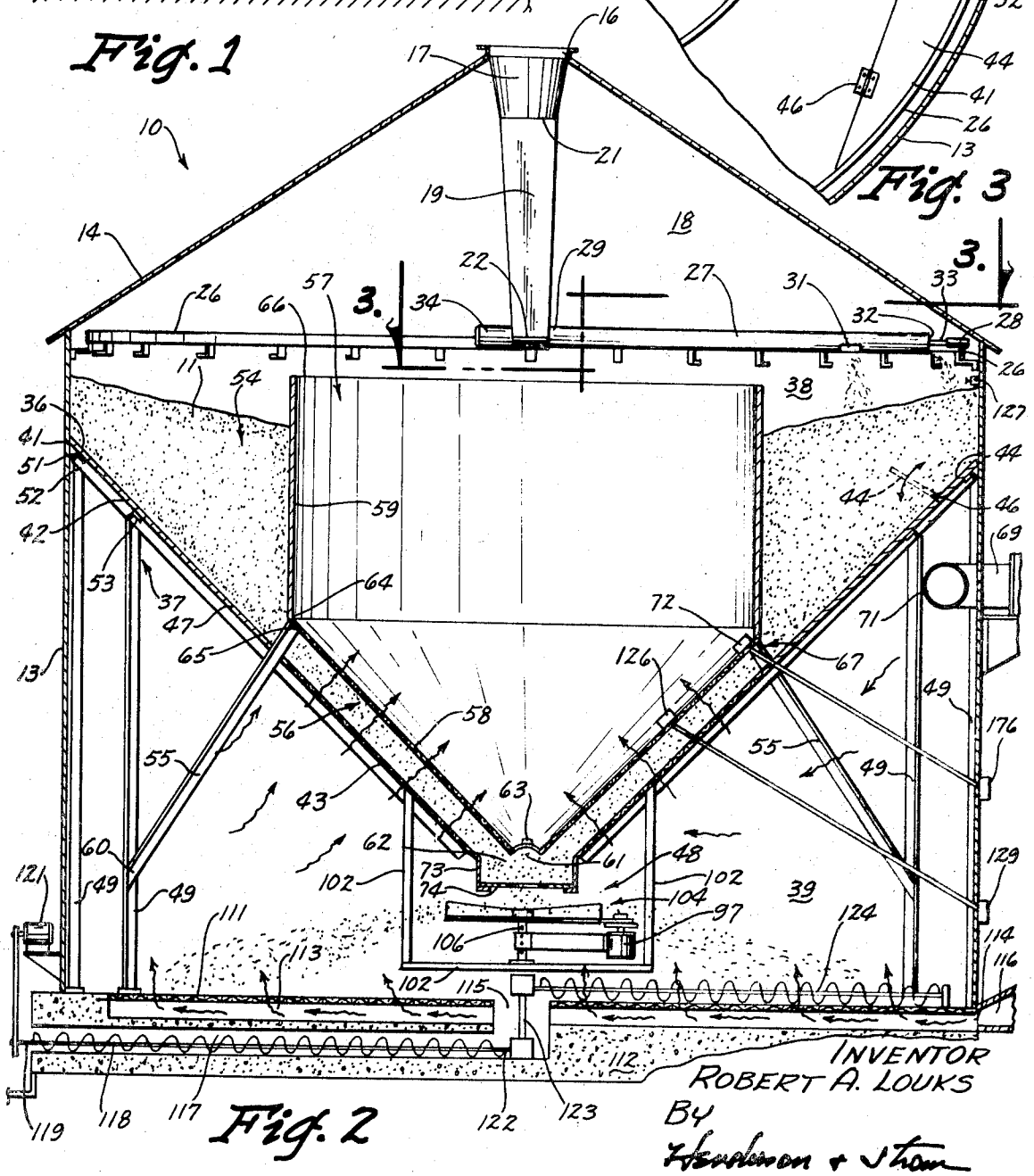


Fig. 2

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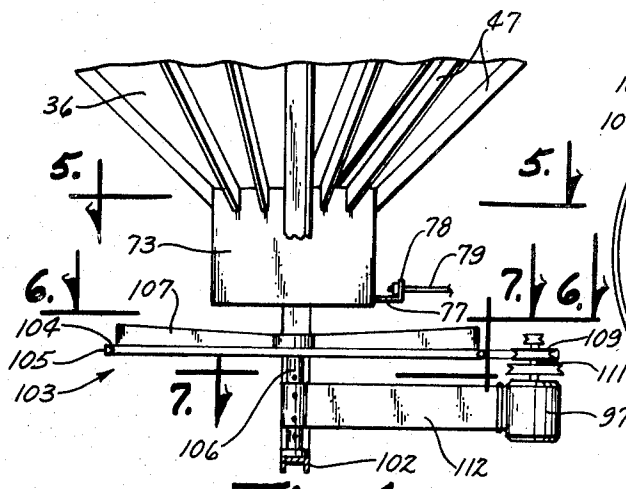


Fig. 4

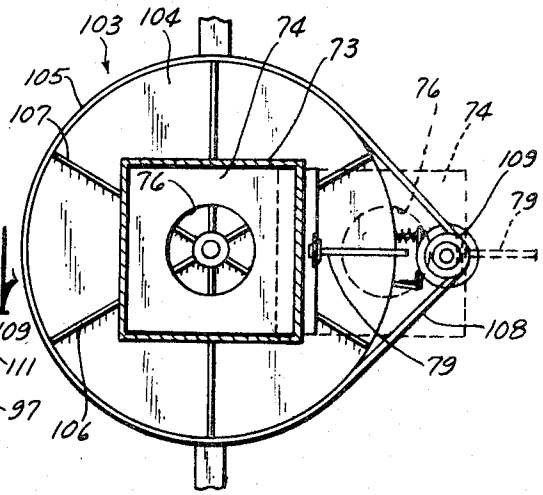


Fig. 5

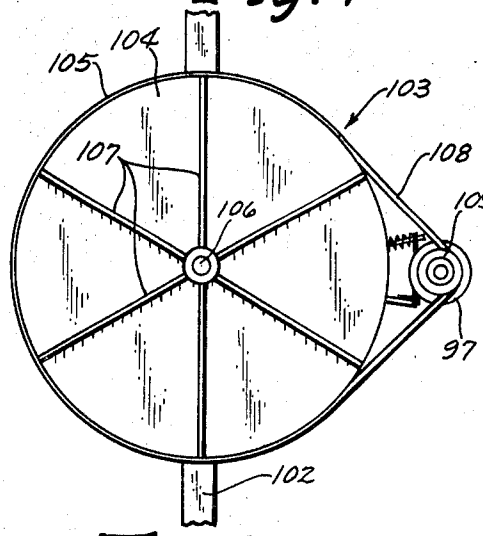


Fig. 6

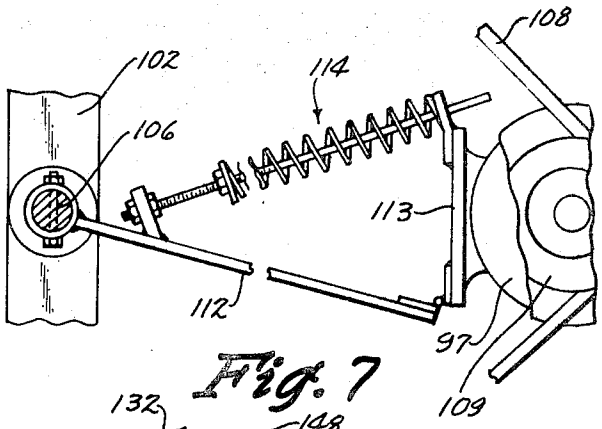


Fig. 7

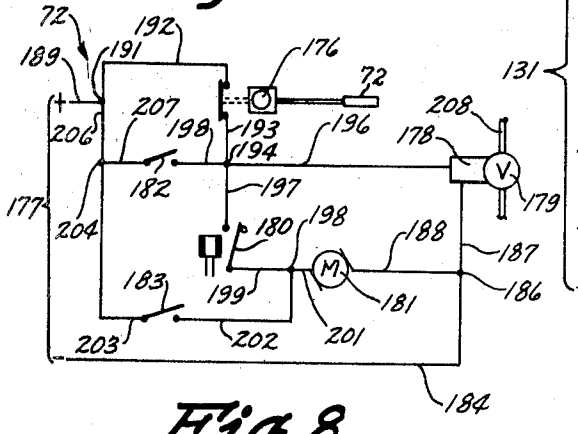


Fig. 8

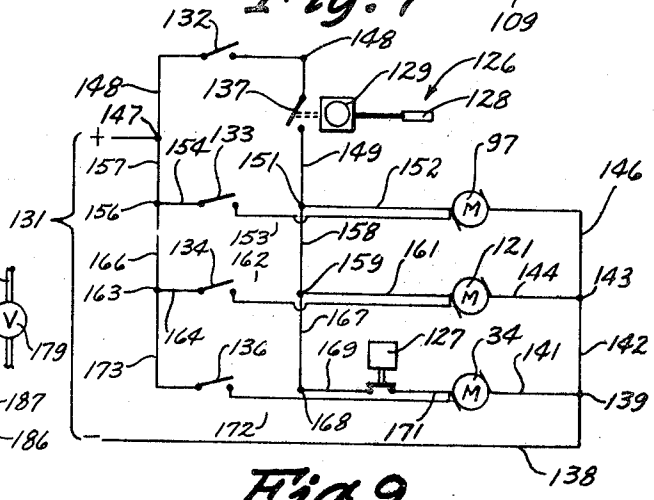


Fig. 9

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CONTINUOUS-FLOW DRYER FOR GRANULAR MATERIAL

BACKGROUND OF THE INVENTION

This invention relates generally to granular material dryers and particularly to a continuous-flow dryer for removing moisture from granular material disposed within a fixed circular storage bin.

Two popular forms of drying granular material are the bin layer dryer and the batch-in-bin dryer. The former, equipped with a fan and a heat unit, dries the granular material in layers. Heated air is forced through the granular material thereby absorbing moisture and thus reducing the moisture content in the first layer, a second layer is added and the drying process recommences. This process of adding layers and forcing air therethrough continues until the bin is filled. The heated air is forced into the bin under the first layer, therefore it is obvious that the lower levels in the bin are subjected to the drying process several times. The bin layer dryer requires a substantial amount of time to dry a full bin of granular material. The lower levels can not be overheated or overdried because of possible damage to the kernel and loss of profit, therefore requiring the constant attention of an operator to prevent overdrying and overheating.

To overcome the disadvantages of the bin layer dryer, operators are changing to a batch-in-bin dryer system. Herein the granular material is dried in a layer on the bottom perforated floor of the dryer bin, and then transferred to a storage bin. The speed of drying is increased considerably because higher temperatures are utilized, higher velocities of air are possible, and each layer is dried only once. One of the disadvantages of this system is that each batch is dried as an entity requiring each batch to be thoroughly dried before removal and replacement by a second moist batch.

The apparatus of this invention is designed to employ all the advantages of the batch-in-bin dryer system while permitting the addition of moist granular material at the operator's convenience and not only when the prior batch has been completed and removed.

SUMMARY OF THE INVENTION

This invention relates to an apparatus for treating granular material in a circular storage bin having a wall, a lower floor, a material feeder auger device, and a material discharge auger device for removing granular material from the bin: the apparatus including a conical-shaped upper floor adapted to support granular material and to feed the material downward toward the center of the floor; a funnel unit for forming with the upper floor a reservoir for receiving moist material above the upper portion of the conical floor and for forming a drying column for receiving and treating the granular material flowing downwardly from the reservoir along the lower portion of the upper floor, the lower portion being perforated; a heater-blower unit for percolating heated, dry air through the column thereby absorbing the moisture from the granular material; and a discharge unit for removing the material from the column to the bin floor for cooling and subsequent evacuation from the bin.

It is an object of this invention to provide a novel apparatus for drying granular material within a conventional circular storage bin.

It is another object of this invention to provide an apparatus for drying granular material wherein the material being dried is substantially constantly flowing.

It is yet another object of this invention to provide a granular material drying apparatus wherein a batch of moist material may be added on top of a previously added batch without affecting the drying process or the uniformity of the dried material.

It is still another object of this invention to provide a continuous-flow drying apparatus wherein higher temperatures and higher velocities of air may be applied to the drying material to increase drying time efficiency without damaging the material.

It is a further object of this invention to provide a continuous grain-drying apparatus wherein granular material to be dried can be added to the dryer, while other material is being dried, and dried material is evacuated, all steps being simultaneous.

An object of this invention is to provide a grain-drying apparatus having a sensing device to automatically deenergize the air blower and heater should the temperature exceed the desired maximum, thereby avoiding damage to the material and negating constant operator attention.

Another object of this invention is to provide a grain-drying apparatus capable of simultaneously discharging dry material from a drying chamber, evenly distributing the material on a bin floor for cooling and aerating, and evacuating already cooled material from the bin for storage.

Yet another object of this invention is to provide a bin for drying granular material which is capable of serving as a storage bin.

A further object of this invention is to provide a grain-drying apparatus that is capable of fulfilling the foregoing objects, yet is simple to use, economical to manufacture, rugged in construction, and efficient to operate.

These objects and other features and advantages will become readily apparent upon referring to the following description when taken in conjunction with the appended drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is an elevational view of a conventional grain bin within which this invention has been installed, with certain parts broken away for clarity of illustration;

FIG. 2 is an enlarged, vertical sectional view of the apparatus of this invention;

FIG. 3 is a plan fragmentary view taken along the line 3—3 in FIG. 2, with certain parts broken away for clarity of illustration;

FIG. 4 is a fragmentary side elevational view of the discharge portion of this invention;

FIG. 5 is a horizontal sectional view taken along the lines 5—5 in FIG. 4 with certain parts shown in an alternate position by the use of dotted lines;

FIG. 6 is a horizontal sectional view taken along the line 6—6 of FIG. 4;

FIG. 7 is an enlarged horizontal sectional view taken along the line 7—7 in FIG. 4;

FIG. 8 is a schematic wiring diagram of the heat control system for the apparatus of this invention; and

FIG. 9 is a schematic wiring diagram of the granular material feed-removal system for the apparatus of this invention.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings and particularly to FIG. 1, the continuous-flow granular material drying apparatus of this invention is indicated generally by the numeral **10**. The apparatus **10** is used primarily for the drying, curing, aeration and storage of granular material **11**, and is shown installed within a conventional grain storage bin **12**.

The storage bin **12** includes a circular sidewall **13** and a conically shaped roof **14** mounted thereon. An opening **16** is formed in the apex of the roof **14**, and a tubular sleeve **17**, communicating the interior **18** of the bin **12** with the exterior, is inserted therein. A hopper **19** is rotatably mounted inside the bin **12**, having a top end **21** communicating with the sleeve **17**, and having a base end **22** disposed vertically downward therefrom, as viewed in FIG. 2. An elevator **23** is disposed above the roof **14**, for the purpose of supplying granular material **11** to the hopper **19** from a transport vehicle **24**.

Mounted near the top of the sidewall **13** is a circular track **26** (FIG. 2), extending completely around the bin **12**. A radially disposed, granular material feeder **27** is disposed in the bin **12**, with one auger end **28** thereof riding on the track **26**, and with the other end **29** thereof secured to the hopper **19**. The feeder tube is provided with a duct **31** and an open lon-

gitudinal end 32 for feeding the granular material 11 from the hopper 19 to the interior 18 of the bin 12. The auger 33 is axially mounted in the feeder tube, and is driven by a motor 34 mounted on the side of the hopper 19. Rotation of the auger end 28 on the track 26 effects rotation of the feeder 27 in a circular manner around the bin 12. The purpose and operations of the feeder 27 will be described hereinafter.

An upper, conically shaped floor 36 (FIG. 2) is mounted in the bin 12, and supported therein by a substructure 37. The upper floor 36 is adapted to support a quantity of granular material 11, and separates the interior 18 of the bin 12 into an upper compartment 38 and a lower compartment 39. The peripheral edge 41 (FIG. 3) of the floor 36 is positioned adjacent the sidewall 13 of the bin 12, and the floor 36 extends downwardly and inwardly therefrom toward the longitudinal axis of the bin 12. The upper portion 42 of the floor 36 is of solid construction, and the lower portion 43 (FIG. 2) is of perforated construction. The perforations in the lower portion 43 are of a size to allow air to circulate therethrough and yet prevent granular material 11 from falling through. A plurality of hatches 44 (FIGS. 2 and 3) coextensive with the upper floor 36 are annularly spaced about the floor 36 and pivotally connected thereto by a plurality of hinges 46. The purpose of the hatches 44 will be hereinafter discussed.

The substructure 37 includes a plurality of angle irons 47 connected to the upper floor 36, and radially extending upward from the discharge unit 48, as hereinafter described, to connect a plurality of vertically disposed columns 49 mounted adjacent the sidewalls 13. A plurality of horizontally disposed beams 51 (FIG. 1) interconnect the columns 49 at the upper ends 52 (FIG. 2) thereof about the periphery of the bin 12. Each of the angle irons 47 is also laterally braced by a plurality of braces 53 (FIG. 1).

An annular reservoir 54 (FIG. 2) and drying column 56 is formed in the upper compartment 38 of the bin 12 by a funnel-shaped structure 57 vertically disposed above the perforated portion 43 of the upper floor 36. The funnel structure 57 is suspended above the upper floor 36 by a plurality of slanted supports 55 penetrating the upper floor 36. The lower end 60 of the supports 55 connect to the vertical columns 49 and the upper ends 65 thereof, connect to the funnel structure 57. Generally the funnel structure 57 includes a perforated conical base 58 connected to a vertically disposed circular wall 59.

The perforated conical base 58 of the structure 57 conforms to the perforated portion 43 of the upper floor 36 and extends parallel thereto. The base 58 is vertically spaced from the perforated floor portion 43 forming a relatively narrow, annular, sloped column 56 therebetween through which column 56 granular material 11 flows. As the granular material 11 flows through the column 56, warm, dry air percolates through the perforated floor 43 and base 58 contacting the material 11 and absorbs the moisture therefrom as hereinafter described. An opening 61 is formed in the apex of the conical base 58 communicating the interior of the structure 57 with the column base 62 and the discharge unit 48. A cover 63 (FIGS. 2 and 3) is provided to span the opening 61, the purpose of the cover 63 to be hereinafter described.

The circular funnel wall 59 substantially parallels the sidewall 13 of the bin 12 and connects the conical base 58 at the peripheral edge 64 thereof. The circular wall 59 extends upward from the peripheral edge 64 of the base 58 to a line 66 paralleling the granular material feeder 27 and disposed immediately therebelow. The wall 59 forms the inner wall of the annular reservoir 54 defined by the wall 59, the solid floor portion 42, and the sidewall 13 of the bin 12. An opening 67 annularly disposed adjacent the peripheral edge 64 of the base 58 fluidly connects the slope-floored reservoir 54 and the drying column 56 to facilitate the movement of granular material 11 from the reservoir 54 to the drying column 56 by gravity.

A blower system 68 (FIGS. 1 and 2) having a heating unit (not shown) installed therein, is mounted to the sidewall 13 immediately below the upper floor 36, and is fluidly communicable with the lower compartment 39 through a vent 69 traversing an aperture (not shown) formed in the sidewall 13. The blower system 68 supplies warm, dry air to the lower compartment 39, which air is directed substantially parallel to the sidewall 13 by an elbow 71 connecting the vent 69. The air circulates about the lower compartment 39 and percolates upwardly through the perforated floor portion 43, the granular material 11 in the drying column 56, and the perforated conical base 58. The blower-heating system 68 is controlled by a heat-sensing device 72 which attaches the perforated base 58 adjacent the peripheral edge 64 thereof. The sensing device and its operation will be described in more detail hereinafter.

For removal of the dried granular material 11 from the drying column 56 to the lower compartment 39, (FIG. 2) a discharge unit 48 is provided. The discharge unit 48 includes an enclosed chute 73 connecting the upper floor 36 at the apex thereof and depending therefrom. The chute 73 fluidly communicates the base 62 of the drying column 56 with the lower bin compartment 39 for funnelling the granular material 11 thereto. Traversing the chute 73 is a slidably mounted, horizontally disposed plate 74 (FIG. 5) having an aperture 76 centrally formed therein. The plate 74 performs as a valve restricting the flow of granular material 11 from the column 56 through the chute 73 to that permitted by the aperture 76 during the drying operation. One side 77 (FIGS. 4–7) of the plate 74 connects an angle iron 78 or the like which is connected to a rod 79 traversing the lower compartment 39 and sidewall 13 for slidably removing the plate 74 from the chute 73 when the bin 12 is used for storage purposes.

Suspended from the floor support angle irons 47 (FIG. 2) is a frame structure 102 supporting a dispersing unit 103 vertically disposed below the aperture 76 and chute 73. The dispersing unit 103 includes a horizontally disposed plate 104 (FIGS. 2, 4, 5 and 6) mounted on a V-belt pulley 105 which in turn is rotatably mounted on a vertically disposed shaft 106. Attached to the upper surface of the plate 104, as by welding, are a plurality of radially disposed blades 107. The pulley 105 is rotated by a belt 108 connected to another pulley 109 mounted on the output shaft end 111 of a motor 97. The motor 97 is mounted by an arm 112 (FIGS. 4 and 7) to the shaft 106, and is held in place so as to maintain tension on the belt 108 by a bracket 113 which is biased outwardly by a spring unit 114.

Upon grain to be dried being placed in the column 56, and falling into the chute 73, it will move through the opening 76 and fall onto the plate 104. The plate 104 is sufficiently close to the opening 76 such that the grain will build up on the plate 104 until it forms a pile the sides of which have approximately a 30 slope, whereupon the opening 76 will be closed off by the grain itself. In effect, the stream of grain attempting to move downwardly through the opening 76 will be shut off by the grain jamming back up into the opening 76.

The lower compartment 39 (FIG. 2) of the bin 12 is provided with a perforated floor 111 appropriately suspended above a foundation 112. Between the lower floor 111 and foundation 112 is a plenum chamber 113 fluidly connected to the exterior of the bin 12 through a hole 114 formed in the sidewall 13. A second blower system 116 (FIG. 1) is attached to the outer surface of the wall 13 and is fluidly communicable with the chamber 113 through the hole 114. Upon energizing the blower 116, atmospheric air is forced into the plenum chamber 113 whereupon it percolates upwardly through the perforated floor 111 and through the dried granular material 11 thereon deposited by the discharge unit 48 for cooling and aeration purposes.

At the center of the floor 111, (FIG. 2) a sump opening 115 is formed therein which is fluidly communicable with the exterior of the bin 12 by a tunnel 117. A auger 118 is axially mounted in the tunnel 117, with one end 119 thereof belt-connected to a third motor 121 mounted outside the bin 12. The inner end 122 of the auger 118 connects a gear housing unit 123 disposed within the sump 115 and operably connects a horizontally disposed sweep auger 124 rotatably mounted

thereto, the sweep auger 124 being positioned on top of the lower floor 111.

The granular material feeder motor 34 (FIG. 2), the discharge unit motor 97, and the granular material remover motor 121 are controlled by a second sensing device 126 positioned adjacent the conical base 58. The granular material feeder motor 34 is additionally controlled by a conventional normally closed pressure-sensing device 127 attached to the sidewall 13 adjacent the top of the reservoir 54 which automatically deenergizes the motor 34 should the granular material 11 reach the level of the device 127.

The second sensing device 126 (FIG. 9) is provided for controlling the rate of flow of the granular material in and out of the bin 12. It includes a thermocouple 128 connected to a heat-controlling device 129, a power supply 131, a master switch 132, and a plurality of switches 133, 134, 136 for independently energizing the discharge unit motor 97, the granular material remover motor 121, and the granular material feeder motor 34 respectively, and a thermostat switch 137. The components of the sensing device 126 are wired as follows: the negative terminal of the power supply 131 is connected by a wire 138 to a junction 139; a wire 141 leads from the junction 139 to one pole of the motor 34, the junction 139 is also connected by wire 142 to a junction 143, wherein a wire 144 connects one pole of the motor 121, and a second wire 146 connects the junction 143 with a pole of the motor 97. The positive terminal of the power source 131 connects a junction 147, a wire 148 leads from the junction 147 to the master switch 132; another wire 148 connects the master switch 132 and heat-controlling device 129, a wire 149 leads from the thermostat switch 137 to a junction 151. A wire 152 leads from the junction 151 to a pole of the motor 97, another wire 153 connects the motor 97 to switch 133, which in turn is connected by wire 154 to junction 156 from which a wire 157 connects junction 147. A third valve 158 connects junction 151 with the motor 121 from a wire 161 connected to a pole of motor 121. A second wire 162 connects junction 159 with switch 134 which is then connected to junction 163 by a wire 164. Wire 166 connects 163 with junction 156. A third wire 167 interconnects junction 159 with junction 168 from which a wire 169 connects the pressure device 127 which is then connected to a pole of motor 34 by wire 171. A second wire 172 connects the motor 34 to the switch 136, connected in turn by a wire 173 to junction 163. The thermocouple 128 is positioned within the conical structure 54 such that it senses the exhaust temperature which varies from the input temperature do to the heat transfer of the granular material 11 and the air in the drying column 56.

In operation, the heat-controlling device 129 is set at a predetermined value and the master switch 132 is manually closed. When the moisture content of the granular material is reduced to a predetermined amount, as determined by the temperature control setting device 129, the switch 137 closes and the circuit connecting the power supply 131 to the motor 97, 121, and 127 is closed. The closing of motors 34, causes the motors 97, 121, and 34 to operate, thereby adding granular material 11 to the bin 12 by energizing motor 34, while simultaneously withdrawing dried material 11 from the drying column 56 by energizing motor 97, and evacuating the bin 12 by energizing motor 121. When the temperature is reduced indicating the material 11 is going through the bin 12 too quickly to be dried to the predetermined value, the thermostat 129 opens, thereby opening the circuit and deenergizing the motors 34, 121, and 97. Should the material 11 be fed to the bin 12 faster than it is removed, the pressure-sensing device 127 breaks the circuit leading to motor 34 while motors 97, 127 continue. Each motor 97, 121, and 34 is operable separately and apart from thermostat 129 should such be desired by the independent switches 133, 134, and 136 respectively.

The sensing device 72 (FIG. 8) is provided for controlling the heat supplied to the air by the first blower 68. It includes a thermocouple 174 connected to a thermostat 176, a power supply 177, a solenoid switch 178, a fluid control valve 179, a blower motor 181, a relay 180, and a pair of manual switches 182, 183. The components of the sensing device 72 are wired as follows: the negative terminal of the power supply 177 is connected by a wire 184 to a junction 186; a wire 187 leads from the junction 186 to the solenoid 178, the junction 186 is also connected to one pole of the motor 181 by a wire 188. The positive terminal of the power supply 177 connects a junction 191 by a wire 189; a wire 192 connects the junction 191 to the thermostat 176, the thermostat 176 is then connected by wire 193 to junction 194. A wire 196 connects the junction 194 and solenoid 178. A second wire 197 connects the junction 194 with a relay 180 which is then connected to junction 198 by wire 199. A wire 201 leads from the junction 198 to the pole of the motor 181; a second wire 202 connects the junction 198 to the switch 183. The switch 183 is then connected by wire 203 to junction 204. The junction 204 is interconnected with junction 191 by a wire 206. A second wire 207 leads from junction 204 to switch 182. The motor 181 powers the blower 68 and the valve 179 is interposed in a fuel line 208, and is operable to regulate the amount of fuel feeding the heating unit (not shown).

In operation, thermostat 176 is normally closed such that valve 179 is open with fuel flowing to the burner (not shown) and the blower motor 181 blowing hot air into the lower compartment 39 below the upper floor 36. If the temperature in the bin 12 directly above the drying column 56 gets too high, the thermostat 176 will open, thereby deenergizing the solenoid 178 and closing the valve 179 to shut off the flow of fuel to the burner. Simultaneously, the blower motor 181 will be deenergized by the action of the relay 180.

To operate the apparatus 10, (FIG. 2) granular material 11, such as corn, is supplied to the hopper 19. The motor 34 is started by closing the switch 136 (FIG. 9) and the corn flows from the hopper 19 into the feeder 27 which distributes the corn into the annular reservoir 54, the floor 42 of which is sloped toward the drying column 56, wherein the corn begins to pile until the reservoir 54 is substantially full, wherein the switch 136 (FIG. 9) is opened and the master switch 132 is manually closed.

The blower-heater system 68 is manually started by closing the switches 182, 183 (FIG. 8) whereby heated air is supplied below the floor 36 (FIG. 2) wherein it percolates upwardly through the drying column 56 and the corn 11 as indicated by the arrows in FIG. 2. The heated air absorbs the moisture from the corn 11 and carries it from the bin 12. Upon reaching a predetermined humidity value, the heat-controlling device 129 (FIG. 9) closes the circuit energizing the motor 97, thereby discharging the dried corn 11 from the drying column 56 and evenly distributing the corn 11 about the lower perforated floor 111, while simultaneously energizing the motors 121 and 34.

At this point, the second blower 116 is activated to blow cool atmospheric air into the bin 12 to percolate through the dried corn 11 upon the lower floor 111 for purposes of cooling and aerating the corn 11 preparatory to storage. The atmospheric air undergoes a heat transfer with the cooling, dried corn, which advantageously heats the air, which then rises through the drying column 56 augmenting the heated air supplied by the first blower 68, and exits the bin 12.

Further, upon the activation of the motors 97, 121, and 34, the switches 182, 183 (FIG. 8) are opened, thereby putting the heater-blower system 68 on automatic control.

As the dried corn 11 builds up on the lower floor 111, the sweep auger 124 engages it and moves the corn toward the sump 115 for removal from the bin 12 through the tunnel 117 to a nearby storage bin (not shown).

Thus it can be fully appreciated that the apparatus 10 is automated to the point where constant attention by an attendant is unnecessary. As the supply of corn to be dried is exhausted, the heater-blower system 68 is automatically deenergized as the temperature of the air passing through the drying column 56 is raised to a predetermined value. When the air in the bin

12 cools to a second predetermined value, the control device 126 opens the circuit, thereby disengaging the power supply to the motors 34, 97, and 121. Thus it has been shown that the drying capacity of the apparatus 10 is limited only by the supply of corn 11 delivered thereto and will continuously operate safely in the absence of a constant vigil by an attendant.

To transform the bin 12 (FIG. 2) from a drying bin to a storage bin, the chute 73 is opened completely by sliding the plate 74 (dotted lines, FIG. 5) into the lower compartment 39, and the annularly spaced hatches 44 (FIGS. 2 and 3) of the upper floor 36 are opened. By opening the apparatus 19 in this manner, granular material 11 to be stored is permitted to completely fill the lower compartment 39, chute 73, column 56, reservoir 54 and finally to overflow the reservoir 54 and fill the interior of the funnel structure 57.

Though not shown, it is understood that though the reservoir 54 has a large capacity, corn 11 may be fed to the hopper 19 by connecting the power source of the auger 23 (FIG. 1) to the same circuit as the feed motor 34 to provide a constant supply of corn 11 to the apparatus 10. Likewise, a second hopper and auger unit can be connected to the same circuit as the motor 121 to automatically transfer the corn 11 to adjoining storage bins.

Although a preferred embodiment of this invention has been described and disclosed hereinafter, it is to be remembered that various modifications and alternate constructions can be made thereto without departing from the invention as defined in the appended claims.

I claim:

1. Apparatus for treating granular material in a circular storage bin having a wall, lower floor, and a device for removing the granular material from the bin, the apparatus comprising:

an upper conical floor mounted in the bin and adapted to support granular material, said floor positioned adjacent the walls and slanted downwardly and inwardly therefrom toward the axis of the bin, said upper floor separating said bin into an upper and lower compartment, and further wherein the upper portion of said floor is solid and the lower portion is perforated;

funnel means disposed above said upper floor, said funnel means including a circular wall and a perforated conical base, said circular wall forming a reservoir with said upper portion of said upper floor for receiving granular material from the feeder, and said perforated base forming a drying column with said lower portion of said upper floor; said drying column fluidly communicating with said reservoir for receiving granular material therefrom;

means for supplying heated air below said upper floor whereby the heated air percolates through the granular material in said drying column; and

means for discharging said granular material from said column into said lower compartment to be cooled and removed from the bin.

2. An apparatus for treating granular material in a circular storage bin as defined in claim 1, and further wherein said apparatus includes a thermocouple adapted to sense the temperature of the grain in said drying column; and

means responsive to said thermocouple to deenergize said air-supplying means when the temperature of the grain has been raised to a predetermined value.

3. An apparatus for treating granular material in a circular storage bin as defined in claim 1, and further wherein said apparatus includes a sensing device for detecting the temperature of the air passed through the drying column; and

means responsive to said sensing device for selectively controlling the operation of said discharge means and the operation of the device for removing the granular material from the bin.

4. An apparatus for treating granular material in a circular storage bin as defined in claim 1, wherein said upper floor includes a plurality of hatches pivotally connected to said floor about the periphery thereof, said hatches operable in one position to extend said floor to the bin wall and in a second position to permit the grain to feed directly into said lower compartment.

5. An apparatus for treating granular material in a circular storage bin as defined in claim 4 wherein said hatches are annularly spaced about the periphery of said floor.

6. An apparatus for treating granular material in a circular storage bin as defined in claim 1 wherein said perforated base connects to the bottom edge of said circular wall, said base extending parallel to said lower portion of said upper floor and being vertically spaced therefrom.

7. An apparatus for treating granular material in a circular storage bin as defined in claim 6 wherein said funnel means includes an opening formed in said base fluidly communicating the interior of said funnel means with said discharge means, said opening having a removable cover.

8. An apparatus for treating granular material in a circular storage bin as defined in claim 1, wherein said air-supplying means includes a blower-heater unit mounted on the bin wall and a vent fluidly communicating said unit and said lower compartment of the bin.

9. An apparatus for treating granular material in a circular storage bin as defined in claim 8, and further wherein said vent has an elbow for directing the air substantially parallel to the side of the bin.

10. An apparatus for treating granular material in a circular storage bin as defined in claim 1, wherein said discharge means includes a chute connecting said upper floor at the apex thereof and depending downwardly therefrom, said chute fluidly communicating said drying column and said lower compartment, and funnelling the granular material thereto.

11. An apparatus for treating granular material in a circular storage bin as defined in claim 10, and further wherein said discharge means includes a dispersing unit disposed beneath said chute, said dispersing unit capable of engaging and distributing granular material from said chute evenly about the bin lower floor.

12. An apparatus for treating granular material in a circular storage bin as defined in claim 11 wherein said dispersing unit is a rotating spinner.

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