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DEVICE FOR DRYING GRAIN

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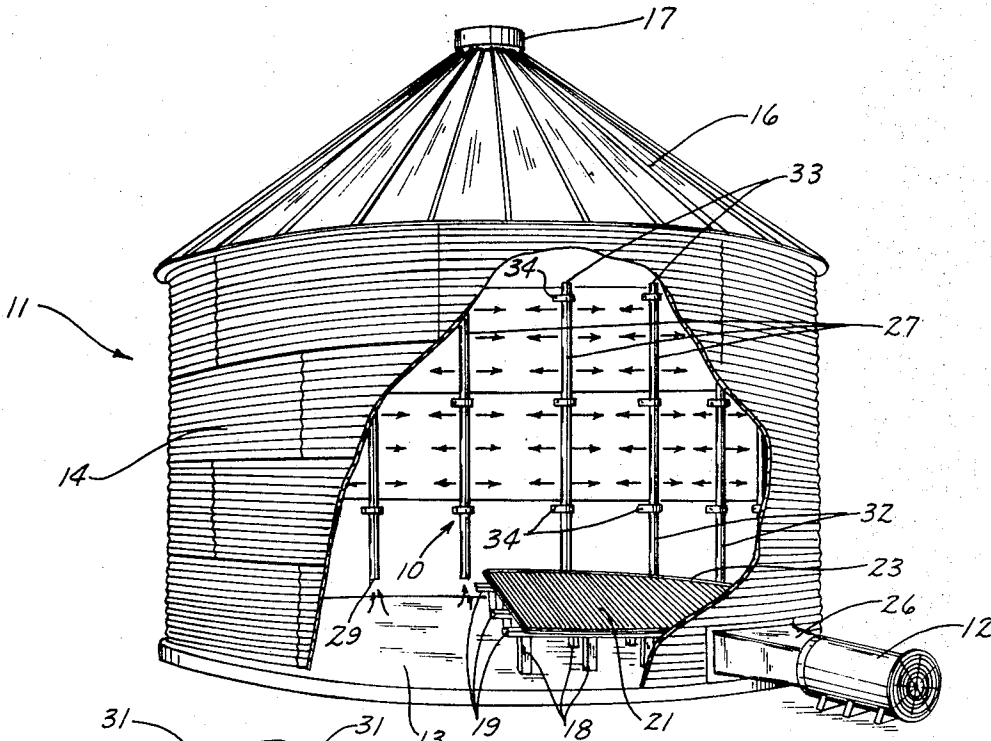


Fig. 1

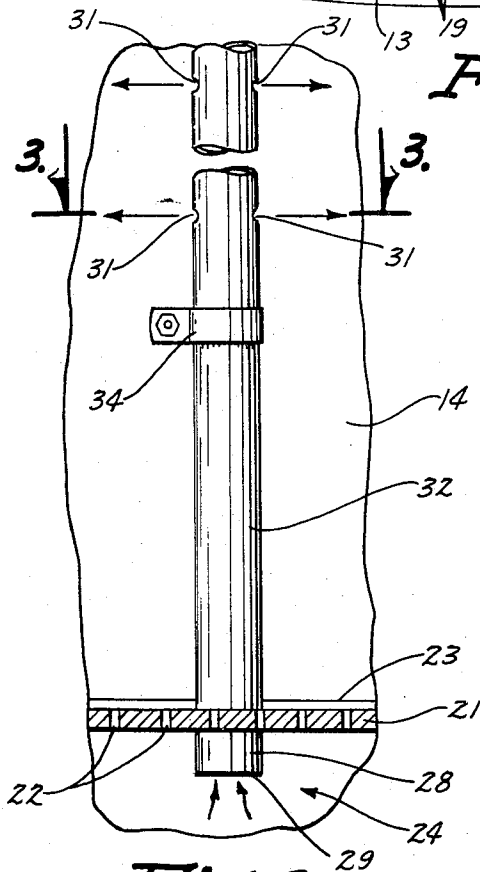


Fig. 2

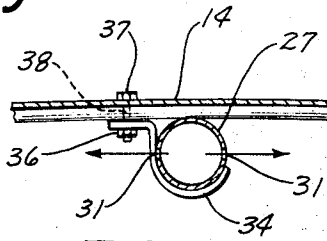


Fig. 3

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DEVICE FOR DRYING GRAIN

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1 Claim

ABSTRACT OF THE DISCLOSURE

This invention relates to a device for ventilating grain adjacent the wall of a drying bin, the device comprising a plurality of tubes attached to the inside wall of a drying bin, and fluidly connected to an air supply below the floor of the bin, the tubes having a plurality of perforations for directing forced air into the grain, the perforations being positioned such that the air is directed in a plane parallel to the wall of the bin.

BACKGROUND OF THE INVENTION

This invention relates to drying grain and particularly to drying grain adjacent the wall of a drying bin.

The stockpiling and storage of grain has become a common practice in modern farming. Generally the grain when harvested is extremely moist because of the climatic conditions at harvest time necessitating drying the grain to prevent its spoilage. Commonly a drying bin enclosed by walls and a roof is used for this purpose, the drying bin having a perforated floor supporting the grain through which dry air is forced upward into and through the grain. The rising air removes the moisture from the grain and continues upward to the roof of the bin where it escapes through a hole therein provided and dissipates into the atmosphere. Quite often, various types of grain stirring devices are used in conjunction with the drying bins to provide a constant flow of the air throughout the grain.

However, it has been the experience of farmers employing the hereinbefore described method of drying grain, and particularly those farmers in colder climates of the United States, that spoilage frequently occurs to that grain positioned near the side of the bin due to condensation and frost forming on the bin wall when the outside temperature drops. The spoiled grain is found adjacent the side of the bin and extends inwardly up to twelve inches.

The reasons proposed for the higher moisture content of the grain stored along the side of the drying bin include less circulation in the area due to higher compaction, moisture being drawn to this area because of the variance in temperature of the area because of its proximity to the outside elements, condensation collecting on the roof and wall and draining down the side of the bin, and the inability of stirring devices to stir the grain near the bin wall causing the forced air rising from the perforated floor to by-pass the grain near the bin wall and take the path of least resistance through the stirred grain. The device of this invention is intended to prevent this grain spoilage by overcoming the above problems.

SUMMARY OF THE INVENTION

This invention relates to a device for drying grain adjacent the wall of a grain drying bin, the device comprising a plurality of conduit members attached to the inner side of the bin wall, the members being fluidly connected at their bottom ends to a supply of forced air below the floor of the bin, each member having a series of perforations formed therein above, the floor for directing the forced air in a plane parallel to the wall of the bin.

It is an object of this invention to provide a new and novel grain drying device.

It is another object of this invention to provide a novel grain drying device for drying the grain disposed adjacent the wall of a drying bin.

It is another object of this invention to provide a grain drying device which is easily installed in existing grain drying bins.

It is yet another object of this invention to provide a device which will derive an air supply from the conventional blower employed with a drying bin and subsequently distribute the air to an area adjacent the wall of a drying bin.

Yet another object of this invention is to provide a grain drying device capable of attaining the above mentioned objects, which is economical, simple, but rugged in construction, and effective in use.

These objects and other features and advantages of this invention will become readily apparent upon reference to the following description, when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view of a grain drying bin, the bin cut away for illustrative purposes to show the device of this invention mounted to the walls of the bin and part of the floor;

FIG. 2 is an enlarged, fragmentary view showing the device of this invention penetrating the floor of the bin; and

FIG. 3 is a sectional view as taken along the line 3—3 of FIG. 2, showing the attachment of the device to the wall of the bin.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings and particularly FIG. 1, the device of this invention is indicated generally by the numeral 10 and is shown in assembled relation with a grain drying bin 11 having a blower-heater unit 12 attached thereto.

The bin 11 includes a floor 13 or foundation supporting an upstanding wall 14 and a roof 16 attached to the walls 14 and enclosing the bin 11. A cap 17 covering an air vent (not shown) formed in the roof 16 is illustrated.

Mounted on the foundation 13 are a plurality of vertical uprights 18 supporting a plurality of horizontal beams 19. A sub-floor 21 having a series of perforations 22 (FIG. 2) rests upon the beams 19. Surrounding the outer periphery of the floor 21 is a flashing 23 which prevents grain (not shown) from falling between the floor 21 and the wall 14.

For supplying dry air internally of the bin 11 for passage through grain therein, the blower-heater unit 12 connects a transition chamber 24 beneath the perforated floor 21 by a duct 26 attaching the wall 14 of the bin 11. The forced air enters the transition unit 24 and is dispersed under the entire area of the perforated floor 21 and is forced upward through the perforations 22 to the grain (not shown) stored above the floor 21. As the air is forced upward through the grain it absorbs moisture therefrom and the moist air exits the bin 11 through the vent (not shown) beneath the cap 17. As the air rises through the grain, it tends to avoid the grain stored adjacent the wall 14 of the bin 11 leaving the grain in this area "wet" and susceptible to spoilage.

To promote air circulation at the periphery of the bin 11 adjacent the wall 14, a plurality of conduit members 27 are attached inside the wall 14 of the bin 11. The conduit members 27 are vertically disposed elongated hollow tubes, each tube 27 being horizontally spaced from

each other and attached to the wall 14 about the entire perimeter of the bin 11.

As the tubes 27 are identical, only one will be described. The lower portion 28 (FIG. 2) of the tube 27 projects below the perforated floor 21 into the transition chamber 24 through a series of holes (not shown) appropriately spaced about the periphery of the floor 21 and flashing 23. The lower end 29 of the tube 27 is open, thereby permitting the forced air within the chamber 24 to enter the tube 27 as best illustrated by the arrows in FIG. 2.

The tube 27 is provided with a series of vertically spaced holes 31 (FIG. 2) formed in a side of the tube 27 such that the forced air emitted therefrom is directed substantially parallel to the surface of the wall 14, as shown by the use of arrows in FIG. 3. Referring to FIG. 2, it is noted that the air flow out of the holes 31 is also directed substantially parallel to the floor 21, although this is not deemed critical. Furthermore, a pair of holes 31 may be formed at diametrically opposite points in each tube 27 (see FIGS. 2 and 3) such that the forced air is emitted from opposite sides of the tube 27 in opposite directions.

It has been found that the lower portion of the grain adjacent the bin wall 11 does dry normally, thereby lessening the need for placing holes in that portion 32 (FIG. 2) of the tube 27 in close proximity to the floor 21.

The top end 33 (FIG. 1) of each tube 27 is appropriately sealed to prevent grain from entering the tube 27 and to require the air flowing in the tube 27 as hereinbefore described, to exit through the holes 31 therein provided. The tubes 27 are attached to the wall 14 by a plurality of braces 34 (FIG. 3), a nut 36 and a bolt 37 therefor traversing the wall 14 of the bin 11 through a hole 38 therein provided.

Upon operation of the blower-heater unit 12, forced air enters the transition chamber 24, passes through the perforations 22 found in the floor 21 of the bin 11, and flows upwardly through the grain on the floor 21. Simultaneously, air from the chamber 24 enters the open ends 29 of the tubes 27 and flows upwardly through the tubes 27 to the holes 31 where the force of the air directs the air outwardly from the tubes 27.

Due to the placement of the holes 31, the air is emitted in a direction of travel parallel to the wall 14 of the bin 11 as illustrated by the arrows in FIGS. 1, 2 and 3. The horizontal spacing of the tubes 27 is such that the air streams emitted from the tube holes 31 join approximately midway between the tubes 27, thereby circulating air completely about the entire inner periphery of the bin wall 14.

During operation of the blower-heater unit 12, the air from the tubes 27 continues to flow through the grain adjacent the bin wall 14 removing the moisture therefrom and preventing condensation and moisture from accumulating on the wall 14 of the bin 11. Like the air passing through the grain through the perforated floor 21, the air from the tubes 27 will also rise and exit the bin 11 through the vented roof 16.

Following the grain drying process, the grain adjacent the wall 14 will be "dry" and able to absorb any moisture, thereby preventing condensation from forming on the bin wall 14. Any moisture absorbed by the "dry" grain will be insignificant and therefore no spoilage will occur.

Although the preferred embodiment of this invention has been shown and described, it is to be remembered that various alterations and modifications can be made thereto without departing from the true spirit and scope of the invention as defined in the appended claim.

I claim:

1. In a grain bin having a metal, non-insulated wall, a roof with a central opening at the apex thereof, a solid bottom floor, a perforated sub floor spaced above the bottom floor, a chamber between said bottom floor and said sub floor, and a blower-heater unit for forcing dry air into the chamber, means for preventing condensation from forming on the interior wall of the bin comprising: a plurality of hollow, conduit members mounted about the interior of the bin wall and fastened thereto in arcuate spaced relation and in an upright manner, each member having an open lower end in fluid communication with the chamber, and a closed upper end, and having further vertically spaced groups of holes formed therein capable of emitting dry air therefrom in a direction substantially parallel to the bin wall, and also only in a substantially horizontal direction parallel to the subfloor.

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