A motorized lid assembly is provided on the roof opening of a grain bin. The assembly includes a ring attached to an upstanding collar of the roof opening, with a lid pivotally secured to the ring for movement between a closed position over the roof opening and an open position away from the roof opening. A motor is mounted to the ring and connected to the lid to pivot the lid between the open and closed positions. The motor is actuated remotely by a person on the ground. In the open position, the lid allows 360° access to the roof opening for discharging seed or grain into the bin.
ELECTRIC GRAIN AGRICULTURE BIN LID

CROSS REFERENCE TO RELATED APPLICATIONS


BACKGROUND OF THE INVENTION

[0002] Conventional grain bins have a circular side wall with a conical roof. An opening is provided in the apex of the roof through which grain can be loaded via an auger or conveyor belt. A lid is pivotally connected to the roof to move between open and closed positions relative to the roof opening. The lid is normally closed, and can be opened by a rope tied to a handle on the lid and extending down to the ground, so that an operator can pull on the rope to open the lid approximately 90°. To maintain the lid in the open position, the rope is tied to an object near the ground, such as a leg or other structure near the base of the grain bin. A torsion spring on the lid closes the lid from the open position to cover the roof opening when the rope is released. If the rope breaks or becomes disconnected from the lid, someone has to climb to the top of the bin to install a new rope on the lid. The lid extends substantially vertically in the open position, and thus creates an obstacle to 360° access to roof opening.

[0003] Therefore, a primary objective of the present invention is the provision of an improved grain bin lid which overcomes the problems of the prior art.

[0004] Another objective of the present invention is the provision of an electric grain bin lid.

[0005] Another objective of the present invention is the provision of a grain bin lid which is moved between opened and closed positions by an electric motor.

[0006] Another objective of the present invention is the provision of an electric grain bin lid which can be moved between open and closed positions remotely.

[0007] Another objective of the present invention is the provision of a grain bin lid which opens at least 180° from the horizontal closed position.

[0008] Another objective of the present invention is the provision of an improved method of opening a grain bin roof lid for discharging seed into the bin.

[0009] Still another objective of the present invention is a provision of a method of opening a grain bin lid by actuation of an electric motor.

[0010] Yet another objective of the present invention is the provision of a method of opening a lid on the roof of a grain bin using a remote controller.

[0011] Another objective of the present invention is a provision of a method of opening a grain bin lid to a position oriented at or below horizontal.

[0012] A further objective of the present invention is the provision of a motorized lid for the roof opening of a grain bin, which is economic to manufacture, and effective and durable in use.

[0013] These and other objectives become apparent from the following description of the invention.

SUMMARY OF THE INVENTION

[0014] A motorized lid assembly is provided for the roof opening of a grain bin. The assembly includes a lid pivotally mounted to the roof for movement between a closed position covering the opening and an open position providing access through the opening to discharge seed from a conveyor or auger into the bin. The assembly also includes an electric motor connected to the lid to move the lid between the closed and open positions. The motor is actuated by a remote controller. The lid is substantially horizontal when closed, and pivots at least 180° to the open position.

[0015] The method of opening and closing the grain bin lid utilizes remote actuation of the motor connected to the lid so as to move the lid between the open and closed positions relative to the roof opening. Wherein the lid is opened, the roof opening is accessible 360° for discharging grain into the bin.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] FIG. 1 is a view showing a grain bin having the lid assembly of the present invention.

[0017] FIG. 2 is an enlarged view of the lid of the present invention in a closed position.

[0018] FIG. 3 is an enlarged view showing the lid in a partially opened position.

[0019] FIG. 4 is another enlarged view showing the lid further opened approximately 90° from the closed position.

[0020] FIG. 5 is another enlarged view showing the lid opened even more.

[0021] FIG. 6 is a view showing the lid in a fully opened position.

[0022] FIG. 7 is another view of the fully opened lid from a different perspective.

[0023] FIG. 8 is an exploded view of the lid assembly of the present invention.

[0024] FIG. 9 is an exploded view of an alternative embodiment of the lid assembly.

DESCRIPTION OF THE INVENTION

[0025] The lid assembly 10 of the present invention is adapted for use on the roof opening 12 of the roof 14 of a grain bin 15. The assembly includes a ring or band 16 secured to the roof 14 in a convenient manner. In a preferred embodiment, the ring 16 is a clamp ring which can be tightened via a bolt 17 onto an upstanding collar on the roof opening 12. The ring 16 includes a pair of ears or tabs 18 to which the lid 20 is pivotally mounted via a pair of tabs or ears 22 on the lid. Bushings or washers 23 may be provided between the tube 18 and 22 to minimize friction. A hollow shaft or tube 24 extends through a sleeve 26 between the tabs 22 of the lid 20. A bolt or pin 28 extends through the shaft 24 and the sleeve 26 so as to secure the shaft and sleeve together. The co-extensive axes of the tube 24 and the sleeve 26 define the pivot axis for the lid 20. Preferably, the axis is horizontal.

[0026] An electric motor 32 is mounted to the lid 20. The motor 32 has an output shaft 30 connected to the shaft or tube 24 in a convenient manner, such that rotation of the motor shaft 30 rotates the shaft 24. The motor 32 is mounted by bolts on to a support bracket 34 fixed to the ring 16. Thus, the motor 32 is connected to the lid 20 via the output shaft 30, the tube 24, and the sleeve 26. The motor 32 can be
electrically coupled to 110 volt AC current or alternatively, to 12 volt DC current, such as a battery.

[0027] In FIGS. 2-8, the motor is arranged transversely to the longitudinal axis of the tube 24. As an alternative, the motor 32A can be arranged parallel or co-axial to the tube 24 and sleeve 26, as shown in FIG. 9. FIG. 9 also shows an alternative mounting bracket 34A for the motor 32A, and mounting bolts 35.

[0028] The motor 32, 32A is actuated by a switch or remote controller which can rotate the output shaft 30 in opposite directions, and thereby pivot the lid 20 between the open and closed position. As seen in FIGS. 2 and 6, the lid pivots approximately 200° between the opened and closed positions. By pivoting the lid at least 180° to the opened position, 360° access is provided to the roof opening 12 without obstruction by the lid 20. Thus, an auger or conveyor belt can be positioned anywhere horizontally around the grain bin for loading grain into the opening 12.

[0029] The invention has been shown and described above with the preferred embodiments, and it is understood that many modifications, substitutions, and additions may be made which are within the intended spirit and scope of the invention. From the foregoing, it can be seen that the present invention accomplishes at least all of its stated objectives.

What is claimed is:

1. A lid assembly for a grain bin having a roof with an opening therein, comprising:
   a) a lid pivotally mounted to the grain bin for covering the opening; and
   b) an electric motor connected to the lid to move the lid between open and closed positions relative to the opening.

2. The lid assembly of claim 1 further comprising a mounting bracket to connect the motor to the lid.

3. The lid assembly of claim 1 further comprising a remote controller for actuating the motor.

4. The lid assembly of claim 1 wherein the lid pivots at least 180° between the open and closed positions.

5. A lid assembly of claim 1 wherein the lid has an axle and the rotatable motor has an output shaft coupled to the axle.

6. The lid assembly of claim 5 wherein the axle and output shaft are co-axial.

7. The lid assembly of claim 5 wherein the motor is parallel to the axle.

8. The lid assembly of claim 5 wherein the motor is perpendicular to the axle.

9. The lid assembly of claim 1 wherein the lid includes a mounting ring adapted to be fixed to the bin roof for mounting the lid on the roof.

10. The lid assembly of claim 9 wherein the ring has tabs and the lid has a perimeter flange with tabs aligned with the ring tabs to pivotally connect the lid to the ring.

11. A method of operating a lid for a roof opening of a grain bin, comprising:
   actuating a motor connected to the lid to move the lid between open and closed positions relative to the roof opening.

12. The method of claim 11 wherein the motor is actuated from the ground.

13. The method of claim 11 wherein the motor pivots the lid at least 180° between the open and closed positions.

14. The method of claim 11 wherein the motor is actuated by a switch.

15. The method of claim 11 wherein the motor is actuated remotely.

16. The method of claim 11 wherein the lid reside no higher than horizontal when in the open position.

17. The method of claim 11, wherein the lid passes beyond horizontal when moving from the closed position to the open position.

18. The method of claim 11 wherein the lid as an upper surface which, in the open position, is substantially parallel to the roof.

19. The method of claim 11 further comprising sending a signal from a controller remote from the motor to actuate the motor to move the lid between the open and closed positions.

20. The method of claim 11 further comprising opening the lid beyond a vertical orientation in the open position.

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