United States Patent

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[54] GRAIN CLEANER

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[52] **U.S. Cl.** **209/255**, 209/257, 209/297, 209/300

[51] **Int. Cl.** **B07b 1/24**

[58] **Field of Search** 209/296, 295, 152, 473, 24, 209/25, 300, 297, 255, 251

[56] **References Cited**

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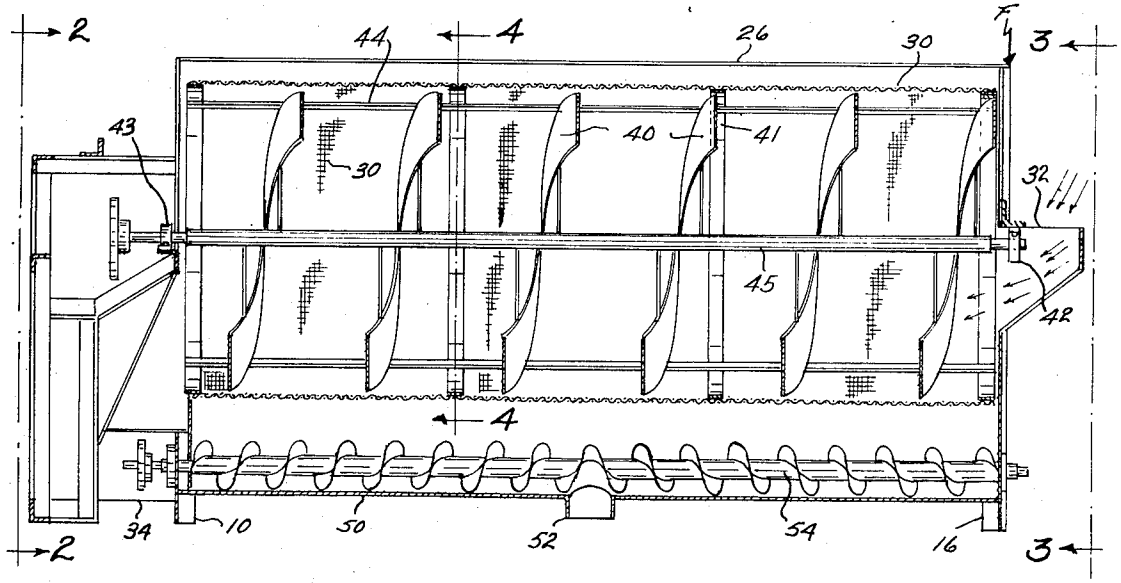
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[57] **ABSTRACT**

An apparatus for cleaning grain including a partially open-ended elongated cylindrical screen cage for receiving grain. A grain inlet chute and a grain outlet chute are disposed at the respective ends of the cage. The screen cage has a mesh slightly smaller than the grain particles. Encompassed within the cage and secured thereto is a grain feed screw that churns the grain and feeds it through the cage from the inlet chute to the outlet chute. As the grain is so moved, dirt particles intermixed in the grain fall through the sides and bottom of the cage onto a dirt receiving receptacle disposed below the cage thereby cleaning the grain. Disposed in the dirt receptacle is a feed screw that feeds dirt to a dirt outlet chute in the receptacle. The cage may have an exhaust fan for removing dust and fine dirt particles from the cage to further clean the grain. In a modification of the invention, the grain feed screw rotates within the cage and is not attached thereto.

1 Claim, 5 Drawing Figures



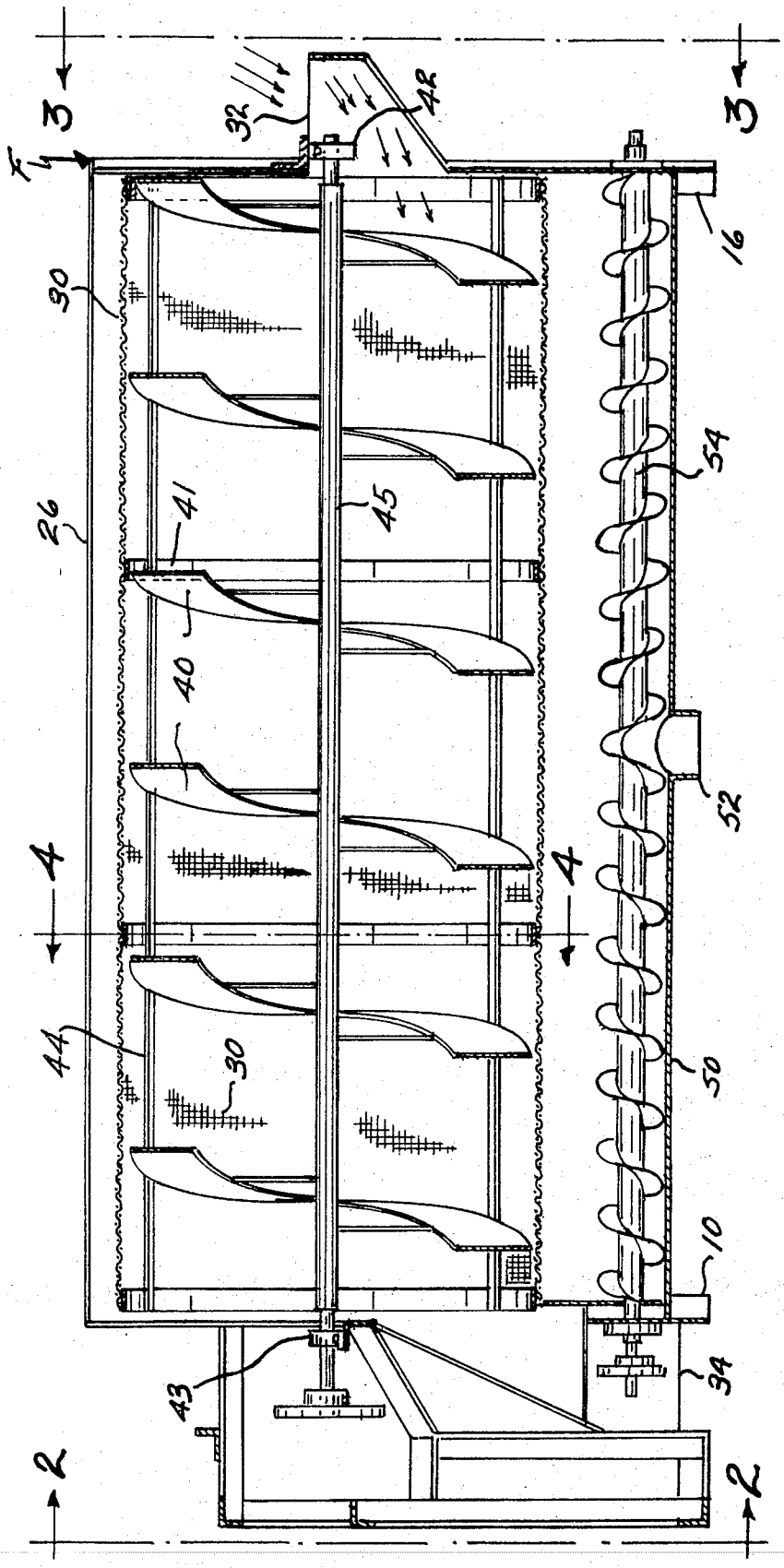


FIG. 1

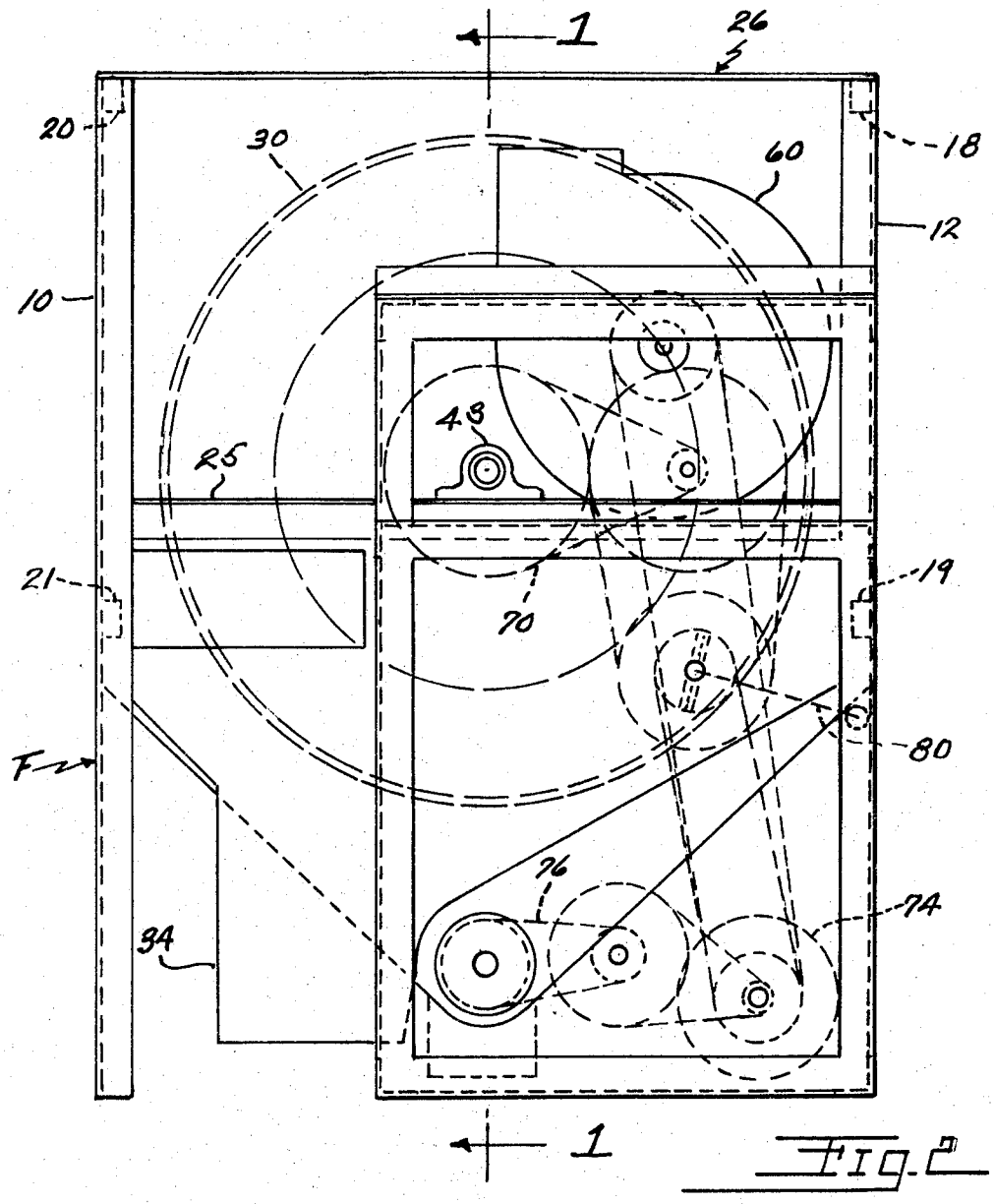


Fig. 2

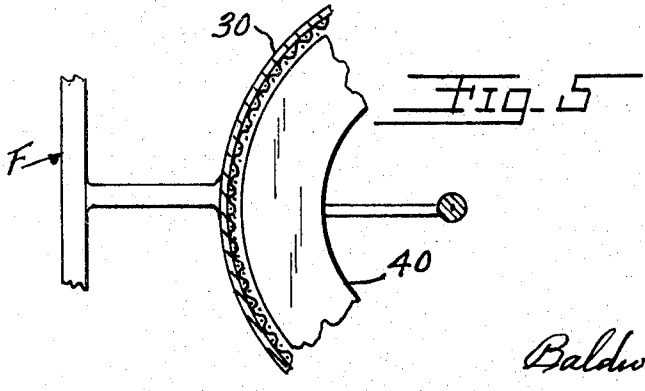


Fig. 5

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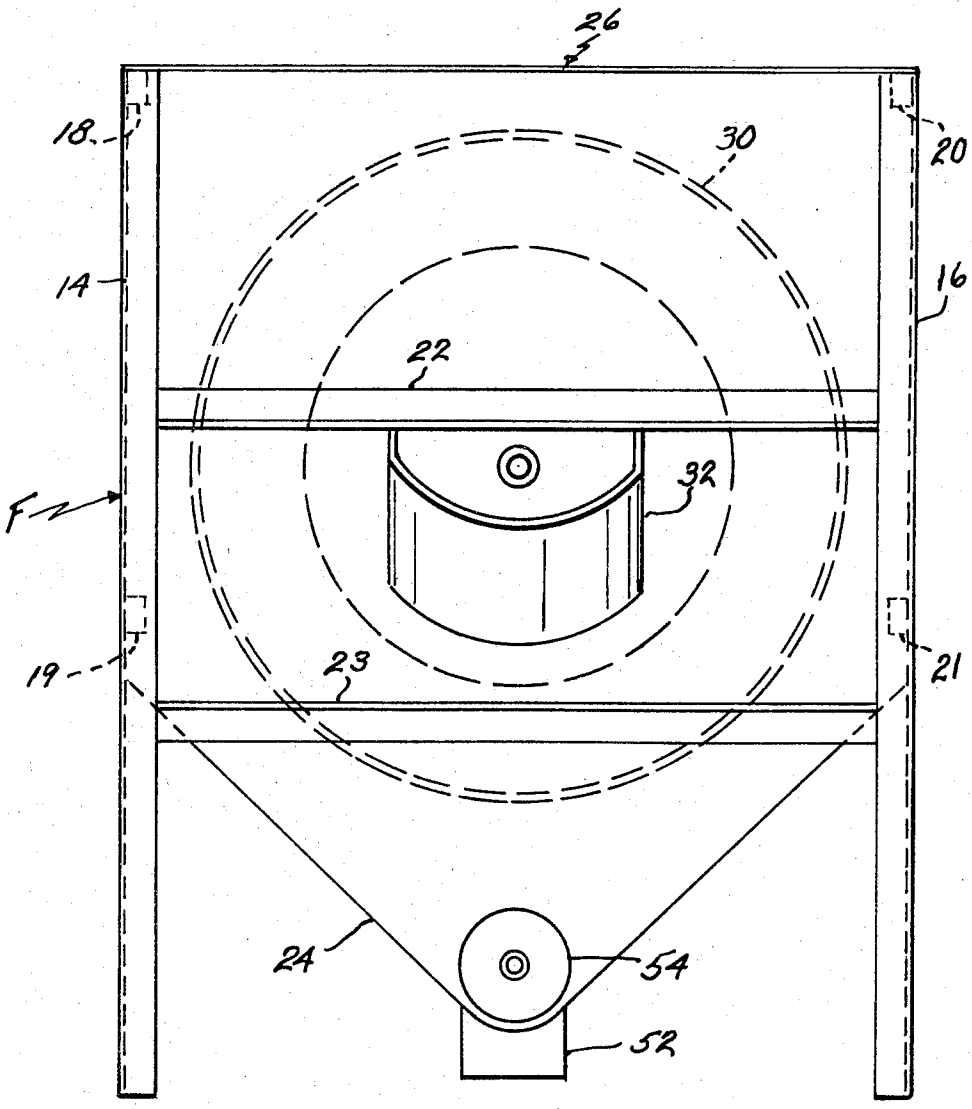


Fig. 3

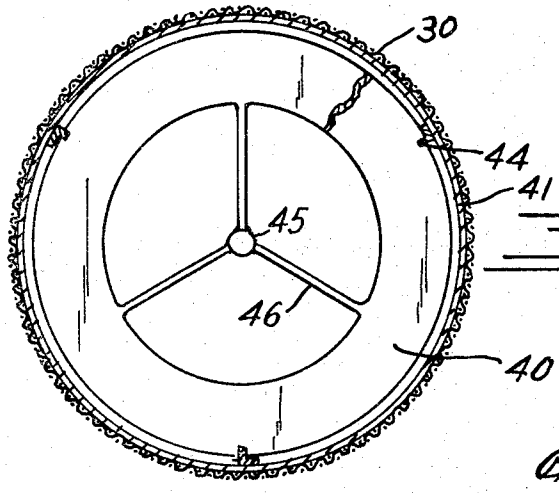


Fig 4

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GRAIN CLEANER

This invention relates to grain cleaners, and more particularly to a cleaner that continuously and automatically cleans dust and dirt particles from grain.

When grain is brought in from the field, it is usually intermixed with dust and dirt particles collected therein during the reaping process. There has long been a need for a device that quickly and simply cleans such grain in a continuous process.

Therefore, it is an object of the invention to provide a cleaning apparatus that continuously and automatically cleans grain quickly and at minimum cost.

A further object of the invention is to provide a grain cleaning apparatus of the above type that is simple in construction, economical to manufacture, and highly effective in operation.

Briefly, the foregoing objects are accomplished by the provision of an apparatus for cleaning grain including an elongated frame supporting a hollow elongated cylindrical screen cage for receiving grain therein and having a mesh slightly smaller than the grain particles. A grain inlet chute is disposed on the frame at one end of the cage for receiving uncleaned grain therethrough and into the cage. A grain outlet chute is disposed on the frame at the other end of the cage through which the cleaned grain is discharged. A grain feed screw is encompassed within the cage and is secured thereto and is rotatably mounted on the frame for rotation about its longitudinal axis for churning the grain in the cage whereby dirt particles in the grain of a size smaller than the grain fall through the sides and bottom of the cage leaving the grain in the cage substantially free of dirt. The grain feed screw also feeds the grain from the inlet chute to the outlet chute. An elongated dirt-receiving receptacle is secured to the frame and is disposed beneath the cage to receive dirt particles therefrom. The receptacle has a dirt outlet at the bottom thereof and a dirt feed screw operatively disposed in the receptacle and rotatably mounted on the frame for rotation about its longitudinal axis for feeding dirt in the receptacle to the dirt outlet. An exhaust fan is positioned on the frame adjacent the upper portion of the cage above the grain outlet chute for discharging dust and fine dirt particles from the cage. A variable speed drive means is provided for rotating said grain feed screw and said dirt feed screw. In a modification of the invention, the grain feed screw is not attached to the screen and rotates freely therein.

Thus, the invention provides a simple, economical grain cleaning apparatus that is highly effective in operation in that it quickly, continuously and automatically cleans grain at minimum cost.

Other objects and advantages of the invention will be apparent from the following description taken in conjunction with the drawings wherein:

FIG. 1 is a front elevational sectional view of a grain cleaning apparatus of the invention and taken along the line 1—1 of FIG. 2;

FIG. 2 is a view taken along the line 2—2 of FIG. 1;

FIG. 3 is a view taken along the line 3—3 of FIG. 1;

FIG. 4 is a view taken along the line 4—4 of FIG. 1; and

FIG. 5 is a broken sectional view of the cage and grain feed screw similar to FIG. 4, but showing a modification of the invention.

Although the invention is shown and described herein with respect to cleaning grain such as wheat, it will be understood that it may be used to clean any type of grain such as oats, corn, soybean, rye, barley, maize, millet, etc.

The terms and expressions which have been employed are used as terms of description, and not of limitation, and there is no intention, in the use of such terms and expressions, of excluding any equivalents of the features shown and described or portions thereof, but it is recognized that various modifications are possible within the scope of the invention claimed.

Referring to FIGS. 1, 2 and 3, there is shown a grain cleaning apparatus, constructed in accordance with the invention, such apparatus being supported in a frame generally designated as F.

The frame F includes four corner posts 10, 12, 14 and 16 to which are secured front longitudinal horizontal side rails 18 and 19, and rear longitudinal horizontal side rails 20 and 21. The frame also includes right end horizontal rails 22 and 23 secured to the adjacent corner posts 14 and 16 and an end plate 24 secured to the rails 22 and 23. At the left end of the apparatus of FIG. 1, a horizontal end rail 25 is secured to the corner posts 10 and 12. A frame top plate 26 is secured to the top side rails 18 and 20.

A hollow elongated cylindrical, substantially open-ended screen cage 30, for receiving grain therein, is disposed in the frame F and has a mesh slightly smaller than the grain particles. A grain inlet chute 32 is secured to the frame F and is disposed directly adjacent the cage 30 at one end (right end of FIG. 1) thereof for receiving uncleaned grain therethrough and into the cage. A grain outlet chute 34 is secured to the frame F and is disposed directly adjacent the cage 30 at the other end (left end of FIG. 1) of the cage through which the cleaned grain is discharged.

A grain feed screw 40 is disposed or encompassed within and secured to the cage 30 by band members 41 and longitudinally disposed members 44, as shown in FIGS. 1 and 4. The feed screw is connected to shaft 45 by arms 46. The shaft is rotatably mounted on the frame F on the journals 42 and 43 for rotation about its longitudinal axis. Thus, the feed screw 40 and it's attached cage 30 rotate as a unit, churning the grain in the cage whereby dirt particles in the grain of a size smaller than the grain fall through the sides and bottoms of the cage leaving the grain in the cage substantially free of dirt. The grain feed screw 40 also is configured to feed the grain from the inlet chute 32 to the outlet chute 34 as the feed screw 40 and cage 30 are rotated as a unit.

An elongated dirt-receiving receptacle 50 is secured to the frame F and is disposed beneath the cage 30 to receive dirt particles therefrom. The receptacle 50 has a dirt outlet 52 at the bottom thereof. A dirt feed screw 54 is operatively disposed in the receptacle and is rotatably mounted on the frame F for rotation about its longitudinal axis for feeding dirt in the receptacle 50 to the dirt outlet 52 therein.

An exhaust fan 60 is disposed on the frame F adjacent the upper portion of the cage 30 above the grain outlet chute 34 for discharging dust and fine dirt particles from the cage.

The grain feed screw 40 is rotated by drive means including a belt 70, which is driven through associated belts and pulleys all operated by the motor 74. The dirt feed screw 54 is driven by drive means in the form of the belt 76 which is driven through associated belts and pulleys all operated by the motor 74, such motor constituting a common drive means for rotating the grain feed screw 40 and the dirt feed screw 54. Such belts and pulleys have a speed adjacent means 80, but such system will not be described in detail as the same, per se, forms no part of the invention.

Thus, the invention provides an apparatus for cleaning grain including an elongated hollow screen cage 30 for receiving grain therein and having a mesh size slightly smaller than the grain particles, and means 40 for churning the grain in the cage and for moving the grain from one end of the cage to the other end thereof whereby dirt particles in the grain and of a size smaller than the grain fall through the sides and bottom of the screen cage as the grain is so moved thereby leaving the grain remaining in the cage substantially free of dirt.

The dirt flow outlet 52 is shown disposed in the center of the receptacle 50 and the dirt feed screw 54 has right and left helixes so disposed to feed dirt to the central dirt outlet 52. It will be understood, however, that the dirt flow outlet may be disposed at one end of the dirt receptacle, and the dirt feed screw may thus have a helix thereon to feed dirt to such outlet at the one end of the receptacle.

FIG. 5 shows a modification of the invention wherein the grain feed screw 40 is not secured to the cage 30, such cage 30 being secured directly to the frame F. With this structure, the cage 30 is stationary and the feed screw 40 rotates within the cage.

Thus, the invention provides a grain cleaning apparatus that continuously and automatically cleans grain in a simple economical operation.

What is claimed is:

1. An apparatus for cleaning grain comprising, an elongate frame, a hollow, elongated, cylindrical, substantially open-ended screen cage rotatably supported on said frame with its axis horizontally disposed, a grain inlet chute secured to the frame and disposed directly adjacent the cage at one end thereof for receiving uncleaned grain therethrough and into the cage through one open end thereof, said screen cage having a mesh slightly smaller than the grain particles received therein to permit particles smaller than grain size to fall therethrough, a grain outlet chute secured to the frame and disposed adjacent the cage at the other end of the cage and through which the cleaned grain is discharged, a helical grain feed screw disposed within and secured to the cage at the inner surface of the cage, said feed screw supported in radially spaced relationship on an elongate shaft extending co-axially through said screen cage and rotatably supported at its opposite ends on said frame for rotation of said feed screw and said screen cage as a unit at a relatively slow speed of rotation for churning the grain in the cage whereby dirt particles in the grain of a size smaller than the grain fall through the sides and bottom of the cage by gravity leaving the grain in the cage substantially free of dirt, said grain feed screw configured to feed the grain from the inlet chute to the outlet chute as the feed screw and cage are rotated as a unit, an elongated dirt-receiving receptacle secured to the frame and disposed beneath the cage to receive dirt particles therefrom, said receptacle having a dirt outlet in the center of the bottom thereof, a helical dirt feed screw rotatably mounted on the frame for rotation about its longitudinal axis and having oppositely directed helixes on the opposite ends thereof operatively disposed in the receptacle for feeding dirt in the receptacle to the dirt outlet therein, an exhaust fan disposed on the frame directly adjacent the upper portion of the cage above the grain outlet chute for drawing dust and fine dirt particles away from the cage and outlet chute, and a variable speed drive means operatively connected with said elongate shaft, said exhaust fan and said dirt feed screw for rotating said screen cage and grain feed screw, said exhaust fan and said dirt feed screw at different selective rotative speeds.

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