

Sept. 26, 1950

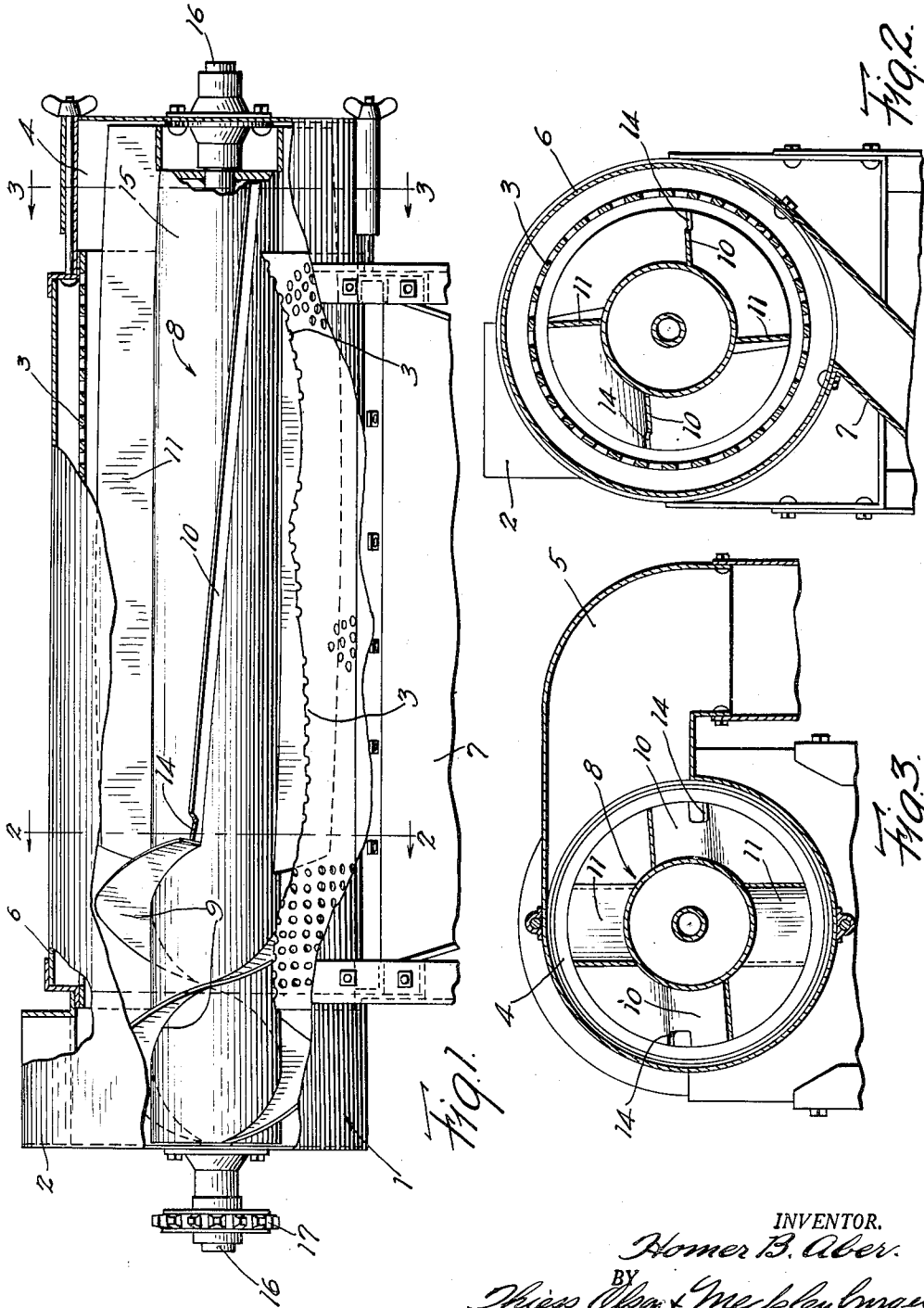
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2,523,259

DEVICE FOR CLEANING GRAIN

Filed Dec. 24, 1946

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

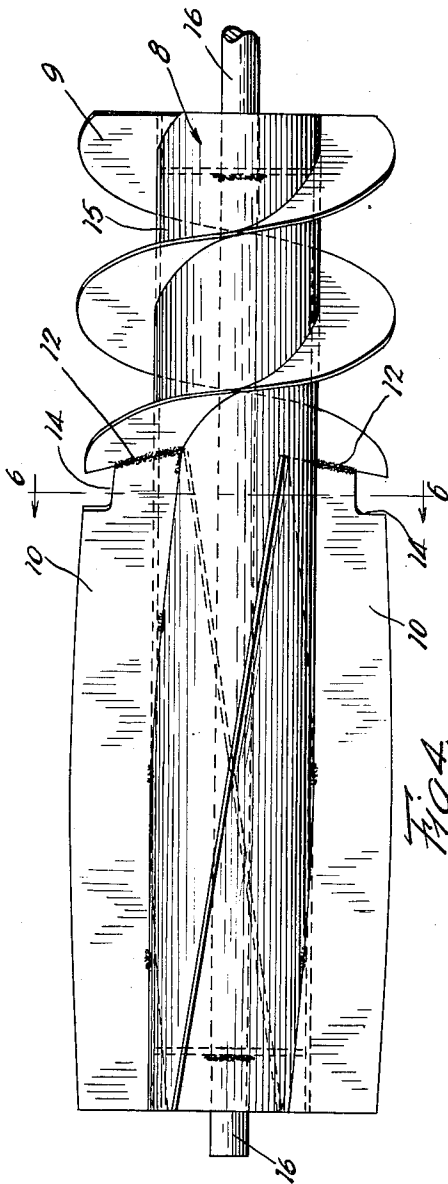


FIG. 4.

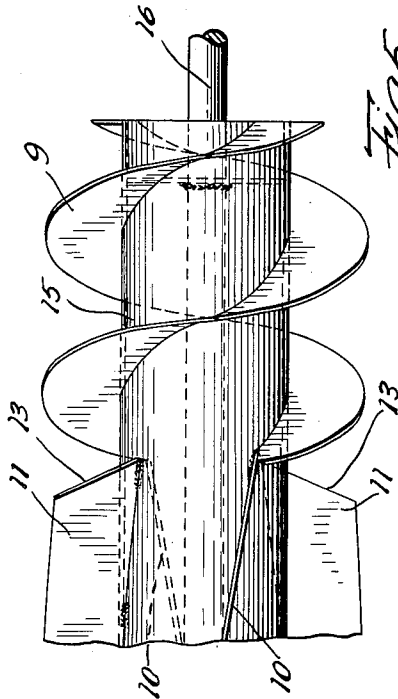


FIG. 5.

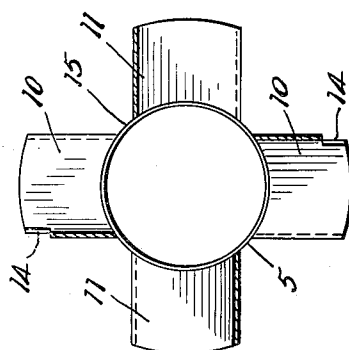


FIG. 6.

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# UNITED STATES PATENT OFFICE

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## DEVICE FOR CLEANING GRAIN

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6 Claims. (Cl. 209—284)

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This invention relates to devices used for cleaning grain or the like by screening out objectionable weed seeds, dirt, and other extraneous matter, and also for separating seeds or green kernels of different size, such for example as defective seeds from normal seeds or seeds from different crops which have been sown and harvested together. Such a device is shown in the application of William Dwyer, Serial No. 542,781, filed June 29, 1944, now abandoned.

One of the objects of my invention is to materially increase the output of such apparatus without materially increasing the cost.

Further objects and advantages of the invention will be apparent from the description and claims.

In the drawings, in which an embodiment of my invention is shown,

Figure 1 is an axial sectional view of a grain cleaning apparatus embodying my invention;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a side view of the rotor;

Fig. 5 is a side view of one end of the rotor, viewed from a different angle from that in Fig. 4; and

Fig. 6 is a transverse sectional view on the line 6—6 of Fig. 4.

Referring to the drawings in detail, the construction shown comprises a short cylindrical horizontal axis receiving chamber 1 to which the grain to be cleaned is delivered from the inlet pipe 2, a horizontal axis cylindrical screen 3 into which the grain is forced from the receiving chamber 1 and in which it is cleaned and burnished, a horizontal axis cylindrical discharge chamber 4 into which the cleaned and burnished grain is delivered from the screen 3 and from which it is delivered through the discharge spout or pipe 5, an annular cylindrical chamber 6 surrounding the cylindrical screen 3 to which the material forced through the screen is delivered and from which annular chamber 6 it is delivered to the long discharge spout 7, and a cylindrical rotor 8 extending through said cylindrical screen 3 and into said receiving and discharge chambers 1 and 4 having relatively short pitch helical screw conveyor blades or vanes 9 for forcing the grain from the receiving chamber 1 into the screening chamber 3 and relatively long pitch screw conveyor vanes 10 and 11 for forcing the cleaned and burnished grain from the screening chamber 3 into the discharge chamber 4 and for forcing the undersized small granules, weed seeds, and screenings to pass through the openings in

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the screen into the annular cylindrical chamber 6 from which they are delivered to the discharge spout 7. As shown in Fig. 1, the ends of the screen 3 extend inside of the chambers 1 and 4, respectively, and are non-rotatably supported thereby.

The vanes 10 have their receiving edges directly connected with the discharge edges of the short pitch helical vanes 9 at 12, the receiving edges of the vanes 11 being spaced from the vanes 9 as indicated at 13 in Figs. 4 and 5. The receiving edges of the vanes 10 are cut away as shown at 14.

As the screw conveyor blades or vanes 9 force the grain from the receiving chamber 1 into the screen chamber 3 some of the grain will be caught in front of the vanes 11 and some will pass between the edges 13 of the blades 11 and the adjacent flights of the screw feed or conveyor blades 9 and be caught by the vanes 10 which are directly connected with the vanes 9. As an aid to equalizing distribution between the vanes 10 and 11, the vanes 10 are cut away at 14 to allow some grain to flow through these passages to be picked up by the succeeding vanes 11. The vanes 9 exert a strong axial force component on the grain tending to pack it into the spaces between the vanes 10 and 11. The vanes 10 and 11 exert a strong circumferential force component on the grain and a relatively slight axial force tending to cause a relatively fast circular brushing movement of the grain along the sieve and a relatively slow axial movement giving plenty of time for the brushing action. The vanes 10 and 11 may be of flat sheet material having their inner edges curved to conform to the surface of the cylindrical core 15 of the rotor 8 and their outer edges curved to maintain a uniform distance from the cylindrical screen 3. Screens with openings of various sizes and shapes can be used according to the nature of the material being separated. For the purposes of the invention, the screens are preferably made of sheet metal perforated with the desired number and type of openings, and formed into a cylindrical shape. This results in a comparatively smooth interior which will tend to burnish rather than to damage grain passing through the cleaner.

A shaft 16 with which the core 15 is rotatable has secured thereto a pulley or sprocket 17 by which to drive rotor 8 from any convenient source of power.

The rotor 8 comprises a preferably hollow core portion which is secured to the shaft 16 and extends substantially the combined length of the chamber 6, inlet chamber 1 and discharge cham-

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ber 4. Auger spirals or vanes 9 start at the inlet end of the cleaner, preferably substantially at opposite points on rotor 8, and extend in a manner similar to a double thread screw about said rotor. At a suitable point, preferably about one complete revolution from the starting point, flights or vanes 9 join respectively with paddle-like portions or vanes 10 respectively, extending lengthwise of the rotor and in the present instance disposed at a slight angle to the plane of the center line of rotor 8. Vanes 10, in view of the slight angle, may conveniently be made plane in character but will serve the functions of an auger flight having an extremely long lead. Auger spirals 9 function to carry the grain from inlet housing 1 (into which it is fed by spout 2) into screen 3. At the termination of spirals 9, vanes or paddle portions 10 and 11 continue to agitate the grain and impel it with a burnishing action against screen 3 so that small particles, undersized kernels, etc., are given a repeated opportunity to find their way through the openings in the screen. The slight pitch of blades 10 and 11 gradually impels the material to the extremity of rotor 8 at the discharge end thereof. Vanes 9, 10 and 11 run comparatively close to screen 3 but are spaced from the screen a sufficient amount so as not to damage the seed being screened. Thus a seed lodged in the screen openings will be cleared by all portions of the rotor and not cut or cracked. On the other hand, the clearance is small enough so that the entire body of seed within the cleaner is positively agitated and carried along by the rotor.

The discharge chamber 4 forms in effect a continuation of the passageway defined by screen 3. Also, inlet chamber 2 likewise forms a continuation of screen 3 so as to result in an elongated cylindrical passageway for passage of grain and which is traversed in its entirety by rotor 8.

Further modifications will be apparent to those skilled in the art and it is desired, therefore, that the invention be limited only by the scope of the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. Grain screening apparatus comprising a short horizontal axis cylindrical receiving chamber to which the grain to be cleaned is delivered, a horizontal axis nonrotatable cylindrical screen into which the grain is forced from the receiving chamber and in which it is screened, a horizontal axis discharge chamber into which the screened grain is delivered from the screen, an annular chamber surrounding the cylindrical screen to which the material forced through the screen is delivered and from which annular chamber it is delivered to a discharge spout, and a rotor extending through said cylindrical screen and into said receiving and discharge chambers having a plurality of short pitch screw conveyor vanes for forcing the grain from the receiving chamber into the screening chamber and a plurality of long pitch screw conveyor vanes for forcing the cleaned grain from the screening chamber into the discharge chamber and for forcing the screenings to pass through the openings in the screen into the annular cylindrical chamber, the number of long pitch vanes being greater than the number of short pitch vanes, said short pitch vanes forming a plurality of short pitch screw conveyor passages and said long pitch vanes forming a greater plurality of long pitch screw conveyor passages, each short pitch passage being in direct close communication with

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a definite plurality of long passages whereby the long pitch passages form continuing branches of the short pitch passages, the discharge ends of each short pitch vane being in grain-tight relation with respect to the intake end of a long pitch vane throughout at least a substantial part of the radial extent of said ends.

2. Grain screening apparatus comprising a short horizontal axis cylindrical receiving chamber to which the grain to be cleaned is delivered, a horizontal axis nonrotatable cylindrical screen into which the grain is forced from the receiving chamber and in which it is screened, a horizontal axis discharge chamber into which the screened grain is delivered from the screen, an annular chamber surrounding the cylindrical screen to which the material forced through the screen is delivered and from which annular chamber it is delivered to a discharge spout, and a rotor extending through said cylindrical screen and into said receiving and discharge chambers having a plurality of short pitch screw conveyor vanes for forcing the grain from the receiving chamber into the screening chamber and a plurality of long pitch screw conveyor vanes for forcing the cleaned grain from the screening chamber into the discharge chamber and for forcing the screenings to pass through the openings in the screen into the annular cylindrical chamber, the number of long pitch vanes being greater than the number of short pitch vanes, said short pitch vanes forming a plurality of short pitch screw conveyor passages and said long pitch vanes forming a greater plurality of long pitch screw conveyor passages, each short pitch passage being in direct close communication with a definite plurality of long passages whereby the long pitch passages form continuing branches of the short pitch passages, a plurality of said long pitch vanes having their receiving edges directly connected with the discharge edges of said short pitch vanes, respectively, and a plurality of said long pitch vanes having their receiving edges spaced from said short pitch vanes, the discharge ends of each short pitch vane being in grain-tight relation with respect to the intake end of a long pitch vane throughout at least a substantial part of the radial extent of said ends.

3. Grain screening apparatus comprising a short horizontal axis cylindrical receiving chamber to which the grain to be cleaned is delivered, a horizontal axis nonrotatable cylindrical screen into which the grain is forced from the receiving chamber and in which it is screened, a horizontal axis discharge chamber into which the screened grain is delivered from the screen, an annular chamber surrounding the cylindrical screen to which the material forced through the screen is delivered and from which annular chamber it is delivered to a discharge spout, and a rotor extending through said cylindrical screen and into said receiving and discharge chambers having a plurality of short pitch screw conveyor vanes for forcing the grain from the receiving chamber into the screening chamber and a plurality of long pitch screw conveyor vanes for forcing the cleaned grain from the screening chamber into the discharge chamber and for forcing the screenings to pass through the openings in the screen into the annular cylindrical chamber, the number of long pitch vanes being greater than the number of short pitch vanes, said short pitch vanes forming a plurality of short pitch screw conveyor passages and said

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long pitch vanes forming a greater plurality of long pitch screw conveyor passages, each short pitch passage being in direct close communication with a definite plurality of long passages whereby the long pitch passages form continuing branches of the short pitch passages, a plurality of said long pitch vanes having their receiving edges directly connected with the discharge edges of said short pitch vanes, respectively and a plurality of said long pitch vanes having their receiving edges spaced from said short pitch vanes, respectively, said directly connected long pitch vanes each having a recess adjacent their connection with the short pitch vanes to enable the passage of grain through said recess, the discharge ends of each short pitch vane being in grain-tight relation with respect to the intake end of a long pitch vane throughout at least a substantial part of the radial extent of said ends.

4. Grain screening apparatus comprising a short horizontal axis cylindrical receiving chamber to which the grain to be cleaned is delivered, a horizontal axis nonrotatable cylindrical screen into which the grain is forced from the receiving chamber and in which it is screened, a horizontal axis discharge chamber into which the screened grain is delivered from the screen, an annular chamber surrounding the cylindrical screen to which the material forced through the screen is delivered and from which annular chamber it is delivered to a discharge spout, and a rotor extending through said cylindrical screen and into said receiving and discharge chambers having a plurality of short pitch screw conveyor vanes for forcing the grain from the receiving chamber into the screening chamber and a plurality of long pitch screw conveyor vanes for forcing the cleaned grain from the screening chamber into the discharge chamber and for forcing the screenings to pass through the openings in the screen into the annular cylindrical chamber, the number of long pitch vanes being greater than the number of short pitch vanes, said short pitch vanes forming a plurality of short pitch screw conveyor passages and said long pitch vanes forming a greater plurality of long pitch screw conveyor passages, each short pitch passage being in direct close communication with a definite plurality of long passages whereby the long pitch passages form continuing branches of the short pitch passages, a plurality of said long pitch vanes having their receiving edges directly connected with the discharge edges of said short pitch vanes, respectively, and a plurality of said long pitch vanes having their receiving edges spaced from said short pitch vanes, respectively, said directly connected long pitch vanes each having an aperture adjacent their connection with the short pitch vanes, respectively, to enable the passage of grain through said aperture, the discharge ends of each short pitch vane being in grain-tight relation with respect to the intake end of a long pitch vane throughout at least a substantial part of the radial extent of said ends.

5. Grain screening apparatus comprising a short horizontal axis cylindrical receiving chamber to which the grain to be cleaned is delivered, a horizontal axis nonrotatable screen into which the grain is forced from the receiving chamber and in which it is screened, a horizontal axis discharge chamber into which the screened grain is delivered from the screen, an annular chamber surrounding the screen to which the material

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forced through the screen is delivered and from which annular chamber it is delivered to a discharge spout, and a rotor extending through said screen having a plurality of short pitch screw conveyor vanes for forcing the grain from the receiving chamber into the screening chamber and a plurality of long pitch screw conveyor vanes for forcing the cleaned grain from the screening chamber into the discharge chamber and for forcing the screenings to pass through the openings in the screen into the annular cylindrical chamber, the number of long pitch vanes being greater than the number of short pitch vanes, said short pitch vanes forming a plurality of short pitch screw conveyor passages and said long pitch vanes forming a greater plurality of long pitch screw conveyor passages, each short pitch passage being in direct close communication with a definite plurality of long passages whereby the long pitch passages form continuing branches of the short pitch passages, the discharge ends of each short pitch vane being in grain-tight relation with respect to the intake end of a long pitch vane throughout at least a substantial part of the radial extent of said ends.

6. Grain screening apparatus comprising a short horizontal axis cylindrical receiving chamber to which the grain to be cleaned is delivered, a horizontal axis nonrotatable screen into which the grain is forced from the receiving chamber and in which it is screened, a horizontal axis discharge chamber into which the screened grain is delivered from the screen, an annular chamber surrounding the screen to which the material forced through the screen is delivered and from which annular chamber it is delivered to a discharge spout, and a rotor extending through said screen having a short pitch conveyor vane for forcing the grain from the receiving chamber into the screening chamber and a plurality of long pitch screw conveyor vanes for forcing the cleaned grain from the screening chamber into the discharge chamber and for forcing the screenings to pass through the openings in the screen into the annular cylindrical chamber, said short pitch vane providing a short pitch screw conveyor passage and said long pitch vanes providing a plurality of long pitch screw conveyor passages, said short pitch passage being in direct close communication with a definite plurality of long pitch passages whereby the long pitch passages form continuing branches of the short pitch passage, the discharge end of said short pitch vane being in grain-tight relation with respect to the intake end of the long pitch vane over at least a substantial part of the radial extent of said ends.

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