

Oct. 29, 1963

W. FEHLMANN

3,108,949

SEPARATOR FOR GRANULAR GOODS

Filed July 18, 1960

2 Sheets-Sheet 1

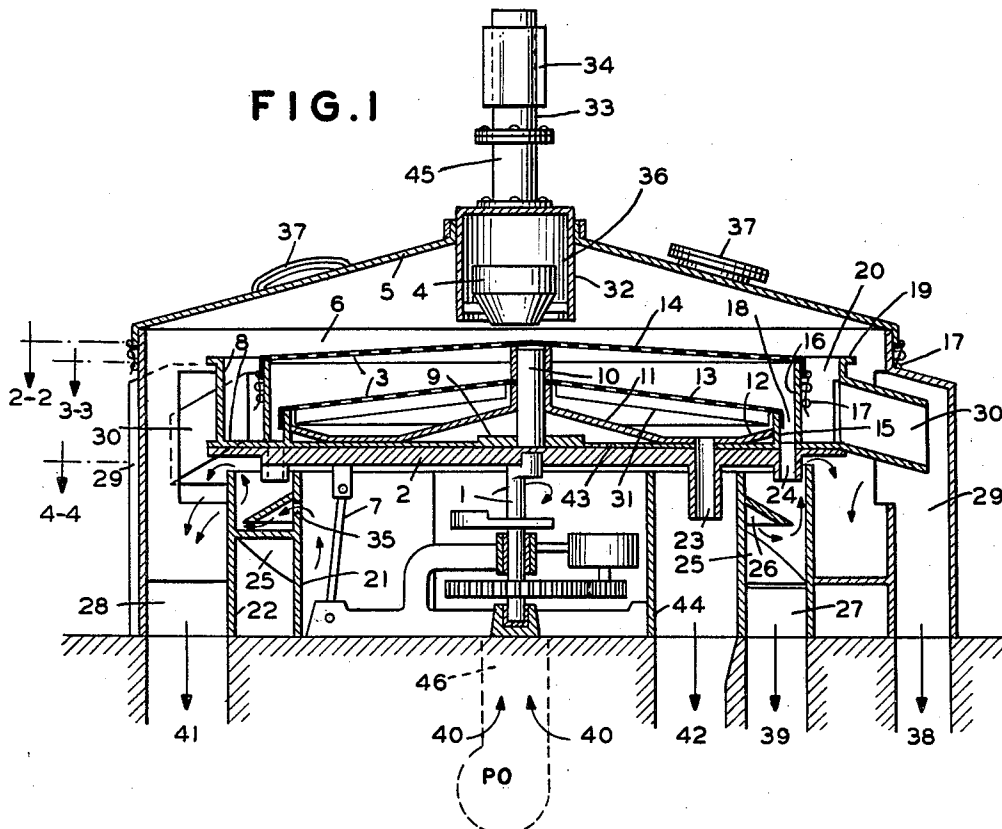
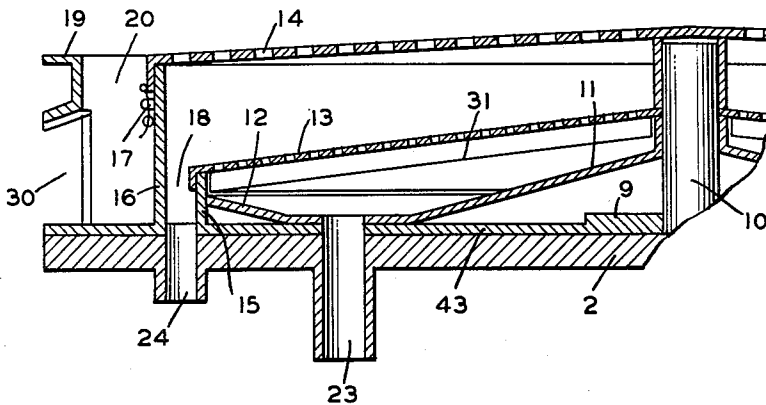


FIG. 3



Oct. 29, 1963

W. FEHLMANN

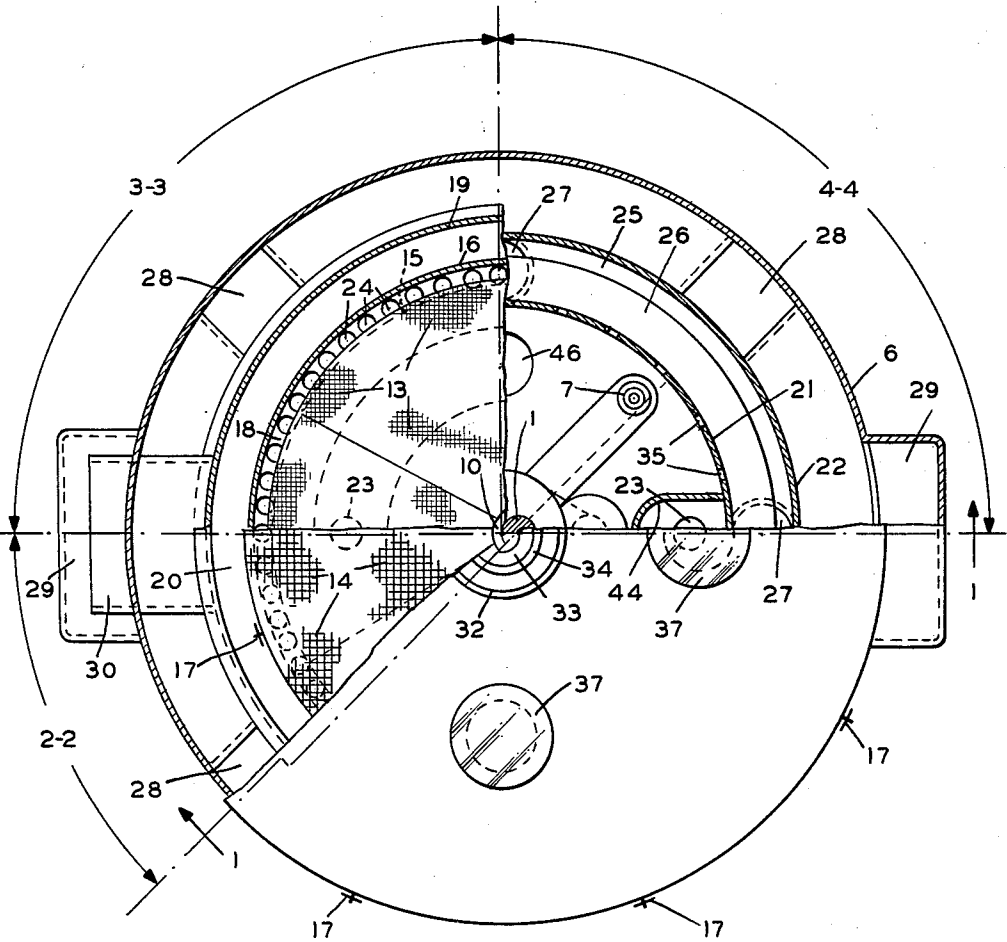
3,108,949

SEPARATOR FOR GRANULAR GOODS

Filed July 18, 1960

2 Sheets-Sheet 2

FIG. 2



1

3,108,949

SEPARATOR FOR GRANULAR GOODS

Werner Fehlmann, Zofingen, Aargau, Switzerland, assignor to Gebrueder Buehler, Uzwil, Switzerland, a Swiss firm

Filed July 18, 1960, Ser. No. 43,355

Claims priority, application Switzerland July 16, 1959

5 Claims. (Cl. 209—36)

This invention relates to a separator for grading and purifying granular material and, more particularly, to a separator for separating and cleaning freshly threshed grain.

Grain, after threshing, contains a relatively large proportion of coarse impurities, such as straw and chaff, as well as smaller, heavier impurities. These impurities must be removed from the grain after threshing. Since the straw and chaff are relatively light in weight, one apparatus which has been employed in removing the impurities employs an aspirated plane sifter in which the threshed material is deposited on a vibrated screen. As the screen is vibrated, air removes the lighter weight straw and chaff and the smaller, heavier impurities are allowed to fall through the openings in the screen. While this type of apparatus has met with some success, it has several disadvantages. The coarse impurities, such as straw and chaff, are removed by the air but impurities heavier than grain remain in the sifter during the entire sifting operation and, thereby, may damage the sifter web or screen.

It is an object of the instant invention to provide an improved grain sifter.

It is a further object of the invention to provide such a sifter in which the coarser straw and chaff are first removed from the threshed grain and then the smaller, heavier impurities.

A still further object of the invention is to provide such a sifter in which the grain is air washed or cleaned after the straw and chaff and heavier impurities are removed.

A still further object is to provide such a sifter in which the impurities are removed from the sifter continuously during the operation of the apparatus.

These and other objects of the invention will be more apparent from the following description and the attached drawings showing one embodiment of the invention, in which:

FIG. 1 is a side elevational view, in section, along the line 1—1 of FIG. 2, of an apparatus according to the instant invention;

FIG. 2 is a top plan view, in partial sections along the lines 2—2, 3—3 and 4—4 of FIG. 1; and

FIG. 3 is an enlarged side elevation showing details of the sieves and frame.

As may be seen in FIG. 1, a supporting structure 2 is connected to the crank arm of drive mechanism 1 and resiliently connected to a plurality of supports 7, only one of which is shown. Supporting structure 2 is connected, in a manner fixed against turning and by means of a flange 9, to a drum 8 which is centered around a carrier pin 10 and carries a sieve-set 3 with convex conical surfaces.

Drum 8 supports sloping collecting bottoms 11, 12 which join to form a flat ring channel. The exterior collecting bottom 12 is surrounded by an annular wall 15 fixed to drum 8 which, at its upper edge, supports a convex sieve 13. Sieve 13 is subdivided into sections and each section, on its underside, is provided, in known manner, with a coarse-mesh net 31 which carries balls, pieces of belts or the like for clearing the sieve surface 13.

An annular channel 18, formed by the bottom 43 of

2

drum 8, annular wall 15 and annular face 16, extends around the periphery of sieve 13. A conical sieve 14, of a larger mesh than sieve 13, is fastened at its periphery by a quick-action connector 17, to annular face 16 and, at its inner end, is connected to carrier pin 10. A second annular ring 20, formed by annular face 16, bottom 43 and annular surface 19, extends peripherally around the outer edge of sieve 14.

In order to provide for discharge for the various materials separated by the sieves 13, 14 and entry of the aspirating air 40 and, at the same time, permit free, circular oscillation of sieve-set 3 by drive mechanism 1, a plurality of concentric annular walls or skirts are provided beneath supporting structure 2 and around drive mechanism 1. Inner cylindrical skirt 21, having a plurality of air openings 35, is fixed to the support for drive mechanism 1 beneath supporting structure 2. On its outer surface and slightly above openings 35, a roof-like annular collar 26 is fixed to skirt 21. On its inner side and at opposite sides of the drive mechanism 1, shaft housings 44 are fixed to the inner sides of skirt 21. A second cylindrical skirt 22 is fixed to the support of drive mechanism 1 and is spaced outwardly from skirt 21 forming, with skirt 21, an annular chamber beneath supporting structure 2. Skirt 22 is connected to skirt 21 by baffles 25 which lead to discharge openings 27.

On the underside of drum 8 are provided outlet tubes 23 which extend downward through support 2 into shaft housings 44, an outlet tube 23 being provided at each of the housings 44 at the opposite sides of drive mechanism 1. A plurality of discharge tubes 24 are provided on the underside of support 2 connecting annular channel 18 with the space between skirts 21 and 22.

The entire device is surrounded by a cylindrical suction hood 6 having a conical roof 5, hood 6 being spaced outwardly from skirt 22 forming a suction shaft 28 therebetween and is connected to roof 5 by quick-acting connections 17 for ready removal of roof 5.

On its outer periphery at diametrically opposite sides of hood 6, vertically disposed discharge channels 29 are connected to the outer wall of hood 6, discharge channels 29 being closed at their tops.

An outlet duct 30 is provided in drum 8 connecting annular ring 20 with discharge channel 29, an outlet being provided for each of the discharge channels 29. A cylindrical container 32 is positioned in the center of roof 5, feed tube 33 being connected at its lower end to the upper end of container 32 by adapter 45. Feed tube 33 is provided with a glass section 34 permitting visual inspection of the material fed therethrough. At its lower end, container 32 opens into hood 6 and, at the opening, carries a nozzle 4 which, with the wall of the container 32, forms an annular gap 36 spaced from the lower end of feed tube 33. The goods to be separated are fed through tube 33 and annular gap 36 into hood 6 and onto sieve-set 3.

In operation, drum 8 with sieve-set 3 is driven in a circular, oscillating path by drive mechanism 1. The material to be separated, containing the threshed grain, short pieces of straw, cords, sticks and the like, and particles of heavier impurities, is fed through tube 33 onto the top of conical sieve 14. The larger particles such as straw, cords and sticks, are retained on the top of sieve 14 and the grain and small, heavier impurities pass downwardly through sieve 14. The coarser impurities retained by sieve 14 are rejected outwardly by the motion of the sieve-set into channel 20 where they are discharged into channels 29 through outlets 30 thence into conduit 38.

The materials which pass through sieve 14 fall onto sieve 13 which is of a mesh size selected to retain the

whole grains while allowing passage of the smaller, heavy impurities. The whole grains retained on sieve 13 are discharged down the inclined sieve surface into annular channel 18 and through discharge openings 24 onto baffle 26 where the grain is spread in a thin veil on the top of baffle 25. From the baffle 25, the grain falls by gravity through chamber 27 and through conduit 39. The sieve surface 13 is continuously cleaned by balls, pieces of felt or the like, carried by coarse mesh 31.

As the grain falls in a thin veil from baffle 26 the aspirating air 40 fed through an opening 46 and through the openings 35 in skirt 21, flows through the veil formed by the grain, air washing or air cleaning the grain as the grain passes around baffle 25 and collar 26. The air with the impurities is discharged through ducts 28, deflected by the rim portion of the bottom 2 around the skirt 22, and into conduit 41.

The fine, heavy impurities such as sand, weed seeds, and the like, pass through sieve 13 and fall, by gravity, on collecting bottoms 11 and 12 and are discharged through the tubes 23 into a discharge duct 44 and conduit 42.

The various materials separated in the device are continuously discharged, the only material remaining in the separator during operation being the actual material which, at the time, is being separated. There is no build-up or accumulation of separated material in the device. Thus the screens, walls, and drive are required to handle only that limited quantity of material which, at the time, is in the separator. Thus, the life of the separator, as well as the screen, is substantially increased. In addition to the mechanical separation of the grain from the impurities, as the grain is discharged after mechanical separation, the grain is spread into a thin veil and air cleaned or washed, removing small, light-weight impurities which are attached to or cling to the grain particles.

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.

What is claimed is:

1. An apparatus for grading and purifying granular material comprising a vertically disposed housing, a horizontally disposed sieve in said housing, means for delivering ungraded and unpurified granular material into said housing and onto the center portion of said sieve, means for driving said sieve in an oscillating path to move granular material on said sieve radially outward across said sieve and to discharge from the edge of said sieve materials retained thereon, means at the edge of said sieve for receiving and removing said retained material from said housing, discharge means beneath said sieve for receiving materials which pass through said sieve, baffle means in said discharge means for spreading said material received therein into a veil, means for air washing said materials in said veil, means for removing said air washed material from said housing, and means below said sieve for deflecting and discharging the washing air from said housing.

2. An apparatus for grading and purifying granular material comprising a vertically disposed housing, a first horizontally disposed sieve, a second horizontally disposed sieve positioned below and connected to said first sieve for movement therewith, delivery means for delivering ungraded and unpurified granular material onto the center portion of said first sieve, means for driving said sieves in an oscillating, circular path to move granular material on

said sieves radially outward across said sieves, means surrounding said first sieve for receiving material retained on said first sieve after said material has moved radially across said first sieve and for removing said retained material, means surrounding said second sieve for receiving material retained on said second sieve and discharged radially therefrom, means beneath said second sieve for removing materials passing through said second sieve, air means in the path of removal of said material retained and discharged radially by said second sieve for cleaning such radially discharged material, and deflector means on said second sieve and positioned therebelow for deflecting and discharging the cleaning air from said housing at a point below said second sieve.

3. In an apparatus as recited in claim 2, said air means including a first cylindrical skirt, a second cylindrical skirt spaced from and surrounding said first cylindrical skirt and forming an annular chamber therebetween, a baffle on one of said skirts extending inwardly into said chamber, said baffle being in the path of movement of material through said chamber, and means for blowing air through said chamber.

4. An apparatus for grading and purifying granular material comprising a housing, a drum mounted for movement in a circular, oscillating path about a vertical axis in said housing, means for driving said drum, a first convex sieve mounted on said drum, an annular channel in said drum around said sieve, a second convex sieve mounted on said drum beneath said first convex sieve, an annular channel surrounding said second sieve, a sloping wall in said drum beneath said second sieve, a discharge opening in said sloping wall, means for delivering ungraded material into said housing and for depositing ungraded material onto the center portion of said first sieve, means at the edge of said first sieve for receiving material retained on said first sieve and for discharging said material from said housing, means for receiving material which passes through said first and said second sieves and for removing said material from said housing, means at the edge of said second sieve for receiving material retained on said second sieve and for removing said material from said housing, and air washing means in said last mentioned receiving means for washing the material as the material passes therethrough.

5. In an apparatus as recited in claim 4, said means for receiving material retained on said second sieve including a first cylindrical skirt, a second cylindrical skirt spaced from and surrounding said first cylindrical skirt and forming an annular chamber therebetween, a baffle on one of said skirts extending into said chamber, said baffle being in the path of movement of said material through said chamber, means for blowing air through said chamber, and means for deflecting and exhausting said air from said chamber after said air has air cleaned the material passing through said chamber.

References Cited in the file of this patent

UNITED STATES PATENTS

279,286	Sutton	June 12, 1883
442,212	Walter	Dec. 9, 1890
595,985	Wolf	Dec. 21, 1897
1,017,631	Willet	Feb. 13, 1912
1,870,629	Ingraham	Aug. 9, 1932
2,777,578	Miller	Jan. 15, 1957
2,828,013	Hurst	Mar. 25, 1958

FOREIGN PATENTS

1,137,980	France	Jan. 21, 1957
-----------	--------	---------------