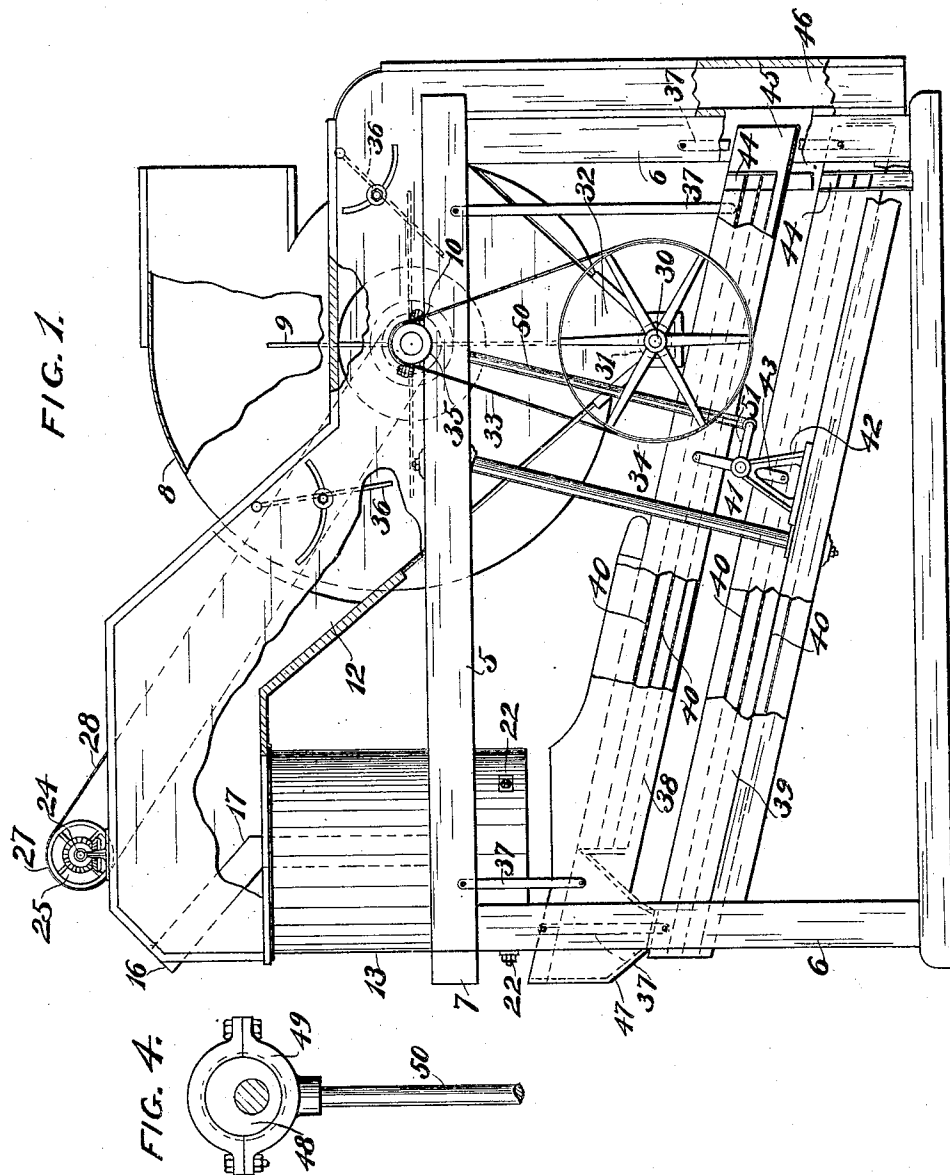


F. GROTENRATH.
GRAIN CLEANER AND SEPARATOR.
APPLICATION FILED MAY 22, 1907.

938,576.

Patented Nov. 2, 1909.
2 SHEETS—SHEET 1.



WITNESSES.

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FIG. 3.

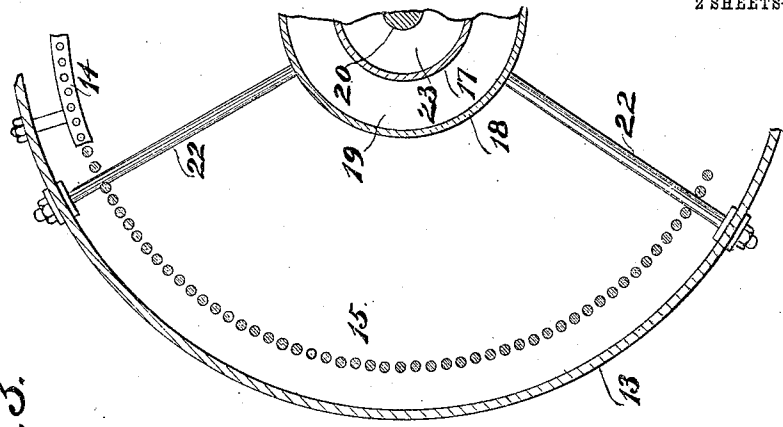
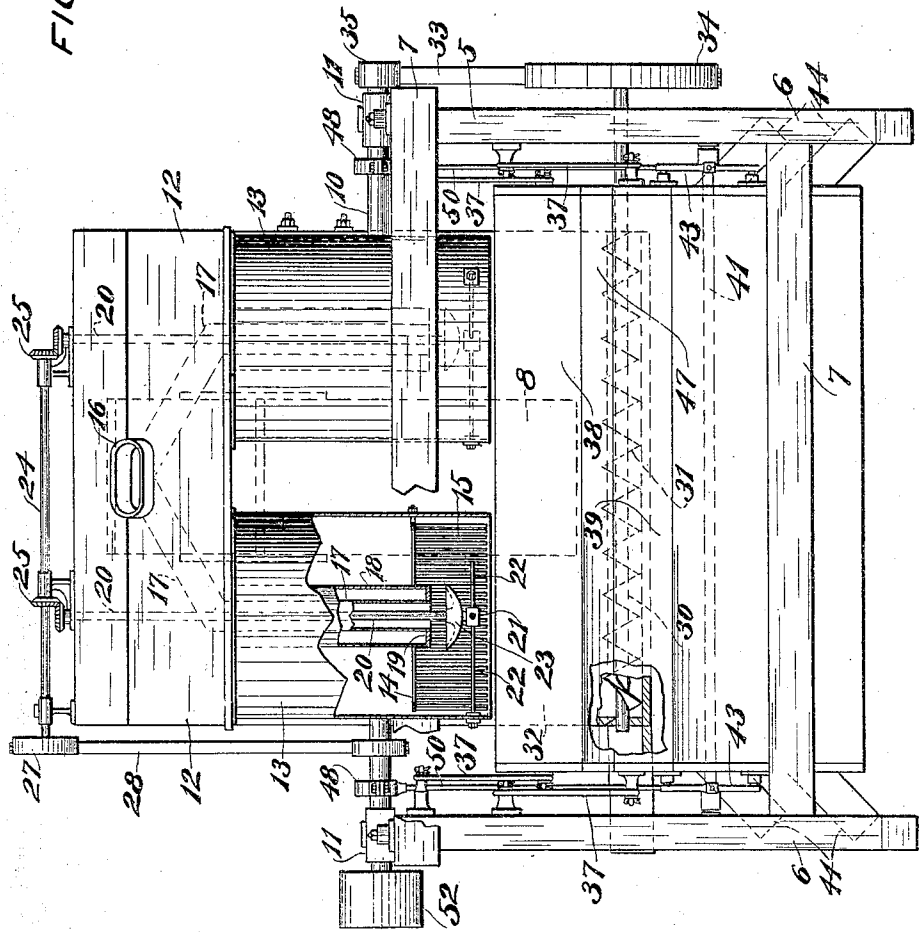


FIG. 2.



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GRAIN CLEANER AND SEPARATOR.

938,576.

Specification of Letters Patent.

Patented Nov. 2, 1909.

Application filed May 22, 1907. Serial No. 375,108.

To all whom it may concern:

Be it known that I, FRED GROTENRATH, residing in Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented new and useful Improvements in Grain Cleaners and Separators, of which the following is a description, reference being had to the accompanying drawings, which are a part of this specification.

My invention has relation to improvements in grain cleaners and separators.

One of the objects contemplated is to provide a machine which is inexpensive to manufacture and maintain and is simple in construction and efficient in operation.

A further object is to provide a machine which is particularly adapted for separating the chaff or dust from grain and remove the same so that the cleaned grain may be delivered from the machine continuously.

A further object is to provide a machine which will separate wheat, oats, rye, barley or other grains from each other and deliver the separated grains to separate discharge spouts.

A still further object is to provide magnetic means for removing particles of iron from the grain.

A still further object is to provide a machine in which the vibration of the machine in operation is reduced to a minimum, and the necessity of bracing a building to stand the vibration of machines as ordinarily constructed is obviated.

With the above, and other incidental, objects in view, the invention consists of the devices and parts, or their equivalents, as hereinafter set forth and claimed.

In the accompanying drawings, Figure 1 is a side view, parts being broken away, of the complete device; Fig. 2 is an end view, parts broken away; Fig. 3 is a fragmentary view of one of the drums and the rods contained therein; and Fig. 4 is a detail of one of the eccentrics.

In the drawings like reference numerals refer to like parts in the several views.

The numeral 5 indicates the frame of the machine which may be of any ordinary construction but preferably constructed of two rectangular side members 6, 6 connected together at their ends by cross pieces 7, 7. Located centrally between the two rectangular side members 6, 6 is a fan casing 8 and within said casing is operatively dis-

posed an exhaust fan 9, the fan being connected to and rotated by a shaft 10 extending across and above the rectangular side members 6, 6. Said shaft has its bearings in blocks 11 located on top of said side members.

Exhaust passageways 12, 12 are disposed on each side of the fan casing and between the rectangular side members. These passageways are formed within a suitable casing of wood or other material and extend upwardly and rearwardly (toward the left, looking at Fig. 1) to the rear ends of the side members. In communication therewith and depending from said casing forming the exhaust passageways are two open ended cylinders 13, 13. These cylinders form a continuation of the exhaust passageways 12.

Within each cylinder and connected thereto is a ring 14 of less diameter than the inside diameter of the cylinders, and depending from each ring is a series of short vertical rods 15 spaced closely together and forming a wall of vertical rods about one-third the length of the cylinders, connected together at their upper ends to the ring 14 but free at their lower ends. The lower ends of the rods are left free in order to present the least possible obstruction in the path of the suction, and to prevent the clogging up of the spaces between the rods by the falling grain. These rods are made of magnetic iron and serve as permanent magnets to attract and hold particles of iron which may be in the grain being cleaned.

A grain inlet pipe 16 extends through the rear wall of the casing of the exhaust passageways and is provided with branch pipes 17, 17 extending centrally within the cylinders within a short distance of their lower ends. These branch pipes 17 are provided with surrounding pipes or jackets 18 of larger diameter and extend into the cylinder the same distance as the branch pipes, and the lower ends of said jacket pipes are closed and joined to the branch pipes by means of flat rings 19, 19.

Extending through each branch pipe 17 is a vertical shaft 20 provided with a step bearing 21 connected to the cylinder by rods and nuts 22, 22. A concavo-convex disk 23 is connected to each shaft 20 a short distance below the lower ends of the tubes 17 and 18 and is adapted to throw by centrifugal force grain discharged thereupon against

the vertical rods 15 so as to thoroughly separate the chaff and foreign matter from the grain. The shafts 20 and disks 23 are rotated by means of the horizontally disposed shaft 24 on top of the exhaust casing provided with bevel gears 25, 25 in mesh with bevel gears 26, 26 on the upper ends of the vertical shafts 20. The shaft 24 has a pulley 27 on one end and is rotated by a belt 28 running on said pulley and a pulley 29 on the fan shaft 10.

A shaft 30 disposed beneath the fan 9 is provided with a spiral conveyer 31 located within a hopper shaped downward extension 32 of the exhaust passageways and is adapted to discharge from one side of the casing, the heavier particles of foreign matter which have been drawn into the exhaust passageways by the suction or vacuum created by the fan and settled in said hopper. The conveyer is rotated by a belt 33 running on a belt wheel 34 on the shaft 30 and on a pulley 35 on the fan shaft 10.

The exhaust passageways are provided with suitable gates 36, 36 for controlling the suction in each passageway.

Suspended from the main frame 5 by means of links 37, 37 are two inclined vibrating frames 38 and 39 provided with screens 40, 40 with meshes of different sizes, the finer ones being beneath the coarser ones and are adapted to separate different kinds of grains. A rock shaft 41 extends across from one side of the main frame to the other between the vibrating frames and has its bearing in brackets 42 connected to the main frame. Two double cranked arms 43, 43 are connected to the rock shaft and the cranked portions are pivotally connected to the vibrating frames 38 and 39 and are adapted to vibrate or swing said frames back and forth on their links 37, 37 and work the grain down the inclined screens to separate and finally discharge the same through the respective discharge openings provided therefor at the lower ends of the vibrating frames. The coarser grain is discharged through side spouted openings 44, 44 from the screens and the finer grain discharged from the bottom and open ends 45 of the vibrating frames into the passageway 46 extending across the front end (looking toward the right of Fig. 1.) of the machine, and from this passageway the fine grain may be spouted into bins or taken care of in any manner desired. The upper end of the upper vibrating frame is provided with a hopper 47, the forward edge of which extends to a position immediately beneath the center of the cylinders 13 so that substantially one-half of the grain discharged from the cylinders will drop into this hopper and be directed into the lower vibrating frame. The screens and the bottom of the upper vibrating frame only extend as far as the side wall of the hopper of

said frame so as not to obstruct the passage of said grain into the lower frame.

The passageway 46 at the forward end of the machine extends upwardly and is in communication with the exhaust passageways 12 so that if any chaff or light particles of foreign matter still remain in the grain it will be again subjected to the suction from the exhaust fan and drawn into and discharged from the exhaust fan casing. This passageway is also controlled by the gates 36.

The fan shaft on each side of the fan is provided with an eccentric 48 and collar 49 and depending from said collars are connecting rods 50 which at their lower ends are pivotally connected to arms 51 extending laterally from the double cranked arms 43. The eccentrics being revolved by the fan shaft will reciprocate the connecting rods 50 and they in turn will rock the double cranked arms 43 and vibrate or swing the frames 38 and 39 and as the movement of the frames in swinging is in opposite directions in relation to each other the vibration imparted to the frame and building containing the same is practically *nil*. A belt wheel 52 is connected to one end of the fan shaft for belt connection with driving means.

In operation grain is fed into the inlet opening and by means of the branch pipes is dropped onto the rapidly revolving disks where it is thrown off centrifugally, and against the vertical magnetic rods within the cylinders which tend to separate the chaff and foreign particles from the kernels of grain. The grain in passing from the disks to the rods is subjected to a suction created by the fan of sufficient strength to draw the lighter chaff from the heavier grain into the fan casing and discharge the same from the fan outlet. Some of the heavier particles will drop into the hopper above the spiral conveyer beneath said fan casing where it will be discharged therefrom by means of the spiral conveyer.

Particles of iron which may have accidentally fallen into the grain will be attracted and held by the magnetic rods and removed when the machine is cleaned. After the grain strikes the magnetic rods it will fall onto the vibrating frames below, one-half going onto the upper screen of the upper frame, and the other half will fall into the hopper on the end of the upper frame and from the hopper it will fall onto the upper screen of the lower frame. The vibration of these frames will cause the grain to work down the inclined screens toward the bottom, and in passing over the screens the smaller kernels of grain will fall through the coarser mesh of the top screens onto the finer screens below and the separated grains are finally discharged at the side spouted opening of the frames or at the open ends of said frames. The grain which

is discharged at the open ends of the frames will fall into the passageway at the front end of the machine and be again subjected to a suction from the fan so as to thoroughly clean the same.

It is obvious that screens with meshes of different sizes may be used to separate wheat from oats, or grains varying in size or weight may be separated from each other by this means or by subjecting the mixed mass to a suction which will draw up the lighter grain from the heavier.

From the foregoing description it will be seen that grain may be quickly and thoroughly cleaned of all chaff and foreign particles in passing through the machine, and grain of different size and weight may also be separated and discharged independently.

What I claim as my invention is:

1. A grain cleaner and separator, comprising a disk, vertical rods surrounding said disk and extending above and below the horizontal plane thereof and connected only at the top, means for feeding grain to the disk, means for revolving said disk to discharge the grain therefrom centrifugally and throw the grain against the vertical rods, and pneumatic means for separating the chaff and light particles from the grain being discharged from said disk.

2. A grain cleaner and separator, comprising a cylinder, a disk within said cylinder, vertical rods surrounding said disk and extending above and below the horizontal plane thereof and connected only at the top, a tube above said disk, means for feeding grain to the disk through said tube, means for revolving said disk to discharge the grain therefrom centrifugally and throw said grain against the vertical rods, and pneumatic means for separating the chaff and light particles from the grain being discharged from the said disk.

3. A grain cleaner and separator, comprising a cylinder, vertical rods having free lower ends within said cylinder, a disk within said cylinder, means for feeding grain to the disk, means for revolving said disk to discharge the grain therefrom centrifugally, means for pneumatically separating the chaff and light particles from the grain being discharged from said disk, frames provided with screens suspended below said cylinder, said frames provided with discharge openings, and means for vibrating said frames.

4. A grain cleaner and separator, comprising a cylinder, a disk within said cylinder, vertical rods surrounding said disk and extending above and below the horizontal plane thereof and having free lower ends, means for feeding grain to the disk, means for revolving said disk to discharge the grain therefrom centrifugally, means for

pneumatically separating the chaff and light particles from the grain being discharged from said disk, frames provided with screens suspended below said cylinder and each frame positioned to receive a portion of the grain discharged from said cylinder, said frames provided with discharge openings, and means for vibrating said frames in opposite directions with relation to each other.

5. A grain cleaner and separator, comprising a main frame, cylinders mounted in said frame, a disk within each cylinder, a shaft connected to each disk, a tube surrounding each shaft, means for feeding grain to each disk through each tube, a gear on each shaft, another shaft provided with gears in mesh with the gears first mentioned, means for rotating the last mentioned shaft to revolve the disks to discharge the grain therefrom centrifugally, a suction fan connected to said main frame, passageways connecting the fan to the cylinders whereby the chaff and light particles are separated from the grain being discharged from the disks, inclined frames provided with screens suspended below said cylinders, links to which said frames are suspended, said frames provided with discharge openings, a passageway adjacent to said discharge openings and in communication with the exhaust fan, crank connections between the frames and a shaft, eccentrics on a shaft connected to the exhaust fan, and connections between the eccentrics and the crank connections adapted to rock the shaft provided with the crank connections and vibrate the frames in opposite directions with relation to each other.

6. A grain cleaner and separator, comprising a main frame, cylinders mounted in said frame, a disk within each cylinder, a shaft connected to each disk, a tube surrounding each shaft, means for feeding grain to each disk through each tube, a gear on each shaft, another shaft provided with gears in mesh with the gears first mentioned, means for rotating the last mentioned shaft to revolve the disks to discharge the grain therefrom centrifugally, a suction fan connected to said main frame, passageways connecting the fan to the cylinders whereby the chaff and light particles are separated from the grain being discharged from the disks, a hopper depending from said passageways and provided with means for removing particles falling therein, inclined frames provided with screens suspended below said cylinders, links to which said frames are suspended, said frames provided with discharge openings, a passageway adjacent to said discharge openings and in communication with the exhaust fan, crank connections between the frames and a shaft, eccentrics on a shaft connected to the exhaust fan, and connections between the eccentrics and the crank connections adapted to rock the shaft pro-

vided with the crank connections and vibrate the frames in opposite directions with relation to each other.

7. A grain cleaner and separator, comprising a main frame, cylinders mounted in said frame, magnetic rods within said cylinders, a disk within each cylinder, a shaft connected to each disk, a tube surrounding each shaft, means for feeding grain to each disk through each tube, a gear on each shaft, another shaft provided with gears in mesh with the gears first mentioned, means for rotating the last mentioned shaft to revolve the disks to discharge the grain therefrom centrifugally, a suction fan connected to said main frame, passageways connecting the fan to the cylinders whereby the chaff and light particles are separated from the grain being discharged from the disks, inclined frames provided with screens suspended below said cylinders, links to which said frames are suspended, said frames provided with discharge openings, a passageway adjacent to said discharge openings and in communication with the exhaust fan, crank connections between the frames and a shaft, eccentrics on a shaft connected to the exhaust fan, and connections between the eccentrics and the crank connections adapted to rock the shaft provided with the crank connections and vibrate the frames in opposite directions with relation to each other.

8. A grain cleaner and separator, comprising a cylinder, a disk within said cylinder, means for feeding grain to the disk, means for revolving said disk to discharge the grain therefrom centrifugally, means for pneumatically separating the chaff and light particles from the grain being discharged from said disk, inclined frames provided with screens suspended below said cylinder, a hopper provided at the upper end of the upper frame and adapted to feed

substantially one half of the grain discharged from the cylinder to the lower frame, links to which said frames are suspended, said frames provided with discharge openings, a passageway adjacent to said discharge openings and in communication with the said pneumatic means, crank connections between the frames and a shaft, eccentrics on another shaft, and a connection between the crank connections and the eccentrics adapted to rock the shaft provided with the crank connections and vibrate the frames in opposite directions with relation to each other.

9. A grain cleaner and separator, comprising a cylinder, a disk within said cylinder, means for feeding grain to the disk, means for revolving said disk to discharge the grain therefrom centrifugally, means for pneumatically separating the chaff and light particles from the grain being discharged from said disk, inclined frames provided with screens suspended below said cylinder, links to which said frames are suspended, said frames provided with discharge openings adapted to discharge the separated grain through different openings, a passageway adjacent to said discharge openings and in communication with the said pneumatic means, crank connections between the frames and a shaft, eccentrics on another shaft, and a connection between the crank connections and the eccentrics adapted to rock the shaft provided with the crank connections and vibrate the frames in opposite directions with relation to each other.

In testimony whereof, I affix my signature, in presence of two witnesses.

FRED GROTENRATH.

Witnesses:

ANNA F. SCHMIDTBAUER,
L. G. THEURER.