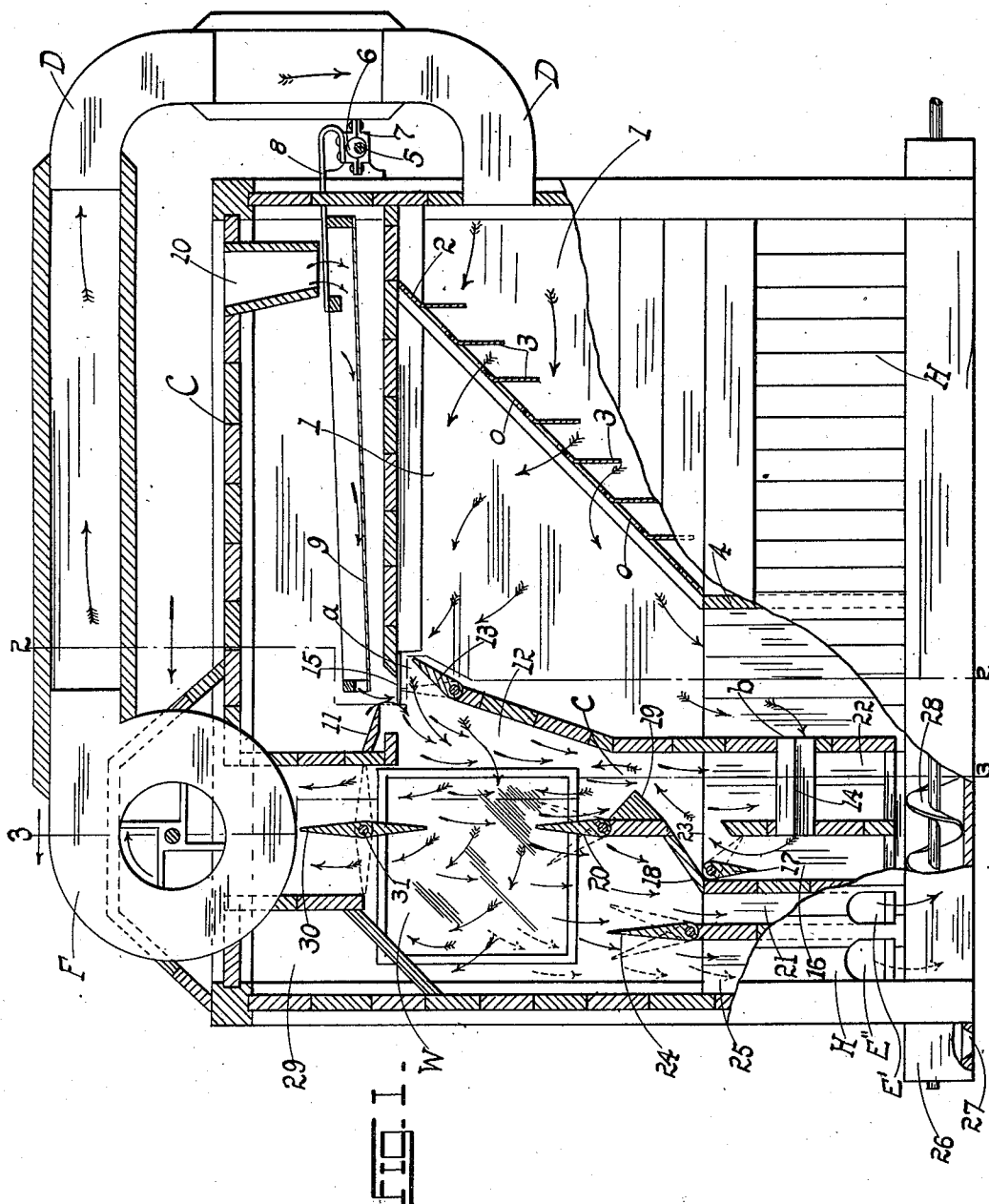


1,018,997.

2 SHEETS—SHEET 1.



WITNESSES:

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A. M. Powell

INVENTOR.

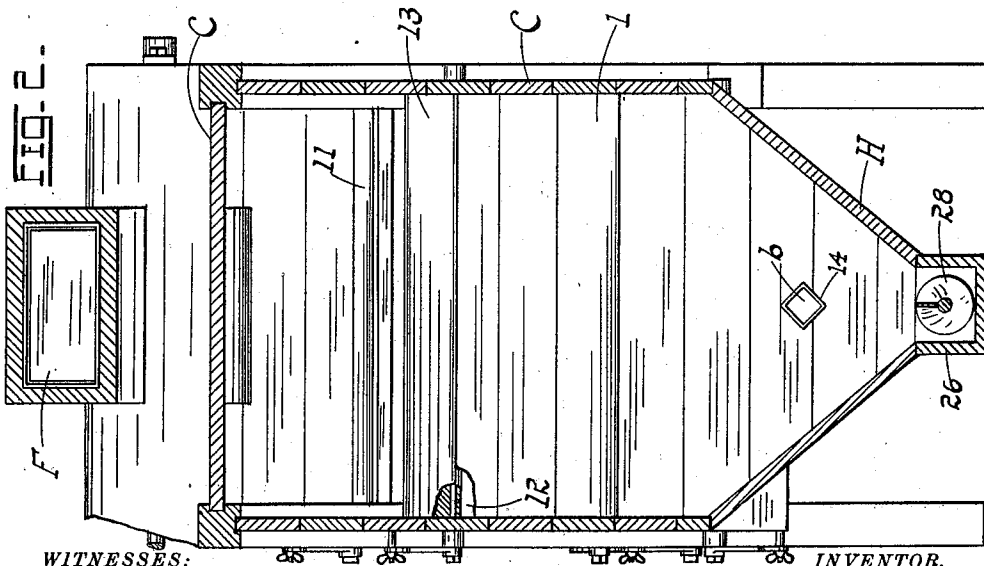
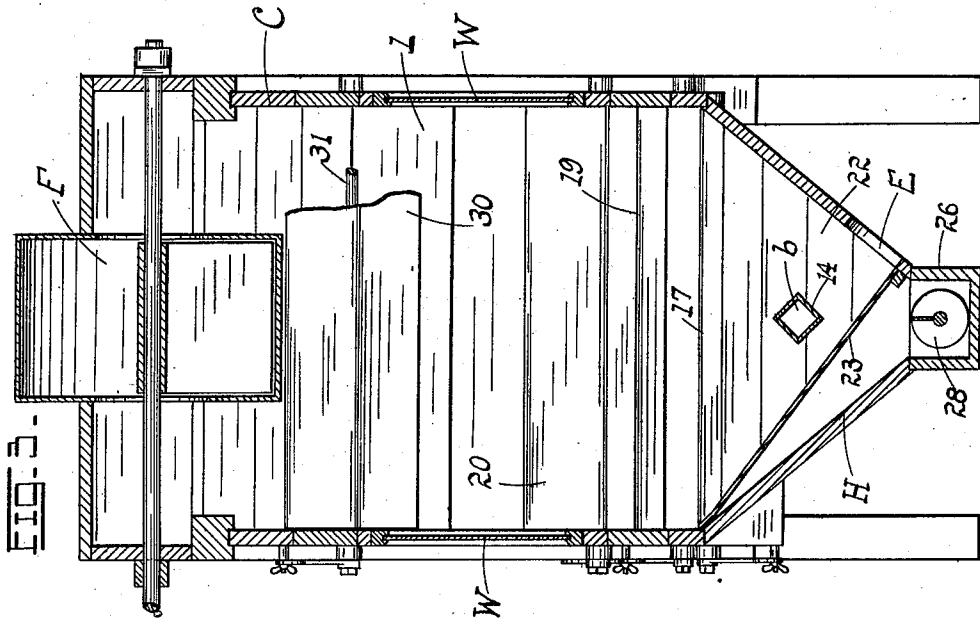
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APPLICATION FILED AUG. 21, 1911.

1,018,997.

Patented Feb. 27, 1912.

2 SHEETS—SHEET 2.



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GRAIN-SEPARATOR.

1,018,997.

Specification of Letters Patent.

Patented Feb. 27, 1912.

Application filed August 21, 1911. Serial No. 645,206.

To all whom it may concern:

Be it known that I, CARL G. THOMPSON, citizen of the United States, residing at Louisville, in the county of Jefferson and State of Kentucky, have invented certain new and useful Improvements in Grain-Separators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part hereof.

My invention has relation to improvements in grain-separators; and it consists in the novel details of construction more fully set forth in the specification and pointed out in the claims.

In the drawings, Figure 1 is a middle vertical longitudinal section of the separator; Fig. 2 is a transverse vertical section on the line 2—2 of Fig. 1; and Fig. 3 is a transverse vertical section on the line 3—3 of Fig. 1.

The object of my invention is to construct a grain separator eminently adapted for the cleaning of wheat in which air currents and gravity conjointly serve to rid the wheat grains of foreign matter such as wild oats, garlic and chaff of every description, the specific gravity and relative weights of the various materials and the specific proportion of the air currents entering as elements in determining the effectiveness of the apparatus and the process identified therewith.

The advantages of the invention will be best apparent from a detailed description thereof which is as follows: Referring to the drawings, C, represents the casing of the separator, F, the casing of the air circulating fan or blower from which leads a conduit D discharging the air through the front wall of the casing C into the front compartment of an air chamber 1, said chamber having disposed diagonally across the same the perforated sheet metal plate 2 in which are punched openings O, the tongues 3 left as a result of the punching operation being bent outwardly and thus serve as deflectors for the air currents which pass through the opening O into the rear compartment of said air chamber. The lower edge of the plate 2 terminates at the upper edge of the partition wall 4 as shown. Mounted across the front wall of the separator casing is a shaft 5 provided with eccentrics 6, the eccentric blocks

or straps 7 of which have secured to them the outer resilient ends of the links 8 coupled to the screen or shaker 9 into which the grain is discharged through a spout or chute 10, reciprocation being imparted to the screen by the action of the eccentrics, whereby the grain is constantly advanced rearwardly along the screen and finally drops from the rear edge of the screen on an inclined shelf 11. The features described are well known in the art and are therefore shown more or less conventionally, and are not claimed.

Rearward of the chamber 1 is a compartment or chamber 12 wherein the separation of the clean stock from the heavy foreign matter, and of the light material from the heavy, takes place, the conditions within said chamber being observed through the glass windows W in the sides of the separator casing. The rear compartment of the chamber 1 is provided with two discharge openings, one *a*, at the top controlled by an oscillating wing or valve, 13, and the other, *b* discharging into a horizontal duct or pipe 14, the spindle of the valve 13, being rotated from a point outside of the casing as well understood in the art. The roof of the rear compartment 1 is provided with a projecting ledge 15 which extends beyond the valve 13 when the latter is vertical or wholly closed, said ledge serving as a deflector for the air currents which pass by the valve when the latter is depressed to open position (dotted position in Fig. 1), this deflection in a measure preventing the upward expansion of the air after it leaves the comparatively constricted passage *a* and enters the more spacious chamber 12. The pipe 14 discharges into a vertical passage 16 whose exit is controlled by a hinged valve 17, the wall 18 of the passage 16 above the valve-spindle inclining upwardly and forwardly and thus forming a deflector for the ascending air current.

At the upper end of the wall 18 is a wedge or block 19 one face of which forms a continuation of the wall 18, the wedge forming a constriction *c* at a suitable point below the passage *a*. The outlet from the constriction is in a measure controlled by an upwardly pointing oscillating valve 20 serving as a skimmer or feather by which the clean stock is effectively separated from the coarse im-

purities, the latter being precipitated into the compartment 21 on one side of the chamber 16, the clean stock dropping into the compartment 22 on the opposite side of said chamber 16, said compartments 21, 22 being located in the bottom hopper-shaped base H of the separator. The compartment 22 has a discharge opening E to which the stock is directed by the inclined plate 23 as best shown in Fig. 3. The compartment 21 is provided with a similar discharge E'. The rear wall of the compartment 21 is provided with a similar skimmer 24 which segregates the lightest and practically worthless impurities from the coarse impurities said light impurities being deposited in the last compartment 25 which is likewise provided with a discharge opening E''. The dust and sand from the air and screen is precipitated and settles in the bottom central trough 26 whence it is advanced toward the discharge opening 27 by a screw or equivalent conveyer 28. Between the dead-air chamber 29 and the top of the rear wall casing, below the fan or blower, and above the passage *a* is a butterfly-valve 30 comprising a pair of blades radiating from a central rotatable spindle 31 (operated from the outside of the casing by any suitable means), which regulates and controls the current drawn back into the fan casing, it being understood that the same air circulates through the apparatus, this air being wholly within the casing. The fan may of course be driven by any suitable means and from any suitable source (not shown).

The operation of the separator may be described as follows. The arrows in Fig. 1 represent the course taken by the grain, and air currents, the grain dropping from the rear edge of the screen or shaker. The air discharged from the conduit D into the forward compartment of the chamber 1 suddenly expands, thereby dropping suspended impurities into the trough 26. The air then is forced through the openings *o* of the plate 2 increasing in velocity in traversing said openings and then expands again in the rear compartment of said chamber 1, again dropping its suspended impurities. The expansion in the rear compartment places the air in a condition of quiescence, yet leaving it under pressure and tension, so that as the valve 13 is swung open the air rushes as a horizontal sheet through the passage *a* into the chamber 12 where it again expands, the lateral rearward travel of this sheet coupled with its expansion it undergoes when it enters the chamber 12 causing the grain precipitated from the ledge or deflector 15 to assume a flaring downward spray (see arrows) the ledge 15 preventing expansion of the air in an upward direction until the current has well entered the chamber 12. By this time however it will have rid itself of

the suspended grain and be in a comparatively clean condition to be sucked into the fan casing. The lateral action of the air sheet in its passage through the opening *a* in a measure dislodges the lighter impurities from the heavy stock (wheat) allowing the latter to be practically precipitated vertically into and through the constricted passage *c* into the clean stock compartment 22. To prevent this clean stock (which is the heaviest and of the greater specific gravity) from falling too rapidly and to insure the certain dislodgment therefrom of all accompanying lighter impurities, advantage is taken of the increased velocity assumed by the upward air current in passing the constriction *c*, this current being the portion emanating from the bottom of the rear compartment of the chamber 1 and traversing the pipe 14, and passage 16. Its control and regulation is accomplished by the valve 17 as already explained. The expansion of the rising current after it leaves the constriction *c* assists the horizontal sheet of air referred to, in dislodging or separating the impurities from the stock, the latter being retarded in its descent (to allow the expanding air to do its work) by the increased velocity of the current at the constriction *c*. Thus the constriction not only imparts a high velocity to the rising current to permit the latter to temporarily suspend or retard the drop of the heavy stock, but brings about a subsequent expansion which assists the horizontal air sheet in its work, the two currents thus acting jointly in the separating process. The precipitating grains encounter the skimmers 20, 24, which are properly adjusted, said skimmers (or feathers) properly directing the heavier and lighter impurities into their respective compartments 21 and 25 as explained. The air returned to the fan is regulated by the valve 30, the blades whereof not only control the rapidity of flow of the current into the fan casing, but in a measure deflect any particles of dust or grain which would have a tendency to rise. The usual impurities are wild oats, garlic, chaff and the like. The coarse impurities usually have stray grains of wheat or fractions of grains and are subsequently purified by any methods known to the art. The fine impurities are as a rule entirely devoid of stock material.

It may be stated in passing that the resultant of the horizontal air sheet and vertical current is in a path oblique to both currents, said oblique resultant effectively removing the impurities associated with the heavy stock.

The separator is not necessarily limited to treating "grain."

In the drawing (Fig. 1) the feathered arrows represent the air; the solid arrows with thickened end portions represent the

grain; the plain arrows represent the coarse impurities; and the dotted arrows represent the light impurities.

Having described my invention what I claim is:

1. A grain separator provided with an air chamber containing air under pressure, said chamber having at one end at the top thereof a valve-controlled opening for discharging a horizontal sheet of air, a ledge projecting beyond said opening and serving as a deflector for the air sheet, and for discharging the grain, a pipe leading from a point above the bottom of the chamber, and an air compartment into which said pipe discharges spaced from the chamber aforesaid, an upper extension leading from said compartment and provided with a constriction at a point above the pipe, the space below the constriction serving as a receiving compartment for the cleansed grain, the air from the air compartment aforesaid rising upwardly through the constriction against the falling grain, a common chamber for receiving the combined air discharges, a blower, a valve for controlling the drafting of the air from said last named chamber into the blower casing, and means for returning the air into the first mentioned chamber.

2. A grain separator provided with a chamber containing air under pressure and

in a state of quiescence, said chamber having at the rear upper corner an opening for the discharge of a horizontal sheet of air, an oscillating valve for controlling the discharge of the air through said opening, a ledge projecting beyond the valve when the latter has been swung to closed position, means for precipitating the grain over said ledge across the path of the horizontal air sheet, a conduit leading from a point above the bottom of the air chamber, a vertical valve-controlled passage into which said conduit discharges, a constriction in said passage being formed at a point above the valve and below the ledge aforesaid, a grain compartment communicating with said constriction, said conduit spanning said compartment, a skimmer above the constriction aforesaid for separating the impurities from the stock, a common chamber into which the combined vertical and horizontal air currents discharge, a blower, a valve for controlling the flow of the cleansed air into the casing of the blower, and a conduit for returning the air to the first mentioned air chamber, substantially as set forth.

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

CARL G. THOMPSON.

Witnesses:

EMIL STAREK,
A. W. POWELL.