No. 749,366. PATENTED JAN. 12, 1904.

E. R. DRAVER.

GRAIN CLEANER AND SEPARATOR.

APPLICATION FILED JUNE 25, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.

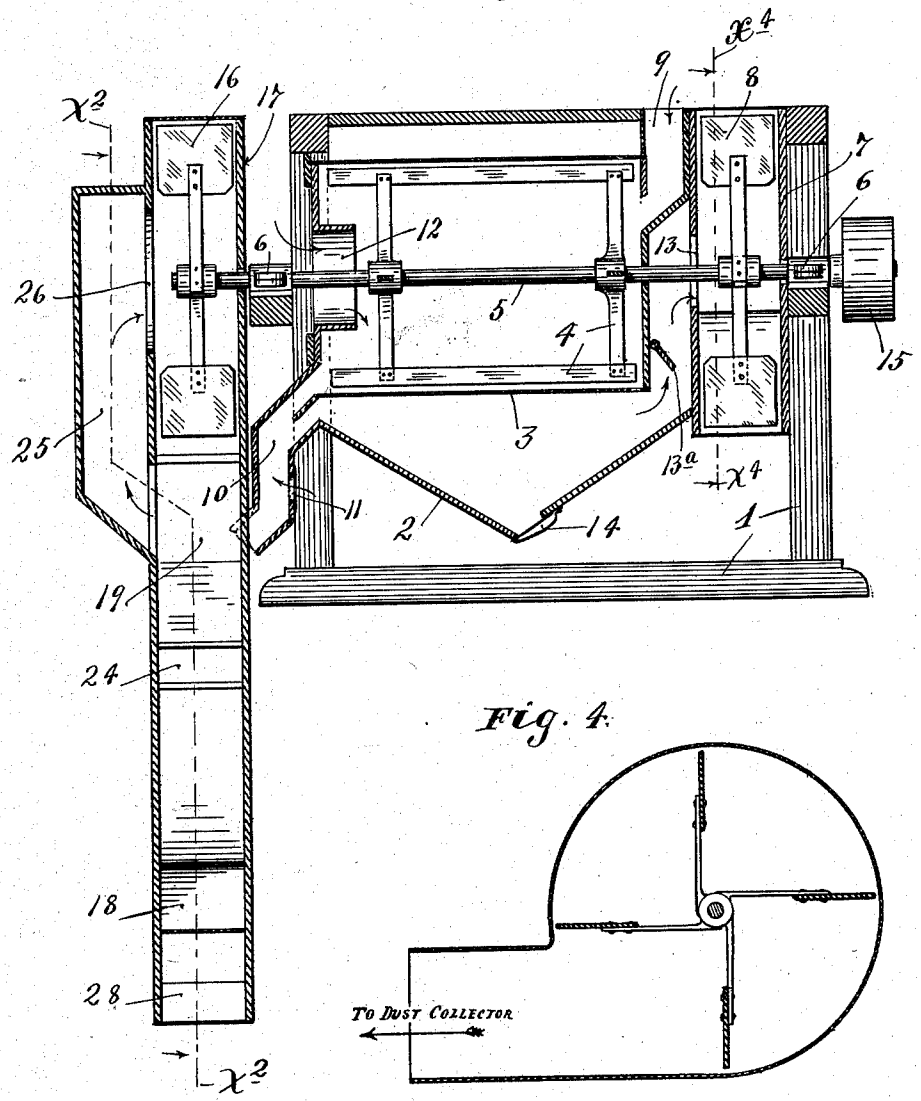

Fig. 4.

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NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

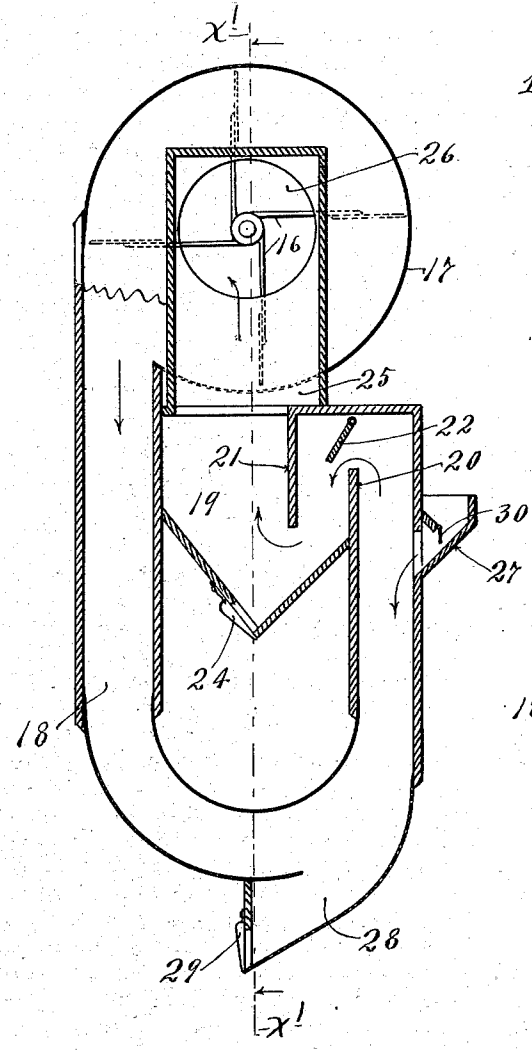
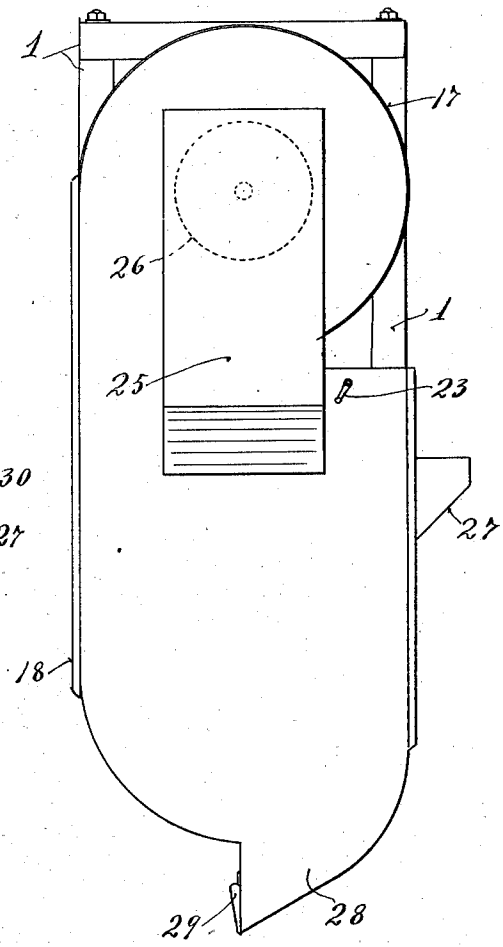


Fig. 3.



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UNITED STATES PATENT OFFICE.

EMIL R. DRAVER, OF RICHMOND, INDIANA.

GRAIN CLEANER AND SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 749,366, dated January 12, 1904.

Application filed June 25, 1903. Serial No. 162,977. (No model.)

To all whom it may concern:

Be it known that I, EMIL R. DRAVER, a citizen of the United States, residing at Richmond, in the county of Wayne and State of Indiana, have invented certain new and useful Improvements in Grain Cleaners and Separators; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to what I term a "combined grain cleaner and separator," and has for its object to improve this class of machines in the several particulars hereinafter noted.

To the above ends the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

The invention is illustrated in the accompanying drawings, wherein like characters indicate like parts throughout the several views.

Figure 1 is a vertical section taken through a complete machine embodying my invention on the line $x' x'$ of Fig. 2. Fig. 2 is a transverse vertical section taken on the irregular line $x^2 x^2$ of Fig. 1. Fig. 3 is a side elevation looking at the machine from the left toward the right with respect to Fig. 1, and Fig. 4 is a transverse vertical section taken on the line $x^4 x^4$ of Fig. 1.

In practice I have found that screenings and broken grain can be removed from the pure grain with facility in an endless air-trunk separator of comparatively small size, considering its capacity, provided, however, that all of the light dust, fuzz, and dirt be removed from the grain before it enters the endless air-trunk separator, in which the final separation takes place. A rapid movement of the air in such an endless air-trunk separator is required in order to separate the screenings and broken grain from the pure grain, and such a rapid movement of the air would not allow dust and light materials to settle in case they were introduced with the screenings and pure grain into this endless air-trunk separator. Hence the obvious necessity of effecting a preliminary separation of the lighter materials from the pure grain or stock. In order that the lighter particles, such as the fuzz of the grain, may be removed before the grain enters the endless air-trunk separator, it is necessary that the same be scoured in order to loosen up these fuzzy particles. In my present machine I overcome all these difficulties.

The machine illustrated may be treated as made up of primary and secondary sections and of which the primary section of the machine involves a scourer and a fan for coöperation therewith to remove the fuzz and light particles from the grain or stock, as above indicated. The best form of the scourer is a perforate cylinder and coöperating internal beater or rotary brush.

The so-called "secondary" section of the machine involves an endless air-trunk and a fan for producing a continuous belt or circulation of air therethrough and which fan is independent of the fan of the so-called "primary" section of the machine in that it does not act upon the same blast or belt of air.

Directing attention first to the so-called "primary" section of the machine, the numeral 1 indicates a rectangular skeleton frame shown as formed of timbers. The numeral 2 indicates a case which is riddidly secured to the frame 1 and within which is rigidly supported a horizontally-disposed perforate scouring-drum 3. Working within the drum 3 is a rotary brush 4 of reel-like form, the shaft 5 of which projects at both ends and is journaled in suitable bearings 6 on the frame 1. Secured at one end of the case 2 is a fan-case 7, in which works a fan-head 8, rigidly secured on the shaft 5. The grain is delivered into the receiving end of the drum 3 through a spout 9, and from the delivery end of said drum the grain passes through a discharge-spout 10, in one side of which, as shown, is an air-inlet passage 11. In that end of the case 2 which forms an end to the drum 3 is an axial air-inlet passage 12, and in that end of said case which forms one side of the fan-case 7 is a large air-passage or eye 13. The bottom of the case 2 is of hopper-like form and has a discharge-opening which is normally closed by a spring-held hinged door 14. At its right-hand end, with respect to Fig. 1, the shaft 5 is shown as provided with a pulley 15, over which runs a power-driven belt, (not shown,) which will serve to impart rotary motion to

the shaft 5 and the parts carried thereby. In the passage which leads directly to the fan-eye 13 is a valve 13ª for regulating the amount of air which will be drawn by the fan 8.

The so-called "secondary" section of the machine in the present instance involves a fan-head 16, secured on the extreme left-hand end of the shaft 5. This fan-head 16 works within a fan-case 17, which fan-case forms a part of an endless air trunk or passage and which air-trunk further involves as follows: The fan-case 7 at its peripheral portion opens into a depending leg or trunk section 18, which at its lower extremity is curved laterally and then extended vertically upward to a hopper-like chamber 19, for the sake of clearness herein termed the "expansion-chamber." The air in passing from the upturned portion of the leg or trunk 18 is caused to abruptly change its course, first, by a deflecting-partition 20, and then by a depending deflecting-partition 21. This abrupt change in the course of the air-blast causes the precipitation within the chamber 19 of such materials or particles as are carried thereinto by the air-blast. The passage between the upper edge of the partition 20 and the overlying wall of the air-trunk is adapted to be opened and closed, more or less, by means of a pivoted cut-off valve 22, the shaft of which, as shown, projects at one end and is provided with a hand-piece 23, by means of which it may be adjusted and set in different positions. In the bottom of the chamber 19 is a discharge-opening which is normally closed by a spring-pressed hinged door 24. The upper portion of the chamber 19 opens into a laterally-offset trunk-section 25, which in turn opens into the fan-case 17 through an axially-disposed eye 26, as best shown in Fig. 1. The grain from the primary section of the machine is by the discharge-spout 10 thereof delivered into a hopper-like pocket 27, formed at one side of the upturned portion of the trunk-section 18 and opening thereinto, as best shown in Fig. 2. The grain introduced into the air-trunk from the pocket 27 drops into a hopper-like depression 28, formed at the lower portion of the trunk-section 18 and provided with a discharge-opening, which is normally closed by a spring-pressed hinged door 29. The opening from the pocket 27 into the trunk-section 18 may be varied by a pivoted cut-off valve 30, which is preferably gravity-held, so that it will open and close automatically.

Operation: The material to be treated, which we will assume to be wheat, is directed by the spout 9 into the perforated scouring-drum 3, where it is subjected to the action of the brush 4 and to a suction-draft from the fan 8. Under this action the light dust and other foreign matter will be loosened up and drawn off by the said fan. From the drum 3 the wheat passes through the discharge-spout 10 and from thence into the endless trunk of the separator or secondary section of the machine, as already stated. While passing through the spout 10, the wheat is subjected to a light suction-draft, which passes into the said spout through the opening 11 and is drawn to the fan 8. By this draft of air all particles of light dust, chaff, scourings, and other light stuff not removed from the wheat while it was in the scouring-drum 3 will be taken up by the air-draft and drawn to the fan 8 and together with other particles drawn to the said fan will be blown into a dust-collector (not shown) in which air will be filtered through the collecting-cloth and the dust and other particles caught and held by the said cloth. Of course in some instances the fan 8 may be permitted to discharge the dust-laden air into open space. In any event the light and fine particles, which should be separated from the screenings as well as from pure grain, are taken up and carried from the body of the grain or stock before it reaches the endless air-trunk separator. Any particles which may be taken up by the draft from the fan 8 and precipitated into the hopper-like bottom of the case 2 may be removed therefrom by opening the spring-pressed door 14. The wheat, cleared of dust and other light stuff, as already described, but containing, for instance, screenings and broken grain upon passing from the pocket 27 into the return section of the trunk-leg 18 falls through a strong upwardly-moving blast of air from the fan 16 and drops into the depending hopper 28, from whence the pure wheat flows outward in a continuous stream through the opening which is normally closed by the spring-pressed door 29. This upwardly-moving blast of air will take up the screenings and broken particles of grain and carry the same over the deflecting-partition 20 and then under the deflecting-partition 21 and into the so-called "expansion-chamber" 19. As the air makes abrupt changes in its course in passing between the deflecting-partitions 20 21, it causes the screenings and broken grain to be precipitated into the bottom of the expansion-chamber 19, from which it will be drawn off when the spring-pressed door 24 is opened. The purified air is then drawn off back into the fan-case 17 and is again started on its course through the endless air-trunk and is thus made to perform over and over the separating action above described.

From another point of view the invention reduces to a minimum the amount of separating-cloth and the amount of air required to be forced or filtered therethrough in a dust-collector of a given capacity wherein filtering-cloth is employed. Much less power is required to keep up the proper circulation of air in the air-belt separator than would be required to force the same amount of air through separating-cloth. Hence much less power is required to drive a machine of the above char-

acter than would be required to drive a machine of the same capacity wherein the air is all forced through separating-cloth. Furthermore, the separation is more complete.

The machine is especially adapted for use in cleaning and separating grain, but is capable of general use wherever separations of the character above described are required to be effected. It is of course evident that the grain or a body of any other material to be cleaned may be passed successively through several of the so-called "air-belt" or "air-trunk" separators. It is also evident from the foregoing description and statements made that the so-called "primary" sections of the machine may take a great many different forms. The invention is also capable of modifications not herein necessary to designate, but which will suggest themselves to those skilled in the art.

What I claim, and desire to secure by Letters Patent of the United States, is as follows:

1. The combination with the endless air-belt separator equipped with a fan maintaining a continuous circulation of the same body of air therethrough, and which separator is provided with a series of deflecting-surfaces and an expansion-chamber intermediate the stock-inlet and the eye of the fan, of a grain-scourer delivering the scoured grain to said separator and itself equipped with a suction-fan, for eliminating the scourings and the fine dust from the stock before said stock reaches said separator, substantially as described.

2. The combination with the endless air-belt separator equipped with a fan maintaining a continuous circulation of the same body of air therethrough and which separator is provided with a series of deflecting-surfaces and an expansion-chamber intermediate the grain-inlet and the eye of the fan, of a grain-scourer delivering the scoured grain to said separator and itself equipped with a suction-fan and an expansion-chamber for eliminating the scourings and fine dust from the grain before reaching said separator, the scourer being incased and subject to the suction-fan, all for coöperation, substantially as described.

3. In a grain-cleaner, the combination with a suitable casing, of a perforated scouring-shell in said casing, a scouring-beater mounted to rotate within said shell, for coöperation therewith, an open-blast fan for drawing off the scourings and dust through said scouring-shell, an endless air-trunk and a fan inclosed therein, for producing a continuous belt of air, and means for passing the grain through the belt of air in said endless air-trunk after it has been subjected to the scouring action, substantially as described.

4. In a grain-cleaner, the combination of a casing, a perforated scouring-shell in said casing, a scouring-beater mounted to rotate in said shell, an open-blast fan, for drawing off the dust through the meshes of the scouring-case, a fan inclosed in an endless air-trunk, for producing a belt of air therethrough, a settling-chamber in the path of the air-belt, and means for passing the grain through the belt of air in said trunk for further separation after it has been scoured, substantially as described.

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

EMIL R. DRAVER.

Witnesses:
FRED S. BUTLER,
G. LEDMAN SMITH.