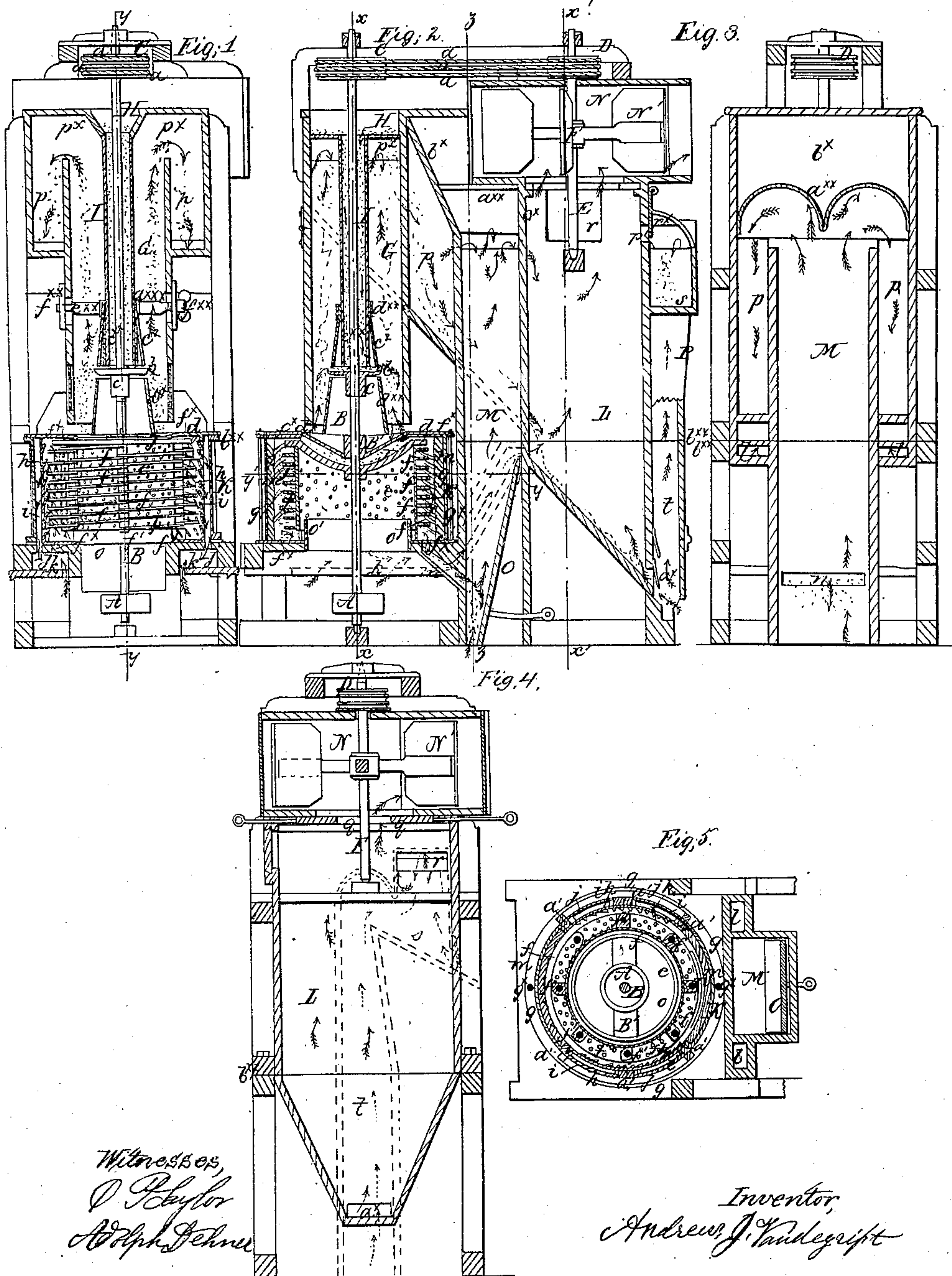


A. J. Vandegrift

Grain Cleaner

No. 29,335.

Patented Jul. 24, 1860.



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GRAIN-SEPARATOR.

Specification of Letters Patent No. 29,335, dated July 24, 1860.

To all whom it may concern:

Be it known that I, ANDREW J. VANDEGRIFT, of St. Louis, in the State of Missouri, have invented a new and improved machine for separating impurities from grain, the same being applicable for hulling certain kinds of grain; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed drawings, making a part of this specification, in which—

Figure 1 is a vertical section of my invention, taken in the line x, x , Fig. 2. Fig. 2 is a vertical section of the same, taken in the line y, y , Fig. 1. Fig. 3 is a vertical section of the same taken in the line z, z , Fig. 2. Fig. 4 is a vertical section of the same taken in the line v', v' , Fig. 2. Fig. 5 is a horizontal section of the same taken in the line y', y' , Fig. 2.

Similar letters of reference indicate corresponding parts in the several figures.

This invention relates to that class of machines for scouring, cleaning and separating grain from impurities, and detaching and separating the hulls therefrom in which the fan is used to produce an exhaust or suction blast. This class of machines, as heretofore constructed are imperfect in many respects; firstly, the scouring devices have been so arranged as to operate in a very inefficient manner, some grains or kernels escaping the action of the scourer, while others would be subjected to an undue action of the same and be broken; secondly, the employment or use of materials, combined or arranged in such a way as to produce bad results, as, for instance, the employment of French bur stone for a scouring surface without the employment of suitable flues to carry off the dust and prevent clogging or choking; thirdly, a defect in the arrangement of air-passages, whereby the blast is made to act in an inefficient manner in passing through the machine; fourthly, due provision not being made for the taking of the machine apart so as to render all parts accessible for the ready repairing and cleansing of the same, and to facilitate transportation.

The object of the within described invention is to obviate these difficulties, by a simple durable and economical machine.

To enable those skilled in the art to fully understand and construct my invention I will proceed to describe it.

A (Figs. 1, 2 and 5) is a pulley which is placed on the lower part of a shaft B, to which motion is given by any convenient power. On the upper end of this shaft B, there is placed a grooved pulley C, from which motion is transmitted to a corresponding grooved pulley D, at the upper end of a fan-shaft E, (shown in Figs. 2 and 4) by three round belts or bands a, a, a , which are shown clearly in Fig. 2. The object of these three bands is to obtain an increase of friction sufficient to prevent slipping—a result which could not be obtained by an ordinary flat belt, owing to the close proximity of the two pulleys C, D. The fan F, of shaft E, may be of usual construction.

G is a flue which is built in with the front part of the body of the machine.

H is a small hopper which is located at the upper end of the flue G, and supports the upper end of feed-tube I, placed within flue G. At the lower end of tube I is a feed-plate b ; said plate being attached to a sleeve or nut c , which forms a coupling in shaft B, the latter being made in two parts.

J is a concave or basin secured upon shaft B, below the mouth or lower end of flue G, and is provided with a horizontal flanch, or rim d , to the under side of which is attached a series of perforated and corrugated plates f , each forming a part of a circle and having their ends lapped, and placed between suitable bearings f'' , with rods f' , passing through them and the flanch d , securing them firmly to said flanch, the plates f , and bearings f'' , being so fitted and arranged as to form a continuous spiral and corrugated ledge in a circle corresponding with flanch d , as shown clearly in Figs. 1 and 2; this spiral ledge being lined with the perforated sheet-iron lining or cylinder e , properly secured in combination with basin J, forms a revolving cylinder. The above described cylinder is encompassed by a cylinder K, which is formed at top and bottom by two semicircular flanches f^* , f^* , of cast-iron, cast with, and fast to each of the lower semicircular flanches f^* , is a hollow longitudinal section g , of a circle which is filled with French bur, or other suitable stone m , the stones occupying positions opposite each other in cylinder K, as shown clearly in Fig. 5.

The top flanches f^* , are fastened to sections g , by bolts g^* . Between the ends of the bottom and top semicircular flanches f^* ,

f^* , are pieces of wood a , standing endwise and secured by bolts running lengthwise through them from the top to the bottom flanch f^* , f^* . To these pieces of wood, and
 5 standing also between said flanches is secured four longitudinal sections h , of a circle; these sections h , are of sheet metal, and are so cut or perforated as to form oblique slots. The sections h , are placed at opposite sides
 10 in cylinder K, and outside of section h , is a loose curb or section g^* , of a circle on each side of cylinder K. These curbs or sections are of sheet iron, and fill the space between the sections g , that contain the stones m , on
 15 each side. These sections g , are provided with a kind of circular wood frame for the purpose of stiffening them. They set in their place loosely, and are designed to be removed by the hand when desired. There
 20 is a space i , between sections h , and g , said space communicating by passages j , with horizontal trunks k , k , at each side of the machine, said trunks communicating at their back ends with inclined spouts l , l , which
 25 lead into the lower part of chamber L. There is a requisite space left between the stone and sections h , and the corrugated ledge of the revolving cylinder e , to allow the cylinder e , to revolve without touching
 30 said stone and sections h ; the bearings f'' , are set a little back from the edges of the perforated and corrugated plates f'' , and answer the double purpose of holding the plates at the proper distance apart, and an-
 35 swering at the same time, as beaters knocking the grain out against the perforated sheet-iron sections h , and the stone m ; the grain is carried down by the spiral in due time and discharged through chute n , which
 40 leads from the bottom of the scouring apparatus into the lower part of flue M.

The inside of revolving cylinder e , communicates with the external air by means of an opening o , which is surrounded by
 45 a sheet-iron curb o' , which extends a few inches up in the cylinder for the purpose of preventing the grain from flying out under the bottom of cylinder e , and falling down through opening o .

50 When the machine is in motion the rotation of the cylinder e , causes a current of air to pass up through opening o , and be ejected through the perforations in the lining of cylinder e , and coming in contact with
 55 the grain in process of scouring, forces the dust and other light impurities out through the perforations in the sheet iron sections h , into the space i , where it is acted upon by the suction current drawn by the fan
 60 through trunks k , k , on each side of the machine and is carried through said trunks into chamber L.

65 B' is a bridgetree or rest to shaft B, located just above concave J. Its ends rest on and are bolted firmly to the top semicir-

cular flanches f^* . By unscrewing the bolts that hold the said bridgetree, making it loose from the flanches, and moving the loose curbs g^* , at the sides and unscrewing the bolts that secure the lower flanch f^* , to the
 70 side pieces of the frame, the front half of cylinder K, can be lifted off and then by turning the back half around in front it can also be lifted off making it easy to renew the sheet-iron sections h , or dress the stones m ,
 75 m , without disturbing the rest of the machine.

Hopper H, answers the double purpose of hopper and deflector for the purpose of dividing the uprising current of air into two
 80 parts, and throwing half of the current on each side through openings into side passages or ducts p , p , thereby preventing an eddy on either side of tube I, in flue G; flue M, has a similar deflector a^{**} , in its upper
 85 end made of sheet-iron or other material it also throws one-half of the uprising current of air to each side into side passages or ducts p , p , which connect with chamber L, below the fan box.
 90

The tube I, is constructed with a slip joint c^{**} , at its lower end, which is immediately above the feed plate B, and it is provided with a conical shell c^2 , the lower end of which has an area equal to plate b , and below
 95 plate b , and concentric with shaft B, there is a similar shell d^{**} . The object of these shells is to contract the space at the lower end of flue G, and give greater strength to the draft at that point. The slip joint
 100 c^{**} , is held in proper position, and adjusted as desired by means of a cross bar e^{**} , which passes horizontally through flue G, and has thumb nuts on its ends outside of said flue. As bar e^{**} , is adjusted up, or down, or lat-
 105 erally the lower end of tube I, is correspondingly adjusted, said bar being properly attached to the slip joint of said tube.

The side passages p , p , are spaces left on each side of flues G, and M, between the
 110 upper ends of flues G and M, to the main chamber L, which is situated immediately under the fan-box containing the fan; this chamber L, has an area equal to that of all of the flues together, and receives the air
 115 from all of them.

Flue M, is located back of flue G, and the scouring apparatus and between flue G, and the chamber L. Flue M, receives the grain
 120 from the scouring apparatus, at its bottom part. The lower part of flue M, is provided with a flap O, which may be adjusted so as to regulate the area of the lower orifice of said flue, and control the strength of the suction draft therein as may be desired—
 125 see Fig. 2.

Flue P is located at the back part of the body of the machine, and is outside of the shell of the main body of the machine, being
 130 built firmly to the same; this flue P, is for

the purpose of cleaning the offal after having been thrown from the first flues G, and M, into chamber L, the said offal passing down on the inclined floor of chamber L, and out through valve a^* , into flue P, where it is operated upon by the suction draft passing up through said flue. The flue P, is connected, at the top or upper end, with chamber L, by means of an opening r' , which is provided with a slide r^* , for the purpose of regulating the strength of the draft in flue P, as desired. Flue P, is also provided with a short turn at its upper part, and a pocket for the reception of the offal drawn up by the draft through said flue, which pocket is provided with a valve to allow the offal to pass off through a spout attached.

The fan case N, is made to communicate with chamber L, by means of an opening in the lower part of said fan case; this opening is provided with two dampers, as slides q, q , (see Fig. 4) which are located immediately under the fan-case or box, and are adjusted by means of two wires extending out through the side, one being on each side of the machine. As these slides are adjusted the draft through the entire machine is proportionately strengthened or weakened. There are two partitions or cross boards b^*, c^* , each resting on the top of flue M; b^* is inclined toward flue G, and prevents the uprushing current of air in flue G, from counteracting the current in flue M, and throws the current downward toward the inclined floor of side passages p, p . Partition c^* , rests on the opposite side from b , of flue M, and forms a support for the fan case, and prevents the current of air rushing up through flue M, from passing directly into the fan-case N. Both partitions b^*, c^* , extend entirely across the body of the machine and are firmly attached to the sides.

All of the flues have their respective communications with chamber L, which has its connection with the fan-case N. The rotation of the fan N, forms a partial vacuum in chamber L, to supply which the air rushes in through all of the flues which communicate with the external air at their lower ends the strength of the draft being regulated by the dampers and slides previously described.

All the bearings or supports of shafts B, and E, are suspended or supported by iron bridgetrees away from the wood to prevent danger of fire from the heating of journals, should they be allowed to run too long without oil.

The framing of the implement, or body of the machine which sustains the flues, etc., is made in two parts, and the flue P, chamber L, and flue M, are also divided in the same plane as indicated by the line b^{**} . This division is important as it admits of the removal of the upper part of the machine

from the lower part, and renders all parts of the device accessible for cleaning, repairing, etc. It is in order to admit of this removal of the upper part of the machine that the shaft B, is made in two parts connected by the sleeve c , as previously described.

The scouring apparatus may be used independently of the suction flues for the purpose of hulling buckwheat and other kinds of grain.

The operation of the machine is as follows: Motion is given to shaft B, by any convenient power and motion is transmitted from shaft B, to fan shaft E, by means of round belts a, a, a , passing around pulleys C, and D. The rotation of the fan forms a partial vacuum in chamber L, causing a strong suction blast to rush up through all of the flues to supply it. In the meantime the grain is subjected to said suction currents in the several parts of the machine, and also to the action of the scouring apparatus as follows: The grain passes in at small hopper H, and down tube I, in flue G, and coming in contact with feed-plate b , which by its rotation, throws the grain off from it horizontally, exposing it in a thin sheet to the current of air rushing up through flue G, which current extracts all of the light foreign matter, the grain falls down and is received by the scouring apparatus, where, by the rotation of concave or basin J, it is thrown outward horizontally through the space between the flanch or rim of said basin and the upper semi-circular flanches f^*, f^* , thence coming in contact with the scouring surface of the outside cylinder K, which is formed alternately of French bur and perforated and corrugated sheet-iron plates, then rebounding and coming in contact with the corrugated spiral ledge or plates f , then being struck by the bearing f'' , the grain is again thrown out against the rough surface of the inside of cylinder K. The grain is thus kept continually vibrating first coming in contact with one rough surface, and then with the other until it is gradually passed down to the bottom of the scouring apparatus, its descent being determined by the spiral ledge. It is then discharged from the scouring apparatus, passing down chute n , in the lower part of flue M, where it comes in contact with a second uprushing current of air, which extracts all of the remaining light impurities; the grain now being clean is discharged at the bottom of the flue M, and passes away from the machine.

There is a strong current of air drawn through flues or trunks k, k , one being located on each side, and passing under the scouring apparatus, this current is for the purpose of carrying the smut and dust and other light particles away from the scour-

ing apparatus; this dust, etc., is ejected during the scouring process through the perforations in the perforated sheet-iron sections *h*, into space *i*, between said section *h*, and the loose curbs *g*^{*}, and is drawn down through openings *j*, into horizontal trunks *k*, *k*, passing on from the back end of said trunks up inclined spouts *l*, *l*, and into the main chambers *L*. To insure a good strong current of air in the trunks *k*, *k*, the outer ends are kept partially open in addition to the openings *j*, which communicate with space *i*. The trunks *k*, *k*, are provided with slides underneath so that they may be easily opened and cleaned.

The air that is drawn through flue *G*, passes in at the bottom of said flue and between it and the top of the scouring apparatus, as shown by the black arrows. This blast passing up through the thin sheet of grain thrown out horizontally across it by feed plate *b*, passes on up through flue *G*, carrying with it the light impurities, and is divided into two parts, hopper *H*, acting as a deflector, and is thrown to the right and left through openings *p*^{*}, *p*^{*}, into side passages *p*, *p*, the air with the lightest of the dust, etc. passing still farther into chamber *L*, and thence out through the fan, while the heavier particles such as chaff, light grains of wheat, etc., carried up flue *G*, by said current is thrown on the inclined bottoms of passages *p*, *p*, thence passing down said inclines into chamber *L*, falling on the inclined bottom of said chamber, and passing out through valve *a*, into flue *P*. The air that is drawn through flue *M*, passes in at the bottom of said flue, as shown in Fig. 2, and passing up through the grain being discharged from the scouring apparatus into said flue, extracts and carries up with it all of the light particles that may have been remaining after the process of scouring. This current passing up flue *M*, is divided at the top of said flue by the deflector *a*^{**}, and is thrown also to the right and left through openings into the side passages *p*, *p*. The heaviest of the particles carried up by it fall down and mix with those from flue *G*, and have the same exit. The air also mixing in side passages *p*, *p*, with that of flue *G*, and passing off through the fan as above stated.

The partitions *b*^{*}, reaching across the machine and resting on the top of flue *M*, prevent the current of air from flue *G*, from counteracting that coming up through flue *M*, and does not allow the two currents to mingle until they have been turned downward, and are both passing in the same direction through the passages *p*, *p*.

Board *c*^{*}, prevents the air from passing directly into the fan; it also forms a support for the fan-case. The fan-case is set in and firmly secured at the top of the back part of the machine, and immediately over, and communicating with chamber *L*, as previously described—see Fig. 2.

The offal passing from the chamber *L*, through valve *a*, into flue *P*, is acted upon by the suction current, drawn through said flue *P*, and the lightest of the offal is carried up said flue and deposited in the pocket *s*, the air passing farther and through the opening *r*^{*}, into the chamber *L*, while the best of the offal being thoroughly separated passes off from the machine at the bottom of flue *P*.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The plates *f*, and bearings *f*^{**}, forming the perforated and corrugated spiral ledge with bolts or rods *f*^{*}, passing through and securing them to the rim or flanch *d*, of concave *J*, with perforated and corrugated lining *e*, combined to form the revolving cylinder *e*^{**}, communicating with opening *o*, arranged relatively with cylinder *K*, and operated in the manner, and for the purpose set forth.

2. The hollow cast iron longitudinal sections *g*, filled with stone *m*, in connection with the longitudinal perforated sections *h*, and loose or movable curbs or sections *g*^{*}, combined and arranged relatively with semi-circular flanches *f*^{*}, *f*^{*}, all forming a cylinder *K*, and arranged relatively with cylinder *e*, and communicating with chute *n*, and trunks *k*, *k*, to operate as and in the manner set forth.

3. The hopper and deflector *H*, and the deflector *a*^{**}, dividing the current in the flues *G*, and *M*, and throwing half on each side through openings in the side passages *p*, *p*, all being constructed and arranged substantially as and for the purpose specified.

4. The cross-bar *e*^{**}, by which the lower end and slip joint of tube *I*, may be adjusted laterally, as well as up and down as desired, when arranged as set forth.

5. The flues *P*, chamber *L*, flues *M*, and *G*, in connection with side passages *p*, *p*, deflectors *H*, *a*^{**}, and trunks *k*, *k*, arranged relatively with each other, the fan and fan-box *N*, the scouring apparatus, and shafts *B*, *E*, to operate as and for the purpose set forth.

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Witnesses:

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