(No Model.) 2 Sheets—Sheet 1.

J. HIGGINBOTTOM & O. STUART.

MIDDLINGS PURIFIER.

No. 490,285. Patented Jan. 24, 1893.

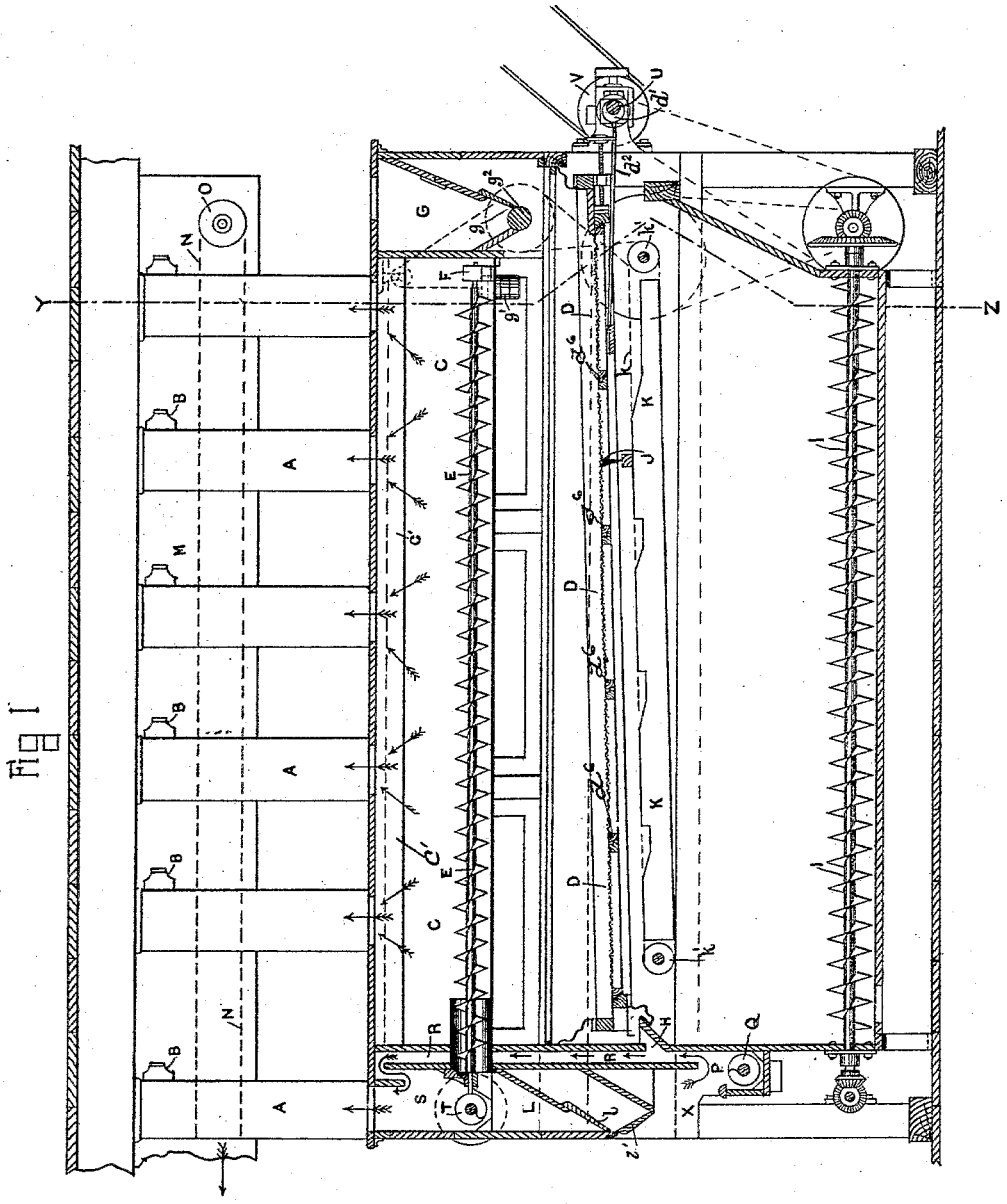

Fig 1

Witnesses

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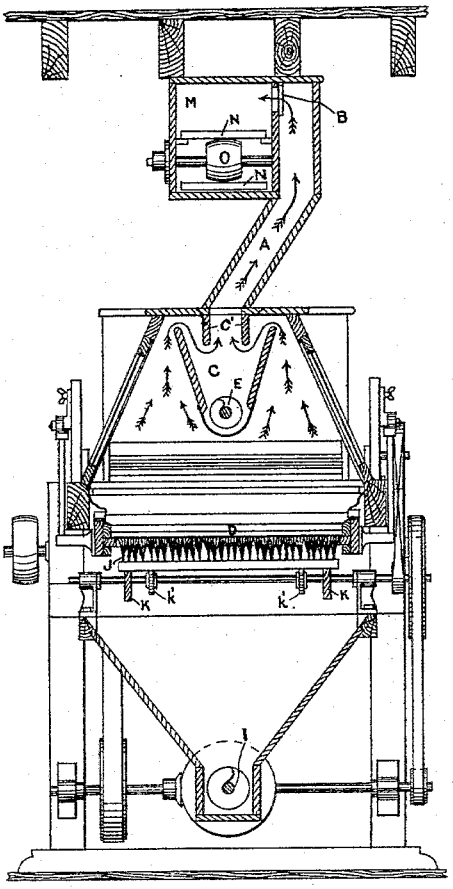
Fig 2.



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UNITED STATES PATENT OFFICE.

JAMES HIGGINBOTTOM AND ORSINI STUART, OF LIVERPOOL, ENGLAND.

MIDDLINGS-PURIFIER.

SPECIFICATION forming part of Letters Patent No. 490,285, dated January 24, 1893.

Application filed April 15, 1887. Serial No. 234,922. (No model.) Patented in England May 18, 1886, No. 6,676.

To all whom it may concern:

Be it known that we, JAMES HIGGINBOTTOM and ORSINI STUART, citizens of Great Britain, residing at Liverpool, in the county of Lancaster, England, have invented certain new and useful Improvements in Purifiers for Grain, Middlings, &c., (patented in Great Britain, No. 6,676, dated May 18, 1886,) of which the following is a description.

This invention relates to that class of middlings-purifiers in which the material to be treated is passed over an inclined shaking screen subject to the influence of an air current passing upward through the screen for the purpose of carrying away the lighter impurities; and the invention consists in various details of construction which will be hereinafter particularly pointed out and claimed.

In the accompanying drawings,—Figure 1 is a longitudinal vertical section through the center of my machine. Fig. 2 is a transverse vertical section on the line y—z of Fig. 1.

In constructing the machine we provide the strong frame-work of any suitable form adapted to sustain the operative parts hereinafter described. The upper part of this frame we inclose in such manner as to form a chamber, which communicates at different points in its length through central upwardly-extending flues A, with an overlying trunk, M, connecting with a fan or other suction apparatus. Each of the flues A is provided with a valve B by which the force of the current therethrough may be controlled.

In the frame is mounted a flat inclined screen, D, joined at its edge to the walls by flexible strips as usual, and forming the lower part of the top chamber. This screen is reciprocated constantly by a rod d^2, connected to an eccentric d'. The screen is clothed with bolting cloth or similar material, supported at suitable points by cross slats d^6 lying thereunder and forming part of the screen frame. The meshes of the cloth are kept clear by brushes J attached to an endless chain, k, passing around pulleys, k', on transverse shafts supported in bearings in the main-frame. In order that the brushes may be supported firmly against the under side of the cloth in passing thereover, but permitted to drop in passing beneath the slats d^6 we provide stationary supporting rails K on the upper edges of which the brush bars travel, these rails being notched immediately beneath the slats d^6, that the bars may descend at the required points.

The main-frame is provided at its base with inwardly inclined walls serving as gathering-boards to direct the material which passes through the screen to the screw-conveyer I, mounted longitudinally in a conveyer trough, and serving to discharge the material in the ordinary manner at one end of the machine.

The material to be treated is fed into the hopper G located in one end of the body, and is delivered from the hopper to the upper end of the screen by a roll g^2, which forms the bottom of the hopper, and which carries the material beneath the edge of the hopper gate g, acted upon by a cord and weight, g', or equivalent device which will permit it to open under the pressure of the material and the action of the roll sufficiently to secure the proper feeding action.

The tailings are delivered from the screen through a throat, H, into a transverse receptacle, P, provided with a screw-conveyer, Q, by which the material is delivered at the side of the machine. During the passage of the tailings from the screen to the receptacle P they are subjected to the action of an upgoing current of air which passes from the exterior of the machine over the top of the receptacle P, across the mouth of the throat H, and thence upward through a special passage, R, provided for the purpose. This passage communicates at its upper end through a chamber, S, with one of the suction pipes A. At the point where the passage R enters the chamber S there is a depending flange or deflector which directs the air downward as shown by the arrow in Fig. 1, to the end that the heavier matters may be precipitated in the chamber S instead of being carried with the blast into the trunk above.

The chamber S is provided at its base with a screw conveyer, T, to discharge its contents at the side of the machine.

In the top chamber of the machine between the screen D and the suction pipes A, we locate a longitudinal trough or receiver C containing in its body a screw-conveyer, E, by which its contents are delivered through a tube at one end into the hopper or chamber L at the base

of the machine. This hopper opens at its lower side through successive valves *l* and *l'* to the outside. These double valves allowing the material to be discharged in an obvious manner without permitting the inflow of air which would interfere with the suction at other points.

The trough or receiver C is of a substantially V-form in cross-section, or, in other words, wider at the top than at the bottom, and is open at the top on both sides throughout its length, so that the air-currents in their course to the pipes A are permitted to flow inward over both edges of the V. Flanges or deflectors *c'* depend from the top of the chamber on opposite sides of the pipes A, and extend downward below the upper edges of the trough so that the air currents are compelled to dip or descend in their course through the trough to the suction pipes.

In the trunk M we mount on endless chains, N, traveling around the guide rails O, a series of slats or scrapers by which the material accumulating in the trunk is carried longitudinally to a suitable point of delivery.

The operation of the machine is as follows: The material to be treated is delivered to the hopper G, and through suitable driving devices to the several conveyers, the feed roll, the shaking screen and the brush carrying belts are kept in constant motion, while, at the same time, a suction is maintained in an upward direction through the pipes A the material lying upon and passing through the screen is subjected to the influence of a strong current of air passing in an upward direction through the screen. The lighter materials are carried upward by its air current on the two sides of the trough C. The current passing over the edges of the trough in a downward direction therein deposits the heavier portion of the matters held in suspension in said trough, whence they are delivered by the conveyer E into chamber L, while the lighter matters continue their upward course with the air current through the pipes A, into the trunk M, where they are precipitated and from which they are delivered by the scraper. The tailings after being purified by the outgoing current are delivered into the receptacle P while the matters separated therefrom by the current flowing through conductor R are again separated the heavy portions remaining in chamber S while the light portions pass through the connecting pipe A to the trunk.

We have represented in the drawings a suitable arrangement of belts for imparting motion to the various parts. As these devices form no part of our invention it will be readily understood by any skilled mechanic on inspection of the drawings, and further description is deemed unnecessary.

We are aware that there are many purifiers in which the air after ascending through a flat screen is conducted, laden with dust, into or through dust receiving or depositing chambers variously constructed, to an exhaust fan. In the operation of these machines as heretofore constructed, difficulty has been experienced in securing a uniform flow of air through the different portions of the screen, and in securing a satisfactory precipitation of the solid matters in the receiving chambers.

It is to be noted that in our machine the exhaust pipes are located at the top and centrally of its width, and that the dust-receiving or precipitating chamber C, is located immediately beneath the mouths of the exhaust pipes and arranged to communicate on both sides with the trunk or chamber containing the screen, so that the ascending body of air is divided and compelled to ascend equally at the two sides of the machine into opposite sides of the receptacle C. As they enter this chamber the counter currents are directed downward by the deflectors *c'*, before entering the exhaust pipes. This downward movement, combined with the impingement of the opposing currents against each other, as they enter from opposite sides, secures an effective precipitation of the solid matters. In order to render this precipitation more complete than would otherwise be the case, the receptacle C is given a sectional area greater than the area of the inlet over its sides, and greater than the area of the exhaust pipes. The result is that the air on entering the receptacle C is expanded before entering the exhaust pipes, this expansion being accompanied by a corresponding reduction in velocity and tension, and by a consequent precipitation of the matters previously held in suspension.

What we claim is,—

1. The flat screen having the cloth surface sustained by underlying cross-bars at intermediate points in its length, in combination with the brush movable from end to end thereunder, and the longitudinal brush-sustaining rails provided beneath the cross-bars with depressions inclined at the side as shown: whereby the advancing brush is permitted to fall in passing under the cross-bars and automatically raised by the rail into contact with the cloth.

2. The flat screen having the cloth surface sustained by the underlying cross-bars, in combination with the traveling brush, the endless brush-carrying chain, and the stationary brush-sustaining rails lying at right angles to the cloth-sustaining bars, and provided with the depressions below said bars: whereby the brush is sustained in contact with the cloth, and automatically lowered and raised in passing the cross-bars.

3. In a middlings purifier, the combination of an elongated chamber C, located above the screen, open at the top, and having downwardly-converging side walls and narrow bottom, a conveyer E in the bottom of said chamber, and an exhaust flue A, leading upward from said chamber and having its mouth de-

pending into the same, with narrow passages between said exhaust flue and the side walls of the chamber; whereby air is admitted in two currents which impinge against each other and expand causing dust particles held in suspension to be precipitated into the bottom of the chamber.

4. In a middlings purifier, the trunk or chamber, the flat screen at its base, and the centrally located exhaust pipes at its top, in combination with the longitudinal dust receptacle C, lying in the top of the chamber directly beneath the mouths of the exhaust pipes, and having at both sides a top communication with the chamber, and the deflectors c', extending downward within the two sides of the receptacle: whereby the inflowing counter currents of dust-laden air are directed downward in their course through the receptacle to the point of exit.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JAMES HIGGINBOTTOM.
ORSINI STUART.

Witnesses:
WM. D. THOMPSON,
GEO. C. DYMOND.