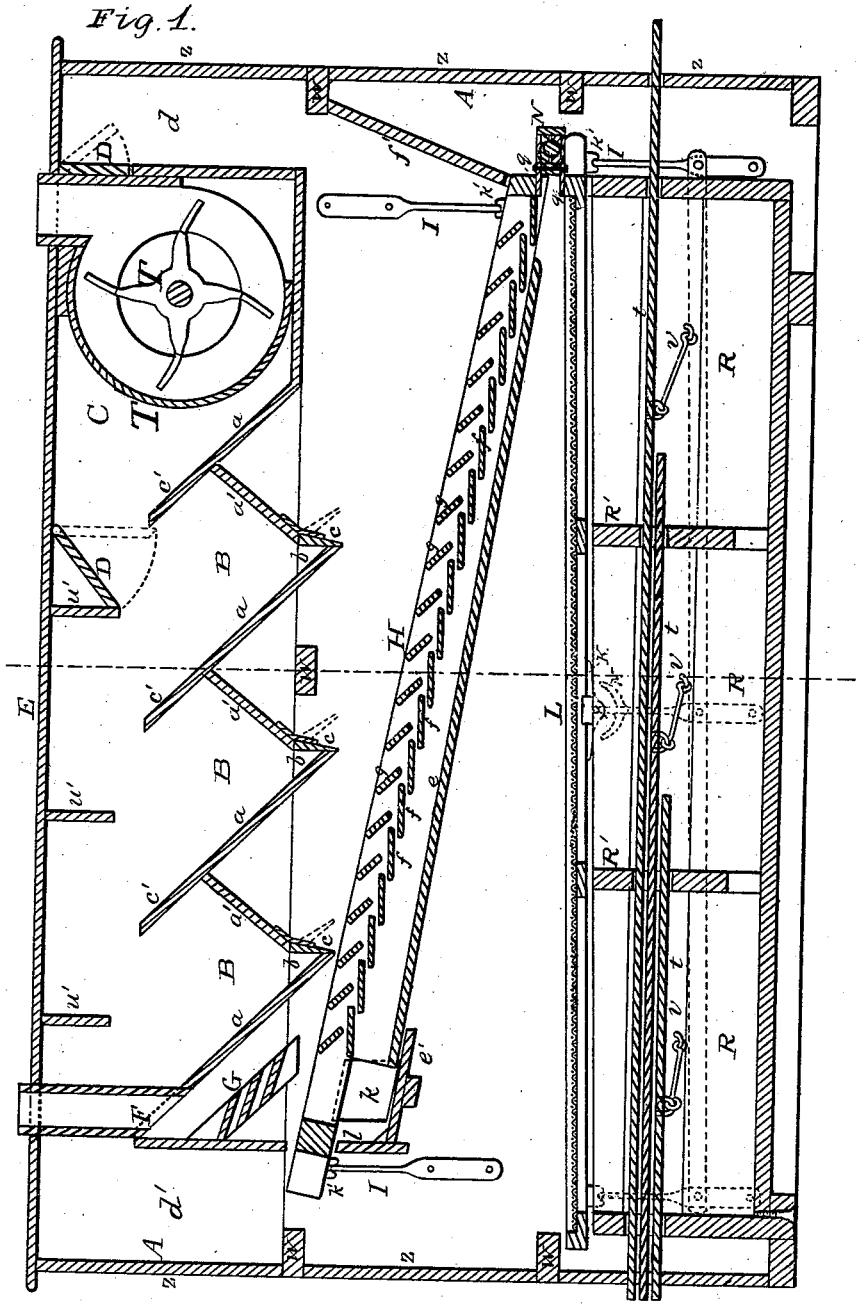
3 Sheets—Sheet 1.

C. N. SMITH.

MIDDLINGS SEPARATOR.

No. 190,381. Patented May 1, 1877.

Fig. 1.



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3 Sheets—Sheet 2.

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Fig. 2.

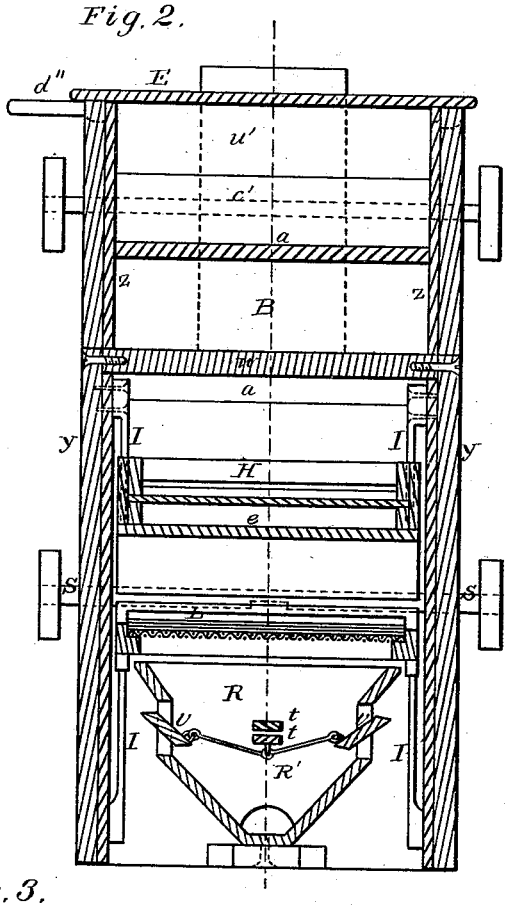
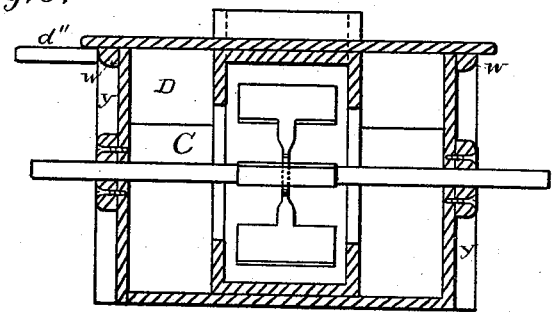


Fig. 3.



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3 Sheets—Sheet 3.

C. N. SMITH.

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Fig. 5.

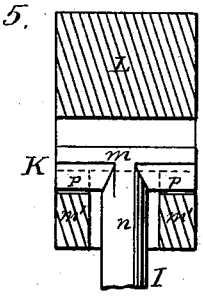


Fig. 4.

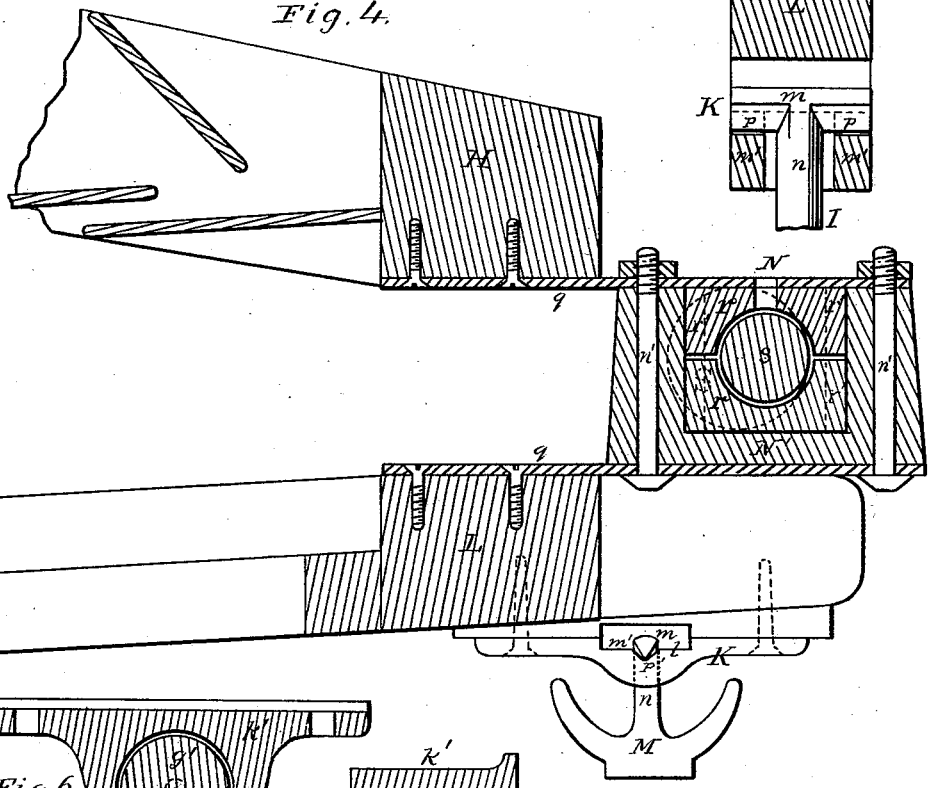


Fig. 6.

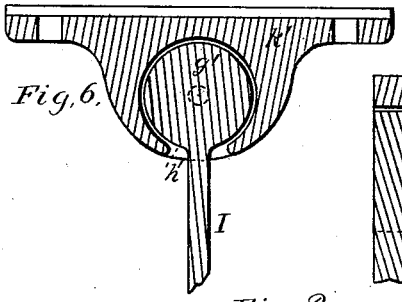


Fig. 7.

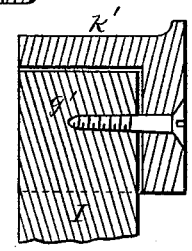
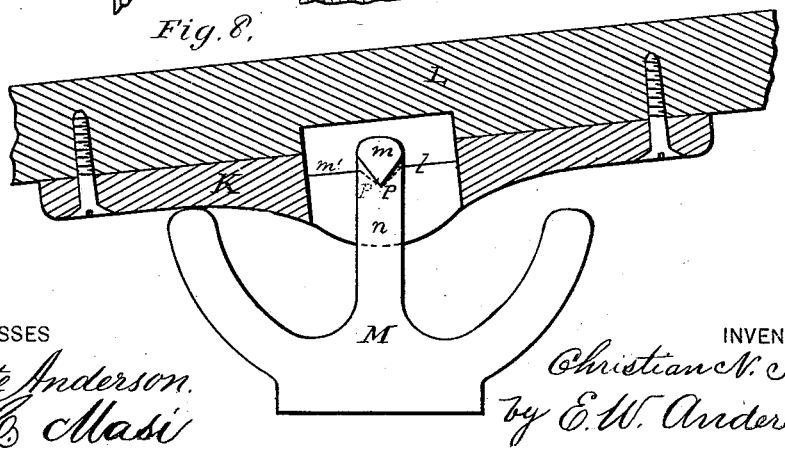


Fig. 8.



WITNESSES

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UNITED STATES PATENT OFFICE.

CHRISTIAN N. SMITH, OF DAYTON, OHIO.

IMPROVEMENT IN MIDDLINGS-SEPARATORS.

Specification forming part of Letters Patent No. **190,381**, dated May 1, 1877; application filed September 16, 1876.

To all whom it may concern:

Be it known that I, CHRISTIAN N. SMITH, of Dayton, in the county of Montgomery and State of Ohio, have invented a new and valuable Improvement in Middlings-Purifiers; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawings is a representation of a vertical longitudinal section of this invention. Fig. 2 is a vertical transverse section of the same, through the central part. Fig. 3 is a vertical transverse section through the fan-box. Figs. 4, 5, 6, 7 and 8 are details of the coupling, the supporter, and the knocker.

This invention has relation to middlings-purifiers; and it consists, mainly, in the construction and novel arrangement of the slatted shaker, the riddles, the air-inducts and draftways, and the fan-chamber; also, in the riddle-knockers, the elastic hangers or supporting-arms, and the eccentric coupling attached to both shaker and riddles; and, finally, in the valves of the conveyer and the means for operating the same.

In the accompanying drawings, the letter A designates the outer wall or case of my middlings-purifier, which is rectangular in form, and may be provided with glass-covered apertures through which the operation of the machine may be inspected. In order to secure a proper degree of strength, the wall-boards *z* of the case may be secured to an external frame-work consisting of uprights *y*, and horizontal, longitudinal, and transverse bars *w*. The case may, if thought desirable, be divided into three horizontal sections, one or all of which may be removable. The arrangement of the internal devices in this case would be such that the upper section would contain the fan and vacuum chambers, while the shaker would be in the middle section, and in the lower section would be placed the conveyer, and above this, the riddles. These sections should be of nearly equal size, and the same general arrangement of the internal parts is designed to be adopted, even if the sections are not made removable.

In the upper part of the case are arranged a series of transverse inclined boards, *a*, and at right angles with these a series of transverse boards, *a'*, oppositely inclined. These boards extend from side to side of the case, forming a series of angular vacuum-chambers, B, but they do not meet at their lower edges. There is a passage-way, *b*, between each set of transverse boards, which is designed to be closed by hanging valve-boards *c* hinged to the lower edges of boards *a'*, and abutting, when closed, against the lower edges of boards *a*. The upper edges of boards *a'* are joined to the boards *a* at right angles, and below the upper portions *c'* of the latter, which form extensions inclined in the opposite direction to that of the draft of the fan. Above the vacuum-chambers B, and immediately under the top of the case, are located vertical guides *w'*, which extend across the case and downward to about the level of the upper edges of boards *a*. At one end of the casing, beyond the vacuum-chambers, a box, C, is formed for the reception of the fan T and its case T', a draft-flue, *d*, being left between the end wall of the casing A and the box, for a purpose hereinafter explained. The wall-boards of the fan-box C extend from case-wall to case-wall, and terminate below the case-top E, being met at their upper edges by the vertically-vibrating valve-boards D, which are hung in bearing near the top of the case and extend downward. The journals *d''* of these valves are extended through the casing to afford means for operating the same from the outside.

At the other end of the case, beyond the vacuum-chambers, is formed a vertical draft-flue, *d'*, extending from the upper edge of the first inclined board *a* nearly to the level of its lower edge.

F represents the passage for the introduction of the middlings through the case-top and the first inclined board *a*. They are then received upon an inclined spreader, G, which delivers them upon an inclined slatted shaker, H, extending from the lower end of the spreader to the opposite end of the case. This shaker consists of a rectangular frame, provided with

a bottom board, *e*, and above the same transverse inclined slats, which are designed to be arranged in two layers, whereof the lower slats *f* are broad and but slightly inclined, as these receive the middlings, while the upper slats *g*, inclined at a higher angle and having their lower edges somewhat above the middle portions of the slats *f*, serve to guide the draft through the shaker. This air-draft enters at the lateral inducts *k* in the case A at the upper end of the shaker, in front of the vertical transverse partition-board *l*, which bounds the lower portion of the flue *d'*, and closes the end of the shaker. Between the lower margins of the inducts *k* extends a transverse bearing-board, *e'*, in contact with which the upper end of the shaker-floor moves. At the other end the shaker-compartment of the case is closed by the inclined transverse partition *f'*, which is attached to the case and forms a continuation of the outer wall of the flue *d*, which receives the draft through the shaker. The lower edge of this board is in contact, or nearly so, with the upper surface of the lower end of the shaker-frame. The shaker is supported in the case by elastic hangers I, which are attached by one end to the case-wall, and have at their other ends cylindrical enlargements *g'*, which are received into cylindrical recesses *h'* of metallic socket-plates *k'* which are attached to the side rails of the shaker-frame. The socket of the plate *k'* is slotted for the passage of the shank of the hanger, and the slot is made sufficiently wide to provide for the play of the shaker. The cylinder-head *g'* is designed to be kept to its engagement with the socket-plate by means of a screw, or other suitable device. These hangers sustain the shaker at each end and allow it free endwise movement in the case, facilitating and accelerating the descent of the middlings to the lower end thereof, whence it falls upon a riddle or riddles, L, arranged in a frame located below the shaker, and, like it, supported on elastic hangers I differing in no respect from those above described in connection with the shaker.

The middlings, having been introduced into the machine through the passage or opening F, fall on the spreader, and are carried by the draft on to the shaker, when the fluff and dust will be removed by the strong currents of air drawn up through the slats of the shaker by the action of the fan before the middlings reach the riddle. A strong draft is designed to be employed, and such middlings as may reach the vacuum-chambers will be re-delivered to the shaker automatically through the valved openings.

The riddle L is provided with graded cloths, and in order to prevent the clogging thereof, crescent-shaped metallic knockers M are employed. Each knocker is provided with a shank, *n*, extending upward, and having at its upper end a cross-piece, *m*, at right angles thereto. The under side of this cross-piece or bearing is V-shaped or angular, as indicated at *p*, and it is received into angular grooves or notches *p'*, having a little more spread made in the upper edges of the walls of the slotted central or bearing part *m'* of the anvil-plate K, against which the ends of the knocker M are designed to strike when the riddle is actuated in a vibratory manner. The suspended portion or knocker M is designed to be connected with the anvil-plate K in such a manner as to be detachable, as this plate is secure to the frame of the riddle. With this object in view the central portion *m'* is slotted longitudinally at *l*, the slot being sufficiently long for the passage of the cross-bearing *m* when turned endwise in the direction of the length of the slot. After the passage of the cross-bearing through the slot it is turned crosswise, and its angular edges seated in the notch-bearings *p'*. The riddle is located just over the conveyer-compartment, and it is so arranged that its head is brought into close proximity with the foot of the shaker, and both shaker and riddle are connected by plate-arms *q* to a journal bearing or coupling, N. This consists of a strong body-casting, N', open at the top and at each end for the reception of the bearing-sections *r* of Babbitt metal, which are kept from endwise displacement by end flanges *r'*. Bolts *n'* serve to secure the arms *q* to the body N. This bearing is connected with a shaft-journal, *s*, eccentrically arranged in the driving-shaft S, which is seated in suitable bearings in the case-frame. This shaft may be operated by pulleys and belts in any convenient manner, and will cause an endwise rising and falling motion in the shaker and riddle.

In the lower part of the case is located the conveyer-compartment or receptacle for the middlings after they are cleaned. This is divided into a series of chambers, R, corresponding to the series of graded cloths employed in the riddle, said chambers being divided by partitions R', which are perforated for the passage of operating-rods *t*. In the side walls of each chamber are formed air-openings *u*, which are provided with valves *v*, which are connected to, and operated by, the rods *t*. These rods are preferably made flat, and extend from the end of the conveyer when their operating-handles project through the dividing-walls each to its chamber. These rods lie one upon another, and occupy but little space in the conveyer-compartment.

By this means it is designed to graduate the draft, which is admitted through the openings in the side wall of the conveyer, to suit each grade of cloth in the riddle independently of the others.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a fan in a middlings-purifier, of the vacuum-chambers B, the riddles L, the intermediate slatted shaker H, and the flues *d d'*, substantially as specified.

2. A middlings-purifier, having the vacuum-

chambers B B, and valves *c*, a shaker, and a riddle, in combination with the end flues *d d'*, fan-box, and valves D D, substantially as specified.

3. The shaker H, having the closed bottom *e*, a lower series of carrying-slats, *f*, and above these a series of flue-slats, *g*, reversely inclined, substantially as specified.

4. The riddle-knocker M in combination with the slotted anvil-plates K, substantially as specified.

5. The combination, with a reciprocating riddle, of the vibrating automatic gravitating knockers M suspended therefrom and having V-bearings thereon, substantially as specified.

6. The elastic supporting-arms I, having the cylinder-heads *g'* and slotted socket-plates K', substantially as specified.

7. The combination, with an endwise-moving riddle or shaker, of elastic supporting-arms I, having cylindrical journal-head *g'* working in the cylindrically-recessed bearing-plates K' on the under side of the riddle aforesaid, substantially as specified.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

CHRISTIAN NEWCOMER SMITH.

Witnesses:
JNO. A. SCHIEBLE,
J. E. BOYER.