G. T. SMITH.

MIDDLINGS-SEPARATOR.

No. 187,923. Patented Feb. 27, 1877.

Fig. 1.

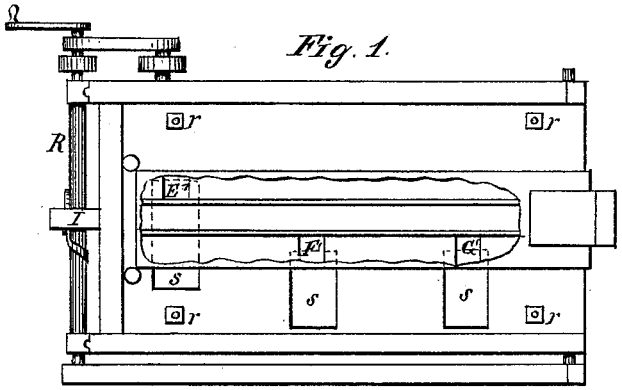


Fig. 3.

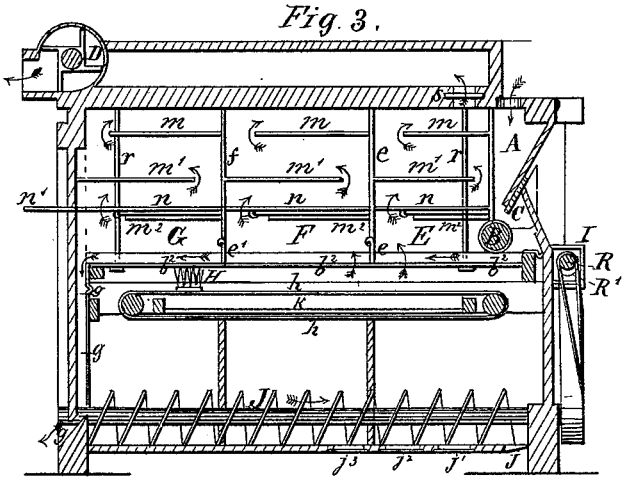
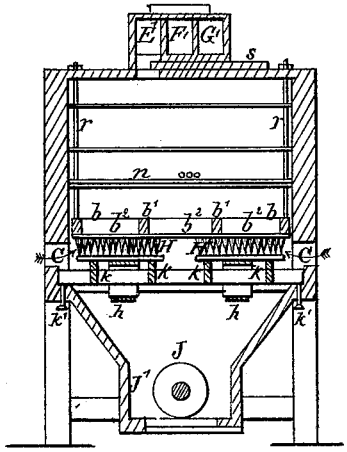


Fig. 2.



Witnesses.

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UNITED STATES PATENT OFFICE

GEORGE T. SMITH, OF WASHINGTON, DISTRICT OF COLUMBIA.

IMPROVEMENT IN MIDDLINGS-SEPARATORS.

Specification forming part of Letters Patent No. **187,923**, dated February 27, 1877; application filed December 28, 1876.

To all whom it may concern:

Be it known that I, GEORGE T. SMITH, of Washington, in the District of Columbia, miller, have invented certain new and useful Improvements in Middlings-Purifiers; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

Middlings, when delivered to a purifier, consist, ordinarily, of a mixture of pure and fine flour, granules of the flour-producing portion of the wheat in various grades or sizes of granulation, and bran or other refuse material, the grains or particles of which correspond substantially in size to those of the flour and flour-producing material, this range or gradation usually extending from a size which will pass through the mesh of a No. 10 bolting-cloth, or even finer, to such as will hardly pass through a No. 2 or a No. 3 cloth, or even coarser.

I have found that, in order to purify middlings thoroughly and economically, it is frequently necessary to pass them over a succession of machines, or else over the same machine more than once, and that it is also necessary to employ a series of bolting-cloths upon each shaker, grading the cloths from fine at the head or receiving end of the shaker to coarser ones toward the tail or discharging end of the bolt or shaker, using graded air-currents through the bolting-cloth, produced by dividing the air-chamber into sections by means of transverse partitions, each section being provided with a valve or damper, where by a light draft may be used upon or through the fine cloth through which the fine middlings are passing, a heavier or stronger draft through the coarser cloth, and so on.

I have also found that, in order to separate the fine refuse from the finest middlings by the combined operation of the air-current and the reciprocating movement of the bolting-cloth, it is important that more or less of the coarse material should be intimately incorporated with the finest, one reason why this mixture of grades is essential being the fact that the very fine flour or middlings will not pass readily through the meshes of the fine cloth unless it is thus mixed with the coarser as it lies in a thin sheet or layer upon said cloth.

Thus it will be seen that a machine which shall meet the above requirements must manipulate or treat the middlings in substantially the following order or sequence: It must receive them while the different grades or sizes of particles or granules are intimately mixed or incorporated with each other, and, by means of a graded bolting-cloth, separate the mass into a number of different sizes of granules, treating each grain with or by an air-current, the strength of which is regulated according to the number of the cloth and the fineness of the material passing over it, and must then be restored, as nearly as possible, to its original condition, so far as relates to a thorough incorporation of the coarse and fine particles, whereby the middlings are prepared for a second purification.

The invention for which protection is sought in this patent consists of certain features of construction and combination, as will be fully understood from the following description.

Figure 1 is a plan or top view of the machine. Fig. 2 is a vertical transverse section, and Fig. 3 is a vertical longitudinal section.

A represents a hopper, into which the middlings to be treated are delivered from an elevator, or by any other means. The middlings are fed by the roller B to the bolt or shaker *b*, the amount of feed being regulated by a slide, *c*. The shaker is arranged in a chamber, through which an air-current is made to pass in an upward direction by means of a fan, D, the air entering through suitable openings C in the side of the bolt-chest.

The bolt or shaker is suspended from the frame-work by means of pivoted links *r r*, and has a reciprocating motion imparted to it by the eccentric R′ on shaft R, and the inclosing-box I.

H H are brushes attached to and carried by endless belts *h*, the brushes being carried, during their contact with the bolt, upon ways

k k, and, by preference, I make the frame-work and ways which support the brushes adjustable by means of set-screws *k'*, (see Fig. 2,) so that I can keep the brushes always in contact with the bolt.

b^1 b^1 are supporting-ribs attached to and forming a part of the bolt or shaker *b*. These ribs are arranged longitudinally of the shaker, their lower edges being in the same plane with the lower edge of the sides of the shaker-frame, the bolting-cloth b^2 being secured both to the shaker and to the supporting-ribs b^1 b^1.

As it is very desirable that the layer or sheet of middlings upon the bolting-cloth should be of as nearly as possible an equal depth across the entire width of the shaker, in order that the air-currents shall act with uniformity upon the middlings; and as it is impracticable to have a series of these ribs upon the under side of the cloth, on account of their being in the way of the brushes, it will be seen that they (the ribs) upon the upper side of the cloth perform an important function in keeping the cloth in a plane, by preventing it from sagging. This feature of construction also enables the operator to adjust the brushes to act upon the entire width of the cloth uniformly.

J is a spiral or worm conveyer, arranged in the conveyer-box J^1. The middlings, after passing through the shaker, are conducted to the conveyer-box by means of gather-boards J^2. (See Fig. 2.)

j j^1 j^2 j^3 are cut-off slides or gates in the bottom of the conveyer-box J^1.

The space within the walls of the machine and above the shaker is divided, by vertical transverse partitions *e f*, into three air-chambers, E F G.

D is an exhaust-fan, connected by means of air-trunks E' F' G' with the air-chambers.

m m^1 m^2 are shelves arranged in zigzag form within each of the air-chambers, the air-currents passing around these shelves, as indicated by the arrows *x*. (See Fig. 3.)

n n n are valves arranged upon the upper side of the lower shelf in each air-chamber, and operated by means of a rod, *n'*, and it is apparent that by drawing these valves rearward a narrow throat can be formed between the rear edge of each valve and the opposing wall or partition, and that thus the strength of the air-draft may be rendered nearly uniform across the entire width of the shaker in each air-chamber.

The middlings are fed from the hopper A to the shaker by the feed-roller B, and as they pass over the fine cloth at the receiving end of the shaker they are thoroughly agitated by the reciprocating motion; and, through the combined effect of the agitation and the upwardly-ascending air-current, more or less of the refuse is brought to the surface, the finer and lighter parts being taken up by the air, the finest of the middlings falling through the bolt-cloth. Another portion of the refuse, which is too heavy to be carried away by an air-current of such strength as can be advantageously used in the air-chamber E, is floated along until it reaches the second air-chamber F. In this chamber a stronger draft can be safely used, (the finest of the middlings having been bolted out,) which will take out a part of the still heavier refuse, and will float another portion still farther toward the tail, where it can be carried away, or be floated over the tail of the shaker.

I have found by experience that it is very difficult, if not impossible, sufficiently to purify middlings by running them once through a machine, modified, it is true, by their condition. Hence, through the cut-off slides, I remove such of the fine middlings as are sufficiently clean, if there be any, and then, by means of the conveyer J, which moves the middlings material in the direction of the arrow *y*, with a peculiar rotary motion, I thoroughly incorporate and intermix the coarse middlings from the tail end of the shaker with the fine ones at or near the head of the shaker, thus putting them in the best possible condition for a subsequent purification.

Another feature of construction which is valuable in the machine is this: By locating the air-chambers E F G, the air-trunks E' F' G', and fan at the upper part of the machine, I accomplish four desirable results: First, I economize room, as in nearly all mills there is space enough between floors to put a machine thus constructed, and this arrangement saves the space which would be occupied by the trunks and fans if they were located at the side or end of the machine; secondly, the machine is more readily gotten at with the air-trunks on top; thirdly, the air-currents are more uniform in their action upon the entire width of the cloth when the sectional chambers are above the shaker; and, fourthly, the brushes have an unobstructed space in which to travel when the partitions forming the air-chambers are above the shaker.

I do not claim in this patent, which is a division of my original application, anything except the specific invention set forth and described and claimed herein; but

What I do claim is—

1. The combination, in a flour-dressing machine, of a reciprocating shaker, having bolting-cloth of different degrees of fineness, an air-chamber arranged above the shaker, and divided into sections by transverse partitions, and a conveyer below the shaker, whereby the middlings may be divided into grades of fineness, and subjected to air-currents of different degrees of strength, and afterward intimately remixed for a second purification, substantially as set forth.

2. The combination, in a flour-dressing machine, of a reciprocating shaker clothed

with bolting-cloth of different degrees of fineness, an air-chamber arranged above the shaker, and divided into sections by transverse partitions, a fan arranged above the air-chamber, and having an air-trunk for each section of the air-chamber, and a brush traversing the under surface of the bolting-cloth, substantially as set forth.

In testimony that I claim the foregoing as my own I affix my signature in presence of two witnesses.

GEORGE T. SMITH.

Witnesses:

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Of the City of Toronto, Barrister-at-Law.

ALBERT OGDEN,
City of Toronto, Student-at-Law.

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