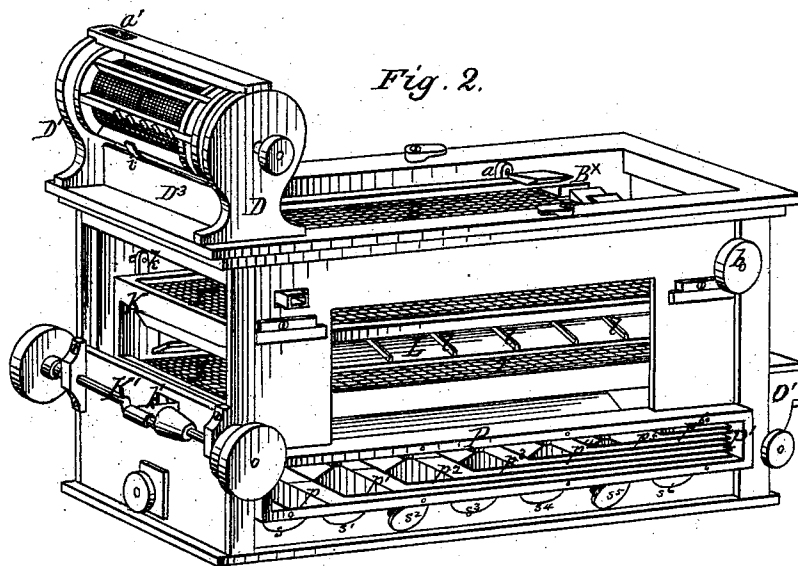
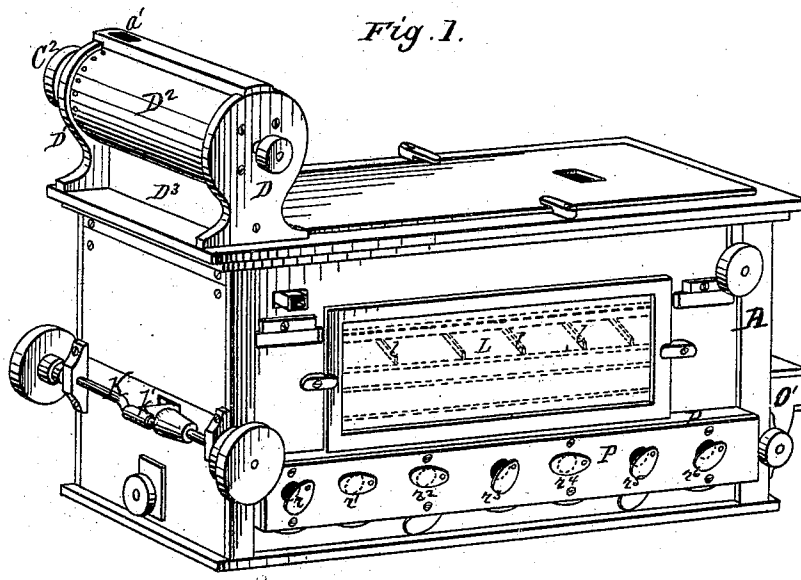


C. F. KELLER.
MIDDLINGS-SEPARATOR.

No. 172,748.

Patented Jan. 25, 1876.



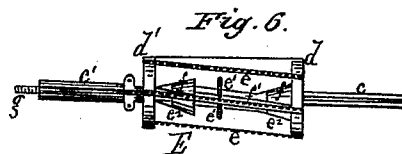
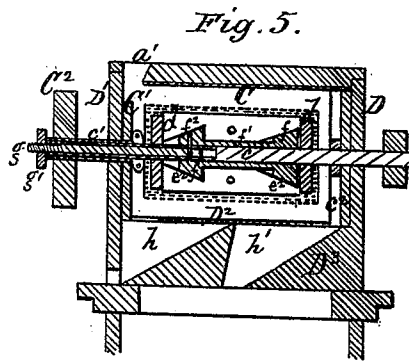
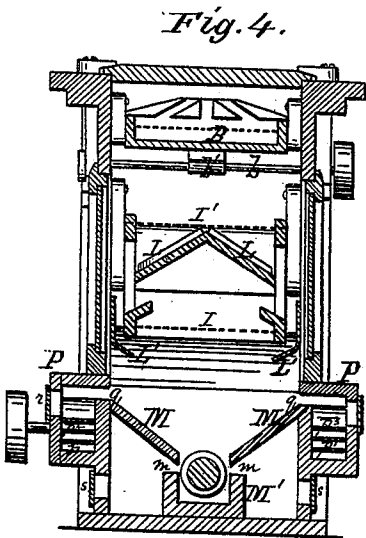
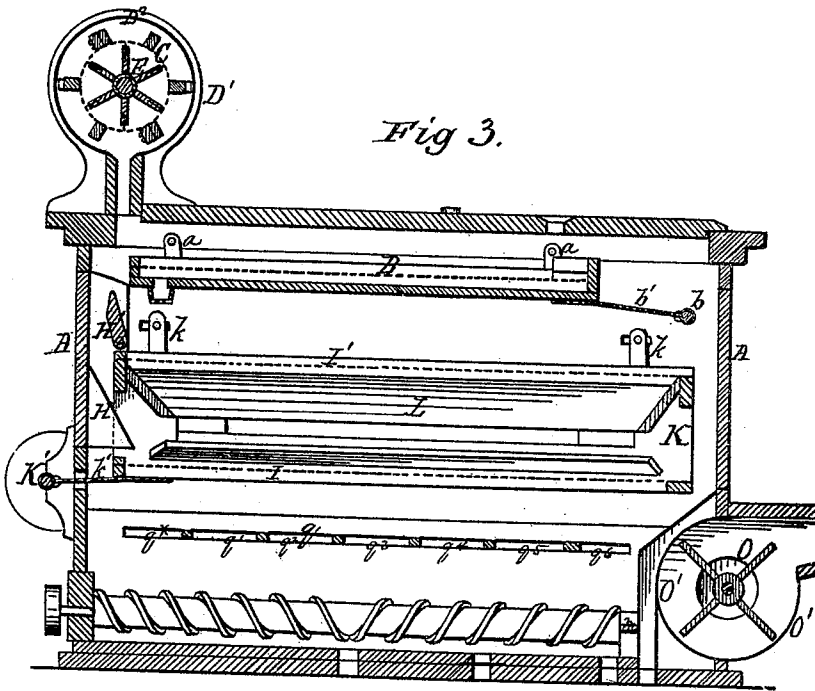
Witnesses:
Alex. Mahon
John E. Center

Inventor:
Chauncy F. Keller
by A. M. Smith
Attorney.

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UNITED STATES PATENT OFFICE.

CHAUNCY F. KELLER, OF NEVADA, OHIO, ASSIGNOR OF TWO-THIRDS HIS RIGHT TO G. W. AND J. L. BALLIET, OF SAME PLACE.

IMPROVEMENT IN MIDLINGS-SEPARATORS.

Specification forming part of Letters Patent No. **172,748**, dated January 25, 1876; application filed October 5, 1875.

To all whom it may concern:

Be it known that I, CHAUNCY F. KELLER, of Nevada, Wyandot county, State of Ohio, have invented certain new and useful Improvements in Middlings-Purifiers, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 represents a perspective view of my improved purifier. Fig. 2 is a similar view, with the top, side, and end casing-panels removed, for showing the internal arrangement. Fig. 3 is a vertical longitudinal section, and Fig. 4 is a vertical transverse section through the same. Fig. 5 represents a vertical section through the flour-extractor or apparatus for separating the flour from the middlings, and Fig. 6 is a side elevation of the brush-cylinder.

Similar letters of reference denote corresponding parts of the machine wherever used.

My invention relates, first, to a novel means for effecting a thorough separation of flour from the middlings prior to the action of the middlings-bolts or screens thereon; and, secondly, to a novel means for applying currents of air to the middlings, and for controlling the force of such currents.

The invention consists, first, in the combination, with a revolving screen or bolt, through which the middlings are passed prior to delivery to the vibrating bolts of the middlings-purifier, of a revolving drum, composed of a series of adjustable brushes, arranged in spiral form, and moving or rotating in an opposite direction to the cylindrical inclosing screen or bolt, by means of which all the flour adhering to the middlings after their passage through the flouring-bolts is effectually removed, as hereinafter explained.

The invention further consists in a novel arrangement of divided wind-trunk, with the valves for controlling the currents of air, relatively to the middlings-bolts and the conveyer, whereby the fuzz and other light impurities are effectually removed from the middlings.

The invention further consists in certain

details of construction and arrangement hereinafter fully described.

In the accompanying drawings, A represents the upright rectangular frame-work of the machine, which may be of any suitable construction, in the upper parts of which is represented a flour-extracting bolt, B, of a construction similar to that shown and described in Letters Patent granted to me October 27, 1874, said bolt being suspended by links *a a*, and reciprocated by means of a crank-shaft, *b*, and connecting rod or link *b'*, and being adapted for use in small mills, or where comparatively small quantities of middlings are to be operated upon.

For operating upon larger quantities, or for more rapid work, a cylindrical bolt, C, is employed, the shaft *c* of which is mounted, in the present instance, in uprights D D', attached to the head of the machine, and between which is secured a cylindrical casing, D², surrounding and inclosing the bolt C.

The bolt C is mounted loosely on the shaft *c*, and has connected with one of its end disks, C', a hollow shaft, *c'*, surrounding the shaft *c*, and extending through the upright D', and rotary motion is imparted to the bolt by means of a band-pulley, C², on the shaft *c'*, from any convenient driving-shaft. The shaft *c* is also made hollow, and is slotted longitudinally upon one side, and upon said shaft, within the bolt C, two disks, *d d'*, are mounted, one near each end of the cylindrical bolt, in radial or nearly radial slots, in which are placed a series of longitudinal brushes, *e e*, forming a brush-cylinder, E, the slots or grooves in one disk being in advance of those in the other disk, for giving the spiral or feeding relation to the brushes shown in Fig. 6.

The brushes are free to move in and out in their seats or slots, for diminishing or increasing the diameter of the brush-cylinder, being held inward toward the shaft *c* by a spring or springs, *e'*.

For moving the brushes outward for increasing the diameter of the brush-cylinder, the shaft *c* has mounted upon it two or more sliding cones or wedge-shaped pieces, *f f*, against which the notched or inclined inner

faces e^2 of the brush-heads rest, the cones being connected by a sieve, f^1 , surrounding the hollow shaft c . A pin at f^2 passes through the slot in shaft c , connecting the cones with a central sliding rod, g , which is adjusted by means of a screw-thread and nut, g' , at its outer end, for moving the cones endwise, and thus, in connection with the spring e' , adjusting the brushes as desired. The shaft c , at that end passing through the support D , has a pulley attached, through which, from any convenient driving-shaft, rotary motion is imparted to the brush-cylinder in a direction contrary to that given to the bolt C . The brushes $e e$ are designed to move in contact with the inner surface of the bolt C , and the middlings being fed through an opening in the casing at a' , and thence through slots or perforations in the end disk O^1 into the cylindrical bolt, where, by the action of the brushes, the flour is effectually removed therefrom, and passed out through the meshes of the bolt, while the middlings are, by the spiral arrangement of the brushes, fed toward the opposite end of the bolt, where they are discharged through slots c^2 , and are carried to the reciprocating bolt or screens, as will be explained.

Between the uprights $D D^1$, and underneath the casing D^2 , is a slotted chute-board, D^3 , through perforations $h h'$ in which the flour and middlings are conveyed to the desired points—the former through the opening or chute h to a point outside of the machine, and the middlings through the opening h' , which is covered by the casing D^2 , except underneath the slots c^2 , where it receives the middlings from the bolt C , and which are conveyed by the chute h' to a point about midway of the length of the board D^3 , where it is discharged upon the head of the middlings-bolt.

The longitudinal strips, forming with the end disks the supporting-frame of the bolt C , are provided with a series of spiral ribs or "flights," by means of which, as the bolt is rotated, the flour discharged therefrom is fed back over the bottom of the casing D^2 to the discharge-chute h , and these strips or bars, as they revolve with the bolt, come in contact with a spring or knocker, i , attached to the bolt-casing D^2 , which is thus made to assist in keeping the meshes of the bolt open and clean.

The middlings, as they pass from the chute h' , may either be directed by an inclined chute-board, H , upon the head of the single bolt I , or, by means of an intermediate pivoted valve, H' , any desired part thereof may be directed upon the head of an upper bolt or bolts, I' , according to the amount of work which it is desired to accomplish.

The bolts $I I'$ consist each of a sash or frame covered by the usual graded bolting-cloth, and are placed in a rectangular reciprocating frame, K , one above the other, as shown.

The frame K is suspended in the frame A

by pendent links k , which are made adjustable longitudinally of the frame A at their upper ends, for varying the centers of vibration, and therewith the character or direction of movement of the bolting-frame, according to the wishes or judgment of the attendant.

The frame K is connected by a rod or pitman, k' , with a crank-shaft, K' , through which the desired reciprocating movement is imparted to the bolts. Knockers of any preferred construction may be applied in connection with the frame K or bolts, if desired.

Where an upper bolt (or bolts) I' is employed, the middlings discharged therefrom are received upon a double-inclined chute-board, L , which extends longitudinally underneath said upper bolt, the inclined sides of which discharge the middlings at the sides of the lower bolt or sash I , and, passing down outside of said lower bolt, the middlings are again deflected inward toward the center of the machine by return-chutes $L' L'$, attached to the sides of the frame A .

Ribs or strips l , attached at intervals to the chutes L , serve to preserve the grading effected by the bolt. From the lower bolt I the middlings fall directly to the double-inclined flooring $M M$ of the machine, and to the conveyer, located between and below the same, the middlings being acted upon in their descent by currents of air communicated thereto, and controlled as follows: At the tail end of the machine, in a suitable case or chamber, is a fan, O , driven from any convenient shaft, and communicating with, and receiving its supply of air from, the bolting-chamber, through longitudinal side trunks P , opening into the fan-chamber at the end P' , and into the bolting-chamber through the divided longitudinal slot q . (See Fig. 3.)

The trunks P are divided horizontally into several trunks or compartments, $p p^1 p^2$, &c., each opening at the tail end into the fan-chamber, and the several compartments terminating at the opposite ends at varying points in the length of the slot q , thus the lower and longer compartment p extending to and opening through the division q^x of the slot into the forward end of the bolting-chamber, the compartment p^1 terminating in the division q' , and so on through the series, each forming a separate wind trunk or spout, through which air is drawn from the various points in the length of the bolting-chamber into the fan-chamber O' .

The several compartments are provided each with an outside pivoted valve, $r r'$, &c., through which outside air may be admitted to said trunks or compartments for modifying the force of the draft or suction of each or all upon the bolting-chamber, or for dispensing with such draft entirely, according to the extent to which such valve or valves may be opened. At the lower end of the inclined bottom boards $M M$, and at the junction thereof with the conveyer-trough M' , a longitudi-

nal slot, *m*, is left, which, by preference, is divided similarly to slot *q*, and a series of adjustable valves, *s s'*, &c., arranged underneath the wind-trunk *P*, admit the external air in any desired quantities, such air passing through the slot *m* into the bolting-chamber at the bottom, and along its entire length, whence it is drawn upward and outward in currents, intercepting the stream of middlings falling from the bolts, and passing through the same it is drawn through the slots *q q'*, &c., and thence through the divided trunks *P* to the fan-chamber, carrying the fuzz and other light impurities from the middlings with it, from which point the impurities are conveyed to the dust room or chamber, while the heavier middlings fall through the currents of air and drop upon the inclined bottom boards *M*, passing thence down to the conveyer, by which they are discharged in any usual manner.

It will be seen that by this arrangement the currents of air are not made to pass through the bolts or screens, and through the mass of middlings thickly spread thereon, but, instead thereof, are made to pass through the falling middlings after they have passed through the bolts and been lightened up and separated thereby, and, consequently, just at the time when they are most easily affected by and operated upon by the currents of air, and when the separation of the light impurities is effected with the greatest facility.

The force of the current at any particular point in the length of the bolting-chamber is regulated by adjusting the valves *r r' s s'*, &c. Thus, for example, if the strongest practicable current is desired at the head of the bolt, the valve *s* is thrown open, and the valve *r* is closed, forcing the entire supply to the exhaust compartment or trunk *p* to pass into the bolting-chamber through the aperture or slot *m*, and thence up and out into the trunk *P*.

For modifying the force of the current the valve *r* may be partially opened, admitting a partial supply directly from the outside into the compartment *p*, thus diminishing the draft of said compartment upon the head of the bolting-chamber; or, if need be, the valve *s* may be closed, and the valve *r* thrown open, in which case the entire supply, or nearly so, of the compartment *p* of the wind-trunk will be drawn from the outer air instead of from the bolting-chamber.

This adjustment of valves may be made through the entire series, and upon both sides of the bolting-chamber, until the required force of currents is secured throughout the entire length of said chamber.

The machine described may be modified in the arrangement of some of its parts—as, for example, the flour-extractor or cylindrical bolt *C* and brush-cylinder *E* may be arranged in a vertical instead of in the horizontal position shown, as the space or amount of room in the mill for its accommodation may dictate.

In this latter case the middlings will be fed into the bolt at the upper and out at the

lower end, and in their passage through the same will be thrown out against the bolt by the rapid rotation of the brush-cylinder, and the adhering particles of flour thereby removed.

The spreader *B**, applied to the bolt or flour-extracting screen *B*, when the latter is not in use, may be transferred to the head of the bolt *I* or *I'*; or a similar device may be applied, if desired, for spreading the middlings evenly across the head of the bolt.

The adjustment of the currents of air by means of the several series of valves, as explained, will be governed in a great measure by the position given to the pendent adjustable link *k*, and the particular movement or throw given to the bolt-frame *K*, as by the adjustment of said links the middlings can be made to move more or less rapidly over the bolts, as desired, and the currents of air will require to be regulated to suit the discharge of the middlings by said bolts.

Parts of the machine not particularly described, such as the driving mechanism or belts, may be constructed and applied in any usual or preferred manner.

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

1. The spirally-arranged brushes *e e*, forming the brush-cylinder, provided with inclined inner faces *e²*, in combination with the adjusting double cone *f f*, arranged and operating in connection with the revolving bolt or screen *C*, substantially as described.

2. The revolving bolt *C* and brush-cylinder *E*, arranged at the head of the middlings-purifier, in combination with the perforated casing-floor, discharge-chutes *h h'*, and spiral flights or starts on the revolving bolt, for removing the flour and conveying the middlings to the middlings-bolt, as described.

3. The combination, with the bolts *I I'*, of the chutes or deflectors *L L'*, arranged as described, whereby the middlings from the upper bolt are passed down outside of and back underneath the lower bolt, as specified, and for the purpose set forth.

4. The wind-trunks *P P*, arranged at the sides of the bolting-chamber below the middlings bolt or screens, and provided with the several longitudinal compartments *p p¹*, each communicating separately with the fan and with the bolting-chambers, for directing the currents of air to the descending middlings, after the latter have been acted upon by the bolts, as described.

5. The divided wind-trunks *P*, in combination with the valves *r r' s s'*, &c., for controlling the admission of air to, and the currents of the same through, the bolting-chamber, substantially as described.

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Witnesses:

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B. F. SMITH.