2 Sheets--Sheet 1.

A. R. GUILDER.

Middlings Separators.

No. 138,019. Patented April 22, 1873.

Fig. 1

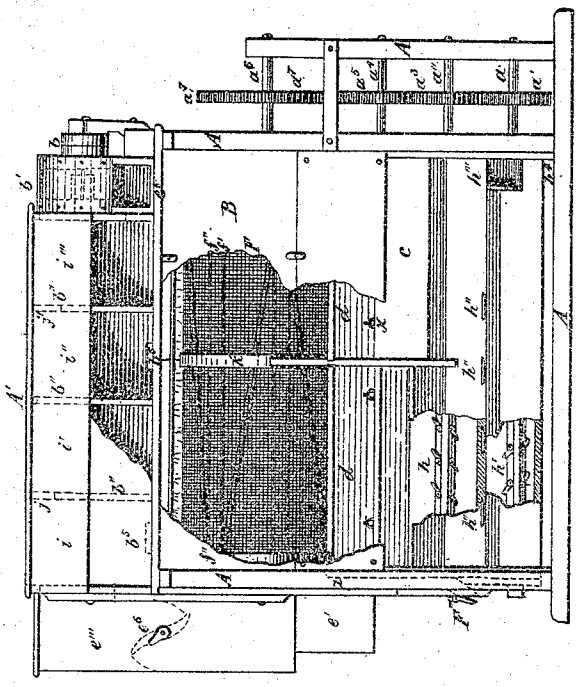


Fig. 6.

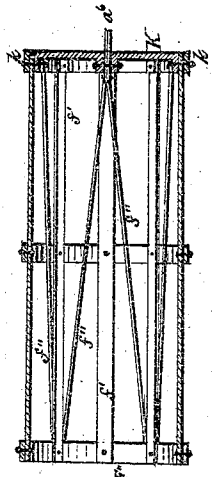
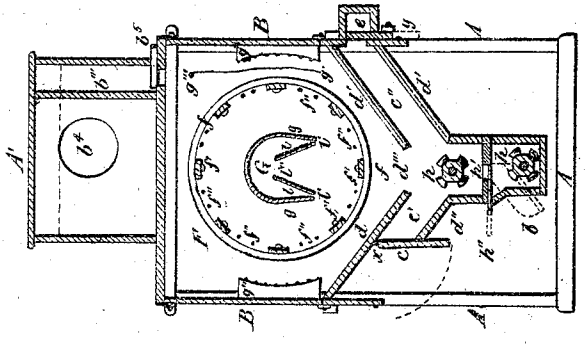


Fig. 4.



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2 Sheets--Sheet 2.

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Middlings Separators.

No. 138,019. Patented April 22, 1873.

Fig. 2.

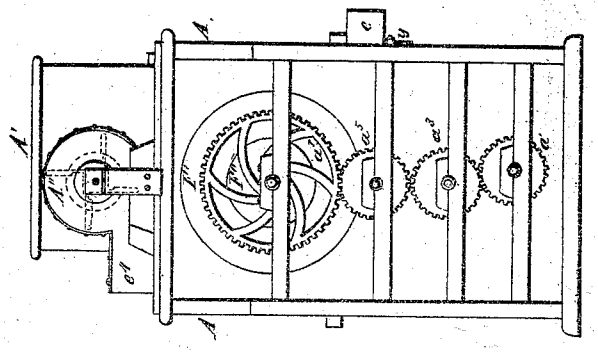


Fig. 3.

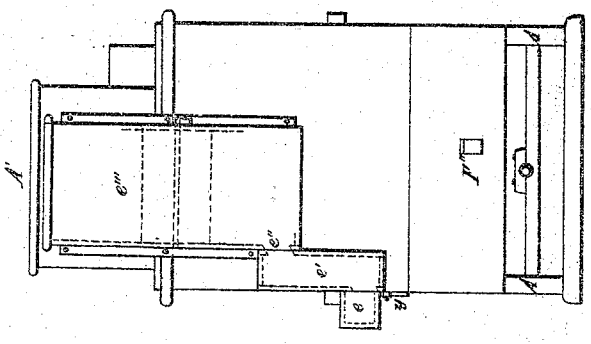
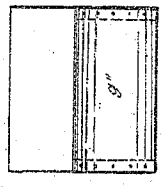


Fig. 5



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UNITED STATES PATENT OFFICE.

ABSALOM R. GUILDER, OF MINNEAPOLIS, MINNESOTA.

IMPROVEMENT IN MIDDLINGS-SEPARATORS.

Specification forming part of Letters Patent No. **138,019**, dated April 22, 1873; application filed January 25, 1873.

To all whom it may concern:

Be it known that I, ABSALOM R. GUILDER, of Minneapolis, in the county of Hennepin, in the State of Minnesota, have invented certain Improvements in Flour-Middlings Separators, of which the following is a specification:

The object of my invention is to rid the flour, after having been passed through the ordinary flour-bolt, from such particles of fine bran and silky substance which it contains; and it consists in the construction and arrangement of the parts of bolt or separator as that all the flour that contains the light and objectionable particles is subjected to a current of air, graded in its force and application, so that such particles are effectually separated from the fine white flour and discharged out of the separator at a different point from the pure flour.

In the drawing, Figure 1 is a side view of the separator with portions of the casing removed to expose the internal parts. Fig. 2 is a view of one end of the separator. Fig. 3 is a view of the opposite end. Fig. 4 is a transverse upright section, and Figs. 5 and 6 detail of parts.

A represents the supporting-frame with the operating parts cased in in the usual way. A′ is an eddy or air chamber divided into different compartments communicating with each division, as will be hereafter described. A″ is a revolving suction-fan in fan-case *b′*, and revolved by pulley *b* on the same shaft with fan A″, and is located at the end of the eddy-chamber, as seen in Fig. 1. B B are removable or swing doors in the casing of the bolt-chest. *b″ b″ b″* are partitions in the eddy-chamber A′. *b‴ b‴* are chambers to admit the air into eddy-chamber from the bolt-reel, the openings into which are closed by the sliding valves b^5 and b^6. b^4 represents an opening in two of the partitions *b‴*. *c c* are swinging doors, hung at *x* to the inclined chute *d*, and, striking against the edge of the inclined casing *d″*, will close the air-passages *c′* when in close contact therewith and gage the amount of air that passes through the machine. *d′ d′* are parallel inclined chutes or deflecting-boards that form air-passages *c″*, which conduct the air into the horizontal air-conduit *e* on the outside of the bolt-chest A. Between the inclined chutes *d* and *d′*, at their lower ends, is an opening, *d‴*, which opening performs two functions, to wit: One to admit the air upward from the ingress-air passage *c′* to the bolt, and the other to conduct the finished flour, as it falls from the bolt-cloth, to the conveyer *h*. *e* is a horizontal air conduit or flue extending longitudinally on one side of the chest A to, and delivering the air into, the upwardly-extending flue *e′*, which communicates at *e″* with a large upright flue, *e‴*. About the center of the upright flue *e‴* is a turn-valve or damper, e^6, which can be turned to admit more or less air through the air-flues and eddy-chamber to the suction-fan and out at exit e^5, and is open while the machine is in operation, but closed when the side doors are open. F is the revolving bolt-reel, of peculiar construction; is put in revolution by means of the train of gear-wheels a^1, a^2, a^3, a^5, and a^7, or by other arrangements, as desired. The bolt-reel F is composed of the head F′ with an open center, in which is inserted the stationary circular head F″, through which the flour to be finished is delivered into the bolt, and to this head F′ are firmly attached the longitudinal ribs *f′* and bands *f*. Shaft a^6, to which the gear-wheel a^7 is attached, has spider K fast on its inner end and within the bolt-reel a short distance, and flanges *k* at their outer ends, to which the ribs *f′* are firmly attached. *f‴ f‴* are truss-braces firmly secured to the flanges *k* of spider K, and going in a diagonal direction to the tail end of the bolt, and are there secured to the head F″, which is a circle and fits in a circular opening in the casing of the frame A. These truss-braces *f‴*, when placed in the position as shown in Fig. 1, will support the bolt-reel and keep it in shape and prevent any sagging or twisting of the reel itself, as the truss-rods are screwed fast to the head F″, which is at the tail of the bolt, and can adjust the center of the reel at the tail end to be in axial line with the center of the shaft a^6. A bolt-reel thus constructed will be strong and durable, will not sag or get out of true, and afford space in the center of the bolt for other improvements and devices that could not be there if a central shaft extended the whole length of the bolt-chest. G is an exhaust or open deflecting air-cylinder placed within and above the center of the bolt-reel, in circular form on its upper

portion, with straight wings *g g* dropping down below the center of the circular part, and has internal, nearly upright but inwardly inclined, plates *l l* leaving at their upper and nearest approach opening *l''*, and at their bottom edges are spaces *l' l'*, between them and the wings *g*, to allow substances that may be drawn up through between the plates *l l* to fall back into the bolt. The air-cylinder is securely attached to the casing or framing at the tail end of the bolt, and extends horizontally nearly the whole length of the bolt-reel. *g'* is a cloth suspended from a roller at *g'''*, so as to strike against the outside of the bolt-cloth and brush off any adhering particles of flour. *g'' g''* are air circular stops formed by an inwardly-projecting frame with fine cloth on the inside or the side toward the bolt-cloth, open at the lower edge and closed at the top, and made concave at their inner sides to nearly fit the outside of the bolt-reel in its revolution, and are attached to the doors B of the bolt-frame A. This air-stop receives the passing current of air from below through the open edge, and it being closed at its top edge the air has to pass through the cloth that covers the inner side and impinges directly against the bolt-cloth, while any heavy substance or good flour that may have been drawn up with the current of air will be stopped in the chamber and fall back upon the chute *d* or *d'*. The bolt-cloth is attached to the reel by means of hoops *k' k'*, which encircle the ribs of the reel and cloth, and are then secured to the ribs, and by releasing the hoops the cloth can be adjusted on the reel, as may desired.

Operation.

The flour or meal being fed into the bolt through head F'', the bolt-reel F and fan A in revolution, as the meal or flour is agitated by the revolution of the bolt-reel, a current of air is drawn under the doors *c*, which are graduated to admit air through passages *c'* into the bolt-chamber through opening *d'''*, and in contact with the bolt, when some of the cool air will pass through the bolt-cloth into the cylinder G, where so much of the air as enters the cylinder G will become nearly still, and so that all the flour and heavy material will fall back, striking the plates *l*, and go through apertures *l''* into the bolt again, while the air that has passed upward through the bolt-cloth into the bolt and into the cylinder G will be drawn into air-flue *e''*; thence into flue *e'''* through opening b^4 into eddy-chamber *i*; thence through opening *j* in top of partition *b''* into eddy-chamber *i'*; thence through another partition, *b''*, by an aperture like b^4, into eddy-chamber *i''*; thence through opening *j'* into a third partition, *b''*, into chamber *i'''*; and thence through the casing of the bolt into the fan-chamber, and is forced out at egress-aperture e^5 free from flour or valuable qualities pertaining to fine flour only charged with the silky dust that is lighter and darker than the flour. Air that goes up the passages *c''* is let into horizontal conduit *e* by the slides or valves *y y*, which will control and graduate the quantity passed through conduit *e*, which empties its passing air into the upright flue *e'*, where it mingles with and passes on through the eddy-chamber, and is discharged from the same by the fan along with the air that has passed through the bolt F and cylinder G. The cool air that passes into the bolt-chamber at the sides of the bolt and into stops *g''* at *o*, and thence into the upper part of the bolt-chamber, where it finds an exit through openings that are graduated by slides b^5 and b^6, which admit the air into the eddy-chamber, passes through opening controlled by slides b^5, enters into compartment *i'* by way of flue *b''* through partition *b''* at opening *j*, and mingles with the air passing through the eddy-chamber, while that which passes through opening controlled by slide b^6 goes into compartment *i'''* through opening *j'* in partition *b''*, and then mingles with the current of air passing through the eddy-chambers. The flour that has passed through the meshes of the flour-bolt will fall upon the chutes *d* and *d'* through space *d'''* into a conveyer-trough, when the conveyer *h* will move it and deliver the graded flour out of either chute *h'''* or h^4, the finest flour at *h'''*, and the coarser quality at h^4, always regulated by the slides *h' h'' h''* *h''* between the conveyer *h* and *h'*, as may be desired. The coarser and lighter material that does not pass through the bolt-cloth or go away with the current of air will go out at the tail end of the bolt into passage Z and out at exit F'''.

By this construction and arrangement of flour-bolts every particle of the flour is subjected to a current of cool air, whether the flour is in the bolt-chamber, in the bolt, or falling from the bolt after having been bolted into the conveyer-trough to be conveyed out of the bolt-chest, and these three distinct currents of air are severally controlled by slides or valves so that each one or all can be graduated according to circumstances, and thereby produce a perfection in this regard heretofore unknown.

Having thus described my invention, which is an improvement upon patent No. 127,413, dated June 4, 1872, what I claim, and desire to secure by Letters Patent, is—

1. The bolt-reel F, constructed with the short shaft a^6, spider K, ribs *f'*, truss-rods *f''*, and head F'', in the manner and for the purposes substantially as described.

2. The arrangement, in a flour-bolt, of the swinging doors *c*, air-passage *c'*, aperture *d'''*, stops *g''*, openings controlled by slides b^5 and b^6, eddy-chamber A' with compartments *i*, *i'*, *i''*, and *i'''*, and openings *j* and *j'* in partitions *b''*, with the exhaust-fan A'' and eduction-air opening e^5, in the manner and for the purpose described.

3. The arrangement, in a flour-bolt, of the swinging doors *c*, air-passage *c'* and *c''*, horizontal air-conduit *e'*, flues *e'*, *e''*, and *e'''* having valve e^6 therein, eddy-chamber A', with compartments *i*, *i'*, *i''*, and *i'''*, and openings *j*

and j' in partitions b'', with the exhaust-fan A'' and eduction-air opening e^5, in the manner and for the purposes described.

4. The air-cylinder G, when constructed and arranged, with relation to the bolt-reel F, eddy-chamber A', exhaust-fan A'', and air-exit e^5, substantially as shown.

5. The eddy-chamber A', composed of compartments i, i', i'', and i''' and openings j and j' and ingress-air chambers b''' by way of apertures controlled by slides b^5 and b^6, when arranged upon the top of a bolt-chest, A, and used in combination with a revolving bolt-reel, F, and air-exhaust fan A'', in the manner substantially as described.

ABSALOM R. GUILDER.

Witnesses:
CHAS. H. WOODS,
R. S. BRYANT.