(Model.) 2 Sheets—Sheet 1.

H. J. LIVERGOOD.

MIDDLINGS PURIFYING MACHINE.

No. 266,296. Patented Oct. 24, 1882.

Fig. 1.

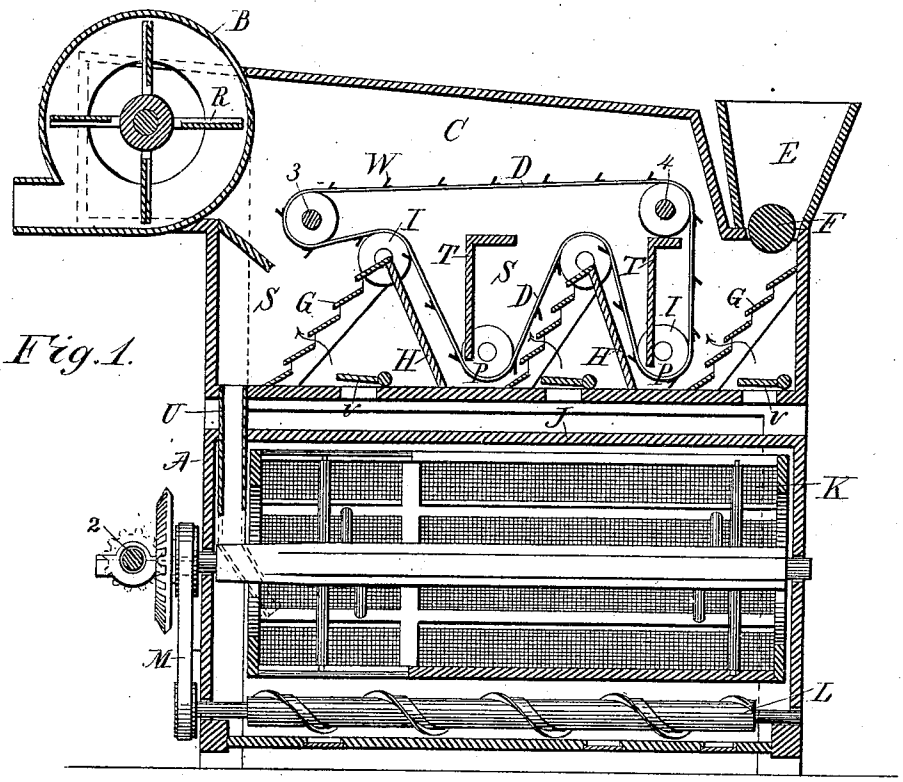
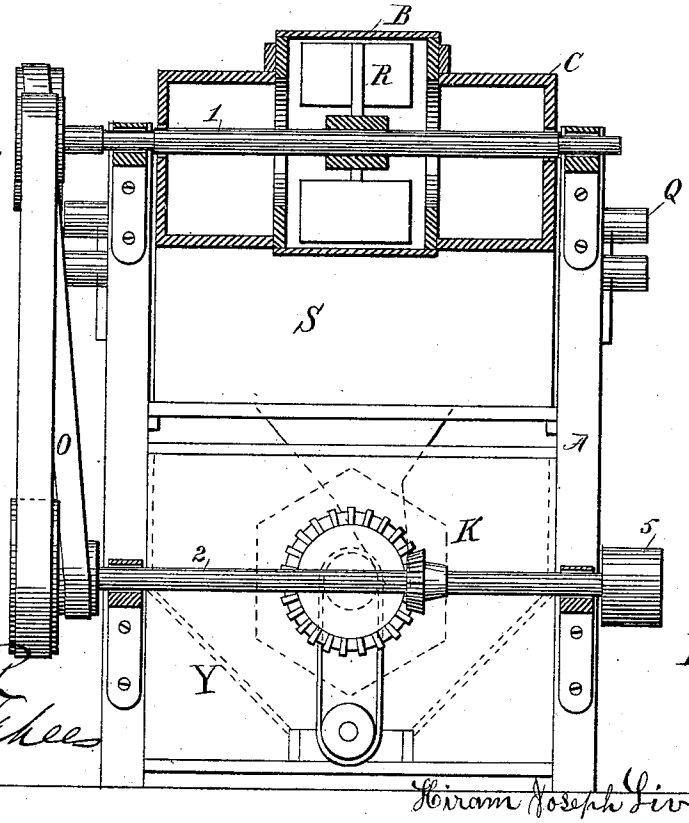


Fig. 2.



Witnesses.

Inventor.

Hiram Joseph Livergood

N. PETERS. Photo-Lithographer, Washington, D. C.

(Model.) 2 Sheets—Sheet 2.

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Fig. 3.

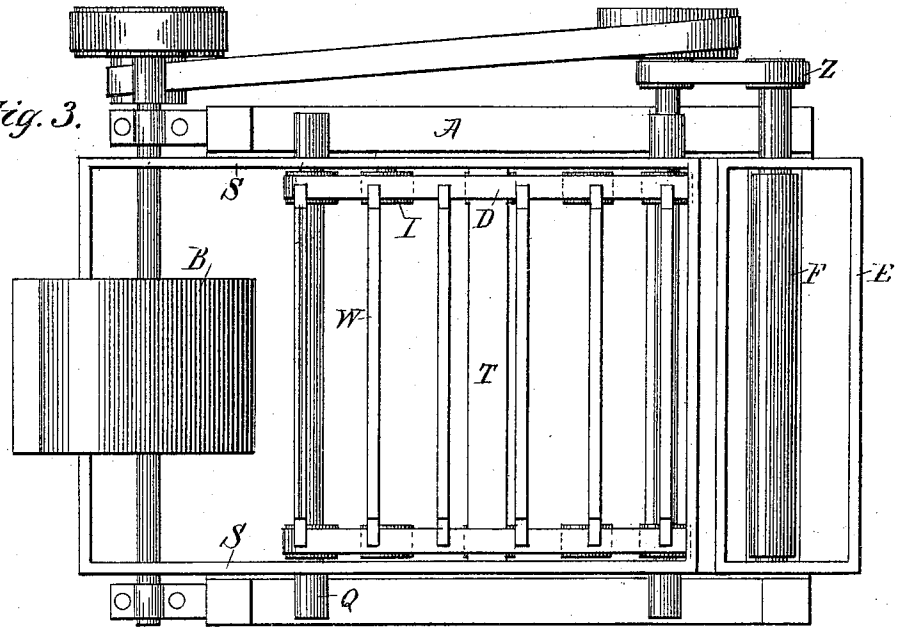


Fig. 4.

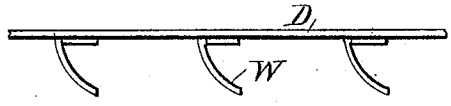


Fig. 5.

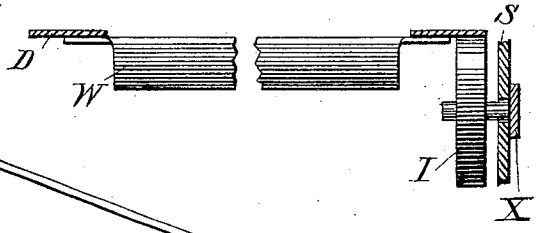


Fig. 6.

Witnesses.

Inventor.

Hiram Joseph Livergood

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

HIRAM J. LIVERGOOD, OF BRANTFORD, ONTARIO, CANADA.

MIDDLINGS-PURIFYING MACHINE.

SPECIFICATION forming part of Letters Patent No. 266,296, dated October 24, 1882.

Application filed November 12, 1881. (Model.)

To all whom it may concern:

Be it known that I, HIRAM JOSEPH LIVERGOOD, of the city of Brantford, in the county of Brant, in the Province of Ontario, Canada, have invented a new and useful Middlings-Purifying Machine, of which the following is a specification.

My invention relates to improvements in middlings-purifying machines in which a suction-fan and endless carrier or elevator operate in conjunction with a separating-chamber and a rotatory reel. The object of my improvement is to provide a mechanism by which pulverulent impurities and fine particles of bran and fiber may be removed from the good middlings without waste, and the flour thus rendered pure and white. These impurities can only be removed by currents of air and before the middlings come to the bolting-cloth for further separation. If they are not removed before by the current of air proper, they will pass through the bolt-cloth with the middlings. The presence of these particles in the flour gives it a darker shade and materially lowers its grade and value in the market. I attain this object by the mechanism illustrated in the accompanying drawings, in which the same letters of reference indicate the same or corresponding parts.

Figure 1 is a vertical longitudinal section of a machine embodying my invention. Fig. 2 is a transverse vertical section through the fan; Fig. 3, a top plan view as the machine appears after the removal of the air-chamber. Fig. 4 is a detail showing an end view of a bucket and edge view of one of the belts of the elevator hereinafter described. Fig. 5 is a detail view of bucket and belts passing over a shaft, with the buckets adapted to pass between the wheels thereof; Fig. 6, a detail view, in perspective, of the separating-chamber.

A designates the frame upon which the working parts are mounted.

B is a cylindrical fan-case. In it is placed a rotatory fan, R. The fan is mounted on the shaft No. 1, said shaft having a horizontal position and extending entirely across the machine and overhanging to receive its driving-pulley. From this pulley the whole machine derives its motion. The fan R may be of usual construction.

C is an air-chamber, into which the current created by the fan proper is drawn to the eye of the fan with the pulverulent impurities, fine bran, and fiber, which are thus wafted out of the mill or into a blast-room. The air-chamber C is placed on the top of the separating-chamber S, so that it can be removed at will. It is roomy, and thus the good middlings that are slightly raised by the current of air drop again to the bottom of the separating-chamber S. In this air-chamber are placed two horizontal shafts, with two pulleys or wheels attached to each shaft, over which the endless belt or chain D passes. These shafts are No. 3 and No. 4, and are plainly shown in drawings, Fig. 3, also in Fig. 6. These shafts run in boxes fastened to the sides of the separating-chamber S, as shown in drawings, Fig. 6. No. 3 is an idle shaft. On this two wheels are placed for the purpose of guiding the belt or chain D. Shaft No. 4 derives its motion from shaft No. 2 by a belt, O. This shaft drives the endless carrier or elevator-belt D, which may be either a belt or sprocket-chain. The latter is preferable. The feed-roller F derives its motion from shaft No. 4. As the middlings are fed out of the hopper E by the feed-roller F they fall upon the first inclined slat-work G, which is placed in the separating-chamber S. They now fall by their specific gravity into the hopper P, and are then caught by the bucket W and raised again by the endless carrier or elevator-belt D, to which the bucket is made fast. The bucket passes close to the inclined board H. The middlings, having now ascended to the top of the inclined board, are emptied out of the buckets *w*. They now pass down over the second inclined lattice-work G by their specific gravity to the hopper P. This same operation is repeated successively over each lattice-work until the middlings reach the opposite end of the machine. The belts or chains D D pass over the top of the pulleys or wheels on the shafts No. 3 and No. 4, thence down under the idle pulleys or wheels I I in the hopper P. They now rise and pass over the top of the idle pulleys or wheels I I, which are located just at the top of the inclined boards H. The bucket W passes between the wheels I I, as shown in drawings, Fig. 5.

Fig. 5 shows an end view of the sides of the separating-chamber S.

X are studs, which pass through the sides of

the separating-chamber, and are fastened to its sides by screws. On them the idle-wheels or pulleys I I run, and they thus take the place of through-shafts. The position of these studs is more plainly shown in Fig. 6.

Q are brackets or boxes for shafts 3 and 4 to run in. These brackets or boxes are shown in Fig. 6, where it is also shown how they are fastened to the sides of the separating-chamber S.

The carrier or bucket *w* may be made of wood, or, what is better, sheet-iron. If made of wood, it will be made concave or hollow on the front side and fastened with a screw to a thin piece of iron attached to and projecting beyond the belt D. If a sprocket or "pitch" chain is used in place of a belt, the thin piece of iron may be looped through the link. I prefer the bucket made of sheet-iron. I form the iron into a bucket, and let the end project out a short distance to fasten to the belt D D; or, if a pitch-chain is used, I loop the projecting end through a link, and, bending it over, fasten with a rivet. By this construction the belts D D, with the buckets or carriers, pass under and over the pulley I I without any interference, and have a continuous travel.

H H H are three inclined boards for the purpose above specified. Adjoining these boards is the slat-work or inclined series of slats G G G, having a greater angle than the inclined boards. As the middlings pass down over the slat-work a current of air, coming in between the deck J and the bottom of the separating-chamber S, and up through the openings in the bottom of the chamber, and through the slat-work, passes through the falling middlings. This operation is repeated as the middlings pass over each slat-work incline until they reach the end of the machine. By this means I attain the advantage of operating on the middlings with a controllable current of air at each stage of the operation. A greater number of air-currents may be brought into operation upon the middlings than has heretofore been done without waste. In this way the pulverulent impurities, fine bran, and fiber are separated before the middlings enter upon the bolting-cloth.

For the purpose of controlling the air-current on the middlings four valves, V V V V, are used—a valve for each opening. The number of these valves will be in proportion to the number of slat-work inclines, which may be more or less. These valves are located in the bottom of the separating-chamber shown in drawings, Figs. 1 and 2. They may be operated by any mechanical device suitable for the purpose. A hole may be made in the side of the separating-chamber for the purpose of inserting the hand to move them.

The separating-chamber S is shown in Figs. 3 and 6. The inclined slat-work G, the inclined boards H, the check-boards T T T, and idle-pulleys are all arranged in this separating-chamber. The check-boards T T T are for the following purpose: As the current of air passes between the slats of the slat-work incline and through the falling middlings the heavy particles strike the check-boards and again fall into the hoppers P P P. They are again lifted by the bucket W and passed over the next slat-work G and again subjected to currents of air. The middlings have now undergone all the suction or other air-current separation that is required. They now pass down the spout U, which delivers them into the head end of the reel K. This reel is made with sieves interchangeable at the head of the reel, as shown in drawings, Fig. 1, by little dots, and with cross-pieces, which extend from one rib to the other. The ribs of the reel are first grooved out or recesses made in them for receiving the interchangeable sieves. The sieves are covered with bolting-cloth and firmly fastened to the ribs of the reel. By this means changes in the cloth can be made much quicker and with less expense than by changing the whole cloth of the reel. The highest numbers of the cloth are used at the head of the reel, decreasing in number as it reaches the tail of the reel. A current of air may be used or not in combination with the cloth separation of the middlings. A vibrating sieve may also be used.

J is a partition dividing the separating-chamber S and the reel-chest. If a vibrating sieve is used to further separate the middlings in place of the reel K, the separating-chamber will sit flat on the partition J, and holes will be cut through directly opposite the holes in the separating-chamber for the purpose of admitting air to the slat-work inclines. When the reel is used there will be an intervening space between the deck J and the bottom of the separating-chamber for the purpose of admitting air through the slat-work inclines to the exhaust-fan R.

Underneath the reel is a hopper, in which the middlings that are sifted through the reel or vibrating sieve are caught. In the bottom of this hopper is placed a conveyer, L, by which the middlings are all carried to one end. On the bottom of the conveyer are suitable cut-offs, by which the operator may grade the middlings to any extent. M is a belt running from the reel-shaft and giving motion to the conveyer L. If a vibrating sieve is used instead of a reel, the conveyer will be driven from shaft 2 by a belt running on a quarter-twist. A pair of miter-wheels may be used, and in that case the belt would be straight.

N is a belt running from horizontal shaft No. 2 to fan-shaft No. 1 and giving motion to the fan R.

O is a belt on the same side of the machine, running from shaft No. 2 to shaft No. 4, plainly shown in Fig. 3 and shown broken in Fig. 2. Belt O gives motion to shaft No. 4, which drives the endless carrier or elevator belt D D. The belts D D are shown in drawings, Fig. 3, a top view showing how the buckets are fastened to the belt.

Fig. 4 is an edge view of the belt and an end view of the bucket, showing the attachment of the bucket W to the belts D D.

Fig. 5 shows partial view, in section, of separating-chamber S, also studs X X X, passing through the sides of the separating-chamber. These studs form the axle of the idle wheels or pulleys I I. Fig. 5 also shows an edge view of idle-wheels, with the belts D D and buckets attached, passing over the top of wheels I I. The buckets W pass between the wheels I I.

I am aware that prior to my invention middlings-purifying machines have been made with suction-fans and bolting-cloth in conjunction with each other for separating middlings. I therefore do not claim such a combination, broadly; but

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The combination of air-chamber C, rotating shafts 3 and 4, combined boxes and brackets Q, pulleys or wheels mounted on said shafts, endless belts D D, buckets mounted on said belts, belt Z, and feed-roller F.

2. The combination of fan B, separating-chamber S, inclined series of slats G, inclined boards H, endless belts D D, and buckets and the check-boards T.

3. The combination of fan B, separating-chamber S, inclined series of slats G, and inclined boards H, forming V-shaped hoppers P, in connection with said slats, the series of slats G being less inclined from the perpendicular than the boards H.

4. The combination of hoppers P, fan B, chamber S, endless chains or belts D D and buckets, and idle-pulleys I I, upon which the belts are arranged to give it a zigzag course corresponding to the hoppers.

5. The combination of air-chamber S, endless belts D D and buckets, hoppers P P, having one side formed of slats, perforate deck J, and suction-fan B.

6. The combination of fan B, belts and buckets D D W W, air-chamber S, hoppers P, perforate deck J, and valves V V, for regulating the upward current of air.

HIRAM JOSEPH LIVERGOOD.

Witnesses:
B. F. FITCH,
JAMES E. LEES.