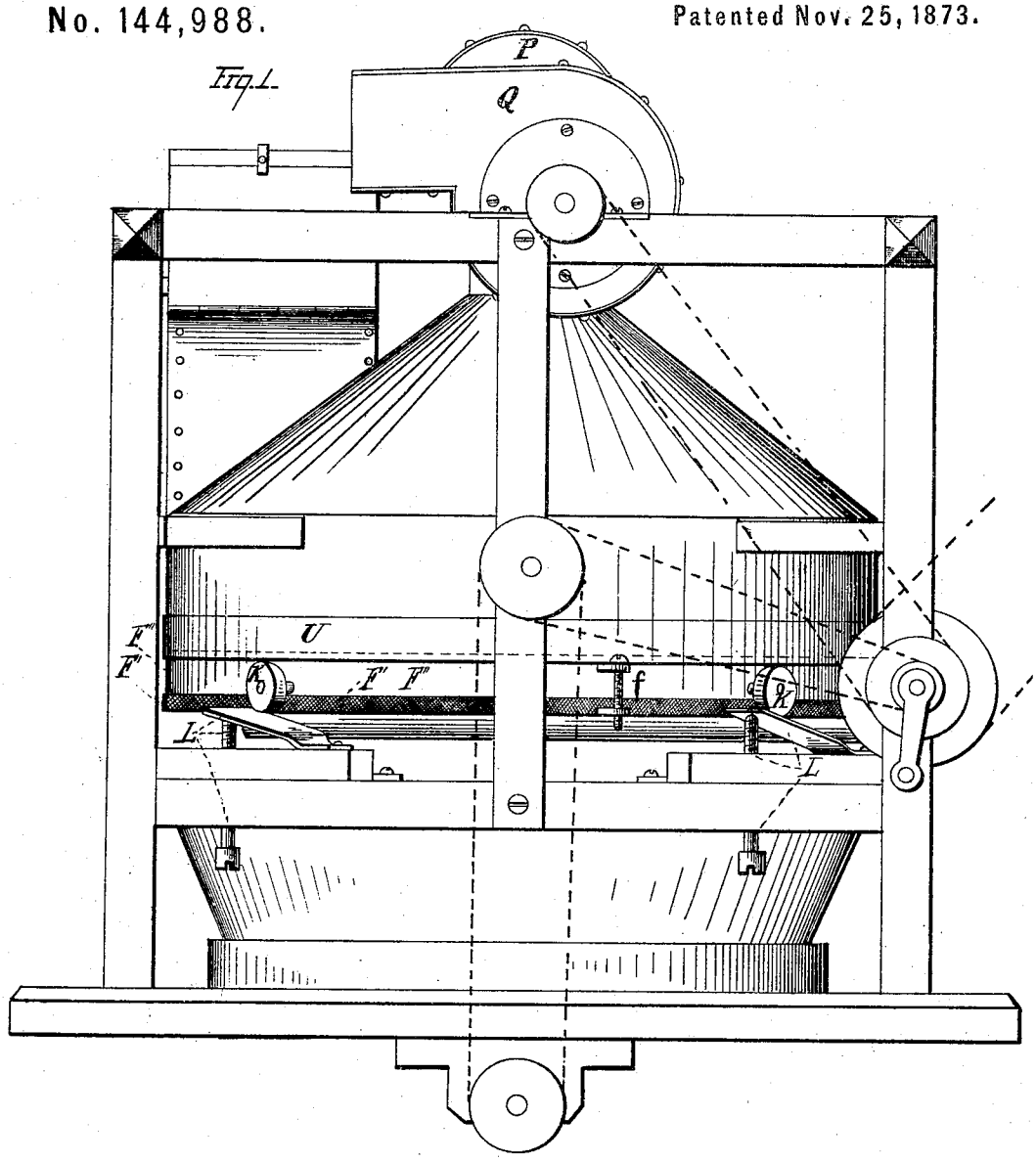
4 Sheets--Sheet 1.

E. N. LACROIX.

Middlings-Purifiers.

No. 144,988. Patented Nov. 25, 1873.

Fig. 1.



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4 Sheets--Sheet 2.

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Fig. 2.

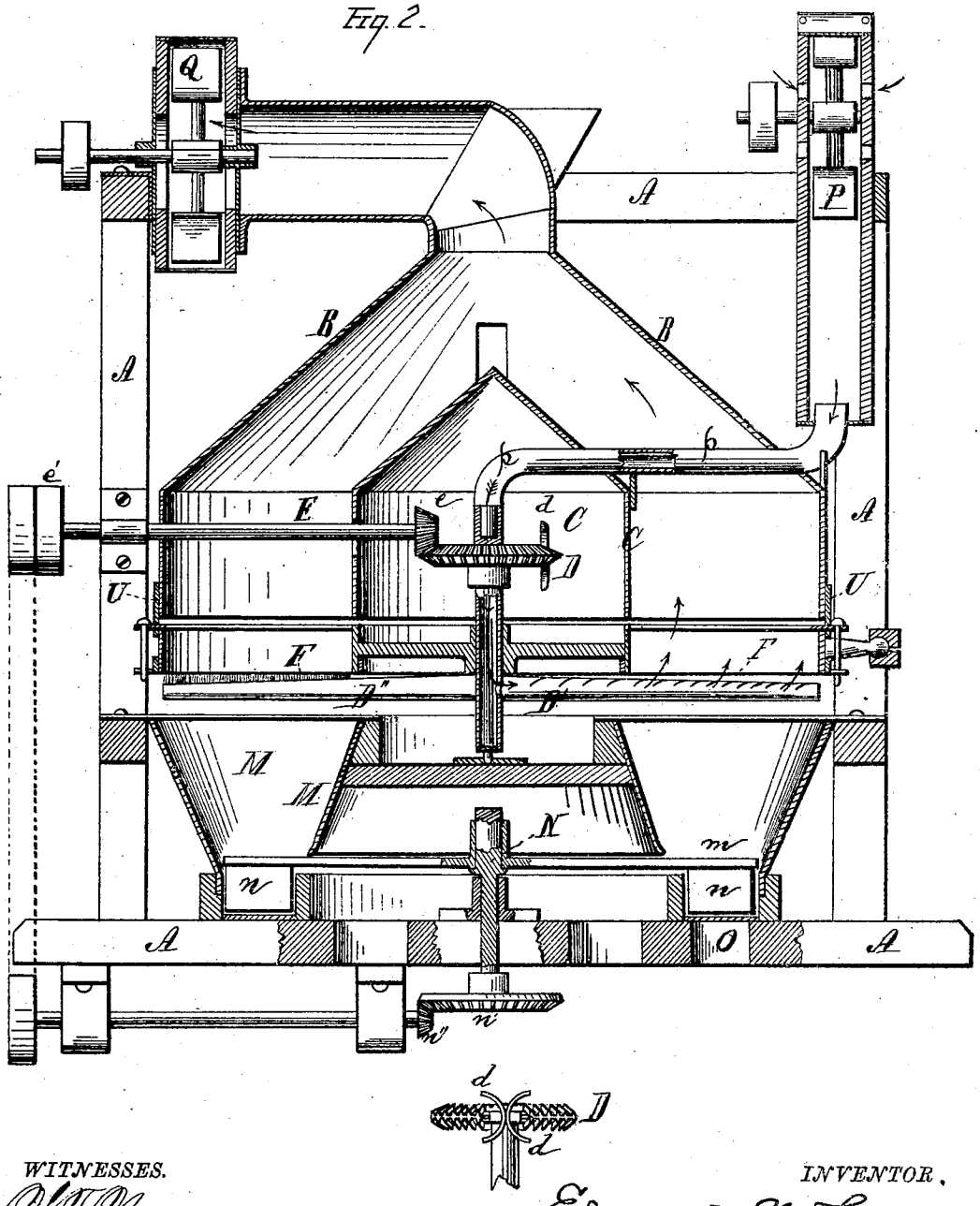

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Fig. 3.

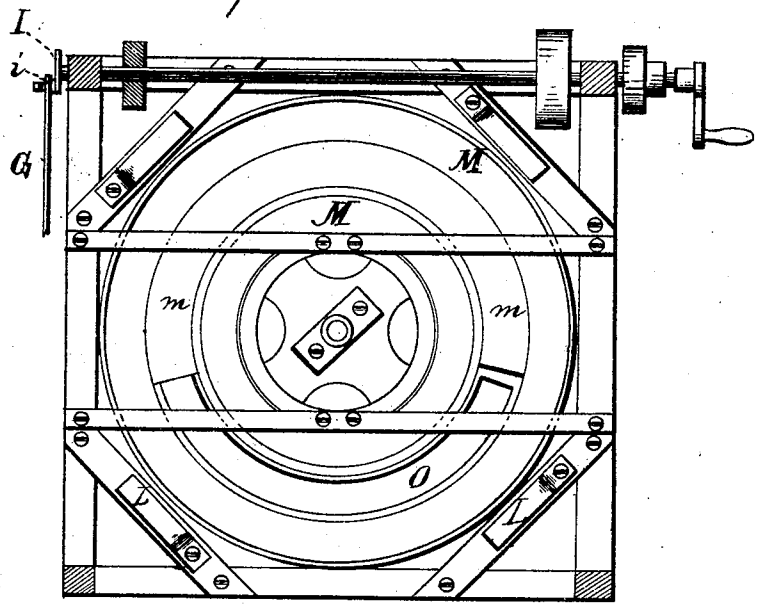

Fig. 4

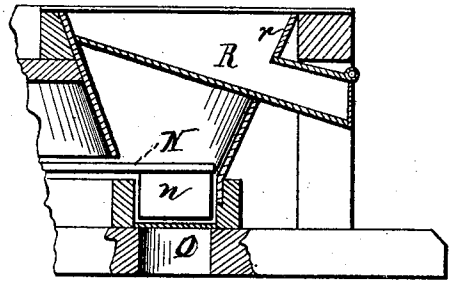

Fig. 5

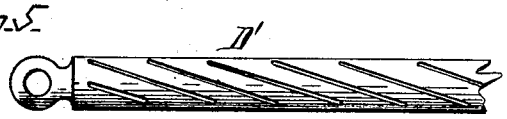

Fig. 5½

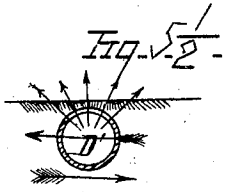

Fig. 6.

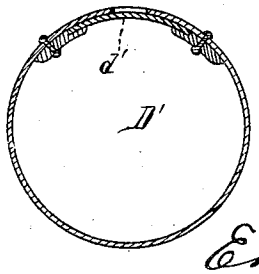

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Fig. 7.

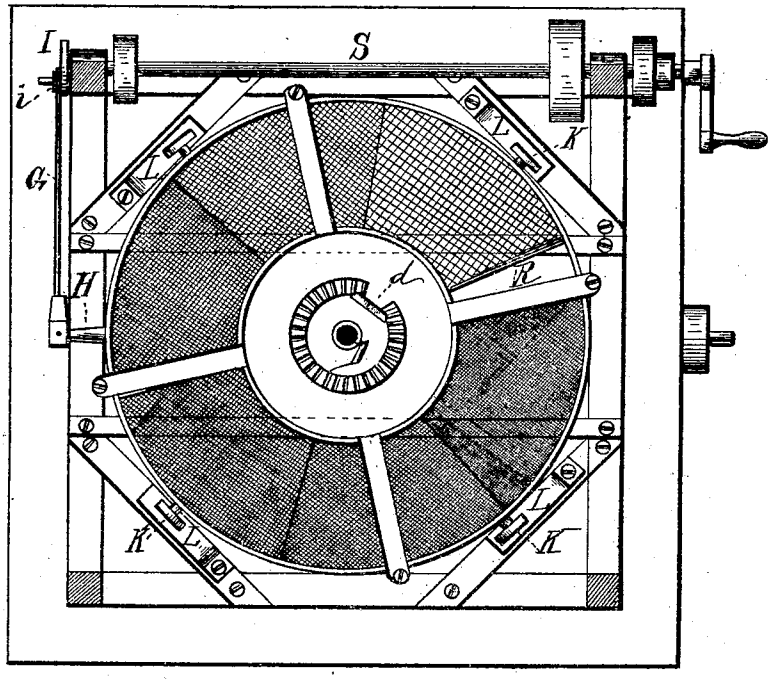


Fig. 8.

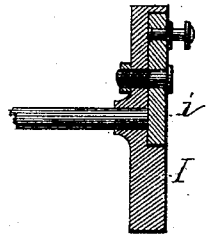


Fig. 9.

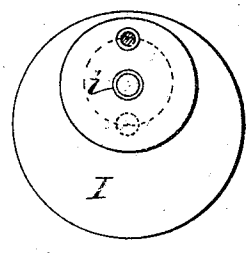
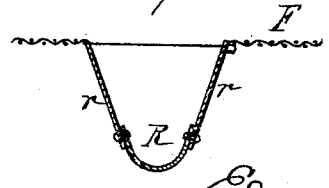


Fig. 10.



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UNITED STATES PATENT OFFICE.

EDMUND N. LACROIX, OF MINNEAPOLIS, MINNESOTA.

IMPROVEMENT IN MIDDLINGS-PURIFIERS.

Specification forming part of Letters Patent No. **144,988**, dated November 25, 1873; application filed November 22, 1873.

To all whom it may concern:

Be it known that I, EDMUND N. LACROIX, of Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Middlings-Purifiers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it pertains to make and use it, reference being had to the accompanying drawings which form part of this specification.

My invention relates to improvements in middlings-purifiers. Its object is to so construct the sieve and other parts that the middlings shall be longer submitted to the purifying action of a suction-fan above, and a moving blast under, the bolt-cloth; and also a reciprocating annular sieve, having a rising and falling motion to permit a current of air to rise freely through the bolt-cloth to facilitate the ascension of the fibrous matter, and by that means to more throughly purify the middlings; and, in connection therewith, mechanism for operating the different parts of the machine, as will hereinafter appear.

In the drawings, Figure 1 is a view, in side elevation, of my invention. Fig. 2 is a central vertical section taken at right angles to Fig. 1, and showing the cam-wheel D *d* in a separate view below. Fig. 3 is a plan view of my invention with all that portion of the mechanism above the lifting-cams removed. Fig. 4 is a separate view, in half-section, of the conical collecting-boards beneath the screen, taken through the refuse-discharge spout. Fig. 5 is a view of the air-pipe, showing one method—by uniform and equal openings—of forcing a double blast upon every part of the screen. Fig. 5½ is a diagram, showing my air-tubes in cross-section, and illustrating the direction of the air-currents as they are projected against the bolt-cloth; showing also the effects of this peculiar blast upon the pendent fibers of the bolt-cloth. Fig. 6 represents a sliding cut-off that may be placed within a pipe by which the size of the blast-openings may be varied at pleasure. Fig. 7 is a plan or top view of sieve. Figs. 8 and 9 are views, in section and plan, of a device for adjusting the length of crank-stroke. Fig. 10 represents a cross-section of my discharge-spout, showing the flexible connection of the same with the screen to accommodate the motions of said screen.

A is a frame of suitable construction, which supports the mechanism complete. B is a cylindrical chamber, terminating in a conical top or dome. C is an inner concentric conically-topped cylinder, that protects the cam-gearing D *d*, and the driving-pinion *e* at the end of the shaft E, and by which the perforated air-pipe and brush D′ D′ are made to reciprocate beneath the screen F. The screen F is given a shaking motion by means of an arm, G, Fig. 7, attached to the shaking-bar H of the screen by a ball-and-socket joint at one end, and operated by means of a disk, I, upon the driving-shaft S, at the other end. While the shaking motion is given to the screen F the same is made to rise in its forward motion, pitch the material upward and forward, and then drop back from under the same, so that they will fall on an advanced portion of the screen. This is effected by means of small rollers or lugs K, fastened to the sieve-frame, that run or slide upon rising and adjustable cams L. When the material is thus tossed up off the screen the air-blast is but little impeded in its passage through the meshes of the sieve; and, while descending, this blast so stirs up the material that all light fibrous matter is driven out, and the middlings permitted to fall in a graded state, according to the specific gravity of their various portions.

As the middlings fall through the sieve F they are directed, by the collecting-boards M, into the gutter *m*, and are here caught by the scrapers *n* of the revolving shaft N, and discharged out of a discharge-port, O. The scraper-shaft N is driven by means of bevel-gearing *n′ n″*, suitably attached to the driving mechanism.

A blow-off fan, P, forces air, through the pipe *p* and reciprocating-pipe D′, upon the under side of the screen F in thin jets or blades, while the suction-fan Q exhausts the air from the chamber above the screen.

The sieve or screen is composed of cloths of different degrees of fineness, varying from a fine mesh at the head to a coarse one at the tail, as shown in Fig. 7. At the tail-end is a discharge-port, through which the offal is discharged. The sides of this port are connected, by flexible cloths *r*, to the sides of the spout R beneath, as shown in Figs. 4 and 10. These flexible cloths will yield as the screen is vibrated.

The screen may be level throughout; or it may either rise or fall, as may be desired, from the head to the tail, according to the rate or rapidity with which it is desired to carry the material forward; and, if desired, the screen may be given a downward pitch from the periphery to the center in order to counteract the slight centrifugal action caused by the slight rotary action in shaking.

The screen is kept taut by a drum-head stretching device, as follows: The screen is attached to a hoop, F′, and the concentric rim or drum F″ is placed within the hoop upon the screen, and a tension is produced by set-screws *f* passing through the lugs attached to the frames F′ F″. (See Fig. 1.) The reciprocating cam-gear D is cogged both on its upper and lower sides, and is operated by a pinion, *e*. When the wheel D is so far revolved that the cam *d* comes in contact with the pinion *e*, the pinion is carried down through the opening shown in the figure below, (Fig. 2,) and travels upon the under set of cogs, causing the wheel D, the pipe D′, and brush D″ to travel in an opposite direction. This is desirable in all cases, but is necessary in the machine shown, because of the interposition of flexible walls, *r*, Fig. 10, beneath the screen.

Instead of a pipe and brush, I may dispense with the brush and employ another pipe. The pipe, Figs. 5 and 5½, is provided with slits or openings, so made that in the passage of the pipe by any point in the screen a double blast is thrown upon it, and the blast will, in passing any given point, be directed toward the point from all the directions, as shown by Fig. 5½.

It is well known that in sifting middlings the meshes are often partially filled with fine fibrous substances that project through beneath, and a direct blast upon such a mesh might simply fold the fiber against the screen so as effectually to stop up, instead of to open, the mesh; but, as shown in Fig. 5½, should such a thing happen, the diagonal blasts would again open them and force a blast through the meshes, and what meshes fail to open in the forward motion would be opened in the return motion of the reciprocating pipe.

If the blasts of air from the pipe D′ are too thick or broad, the device shown in Fig. 6, of the sliding similarly-slotted plate *d′* upon the interior, can be adjusted as desired. In order to give an adjustable length of stroke to the shaker-arm of the screen, I employ a device shown in Figs. 8 and 9.

On the end of the drive-shaft S I put the crank-wheel or disk I, and upon its face is secured another wheel or disk, *i*, that carries the crank handle or attachment. By turning this disk *i*, the length of the crank-arm, and, consequently, the stroke of the sieve, may be varied from the greatest, as shown in Fig. 9, to nothing at all, which would be the case with the disk *i* turned until the handle was at the center of the large disk I, as shown by dotted lines.

The flexible walls *r*, connecting the spout R, Fig. 10, with the sieve prevent the air from passing up through the discharge-port at the tail of the sieve.

In order to prevent air passing in above the sieve around the top of the drum F″, because of the suction, I employ a band, U, of india-rubber or other flexible material, as shown in Figs. 1 and 2, that covers over the intervening space.

I lay no claim here to the broad combination, with a screen or sieve, of a suction over it and an air-blast beneath it, as that forms the subject-matter of a previous application of mine.

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

1. An annular sieve constructed and operated as described, the material to be acted upon traveling over the same in the path of a circle from head to tail.

2. The combination, with an annular sieve, constructed as described, of mechanism for imparting a reciprocating or vibrating motion to the same, substantially as and for the purpose described.

3. The combination, with an annular reciprocating or vibrating sieve, of mechanism for imparting a rising-and-falling motion to the same, substantially as and for the purposes described.

4. The combination, with an annular reciprocating or vibrating sieve, of an automatic cleaning device underneath the same for keeping the meshes of the cloth clear.

5. The combination, with a sieve or shaker, of mechanism for imparting a reciprocating rotary motion to the devices for cleaning the meshes of the cloth.

6. The combination, with an annular reciprocating or vibrating sieve, of a suction-blast, substantially as and for the purposes described.

7. The combination, with an annular reciprocating or vibrating sieve, of an air-blast underneath the same, substantially as and for the purpose described.

8. The air pipe or pipes D′, constructed with diagonal openings, with or without slides *d′*, substantially as and for the purpose specified.

9. The combination, with the chamber B and annular sieve F″, of the flexible ring or band U, for the purpose specified.

10. The combination, with an annular reciprocating sieve, of discharge-spout R and flexible connections *r*, substantially as and for the purpose described.

In testimony that I claim the foregoing I have hereunto set my hand this 21st day of November, 1873.

EDMUND N. LACROIX.

Witnesses:
WELLS W. LEGGETT,
ACLAND BOYLE.