

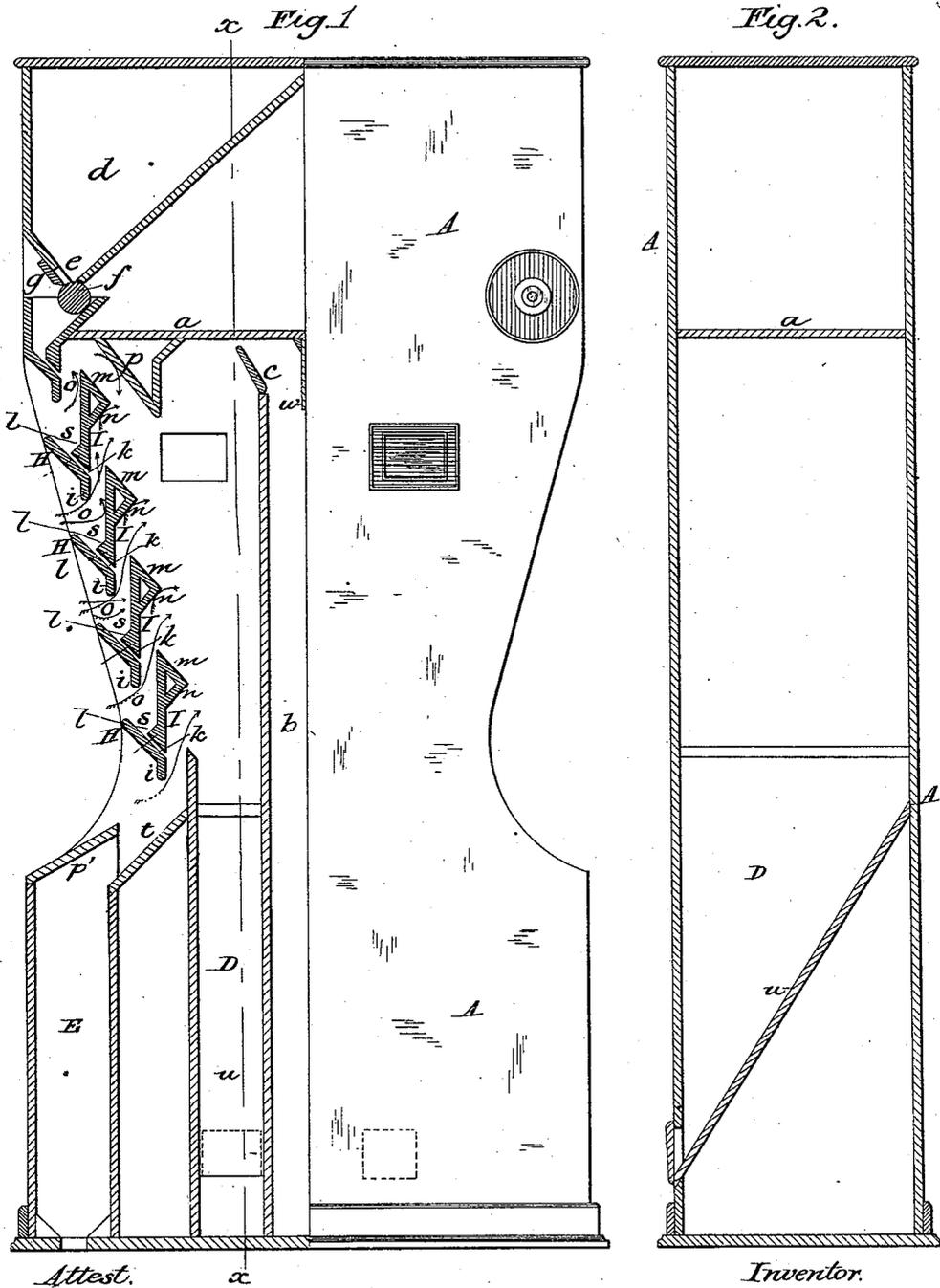
(No Model.)

2 Sheets—Sheet 1.

W. D. GRAY.
MIDLINGS PURIFIER.

No. 251,216.

Patented Dec. 20, 1881.



Attest.
Sidney P. Hollingsworth
Walter S. Dodge,

Inventor.
W. D. Gray
By Dodge & Co.
Atty.

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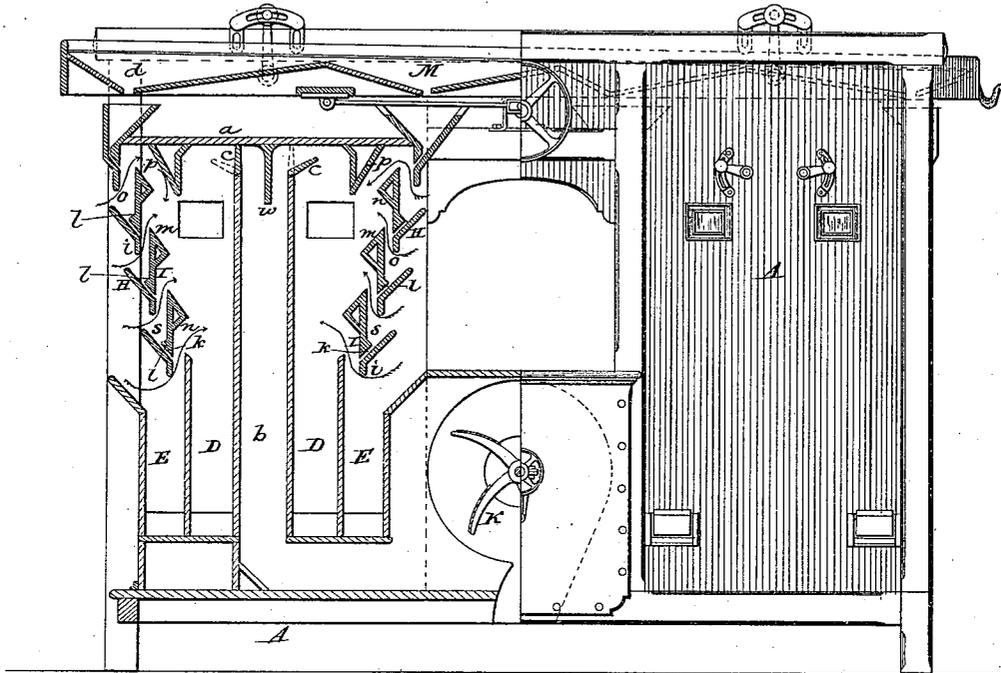
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Fig. 3



Attest.

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UNITED STATES PATENT OFFICE.

WILLIAM D. GRAY, OF MILWAUKEE, WISCONSIN.

MIDDLINGS-PURIFIER.

SPECIFICATION forming part of Letters Patent No. 251,216, dated December 20, 1881.

Application filed December 2, 1880. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM D. GRAY, of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain Improvements in Middlings-Purifiers, of which the following is a specification.

My invention relates to that class of machines in which the material passes down over a series of shelves or through a series of hoppers subject to the action of an ascending current of air, which carries off the light impurities, but permits the heavy impurities and middlings to fall into separate chambers in the base of the machine.

The object of the invention is to do away with the numerous valves, dividers, and other adjustable devices hitherto required in all successful machines of this class, and which are a source of much trouble and annoyance, besides rendering the attention of a skilled operator necessary.

My invention consists in the construction and arrangement of the various stationary shelves and other parts hereinafter described.

The machine may be made with one, two, or four series or columns of purifying devices, all communicating with a single fan or air trunk, and may be made with or without a grading-screen at the top.

The accompanying drawings represent my machine in two forms.

Figure 1 represents a side elevation of a machine containing two series or columns of purifying devices, one side of the machine, which is a duplicate of the other, being shown in section. Fig. 2 represents a vertical cross-section of the same on the line *x x*. Fig. 3 represents an elevation, one-half in section, of a machine containing four series or columns of devices and a grading-screen.

Referring to Figs. 1 and 2, A represents an upright casing, closed at all points except those hereinafter specified. Near the top of the machine there is a horizontal partition, *a*. In the middle of the body there is a vertical air trunk or passage, *b*, extending from the foot nearly to the top partition, *a*, and having at its upper end two hinged valves or regulators, *c*, opening toward the respective sides of the machine, and serving to control the force and volume of

the air-currents which are drawn through the sides of the body into the trunk *b*. An exhaust-fan or other air-exhausting apparatus will be connected with or mounted in the foot of the air-trunk *b*. In the top of the body, above the partition *a*, there are two hoppers or a double hopper, *d d*, inclining downward toward the two sides of the machine, and provided near each side with a feed opening or throat, *e*. Beneath each throat there is a feed-roll, *f*, and a gate, *g*, to regulate the rate of feed.

In each side of the machine, beneath the feeding devices, I arrange, one above another, a series of pockets, each of which serves to check or retard the descending material, spread the same into a thin sheet, and deliver it through the incoming air-current upon the device next below in the series. Openings between the pockets admit currents of air inward through the side of the machine. Each of the detaining-pockets consists of an inwardly-inclined board or shelf, *H*, having a vertical depending flange, *i*, at the inner lower edge, and of a vertical guard or board, *I*, located immediately above the inner edge of the shelf in such manner as to leave a narrow slit or opening, *k*, between them to permit the descent of the material. The guard *I* has at its lower edge a surface inclined toward shelf *H*, as shown at *l*. In practice it is found that by the use of this inclined surface a much better and more uniform distribution of the material is secured, the effect of the inclined lip being, first, to direct the material toward the shelf *h*, and, secondly, to increase the length of the slide or passage through which the material falls to the pocket below. On the inner side the guard *I* is provided at the top with a surface, *m*, inclining downward and inward, and also with a face, *n*, inclining upward and inward, as shown. Below the face *n* the guard *I* has a vertical face. Each slit or opening *k* is in such position as to discharge the material passing through it upon the shelf *H* beneath, each shelf and the adjacent guard *I* forming jointly a hopper or pocket, *s*, to retain the purified or partly-purified material falling from above and compel the same to pass gradually through the slit *k*. Each of the inclined faces *m* overhangs the one below, so that the material falling from one face is de-

livered inward and downward upon the next, and so on repeatedly until the material from all the faces is finally delivered into a receiving-chamber, D, in the base of the machine.

5 It will be noticed that a series of winding or crooked passages, *o*, exists between each shelf and guard and the next, admitting the air through the side of the machine into the interior. The air, in entering, passes beneath
10 the shelves H, against the upright faces of guards I, thence upward past the mouths or slits *k*, impinging against the inclined face *n* and being deflected inward thereby, after which it passes upward into the trunk, and
15 thence out of the machine. An inclined depending guard, *p*, at the top, directs the air entering at the top opening downward.

In the base of the machine, at the outer side, there is a chamber, E, to receive the
20 purified material. This chamber is located outside of the bottom shelf, H, and is covered by an inclined board or guard, *p'*, to protect the material from the incoming air and prevent it from being driven over into the cham-
25 ber D. The purified material (all of which passes over the bottom shelf) is delivered into the chamber E by inclined conducting board *t*. The shelves H and guards I are all fixed rigidly and permanently in position.

30 It will be noted that the admission of air into the side of the machine is controlled by the shelves, being arranged to leave the proper spaces between them, and that consequently the boards, valves, and other special devices
35 ordinarily employed are not required.

Inclined delivering-boards *u*, arranged in chamber D, will discharge the impure matters or returns through an opening in the side of the chamber, as represented in Fig. 2. The
40 opening is closed by a hinged falling door or otherwise.

The chamber E is provided with a discharge-opening in the bottom.

45 The operation is as follows: The fan being set in motion and the material to be treated placed in the hopper, the material passes down into the first pocket and out through its slit *k* in a thin sheet. This sheet encounters the incoming current of air, by which the
50 impurities, to a greater or less extent, are removed and carried over the top of the guard I, while the purified material falls into the next pocket beneath. The heavier portion of the material removed by the air falls upon the
55 face *n* and passes down over the corresponding faces below to chamber D; but the light matters and impurities remain in suspension in the air and are carried off through the trunk. The partially-purified material, after
6c being acted upon in falling from the first pocket, descends in succession through the various pockets, over the various shelves, to the conducting-board, which delivers it into the chamber F. Between each pocket and

the next the material is acted upon by the air 65 in the same manner as in the first instance, and by each action the material brought to a higher state of purification.

The machine represented in Fig. 3 resembles the one above described so far as the ar- 70 rangement of each series of shelves and guards is concerned. It has, however, four series of shelves and guards instead of two, and has the exhaust-fan K located in a central chamber, which communicates by bottom passages with 75 the air-trunks in the two sides of the machine. As in the first machine, each trunk *b* has at the top a central fixed board, *w*, the better to divide and equalize the draft on the two sides of the trunk. This double machine also 80 contains at the top a reciprocating screen, M, having a graded cloth, so as to grade the material and deliver the different grades to the respective series of shelves. This screen may be suspended by links and driven by an ec- 85 centric and pitman, as shown, or it may be sustained and driven in any other suitable manner.

I am aware that various machines have been constructed in which the material was 90 delivered through a blast of air from one hopper downward to another, and I make no broad claim thereto.

Having thus described my invention, what I claim is— 95

1. In combination with the shelves, the fan producing an inward draft, and an outside chamber, E, deflector or guard *p'*, located above said chamber to protect the purified material from the inflowing air and direct it 100 into the chamber.

2. In a gravity-separator, the combination of the inclined shelves H, having the depend- ing lips *i* at the lower edge, and the vertical boards I, each having at the top the inclined 105 faces *m* and at the bottom the inclined face *l*, over which the material passes to the shelves.

3. In a middlings-purifier, a series of separating-guards and shelves, arranged one above the other, each embracing an inclined shelf, 110 H, with a depending lip, *i*, and a vertical wall above said shelf, provided with inclined faces *m* and *n*.

4. In combination with the feed-hopper, the pockets, and inclined shelves below the same, 115 the inclined guards *p*, extending downward below the line of the inlet, as described.

5. In a middlings-purifier, the combination of a fan or exhauster, a series of vertical walls, *i*, arranged successively below and inside of 120 one another, in combination with inclined boards H, having lips *i*, throats *k*, and inclined faces *n* and *m*, the latter overhanging each other, as described and shown.

WILLIAM D. GRAY.

Witnesses:

EDWD. P. ALLIS, Jr.,
T. F. WAMBOLD.