No. 672,299. Patented Apr. 16, 1901.

C. G. THOMPSON.

MIDDLINGS PURIFIER.

(Application filed Dec. 26, 1899.)

(No Model.)

Fig. 1.

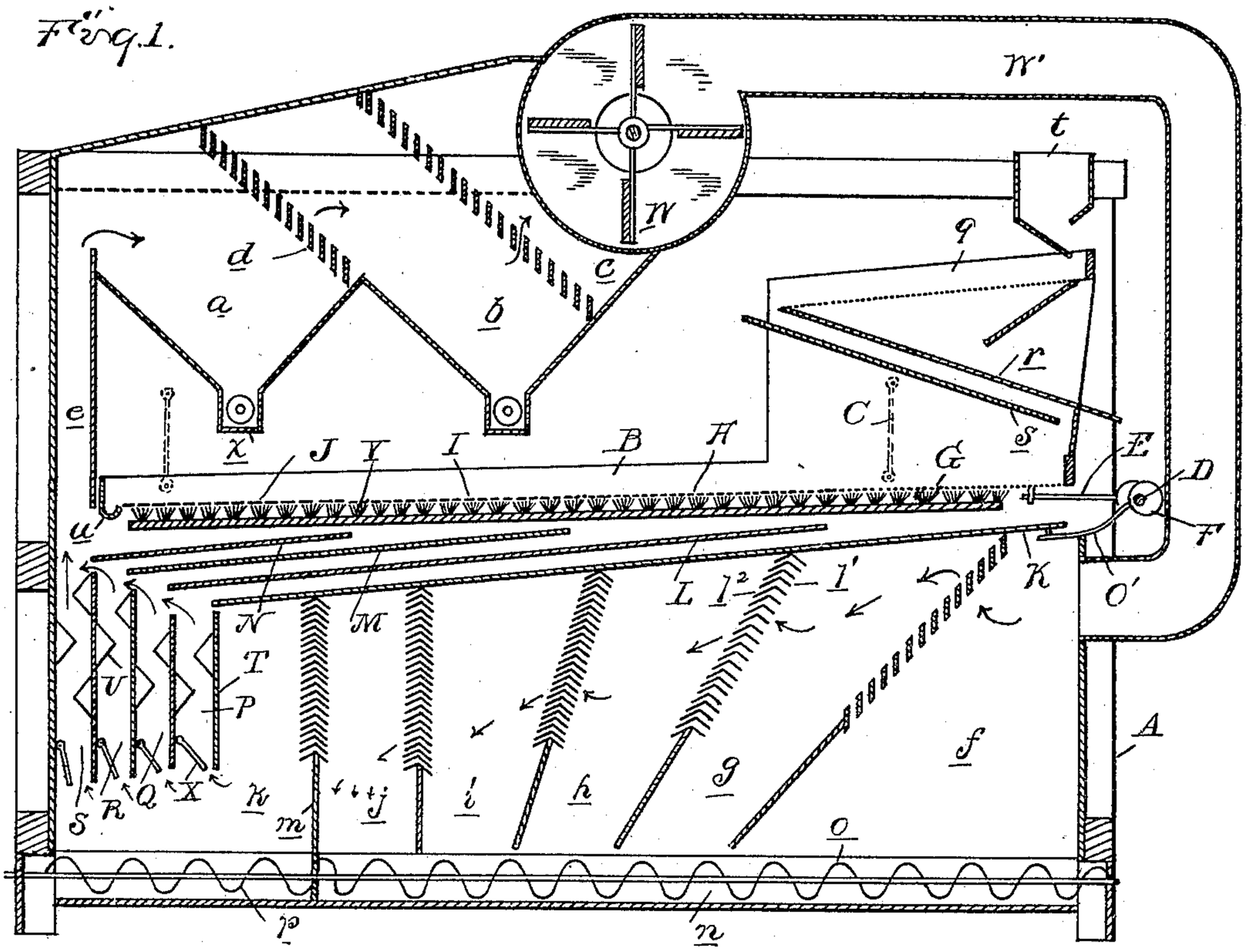
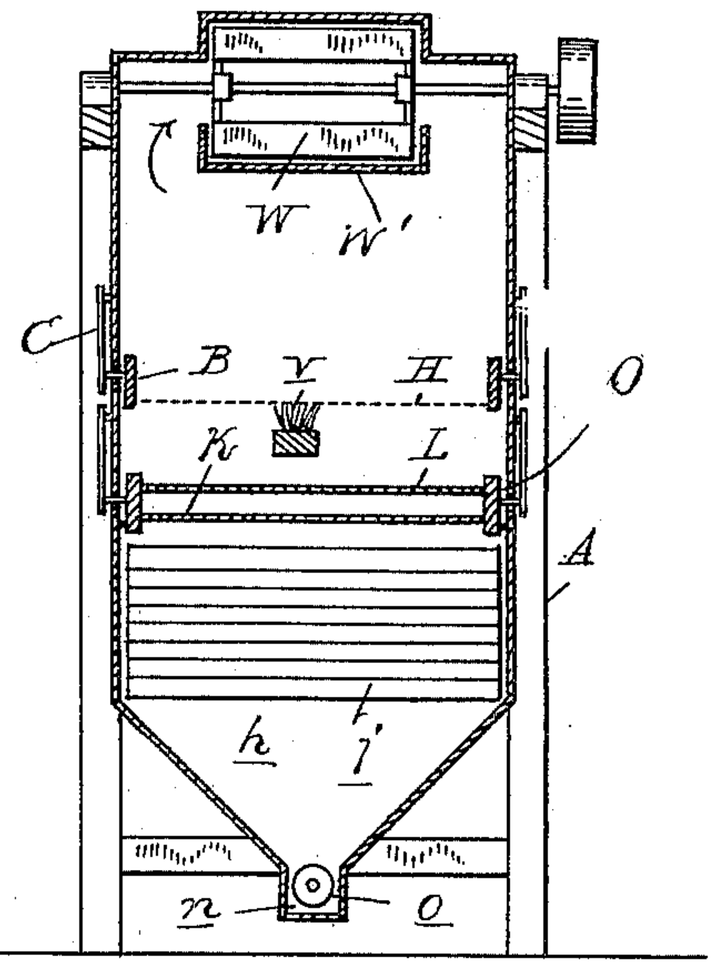


Fig. 2.



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UNITED STATES PATENT OFFICE.

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MIDDLINGS-PURIFIER.

SPECIFICATION forming part of Letters Patent No. 672,299, dated April 16, 1901.

Application filed December 26, 1899. Serial No. 741,557. (No model.)

To all whom it may concern:

Be it known that I, CARL G. THOMPSON, a citizen of the United States, residing at Huntington, in the county of Huntington and State of Indiana, have invented certain new and useful Improvements in Middlings-Purifiers, of which the following is a specification, reference being had therein to the accompanying drawings.

My invention relates to middlings-purifiers; and it is one object of the invention to produce a machine which will insure more perfect elimination of the impurities without wasting the stock.

It is a further object to provide means for eliminating the dust from the purifying air-current, whereby the latter may be used in continuous circuit.

The invention consists in the means employed for subjecting the graded material separately to the action of independent air-currents, whereby the strength of said currents may be varied according to the fineness of the grade.

The invention further consists in the peculiar construction of the dust-eliminating devices and, further, in the peculiar construction, arrangement, and combination of parts, all as more fully hereinafter described and claimed.

In the drawings, Figure 1 is a longitudinal section through my machine, and Fig. 2 is a cross-section thereof.

My machine comprises, broadly, means for grading the impure material, a series of independent air-channels into which the separated grades are delivered and where they are separately subjected to the action of opposing air-currents, and means for independently regulating said currents.

In the construction shown in the drawings, A is a suitable casing. Within this casing is arranged a vibratory screen-frame B, preferably extending completely across the casing. This frame is supported in any suitable manner, such as by the links C, in a slightly-inclined position.

D is a rotary shaft journaled in bearings at one end of the casing, and E represents rods connecting the screen-frame with eccentrics or cranks F upon said shaft, whereby in the rotation of said shaft an oscillatory movement will be imparted to said screen-frame. Across the screen-frame is arranged a series of screens G, H, I, and J of different grades, the finest being arranged at the upper end of the frame.

K, L, M, and N are aprons arranged, respectively, beneath the screens G, H, I, and J and preferably carried by an independent frame O. This frame is also supported free to oscillate and is connected by the links O′ to eccentrics on the shaft D, the frames B and O being preferably arranged to counterbalance. The aprons K, L, M, and N are slightly inclined, so that in the oscillation of the frame O any material sifting through the screens upon said aprons will be fed downward thereon.

P, Q, R, and S are channels arranged beneath the discharge ends of said aprons and preferably extending vertically completely across the machine. These channels are formed by the partitions T, on the sides of which are preferably arranged a series of inclined deflectors U, adapted to direct the material discharged from the aprons across said channels.

W is a fan arranged within the casing above the screen-frame B and having a discharge-trunk W′, extending around the casing and communicating with the chamber below the screen and aprons.

The space within the casing above the screen is divided into a series of compartments *a*, *b*, and *c*, each of which is provided with a hopper-shaped bottom and which are divided from each other by lattice partitions *d*. The compartment *a* is connected to a trunk *e*, which passes downward across the end of the screen and communicates at its lower end with a space above the channels P, Q, R, and S. The chamber *c* connects with the exhaust-passage of the fan. Beneath the screen and aprons the casing is divided into a series of compartments *f*, *g*, *h*, *i*, *j*, and *k*, which are divided from each other by the lattice partitions *l* and imperforate walls *m*. The bottoms of the compartments *f*, *g*, *h*, *i*, and *j* are preferably of hopper shape and connect with a longitudinal passage *n*, in which is arranged a suitable conveyer *o* for carrying the deposit therein out from the casing. Beneath the compartment *k* is also

preferably arranged a conveyer *p* for carrying out the purified stock discharging from the passages P, Q, R, and S. As shown in Fig. 1′, the lattice partitions *l* are of peculiar construction and comprise a series of slats *l′* and a second series of slats l^2, extending at an angle to those of the series *l′*. An angle-bend is thus formed in the passages between the slats, for the purpose hereinafter described.

Above the upper end of the screen-frame and carried thereby is an auxiliary screen *q*, and beneath this screen are the aprons *r s*, the former being adapted to discharge the siftings through the screen and the latter to carry the tailings therefrom to the upper end of the main screen.

t is a hopper in the casing, from which the material is discharged onto the screen *q*. At the lower end of the screen-frame B is arranged a laterally-extending discharge-spout *u*, through which the tailings from the main screen are discharged.

v is a brush for cleaning the main screen, arranged therebeneath and adapted to be reciprocated thereacross by suitable mechanism. (Not shown.)

The construction being as shown and described, the operation of the machine is as follows: The material to be purified is first delivered into the hopper *t*, from which it is discharged onto the screen *q*. The object of this screen is to separate from the stock any floury material which it may contain before subjecting it to the purifying air-currents. As middlings always contain more or less of this material, which if subjected to the air-current would be carried away with the dust, it is obvious that a saving is effected by first eliminating this flour. This floury material passes through the screen *q* and is discharged by the apron *r*, while the remainder of the stock passes onto the apron *s* and is discharged onto the upper end of the screen G. The oscillation of the screen-frame B, due to its connection with the shaft D, will effect the sifting of the material through the screens and will also cause it to travel downward on the screens and on the aprons therebeneath. It will be understood that as the screen G is of the finest material and the succeeding screens are progressively coarser the finest siftings will be deposited onto the apron K, while the aprons L, M, and N will each receive coarser material. The air-current, which is furnished by the fan W, passes through the trunk W′ into the lower part of the casing and after passing through the lattice partitions therein enters into the lower end of the channels P, Q, R, and S. Each of these channels is provided at its lower end with a regulating-valve X, by means of which the size of the opening therein may be graduated, and consequently the strength of the current passing through the channel determined. In practice the valve of the channel P is adjusted to give the weakest air-current, so that the fine material passing through the screen G and over the apron K will be subjected to this weak current. This prevents danger of carrying off with the dust any good stock, which would be unavoidable if the current were regulated to suit the coarser material passing through the other screens. In each of the succeeding channels Q, R, and S the valves are adjusted to produce progressively stronger currents, so that each grade of material is subjected to a current of proper strength to insure the elimination of the dust and impurities without danger of carrying away the stock. After passing through the channels the dust-laden air passes into the trunk *e* and thence through the chambers *a* and *b* to the fan W. It will be noticed that the dust-laden air from the channel P passes over the channel Q, while the air from the latter passes over the channels R and S. Thus a cross-current is formed above the channels, which is reinforced or strengthened as it passes each succeeding channel from the channel P to the channel S. This will still further assist in removing the dust and impurities from the heavier grades without danger of wasting the stock in the lighter grades. After passing through the trunk *e* the dust-laden air passes successively through the chambers *a b*, which are separated from each other by the lattice partitions. In these chambers the heavier impurities are removed and dropped into the hopper below, from which they are extracted by suitable conveyers *x*. The air-current then passes the fan and through the trunk W′, which delivers it into the chamber *f*, from which it passes successively through the chambers *g*, *h*, *i*, *j*, and *k* and the lattice partitions separating said chambers. In passing through these chambers and partitions the dust is extracted from the current and settles in the hoppers below, and I have found from experiment that the peculiar construction and arrangement of the partitions are most efficacious in eliminating the dust from the air-current. The reason for this, as I understand it, is as follows: The dust is held in suspension in the air-current not so much on account of its slow movement while passing through the settling-chambers as because of the eddies and cross-currents constantly present in the main current. These eddies and cross-currents are constantly lifting the partially-settled dust, so that it would be almost impossible to thoroughly settle the dust in a single expansion-chamber.

In my dust-removing apparatus the dust-laden air is passed through a series of settling-chambers, and in going from one to the other it is passed through a series of parallel slots in the partition formed by the lattice bars. These serve to break up the eddies and cross-currents and to secure again a parallel movement of the whole body of air. In order to facilitate the dropping of the dust, these lattice bars are turned at an angle, so as to direct the current entering each chamber in a

downwardly-inclined direction. These downwardly-directed currents will, however, again turn upward after passing a certain distance, and I therefore arrange the oppositely-inclined lattice bars to receive these upwardly-directed currents and by forcing them against the adjacent bars again secure the downward direction. The effect is to lower the position of the dust in the air-current after passing each successive chamber and partition, until finally the dead-air space is reached in the lower part of the chamber and the dust settles to the bottom.

As the object of grading the stock is to facilitate the removal of impurities therefrom, I preferably recombine the purified grades after they are discharged from the lower ends of the channels P, Q, R, and S, and in the construction shown in the drawings I have arranged a common conveyer *p* for carrying the material from all of said channels to a common discharge. If, however, it is desired to keep the grades separated, they may be readily delivered to the independent discharge-spouts.

What I claim as my invention is—

1. A purifier comprising a series of separating-conduits, means for passing air-currents of different relative strength separately upward through said conduits, and means for feeding sifted grades of unpurified stock separately in thin streams into the upper ends of said respective conduits, whereby the different grades will pass in opposition to the currents of different strength, the progressively heavier grades being treated by the progressively stronger current.

2. A purifier, comprising a series of separating-conduits, means for passing air-currents separately upward through said conduits, valves for independently varying the strength of said currents, and means for feeding sifted grades of unpurified stock separately and in thin streams into the upper ends of said conduits respectively, whereby the different grades will pass in opposition to the currents of different strength, the progressively heavier grades being treated by progressively stronger currents.

In testimony whereof I affix my signature in presence of two witnesses.

CARL G. THOMPSON.

Witnesses:
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