(No Model.) 4 Sheets—Sheet 1.

V. MONNIER.

MIDDLINGS PURIFIER.

No. 387,798. Patented Aug. 14, 1888.

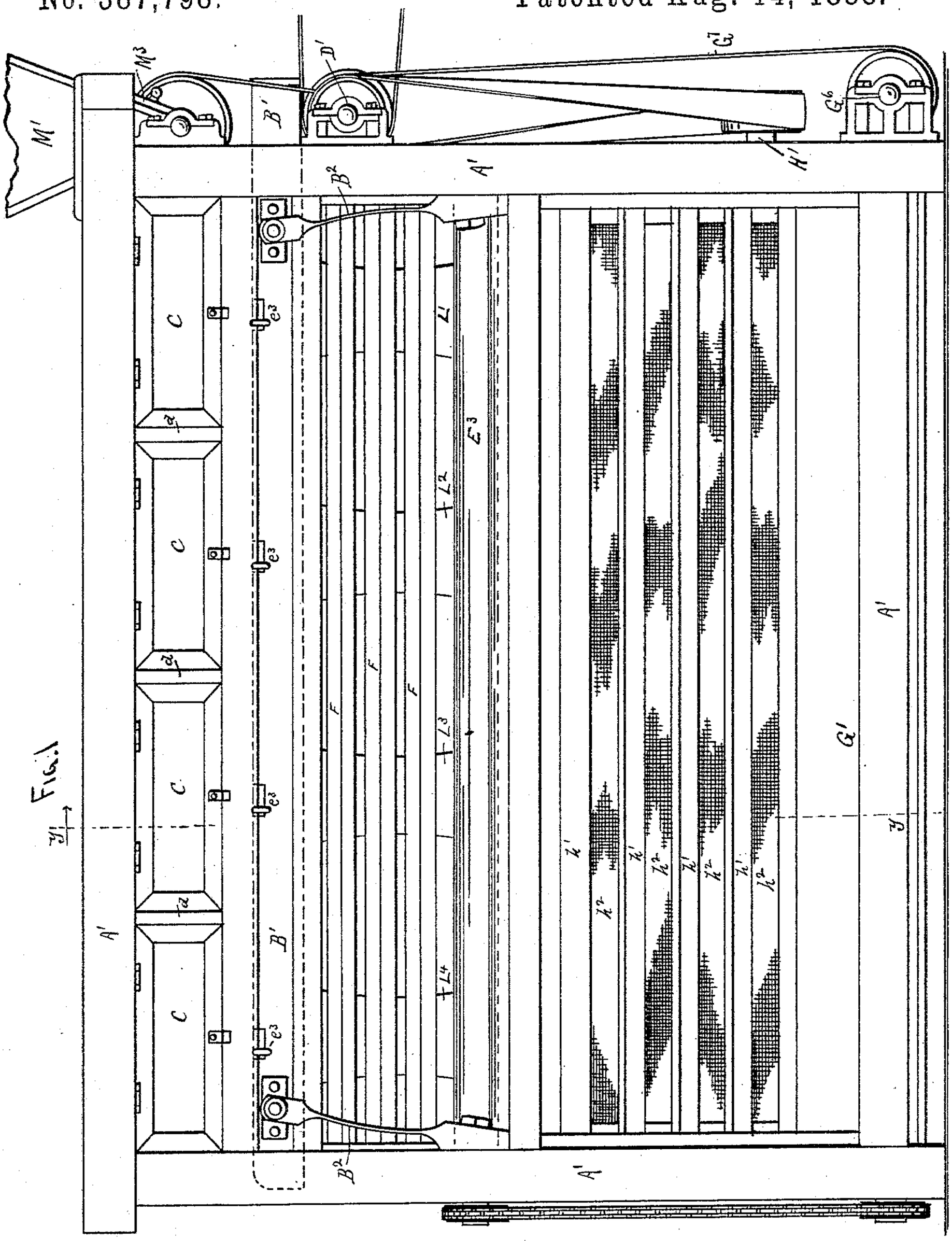

FIG. 1.

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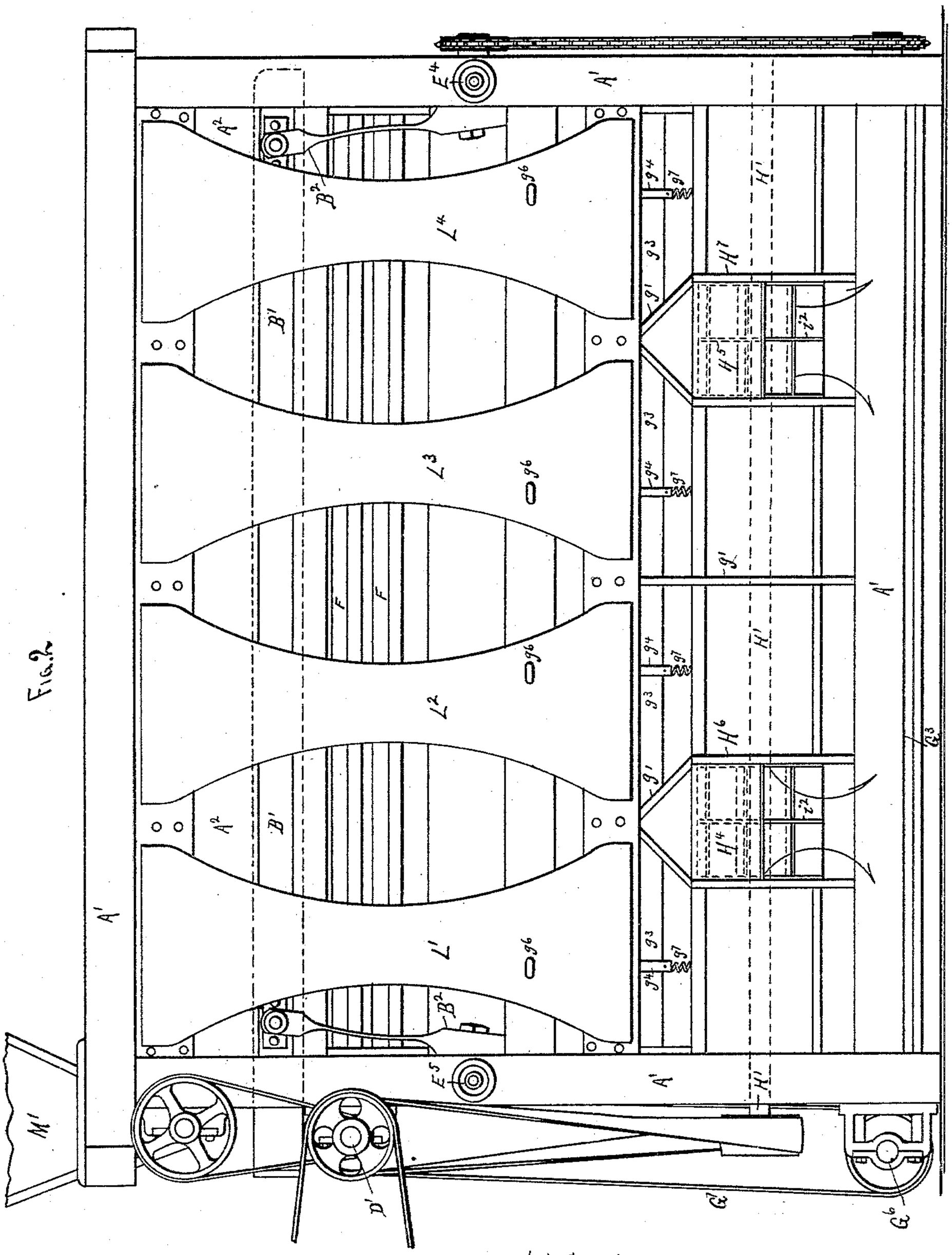

FIG. 2.

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V. MONNIER.

MIDDLINGS PURIFIER.

No. 387,798. Patented Aug. 14, 1888.

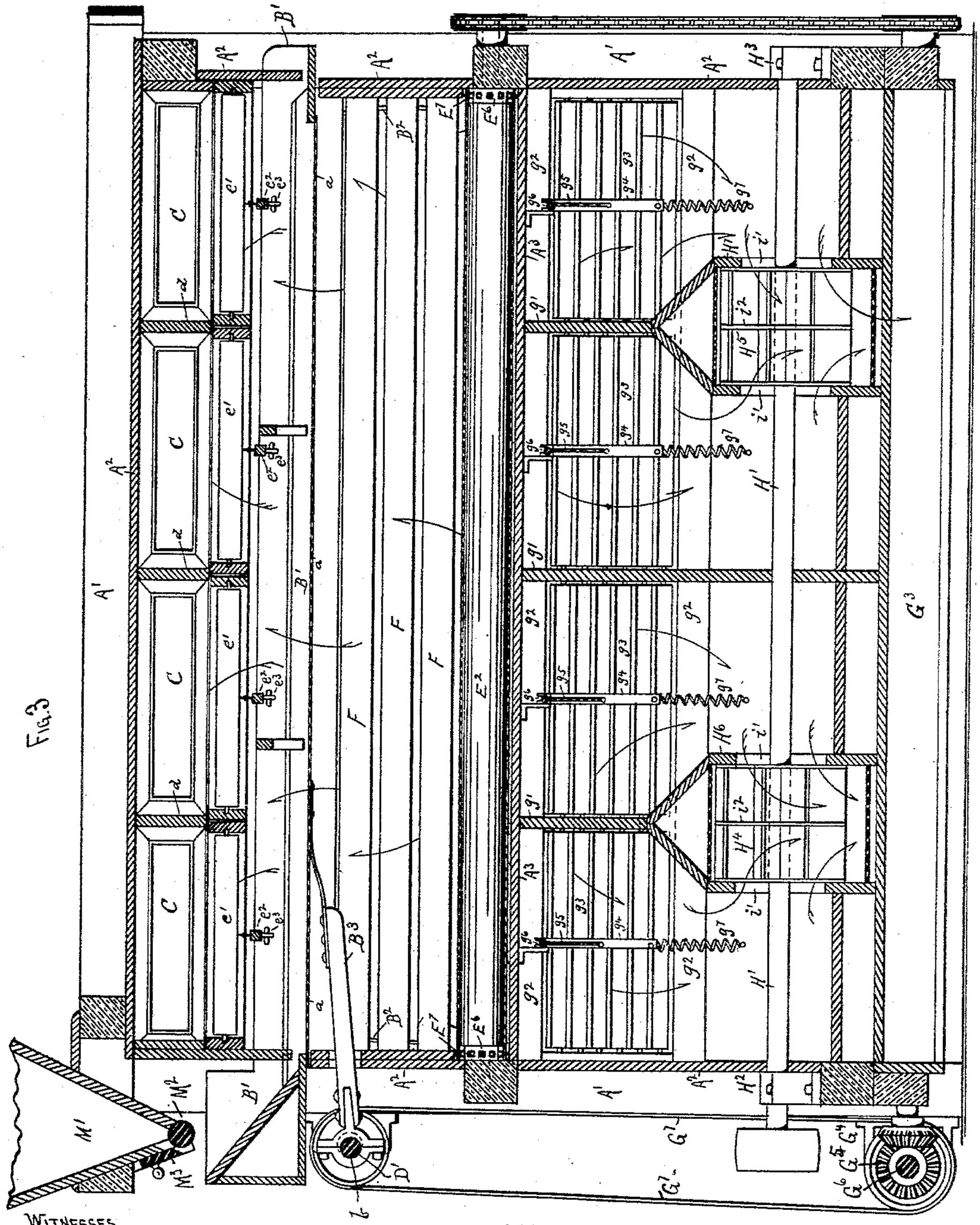

FIG. 3

WITNESSES.
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(No Model.) 4 Sheets—Sheet 4.

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MIDDLINGS PURIFIER.

No. 387,798. Patented Aug. 14, 1888.

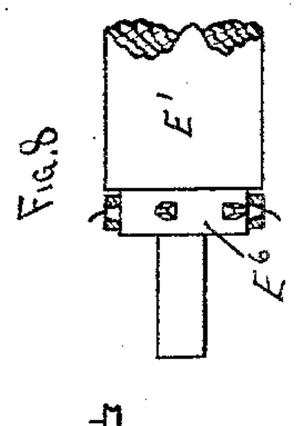

Fig. 8.

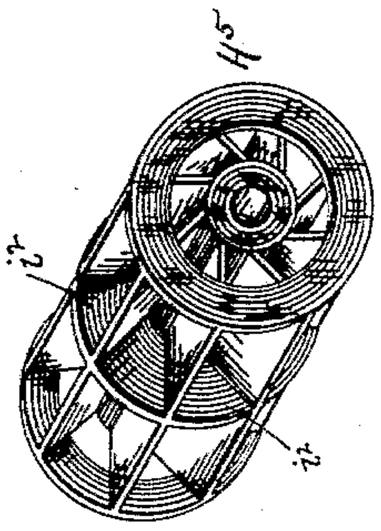

Fig. 5.

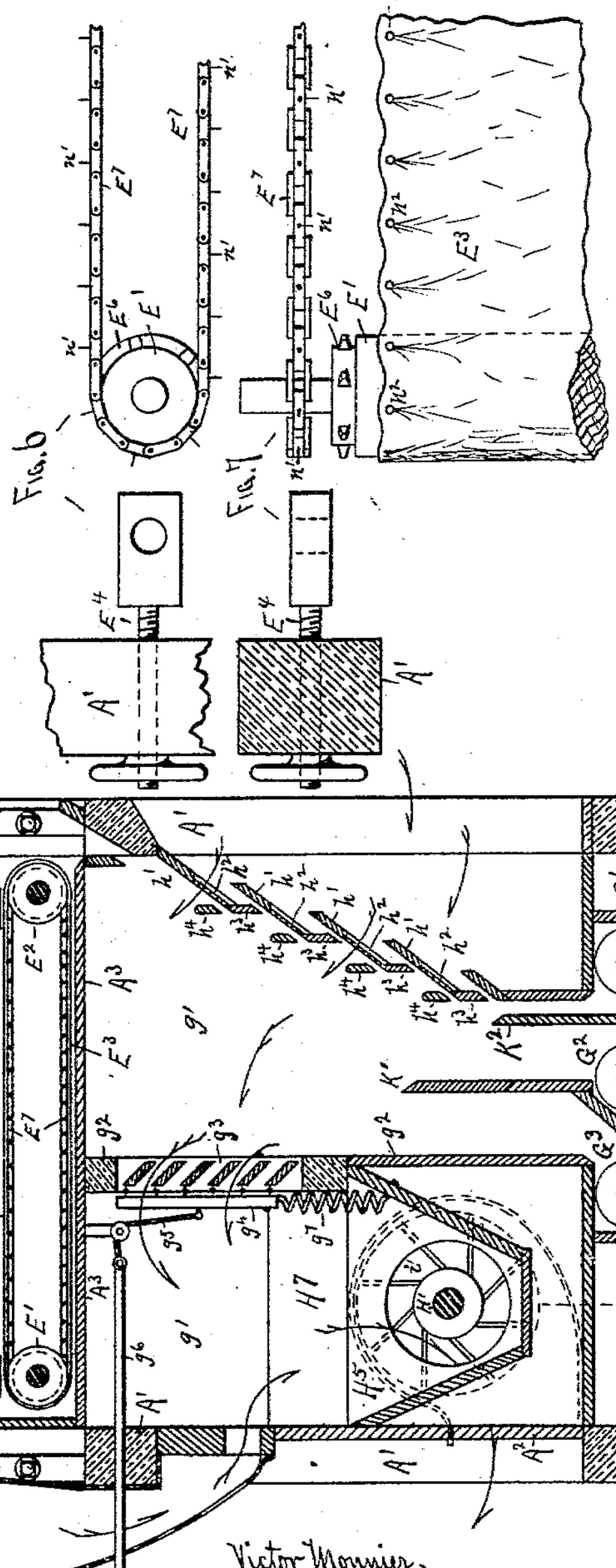

Fig. 6. Fig. 7.

WITNESSES.
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Victor Monnier,
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Charles N. Woodward.
Atty.

UNITED STATES PATENT OFFICE.

VICTOR MONNIER, OF DUNDAS, MINNESOTA.

MIDDLINGS-PURIFIER.

SPECIFICATION forming part of Letters Patent No. 387,798, dated August 14, 1888.

Application filed June 22, 1886. Serial No. 205,939. (No model.)

To all whom it may concern:

Be it known that I, VICTOR MONNIER, a citizen of the Republic of France, residing at Dundas, in the county of Rice and State of Minnesota, have invented certain new and useful Improvements in Middlings-Purifiers, of which the following is a specification.

This invention relates to machines for separating and purifying middlings in flouring-mills; and it consists in the construction and combinations of parts, as hereinafter described and claimed.

In the drawings, Figures 1 and 2 are views of the opposite sides of the machine, Fig. 1 looking toward the right, and Fig. 2 toward the left, of the machine, as shown in Fig. 4. Fig. 3 is a longitudinal sectional elevation on the line *x x* of Fig. 4. Fig. 4 is a cross-sectional elevation on the line *y y* of Fig. 1, looking toward the "feed" end of the machine. Fig. 5 is a perspective view of one of the double fans detached. Figs. 6, 7, and 8 are enlarged detached details illustrating the manner of operating and attaching the endless belt.

A′ represents the main frame-work, having inclosing-boarding A^2, and divided into upper and lower compartments by a horizontal partition or "deck," A^3.

B′ is the shaker frame or screen, constructed in the ordinary manner and "clothed" with bolting-cloth, *a*, of decreasing fineness of mesh from the "head" toward the "tail" of the machine. This shaker-frame is supported by four spring-arms, B^2, each attached by one end to the frame A′ and by the other end to the shaker-frame, the screen being adapted to be rapidly vibrated by an arm, B^3, actuated by an eccentric, *b*, in a cross-shaft, D′, as shown in Fig. 3.

The space above the shaker-frame B′ is divided by transverse partitions *d* into a series of smaller compartments, the bottom of each of these compartments being provided with a set of adjustable slats, *e′*, to regulate the air-currents. Each set of these slats *e′* is coupled to a bar, e^2, and each bar is provided with a rod, e^3, passing out through the side of the casing or frame, so that each set of slats *e′* may be opened or closed to any desired extent to regulate the volume of air passing up through the bolting-cloth *a* on the shaker-frame, as hereinafter explained. In the drawings three of these transverse partitions *d* are shown, forming four of the smaller compartments and with four sets of the slats *e′*; but a greater or less number may be used, if required.

One side of the frame A′ is provided with a series of doors, C, one opening into each of the compartments formed by the partitions *d*, so that access may be had to the compartments, if required.

Just above the deck A^3, on each side of the machine, rollers E′ E^2 are journaled, and over these rollers an endless belt, E^3, of canvas or other suitable material, is stretched horizontally and adapted to be revolved in the direction of the arrow in Fig. 4 by the motion imparted to one or both of the rollers to catch the material falling through the shaker-frame B′ and convey it to one side and deliver it to the separating mechanism below the deck A^3. One of the rollers, E′, is adjustable by screws E^4 E^5, Fig. 2, so that the proper tension may be imparted to the belt, and also to enable the belt to be kept taut at all times. The manner of arranging these tension-screws is more clearly shown in Figs. 6 and 7.

Inwardly-inclining gather-boards F are arranged along the sides of the frame between the shaker-frame B′ and belt E^3 to guide the material falling from the shaker-frame upon the belt, the gather-boards having spaces between them for the passage of the air-currents, as indicated by the arrows.

The space below the deck A^3 is divided into separate compartments by transverse partitions *g′*, the latter being placed directly beneath the partitions *d*, so that the compartments formed by the partitions *g′* are equal in number to and come directly beneath the compartments formed by the partitions *d*.

The lower set of compartments formed by the partitions *g′* are subdivided longitudinally by a set of partitions, g^2, the upper part of each of these longitudinal partitions being provided with a set of adjustable slats, g^3, similar to the slats *e′*, to regulate the air-currents. Each individual slat of each set of these slats g^3 is coupled to a bar, g^4, and each bar g^4 is connected by a cord, g^5, to a rod, g^6, passing out through the side of the machine, so that each set of the slats g^3 may be opened by drawing out the rod g^6 and closed by a spring, g^7, connecting each bar g^4 to its parti-

tion g^2 to regulate the volume of air passing through the slats, as hereinafter explained.

Beneath the compartments formed by the partitions g' g^2 are three screw conveyers, G' G^2 G^3, running the whole length of the machine, and adapted to be revolved by bevel-gears G^4, engaging with bevel-gears G^5 on a transverse shaft, G^6, the latter adapted to be revolved by a belt, G^7, from the main shaft D'.

Only one pair of the bevel-gears, G^4 G^5, are shown in the drawings; but it will be understood that each conveyer-shaft will be provided with its own set of gears.

H' is a fan-shaft journaled in bearings H^2 H^3 on the ends of the frame-work A', and lying through the left-hand set of sub-compartments formed by the partitions g^2, as shown in Fig. 4, the fan-shaft thus being placed through the set of compartments opposite those into which the material is fed by the belt E^3. Beneath each of the two outer partitions, g', the fan-shaft is arranged to run in a separate casing, H^6 H^7, as shown in Fig. 3, each casing opening by ports i' into two of the sub-compartments between the partitions g'. Each fan is divided into two parts by a central disk, i^2, Fig. 5, so that it is double-acting and draws the air from the sub-compartments on each side, as indicated by arrows in Fig. 3, one fan thus serving to exhaust the air from two of the compartments.

In the sub-compartments formed by the partitions g^2, into which the material is fed by the belt E^3, are arranged a series of inclined "separating-chutes," formed with their upper parts, h', solid and their lower parts open and covered with bolting-cloth, h^2, the solid portion of one chute coming beneath the cloth-covered portion of the next one above, as shown in Fig. 4. By this arrangement the material falling from the belt E^3 passes over the chutes h' h^2 from one to the other, the finer particles passing through the meshes of the bolting-cloth and falling upon the solid portions h' of the next chute below and the coarser particles flowing over the lower edges of the chute and dropping down upon the next bolting-cloth partitions h^2 of the chute below. The finer particles are thus separated from the coarser particles, so that the air-currents which are drawn through the meshes of the bolting-cloth h^2 by the fans H^4 H^5, as indicated by the arrows in Fig. 4, have a greater power upon them, as hereinafter described.

K' K^2 are two "stop-walls" of different heights between the partitions g^2 and the lowermost chute h' h^2, these stop-walls forming compartments to guide the material into the conveyers G' G^2 G^3, as shown in Fig. 4.

L' L^2 L^3 L^4 are four wind-trunks, Figs. 2 and 4, connecting the sub-compartments formed by the partitions g' g^2, and into which the fan-casings open, with the compartments formed by the partitions d and slats e', so that the air may be exhausted from the upper set of compartments into the lower compartments to create a current upward through the bolting-cloth a on the shaker-frame B', as indicated by the arrows in Figs. 3 and 4.

M' is the feed-hopper through which the material is fed to the machine, and which is provided with the usual feed-roller, M^2, and adjustable feed-slide M^3.

The "chop," "middlings," or other material to be separated is fed into the shaker-frame B' from the hopper M', and is spread out evenly over the whole surface of the cloth a by the rapid vibration imparted to the shaker-frame by the eccentric b and bar B^3. As before stated, the cloth a will be in sections of increasing size of mesh from the head toward the tail of the shaker-frame, so that the heavier valuable material will be separated into its component parts, according to the size of its particles, and fall upon the belt E^3, while the lighter particles of dust, &c., will be carried up through the slats e' by the action of the fans H^4 H^5, and thence down through the trunks L' L^2 L^3 L^4, and thence out through the fans. The material falling upon the belt E^3 in separate grades, according to its fineness, is fed by the revolution of the belt into the separate compartments formed by the partitions g' g^2 and flows down over the "chutes" h' h^2, where it is again separated according to size by the cloths h^2, as before described. As the middlings flow down over the chutes h' h^2, the air-currents will be drawn through the cloths h^2, as indicated by the arrows, and the dust and very light particles carried through the fans. The next lighter particles will be carried over toward the partitions g^2, and by properly regulating the force of the air-currents by adjusting the slats g^3 these latter particles will only be carried a sufficient distance to pass over the stop-walls K' and fall into the conveyer G^3, while the next lighter particles will only be carried a sufficient distance to pass over the walls K^2 and fall into the conveyer G^2, leaving the heavier particles only to fall into the conveyer G'. By this construction and arrangements of parts the dust, bran, and other lighter particles are separated from the middlings and the latter divided into different portions according to size.

The lower edges of the chutes h' h^2 will be provided with "drop-pieces" h^3, extending down almost to the next chute below, and above the lower edge of each chute a small stop-strip, h^4, is placed, with its lower edge close to its respective chute. By this means the passage-ways for the material from one chute to the other are very narrow, so that the material will completely fill them and cause all the air-currents to pass through the meshes of the bolting-cloths h^2 to insure a more uniform and perfect action of the air upon the middlings, the air by this means acting only on the middlings when they are running in thin streams over the bolting-cloths h^2.

On each end of each of the rollers E' E^2 is a chain-pulley, E^6, (see Figs. 6, 7, and 8,) over which endless chains E^7 run. Small hooks n' are formed upon the links of the chains E^7

at suitable intervals, and over these hooks eyelets n^2 in the edges of the belt E^3 are placed, thus uniting the belt to the chains and insuring the proper end tension and effectually preventing the sagging of the belt.

One important point to be noted in connection with this manner of arranging the interior of the machine into the separate compartments and governing the power of the air-current by the slats $e' g^3$ is that each compartment is thereby rendered entirely independent of all the others and the currents of air can be regulated perfectly to correspond to the requirements of the material being treated. Thus each distinct grade of material may be treated separately and without affecting the other grades.

By the employment of the horizontal transversely-moving belt the following results are secured: first, the height of the machine and the material and cost required are diminished as compared with those that would be incident to the use of an inclined chute instead; secondly, an equal fall and consequent exposure to the air-current of the material sifted through the screen are secured at each side of the machine; thirdly, the belt arranged, as it is, transversely of the machine carries the material just as it falls without any remingling of the grades set up to the several air-separators beneath, each grade being thus treated separately; fourthly, space is obtained in the lower compartment for the proper length of fall and proper area of air-current to which the material is to be exposed.

Having thus described my invention, what I claim as new is—

1. The combination of the casing divided into upper and lower compartments by a partition, the vibrating screen arranged lengthwise in and subdividing the upper compartment, the endless traveling belt moving transversely of the machine and equal in width to the length thereof, a series of separating-chutes arranged side by side beneath the delivery end of the belt, and a corresponding series of suction-fans communicating with said separating-chutes and with the air-space over the screen, substantially as specified.

2. The combination of the casing divided into upper and lower compartments by a partition, the vibrating screen arranged lengthwise in and subdividing the upper compartment, the endless traveling belt moving transversely of the machine and equal in width to the length thereof, gather-boards arranged to leave air-openings between each side of the screen and each end of the belt, a series of separating-chutes arranged side by side beneath the delivery end of the belt, and a corresponding series of suction-fans communicating with said separating-chutes and with the air-space over the screen, substantially as set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

VICTOR MONNIER.

Witnesses:
JOHN I. RINGSTAD,
G. A. GATZKE.