No. 830,538. PATENTED SEPT. 11, 1906.

A. H. STEBBINS.

PNEUMATIC VANNER.

APPLICATION FILED AUG. 19, 1904.

2 SHEETS—SHEET 1.

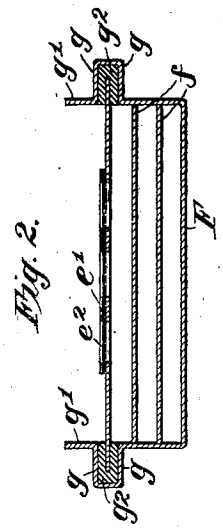

Fig. 2.

Fig. 1.

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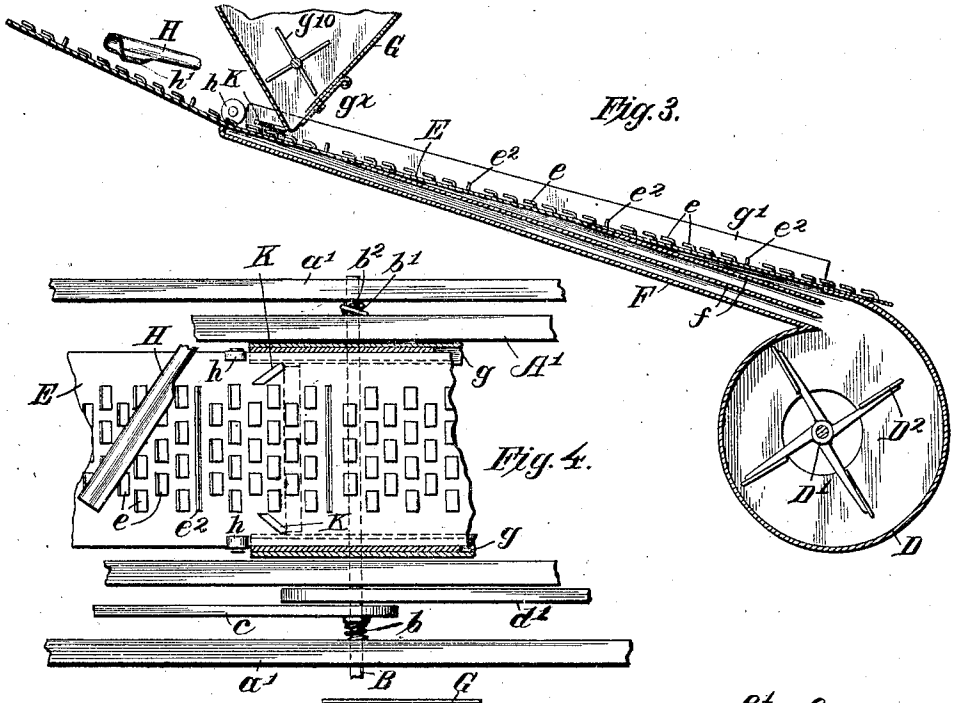

Fig. 3.

Fig. 4.

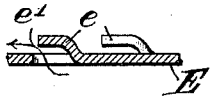

Fig. 6.

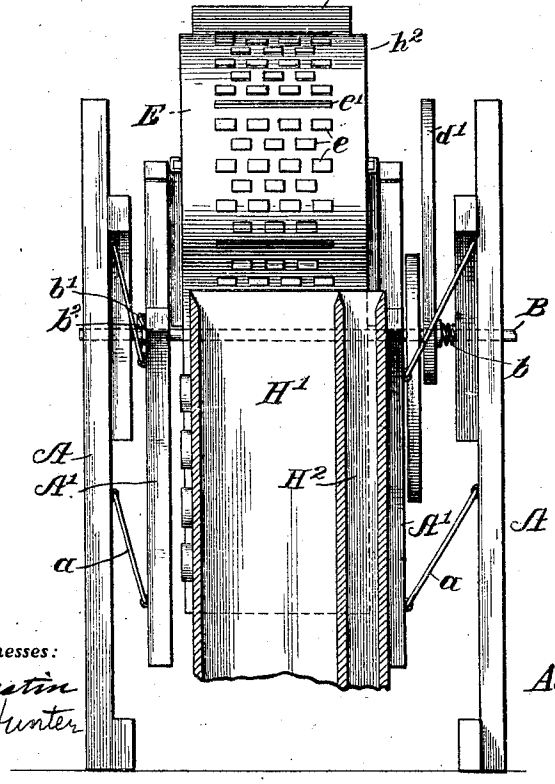

Fig. 5.

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UNITED STATES PATENT OFFICE.

ALBERT H. STEBBINS, OF LITTLE ROCK, ARKANSAS.

PNEUMATIC VANNER.

No. 830,538. Specification of Letters Patent. Patented Sept. 11, 1906.

Application filed August 19, 1904. Serial No. 221,424.

To all whom it may concern:

Be it known that I, ALBERT H. STEBBINS, a citizen of the United States, residing at Little Rock, in the county of Pulaski and State of Arkansas, have invented certain new and useful Improvements in Pneumatic Vanners, of which the following is a specification.

The invention to be hereinafter described relates to machines for separating the valuable portion of ore-bearing material from the accompanying impurities, and more especially it relates to the class of such devices known in the practical art as "vanners."

It is well known that the particles forming the mass of ore-bearing material differ in size and specific gravity and that the valuable portion of such mass consists of particles of relatively greater specific gravity than the accompanying impurities. In the present invention, one embodiment of which is shown in the drawings forming part of this application, I have taken advantage of this known fact, the object being to provide a machine by which the mass being treated may be subjected to the action of air or fluid currents introduced beneath such mass as it moves over the surface of an inclined belt, whereby the lighter particles which comprise the waste may be effectually removed from the values and the latter be collected.

With these generally-stated objects in view the invention consists of the parts and combinations that will be hereinafter more fully described and then definitely pointed out in the claims.

In the drawings, Figure 1 is a side elevation of one form of machine embodying the present invention. Fig. 2 is a cross-section on the line $x\ x$, Fig. 1. Fig. 3 is a central longitudinal section of the upper portion of the device shown by Fig. 1. Fig. 4 is a detail plan view of a portion of the device shown in Figs. 1 and 2, illustrating the perforated belt, shaking appliances, and other parts, some portions being shown in section. Fig. 5 is an end view of the device of Fig. 1 looking in the direction of the arrow, Fig. 1; and Fig. 6 is a detail sectional view of a portion of the belt, showing one manner of forcing the perforations therein.

In the drawings, A represents any usual or desired form of main frame upon which the auxiliary frame A′ is suitably supported. In the form my invention is herein embodied the auxiliary frame A′ is hung from the uprights of the main frame, as by the hangers $a\ a$, Fig. 5, whereby said auxiliary frame A′ may be moved or shaken, if desired, by appropriate means. Properly mounted on the cross-bar a' of the main frame and passing transversely of the auxiliary frame A′ is the shaft B, which may be driven from any suitable source of power. Disposed about the shaft B and between the main and auxiliary frames A and A′ is the spring b, Figs. 4 and 5, which normally acts to force the auxiliary frame A′ to the left, Fig. 5, and connected to shaft B at the opposite side of the auxiliary frame is a small cam-face b', the cam-face bearing against a part b^2, secured to the main frame, from which it will be evident that upon rotation of the cam b' the auxiliary frame A′ as an entirety will be moved sidewise against the action of the spring b and then back again as the cam-face passes the part b^2, thus imparting a sidewise-shaking action well understood by those skilled in the art. It is not always necessary to employ this shaking action for the auxiliary frame A′, but it has been found to operate with good results in the treatment of some materials.

Mounted adjacent one end of the auxiliary frame A′ is the drum C, driven by a belt c, passing about suitable pulleys c' and b^3, and mounted adjacent the opposite end of the auxiliary frame A′ is the fan-casing D, carrying a series of rollers $d\ d$. Passing around drum C and the series of rollers $d\ d$ is the concentrate-belt E, said belt being driven by the drum C, as will be apparent, so as to cause said belt to move in the direction of the arrows, Fig. 1.

The belt E is preferably formed of thin metal and has perforations therein of the general character shown in Fig. 6—that is to say, the perforations are so formed that air or fluid currents passing therethrough, as will be described, will not pass directly at right angles through the belt, but be directed at first substantially parallel to the surface of the belt, as indicated by the arrow, Fig. 6. As one means of receiving this directional movement of the air or fluid currents which are forced through the belt, as will presently appear, the walls of said perforations may be offset, as at e, Fig. 6.

Disposed within the fan-casing D is the fan D^2, mounted on the shaft D′, suitably journaled in bearings on the auxiliary frame, as shown in Fig. 1, said shaft D′ being driven by suitable means, as the belt d' and pulley d^2, from the shaft B or other source of power.

Extending from the fan-casing D, beneath the concentrate-belt E, is the air-chamber, (designated as a whole by F,) said chamber being preferably divided longitudinally by partitions *f f*, extending to different points beneath the concentrate-belt to evenly distribute the blasts or force of the air or fluid currents to the various portions of the belt.

A hopper G is disposed above the belt, said hopper preferably having a sliding door $g^{\times}$, by which the opening in the bottom thereof may be regulated in size to control the quantity of material fed to the belt E, and within said hopper is a suitable stirrer g^{10} of usual form and rotated by usual means for preventing any clogging of the material in the hopper.

From the construction thus far described it will be noted that material in more or less comminuted form being supplied to the hopper G will pass therefrom onto the inclined surface of the concentrate-belt E and tend to move down the incline. The concentrate-belt at this time is moved in the direction of the arrows, Fig. 1, and its speed is regulated so that the too-rapid descent of the material will be prevented, air or fluid currents being simultaneously forced by the fan D^2 through the chambers formed by the partitions *f f* and thence through the perforations of the belt. The perforations of the belt, it will be noted, are disposed with their mouths *e'* facing up the incline or lengthwise of the belt, so that as the air or fluid currents pass therethrough they first move up and over the surface of the belt and then rise through the mass of material. The first of these directional movements acts to prevent too rapid downward travel of the mass and agitates the same, while the second causes a stratification of the material, the lighter or waste product appearing on top. This top position of the waste relieves it somewhat of the air or fluid movement, which are parallel with the surface of the belt, and permits it to pass down the incline of the belt faster than the belt travels, so that much of the waste or light material will be discharged from the lower end of the machine. The values being heavier gravitate to the bottom of the stratified mass and are held there primarily by the air or fluid currents as they move parallel to the surface of the belt and to some extent also by the offset walls of the perforations, so that the values are carried along with the belt and discharged over the upper end of the machine. In some cases riffles e^2, extending transversely of the belt, may be employed, though they are not always necessary.

In order to prevent the air or fluid currents passing around the edges of the belt and escaping without doing the desired work, the walls of the air or fluid chamber F are provided with an edge envelop on each side of the belt, said envelop in one form being represented in Fig. 2 as comprising the parts *g g*, formed to embrace the edges of the belt, suitable packing material, as felt or the like g^2, being contained between the parts *g g* to bear with sufficient degree of tightness upon the upper and lower surfaces of the belt to prevent the escape of the air or fluid currents. The upper edge of the parts *g g* are extended upward over the belt to form the side retaining-walls *g' g'*, so that material under treatment may not fall from the side of the machine. Evidently the side reatining-wall may be otherwise formed and the character of the envelop be modified; but the above construction has been found efficient and simple. It will be noted also that by reason of the envelop engaging the edges of the belt the latter is not perforated along its edge, as indicated in Fig. 5.

Referring to Figs. 1 and 3, the fluid-chamber F extends to a point beyond the hopper G, so that as material is fed onto the belt from the hopper and is carried by the moving belt past the hopper it will be subjected to the action of the air or fluid currents, as already explained. If it were not for this disposition of the hopper and chamber F, some of the material as fed from the hopper might be carried beyond the hopper by the moving belt and not treated by the air or fluid currents.

The construction thus disclosed is well adapted for the treatment of some forms of material and in details may be varied as circumstances may dictate. For instance, while the perforations are shown as formed to direct the air or fluid currents lengthwise of the belt, and such form has been found efficient in practice, it is obvious to one skilled in the art that they may be disposed to direct the air or fluid currents in other directions within the scope of the present invention, and while the auxiliary frame may be given a shaking movement this is not always necessary.

The material fed from the hopper having been subjected to the action of the device as thus far described, the concentrates or values are delivered to the upper part of the machine by the moving belt and discharged therefrom, while the waste or light material travels to the lower part of the machine and is passed over the belt; yet the concentrates sometimes contain a proportion of impurities after such treatment, in which case it becomes desirable to subject them to a further cleaning or finishing treatment prior to discharging them from the upper portion of the belt, and I will now proceed to describe one form of finishing mechanism provided for this purpose.

From a point adjacent the hopper G to the upper end of the machine the perforated belt E is given a greater inclination than the remainder of the belt where the main treatment of the material takes place, and as one

means of accomplishing this object there are provided guide-rollers *h h*, mounted in suitable manner, as shown, Figs. 1, 3, and 4, to bear upon the unperforated edge of the concentrate-belt E. At a point between the rollers *h h* and the upper end of the machine is the nozzle H, having a slotted edge *h'* to direct currents of air or other fluid across the top of the concentrates, the said nozzle being connected to any usual source of air or fluid supply, as will be understood. The effect of the cross-currents directed from nozzle H is to further clean or dress the concentrates by blowing or removing therefrom crosswise of the concentrate-belt E the light or waste material still mixed with such concentrates as they are carried above and past the chamber F, so that the concentrates remain substantially unaffected by the cross-currents, while the waste material is carried to one side of the belt. To prevent the light waste products from being blown over the side of the belt, a retaining-wall h^2 is disposed along the edge of the belt, as shown in Fig. 1, and below the belt (see Figs. 1 and 5) receptacles H' and H^2 are provided, the former to receive the concentrates and the latter the waste material.

Secured to the retaining-walls along the sides of the belt are the deflectors K K, Figs. 3 and 4, to turn or deflect the material slightly out from the walls, as otherwise the material will hang along the sides a little thicker than at the center of the belt and the air or fluid currents will not act on it effectively. These deflectors may be in the form of brushes, if desired.

In order that the lower run of the perforated concentrate-belt may be supported and to prevent undue strain thereon, the auxiliary frame A' is provided with antifriction-rollers M, upon which the edges of the belt may rest.

The perforated concentrate-belt may be formed of any suitable material wherein the perforations can be formed with their openings or mouths *e'* adapted to direct the air or fluid currents parallel to the surface of the belt; but I have found in practice that a thin steel or metal belt having the offsets or lips *e* is well adapted to the purpose, the perforations being such that while they permit the passage of the air or fluid currents effectually prevent the passage of any of the material being treated.

Other forms of shaking devices may be employed where such device is found desirable. In fact, variations in the form and details of the device may be made within the scope of the present invention, as will be understood by one skilled in the art.

Having thus described the invention, what I claim, and desire to secure by Letters Patent, is—

1. In a machine of the class described, the combination of a main supporting-frame, a belt-carrying frame mounted to swing from said main frame, an inclined concentrate-belt formed of sheet metal and carried by said belt-carrying frame, said sheet-metal belt having perforations, the walls of which are disposed to direct fluid-currents over and substantially parallel to said belt, and a fluid-chamber beneath the upper run of said belt for directing fluid-currents through said perforations.

2. In a machine of the class described, the combination of a frame, an inclined concentrate-belt carried by said frame and provided with perforations, the walls of said perforations being disposed to direct fluid-currents over and substantially parallel to the surface of said belt, a hopper located above the belt and between the extremities of the upper run thereof to feed material onto said belt for treatment, and a fluid-chamber beneath the upper run of the perforated concentrate-belt and extending from the lower end of said run to a point beyond the hopper, said fluid-chamber being disposed to force a continuous uniform pressure throughout the entire extent of its connection with the perforated belt.

3. In a machine of the class described, the combination of a frame, a concentrate-belt carried by said frame and provided with perforations, the walls of said perforations being disposed to direct fluid-currents over and substantially parallel to the surface of said concentrate-belt, means for moving said belt, and mechanism for imparting to the frame carrying the perforated concentrate-belt a sidewise-reciprocating motion.

4. In a machine of the class described, the combination of a supporting-frame, an inclined concentrate-belt carried thereby, said belt being provided with perforations the mouths of which are disposed to direct fluid-currents over and substantially parallel to the surface of the belt, a fluid-chamber below the upper run of the belt, a one-piece envelop inclosing the edges of the belt to prevent escape of fluid-currents, and means for moving the belt.

5. In a machine of the class described, the combination of a concentrate-belt, means for supporting said belt on an incline, said belt being formed with perforations, the walls of which are offset to direct fluid-currents over and substantially parallel to the surface of said belt, a hopper disposed above said belt, means for directing fluid-currents through the perforations of said belt, means for moving said belt, and movable devices for directing dressing or finishing fluid-currents over the surface of said belt.

6. In a machine of the class described, the combination of a concentrate-belt, means for swingingly supporting said belt on an incline, said concentrate-belt being provided with perforations, the walls of which are offset to direct fluid-currents over and substantially parallel to the surface of said belt, means for

giving to one portion of the belt a greater incline than to another portion thereof, a fluid-chamber for directing fluid-currents through the perforations of the belt, and operating means for moving the concentrate-belt.

7. In a machine of the class described, the combination of a concentrate-belt, means for supporting said belt on an incline, said concentrate-belt being provided with perforations, the walls of which are offset to direct fluid-currents over and substantially parallel to the surface of said belt, means for giving to one portion of the belt a greater incline than to another portion thereof, a fluid-chamber for directing fluid-currents through the perforations of the belt, and movable devices for directing dressing or finishing fluid-currents over the surface of a portion of said concentrate-belt.

8. In a machine of the class described, the combination of a frame, an inclined perforated concentrate-belt supported thereby, the walls of the perforations being offset to direct fluid-currents over and substantially parallel to the surface of the belt, a hopper disposed above the belt between the extremities of the upper run thereof, devices for imparting a greater incline to the portion of the belt above the hopper than to the portion below the same, and means for directing fluid-currents through the perforations of the belt.

9. In a machine of the class described, the combination of a frame, an inclined perforated concentrate-belt supported thereby, the walls of the perforations being offset to direct fluid-currents over and substantially parallel to the surface of the belt, a hopper disposed above the belt between the extremities of the upper run thereof, devices for imparting a greater incline to the portion of the belt above the hopper than to the portion below the same, and movable devices for directing fluid-currents across the portion of the belt above the hopper to separate the light material from the concentrates.

10. In a machine of the class described, the combination of a frame, an inclined perforated concentrate-belt supported thereby, means for moving the belt, devices for directing fluid-currents through the perforations of the inclined concentrate-belt, a hopper disposed above the upper run of the belt between the extremities thereof, and deflecting-bars for moving the material near the edges of the belt toward the center thereof.

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

ALBERT H. STEBBINS.

Witnesses:
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W. H. AUDERECH.