

No. 633,254.

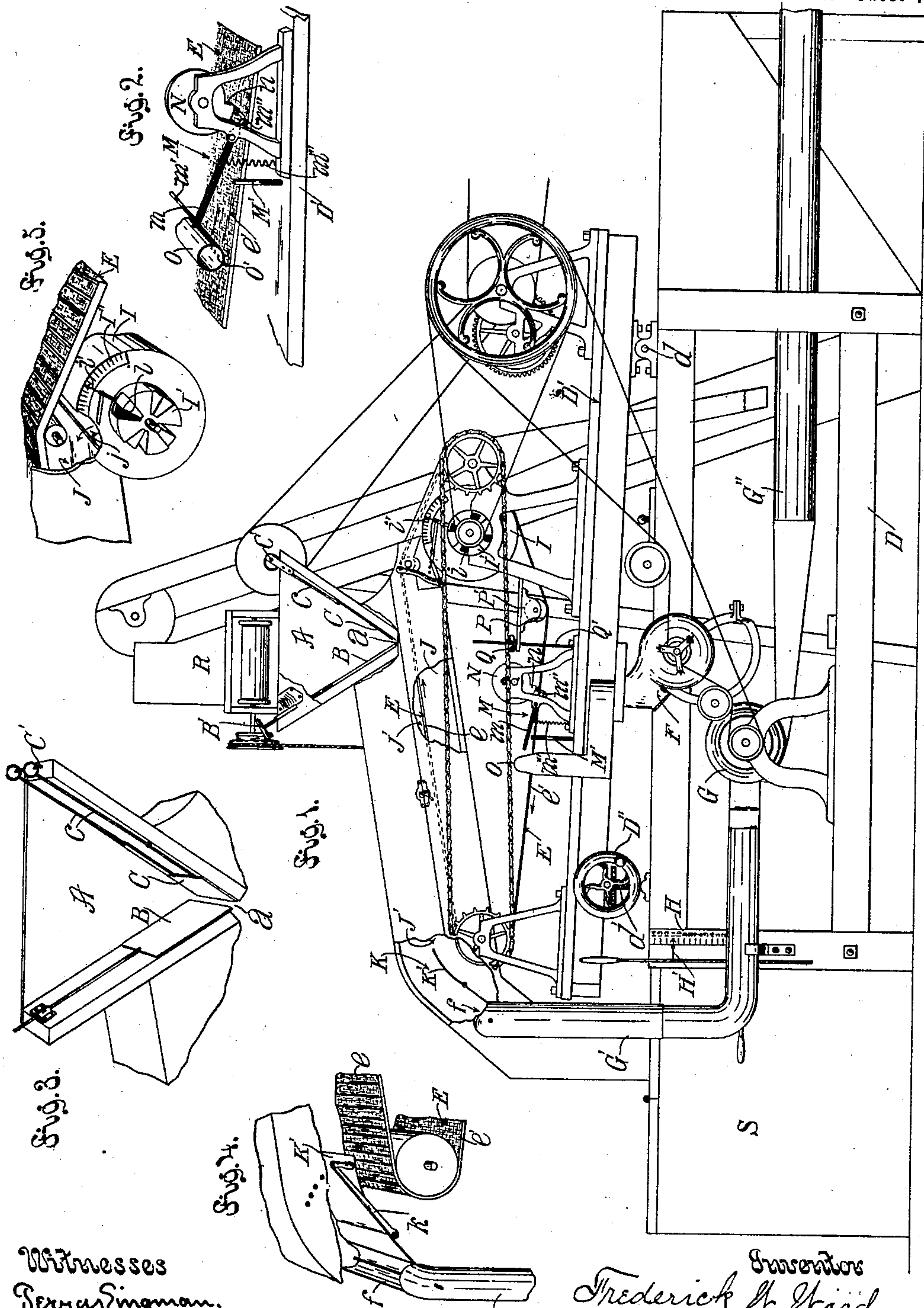
Patented Sept. 19, 1899.

F. W. WOOD.
DRY CONCENTRATOR.

(Application filed Aug. 5, 1897.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses
Derry Singman.
C. D. Osby

Inventor
Frederick W. Wood.
by Townsend Bros
his attys

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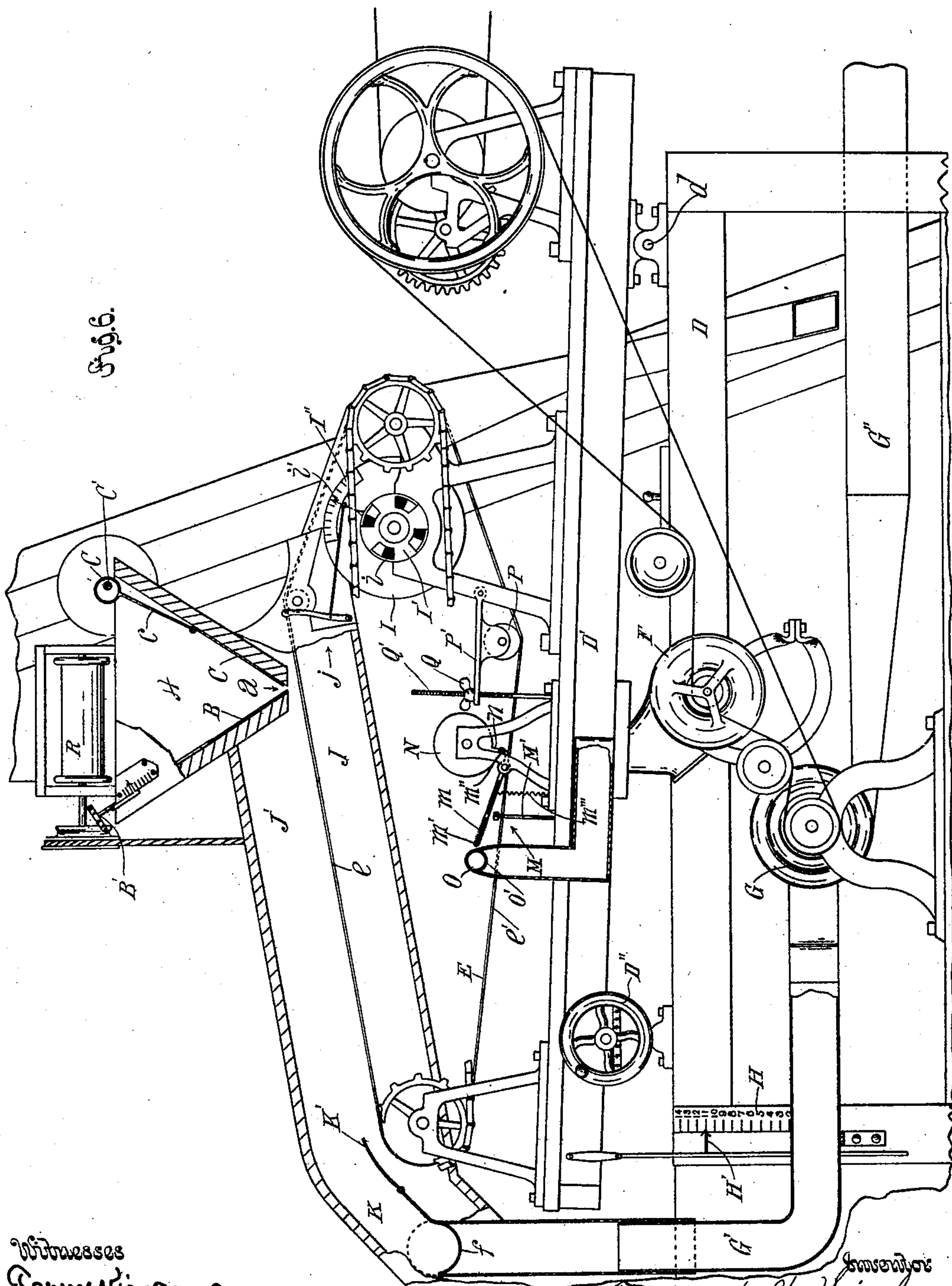
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Sergeytingman.
E. A. Katerman.

by Frederick H. Wood.
Townsend Bros.
his attys

UNITED STATES PATENT OFFICE.

FREDERICK W. WOOD, OF LOS ANGELES, CALIFORNIA.

DRY CONCENTRATOR.

SPECIFICATION forming part of Letters Patent No. 633,254, dated September 19, 1899.

Application filed August 5, 1897. Serial No. 647,241. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK W. WOOD, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented new and useful Improvements in Dry Concentrators, of which the following is a specification.

The object of my invention is to provide improved means for the separation of minerals, particularly fine flake and flour gold from metalliferous gangue.

My machine is designed to operate upon finely-pulverized ore.

My invention comprises an improvement in the manner of controlling the air-blast which is forced through a traveling pervious fibrous or equivalent belt, whereby the force of the blast can be accurately regulated to the exact degree desired.

My invention also comprises improved means whereby I free from the pervious separating-belt the fine flour-gold which naturally gravitates to the belt and is engaged and retained by the fibers thereof. In this relation my invention includes an improved form of knocker by which to operate most effectively upon the moving pervious belt to jar out the precious materials caught thereby.

My invention further comprises improved means for separating from the gangue the fine flake-gold which is by the action of the blast blown with the dust and silt from the main body of the gangue and with the ordinary construction of machines of this class is driven from the machine and lost.

My invention also comprises the feed which I employ for distributing the gangue evenly upon the traveling belt.

My invention comprises the various features of construction and combinations of parts hereinafter fully set forth and claimed.

The accompanying drawings illustrate my invention.

Figure 1 is a side elevation of a machine embodying my invention. In this view portions of the machine are broken away to expose the construction. Fig. 2 is a fragmental detail illustrating the means which I employ for freeing from the belt the fine gold that has become lodged therein. Fig. 3 is a perspective view showing my improved force-feed. Fig. 4 is a fragmental view illustrating

my improved arrangement for separating the flake-gold from the gangue. Fig. 5 is a fragmental view illustrating my improved device for regulating the blast passing through the belt. Fig. 6 is an enlarged fragmental view, partly in section, to show the working parts on larger scale than shown in Fig. 1.

In the drawings, A represents a hopper which is provided in its bottom with a feed-slot *a*, which is controlled by means of a gate B, which by means of a handle B' may be regulated to give the sized opening desired.

C is a feed-bar which is arranged to reciprocate in the hopper to force through the slot the ore to be fed and is operated by means of a crank or cam shaft C', which is journaled on one side of the hopper. *c* represents pitman-arms connecting the crank or cam shaft with the bar.

Dis the main body or supporting base-frame, upon which is pivotally secured a movable frame D', which carries the traveling concentrating-belt E and all the mechanism with the exception of the fans F and G.

d is the pivotal point of the frame D', and D'' is a crank-wheel which operates a screw *d'* to raise and lower the free end of the movable frame to thereby vary the inclination of the top member *e* of the belt E to regulate the specific gravity of the concentrates.

Upon the base-frame D is secured a scale H, which is numbered to indicate specific gravity, and to the frame D' is secured an index-finger H', which points to the scale to thereby enable the operator to accurately adjust the machine to save concentrates of any desired specific gravity.

Another important feature of my invention is the manner in which I regulate the supply of air which is forced through the pervious belt E. This comprises a fan or air-forcing device I, having an inlet *i*, controlled by means of a valve I', whereby the size of the opening through which air is admitted to the air-forcing device is regulated in contradistinction to regulating the size of the outlet. When the size of the outlet from the air-forcing device is regulated, the air-forcing device being supplied with more air than is desired, by increasing the compression and velocity of the jet forces an abnormal amount of air through a small opening and cause an unde-

sirable eddying and unequal compression of air in the chamber into which it is forced. This prevents that evenness and regularity of blast which is essential to perfect success.

5 When the opening *j*, leading into the blast-chamber J, is unrestricted at all times and the opening leading to the air-forcing device is regulated, there can be no undesirable jet and consequent eddies produced in the cham-
10 ber when the supply of air supplied to the air-forcing device is diminished, the jet being produced at the inlet and thoroughly broken up and distributed by the fan before the air enters the blast-chamber, so that there is an
15 even pressure of air against the underside of the moving fibrous belt and there is no vibration of the belt due to variation of air-pressure while the air flows upward through the belt. The material is therefore subjected
20 to the moving action of two constant moving forces and to these only—viz., the constant forward movement of the belt and the constant upward movement of the air through the belt—so that the fine flour-gold will settle
25 down through the constant upward stream of air and rest in the fibers of the belt, and thereby be carried along by the belt, and at the same time the material which falls upon the belt is carried along by the belt, being buoyantly
30 supported by the upward current of air, and the lighter dust is carried upward and out through the outlet. The valve I', which I have shown for controlling the air-inlet, is pivoted to partially rotate and is provided
35 with an index-finger *i'*, which points to a scale I'', arranged upon the blower-frame, to thereby indicate the size of the inlet and the force of the blast passing through the concentrating-belt. Thus the pitch of the belt may be
40 quickly and accurately adjusted by raising or lowering the adjustable frame D' until the index-finger H' indicates upon the scale H the specific gravity desired. Then the valve I' may be adjusted by turning the valve to
45 cause the index-finger *i'* to point to the desired place upon the scale I'', and the operator knows that the strength of the blast and the pitch of the belt are regulated to suit the character of the ore being treated. Thus
50 after the character of ore is once determined upon an inexperienced operator can be instructed how to set the machine to produce the best results in saving the precious metals.

The belt E is formed of suitable pervious
55 material through which the air can pass, but which will not allow the fine particles of gold and gangue to pass downward through the belt. The blast-chamber J is arranged below the belt—that is to say, the belt forms the top
60 of the chamber in the usual manner of such machines. Above the belt is arranged an air-tight chamber J', of which the belt forms the bottom, and at the tail end of the chamber is arranged the intake of an exhaust-opening K,
65 the lower lip of the mouth of which is formed of an adjustable shutter K', which is provided with a handle *k*, whereby the shutter may be

moved nearer to or farther from the belt in order to intercept a greater or less proportion of the fine material carried into the air by the
70 action of the blast passing through the belt.

The suction-fan G communicates, by means of a telescopic tube G', with a trough *f*, which extends entirely across the machine, so that
75 by the suction produced by the fan G the fine dust and flake-gold carried in the air in the chamber J' are drawn out of the chamber into the trough, thence through the fan, and discharged through a tube G'' out of the machine,
80 where the dust and gold may be separated from the air by any suitable dust-separating device. By regulating the mouth of the exhaust by means of the adjustable shutter I
85 can accurately gage the character of the material which is carried from the chamber J' by the exhaust—that is to say, if the flake-gold is heavy and does not rise very high above
90 the body of gangue on the belt the shutter is lowered so as to intercept such matter, and, upon the contrary, if the flake-gold is light
95 and rises easily the shutter is correspondingly raised to avoid carrying away too much of the heavy silt and other matter which may be carried into the air by the blast.

It will be noted that I employ not only a
95 blast which is forced from below up through the belt and the gangue, but also an exhaust which exhausts from an exhaust-chamber above the belt, which chamber extends beyond the tail of the belt, the inlet to the ex-
100 haust being above the plane of the tail of the belt, whereby the fine flake-gold can be separated from the gangue by using a very moderate blast.

The fine flour-gold naturally gravitates to-
105 ward the belt, and where a pervious belt is used, as in this case, the fine gold becomes lodged in the interstices thereof. In order to save this gold, I provide a knocker M, which is arranged to jar the lower member *e'* of the
110 belt to thereby dislodge the fine flour-gold, so that it falls upon a cloth or into a receptacle placed to receive it. This knocker comprises spiral spring-arms *m*, one arranged upon each
115 side of the machine, and a cross-rod *m'*, secured to the spring-arms and adapted to knock upon and jar the belt. By mounting a cross-rod on the two spiral spring-arms it is caused
120 to strike a peculiarly effective blow that cannot be otherwise produced so far as I am aware.

M' are adjustable stops arranged to engage the spring-arms to regulate the drop of the knocker. The spring-arms are each secured
125 to a body member *m''*, the outer end of which is arranged in the path of a cam N, which is provided with an offset *n*, into which the outer end of the body member drops to thus actuate the knocker. A coiled spring *m'''* adds
130 force to the blow delivered by the knocker, and the elasticity of the coiled spring-arms allows the stroke with which the knocker strikes the belt to be so nicely regulated by raising or lowering the adjustable stops M' as

to give exactly the blow necessary to jar the fine gold loose from the meshes of the belt. In order to assist in dislodging from the belt those particles of fine gold, I arrange a pipe 5 O, extending across the belt close above the lower member *e'* of the belt and provided with perforations O' in the bottom thereof. By means of the fan or air-forcing device F a strong blast of air is forced through the per- 10 forations in the pipe and through the pervious belt adjacent to the knocker M, so that the air-blast assists the knocker in thoroughly dislodging the fine gold from the belt.

P is a tension-roller which is journaled in 15 a supporting-frame P', which is pivoted by one end to the frame of the machine and has its other end engaged by a butterfly-nut Q, screwed upon a bolt Q', which is secured to the frame D'. By screwing the nut downward 20 the tension upon the belt can be regulated to any point desired.

In practical operation the gangue is placed in the hopper A by means of a carrier R or any other suitable device, and the feed-slot *a* is 25 regulated by means of the gate B to give the sized opening desired. Then the machinery is started to actuate the cam-shaft C' to thus reciprocate the feed-bar C to force material downward through the slot and upon the trav- 30 eling belt E. The belt travels upward, as indicated by the arrow in Fig. 1, and the blast from the fan or air-forcing device I passes upward through the belt and the gangue, causing the fine flake-gold to rise in the upper portion 35 of the chamber J'. The exhaust-fan G operates to draw from the tail portion of such chamber the fine material which rises above the lip of the shutter or valve K', the shutter being raised or lowered to carry from the ma- 40 chine a greater or less amount of the fine dust raised by the blast, while the remainder or heavier portion of the gangue carried by the force of gravity and the blast passes down into the discharge or tailing bin S. The fine flake- 45 gold is carried from the chamber and separated from the air by any suitable dust-collector, after which the material thus discharged may be treated to secure the precious metals therefrom.

50 By examining the character of the concentrates carried upward by the belt and discharged from the machine the operator can determine whether or not too much of the gangue is being carried over with the con- 55 centrates. If such is the case, the adjustable frame D' is lowered by means of the crank-wheel D'', the index-finger H' pointing out upon the scale H the specific gravity of the

concentrates. The opening *i* of the air-forcing device I is regulated by valve I' until the 60 index-finger *i'* points to the proper place upon the scale I'', and the blast is thus regulated to the exact point desired. In the meantime the cam N has been actuating the knocker M to shake from the belt the fine gold carried 65 thereon and the blower F has been forcing the air through the perforated pipe O down through the belt to thus aid the knocker in dislodging the fine material from the belt.

Now, having described my invention, what 70 I claim as new, and desire to secure by Letters Patent, is—

1. In a concentrator, the combination set forth of a pervious traveling belt; means for feeding ore upon the belt; means for forcing 75 air through the belt; a shutter movable toward and from the belt; and an exhaust having its intake above the shutter.

2. In a concentrator, the combination set forth of a traveling pervious belt; an air- 80 forcing device arranged to force air up through the belt; a closed chamber arranged above the belt; an exhaust-passage leading from the closed chamber; a movable shutter arranged to form the lower wall of the mouth 85 of the exhaust-passage and adapted to be adjusted toward and from the traveling belt.

3. In a concentrator, the combination set forth of a base-frame; a movable frame piv- 90 oted to the base-frame and carrying a pervious concentrating belt; a blower for forcing air through the belt; a valve for regulating the air admitted to the blower; a scale arranged upon the blower-frame; a pointer se- 95 cured to the valve and pointing to the scale; a scale arranged upon the base-frame; a pointer secured to the movable frame and pointing to the scale upon the base-frame; and means for adjusting the movable frame 100 with relation to the base-frame.

4. In a concentrator, the combination set forth of a blast-chamber; a traveling pervi- ous belt forming the top of such chamber; an exhaust-chamber of which the belt forms the 105 bottom; an air-forcing device arranged to force air into the blast-chamber and which extends beyond the tail of the belt; and an exhaust device arranged to exhaust air from the tail of the exhaust-chamber and having 110 its inlet above the plane of the tail of the belt.

F. W. WOOD.

Witnesses:

ALFRED I. TOWNSEND,
JAMES R. TOWNSEND.