

No. 650,800.

Patented May 29, 1900.

F. H. SMITH & L. V. BOND.

APPARATUS FOR SEPARATING METALS FROM THEIR ORES, &c.

(Application filed Apr. 4, 1899.)

(No Model.)

2 Sheets—Sheet 1.

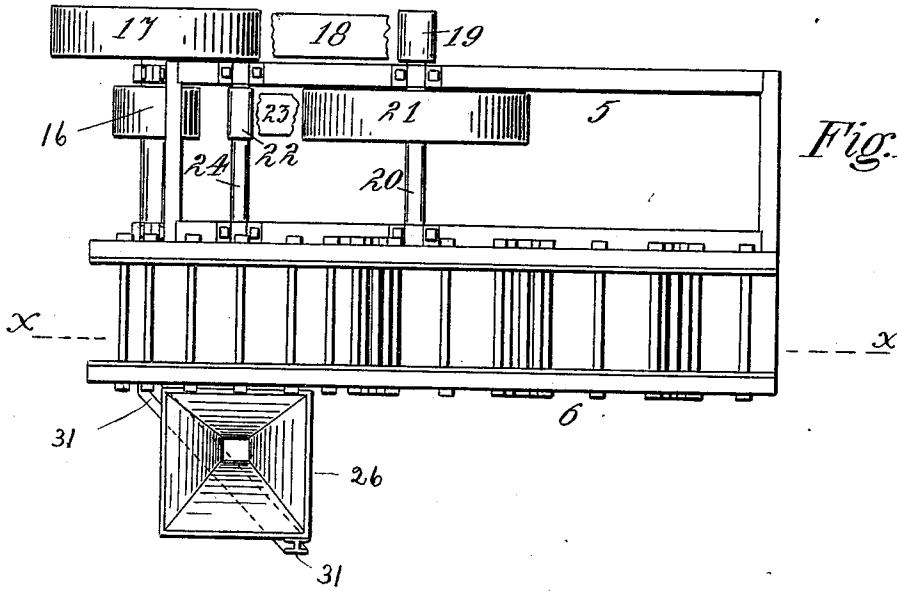


Fig. 1.

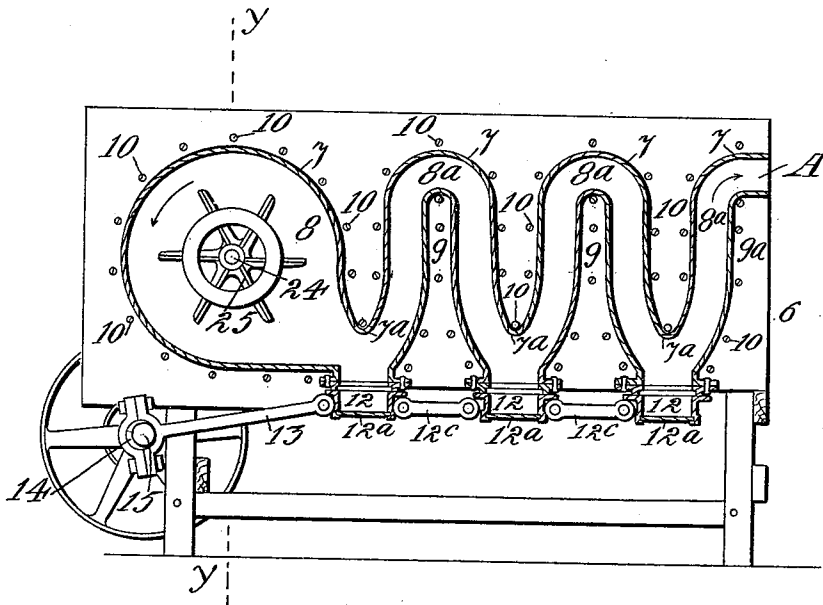


Fig. 2.

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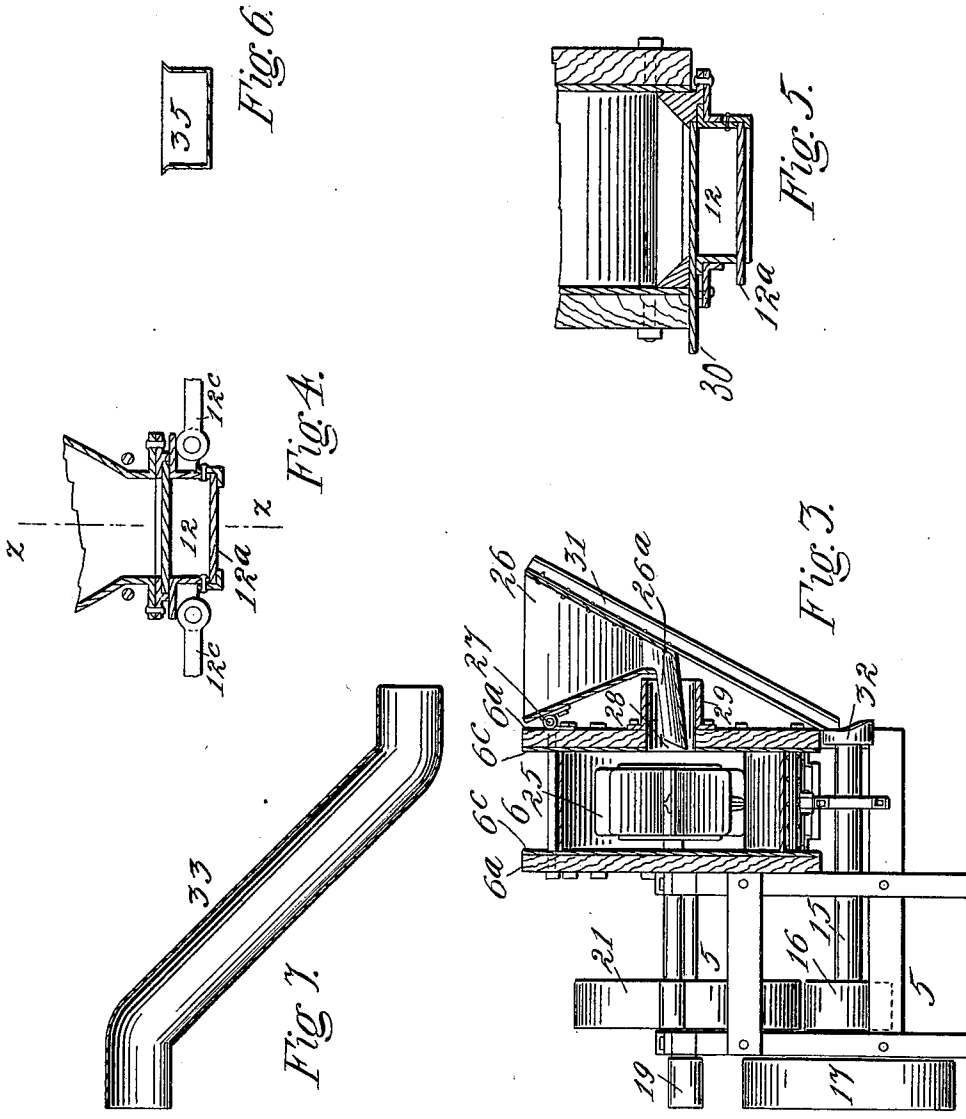
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2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

FREDRICK H. SMITH AND LUCIUS V. BOND, OF DENVER, COLORADO,
ASSIGNORS OF TWO-THIRDS TO JOHN P. IBSON, OF SAME PLACE.

APPARATUS FOR SEPARATING METALS FROM THEIR ORES, &c.

SPECIFICATION forming part of Letters Patent No. 650,800, dated May 29, 1900.

Application filed April 4, 1899. Serial No. 711,660. (No model.)

To all whom it may concern:

Be it known that we, FREDRICK H. SMITH and LUCIUS V. BOND, citizens of the United States of America, residing at Denver, in the county of Arapahoe and State of Colorado, have invented certain new and useful Improvements in Apparatus for Separating Metals from their Ores or other Material with which they may be Mingled; and we do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

Our invention relates to improvements in apparatus for separating metals from their ores or other material with which they may be mingled. It is more especially intended for treating material in a dry state, though its use is not limited thereto, as the ore or placer-dirt may be moist, damp, or even wet and still be successfully treated by our improved machine.

To these ends the invention consists of the features, arrangements, and combinations hereinafter described and claimed, all of which will be fully understood by reference to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is a top or plan view of our improved machine. Fig. 2 is a section taken on the line X X, Fig. 1. Fig. 3 is a section taken on the line Y Y, Fig. 2. Fig. 4 is a fragmentary detail view of the apparatus, illustrating one of the mineral-cups. Fig. 5 is a section taken on the line Z Z, Fig. 4. Fig. 6 is a detail view of a detachable mercury-cup adapted to be set into a mineral cup or receptacle. Fig. 7 is a detail view of a conduit which may be employed in carrying the material to the machine.

Similar reference characters indicating corresponding parts in the views, let the numeral 5 designate a suitable framework, upon which is mounted a casing 6, preferably composed of wood walls and provided with a sheet-metal lining 6^c. Between the vertical side walls of this casing is placed a sheet-metal

partition 7, bent into serpentine shape to form a drum-compartment 8 and a number of upright compartments 8^a, communicating with the drum-compartment. Into each of the two compartments 8^a, nearer the drum, projects a double upright partition 9, and into the last or terminal compartment 8^a, at the tail of the machine, projects a single upright partition 9^a, forming the space between the side walls and inclosed by the serpentine plate or partition 7, located to the right of the drum 8, (see Figs. 1 and 2,) into a serpentine channel or way communicating with the drum-compartment at one extremity and with the air at the opposite extremity. The plate 7 and the partitions 9 and 9^a are supported between the side walls 6^a by means of bolts 10, passed transversely through the said walls and secured by nuts screwed tightly thereon, whereby the said parts 7^a and 9^a are clamped, as it were, between the side walls of the casing 6. Directly below each depending bend 7^a of the plate 7 is located a box or receptacle 12, in which the metals are deposited and saved during the operation of the machine. These mineral-boxes are slidingly supported on the casing and connected by links 12^c, whereby they are all arranged to be reciprocated through the instrumentality of a pitman 13, operated from an eccentric 14 on a shaft 15, journaled in the framework. Fast on this shaft is a pulley 16, which may be connected with any suitable motor for imparting motion to the machine. Fast on the left-hand extremity of this shaft 15 is a larger pulley 17, adapted to be connected by a belt 18 with a small pulley 19, fast on a shaft 20, which is also provided with a large pulley 21, connected with a small pulley 22 on a shaft 24 by a belt 23, whereby a high speed is imparted to the shaft 24, upon which is secured a fan 25, located within the drum-compartment 8 of the casing. To one side of the machine, adjacent this drum, is hinged a hopper 26, as shown at 27. This hopper is provided with a lateral chute 26^a, projecting into an opening 28, formed in the casing side and surrounded by a thimble 29. The opening 28 is directly opposite the axis of the fan, whereby the partial vacuum produced by the fan's rapid rotation induces a rapid air-current from the

outside inwardly, whereby the material fed into the hopper is drawn into the drum-compartment and carried into the serpentine channel heretofore described. As the material comes in contact with the depending bends or air-checks 7^a of the partition 7 the metallic values, which are the heavier, fall into the mineral-boxes 12 out of the path of the air-current and are saved, while the lighter gangue or waste material is carried along with the current and discharged at the terminus A of the serpentine channel. The coarser mineral particles will be caught in the mineral-boxes nearer the fan or air-blast-inducing apparatus, a finer grade will be caught in the next mineral-box in the direction of the tail of the machine, and the finest grade of mineral in the last of these mineral-boxes. The reciprocating or shaking motion imparted to the mineral-boxes during the operation of the machine has a tendency to cause the mineral values to seek the lowest possible position, whereby any gangue which finds its way into the boxes 12 is kept on top and brought as nearly as possible into the path of the air-current, which skims off the gangue, so to speak, leaving the mineral contents in the said receptacles. The bottoms 12^a of the boxes 12 are detachable, whereby the contents of the boxes may be removed at pleasure during the operation of the machine, a slide 30 being inserted above each box to close the opening communicating with the serpentine channel until the contents of the box have been removed and its sliding bottom replaced, after which the slide 30 is removed.

The hopper 26 is provided with a depending bar 31, whose lower extremity projects into the path of a cam 32, mounted on the shaft 15, remote from the pulley 17. Hence a shaking motion is imparted to the hopper during the operation of the machine, whereby the hopper is prevented from clogging, the feed therethrough being thus made entirely automatic. Instead of the hopper 26 a chute or conduit 33 (see Fig. 7) may be employed. In this case the upper extremity 33^a of the conduit would be connected with the thimble 29, and it would then be practicable to take the material from the ground or other surface upon which the machine is placed, since the air-current induced in the blast-drum would be strong enough for this purpose.

If desired, a cup containing mercury may be placed in the mineral-box nearest the tail of the machine to facilitate the catching of the fine mineral particles which alone reach this point as the material is passing through the apparatus.

Having thus described our invention, what we claim is—

1. In an apparatus for separating metals

from their ores or other material, the combination of a casing inclosing an air-blast compartment and a serpentine passage leading therefrom to the outer air, means located in the blast-compartment for inducing an air-current adapted to carry the said material into and through said passage, the casing inclosing the blast-compartment being provided with an opening through which the material to be treated is drawn by the induced air-current, mineral-receptacles consisting of closed boxes located beneath the depending partitions or bends of the serpentine passage, and means for imparting a reciprocating movement to the said boxes which are adapted by their reciprocation to concentrate the mineral at the bottom under a layer of material which protects them from the blast.

2. The combination of a casing, comprising two vertical side walls, a serpentine plate clamped between said walls and forming a drum-compartment, and several upright compartments communicating with the drum-compartment, a double upright partition projecting into each upright compartment and forming a serpentine channel, a fan located in the drum-compartment, a reciprocating mineral-box located below each depending bend of the serpentine channel, links connecting the mineral-boxes, a shaft, a pitman connected with said shaft at one extremity and with one of the end mineral-boxes at the other extremity for imparting a reciprocating movement to the series of mineral-boxes, means for feeding the material to be treated to the drum, and means for operating the fan to induce an air-current in a direction to draw the material into the drum and carry it through the serpentine channel.

3. The combination of a casing provided with a drum-compartment and a number of other compartments forming together a serpentine or winding passage leading from the drum-compartment, means for introducing an air-current into the drum in such a manner that it will pass from the drum through the winding passage, mineral-receptacles located at intervals below said channel, said receptacles consisting of closed boxes movably mounted on the frame and suitably connected, and means for imparting a reciprocating movement to the said boxes which are adapted by their reciprocation to concentrate the mineral at the bottom under a layer of material which protects them from the blast.

In testimony whereof we affix our signatures in presence of two witnesses.

FREDRICK H. SMITH.
LUCIUS V. BOND.

Witnesses:

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NELLIE G. DANIELS.