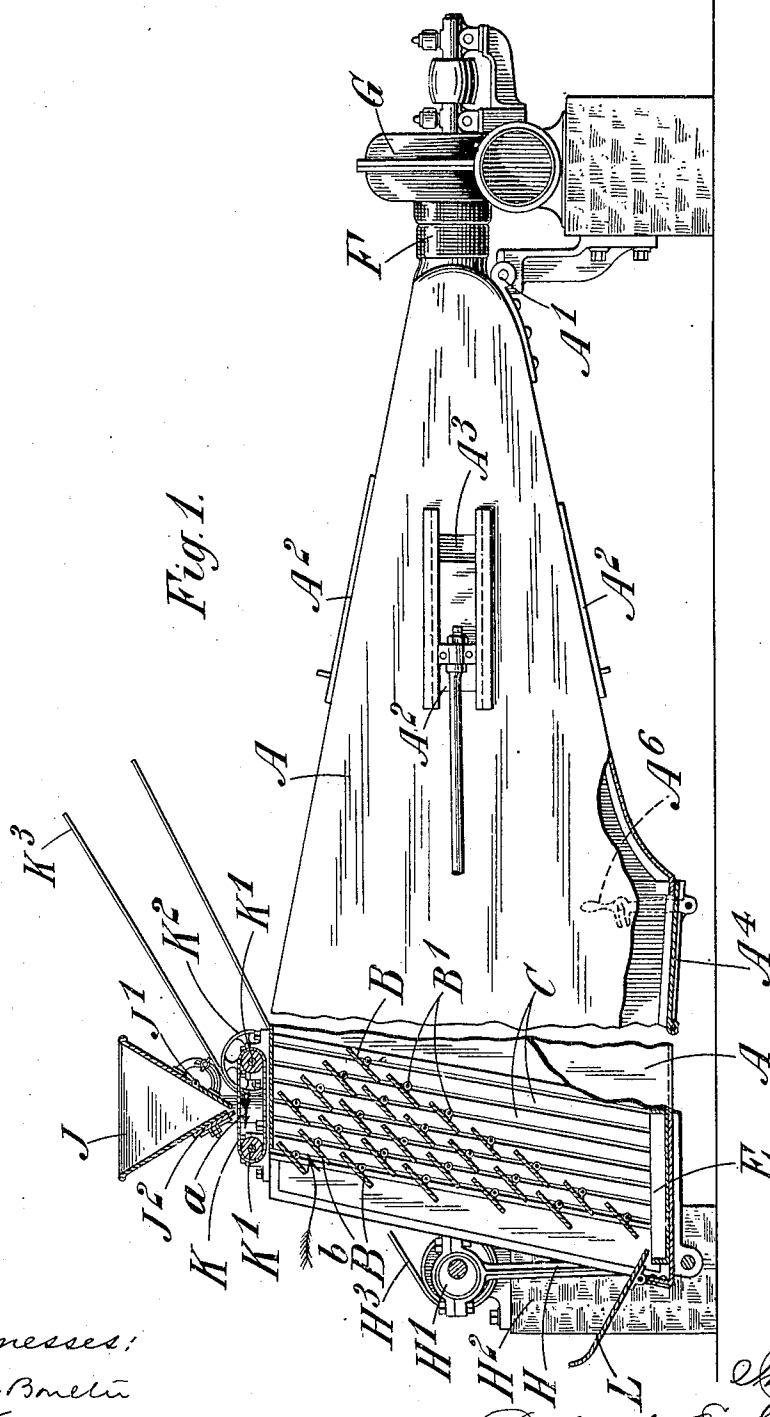


No. 844,620.

PATENTED FEB. 19, 1907.

R. E. SAUNDERS.
SEPARATION OF METALS FROM THEIR ORES.
APPLICATION FILED NOV. 11, 1905.

3 SHEETS—SHEET 1.



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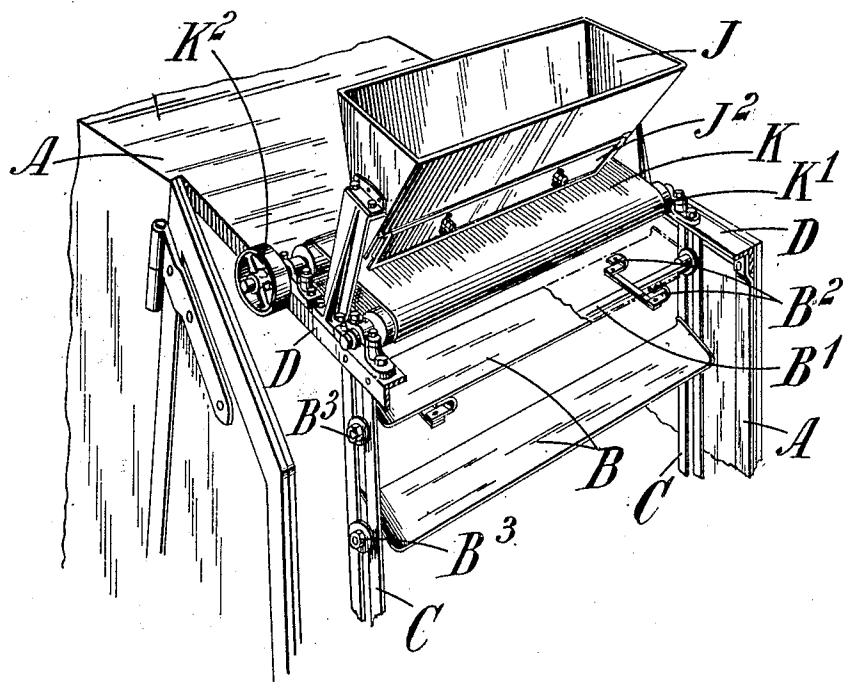
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3 SHEETS—SHEET 2.

Fig. 2.



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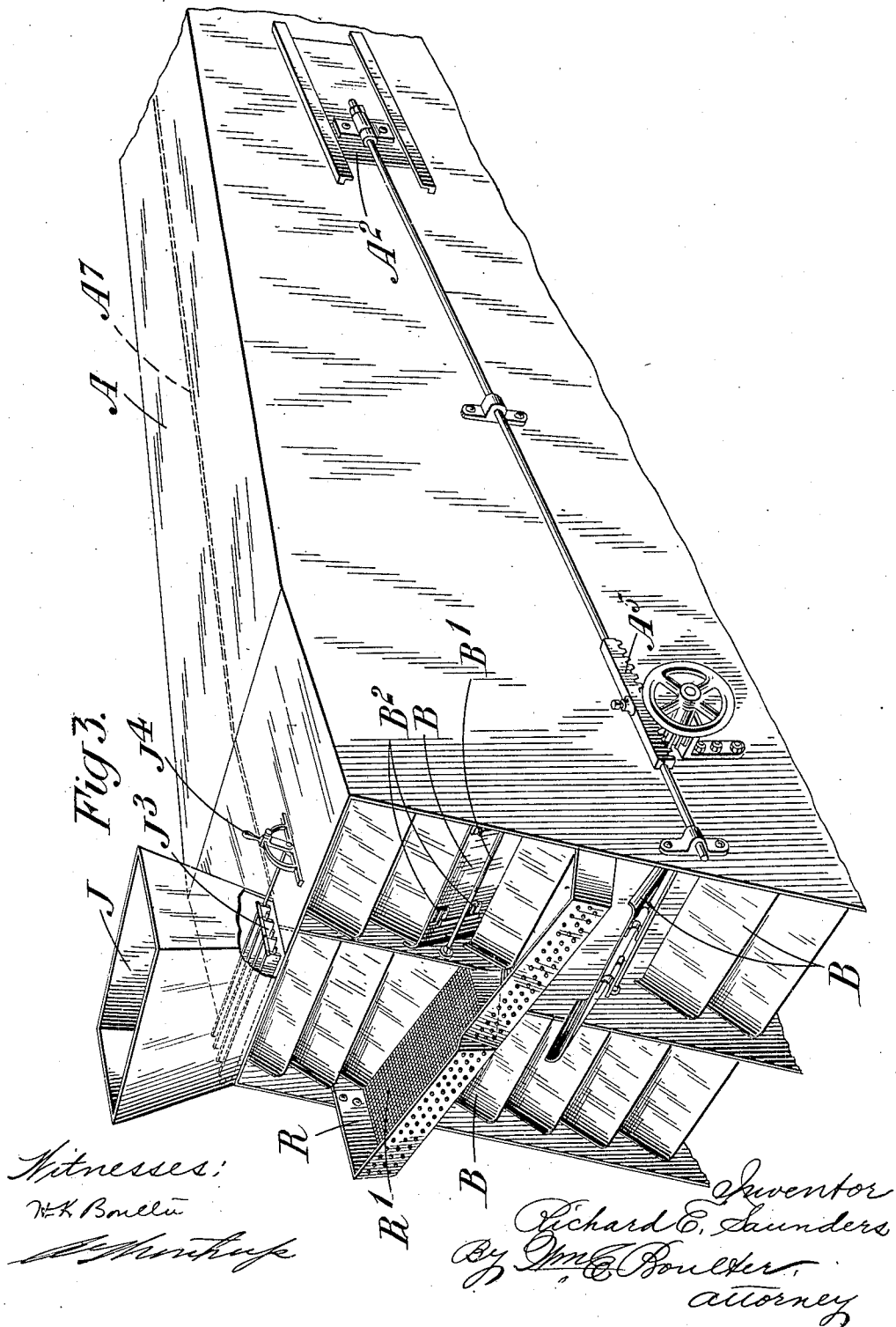
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APPLICATION FILED NOV. 11, 1905.

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UNITED STATES PATENT OFFICE.

RICHARD EDWARD SAUNDERS, OF LONDON, ENGLAND.

SEPARATION OF METALS FROM THEIR ORES.

No. 844,620.

Specification of Letters Patent.

Patented Feb. 19, 1907.

Application filed November 11, 1905. Serial No. 286,879.

To all whom it may concern:

Be it known that I, RICHARD EDWARD SAUNDERS, a subject of the King of Great Britain, residing at London, England, have
5 invented certain new and useful Improvements in or Relating to the Separation of Metals from their Ores, of which the following is a specification.

This invention relates to the separation of
10 metals from their ores, and has particular reference to apparatus whereby the metalliferous constituents of the ore can be separated from the gangue by a mechanical and dry process.

15 According to this invention the crushed or powdered ore is subjected to a current of air or other fluid preferably produced by an exhaust-fan, this air-current acting several times on the material as it falls from one to the other of a series of baffle-plates, traveling
20 bands, or similar members.

In one convenient construction of apparatus the material is fed to the top of a series of baffle-plates, preferably capable of adjustment as to the angle which they make with the horizontal. These plates are mounted in a casing conveniently open at the front and leading at the rear to an exhaust-fan, and the various baffles forming the series are so arranged that as the material falls from one baffle to that next below it it is acted upon
30 by the current of air induced by the fan and the lighter particles drawn away into the casing. The baffles are arranged in rows and are preferably staggered, so that it is not possible for the lighter portion of the material to be drawn into the casing without coming into contact with several baffles in succession. The final result of the process is that the
40 finely-divided metalliferous constituents are delivered at the foot of the series of baffles, while the gangue, practically free from metal, passes into the casing, from whence it can be readily removed.

45 Traps are provided in the casing for the easy regulation of the draft by varying the amount of air admitted from the outside of the casing to the fan.

The crushed material is conveniently delivered from a hopper to a traveling band and thence to the uppermost of the series of baffles. In some cases the baffles may be dispensed with and a series of traveling bands employed arranged in a step-like fashion one below the other, so that the material
55 falls from one to the other in succession, be-

ing acted upon by the air-current during its fall.

It is sometimes desirable to divide the casing longitudinally and to feed one division 60 from the hopper, so arranging the air-traps that the division to which the material is first passed has less suction in it than the other portion of the casing. One or more slanting trays may be arranged in connection with the baffles of a machine of this type, so that the heavier portion of the material falling into the tray will roll down and be acted upon by the stronger draft in the second portion. A separation of the lighter 70 from the heavier portions of the metalliferous constituents of the ore is thus rendered possible.

In the accompanying drawings, Figure 1 is an elevation, partly in section, of one construction of separating-machine according to this invention. Fig. 2 is a perspective view showing details of a portion of the same. Fig. 3 is a perspective view illustrating diagrammatically another construction of the 80 machine, also according to this invention.

Like letters indicate like parts throughout the drawings.

With reference first to Figs. 1 and 2, A is a casing provided at its front or open end with 85 a series of baffles or trays B. Each baffle is supported upon a bar B' by means of springs B², the ends of the bar B' terminating in screws, so that the baffle may be adjustably secured by nuts and washers B³ to frames 90 formed by bars C, secured to the framing D of the machine. These details can be seen by reference to Fig. 2.

As shown in Fig. 1, the baffles B are arranged in a number of rows, the baffles forming the second row being placed in the spaces 95 between the members of the first row, and so on, so that a zigzag path is formed between the baffles. The number of baffles in each row is diminished as the rear is approached, 100 so that, as shown in Fig. 1, all the baffles lead down over the lowest baffle in the front row to a tray E at the bottom of the casing.

The casing A is preferably tapered and terminates at its rear end in a flexible pipe F, 105 leading to an exhaust-fan G. This pipe F is made flexible, and the casing is hinged at its rear end, as at A', in order to admit of rapid vibration or shaking of the whole casing. This is brought about by supporting the front 110 end of the casing upon eccentric-rods, one of which is shown at H in Fig. 1. This eccen-

tric-rod is connected with an eccentric H' , mounted upon a stationary block H^2 , and the effect of rapidly rotating the eccentric by a belt H^3 will be to give a rapid up-and-down movement to the casing hung upon the eccentric-rods. The object of this arrangement is to prevent the material from lodging on the baffles B , and it is to aid the vibration of these baffles that they are mounted upon the springs B^2 .

Above the series of baffles is a hopper J , having the lower portion of its rear wall hinged at J' to allow for regulation of the size of the bottom outlet and provided with a sliding plate J^2 , which can be moved up or down on the front wall of the hopper, so that its lower edge acts as a scraper or distributor to the material passing from the hopper J to a traveling band K beneath it. This traveling band is mounted upon rollers K' , driven by a pulley K^2 and belt K^3 .

The casing A is provided on each side with a sliding trap or door A^2 , controlling an opening A^3 , through which air may be admitted from the outside to the inside of the casing. These regulatable openings afford an easy method of controlling the amount of suction exerted by the fan G without altering its speed, and the doors A^2 are conveniently arranged so that they may be operated by a person standing near the head of the machine—say by gear A^5 , Fig. 3.

At the lower part of the front of the casing is a plate L , serving to catch any of the metal which may fall outward from the front baffles B and to return it with the rest of the metal to the tray E . At the bottom of the casing, behind the baffles B , is a hinged door A^4 , closed by a catch A^6 . This serves as an outlet for the tailings and the gangue which may settle in the casing at the rear of the baffles.

The operation of the apparatus is as follows: The crushed material having been fed into the hopper J , the bottom opening of the hopper is regulated so as to allow a sufficient quantity to pass regularly to the belt K . As the belt moves forward in the direction indicated by the arrow a in Fig. 1 the material is evenly distributed upon it by the action of the sliding plate J^2 , and as the motion continues the material upon the belt falls over onto the top baffle B . Thence it drops to the next baffle in the front row, but in doing so is subjected to the action of an air-current passing in the direction indicated by the arrow b . Some of the gangue and metalliferous material is carried by the air onto the upper baffle of the second row, against which it impinges. Some of this material now slides down this top baffle of the second row and falls to the second baffle of the first row, meeting another current, which probably carries some of it to the top baffle of the third row.

From this explanation it will be readily

understood that the divided material in passing from baffle to baffle is subjected to successive air-currents and that each air-current aids in the separation of the metalliferous constituents from the gangue, the metal finally descending into the tray E , while the gangue is drawn into the casing.

The construction illustrated in Fig. 3 is intended to effect a preliminary grading of the metal as well as a separation of the gangue when the crushed material contains particles of varying size. In this form of machine the casing A is provided with a longitudinal partition A^7 , which divides it into two distinct portions. Each of these portions is provided with baffles B , which may correspond to those shown in Figs. 1 and 2 of the drawings, and one compartment is furnished with a hopper J , having preferably some form of regulatable outlet—such, for instance, as is shown by way of example in Fig. 5, as comprising blades J^3 , which can be altered in position by means of a handle J^4 . In front of the baffles B is a tray R , sloping downward from one side to the other of the casing and also sloping inward from front to back—*i. e.*, toward the baffles—where it is opposite to the second compartment. The portion of this tray opposite to the first compartment of the casing—*i. e.* the compartment which is furnished with the hopper—is provided with a meshed bottom K' . The compartment forming this side of the machine is intended to have less suction within it than the other compartment, a result which may be attained by suitably regulating the sliding doors A^2 .

In operation as the material leaves the hopper J and passes over the upper baffles B of the one compartment the lightest portion of the gangue and some of the light metal is drawn away, the metal being separated from the gangue in the manner previously described in connection with the machine illustrated in Figs. 1 and 2. Some of the lighter and all of the heavier material will, however, fall into the tray R . The lighter stuff passes through the mesh R' and is separated as it passes over the remainder of the baffles B in the first compartment of the machine; but the heavier material rolls down over the meshed portion of the tray to the lower part, which is inclined steeply toward the baffles, so that the material passes to the second compartment, where it is subjected to the action of a stronger suction. In order that there may be no risk of the material heaping up at the end of the tray R , the bottom is cut away toward the lower corner, and the baffle B immediately below that part of the tray is inverted to deflect the falling material in the right direction. The separation of the heavier metal from the gangue thus takes place in the second compartment, and the machine therefore effects a preliminary grad-

ing of the lighter from the heavier metal. It is found useful in some cases to regulate the direction of the currents of air drawn through the baffles by turning one or more of them, and in Fig. 5 one baffle above the tray R is shown, by way of example, as turned right round, so that it slopes in a direction contrary to that of the remainder of the baffles.

It is to be understood that the drawings are merely diagrammatic and intended to illustrate the features of the invention and that the constructional details may be varied as may be found desirable.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. In apparatus for the separation of the metalliferous constituents of ore from gangue, the combination of a casing, an exhaust-fan flexibly connected to one end of said casing, a hinged support for that end of the casing, means for vibrating the other end of the casing, regulatable openings in the casing, ad-

justable baffles within the casing, and a hopper for feeding crushed ore to the baffles substantially as set forth.

2. In apparatus for the separation of the metalliferous constituents of ore from gangue, the combination of a casing, a longitudinal partition dividing the casing into two compartments, baffles in each compartment, a hopper to feed the baffles of one compartment with crushed ore, an exhaust-fan connected with the casing, regulatable openings in each compartment, and an inclined tray extending from the front of one compartment to the other substantially as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

RICHARD EDWARD SAUNDERS.

Witnesses:

H. E. DUNBAR KILBURN,
HARRY B. BRIDGES.