G. M. RICE, 2nd.

Apparatus for Classifying and Concentrating Ores.

No. 197,897. Patented Dec. 4, 1877.

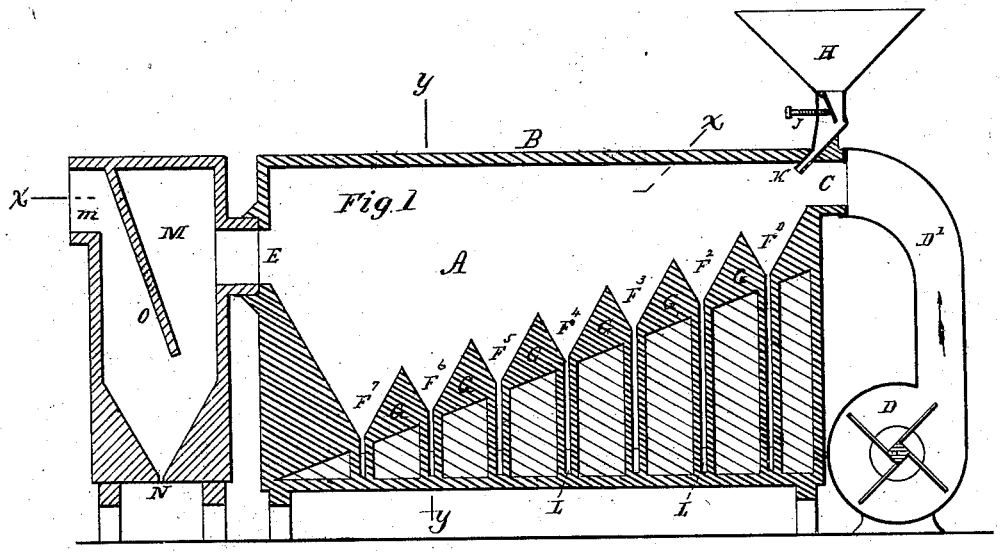

Fig. 1

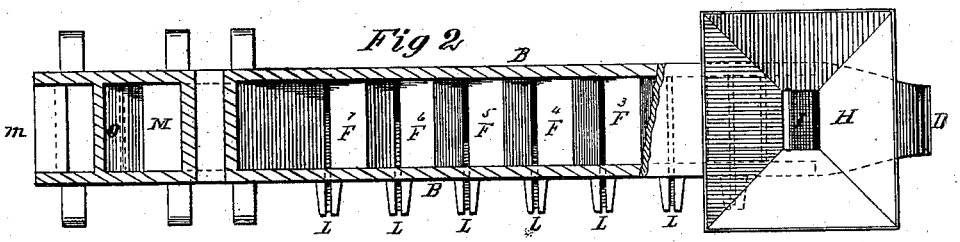

Fig 2

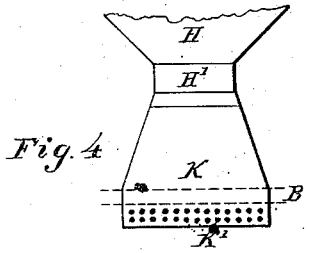

Fig. 4

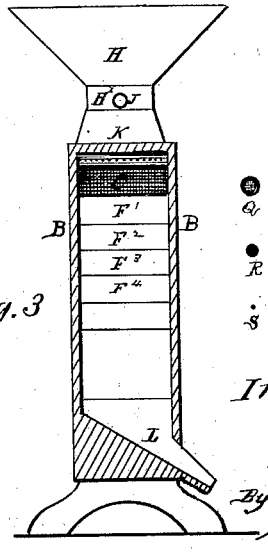

Fig. 3

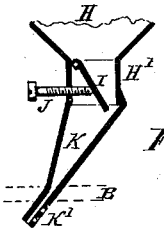

Fig. 5

Witnesses

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GEORGE M. RICE, 2D, OF WORCESTER, MASSACHUSETTS.

IMPROVEMENT IN APPARATUS FOR CLASSIFYING AND CONCENTRATING ORES.

Specification forming part of Letters Patent No. 197,897, dated December 4, 1877; application filed August 6, 1877.

To all whom it may concern:

Be it known that I, GEORGE M. RICE, 2d, of the city and county of Worcester, and State of Massachusetts, have invented certain new and useful Improvements in Apparatus for Classifying Granular Substances and for Concentrating Ores; and I declare the following to be a description of my said invention sufficiently full, clear, and exact to enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, which form a part of this specification, and in which—

Figure 1 represents a longitudinal vertical section of my improved apparatus; Fig. 2, a part plan, part horizontal, sectional view at line *x x*, Fig. 1; Fig. 3, a transverse vertical section at line *y y*, Fig. 1. Fig. 4 shows a transverse view of the feeding-spout of the hopper; and Fig. 5 is a section through said feed-spout and gate.

The object of my invention is to provide a simple and convenient apparatus for separating the various particles of granular substances, and classifying such particles according to their weight, with a view more especially to its use in the concentration of ores, or for the preparation of pulverized ores for treatment by other concentrating mechanism or reducing processes; also, for the separation of gold particles from auriferous sands and gravel, and for other similar purposes.

To this end my invention consists in an air-blast classifying and concentrating apparatus, constructed and organized for operation as hereinafter described.

In the drawings, A denotes the separating-chamber, which is surrounded on all sides by a suitable casing, B, having at one of its upper corners an inlet-opening, C, for the air-blast, which is forced in through a pipe, D′, from the rotary blower D, or by other suitable blowing mechanism, and an exit-opening, E, at the opposite end of the casing for the escape of the air from the chamber. The exit-opening E is preferably placed somewhat lower than the inlet C, as shown. At the lower part of the chamber A, ranging from the air-inlet C toward the exit E, and preferably inclined downward, as illustrated, I arrange a series of V-shaped receptacles or catch boxes, F^1 F^2 F^3 F^4, &c., formed and separated by the angular or knife-edged partitions G, which extend transversely across the chamber A between the sides of the case. A greater or less number of these catch-boxes may be employed, according to the requirements of the particular materials to be separated and the degree of classification desired.

Above the blast-inlet C is a feed-hopper, H, constructed and arranged in such manner as to deliver the crushed ore or granular material in a thin uniform stream across the blast-opening while the apparatus is in operation. The neck H′ of said hopper H is provided with an adjustable gate or valve, I, operated by a screw, J, by which the passage can be opened or closed for regulating the flow of the particles to the delivery-mouth.

The mouth-piece K is made of the form shown in Figs. 4 and 5, its lateral width increasing from the neck H′ downward toward the discharge-opening, while its dimension from front to rear diminishes toward the discharge-opening, so that the granular particles are caused to spread toward the sides, and to flow out freely in a thin uniform stream across the width of the opening.

In the present instance, that portion of the mouth-tube K which projects below the top board of the casing B, on the side toward the incoming blast, is perforated with small holes, as at K′, (or may be of wire-netting,) to permit of the air-current acting upon the particles while in the tube, and assisting in their dissemination.

Channels or chutes L communicate with the catch-boxes F for carrying away the classified material as it falls into the respective boxes F. Spouts or leaders may be connected with the chutes L, if desired, for conveying the classified particles to the various jigs, screens, or other concentrating mechanism, or to suitable bins or other receptacles arranged for the deposit thereof.

A dust box or chamber, M, is arranged at the foot of the separator to receive the fine dust which is carried from the chamber A through the exit-passage E. Said dust-chamber M may be of any suitable size as desired for the proper settlement of the dust. An opening, N, is provided for the removal of the

deposited dust; or, if desired, the lower part of the chamber M can be otherwise constructed.

A partition, O, from the upper part of the chamber, may be employed for deflecting the air-current downward before it passes to the exit *m*.

The operation of my improved apparatus is as follows: The finely-crushed ore or granular substance, in a dry condition, is placed in the hopper H, and a strong blast of air is forced into the chamber A through the pipe D′ and inlet C from the blowing mechanism. The gate or valve I then being opened, the particles of ore flow down through the neck H′, and are spread and delivered from the mouth K into or across the inlet-space C, from whence the air current or blast propels them forward into the chamber A, where the particles fall, according to their gravity or resistance to the propelling force, into the several catch-boxes F, the heaviest particles falling into the first box or receptacle, F^1, while the lighter particles are carried forward to the succeeding boxes, F^2, F^3, F^4, &c., thereby giving a very accurate and evenly-graded weight-classification of the materials. The fine dust is carried forward into the chamber M, or elsewhere, if desired, by means of a pipe connected to the exit E.

Particles of materials of different specific gravity, but of like weight, as, for instance, gold, S, galena, R, and quartz, Q, (see drawings,) will fall into the same receptacle, and such particles Q R S, since they differ in size or bulk, may be readily separated from each other in each class by passing through screens of suitable mesh to retain the larger particles, while the smaller grains fall through.

The ore, when classified and separated in my improved apparatus, as described, is in an excellent condition for further treatment in jigs, concentrators, or other reduction machinery.

My apparatus is also of advantage in working auriferous earth of clayey nature, since the dry-blast removes the fine clay as dust without trouble, and obviates the balling up of the clay incident to ordinary wet processes of separation.

The sides of the rectangular case B being parallel, and the partitions G successively reduced in height, gives space for the downward expansion of the air as the distance from the inlet C increases, thus reducing the force of the air-current and permitting the lighter particles to fall with greater uniformity than they otherwise would.

The top line of the boxes F may be made level, if desired, or at any degree of inclination preferred, and said boxes may be made square instead of V-shaped; but I prefer the form and arrangement shown.

Having described my apparatus, I will state that I do not claim separating and classifying granular materials by the aid of an air-blast, as I am aware that devices have heretofore been used wherein an air-blast was employed; but

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

1. In an apparatus for classifying and separating ores, the combination, substantially as hereinbefore described, of the close chamber A, having the air-blast inlet C and exit-opening E, as shown, the receptacles F^1, F^2, F^3, F^4, &c., ranging along the lower part of said chamber in a downwardly-inclined series from the inlet C, with the feed-spout K, for delivering the granular ore in a thin uniform stream across the air-blast inlet, and the chutes L, leading from the receptacles, for the purposes set forth, said parts all being constructed and combined for operation, as hereinbefore set forth.

2. The combination, with the rectangular casing B, having parallel sides and horizontal cover, of the series of partitions G, each succeeding partition being of less vertical height than the preceding ones, thereby giving downward enlargement of the air-space without lateral enlargement, and the intervening channels and spouts L, as and for the purposes set forth.

3. In combination with the feed-hopper H and blast-passage C, the delivery-mouth K, formed, as shown, with its lateral width increasing from the neck H′ downward, while its dimension from front to rear diminishes, as and for the purpose set forth.

4. In combination with the blast-passage C in an ore-separator, the laterally-expanded mouth-piece K, with its rear plate provided with perforations K′, for the purpose set forth.

5. In combination with the chamber A, having inlet C and exit-passage E, receptacles F, and blast-flue D′, the dust-chamber M, with the partition O, substantially as and for the purposes set forth.

Worcester, Massachusetts, August 3, 1877.

GEO. M. RICE, 2D.

Witnesses:

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S. E. BARTON.