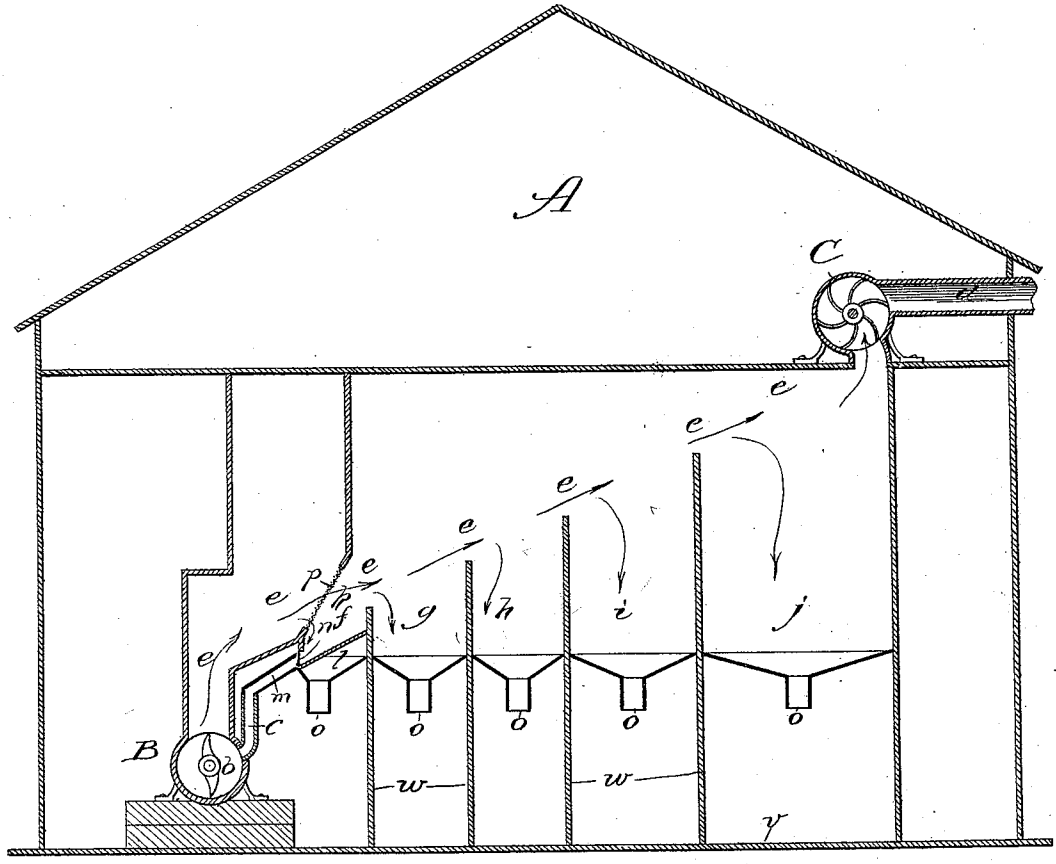
(No Model.)

J. K. HALLOWELL.

ORE SEPARATING APPARATUS.

No. 447,027. Patented Feb. 24, 1891.



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UNITED STATES PATENT OFFICE.

JOHN K. HALLOWELL, OF CAMDEN, NEW JERSEY.

ORE-SEPARATING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 447,027, dated February 24, 1891.

Application filed June 13, 1888. Serial No. 277,023. (No model.)

To all whom it may concern:

Be it known that I, JOHN K. HALLOWELL, of Camden, in the county of Camden and State of New Jersey, have invented certain new and useful Improvements in Ore-Separating Apparatus, of which the following is a specification.

My invention relates, more particularly stated, to an improvement for use in the known manner of ore separation, wherein to attain the desired result the ore in a pulverized condition is forced by means of air-currents over a series of receptacles located below the plane of the air-currents and into which the particles of ore carried by the air-currents are dropped successively by and according to their specific gravities.

The object of my improvement is to enable the manner stated as having been hitherto employed for producing the separation to be the more effectually practiced, and this I accomplish by my improved apparatus hereinafter described, and shown in sectional elevation in the accompanying drawing.

A denotes a building or inclosure containing the entire mechanism—namely, a pulverizing-machine B—in which *b* denotes beaters and situated at the lower end of an inclined course of the material acted upon and which is defined by the inlet ends of any desired number of vertically-disposed receptacles or bins, of which five are shown and indicated, respectively, by *f*, *g*, *h*, *i*, and *j*, and an exhaust-fan C at the opposite upper end of the inclined plane, the exhaust-fan being provided with an inlet-pipe *d*. The bins are provided, as shown, with hopper-shaped bottoms having the outlets *o*. In the first or lowest receptacle *f* is a false bottom *l*, inclining downward to coincide with the upper part of the base of a return-passage *m*, leading to an upper air-inlet passage *c* in the pulverizing-machine, and a valve *n* is provided at the inlet end of the passage *m*. The pulverizing-machine B is partitioned off, as shown, from the compartment containing the bins and communicates therewith above the latter through an opening covered by a screen *p*. The partitions *w* between and forming the receptacles extend from the floor *v* and increase in height from that nearest the screen *p* to the end of the compartment containing the receptacles, where the exhaust-fan C communicates with it, and operates when set in motion to draw air-currents upward through the compartment from the pulverizer in a direction inclined from the horizontal, the base of the air-currents being about at the line indicated by the arrows at *e*. The ore as it is pulverized is drawn by the suction effect of the fan C with the air-currents through the screen *p* in the ascending direction indicated by the arrows *e*. The heaviest particles of the ore drop into the receptacle *f*, the next heaviest into the receptacle *g*, and so on, the particles dropping into the successive receptacles in the order of their specific gravities, the different lots or grades being prevented from becoming intermixed in the receptacles by the successively rising partitions, which, as indicated by the curved arrows at *k*, intercept the material belonging in the bins they respectively define against being passed by its inertia beyond the bin in which it belongs. In many cases a portion of the ore will not be pulverized sufficiently to have effected an approximately complete separation of mineral or metal from the inclosing rock or gangue. This portion will seek the bin *f*, lodging on the false bottom *l* thereof and passing thence through the air-inlet *c* back into the pulverizer to be again subjected to its action. Where repulverizing of the material is not required, the valve *n*, otherwise open, is closed and the false bottom *l* removed to permit, as in the case of all the receptacles, the material to lodge in the hopper-bottoms of the bins, whence it may be withdrawn through the outlets *o*. This manner of effecting the separation according to differences in the specific gravity of the material is advantageous both in complex sulphide and telluride ores, wherein the mineral is more brittle than the inclosing rock or gangue, and in all ores containing native metals—such as copper, silver, gold—the inclosing rock or gangue of which is more brittle than the metal as it is usually found, naturally the forcing of the ore-laden currents in an upwardly-inclined direction materially assisting the action of gravity, the separation being still further regulated by the intercepting effect of the successively increasing height of the partitions in opposing the force of inertia.

To definitely describe the effect of the treatment with my improved apparatus upon a particular kind of ore, take a complex sulphide ore, the value of which is in silver, but the material of which is composed of quartz, galena, iron pyrite, gray copper, and zinc-blende. By the action of the described apparatus the largest percentage of galena would be found in the receptacle *g*, of the iron pyrite in the receptacle *h*, the greatest value in gray copper in the receptacle *i*, and a mingled material composed of zinc-blende and gray copper with some of the finer particles of galena and iron pyrite in the receptacle *j*. Each receptacle would then contain the pulverized mineral separated for the most part in a degree, each variety being largely by itself, but all mingled with larger particles of gangue of a degree of specific gravity relative to each separation; and as thus reduced the material is in condition to be further treated, as for sizing it or screening it, if necessary, and to have the largest percentage of each variety of mineral value kept by itself.

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

An ore-separating apparatus comprising, in combination with an inclosure A, a pulverizer B, having an air-inlet passage *c* and communicating through an opening covered by a screen *p* with a compartment containing receptacles having their defining partitions extended successively higher from the pulverizer to define a gradually-rising plane, an exhaust-fan C, communicating with the said compartment near the upper end of the inclined plane, a false bottom *l* in the lowermost receptacle, a return-passage *m*, leading into the pulverizer through its air-inlet *c*, and a valve *n* for the passage *m*, substantially as and for the purpose set forth.

JOHN K. HALLOWELL.

Witnesses:
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