

No. 690,278.

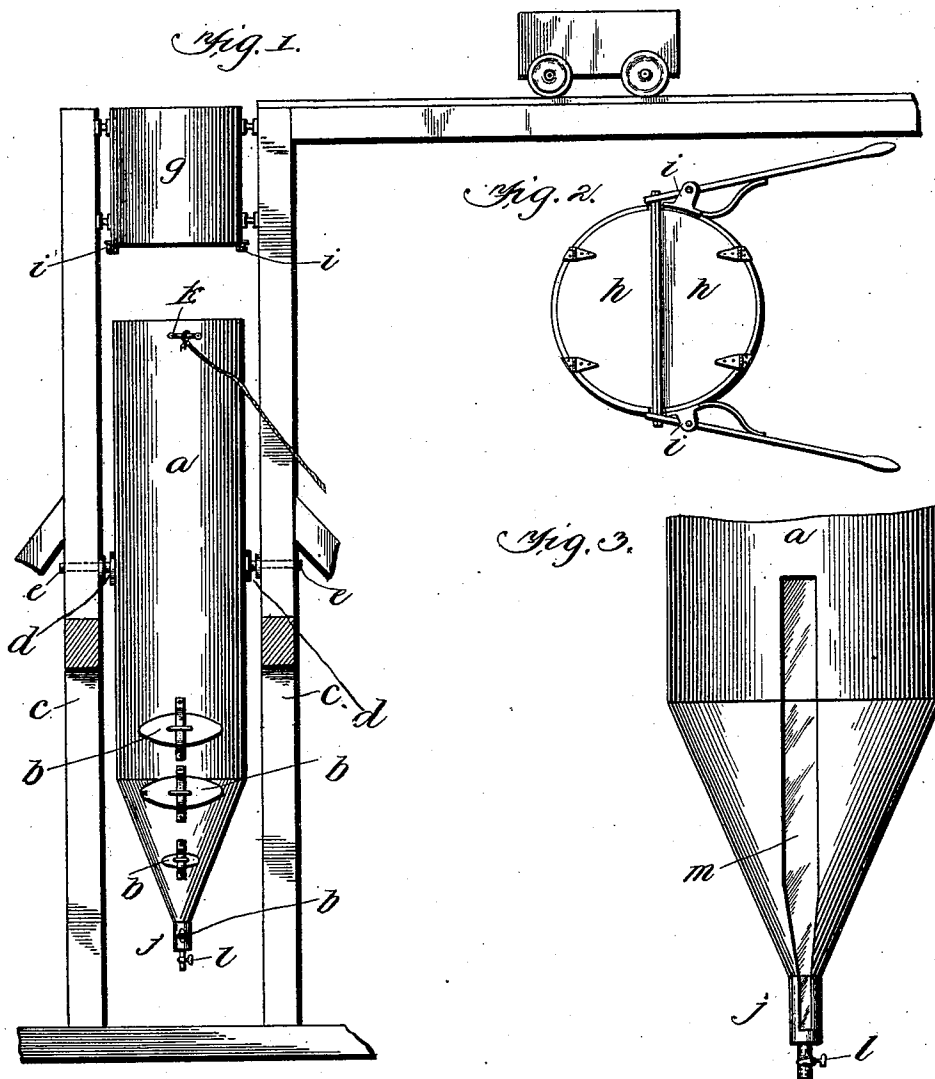
Patented Dec. 31, 1901.

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APPARATUS FOR EXTRACTING GOLD AND CONCENTRATING ORES AND METALS.

(Application filed Jan. 27, 1900.)

(No Model.)



WITNESSES:

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APPARATUS FOR EXTRACTING GOLD AND CONCENTRATING ORES AND METALS.

SPECIFICATION forming part of Letters Patent No. 690,278, dated December 31, 1901.

Application filed January 27, 1900. Serial No. 2,973. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. HEATHMAN, a citizen of the United States, residing at Santa Ana, county of Orange, and State of California, have invented certain new and useful Improvements in Apparatus for Extracting Gold and Concentrating Ores and Metals; and I do hereby declare that the following is a full, clear, and exact description of the invention, which will enable others skilled in the art to which it appertains to use the same.

The object of my invention is to concentrate ores, metals, and auriferous sands and beach-sands of every character, so that the product of such concentration obtained may be reduced to a small but valuable compass, a more marketable product, and saved from the worthless rock in which such metals are embedded, and by so doing reduce the cost of transportation to the smelters and the cost of smelting the valuable concentrates thus produced.

My invention is constructed and operates upon the well-known principle or law of physics that the times occupied by different bodies or substances in falling through water are dependent upon their relative specific gravities and that the body of greater density than another will acquire a corresponding velocity. Hence if a number of bodies—say metals—having different specific gravities are dropped into the water at the same time from a point above the water each individual body will assume a velocity through the water in proportion to its specific gravity, with the result that the body of greatest specific gravity will reach the bottom of the water first and be there deposited in a layer. The body of next greatest specific gravity will impose itself upon the first body in a layer, and so on in their order of specific gravity the remaining bodies will be deposited upon those of greater specific gravity in layers until the body of least specific gravity will rest upon all those bodies that had greater specific gravity and velocity. In order for these bodies of varied specific gravity to deposit themselves on the bottom of the water in their relative positions according to their specific gravity, it is indispensable that a sufficient length of time elapses from the time they are

dropped into the water until they are deposited at the bottom. It is necessary for metals to pass through a great depth of water—twenty feet, more or less—so that each body of the same degree of specific gravity may have sufficient time to deposit itself in its proper layer and according to its velocity, unmixed with ores, metals, or bodies of different degree of specific gravity.

In the accompanying drawings, Figure 1 is a vertical section of my apparatus. Fig. 2 is a plan view illustrating the means for closing the primary ore-receptacle. Fig. 3 is a side view of a portion of the tiltable water-holder.

To carry my invention into effect, I first construct a tank or cylinder *a*, preferably a cylinder, twenty feet high, more or less, when placed in a vertical position, which may be made of any convenient metal, with one end open and the other closed except for the gaskets and faucet hereinafter described, and of any size proportionate to the amount of ore that is to be concentrated. The inside walls of the cylinder from a point near the closed end converge toward the center and form a recess of small size, termed by me a "gold-pocket," terminating in a faucet, which occupies the extreme lower end of the cylinder when the cylinder is in a vertical position. This cylinder is provided with one or more gaskets *b* on one side of the lower portion thereof when in a vertical position and the gold-pocket above referred to is also provided with a gasket on the same side, and on the reverse side of the cylinder is provided a panel of strong clear glass set into the side of the cylinder for the purpose of viewing the condition of the concentrates from the outside after an operation. The cylinder is then suspended vertically between two supports *c*, strongly made, framed, and braced, by means of shafts *d*, affixed to either outer wall of the cylinder near the middle of the same, and these shafts rest in boxing *e*, inserted into the supports, for the purpose, after the operation is ended, of tilting the cylinder on the shafts by means of ropes *f* and chains to a horizontal position and allowing the gold and concentrates to drop vertically from the cylinder through the gaskets into a convenient receptacle.

Upon a support directly above the opening

of the cylinder is constructed an ore-box *g*, the chief feature of which is that it has a bottom so constructed that it may be opened instantaneously. It is constructed of two leaves *h*, hinged on either side of the lower side of the box and meeting each other at the middle of the box, and when in use they form a continuous bottom by meeting in a parallel joint at the center and are held in place by projecting bolts supported by the levers *i i*, fastened to side of box *g*. The ore-box has for its object that when a charge of ore or sand is placed therein the bolts which support the leaves composing the bottom being instantly withdrawn the whole charge is instantly dropped into the opening of the cylinder and water, and the different degrees of specific gravity of the ores, metals, and gold meet the conditions in the water on equal terms so far as the element of time is concerned. The success of the operation absolutely requires that all the ore, sands, or gold should fall into the cylinder and water at the same moment of time.

By the term "free gold," used herein, is meant any gold released from ores or sands.

Having now described the construction of my invention and the fundamental principles upon which it is based, I will now proceed to describe the manner in which it is used. Ores bearing precious metals and other metals of value should be first crushed to a uniform fineness, so that the metals contained therein may be released from the gangue of the ore, and in case of sand or gravel containing gold in the free state the sand or gravel should be first screened and the pebbles eliminated. The cylinder is then placed in a vertical position and filled with water to a point near the top, allowing as much space in the opening of the cylinder as will be occupied by the charge of ore to be concentrated. The ore-box is then filled with the ore or sand containing free gold, the leaves of the bottom of the ore-box first having been bolted, and when all is made ready for the operation the bolts upon which the leaves of the bottom of the ore-box rest are both instantly relieved of their support by withdrawing the levers which support the same. The leaves of the bottom fall downward and sidewise out of the way of the ore, and the ore or sands are precipitated instantly into the water in the cylinder, and the different degrees of specific gravity of the ores, metals, including the free gold that may be therein, gravitate through the water to the bottom of the cylinder with a velocity proportionate to their specific gravity and form layers in the order of their specific gravity—that is to say, the free gold will deposit itself first—and in a cylinder of the above construction will be deposited in the recess or gold-pocket *j*. The lead ore will be deposited over the gold, silver, copper, and zinc ores over the lead, and

the quartz or other rock of less specific gravity than these will be deposited above the valuable metals and may be discarded at the mines.

The concentrates may be extracted from the cylinder in any convenient mode, but I prefer the following: After the last operation the cylinder is tilted on its shafts and boxing by means of ropes or chains attached to rings *k* at the extreme upper sides of the cylinder, and the cylinder is drawn downward on its shafts until it occupies a horizontal position and fastened there, when the greater portion of the water flows out. This horizontal position should be such that the gaskets should be on the under side of the cylinder. The gaskets are then opened and the concentrates are allowed to drop vertically from the cylinder and into a suitable receptacle, when they are ready for shipment to the smelter. The free gold deposited in the gold-pocket *j* may be emptied therefrom either from its gasket or through the faucet *l* in the end of the cylinder provided for the purpose of clearing the cylinder of sediment and for extracting any free gold that may be therein by the pressure of water when the same is in a vertical position by allowing the water to flow out. The open end of the cylinder is then tilted farther downward and the worthless rock and sands are sluiced out with water. The cylinder is then raised to its vertical position and is ready for the next operation.

Having thus described my invention, I claim—

1. The improved apparatus adapted for separating and concentrating ores and metals upon the principle hereinbefore stated, the same consisting of a tiltable, elongated water-holder, adapted to assume vertical and horizontal positions, and having a wide opening at its upper end and its lower end being tapered or conical and provided with a series of openings arranged one at the apex, and the others in the side at different distances above the apex, and an ore or metal receiving box fixed directly over the water-holder, and provided with means for releasing and allowing discharge of its contents instantaneously as shown and described.

2. The improved apparatus adapted for separating and concentrating ores and metals upon the principle hereinbefore stated, the same consisting of the supporting-frame, an elongated, open-mouth water-holder, pivoted to swing in a vertical plane, and having a series of discharge-openings at its lower end arranged one above another, and the ore or metal receiving box fixed in said frame above the water-holder, and having a releasable bottom, as shown and described.

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Witnesses:

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