

IMPROVEMENTS IN APPARATUS FOR SAVING METALS CONTAINED IN DISCRETE METALLIFEROUS MATERIALS, AND FOR CONCENTRATING AND FOR CLASSIFYING DISCRETE ORES AND SUBSTANCES.

I, John Frederick Cooke Farquhar, of Lucy Cottage, Glebe Street, Parramatta, in the Colony of New South Wales, engineer, do hereby declare the nature of my invention for "Improvements in Apparatus for Saving Metals contained in Discrete Metalliferous Materials, and for Classifying Discrete Ores and Substances," and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to apparatus for saving the precious metals contained in discrete auriferous and argentiferous materials, and for concentrating and classifying discrete substances in which the upward velocity of water or liquid in a vertical pipe or cylinder will barely equipose the weight of the grains or heavier particles of the material operated upon, so that, while such grains or heavier particles will by gravity descend through such water or liquid, the gangue or lighter particles will be carried away to waste; preferably the vertical pipe through which the water flows upwardly against the feed of the material (with or without water) is made of glass or other transparent material, so that the actual operation of separation of the heavier and lighter particles may be viewed.

But, in order that this invention may be clearly understood, reference will now be made to the drawings herewith, in which Fig. 1 is a plan, and Fig. 2 a sectional elevation of an apparatus for the purposes set forth, while Fig. 3 is a sectional elevation of a modified construction of receiver for the saved metals or concentrates.

Upon a suitable framing, say, of timber, is supported a receiving-hopper A, in which is fitted a screen or sieve A¹. The bottom of this hopper is prolonged as a pipe A², taking within a second pipe or cylinder B¹, so as to form an annular space B, in the top or upper part of which is a discharge-orifice B², from which discharge-pipe B³ leads to waste, or, as hereinafter explained, to a second similar apparatus. The outlet from the annular space B is into the vertical pipe or tube C, in which the separation is effected. This pipe, as before stated, being made preferably of glass. The pipe C at its bottom has an enlarged chamber C¹, into which, preferably pointing downwards, is led a water-service pipe C² having therein a regulating cock or valve C³. On the bottom of chamber C¹ is a receiver of large or small capacity, as may be desired. A large receiver D is shown in Fig. 2, and this may have a convenient discharge-door where desired; and a small receiver D^x is shown in Fig. 3, which receiver has a bayonet or other suitable joint on to the end of said chamber C¹.

Before commencing operations the cock C³ is turned on, and water allowed to fill the whole of the apparatus right up to the discharge-orifice B²—that is to say, the receiver D, chamber C¹, pipe C, and space B are filled with water, which fact is known by observing the water flowing from pipe B³. The material to be treated may then be fed to hopper A, whence it passes, preferably with the addition of water, through sieve or screen A¹, flowing or passing with the water into pipe A² it, or its heavier part, is led or falls downwardly against the rising current of water in glass pipe or tube C, into said tube C, where the heaviest particles in view of the attendant overcome the velocity of said upward current and pass down through chamber C¹ into receiver D, from whence they may be removed as desired. The lightest particles of the material when they leave pipe A² are at once carried to orifice B², and thence through pipe B³ to waste, while the lighter particles, as they meet the upward current of water, lose their downward progress, and are carried upward to orifice B², and waste, as before set out. The velocity of the water in pipe C is regulated by turning on or off of cock C³, the force of current required being adjusted as the attendant views the separating operation in pipe C.

If preferred, instead of a continuous feed, the material may be treated in charges, in which case the orifice to waste is closed, and the material deposited in the receiver, according to specific gravity, in classes—that is to say, the heaviest particles are first allowed to overcome the velocity of the upward current, and, after the removal of these particles from the receiver, the velocity of the upward current is reduced, so as to allow the next grade of material to deposit, and, after its withdrawal from the receiver, the velocity may be further reduced, and another grade of the material be recovered, and so on, until the whole of the material is classified into as many different classes as may be desired.

For the classification of discrete materials in a continuous operation it is only necessary to increase the number of apparatus, and after the recovery of the heaviest particles in one apparatus to lead the waste therefrom into second similar apparatus, wherein the velocity of the upward current of water is slightly less, and similarly treat the waste of this second apparatus in a third apparatus, and so on.

While this apparatus is especially useful in the saving of gold and silver from discrete metalliferous material containing same, yet it may be used with equally satisfactory results in the concentration and classification of ores, and of all discrete materials and substances unaffected by liquids into grades of varying specific gravity.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is,—

1. Apparatus for saving metals contained in discrete metalliferous materials, and for concentrating and classifying discrete ores and substances, in which the material under treatment falls vertically into a vertical pipe or cylinder, in which a current of water or liquid flows upwardly with a regulated velocity, substantially as herein described and explained.

2. In an apparatus of the class set forth, the combination and arrangement with a feeding-hopper and a receiver of a vertical pipe or cylinder of glass or other transparent substance in which a current of water or liquid passes upwardly with a regulated velocity, substantially as herein described and explained.