R. W. WATSON.
CLASSIFIER FOR CRUSHED ORES, &c.
APPLICATION FILED JAN. 26, 1900.
2 SHEETS—SHEET 1.

Fig. 1.

Fig. 2.

INVENTOR
Robert W. Watson,
By his Attorney,
Thurston Baker.

WITNESSES
E. B. Hichens
F. D. Averman

J. NOYES PETERS CO., MARYLAND, WASHINGTON, D. C.
To all whom it may concern:

Be it known that I, ROBERT W. WATSON, a citizen of the United States, residing at Silverton, in the county of San Juan and State of Colorado, have invented a certain new and useful Improvement in Classifiers for Crushed Ores, &c., of which the following is a full, clear, and exact description, reference being had to the accompanying drawings.

The object of my invention is to effect the classified segregation of the particles of crushed ore and other like materials.

The invention consists in the construction and combination of parts hereinafter described, and pointed out definitely in the claims.

In the drawings, Figure 1 is a vertical section of the apparatus; Fig. 2, an end elevation; Fig. 3, a plan, and Fig. 4 a plan with the top removed.

The apparatus in respect to its form resembles the well-known Spitzkasten; but its construction differs from the Spitzkasten in many essential respects, and it has a radically different mode of operation. In the Spitzkasten the water in which the crushed ore is held in suspension is admitted into the top of the first compartment of the tank and it flows by gravity through the tank over the dams separating the various compartments thereof to the outlet-opening, which is below the inlet-opening. The crushed ore tends to settle in the several compartments; but the extent to which it settles is controlled and regulated by the upward currents of water admitted under variable pressures into the bottoms of the several compartments. The crushed ore must therefore settle through and in opposition to said upward currents, and obviously only such particles will settle as are heavy enough to resist such upward currents. It is wholly immaterial whether the top of the Spitzkasten tank be covered or not. In my apparatus, however, the tank A necessarily has a closing-top C and is, in fact, a closed tank through which the water, holding the crushed ore in suspension, may be forced under pressure from the inlet-opening, which is preferably near the bottom of the first compartment, to the outlet-opening, which is preferably near the top of the last compartment. The tank A is narrowest at the inlet end thereof and it grows progressively wider toward the discharge end, this result being preferably obtained by means of diverging sides \( \alpha \alpha \). These sides also converge from their tops to their bottoms. This tank, which is a settling-tank, is divided into a plurality of compartments \( E E' E'' \) by transverse partitions or dams B, which are formed so as to form the oppositely-inclined front and rear walls \( b b' \) of these compartments. These compartments are therefore in the form of inverted four-sided pyramids. The transverse dams or partitions B are progressively higher as they are nearer the discharge end of the tank. The tank is closed by a top or roof C, whereby the water may be forced under pressure from the inlet to the discharge end of the tank. As shown, the water flows from a tank D, which is high enough to give the desired "head" through a pipe \( d \), connected over the inlet-opening \( \alpha' \), which is separated from the first of the settling-compartments by a dam \( B' \), over which the water must pass. The water in passing through the tank to the discharge-opening \( H \) passes necessarily upward over the several dams which separate the settling-compartments. The current, therefore, in the tank has an upward inclination, and it necessarily is of decreasing velocity from the inlet to the discharge end because of the increasing width of the tank.

The operation of the apparatus is as follows: The water carrying the crushed ore in suspension flows from the tank D through the inlet-pipe into the tank A, passing through the tank over the dams to the discharge-opening \( H \) in an upwardly-inclined direction and with diminishing velocity. The heaviest particles of the crushed ore will settle to the bottom of the first settling-chamber, from whence they may be drawn off through the discharge-pipe \( G \), which is connected with the lower end. The next size or class of the crushed ore will settle to the bottom of the next settling-compartment \( E' \), and so on throughout the several compartments. The settling into the several compartments of particles of different size is due to the character of the current—viz., its decreasing velocity and its upwardly-inclined direction. The water passing out of the outlet-opening will be found to contain substantially none
of the crushed rock or mineral particles; but it will be found that such crushed rock or mineral particles, properly classified according to their size and weight, have settled to the bottom of the several compartments.

The most effective work is produced when the water-currents are broken up, and to that end the top of the tank is raised step by step, and the lower edges of the risers c of said steps are below a plane passing between the tops of adjacent dams. This construction is shown by the full lines of the drawings. The apparatus would, however, do effective work if the top of the tank is flat and inclined upward, substantially as shown in the dotted line.

The apparatus, embodying nothing more than what has been heretofore described, is a thoroughly-efficient apparatus for the purpose stated, provided it is so constructed as to be adapted to the peculiar character of the crushed ore which it is designed to classify. The character of the crushed ore rock varies, however, and to get the most satisfactory results out of an apparatus constructed in accordance with the foregoing description it would be necessary to so proportion the width of the compartments and the height of the dams, as well as the head of the water containing the crushed ore, as to particularly adapt it to the specific kind of ore. In order to render the apparatus adaptable for use with crushed ore of various grades and degrees of fineness, the discharge-pipes G, with which the several settling-chambers are provided, (or one or more said discharge-pipes,) are provided with lateral valved extensions J, and through these extensions water is or may be forced under pressures which may be regulated by the valves or otherwise. This creates upward currents of water through the several compartments, which act upon the same principle as similar currents in the Spitzkasten act to modify the settling of the crushed material out of the Spitzkasten act to modify the settling of the crushed ore by the valves or otherwise. This creates upward currents of water through the several compartments, which act upon the same principle as similar currents in the Spitzkasten act to modify the settling of the crushed material out of the Spitzkasten act to modify the settling of the crushed material out of the Spitzkasten.

I claim—

1. A closed tank having an inlet-opening at one end and a discharge-opening at the other end, which tank is composed of a plurality of settling-chambers in the form of inverted pyramids, dams separating said compartments which dams are progressively higher from the inlet to the outlet end thereof, a top which extends upward step by step from the inlet to the discharge end, the risers of said steps being located between said dams, discharge-pipes connected with the lower end of each compartment, a means for forcing a fluid containing the crushed material in suspension through said tank from the inlet to the discharge end thereof, substantially as and for the purpose specified.

2. In a hydraulic ore-classifier, a tank which is progressively wider from its inlet toward its outlet end, partitions dividing said tank into a series of tanks, and a stepped cover rising toward the outlet end, each partition extending above the planes forming the lower ends of the risers of the cover between which it is located whereby a current of liquid forced therethrough flows in a sinuous course in an upwardly-inclined direction with diminishing velocity, substantially as and for the purpose specified.

3. In a hydraulic ore-classifier, in combination, a tank progressively wider from its inlet toward its outlet end, a cover rising toward the outlet end of the same, means for forcing a current of water therethrough, and partition-walls which divide said tank into a plurality of settling-chambers, the upper ends of said partition-walls having an overhang toward the inlet substantially as shown, so as to oppose said current, substantially as and for the purpose specified.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ROBERT W. WATSON.

Witnesses:

JAMES H. ROBIN,
G. H. STOIBER.