No. 890,906. PATENTED JUNE 16, 1908.

J. R. HOLMES.

CLASSIFIER.

APPLICATION FILED MAY 7, 1906. 2 SHEETS—SHEET 1.

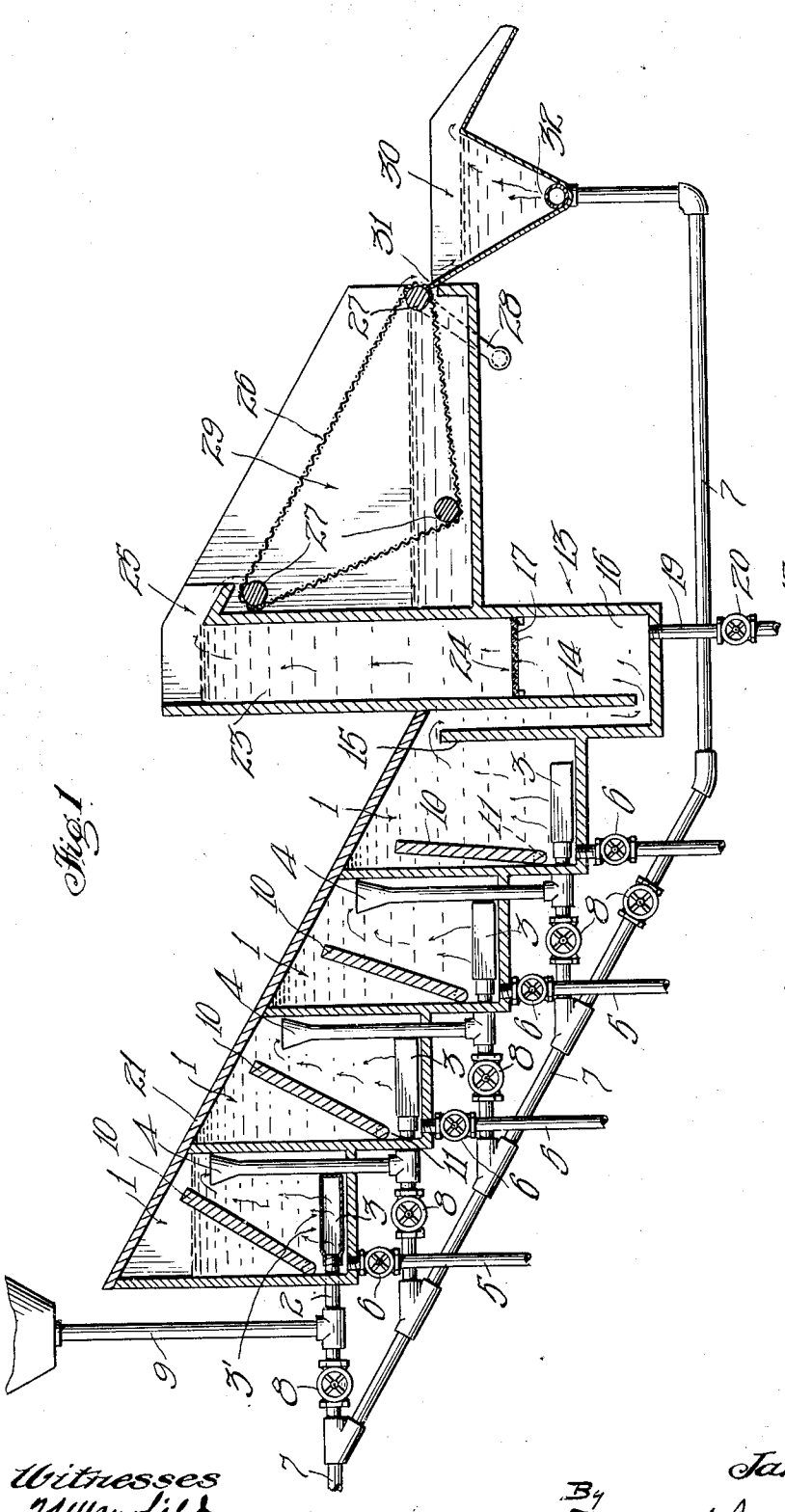


Fig. 1

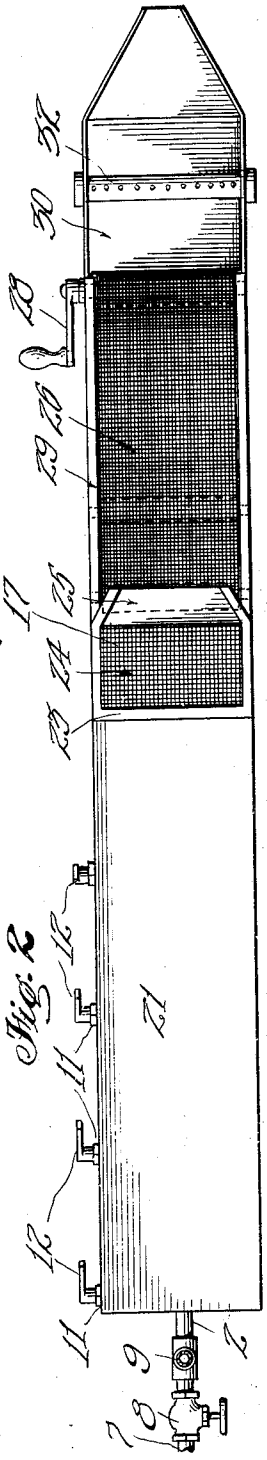


Fig. 2

Witnesses
F. L. Mansfield
Frank L. Graham

Inventor
James R. Holmes
By Townsend, Lyon, Hackley & Knight
Attorneys

No. 890,906. PATENTED JUNE 16, 1908.

J. R. HOLMES.

CLASSIFIER.

APPLICATION FILED MAY 7, 1906. 2 SHEETS—SHEET 2.

Fig. 3

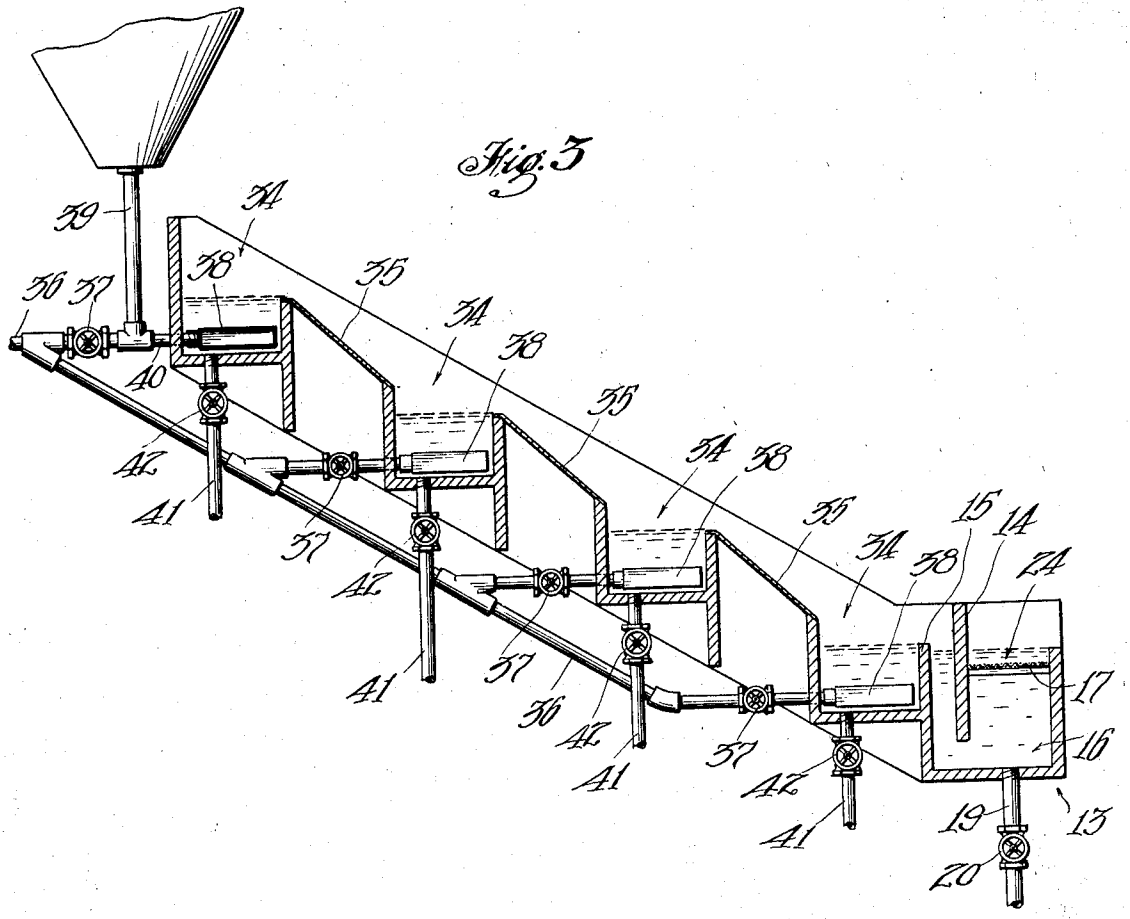
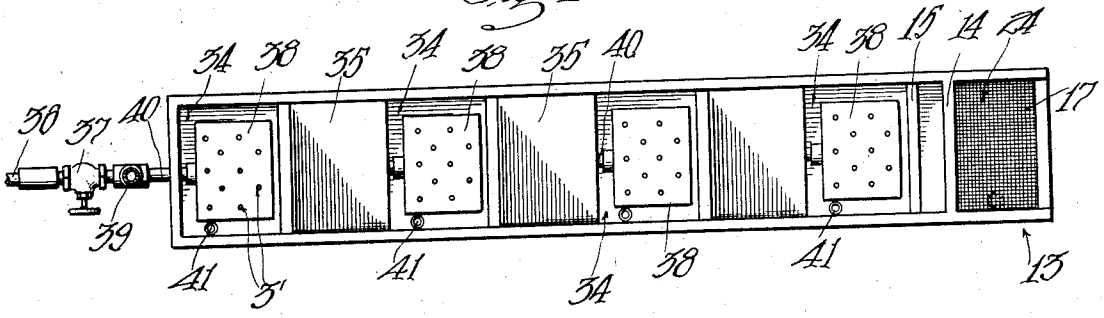



Fig. 4




Witnesses
Fillmansfield
Frank L. Abraham

Inventor
James R. Holmes
By Townsend, Lyon, Hackley & Knight
Attorneys

# UNITED STATES PATENT OFFICE.

JAMES R. HOLMES, OF SANTA MONICA, CALIFORNIA.

## CLASSIFIER.

No. 890,906. Specification of Letters Patent. Patented June 16, 1908.

Application filed May 7, 1906. Serial No. 315,705.

*To all whom it may concern:*

Be it known that I, JAMES R. HOLMES, a citizen of the United States, residing at Santa Monica, in the county of Los Angeles and State of California, have invented a new and useful Classifier, of which the following is a specification.

This invention relates to a device for classifying ore and similar material into grades or classes of different value or specific gravity, and the main object of the invention is to provide means for this purpose which will be of extreme efficiency and economy in operation and will be of minimum cost in construction.

A further object of the invention is to provide an ore classifier which will be continuous in its operation and will present uniform and unvarying conditions of operation throughout, irrespective of the time it has been in operation.

The accompanying drawings illustrate the invention.

Figure 1 is a vertical section, somewhat diagrammatical, of the apparatus embodying the invention. Fig. 2 is a plan thereof. Fig. 3 is a vertical section, showing a different form of the apparatus. Fig. 4 is a plan thereof.

Referring to Figs. 1 and 2, a series of plurality of tanks or boxes 1 are provided, preferably arranged in descending series. Each tank 1 is provided with inlet pipe 2 extending through the wall of the tank and terminating in a head or perforated chamber 3 adjacent to the bottom of the tank. Each tank is furthermore provided with an overflow outlet pipe 4 extending up to the upper portion of the tank and extending downwardly through the wall of the tank. Another outlet pipe 5 extends through the bottom of each tank and is provided with a valve 6 to control discharge of deposited material from the bottom of the tank.

The several inlet pipes 2 of the respective tanks may be connected to a single water supply pipe 7, having valves 8 controlling the supply to the respective inlet pipes. 9 designates the feed pipe which leads from a hopper or bin for supplying the comminuted ground, ore or material, said feed pipe communicating into the inlet pipe 2 of the first or upper tank of the series. Each of the succeeding tanks is preferably supplied from the one before it by connection of this inlet pipe 2 with the overflow outlet pipe 4 of the preceding tank, said pipe 4 opening into the pipe 2 between the controlling valve 8 and the discharge head 3, so that the flow or head of water from the supply pipe passing through the inlet pipe 2 carries in the feed or material and discharges it into the succeeding tank.

The above described series of tanks effect a successive gradation or classification of the ore or material according to gravity, the ore fed in at 9 being carried in by the water supply pipe 7 through the inlet pipe 2 into the discharge head 3 and passing out along with the water through the perforations 3′ in the top of said head and passing upwardly in the first tank along the said water, the result of this operation being that the lighter materials are carried upward rapidly and are separated from the heavy materials which remain at the bottom of the tank and can be drawn off from time to time through the valved outlets 5. The lighter materials which are carried up along with the water are discharged through the outlet pipe 4 and pass into the feed or outlet pipe of the next succeeding tank, in which they are subjected to the repetition of the same operation, the velocity of feed being, however, graduated so that there will be less upward impelling effect and consequently there will be a further deposition or residuum of heavy material in the second tank, this residuum being of lighter grade than the material deposited in the first tank, and so on down until the last tank is reached.

Deflectors or plates 10 are provided in the respective tanks 1, pivoted at 11 and operated by handles 12 so as to confine or constrict the water in its upward passage in the tank and increase the velocity as much as may be necessary to produce the required lifting effect on the lighter material.

For the separation of slimes from the liquid flowing through the last tank a trap is preferably provided, consisting of a box 13, having its rear wall 14 extending below and slightly in advance of the lip or overflow wall 15 of the last or lowest tank 1, said wall 14 being separated from the bottom of this trap box and also from terminal wall 15 to enable flow of water down between said walls and above the bottom into a chamber 16 formed at the bottom of the trap box. A filter medium or screen 17 extends across the trap box above this chamber and the top of the trap box extends above said screen, so that the liquid will flow upwardly from said cham-

ber through the filter and then over the lip, with the result that the values or heavier portions of the slime will accumulate on the lower face of the screen and may be discharged from time to time by drawing off or flushing the trap box through a discharge pipe 19 provided with a valve 20. To reduce the total head necessary for the operation, the several boxes 1, above described, are closed at the top by cover means 21.

In operation on some material, such as gold-bearing placer ground, a certain amount of fine or flaked gold may escape the above described devices, and for this purpose an additional overflow trap may be provided, the same comprising a riser 23 extending upwardly from the discharge outlet 24 of the trap box 13, and having an outlet 25 in which the slimes pass onto a collector apron 26 mounted on rolls 27 and operated from time to time or continually by operating means such as a handle 28. Said collector apron may consist of a fabric or carpet strip, and its lower portion dips into a tank 29 containing water. Any values escaping from the collector apron will pass with the slimes or tailings into a trough 30, into which said material is guided by a scraper 31 emptying on the collector apron. Discharge jets 32 connected with the supply pipe 7 open into this trough so as to maintain a continual upward current therein, which carries away the lighter material and allows the heavier to deposit.

The operation of the apparatus is as follows:—Water is turned on through the various valves 8 and the material is fed in through the pipe 9, the water carrying said material into the bottom of the first tank and there subjecting it to an upward pressure and flow which carries the lighter materials upwardly into the overflow and allows the heavier materials to settle or remain at the bottom of the tank. The material so overflowing passes into the inlet pipe of the next tank and thence into the bottom of the said tank and is there again subjected to an upward flow and pressure, the valves and deflectors being so adjusted that this upward flow will be less strong than that of the first tank so that an additional quantity of material will be deposited, the same being of somewhat lighter grade than that deposited in the first tank, this process being repeated in the successive tanks so that sections or classes of different grades or densities of the material will remain in the bottom of the successive tanks and may be drawn off from time to time by opening the discharge valves of the outlets 5 which may lead to any suitable collecting means or receptacles. The material which reaches the trap 13 at the bottom of the series may be assumed to have deposited all its values except those that are so finely comminuted that they constitute slimes, and these will largely collect on the bottom of the filter 17 therein. The remaining liquid is carried out through the riser 23 and discharged on its collector apron 26 which catches the heavier or metallic constituents; for example, fine gold, and discharge the tailings into the trough 30, in which the final collection or separation of any residual values is effected as above described.

It will be understood that for general purposes the classifier comprising boxes 1 and 13 with their connected devices will be sufficient to produce the requisite sorting of the ore into the different grades and the collector apron 26 is only for use in special conditions.

Another form of the invention is shown in Fig. 3, wherein the plurality of tanks 34 are arranged in a descending series, each discharging over the lip or apron 35. In this case the water supply pipe 36 is connected through valves 37 through perforated heads 38 into the bottom of the respective tanks 34. The material feed is through a pipe 39 into the inlet pipe 40 of the first tank, and material is carried in said tank by the action of said water flowing thereinto through said inlet, but for the succeeding tanks the material is fed to each tank by the direct overflow thereinto from the preceding tank, the function of the inlet pipes 40 of the succeeding tanks being simply to furnish the upward flow of water necessary to hold up and carry out the lighter material falling into each tank, while allowing the heavier material to fall to the bottom and be drawn off from time to time through the outlet pipes 41 having valves 42. The trap at the bottom of the series is the same as above described and the operation of the apparatus as a whole is similar to that above described, except that in all the tanks after the first one material is charged into the top of the tank instead of into the bottom.

What I claim is:—

1. In an ore classifier, a series of tanks arranged in descending order and each provided with a discharge outlet in its bottom, a valved water supply pipe communicating with the bottom of each tank, means for feeding ore to the supply pipe for the upper tank, and an overflow pipe in each tank, the upper end of which is near the top of the tank and the lower end communicates with the supply pipe to the next succeeding tank between the valve of said pipe and said succeeding tank.

2. In an ore classifier, a series of tanks arranged in descending order, and each provided with a discharge outlet in the bottom, a valved water supply pipe communicating with the bottom of each tank, the inner end of which is provided with a perforated chamber, means for feeding ore to the supply pipe for the upper tank, an overflow pipe in each

tank, the upper end of which is near the top of the tank, and the lower end communicates with the supply pipe to the next succeeding tank, between the valve of said pipe and said succeeding tank, and adjustable means for constricting the upper portion of said tanks adjacent to the upper ends of said outlet pipes.

3. In an ore classifier, a series of tanks arranged in descending order and each provided with a discharge outlet in its bottom, a valved water supply communicating with the bottom of each tank, the inner end of which is provided with a perforated chamber, means for feeding ore to the supply pipe for the upper tank, an outlet pipe in each tank, the upper end of which is near the top of the tank and adjacent to the lower side, and the lower end extends through the bottom of the tank and communicates with the supply pipe to the next succeeding tank between the valve for said pipe and said succeeding tank, and a deflector plate pivotally secured in each tank adjacent to its upper side and near said chamber, the upper end of said deflector being movable toward and from the upper edge of said lower side of the tank.

4. In an ore classifier, a series of tanks arranged in descending order and each provided with a discharge outlet in its bottom, a water supply pipe provided with valved branches, one branch leading to each tank and provided at its inner end with a perforated distributer, means for feeding ore to the first branch between its valve and the upper tank, an overflow pipe from each tank above said distributer and communicating with the pipe for the next succeeding tank between its valve and said tank, and adjustable means for constricting the tank adjacent to said outlet.

5. In an ore classifier, a series of tanks arranged in descending order, each provided with a discharge outlet in its bottom, and each adapted to discharge its overflow into the next lower tank, a water supply pipe provided with valved branches communicating with said tanks, one branch leading to each tank with its inner end provided with a perforated distributer, means for feeding ore to the first branch between its valve and the upper tank, and a trap at the bottom of the series to receive the overflow from the bottom tank.

In testimony whereof, I have hereunto set my hand at Los Angeles California this 23rd day of April 1906.

JAMES R. HOLMES.

In presence of—
ARTHUR P. KNIGHT,
GEORGE T. HACKLEY.