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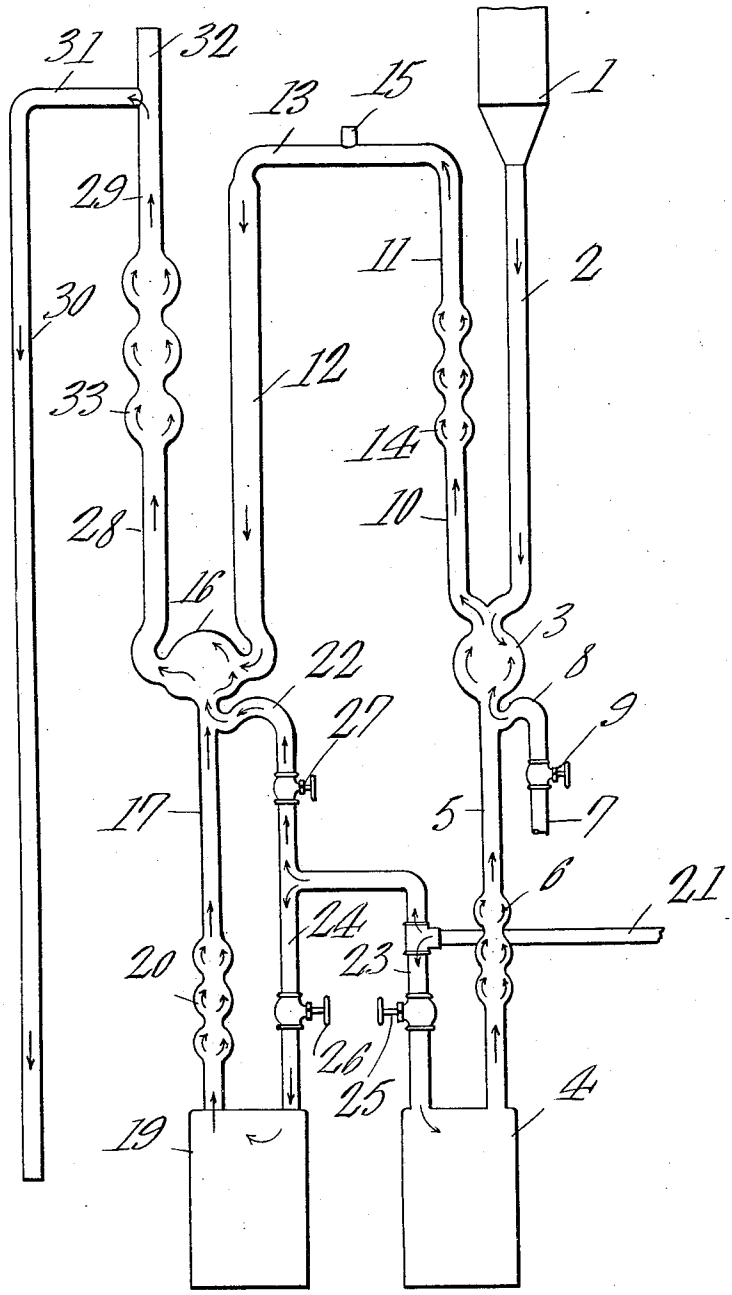
SEPARATOR.

APPLICATION FILED AUG. 2, 1911. RENEWED DEC. 28, 1912.

**1,069,214.** Patented Aug. 5, 1913.

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# UNITED STATES PATENT OFFICE.

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1,069,214. Specification of Letters Patent. Patented Aug. 5, 1913.

Application filed August 2, 1911, Serial No. 641,917. Renewed December 28, 1912. Serial No. 739,152.

*To all whom it may concern:*

Be it known that I, JOHN N. WINGETT, a citizen of the United States, residing at Denver, in the county of Denver and State of Colorado, have invented a new and useful Separator, of which the following is a specification.

This invention relates to a new and useful method of, and apparatus for separating values of different specific gravities.

The invention has for its object the provision of a continuous inclosure through which a separating medium is directed, the velocity of said medium being different at different points whereby the materials to be separated will be subjected, successively, to the action of the separating medium at the different velocities utilized, and will be precipitated successively according to their specific gravities.

With the foregoing and other objects in view the invention consists of certain new and novel steps of the method pursued in the separation of values, and in such novel details of construction and combination and arrangement of parts of the apparatus, which will be hereinafter more particularly described and claimed, it being understood that changes in the precise embodiment of the invention herein disclosed can be made within the scope of what is claimed without departing from the spirit of the invention.

In the accompanying drawing has been shown the preferred form of apparatus used in carrying out the process, said apparatus being shown in elevation.

Referring to the drawing by characters of reference, 1 designates a feed chamber or hopper from the bottom of which extends a feed pipe 2 opening, at its lower end, into a bulb 3. A storage chamber 4 is arranged below the bulb 3 and the top thereof is connected to the bottom of the bulb by a tube 5 in which a series of small bulbs or enlargements 6 may be formed. A supply pipe 7 opens into a trap 8 which in turn discharges into the upper end portion of the tube 5. This supply pipe may be provided with a valve such as indicated at 9, whereby the flow of fluid into the apparatus may be controlled.

A discharge pipe 10 extends upwardly from the bulb or enlargement 3 and is made up of opposed legs 11 and 12 and an intermediate or crown portion 13. The leg 11, which is the one extending directly from the bulb or enlargement 3, is formed with a series of bulbs or enlargements 14 while the leg 12 is of uniform diameter throughout its length, said diameter, however, being greater than the diameter of the leg 11. A vent 15 is formed in the crown portion 13 and serves to prevent siphonic action of the separating medium flowing through the tube 10. The lower end of the leg 12 opens into a bulb or enlargement 16 from the bottom of which extends a pipe 17 opening into the top of a storage chamber 19. This pipe 17 is preferably formed with a series of bulbs or enlargements 20. A supplemental supply pipe 21 opens into a trap 22 which, in turn, discharges into the upper end portion of the tube 17. Connecting tubes 23 and 24 are provided for establishing communication between the supply pipe and the upper end portions of the storage chambers 4 and 19 respectively, each of these pipes 23 and 24 being provided with a valve, such as indicated at 25 and 26 respectively and the pipe 21 being also provided with a valve 27 which is located between pipe 24 and the trap 22. An outlet pipe 28 extends upwardly from the bulb 16 and preferably consists of oppositely disposed legs 29 and 30 connected by an intermediate or crown portion 31, there being a vent 32 extending upwardly from this crown portion so as to prevent siphonic action. The leg 29 is formed with enlargements or bulbs 33, the capacity of each of these bulbs or enlargements being greater than the capacity of any one of the bulbs or enlargements 14.

In carrying out the process of separating values, the materials to be acted upon are placed within the feed chamber or hopper 1. Water or any other separating medium to be employed is then directed through pipe 7 into the bulb 3 and flows upwardly through the tube 10, the velocity of the separating medium being reduced at those points where said medium passes through the enlargements 14. If, for example, the values to be separated are gold and zinc, they will gravitate through the feed tube 2 and into the bulb or enlargement 3 where they will be met by the inrushing current of the separating medium. The velocity of this medium is such as to overcome the weight of the lighter, or zinc particles and thus cause them

to be carried upwardly through the leg 11 and the crown portion 13 into the leg 12 of tube 10. The heavier or gold particles will gravitate through the bulb 3 and tube 5 into the storage chamber 4. Should any of the gold be carried upward into the leg 11 by the force of the separating medium, such movement of the gold will be arrested within one of the bulbs or enlargements 14 for the reason that, at these points of increased transverse area, the velocity of the separating medium will be materially reduced, thus permitting the gold to remain lodged in the bulbs 14 until the current is cut off whereupon the gold will be free to gravitate back to the bulb 3 and thence through tube 5 to the storage chamber 4. The separating medium and the lighter particles commingled therewith will, as before stated, flow downwardly through leg 12 after the gold has been separated therefrom and will pass into the bulb or enlargement 16. The velocity of the separating medium can be increased at this point by partly or entirely opening the valve 27 so as to admit a fresh supply from pipe 21. The values discharged into the bulb 16 will, if of a specific gravity sufficient to overcome the velocity of the separating medium, gravitate through tube 17 into the storage chamber 19. As the tube 28 is of greater diameter than the tube 10, the velocity of the separating medium within this tube 28 will be less than within the tube 10 and the zinc, which is lighter than the gold, will thus be free to flow downwardly into the chamber 19 as hereinbefore stated. Should any of the zinc be carried upwardly into tube 28 by the force of the separating medium, it will be stopped, in its upward movement, upon entering one or the other of the enlargements or bulbs 33 for the reason that the separating medium will be retarded in its movement at these points because of the increased transverse area. The zinc thus brought to a stop within the bulbs 33 will be free when the current is cut off, to gravitate to the bulb 16 and thence through the tube 17 to the storage chamber 19.

It will be apparent that, by partly or entirely opening the valve 25 the separating medium admitted from pipe 21 can be directed downwardly into the storage chamber 4 and will then pass upwardly through pipe or tube 5 and commingle with the fluid admitted from trap 8. This upwardly flowing column of separating medium will pass through the bulbs or enlargements 6 and elevate any light particles which may, from any cause pass downwardly into the tube 5. The valve 26 can be similarly operated for causing the current admitted from pipe 21 into chamber 19, to force upwardly any particles lighter than those intended to be deposited in the chamber 19. Should any particles be carried upward from the chambers 11 and 19 and into the tubes 5 and 17 respectively, the enlargements 6 and 20 will check them in their upward movement and the said particles will thus become lodged in the enlargements until the current has been cut off whereupon they will gravitate back to the respective compartments.

In the structure illustrated two complete units have been shown, each unit including a storage chamber, a tube extending upwardly therefrom to a bulb or enlargement, a tube for directing values by gravity into the bulb or enlargement, and an outlet tube extending upwardly from said bulb or enlargement and provided with a series of bulbs. Instead of providing only two of these units in a complete apparatus, a greater number may be employed, this being dependent upon the number of separations to be effected. Where, for example, there are four different kinds of values to be separated, four different units will be employed, the parts being so proportioned that the velocity of the separating medium within the first unit will be sufficient to elevate all but the heaviest value, the velocity of the separating medium in the second unit being sufficiently strong to permit only the second heaviest value to gravitate, the velocity of the separating medium within the third unit being sufficient to elevate only the lightest values, and the fourth unit being adapted to receive the lightest values discharged from the third unit.

While water is preferably utilized as a separating medium, it is to be understood that under some conditions it will be found desirable to use other kinds of liquid and even gases can be used to advantage.

It will be apparent that by properly proportioning and adjusting the parts separation of different values can be accurately carried on even though there should be a difference of but one-half a unit of specific gravity between two of the values.

By providing the vents 15 and 32 air is permitted to escape freely during the initial filling of the apparatus and, as before stated, siphonic action of the contents of the apparatus is prevented.

While the apparatus has been described and shown formed of tubes, it is to be understood that the same can be made of any suitable conducting means of any desired cross sectional contour and that the interior enlargements in certain of the conducting portions of the apparatus can be of any desired contour.

It is to be understood that the separating medium can be caused to flow through the apparatus either continuously or intermittently.

What is claimed is:—

1. Apparatus for separating values, including an open feed chamber, a storage chamber thereunder, a tubular connection be-

tween said chambers, said connection including an enlargement, a discharge tube extending upwardly from the enlargement and having an enlargement for varying the velocity of a separating medium passing through the tube, there being an air inlet opening in the uppermost portion of the discharge tube, and means opening into the bottom portion of the enlargement in the tubular connection for directing a separating medium upwardly into said enlargement and the discharge tube.

2. Apparatus for separating values, including an open feed chamber, a storage chamber thereunder, a tubular connection between said chambers, said connection including an enlargement, a discharge tube extending upwardly from the enlargement and having an enlargement for varying the velocity of a separating medium passing through the tube, there being an air inlet opening in the uppermost portion of the tube, means opening into the bottom portion of the enlargement in the tubular connection for directing a separating medium upwardly into said enlargement and the discharge tube, and means for controlling the passage of the separating medium into the enlargement.

3. Apparatus for separating values, including a feed chamber, a storage chamber thereunder, a tubular connection between said chambers, said connection including an enlargement, a discharge tube extending upwardly from the enlargement and having an enlargement for varying the velocity of a separating medium passing through the tube, means opening into the bottom portion of the enlargement in the tubular connection for directing a separating medium upwardly into said enlargement and the discharge tube, there being enlargements in the connecting tube between the storage chamber and the inlet for the separating medium and means for directing a separating medium into the storage chamber, said medium being adapted to flow from the storage chamber through the connecting tube.

4. Apparatus for separating values, including a feed chamber, separate storage chambers, a tubular connection between the feed chamber and one of the storage chambers, said connection having a main enlarged portion, a discharge tube extending upwardly from said enlarged portion and having an enlargement, said tube opening into a downwardly extending portion discharging into the other storage chamber, said portion having a main enlargement, a valved connection between the last named enlargement and the first storage chamber, means for directing a separating medium into said connection, a valved tubular member opening at its ends into said connection and the second storage chamber, valved means for discharging a separating medium into the first main enlargement, and a discharge tube extending from the second enlargement, there being enlargements between and communicating with the storage chambers and the respective main enlargements.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

JOHN N. WINGETT.

Witnesses:
AGNES JOHNSON,
MARGARET ALLER.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."