209. CLASSIFYING, SEPARATING, AND ASSORTING SOLIDS.
159

DRAUGHTSMAN.

No. 751,645. PATENTED FEB. 9, 1904.

F. W. HOPKINS.

PNEUMATIC HYDRAULIC SEPARATOR.

APPLICATION FILED APR. 2, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

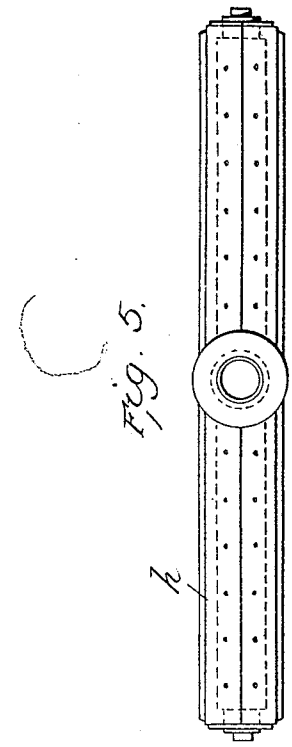


Fig. 5.

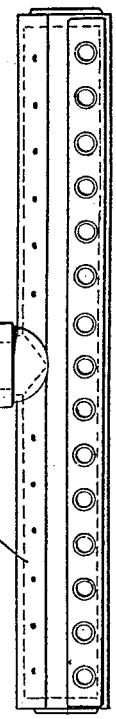


Fig. 6.

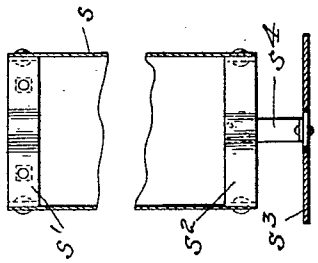


Fig. 3.

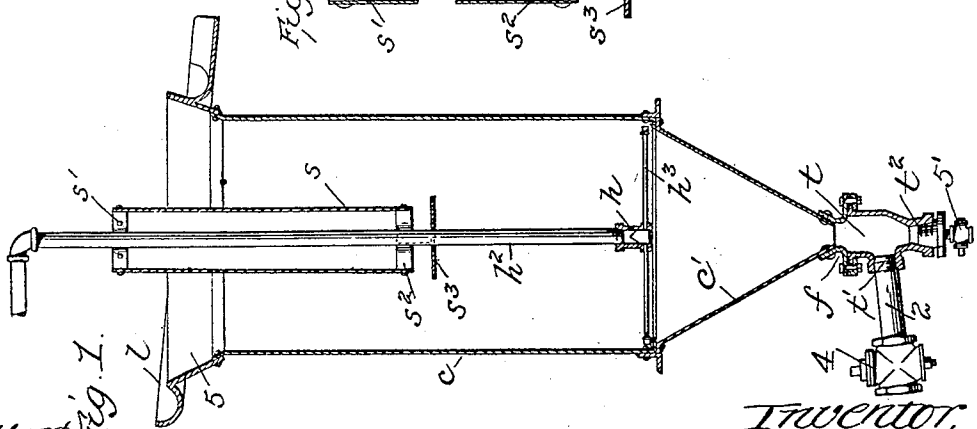


Fig. 1.

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APPLICATION FILED APR. 2, 1903.

NO MODEL. 2 SHEETS—SHEET 2.

Fig. 2.

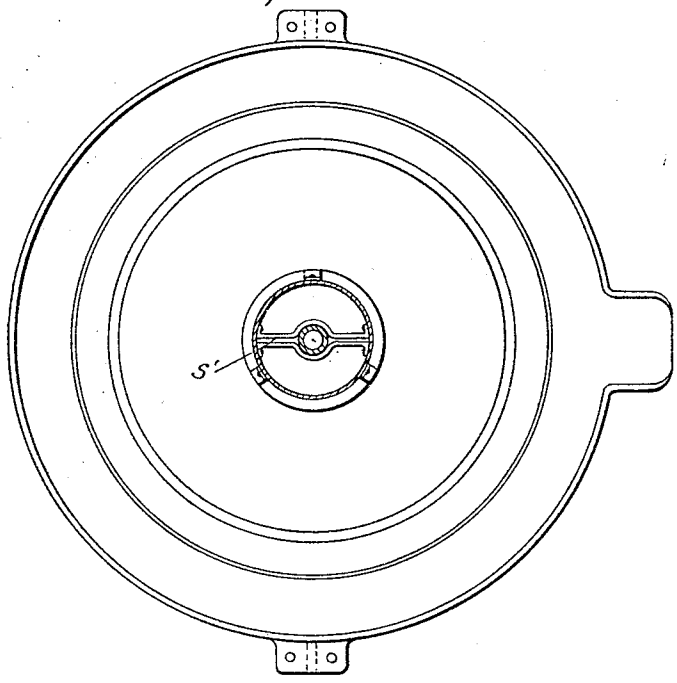
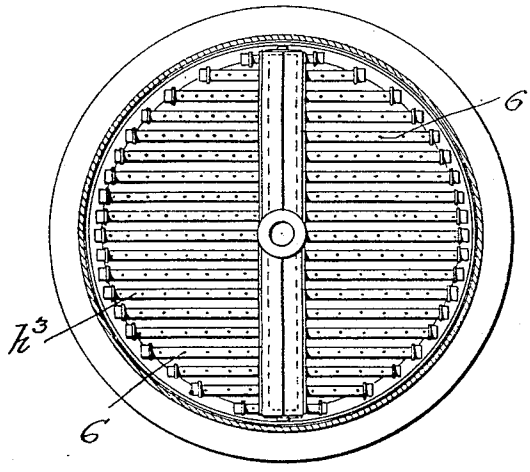


Fig. 4.



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No. 751,645. Patented February 9, 1904.

UNITED STATES PATENT OFFICE.

FRANK W. HOPKINS, OF DENVER, COLORADO, ASSIGNOR TO THE COLORADO IRON WORKS COMPANY, OF DENVER, COLORADO.

PNEUMATIC HYDRAULIC SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 751,645, dated February 9, 1904.

Application filed April 2, 1903. Serial No. 150,826. (No model.)

To all whom it may concern:

Be it known that I, FRANK W. HOPKINS, a citizen of the United States, residing at Denver, Colorado, have invented certain new and useful Improvements in Pneumatic Hydraulic Separators, of which the following is a specification.

The invention is designed for use more particularly with the cyanid process of the treatment of ore, though it is not limited in this respect. It is intended for the purpose of separating fine material and slimes from the coarser material in the said cyanid or other process by the use of air.

The invention relates more particularly to means for feeding in the material at a point below the surface of the solution in the tank and is an improvement upon the apparatus disclosed in an application for Letters Patent of the United States, filed by W. R. Grant, dated March 19, 1903, Serial No. 148,617.

The features of the invention will be hereinafter particularly described, and pointed out in the claims.

In the accompanying drawings, Figure 1 is a central vertical section of the invention with parts in elevation. Fig. 2 is a plan view of Fig. 1. Figs. 3 and 4 are detail views of the central sleeve. Figs. 5 and 6 are detail views relating to the header.

The apparatus with which my improvement is combined consists of a cylindrical shell c, having a conical extension c' secured to its lower end. At the apex or lower end of the conical portion a cast-iron tip t is arranged, the said tip being bolted to a cast-iron ring f, secured to the lower open end of the conical portion. This tip t is provided with a plurality of outlets t' and t^2, and these outlets are furnished with pipe connections 2 and 3, each of which is provided with a suitable valve 4 and 5, the said pipe connections being screwed into suitable nipples on the tip. The cylindrical part c is surmounted by a flaring rim 5, which at its upper edge ends in a launder 1, which is inclined, as shown in Fig. 1, for the discharge of the material passing over the flared rim 5. At a point near the junction of the cylindrical portion with the depending cone an air-header h is provided, having a number of pipes h^3, each closed at its outer end and having a series of upwardly-directed air-openings 6. To this header an air-pipe h^2 is connected, said air-pipe being preferably located centrally of the cylindrical portion and extending vertically thereof. An inlet-sleeve s surrounds the air-pipe, being clamped thereto by clamping members s' at the upper end of the sleeve and being held in proper position by means of guides s^2, connected with the lower end of the sleeve and bearing upon the air-pipe. At a slight distance below the lower end of the sleeve a deflector s^3 is arranged about the air-pipe, it being supported by means of brackets s^4, extending down from the guides s^2. The spreader or deflector may be simply a flat disk or of conical form; but in any event it must be larger in diameter than the feed or inlet pipe, and it is so arranged that it deflects the air beyond the outside of the feed-pipe and slightly below it, so that the air being deflected beyond the feed-pipe will pass straight upward through the mass and no part of it will curve back into the feed-pipe to escape. It will be understood that the air-pipe is connected with a suitable source of air-pressure.

In the operation of the apparatus the cyanid solution or water containing the pulp and ore is fed into the inlet-sleeve s, which conveys the solution and its accompanying material down to a point considerably below the top of the cylinder and the surface of the solution contained therein. On emerging from the inlet-sleeve the pulp and ore strikes the spreader-plate s^3, which deflects the material laterally and causes it to be spread over a considerable area. In this spread condition the material encounters the fine ascending stream of air furnished by the header, and this causes the fine particles of ore and slimes to rise with the air and overflow the flaring rim 5 into the surrounding launder 1. The coarser material will settle through the ascending air-currents and slimes and will pass down between the air-pipes of the header into the cone c', where they will be collected and whence they may be delivered through one of

the outlets t' or t^2. Either one of these parts may be used for the introduction of air or solution, or both, in the event of the material packing or banking in the conical section or cone-tip. It will be noticed that the material is introduced at a point considerably below the surface of the solution within the cylindrical casing and centrally thereof. By reason of this the fresh material is kept in a measure separate from that which is rising under the action of the air-currents to overflow into the launder, and thus the upward passage of the separated material is not retarded by the introduction of the fresh material. In other words, by this arrangement the coarser material will not mix too much with the slimes and water and thereby interfere with the separation of the lighter material.

It is not necessary that the inlet-sleeve be centrally and vertically arranged or that the air-pipe be centrally and vertically arranged; but it is desirable, as above pointed out, that the crushed material be fed into the tank at a point considerably below the surface of the liquid therein.

I claim as my invention—

1. In combination the casing having the upper and lower outlets, means for introducing air into the casing extending throughout the entire cross-sectional area of the casing to diffuse the air gently throughout the entire mass of material, said casing being unobstructed for the passage of the material upwardly and downwardly according to weight, an inlet for the crushed material at a point below the surface of the liquid in the casing and a deflector or spreader extending across the inlet to spread the material issuing therefrom and to prevent the escape of the air therethrough, the air-introducing means being located at a distance below the deflector with a liquid-space intervening, substantially as described.

2. In combination a casing having an upper and a lower outlet, an air-header in the form of an open grating located within the casing, an air-pipe extending centrally of the casing and extending across the casing to diffuse the air gently throughout the entire mass of material and connecting with the said header, a sleeve surrounding the said pipe and extending vertically of the casing and a deflector extending across the lower end of the sleeve and surrounding the air-inlet pipe, substantially as described.

3. In combination a casing, means for introducing the material into the same having its discharge end below the surface of the liquid in the casing a deflector extending across the said discharge end, air-introducing means at a point some distance below the said deflector with a liquid-space intervening said air-introducing means extending across the casing to diffuse the air gently throughout the entire cross-sectional area of the casing, and the space within the casing being free for the rise of the air and the lighter particles around and above the point of introducing the material, the casing having an upper and a lower discharge and the air-introducing means permitting the downward passage of the heavier particles, substantially as described.

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

FRANK W. HOPKINS

Witnesses:
C. M. HAMPSON,
J. P. EVANS.

