

H. V. SEALE AND. W. SHELLSHEAR.
MACHINE FOR THE SEPARATION OF SULFID ORES.
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1,341,024.

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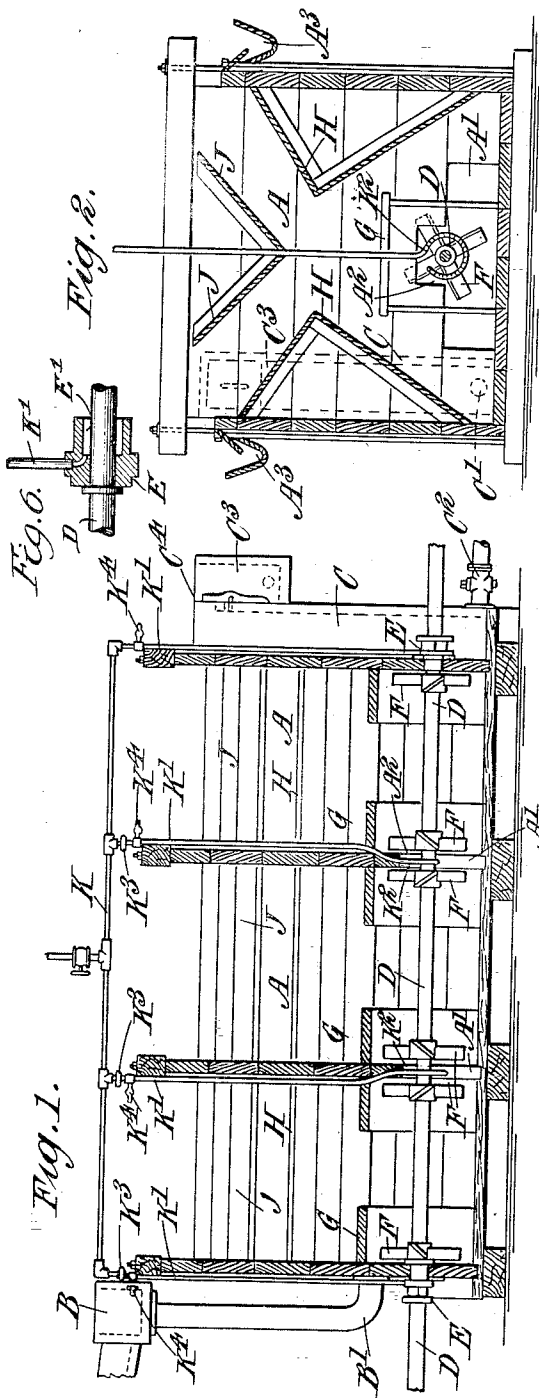


Fig. 1.

Fig. 2.

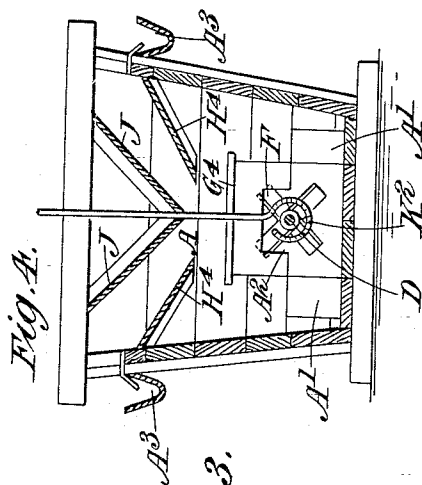


Fig. 3.

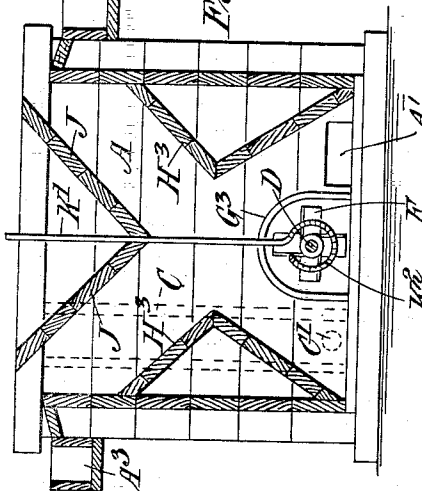
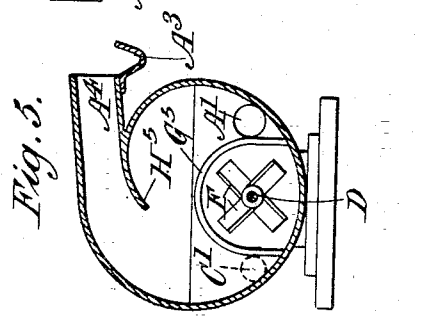


Fig. 4.



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UNITED STATES PATENT OFFICE.

HARRY VERNON SEALE AND WILTON SHELLSHEAR, OF BROKEN HILL, NEW SOUTH WALES, AUSTRALIA, ASSIGNORS, BY MESNE ASSIGNMENTS, TO MINERALS SEPARATION NORTH AMERICAN CORPORATION.

MACHINE FOR THE SEPARATION OF SULFID ORES.

1,341,024.

Specification of Letters Patent.

Patented May 25, 1920.

Application filed April 18, 1916. Serial No. 91,873.

To all whom it may concern:

Be it known that we, HARRY VERNON SEALE, mill superintendent, and WILTON SHELLSHEAR, metallurgist, both of Junction North Mine, Broken Hill, in the State of New South Wales, Commonwealth of Australia, subjects of the King of Great Britain, have invented certain new and useful Improvements in Machines for the Separation of Sulfid Ores, of which the following is a specification.

This invention relates to an improved apparatus for the separation of ores by flotation, and refers more especially to apparatus for effecting what is commonly known as froth-flotation separation in which the ores are subjected to aeration and agitation in an aqueous separating medium in the presence of a frothing agent for the formation of a froth containing the metallic ore particles. This mode of separation is most commonly applied to sulfid ores.

This invention is equally applicable to collective separation in which an indiscriminate float concentrate of sulfids or other ores is obtained, or to differential or preferential flotation-separation in which a float concentrate of certain ores or sulfids is obtained by selective flotation which leaves other ores or sulfids unfloated in the tailings.

This invention is applicable to the treatment of ores, concentrates, tailings, slimes or other metallurgical products and it will be understood that in this specification the term "ores" will include all such metallurgical products as well as crude materials.

Economy of operation and efficiency of concentrates recovery are the objects of this invention.

In constructing a machine according to this invention we provide a number of separating boxes arranged in sequence or series somewhat as shown in the accompanying drawings in which—

Figure 1 is a longitudinal section.

Fig. 2 is a cross section.

Figs. 3, 4 and 5 are cross sections of various modifications thereof.

Fig. 6 is an enlarged detail longitudinal sectional view of the shaft-carrying journal-box of the construction of Figs. 1 and 2.

In these drawings three boxes A are shown, the first having a feed hopper B for the ore with inlet B' and the last a suitable

discharge outlet C' for the residues which may deliver direct into a launder or may deliver into a subsidiary residues box C having an outlet C² at the bottom for the coarse material and a launder C³ at the top with a regulating overflow lip C⁴. By regulating the overflow lip C⁴ and adjusting the flow of coarse material through the outlet C² the level of the separating liquid in the boxes A may be controlled. The boxes A are connected from one to the other by supplemental level-equalizing passages A' in the dividing partitions at the bottom. Mounted throughout the length of the series of boxes is a horizontal shaft D working in suitable glands E on the end partitions and passing through the dividing partitions. Upon this shaft D are mounted impellers F arranged adjacent to each partition the blades thereof being set to throw the pulp toward the center of the box. Each impeller F is surrounded by a casing G which may be rectangular in shape as shown in Figs. 2 and 4 or semicircular as shown in Figs. 3 and 5. Each box or vessel is provided with an inwardly projecting baffle H one upon either side inclined toward the top for the purpose of deflecting the froth-forming bubbles as they rise, and these baffles H are surmounted by a V-shaped baffle J at the top centrally disposed to deflect the bubbles to either side toward the concentrate launders A³ provided upon either side for the removal of the float concentrates.

To insure the aeration of the pulp we provide a supply of air under low pressure delivered into the zone of the swirl adjacent to the impellers. For this purpose we provide a main pipe K connected to a source of air at low pressure having downwardly projecting branch pipes K' at each partition. The end pipes K' are connected to the boxes E through which the shaft D passes the said boxes E having an annular channel or groove E' for the delivery of the air into the box around the shaft, and adjacent to the impeller, and within the casing G wherein is constituted the zone of swirl. The inner branch pipes K' at the inner partitions are bent around at their lower ends to encircle the shaft D, the circular portion K² being perforated for the delivery of air around the shaft and adjacent to the im-

pellers F upon either side and within their respective zones of swirl. Each branch pipe K' is provided with a cock K² and a cock K⁴. In Fig. 3 the casing G is formed as an arch, and only one rectangular level-equalizing aperture A' is provided through the box partition, at one side of the impelling casing. In Fig. 5 the boxes are made cylindrical, and of sheet metal, and the froth carrying the concentrates is delivered through the spout A⁴ into the launder A³. In this instance the impeller casing G is arch-shaped, and one circular equalizing aperture A' is cut through the box partition.

15 We claim:

1. Flotation-separation apparatus comprising a number of separating boxes, communicating passageways between the boxes below their liquid level, agitating means within the separating boxes below their liquid level and disposed in the path of pulp flow from box to box, submerged casings surrounding their zones of agitation, means for introducing air into the casings, and supplemental level-equalizing passageways between the separating boxes.

2. Flotation-separation apparatus comprising a number of separating boxes, communicating passageways between the boxes below their liquid level, a horizontal shaft passing through said boxes and their said communicating passageways, agitators mounted on the shaft and within the separating boxes below their liquid level and disposed in the path of pulp flow from box to box, and submerged casings surrounding the agitators, means for introducing air within the casings in proximity to the agitators, and supplemental level-equalizing passageways between the separating boxes.

3. Flotation-separation apparatus comprising a separating box with a froth overflow, a horizontal shaft passing through the box below its liquid level, impellers mounted on the shaft within the box near its opposite sides and arranged to impel the pulp toward the middle of the box, and casings surrounding the impellers, and means for supplying air to the region of agitation.

4. Flotation-separation apparatus comprising a separating box with a froth overflow, a horizontal shaft passing through the box below its liquid level, impellers mounted on the shaft within the box near its opposite sides and arranged to impel the pulp toward

the middle of the box, casings surrounding the impellers, and means for introducing air into the casings in close proximity to the impellers.

5. Flotation-separation apparatus comprising a number of separating boxes with respective froth overflows, communicating passageways between them, a horizontal shaft passing through the boxes below their liquid level, in each box two impellers mounted on the shaft and arranged to impel the pulp toward the middle of the box, and a submerged casing surrounding each impeller.

6. Flotation-separation apparatus comprising a number of separating boxes with respective froth overflows, communicating passageways between them, a horizontal shaft passing through the boxes below their liquid level, in each box two impellers mounted on the shaft and arranged to impel the pulp toward the middle of the box, a submerged casing surrounding each impeller, and means for introducing air into each casing in proximity to its impeller.

7. Flotation-separation apparatus comprising a series of separating boxes communicating successively through passageways below their liquid level, froth overflows for said boxes, a horizontal shaft passing through said boxes and their communicating passageways, submerged impellers mounted on the shaft within the separating boxes and in the paths of pulp flow through the said passageways and arranged to impel the pulp toward the middles of their respective separating boxes, and submerged casings surrounding the impellers.

8. Flotation-separation apparatus comprising a separating box, a shaft in the separating box below the pulp level therein, a rotary agitator mounted on the shaft and submerged within the pulp, a perforated circular pipe surrounding the shaft in close proximity to the agitator, and means for forcing air into the pipe and through its perforations into the pulp.

In testimony whereof we have affixed our signatures in the presence of two witnesses.

HARRY VERNON SEALE.
WILTON SHELLSHEAR.

Witnesses:

CLEM A. HACK,
G. R. CULLEN.