F. H. A. WIELGOLASKI.

METHOD OF DRESSING ORES.

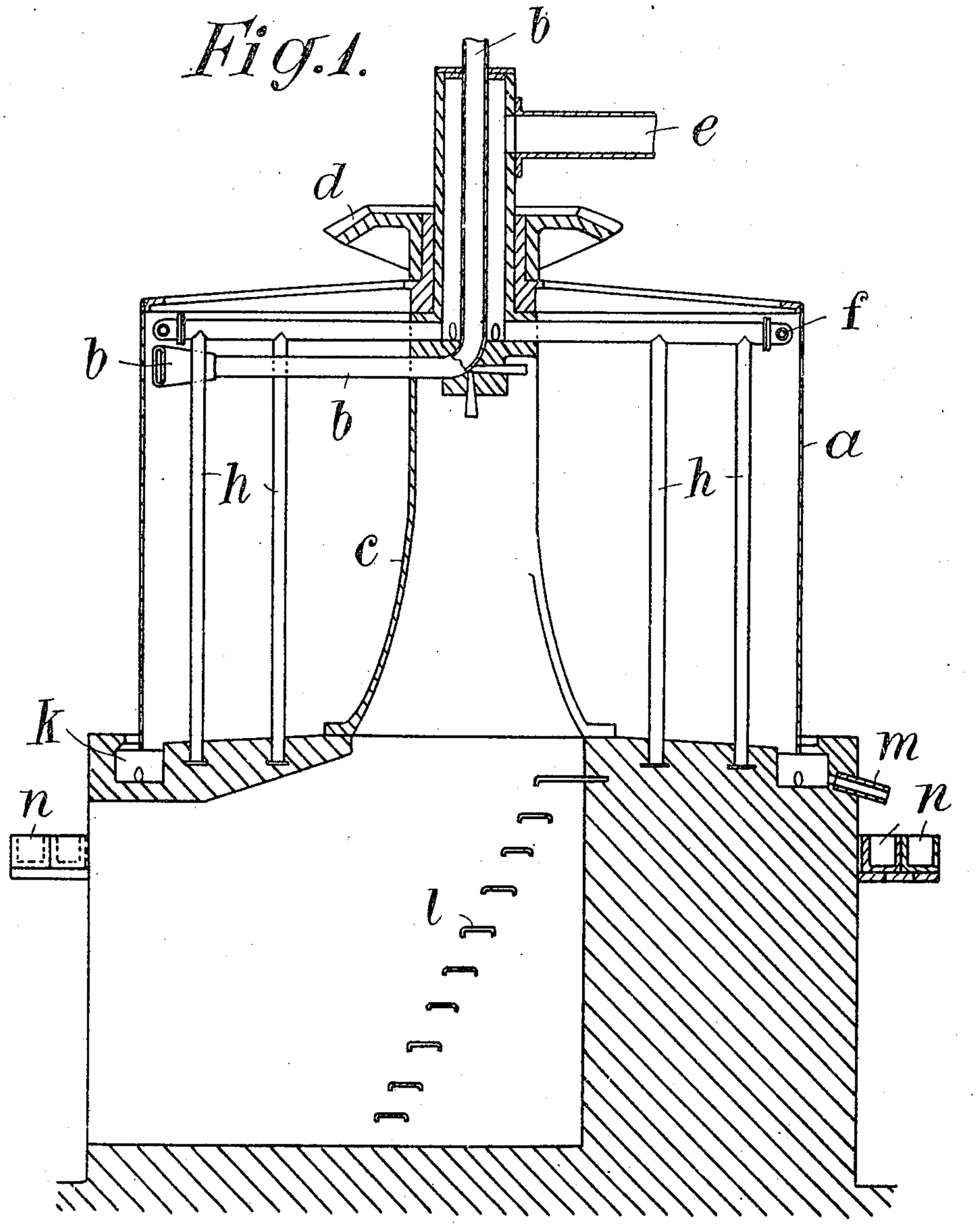
APPLICATION FILED FEB. 23, 1909.

953,309.

Patented Mar. 29, 1910.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses.

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2 SHEETS—SHEET 2.

Fig. 2.

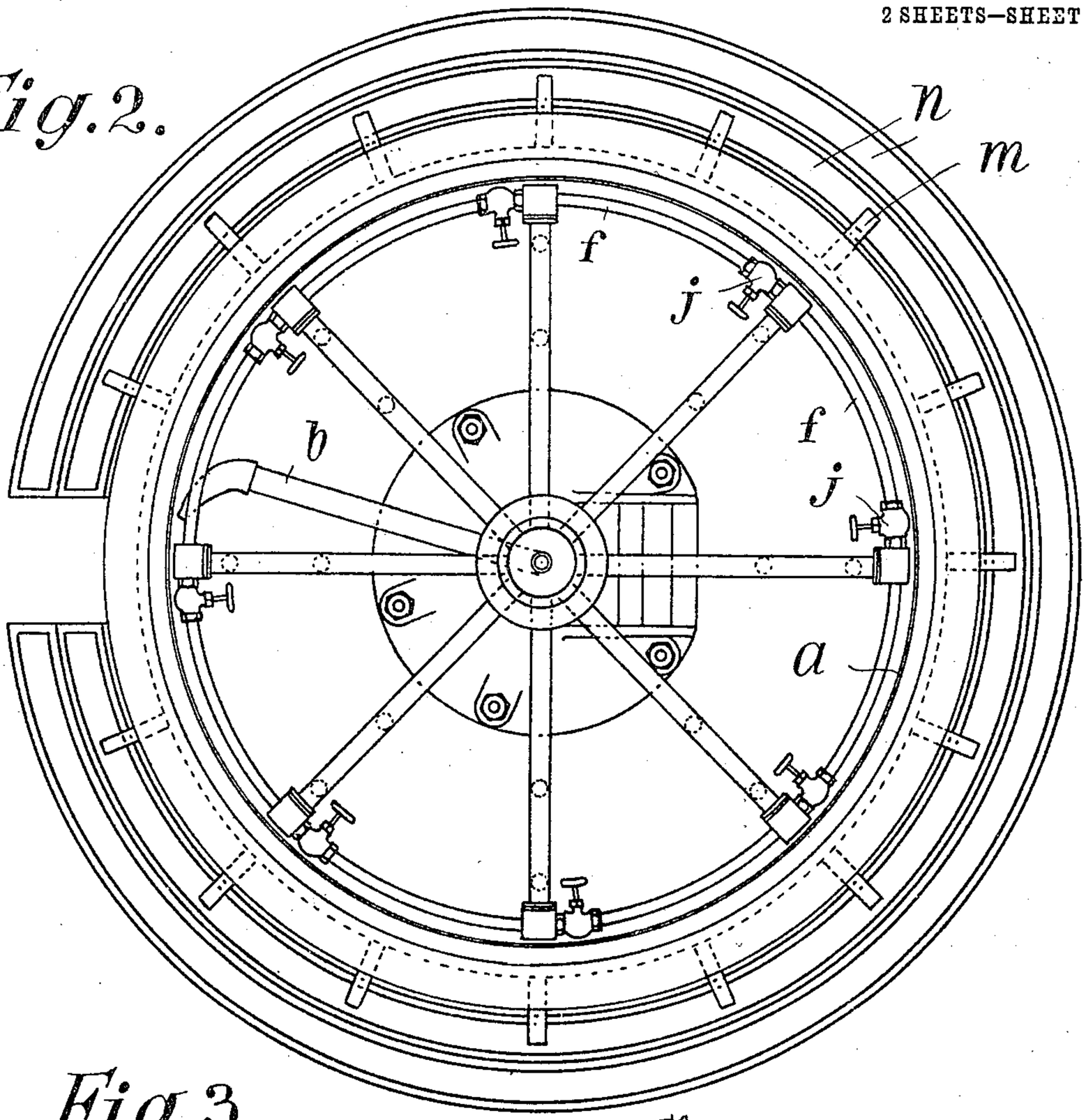
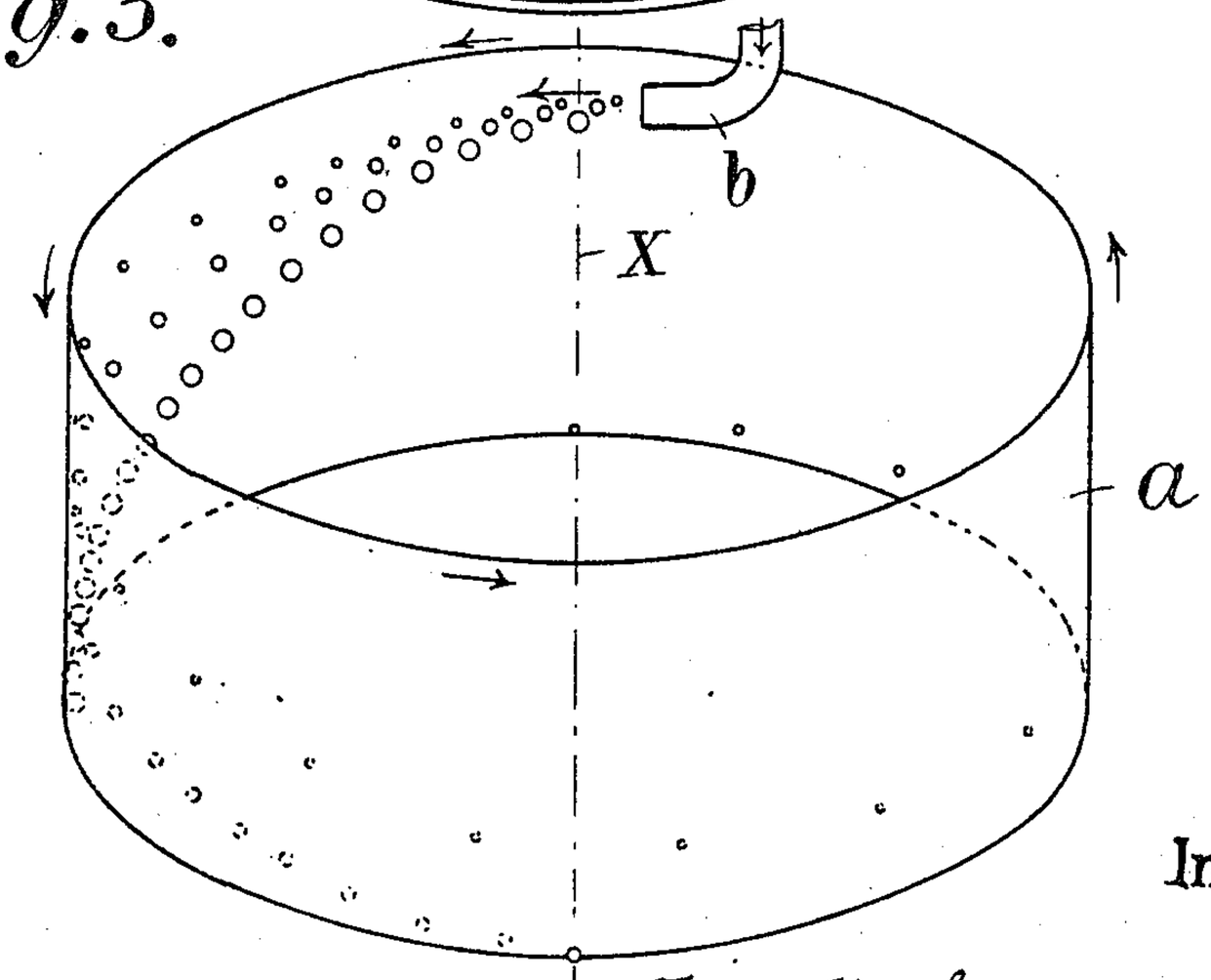


Fig. 3.



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UNITED STATES PATENT OFFICE.

FRANS HENRIK AUBERT WIELGOLASKI, OF KRAGERÖ, NORWAY.

METHOD OF DRESSING ORES.

953,309. Specification of Letters Patent. Patented Mar. 29, 1910.

Application filed February 23, 1909. Serial No. 479,328.

To all whom it may concern:

Be it known that I, FRANS HENRIK AUBERT WIELGOLASKI, a subject of the King of Norway, residing at Kragerö, Norway, have invented certain new and useful Improvements in Methods of Dressing Ores; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters of reference marked thereon, which form a part of this specification.

This invention relates to the art of dressing ores and more especially to the dressing of slimes, the particles of which are of different specific gravity and of different sizes, so that they can not be separated by simply washing them in water, because they are precipitated at equal velocity.

Heretofore the separation of slimes has been effected by feeding them onto a horizontal rotating distributing plate from which the slimes are fed by the action of centrifugal force against a substantially vertical revolving separating surface which is secured to and moves in unison with the distributing plate. In such machines the grading of the material is effected either by sprays of water being directed against the surface to wash the lighter particles toward the bottom of the surface while the heavier particles are carried up by the centrifugal force over the top; or the separation is effected through the instrumentality of a deflector rotated differentially to the separating surface and forming in conjunction with the latter a separating channel which is completely filled with water, the flow of water being retarded by a water-retaining ring at the bottom of the chamber.

The present invention relates to a method by means of which a considerably increased separating effect is attained by the arrangement, that the mass of ore is subjected simultaneously to the action of centrifugal force and of the force of gravity on a surface so arranged, that the centrifugal force will cause the forcing of the mass against the surface, while the force of gravity in conjunction with the currents in the water will cause the ore particles to be moved on.

From the following description it will be clearly understood, that this mode of action is of greater advantage as to the production of an energetic separation, than that which is now in use.

An embodiment of the invention is illustrated in the accompanying drawing, wherein—

Figure 1 is a vertical section of an apparatus capable of carrying out my method. Fig. 2 is a plan of the same and Fig. 3 is a perspective diagram showing the mode of operation.

The slime carrier used in this method consists of a large hollow cylindrical member open at one end and mounted to rotate on its axis, the slimes pulp and the washing water being sprayed on to the inner side of the carrier.

The mode of operation of this separator is illustrated in Fig. 3 of the drawing. The cylinder *a* rotates on its axis *x*, for instance in the direction of the arrows, with a velocity adjusted to suit the sort of slime in question. The slimes pulp is moved with a controllable velocity through a stationary pipe *b* and is sprayed on to the inner side of the cylinder in the direction of rotation. The slimes pulp spreads over the surface of the cylinder and has a natural tendency to flow downward, being at the same time carried along by the surface in the direction of rotation.

The mineral particles of the slimes pulp will gather closely up to the cylindrical surface and are pressed up against the latter by the centrifugal force in a manner similar to that produced by the force of gravity in the usual slime-tables. If now the slimes pulp were spread with a velocity equal to the velocity of revolution of the cylinder *a*, on to the surface of the latter, and if the friction between the surface of the water layer spread over the surface of the cylinder and the air had no influence, the separation downward on the surface of the cylinder would proceed exactly in the same manner as in the ordinary slime-tables, and nothing would have been gained by the present method. If, on the other hand, slimes pulp be sprayed, with a velocity less than the velocity of revolution of the cylinder, on to the surface of the latter, a friction in the direction of rotation will be produced between the surface of the cylinder and the slimes pulp, the surface of the cylinder tending to increase the velocity of the slimes pulp. However, this action, owing to the inertia of the water is only transmitted to

the water layers later on and in consequence thereof the water layers, that are next to the surface of the cylinder, will soon obtain a greater velocity than those that are more remote from the same. A similar action is produced on the ore particles of the slimes pulp, because of their different size. The action on the water, however, is quite sufficient and by the different velocities of rotation of the water layers a separation of the ore particles of different sizes is caused to take place in the direction of rotation in a manner analogous to that employed in the usual method of separation in the slime-tables now in use. Thus the larger ore particles are detained and attain a velocity less than that of the smaller particles, the centrifugal force, acting on the larger ore particles being proportionate to the square of the velocity, will under these circumstances be quite considerably less than that acting on the smaller particles. The larger particles, therefore, will later on exert less pressure on the surface of the cylinder than the smaller ones. These changes of pressure will, of course, produce corresponding changes in the conditions of friction of the different ore particles on the surface of the cylinder, which changes will again tend to facilitate the separation in the direction of rotation as well as in the axial direction, and this facilitation of separation in the direction of rotation will again increase with differences of the actions of the centrifugal force on the particles of different sizes and so on, until a maximum is arrived at. The production of the said differences of the velocities of rotation of the water layers is greatly facilitated by the friction between the surface of the water and the air. Moreover, this difference can also be considerably increased through the direction of the jets of washing water, the latter being sprayed in a direction more or less contrary to the direction of rotation of the cylinder. The inertia of these quantities of water injected will have a very retarding effect on the rotation of the water surface and causes the slimes to travel in spiral paths the pitch of which decreases with the decreased size of the particles.

The advantage of the present method is thus based on the fact, that a very material reduction of the centrifugal force acting on the larger ore particles is attained. The effect hereof corresponds to the effect, that would be attained in a usual slime-table, if the action of the force of gravity on the larger ore particles be reduced without simultaneously reducing the action on the smaller particles; but it is a well-known fact that the force of gravity cannot be influenced in such a manner.

According to the present method it will be possible to separate ore mixtures of common occurrence much more readily and much better than heretofore, and such mixtures can be separated, the constituents of which have specific gravities, that approach each other too closely to enable a separation of the same to be effected by devices hitherto known.

In the embodiment illustrated in Figs. 1 and 2 the cylindrical member *a* is mounted on a high pillar *c* and is rotated by means of a toothed wheel *d*, *b* designates the slimes pulp pipe and *e* the clear water main. The pipes *f* are spray pipes each of which is provided with a valve *j* enabling the flow through the pipe to be controlled.

The lower edge of the cylinder *a* extends into a collecting channel *k* which can, according to the requirement, be partitioned off by means of small partition walls in order to enable the different products to be collected separately. From this channel small spouts *m* lead to discharge channels *n*, which may also be located within the circumference of the cylinder. The interior of the cylinder *a* is accessible by stairs *l* in the foundation.

I claim:—

1. The process of separating slimes consisting in projecting slimes from a stationary source under centrifugal impulse upon a substantially vertically unobstructed surface revolving at a speed sufficient to retard but not overcome gravital tendency of materials thereon, said slimes being projected upon said surface in the direction of rotation but at less speed; spraying water upon said surface and slimes to retard the circular travel of the lighter material, and separately discharging the light and heavy material at different circumferential points fixed relatively to the feed.

2. The process of separating slimes consisting in projecting slimes from a stationary source under centrifugal impulse upon a substantially vertically unobstructed surface revolving at a speed sufficient to retard but not overcome gravital tendency of materials thereon, said slimes being projected upon said surface in the direction of rotation but at less speed; spraying water upon said surface contrary to the direction of rotation of the surface to retard the circular travel of the lighter material, and separately discharging the light and heavy material at different circumferential points fixed relatively to the feed.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

FRANS HENRIK AUBERT WIELGOLASKI.

Witnesses:
B. von Dobozycki,
Louis Vandory.