No. 725,549. PATENTED APR. 14, 1903.

H. R. ELLIS.

CENTRIFUGAL LIXIVIATING MACHINE.

APPLICATION FILED JAN. 9, 1903.

NO MODEL.

Fig. 1.

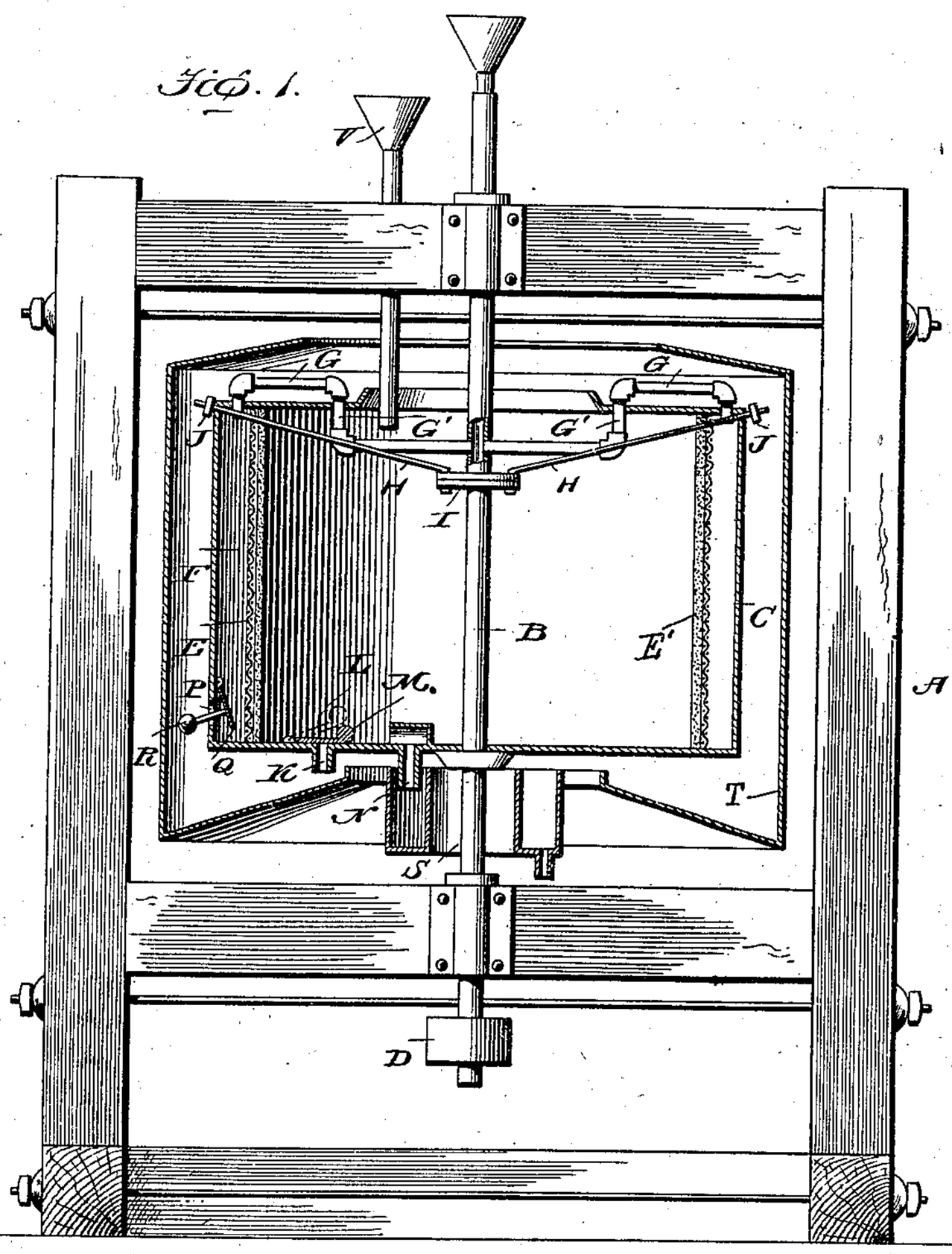
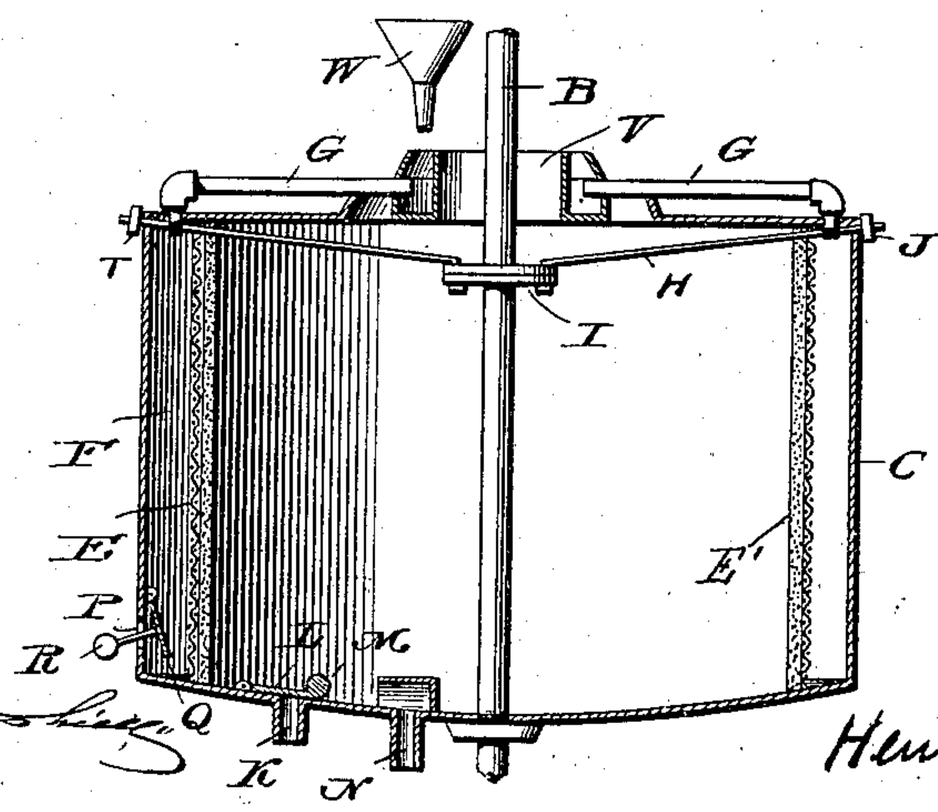


Fig. 2.



Witnesses

Geo. H. Evans

Inventor

Henry Rives Ellis

by Shuttuck & Bradley

Attorneys

UNITED STATES PATENT OFFICE.

HENRY RIVES ELLIS, OF SALT LAKE CITY, UTAH.

CENTRIFUGAL LIXIVIATING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 725,549, dated April 14, 1903.

Application filed January 9, 1903. Serial No. 138,370. (No model.)

To all whom it may concern:

Be it known that I, HENRY RIVES ELLIS, a citizen of the United States, residing at Salt Lake City, in the county of Salt Lake, State of Utah, have invented certain new and useful Improvements in Centrifugal Filtering-Machines, of which the following is a description, reference being had to the accompanying drawings and to the letters of reference marked thereon.

My invention relates to centrifugal filtering-machines, particularly that class of such machines which are employed in the treatment of ores and the like; and the invention has for its objects, first, to provide a construction by which a solvent solution or other liquid may be passed continuously through finely-pulverized or otherwise comminuted ore, rock, or other material and the charged solution or other liquid separated from the material treated without clogging the filter cloth or screen with the slime or finely-divided particles of solid material; second, to provide means by which the tailings or powdered or crushed material may be conveniently discharged from the drum or basket while the latter is at rest or revolving slowly, and, finally, to provide means by which the charged solution may be discharged while the drum or basket is revolving free from tailings or other solid material.

Further objects will be hereinafter pointed out.

I attain these objects by the construction shown in the accompanying drawings; and my invention consists in the construction and combination of elements hereinafter described and shown, and particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a vertical sectional view of my improved machine, and Fig. 2 is a similar view of a modification.

In the drawings, A is a framework supporting the working parts of the machine.

B is the main shaft, mounted in suitable bearings on the framework and carrying the drum or basket C. The shaft is provided, preferably below the lower bearing, with a pulley D, by which the shaft and drum or basket may be rotated. The shaft B is hollow for a portion of its length, and discharge-passages, to be hereinafter described, communicate with the interior of the shaft.

The sides and bottom of the drum or basket C are imperforate except for certain discharge-passages, hereinafter described. The central portion of the top of the drum or basket is preferably open, as shown.

E is a perforated partition or screen arranged within the drum or basket concentric therewith and at sufficient distance from the sides thereof to provide an annular chamber F between the partition or screen and the sides of the drum or basket. Against the inner face of this screen is arranged a filter-cloth or other filtering medium E′.

Discharge-tubes G are arranged near the top of the drum or basket, having their inner ends in communication with the interior of the hollow of the shaft B and having their outer ends in communication with the chamber F. These tubes are conveniently arranged, as shown in Fig. 1, with vertical portions G′, extending through openings in the top of the drum or basket and having horizontal portions extending from the openings in which the portions G′ are located outward and connected at their outer ends to the chamber F.

The drum or basket is preferably further steadied and held true to the shaft by means of tie-rods H, secured at their inner ends to a collar I, secured to the shaft and provided at their outer ends with nuts J, bearing against the outer periphery of the drum or basket.

At a point in its bottom near the partition or screen E and between it and the shaft the bottom of the drum or basket is provided with a discharge-opening K, which is closed when the drum or basket is at rest by a cover L, which is hinged at its outer end to the bottom of the drum or basket and is provided on its upper face at its inner end with a weight M.

Near its center the bottom of the drum or basket is provided with a discharge-gate N. In the side of the drum or basket near the bottom a discharge-opening P is provided. This opening is provided with a valve Q, hinged at its upper end to the interior of the drum or basket and provided with a weight R, by which the valve is held open when the drum or basket is at rest.

Beneath the discharge-gate N is arranged

an annular trough S, adapted to receive material discharged through the gate. Surrounding the drum or basket and having its bottom extended inward to a point below the opening K is a shell T. This shell preferably has an upwardly-inclined top extending inward, as shown, a distance sufficient to catch any liquid which may be thrown outward above the top of the drum or basket. The bottom of the shell is also preferably inclined upward, as shown, and has a discharge-opening near its periphery.

A funnel V, supported in any convenient manner, has its discharge end arranged within the opening in the top of the drum or basket.

In operation the crushed or pulverized ore or other solid material to be treated is fed to the drum or basket through the funnel V and by the centrifugal force as the drum or basket is rapidly rotated is thrown against the filtering medium supported by the perforated partition or screen E. The solvent solution or other liquid with which the solid material is to be treated is introduced through the hollow of the shaft B, from which, through the tubes G, it passes into the chamber F. The rotation of the drum or basket will cause the valve Q to be thrown outward against the force of the weight R, closing the opening P. The solution or other liquid will thus be compelled to pass inward through the perforations of the partition or screen E through the filter-cloth or other filtering medium E′ and in contact with the particles of solid matter held against the filtering medium by centrifugal force. The charged solution or other liquid passing thus into the interior of the drum or basket will be held by centrifugal force against the solid matter and will pass downward by gravity and be discharged through the opening K, the cover of which will be raised during the rotation of the drum or basket by centrifugal force acting upon the weight end and will pass into the shell T, from which it may be conducted to suitable tanks for treatment. When the drum or basket is brought to rest, the weight R will cause the valve Q to open, permitting the liquid in chamber F to be discharged into the shell T and at the same time the cover L will be caused by the weight M to close the discharge-opening K, thus preventing the tailings or other solid matter from passing into the shell T. The discharge of the tailings or other solid material may be readily effected by bringing the drum to rest or rotating it slowly and introducing water or other liquid into the solution feed, the opening P being held closed by any convenient means after the solvent solution has been discharged. The liquid passing into the annular chamber F will force the solid materials away from the filtering medium, against which they are no longer held by centrifugal force, and will wash them down to the bottom of the drum and out through the discharge-gate N, the discharge-opening K being held closed by the weight M.

The machine may thus be run practically continuously, it being necessary only to slow down when a charge of material has been sufficiently treated by the solvent solution and to pass sufficient water through the supply-pipes to wash the tailings down and out, the entrance of tailings into the charged liquid being automatically prevented without the necessity of opening or closing valves by hand.

It will be seen from the above description that in the operation of the machine the direction of the liquid in its action on the solid matter is from the periphery toward the center, so that instead of acting to force the solid material against the filter, and thus tending to cause the filtering medium to become clogged by the finer particles and slime, the liquids tend to wash the solid material away from the screen, thus preventing the filtering medium from becoming clogged, allowing free passage through the solid material and securing more intimate contact between the liquid and the particles of the material to be treated.

In Fig. 2 I have shown a modified form of the means for supplying the solvent solution or other liquid. In this form of my apparatus the construction of the drum and its mounting on the driving-shaft is the same as in Fig. 1. The shaft B is not hollow, as in Fig. 1, and the inner ends of the discharge-tubes G instead of being connected to the shaft are in communication with an annular trough V, into which a supply-funnel W discharges. The bottom of the drum in this form is shown concaved, so as to facilitate the discharge of the tailings.

It will be understood that the invention is not limited to the construction shown, as the construction may be varied, so far as specific features of construction are concerned, without departing from the spirit of the invention.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a centrifugal filtering-machine, the combination of a rotary shaft, a drum mounted thereon, a perforated partition within the drum, arranged concentrically with the periphery of the drum and located at such distance therefrom as to form an annular chamber about the perforated partition, a filtering medium on the inner face of the perforated partition, radial supply-tubes communicating with the annular chamber near its top and means for supplying liquid to the supply-tubes; substantially as described.

2. In a centrifugal filtering-machine, the combination of a hollow rotary shaft, a drum mounted thereon, a perforated partition within the drum, arranged concentrically with the periphery of the drum and located at such distance therefrom as to form an annular chamber about the perforated partition, a filtering

medium on the inner face of the perforated partition, radial supply-tubes communicating at their inner ends with the hollow shaft and at their outer ends with the annular chamber, and means for supplying liquid to the hollow shaft; substantially as described.

3. In a centrifugal filtering-machine, the combination of a rotary shaft, a drum mounted thereon, a perforated partition within the drum arranged concentrically with the periphery of the drum and located at such distance therefrom as to form an annular chamber about the perforated partition, a filtering medium on the inner face of the perforated partition, means for supplying liquid to the top of the annular chamber and a valve arranged in the side of the drum near the bottom of the annular chamber, adapted to be closed by centrifugal action when the drum is rotated and means for holding the valve open when the drum is at rest; substantially as described.

4. In a centrifugal filtering-machine, the combination of a rotary shaft, a drum mounted thereon, a perforated partition within the drum, arranged concentrically with the periphery of the drum and at such distance therefrom as to form an annular chamber about the perforated partition, a filtering medium on the inner face of the perforated partition, means for supplying liquid to the annular chamber, a discharge-opening in the bottom of the drum, a cover for the discharge-opening adapted to be raised by centrifugal force when the drum is rapidly rotated, to permit the discharge of the charged liquid, and means for holding the cover in closed position when the drum is slowly rotated or at rest; substantially as described.

5. In a centrifugal filtering-machine, the combination of a rotary shaft, a drum mounted thereon, a perforated partition within the drum, arranged concentrically with the periphery of the drum at such distance therefrom as to form an annular chamber about the perforated partition, means for supplying liquid to the annular chamber, a discharge-opening in the bottom of the drum, a cover therefor, adapted to be held open by centrifugal force when the drum is rapidly rotated, to permit discharge of the charged liquid, and to be held in closed position when the drum is rotated slowly, and a discharge-gate in the bottom of the drum at a point nearer the center than the discharge-opening; substantially as described.

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

HENRY RIVES ELLIS.

Witnesses:
A. C. ELLIS, Jr.,
H. C. BROWNE.