No. 855,718. PATENTED JUNE 4, 1907.

T. H. MILLER.

CENTRIFUGAL MACHINE.

APPLICATION FILED MAR. 6, 1905.

2 SHEETS—SHEET 1.

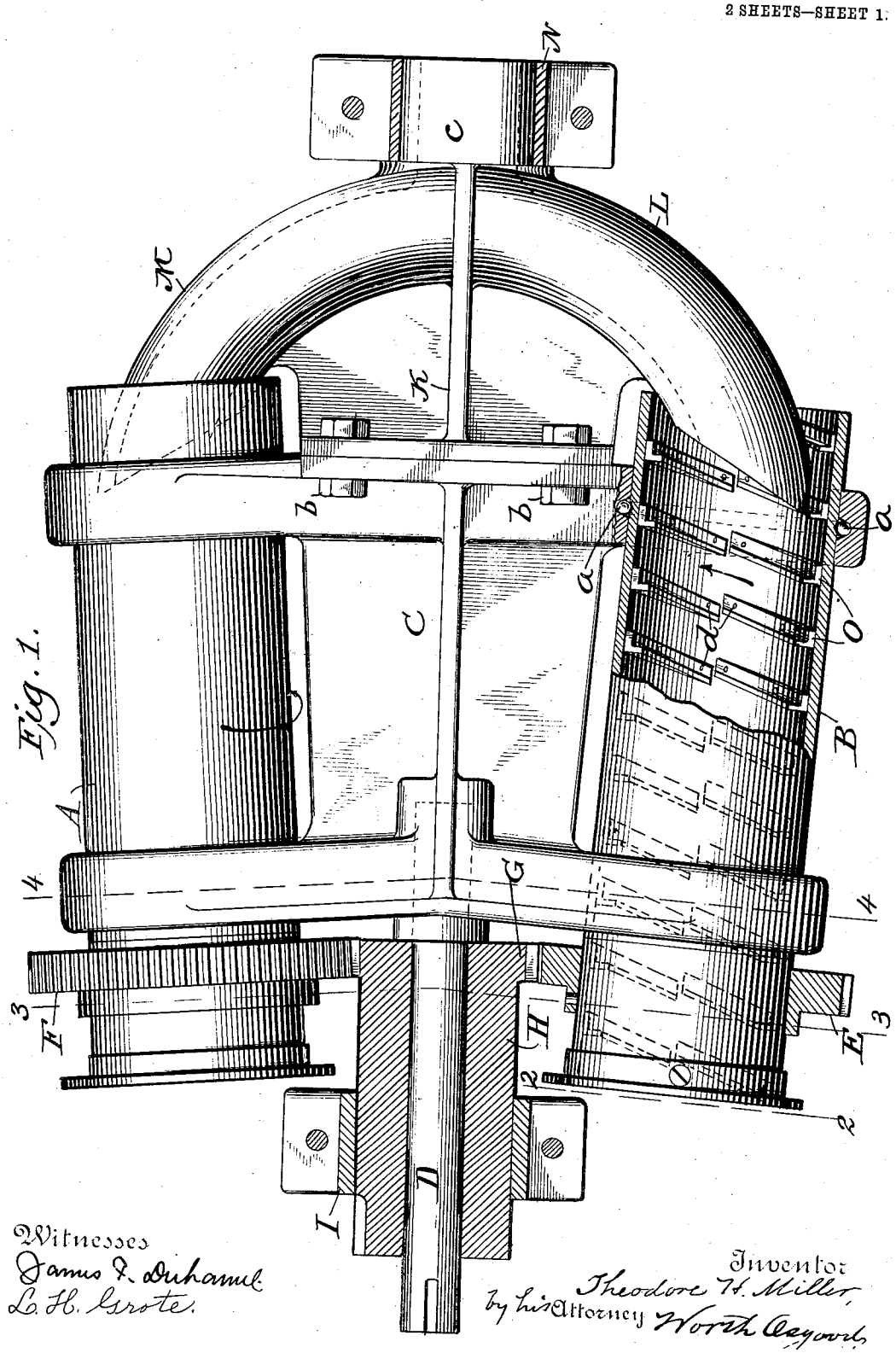

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 2.

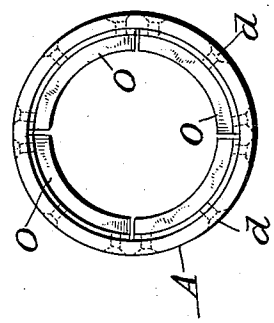


Fig. 3.

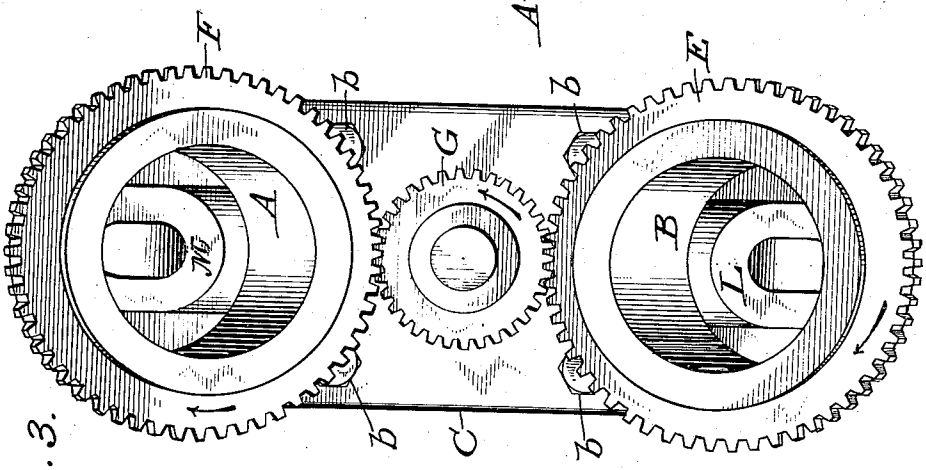
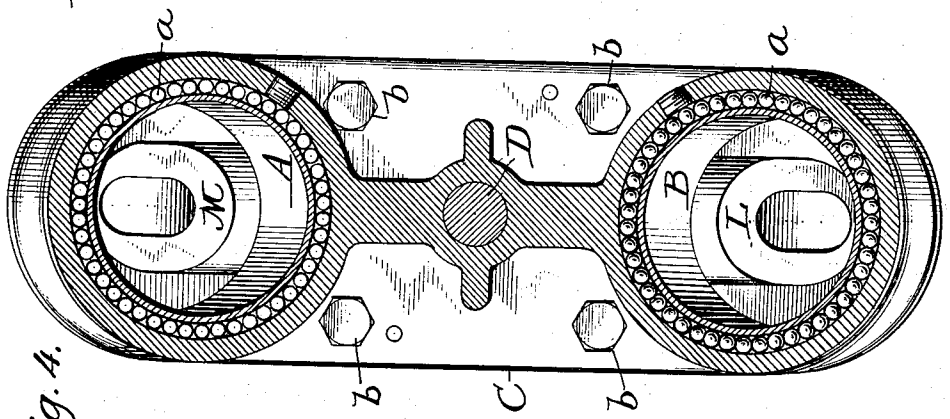


Fig. 4.



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CENTRIFUGAL MACHINE.

No. 855,718. Specification of Letters Patent. Patented June 4, 1907.

Application filed March 6, 1905. Serial No. 248,407.

To all whom it may concern:

Be it known that I, THEODORE H. MILLER, a citizen of the United States, residing at Poughkeepsie, Dutchess county, State of New York, have invented certain new and useful Improvements in Centrifugal Machines for Separating Solids from Liquids, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact specification, sufficient to enable others skilled in the art to practice and use my invention.

The principal object of my present invention is to provide or produce a simple, cheap and efficient machine or apparatus for accomplishing the thorough and economical separation of solids from liquids through the aid of centrifugal force or action.

Subordinate objects are to make the machine of few and simple parts, easy to be constructed and assembled for use, light and easy easy running and economical of power required for its operation.

To accomplish these objects and to secure other and further advantages in the matters of construction, operation and use, my improvements involve certain new and useful constructions, arrangements or combinations of parts, and principles of operation, all of which will be herein first fully described and then pointed out in the claims.

In the accompanying drawings forming part of this specification, I have shown one form of machine or apparatus constructed and arranged for operation in accordance with my invention and involving my improvements, this form embodying the use of two revolving cylinders and serving to illustrate the principles of my invention.

Figure 1 is a view in plan or elevation, portions being shown in section. Fig. 2 is an end elevation on a plane through line 2—2 of Fig. 1 of one of the cylinders showing the interrupted or divided spiral conveyer mounted therein. Fig. 3 is an end elevation corresponding with Fig. 1 and on planes through line 3—3 thereof but omitting the supports for the machine and the spiral conveyer. Fig. 4 is a view in elevation and partial section on planes through the bearings for the cylinders and showing the frame by which they are carried but omitting the spiral conveyer, the view being taken on planes through line 4—4 of Fig. 1.

In all these figures like letters of reference, wherever they occur, indicate corresponding parts.

It should be understood at the outset that the vessels into which the solids and liquids are fed to be therein separated one from the other may be of any number, whether one, two, three or more, but when one is employed it should be balanced on the opposite side of the main axis of rotation of the machine, which may be accomplished by use of any suitable counterweight, and when two, three or more are applied they should be arranged around this general axis of rotation in such manner as to preserve the desired balancing.

A and B represent two cylinders of sufficient length, within which the desired separation is to take place and these are mounted in a substantial frame, C, with which they are intended to revolve and within which they are capable of being rotated around their individual axes under slow speed as compared with their speed around the principal axis of revolution. Any preferred form of bearing for the vessels within the frame may be adopted, but the preferred form is that known as a ball bearing. Of such bearings the balls are represented at *a*, *a*, in Figs. 1 and 4. This form of bearing is supplied near each end of the cylinders or vessels.

D is the main shaft through which the frame and the parts connected therewith are rotated through power applied to the shaft by any suitable connection therewith. This shaft is secured in the frame in any preferred way, as by shrinking the latter on the end within it, or otherwise so that the union is perfectly made. Each cylinder or vessel is provided with a gear, as E, F, by which it may be rotated in its bearings within the frame, and these gears mesh with a central pinion, G, of which the axis preferably coincides with that of the main shaft. As shown in Fig. 1, pinion G is formed integrally with an elongated neck, H, within which the main shaft D turns as in a bearing, the neck taking the form of a loose sleeve on the shaft. This sleeve is itself sustained in a suitable bearing indicated at I, and power is to be applied to the projecting end of the sleeve H to accomplish the desired rotation of the cyinder or cylinders or their equivalent vessels through the medium of the pin ion.

On the other end of the frame C a second

frame is shown as applied and secured in place, as by bolts and nuts *b*, *b*, but it might be made integrally with the first named frame or otherwise so as to revolve therewith. This second frame or extension, represented at K, carries the feeding tubes, one or more, one for each vessel employed, and these are represented at L and M. They discharge into the otherwise open ends or near to the open ends of the cylinders, the materials being fed into them by use of any suitable apparatus and through the axial opening, *c*, which is common to all the feeding tubes employed. The neck common to all the feeding tubes and containing the axial opening is sustained in a suitable bearing, represented at N.

As thus far described it will be understood that when the main shaft D of the machine is rotated, the cylinders or vessels sustained in the frame and their respective feeding tubes will be revolved around the main axis of the machine which is coincident with the axis of the shaft D.

Within each cylinder or vessel I employ a spiral conveyer extending from one end to the other and affixed to the walls of the cylinder or vessel in any substantial way, as by screws, *d*, *d*. This spiral conveyer, as shown, is not continuous but is broken or interrupted at certain points, preferably at about four points in each winding, substantially as indicated in Figs. 1 and 2, the conveyer itself being composed of sections as O, O, an uninterrupted space being left between the adjacent ends of the various sections. The conveyer, instead of being composed of sections might be perforated or notched.

As the material is fed into the revolving vessel, the heavier particles are by centrifugal force thrown against the inner walls of the vessel and the water or other liquid which is mixed with the heavier particles or solids naturally occupies either a position nearer the axis of the vessel, or it may percolate between the particles.

The rotation of the vessel and its spiral conveyer on the axis of the vessel itself, forces the solid material toward and out of the end of the vessel opposite the feeding tube, and the liquid being also operated upon by centrifugal force finds escape from the action of the conveyer by passing through the openings between or in the various sections thereof or over the sections and will be discharged at the open end of the vessel nearest the feeding tube and farthest from the main shaft or main axis of revolution.

In separating machines heretofore proposed, a spiral conveyer has been suggested, the same being rotated independently of the vessel within which it was to be situated. Obviously the power employed to rotate the spiral conveyer in such forms can only be utilized in forcing the material toward the discharge orifice and impedes rather than facilitates the desirable separating action.

The feeding tubes extend within the vessels a sufficient distance so that the spiral conveyer will act upon the solid material before any of it can be washed out with the liquid.

The operation of the machine is or may be continuous, and the liquid discharged at one end and the solid material at the other may be caught and conveyed away by any suitable appliance, if necessary. The main axis of the machine may lie in a horizontal plane, or it may be vertical, or inclined, as may be preferred.

The improved machine is intended to be employed for the separation of liquids and solids of any character, and is intended to deliver the solids free from all water or liquid that can be separated therefrom by centrifugal action.

Being constructed and arranged for operation substantially in accordance with the foregoing explanations, the improved machine will be found to admirably answer all the purposes or objects of the invention hereinbefore alluded to.

Having now fully described my invention, what I claim as new herein and desire to secure by Letters Patent, is:—

1. In a machine for separating solids from liquids, the combination with a vessel in which the separation is to take place, the wall of the same being imperforate, of a feeding tube projecting into the liquid discharge end of the vessel which is farthest from the main axis of the machine, the vessel and feeding tube being arranged to revolve together around the said main axis, substantially as and for the purposes set forth.

2. In a machine for separating solids from liquids, the combination with a vessel in which the separation is to be effected, the wall of the same being imperforate, of a feeding tube projecting into the liquid discharge end of the vessel and arranged to revolve together with the vessel around the main axis of the machine, the axis of the vessel being inclined with respect to the main axis of the machine and the vessel having a discharge opening at each end, substantially as explained.

3. In a machine for separating solids from liquids, the combination with a vessel in which the separation is to take place, the wall of the same being imperforate, of a feeding tube projecting into the liquid discharge end of the vesesl which is farthest from the main axis of the machine, the vessel and tube being arranged to revolve together around the said main axis of the machine and the vessel arranged to be rotated also around its own axis, substantially as explained.

4. In a machine for separating solids from liquids, the combination with a vessel in

which the separation is to take place, the wall of the same being imperforate, of a feeding tube projecting into the liquid discharge end of the vessel, the vessel and tube being arranged to revolve together around the main axis of the machine and the vessel having a discharge opening at each end and arranged to be rotated also around its own axis, the two axes being inclined with respect to each other, substantially as explained.

5. The combination with the frame arranged to be rotated by the main shaft, of a vessel mounted therein, rotatable around its own axis and supplied with an interior spiral conveyer fixed with respect to its wall and interrupted at intervals, the said vessel being open at both ends and its wall being imperforate.

6. The combination with a vessel rotatable around its axis and having an imperforate wall open at both ends, of an interior spiral conveyer fixed upon the interior of said wall, said conveyer being supplied with openings at points in its windings for passage of liquids, substantially as and for the purposes set forth.

7. In a machine of the character herein set forth, one or more vessels having imperforate walls rotatably mounted in bearings in a rotatable frame, means for feeding mixed solids and liquids into one open end of each vessel, each vessel being provided with a spiral conveyer fixed upon its interior for forcing the solid materials to and out at the other open end of the vessel, and means for rotating the frame and the vessels therein whereby the liquid is caused to be discharged at the ends of the vessels nearest the feeding tube, substantially as explained.

8. In a centrifugal machine for separating solids from liquids, one or more vessels in which the separation is to take place, each such vessel having an imperforate wall and a discharge opening at each end and being provided with a spiral conveyer fixed on the interior of its wall and receiving the mixed solids and liquids at a point between the open ends, and discharging the liquid at the end nearest the feeding tube and the solids at the other open end, substantially as and for the purposes explained.

In testimony whereof, I have signed my name to this specification in the presence of two subscribing witnesses.

THEODORE H. MILLER.

Witnesses:
H. C. BARKER,
E. A. CONGER.