R. S. BROWNLOW.

CENTRIFUGAL SEPARATOR.

APPLICATION FILED FEB. 13, 1919.

1,356,805. Patented Oct. 26, 1920.

2 SHEETS—SHEET 1.

Fig. 1.

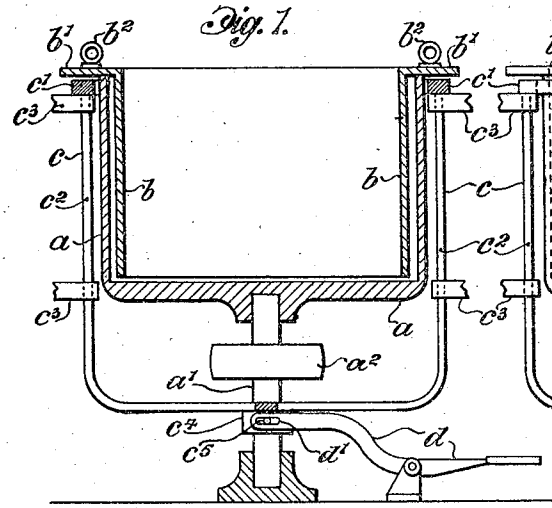


Fig. 2.

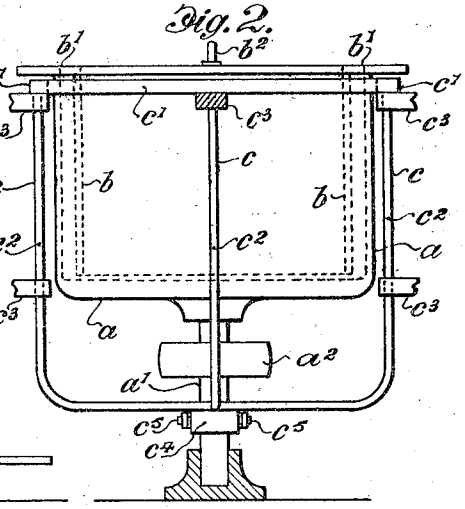


Fig. 3.

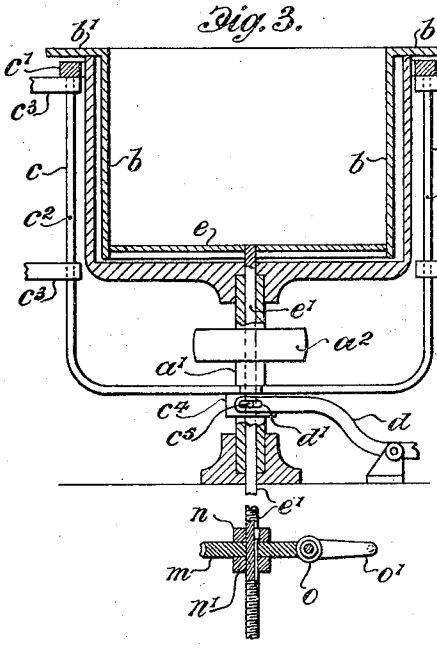
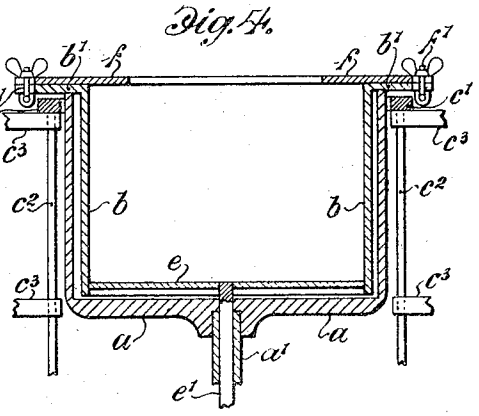


Fig. 4.



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2 SHEETS—SHEET 2.

Fig. 5.

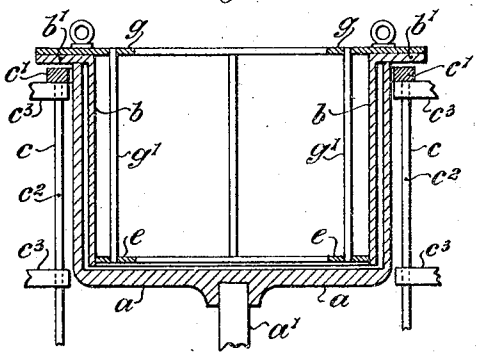


Fig. 6.

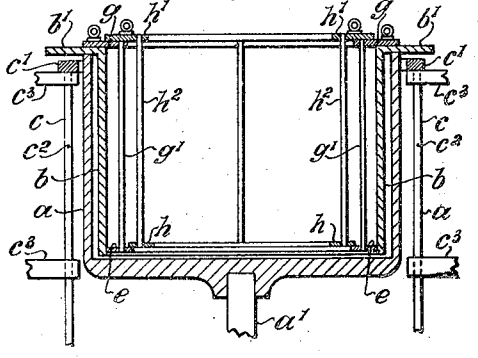
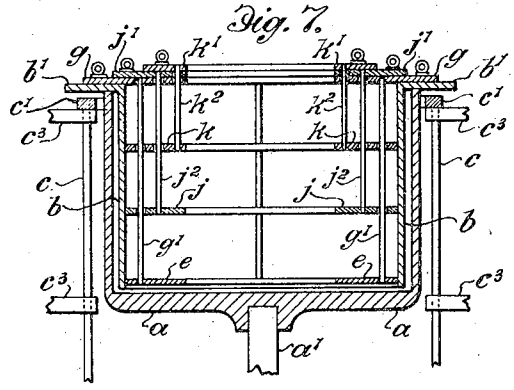


Fig. 7.



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UNITED STATES PATENT OFFICE.

RICHARD SYDNEY BROWNLOW, OF MANCHESTER, ENGLAND.

CENTRIFUGAL SEPARATOR.

1,356,805. Specification of Letters Patent. Patented Oct. 26, 1920.

Application filed February 13, 1919. Serial No. 276,851.

To all whom it may concern:

Be it known that I, RICHARD SYDNEY BROWNLOW, a subject of the King of Great Britain and Ireland, and a resident of Manchester, in the county of Lancaster, England, have invented certain new and useful Improvements in Centrifugal Separators, of which the following is a specification.

This invention relates to centrifugal separators. The invention is especially applicable to apparatus for treating clay "slip" to obtain the clay suspended therein in a more or less plastic state, but it is also applicable to apparatus for separating solids from other liquids. The object of the invention is to provide improved and simple means for removing the separated solids or solid substance without stopping the rotation of the drum.

According to the invention, I provide the rotary drum of a centrifugal separator with a removable lining which can, while the drum is rotating, be placed therein to rotate therewith and have the clay or other material deposited or accumulated upon its interior surface, and be removed from the drum, or be raised out of engagement therewith, to arrest its rotation and allow of the ejection of the clay or other material by means of an annular or other disk, piston or the like or other appropriate means.

The invention is hereinafter further and more fully described with reference to the accompanying drawing, whereof Figure 1 is a more or less diagrammatic vertical section of one embodiment of it, and Fig. 2 is an elevation at right angles to Fig. 1. Figs. 3, 4, 5, 6 and 7 are similar views to Fig. 1 exemplifying further embodiments.

Referring first to Figs. 1 and 2, a is the rotary drum of an under-driven centrifugal separator mounted on a shaft a^1 carrying a driving pulley a^2. Within the drum a is arranged a removable lining b provided with a flange b^1 which rests on the upper edge of the drum a so that the lining rotates with the drum. Surrounding the drum a is a frame c comprising a ring c^1 connected by rods c^2 (mounted to slide in guides c^3) to a boss c^4 loose on the shaft a^1 of the drum a. The boss c^4 is provided with pins c^5 which engage slots d^1 in one arm of a foot-lever d. To place the lining b in the drum a the pedal of the foot-lever d is depressed to raise the frame c and the lining is lowered, conveniently by overhead lifting tackle connected to eyes b^2 provided on the flange b^1, until its flange b^1 rests on the ring c^1. The tackle is then disconnected and the frame c lowered by releasing the foot-lever until the flange b^1 of the lining rests upon the drum when the lining rotates with the latter by frictional engagement. The clay slip or the like is then run into the drum and when the clay or other substance has accumulated or been deposited upon the interior surface of the lining b the supply is cut off and the frame c raised to lift the lining out of engagement with the drum and arrest its rotation. The lining is then raised clear by the tackle aforesaid and may be traveled to some convenient situation for the removal of the deposited or accumulated clay or other substance, another lining being placed in the drum for the next operation. Other means than the frame c and foot-lever d may be employed for raising and lowering the lining b.

The lining b may be made of material impervious or pervious to liquids as desired, and the effluent liquid and also the liquid expelled from the deposit by centrifugal force may be run off from the drum a in any suitable manner while the drum is rotating.

In order to effect the discharge of the deposited or accumulated clay or other substance from the lining without completely removing the latter from the drum I may, as shown in Fig. 3 make the shaft a^1 of the drum a tubular and fit within the lower part of the drum a piston e adapted to slide inside of the lining b and furnished with a rod e^1 which passes through the drum shaft a^1 and whereby it is actuated. The shaft e^1 is screw-threaded and has mounted on it a worm-wheel m which acts as a nut between upper and lower bearing members n, n^1 through which the shaft e^1 is splined so that it can slide therethrough but not rotate. With the worm-wheel m co-acts a worm o provided with an operating hand-lever o^1. On the lining b being raised out of engagement with the drum a by the operation of the foot-lever d, as before described, the accumulated solids are ejected from the interior surface of the lining by actuating the worm o so that the worm-wheel nut m travels the shaft e^1 upward and raises the piston e. After the ejection of the accumulated solids, the lining b and piston e are lowered into normal position for the next operation.

I may, if desired, arrange for the consolidation of the deposited or accumulated clay or other substance before the discharge of same from the lining by the piston *e*. To this end I may, as shown in Fig. 4, arrange above the lining *b* an annular disk *f* which is normally retained by swing bolts f^1 so that the piston *e* on rising first consolidates the clay or other substance between itself and the disk *f*, after which the fastenings f^1 are released and the disk *f* is removed or raised to allow of the discharge of the consolidated clay or other substance. Consolidation may be effected before or after the lining *b* is raised. Instead of employing swing bolts f^1 to normally retain the disk *f*, I may employ any other appropriate securing means.

Instead of the piston *e* being actuated from below, I may employ, as shown in Fig. 5, an annular disk *e* actuated from above by an annular disk *g* to which it is connected by rods g^1 and which normally rests upon the flange b^1 of the lining *b*, as shown. In such case, when the clay or other substance is consolidated before being ejected from the lining, the disk *f*, Fig. 4, will be arranged between the flange b^1 and the disk *g*.

According to the modification exemplified in Fig. 6, I may employ a second discharging piston or disk *h* of lesser external diameter than the piston or disk *e*, and connected to an upper disk h^1 by rods h^2 which pass through holes in the upper disk *g* whereupon the disk h^1 rests, for discharging the lesser separated or more dilute clay or other substance before discharging the more separated or less dilute clay or other substance by means of the piston or disk *e*.

According to the modification illustrated in Fig. 7, I may employ a plurality of discharging pistons or disks *e*, *j*, *k* for discharging the deposited or accumulated clay or other substance in sections according to the grading thereof axially of the drum. The disks *e*, *j* and *k* are connected to the upper disks *g*, j^1 and k^1 by rods g^1, j^2 and k^2 which pass through the intervening disks.

What I claim as my invention and desire to secure by Letters Patent is:—

1. In a centrifugal separator, the combination with the rotary drum of the separator, of a lining loosely fitting therein and normally rotating therewith and upon the interior surface of which the separated solids are deposited or accumulated, and means for operating said lining out of and into engagement with said drum while the latter is rotating.

2. In a centrifugal separator, the combination with the rotary drum of the separator, of a lining loosely fitting in said drum and having a flange which seats on the rim of the drum whereby the lining normally rotates therewith and has the separated solids deposited or accumulated upon its interior surface, and means cooperative with said flange to raise and lower said lining out of and into engagement with the rim of said drum while the latter is rotating.

3. In a centrifugal separator, the combination with the rotary drum of the separator, of a lining loosely fitting in said drum and having a flange which seats on the rim of the drum whereby the lining normally rotates therewith and has the separated solids deposited or accumulated upon its interior surface, a movable frame coöperative with said flange, and means for actuating said frame to raise and lower said lining out of and into engagement with said drum while the latter is rotating.

4. In a centrifugal separator, the combination with the rotary drum of the separator, of a lining loosely fitting in said drum and having a flange which seats on the rim of the drum whereby the lining normally rotates therewith and has the separated solids deposited or accumulated upon its interior surface, a movable frame coöperative with said flange, and a foot-actuated lever for operating said frame to raise and lower said lining out of and into engagement with said drum while the latter is rotating.

5. In a centrifugal separator, the combination with the rotary drum of the separator, of a lining loosely fitting and normally rotating therewith and upon the interior of which the separated solids are deposited or accumulate, means for operating said lining into and out of engagement with said drum while the latter is rotating, and means for removing the solids from the lining when same is operated out of engagement with said drum.

6. In a centrifugal separator, the combination with the rotary drum of the separator, of a lining loosely fitting in said drum and normally rotating therewith, means for effecting relative axial movement between the drum and lining, and a stripper within the lining adapted to be positively moved axially thereof, for the purpose described.

7. In a centrifugal separator, the combination with the rotary drum of the separator, of a lining loosely fitting in said drum and normally rotating therewith, means for effecting relative axial movement between the drum and lining while the drum is rotating, a stripper plate extending transversely across the lining, and means for positively moving said plate axially of the lining.

8. In a centrifugal separator, the combination with the rotary drum of the sepa-

rator, of a lining loosely fitting in said drum and normally rotating therewith, means for effecting relative axial movement between the drum and lining, a stripper within the lining and adapted to be moved axially thereof, and means adjacent the mouth of the lining coöperating with said stripper for compacting material collected on the inner surface of the lining.

9. In a centrifugal separator, the combination with an open top rotary drum, of a lining loosely supported in the drum by means engaging the rim of the drum, whereby the lining normally rotates with the drum and will have separated solids deposited or accumulated on its inner surface, and means for positively moving the lining vertically to disengage it from the drum while the latter is rotating.

10. In a centrifugal separator, the combination with an open top rotary drum, of a lining loosely supported in the drum by means engaging the rim of the drum, whereby the lining normally rotates with the drum and will have separated solids deposited or accumulated on its inner surface, means for positively moving the lining vertically to disengage it from the drum while the latter is rotating, and means within the lining for stripping the accumulated material therefrom.

In witness whereof I have hereunto set my hand.

RICHARD SYDNEY BROWNLOW.