May 8, 1928. 1,668,955

E. A. FORSBERG

APPARATUS FOR CLEANING SEPARATOR BOWLS AND THE LIKE

Filed Aug. 3, 1922 2 Sheets-Sheet 1

Fig. 1.

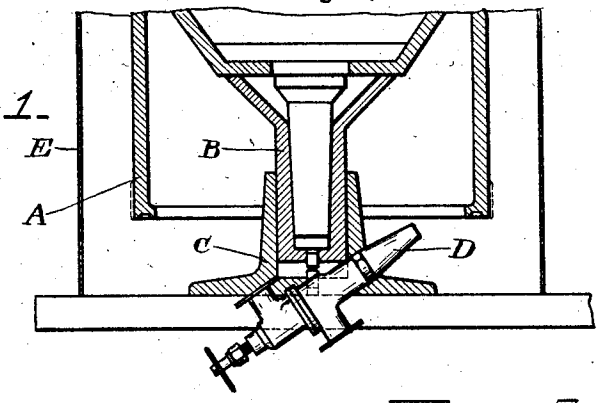



Fig. 2.

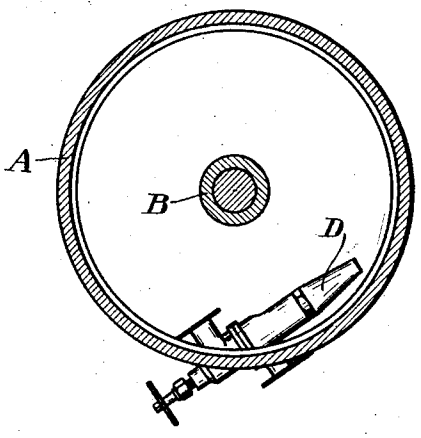
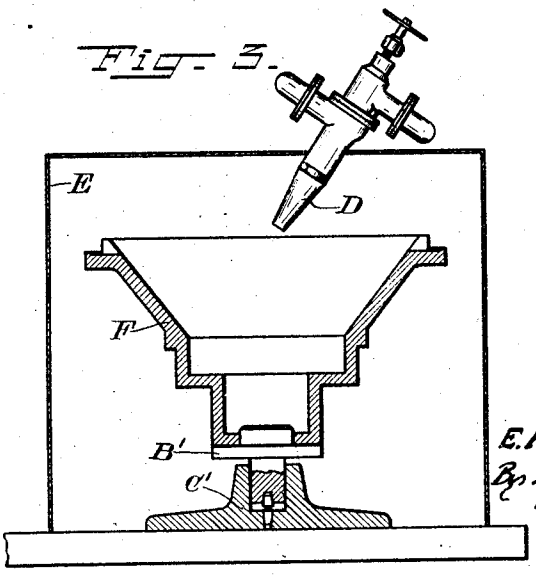



Fig. 3.




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Fig. 4.

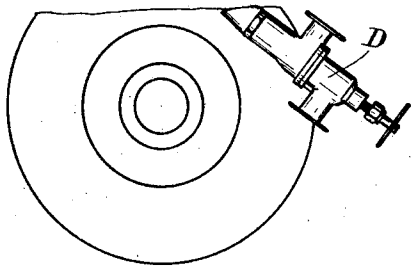



Fig. 5.

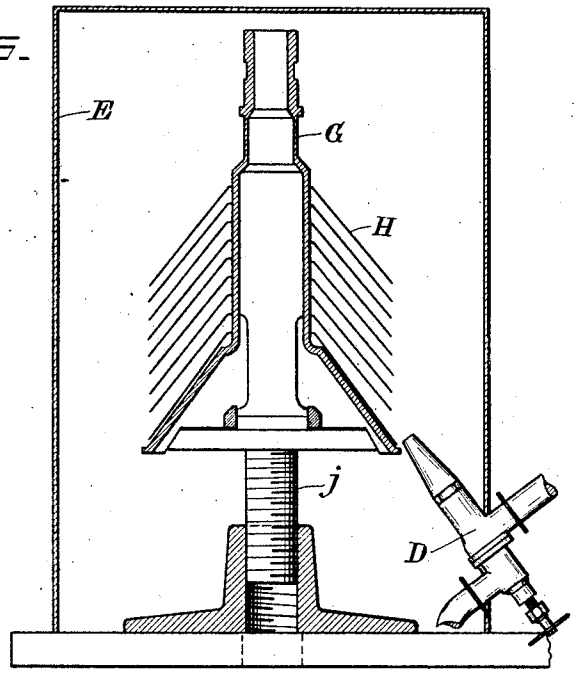
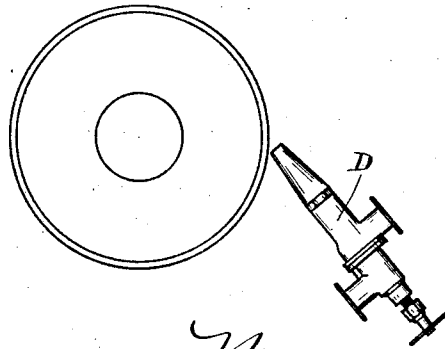



Fig. 6.




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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR CLEANING SEPARATOR BOWLS AND THE LIKE.

Application filed August 3, 1922, Serial No. 579,496, and in Sweden September 22, 1921.

In centrifugal separation of liquids in which particles of greater specific gravity than that of the liquid are suspended, the difficulty is often encountered that the heavier particles deposit on the wall of the bowl and silt up the latter so that the separation must be discontinued to have the bowl cleaned. Under such conditions the work will necessarily be intermittent on account of the alternating working and cleaning periods, and the effectiveness will thus greatly depend on cutting down the time required for the cleaning procedure.

Now, the present invention has for its purpose to render possible an effective and time-saving cleaning of separator bowls and similar parts by washing same with the aid of mechanical means as simple as possible, and the invention is based on the use of a steam injector sucking up water and discharging it in a heated state against the parts to be cleaned. As is well known, it is then possible, by suitably selecting the construction of the injector, to impart to the water a high discharge velocity while the temperature of the water is at the same time raised to the boiling point. The separator bowl to be cleaned is preferably mounted pivotally so as to be capable of being rotated in the course of the washing operation, and the jet of hot water is preferably directed obliquely against the surface of the bowl, in order to make the latter revolve by the action of the jet, whereby the whole of the surface impinged upon by the jet is being successively cleaned.

In a number of cases, the relative position between the bowl and the discharge nozzle may be maintained constant, apart from the said rotation, if such relative position is one that will insure washing the entire surface to be cleaned. In other cases, it may be necessary to alter, in the course of the cleaning procedure, the relative axial position between the discharge nozzle and the bowl, which may of course be effected by shifting the position of either or both of the said parts.

The invention is illustrated in the accompanying drawing.

Fig. 1 is a vertical section, and Fig. 2 a horizontal section of an arrangement for cleaning the casing of a separator bowl. Figs. 3 and 4 illustrate, in vertical section and a plan view respectively, a modified arrangement for cleaning the casing of a separator bowl. Figs. 5 and 6 are a vertical section and a plan view respectively of an arrangement for cleaning the insert of a separator bowl.

With reference to the arrangement disclosed in Figs. 1 and 2, the casing A or bowl body, is mounted upside down on the frame B, which is freely rotatable in the bearing C. Cold or, perhaps, slightly heated water flows into the injector D and is discharged as hot water at a great velocity through the injector which is directed so that the jet will hit the inner periphery of the casing in an oblique direction, vertically as well as horizontally. The casing is brought into rotation owing to the said oblique direction of the jet, and the speed of rotation may be adapted to suit different conditions by selecting the proper angle of discharge. By the oblique vertical direction of the jet, the liquid, on having hit the inner wall of the bowl, is thrown upwards, and in this way the whole inner wall will be subjected to the action of the jet. The slime washed off and the wash-liquid are discharged downwards and may then be led off. Preferably, the whole arrangement is surrounded by a protecting casing E which prevents hot water from being splashed about.

A similar arrangement is disclosed in Figs. 3 and 4, where a separator bowl casing F of a different form is shown as mounted upside down on a rotatable support $B^1$ mounted in a bearing $C^1$, and the jet is directed obliquely inwards and downwards from the injector D so that the whole inner conical surface is washed clean while the casing is caused to rotate.

According to Fig. 5, the bowl inset mounted for cleaning comprises a great number of conical disks disposed on a so-called center cross G. The center cross G with the disks H disposed thereon is mounted on a stud J permitting rotation of the parts G and H. Wash-liquid is discharged from the injector D in an oblique direction relatively to the radius of the disks but approximately parallel to their generatrix. The wash-liquid may thus flow up in the space between the disks and effect the cleaning thereof. However, in order that all of the disk spaces shall be cleaned, it is necessary that the relative

height between the injector and the disk inset is varied, which may be effected by the stud J being provided with a thread engaging a similar thread in the support of the stud, so that the center cross and the disks will be lowered slowly while the disks are rotating, whereby the set of disks will be gradually subjected to the washing action all over. Obviously, other mechanical arrangements may be used as well for the axial displacement of the set of disks or the injector.

What I claim as new and desire to secure by Letters Patent of the United States of America is:—

1. In a centrifugal bowl cleaner, the combination of means to support a bowl shell rotatably on its axis, and means to supply fluid under pressure including a nozzle positioned in fixed relation to the bowl-supporting means and at such angle as to project, toward the inner wall of the bowl adjacent its open end, a concentrated jet of such fluid in a direction intersecting planes including the axis of the bowl and also intersecting planes which are at right angles to the axis of the bowl, thereby causing said fluid to rotate the bowl on its axis and simultaneously scour the bowl shell along a multitude of paths extending from end to end of the bowl.

2. In a centrifugal bowl cleaner, the combination with means to support a bowl shell in inverted position to rotate on a vertical axis, of a nozzle whose discharge is positioned nearer than the bowl wall to the bowl axis and which is adapted to forcibly project a concentrated fluid jet toward the lower end portion of the bowl in a direction intersecting horizontal planes and also intersecting vertical planes including the axis of rotation and thereby adapted to turn the bowl on its axis during the said cleaning action and plough away the sediment collected on the bowl wall along a multitude of paths extending from top to bottom of the bowl wall.

3. In a centrifugal bowl cleaner, the combination, with a base, of a ring rotatably mounted on the base and adapted to engage the nave of an inverted bowl shell, whereby the ring and bowl shell are rotatably supported on the base, and a nozzle supported on the base and positioned thereon to project a jet upward toward the lower part of the inner wall of the shell along a line diverging from the axis of the shell and extending at an oblique angle to a line tangential to the wall of the shell at the point of impact of the jet.

4. In a bowl cleaner, the combination with means to support a bowl rotatably on its axis, and means to supply fluid under pressure including a nozzle positioned in fixed relation to the bowl-supporting means and at such angle as to project, toward the inner wall of the bowl adjacent its open end, a concentrated jet of such fluid in a direction oblique to a plane through the axis of rotation of the bowl, thereby causing said fluid to rotate the bowl on its axis and simultaneously scour the bowl shell along a multitude of paths extending from end to end of the bowl.

5. An apparatus for cleaning a centrifugal separator bowl element from slime deposited thereon during the process of separation, comprising, in combination, means to support the bowl element to allow it to freely rotate on its axis, and a non-rotatable high velocity steam-water injector positioned to discharge a concentrated jet of hot water forcibly against the silted surface of said bowl element in a non-radial direction to impart a movement of rotation to the bowl element and also in a direction oblique to planes at right angles to the axis of rotation of said bowl element to cause the water to forcibly plough along the surface of the bowl element in a direction oblique to its circumferential direction of rotation.

6. An apparatus for cleaning the parts of a centrifugal separator from slime deposited thereon during the process of separation, comprising, in combination, means for mounting a separator bowl element so as to be rotatable about the axis thereof, a steam-water injector adapted to discharge a jet of hot water with high velocity in a non-radial direction against the surface of said part to be cleaned, a threaded member rotatable with the bowl to be cleaned and a threaded support engaging said threaded member so that, in the rotation of the part of the bowl to be cleaned, it will have a bodily movement along the axis of rotation.

7. An apparatus for cleaning the parts of a centrifugal separator from slime deposited thereon during the process of separation, comprising, in combination, means for mounting a separator bowl element so as to be rotatable about the axis thereof, a steam-water injector adapted to discharge a jet of hot water with high velocity in a non-radial direction against the surface of said part to be cleaned, and means, operative in the rotation of the part of the bowl to be cleaned, to impart to said bowl part a bodily movement along its axis of rotation.

In testimony whereof I affix my signature.

ERIK AUGUST FORSBERG.