April 14, 1925. 1,533,313

E. A. FORSBERG

CENTRIFUGAL SEPARATOR BOWL TO FACILITATE THE REMOVAL OF SLIME THEREFROM

Filed July 19, 1922 3 Sheets-Sheet 1

Fig. 1.

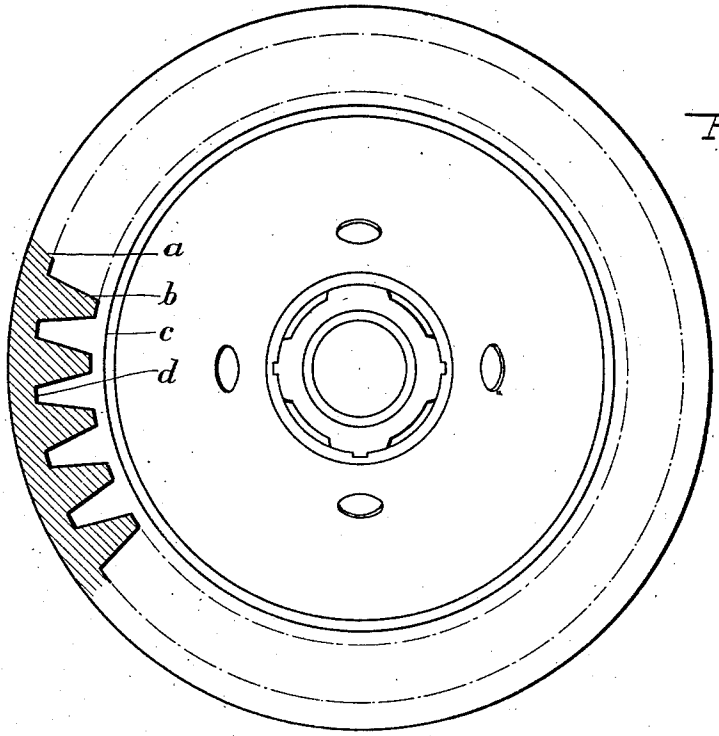
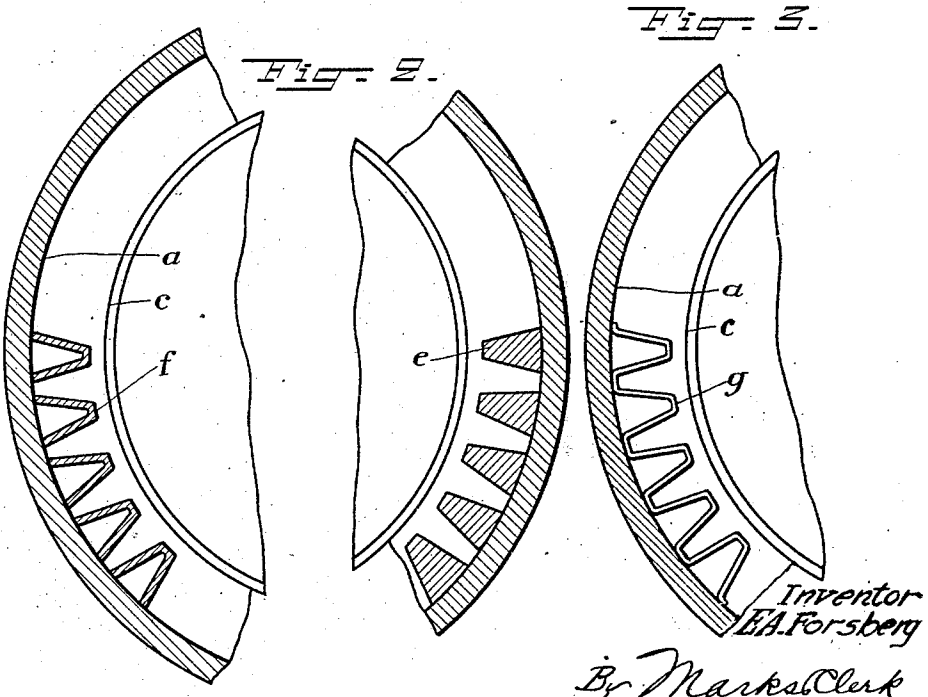


Fig. 3.

Fig. 2.



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Fig. 4.

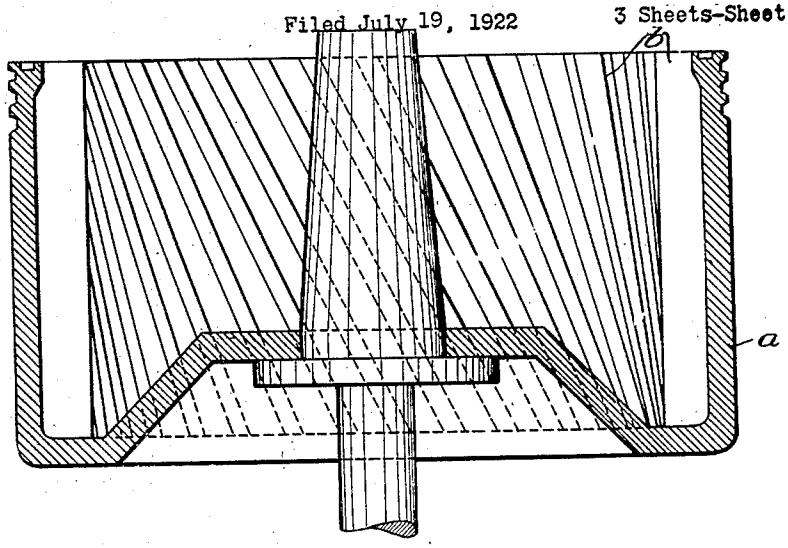
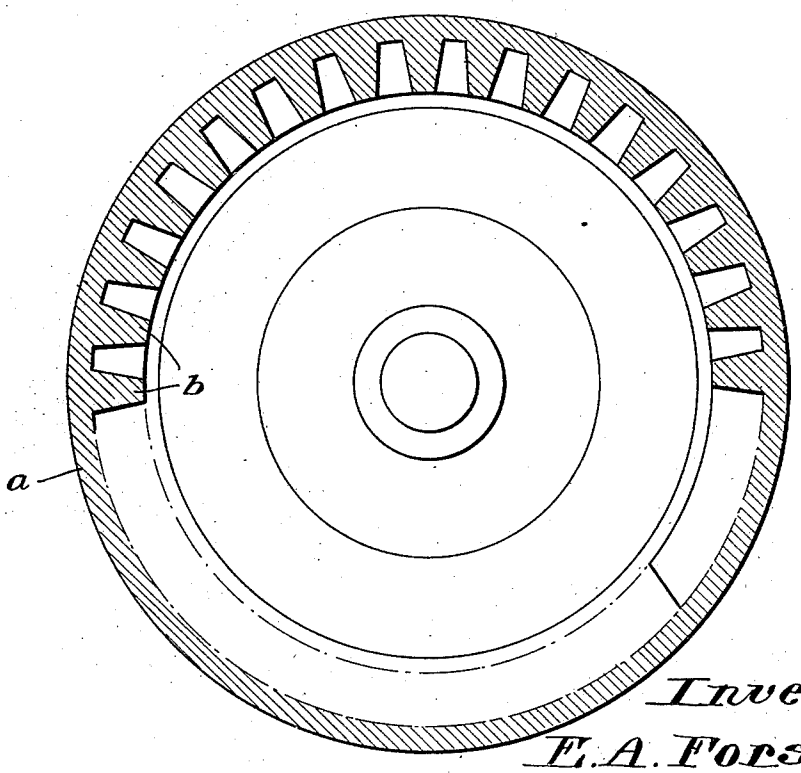


Fig. 5



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Fig. 6.

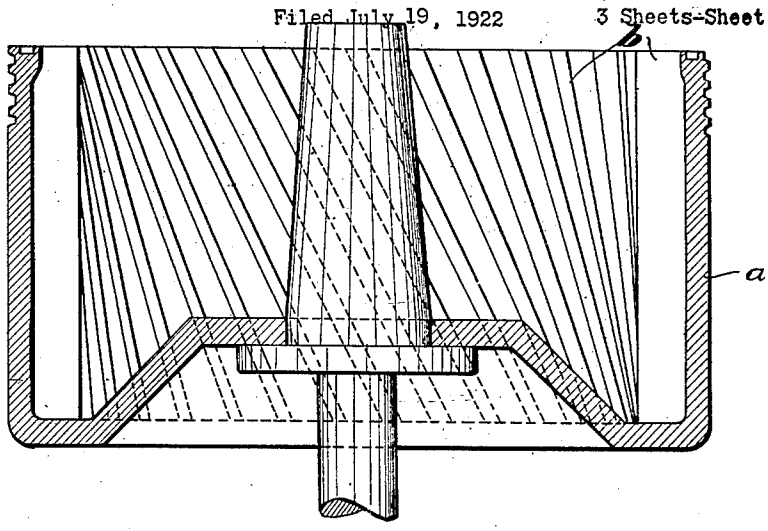
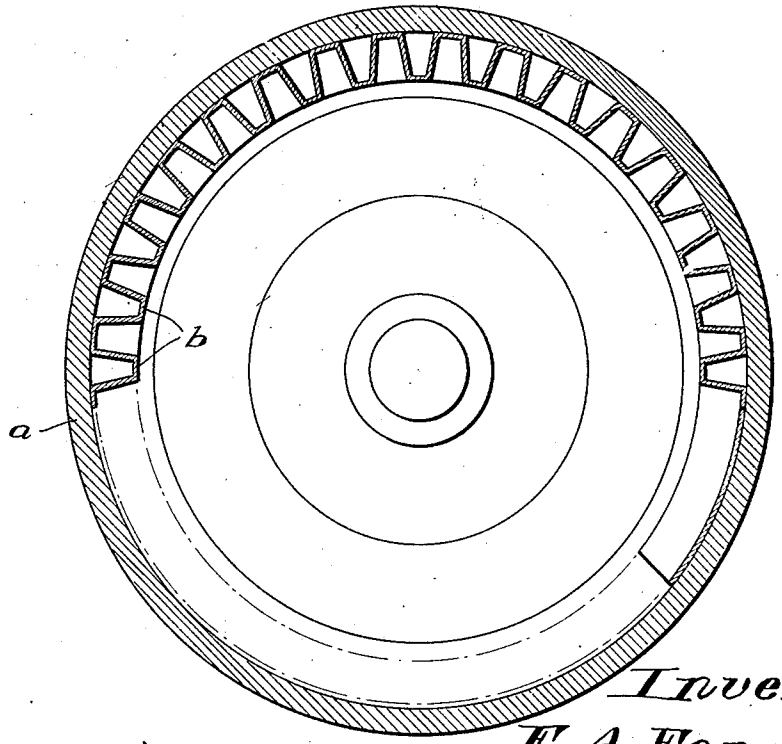


Fig. 7



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Patented Apr. 14, 1925. 1,533,313

UNITED STATES PATENT OFFICE.

ERIK AUGUST FORSBERG, OF STOCKHOLM, SWEDEN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE DE LAVAL SEPARATOR COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

CENTRIFUGAL SEPARATOR BOWL TO FACILITATE THE REMOVAL OF SLIME THEREFROM.

Application filed July 19, 1922. Serial No. 576,123.

To all whom it may concern:

Be it known that I, ERIK AUGUST FORSBERG, chief engineer, a subject of the King of Sweden, residing at 3 Lutzengatan, Stockholm, Sweden, have invented certain new and useful Improvements in Centrifugal Separator Bowls to Facilitate the Removal of Slime Therefrom, of which the following is a specification.

In a number of processes for centrifugal separation, where liquids of different specific gravities are separated with the aid of centrifugal action, or where a liquid is liberated from heavier contaminating matters suspended therein, the difficulty is encountered that the heavier particles will deposit at the periphery of the separator bowl which is thus gradually silted up. To avoid this drawback, various arrangements have been resorted to, and, with certain kinds of silt, exceedingly favourable results have been obtained by supplying the bowl with a heavier liquid, such as a solution of salt, together with the separating liquid, the said heavier liquid accumulating at the periphery and washing away the silt. The best result will be attained, if the added liquid has a greater specific gravity than the silt which in this case floats on the liquid and cannot stick to the wall of the bowl. But the use of an auxiliary liquid has been found to be advantageous also with heavier kinds of silt, viz where such liquid is capable of washing the bowl clean. At any rate, it will be of advantage if the flow of liquid at the periphery of the bowl, whether such liquid consists of separating liquid or of an auxiliary liquid as well, is as fast as possible, in that the cleaning power will evidently be greater at a greater rate of flow. On the other hand, it is not possible in the constructions now in use, to increase the rate of flow to any greater value, as this would require very large amounts of liquid or narrow passages between the wall of the bowl and the separating inset, these arrangements being generally both, for reasons readily understood, impossible to carry out.

The present invention has for its purpose to facilitate an effective washing of the slime-chamber of the bowl, whether auxiliary liquid is being used or not, and without the necessity of using very large quantities of liquid, or of making the distance between the deposit of slime and the outer edge of the skimming inset particularly small, and the invention consists principally in the inner side of the separator bowl being all around provided with ridges separated by intermediate channels and extending from the bottom of the bowl and upwards, substantially as will be more fully described hereinbelow.

The accompanying drawings illustrate various embodiments of the invention. Fig. 1 represents a cross section of a centrifugal separator bowl arranged according to the invention. Fig. 2 shows two modified forms of construction in cross section. Fig. 3, likewise, is a cross section of a further embodiment of the invention. Fig. 4 is a longitudinal section of an embodiment of the invention wherein the ridges of the separator bowl extend in an oblique direction with respect to the axis of the bowl. Fig. 5 is a cross section of the embodiment, disclosed in Fig. 4. Fig. 6 is a longitudinal section of a further embodiment of the invention with the ridges of the separator bowl extending obliquely relatively to the axis of the bowl. Fig. 7 is a cross section of the embodiment shown in Fig. 6.

In the arrangements represented in the drawings, the slime chamber is not of the common annular shape, but shows a number of channels separated from each other by means of ridges extending inwardly from the mantle of the bowl, to a greater or smaller extent. Referring to Fig. 1, the wall of the bowl is denoted by *a*, said wall being provided with ridges in the form of inwardly projecting ribs *b*, which may extend inwards either so as to reach the outer edge *c* of the skimming inset, or, as shown in the figure, terminating some distance therefrom. Preferably, the ridges are wedge-shaped so that the distance between them will be small near the bottom portions thereof. The most simple arrangement will of course be obtained by having the ridges longitudinally parallel with the axis of the bowl but there is no objection to their being disposed obliquely and thus shaping them on spiral lines, in some way or other. The separated slime accumulates close to the periphery at *d*. The liquid flowing out

moves between the projections, and the velocity of the liquid will depend on the quantity thereof and on the free space available for the flow. As the latter is reduced by the volume occupied by the ridges, the rate of flow will consequently be great and the washing power of the liquid considerable, this being the case to an exceptionally high degree, if a special auxiliary liquid be used, which, on account of its higher specific gravity, forces itself outwards, thus filling the extreme outer space between the projections.

With reference to Fig. 2, the ridges are not made integral with the body of the bowl, the same consisting of loosely inserted solid ribs *e*, or of hollow ribs *f*, preferably soldered onto the inner side of the bowl mantle.

In Fig. 3, the bowl is lined with a folded jacket *g* made of thin material, such as sheet metal, and fixed to the inner side of the bowl mantle, the folds produced providing the ridges characteristic of the arrangement.

In all of the embodiment shown in Figs. 1–3, the ridges of the separator bowl are assumed to extend in the axial direction of the bowl. As pointed out above, however, the said ridges may also be adapted so as to extend obliquely with respect to the bowl, and this latter arrangement is clearly disclosed in Figs. 4–7 wherein, as before, *a* designates the mantle of the bowl and *b* the ridges or ribs on the inner side of the bowl mantle.

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

1. A centrifugal bowl especially adapted to effect the carrying away by outflowing liquid of slime deposited on the peripheral wall of the separating chamber, which comprises a bowl having a cylindrical inner wall provided with a multiplicity of channels whose longitudinal direction of extension is toward the bowl outlet, said channels opening along their length toward the interior of the bowl and having imperforate bottoms and side walls and adapted to receive the separated slime, said channels having a depth greater than the width of their bottoms and concentrating the peripherally outflowing liquid in narrow spaced apart streams and thus so increasing the velocity of flow of the peripherally outflowing liquid as to facilitate the sludging out of the slime.

2. A centrifugal bowl especially adapted to effect the sludging out by outflowing liquid of slime deposited on the peripheral wall of the separating chamber, which comprises a bowl having a cylindrical inner wall provided with a multiplicity of alternating ridges and channels whose longitudinal direction of extension is toward the bowl outlet, said channels opening along their length toward the interior of the bowl and having imperforate bottoms and side walls and adapted to receive the separated slime, the combined width of the bottom parts of the channels being substantially less than the combined thickness of the ridges at a corresponding distance from the axis of the bowl, whereby the outflowing streams of liquid flowing along the bottoms of the channels have a velocity of flow more than double that which the liquid would have if distributed over a plane surface, thereby effecting a more thorough sludging out of slime.

3. A centrifugal bowl especially adapted to effect the sludging out by outflowing liquid of slime deposited on the peripheral wall of the separating chamber, which comprises a bowl having a cylindrical inner wall provided with channels whose longitudinal direction is toward the bowl outlet, said channels opening along their length toward the interior of the bowl and having imperforate bottoms and side walls, the channels being wedge-shaped in cross-section so as to provide relatively wide openings and narrow bottoms, so as to concentrate the slime and outflowing sludging liquids along narrow paths most distant from the axis of the bowl and thereby concentrate the sludging action of the liquid on the slime.

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

ERIK AUGUST FORSBERG.

Witnesses:

P. SWENSON,

ERIC HALGER.