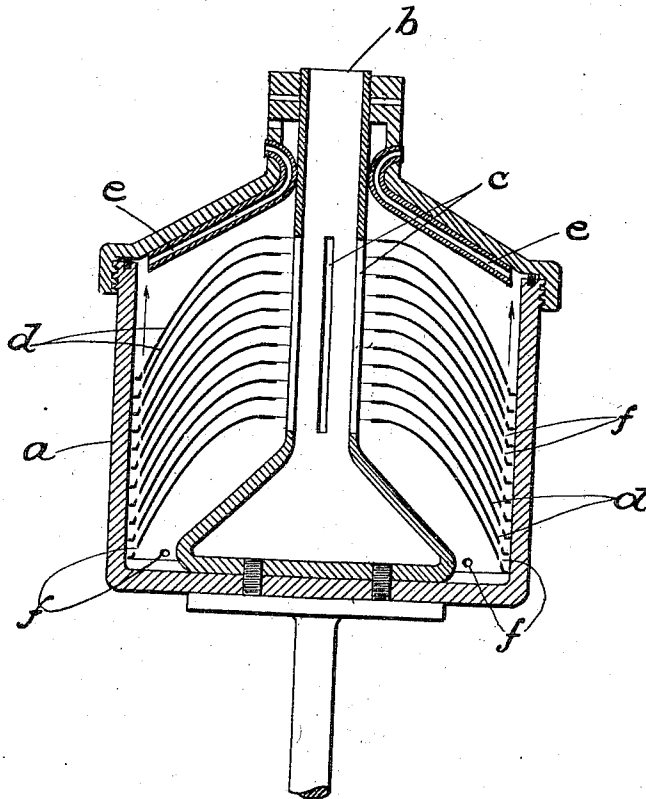


E. A. FORSBERG.
CENTRIFUGAL LIQUID SEPARATOR.

APPLICATION FILED SEPT. 3, 1909. RENEWED NOV. 29, 1911.

1,030,991.

Patented July 2, 1912.



WITNESSES:

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CENTRIFUGAL LIQUID-SEPARATOR

1,030,991.

Specification of Letters Patent.

Patented July 2, 1912.

Application filed September 3, 1909, Serial No. 516,126. Renewed November 29, 1911. Serial No. 663,177.

To all whom it may concern:

Be it known that I, ERIK AUGUST FORSBERG, a subject of the King of Sweden, residing at Stockholm, Sweden, have invented a new and useful Improvement in Centrifugal Liquid-Separators, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates particularly to a certain new form and construction of division plates which are used in liners for centrifugal bowls. These plates, or, as they are called, disks, are generally conical and generally have straight mantles or sides so that the spaces between disks or plates are the same from the inner to the outer ends thereof.

There has been patented by Fredrik Ljungstrom, of Sweden (United States Letters Patent No. 892,999, dated July 14th, 1908) a construction in which the disks or plates are so formed that the spaces between a disk or plate and its adjacent disks or plates are gradually narrowed from the inner ends of said spaces outward. In the construction shown and described in this Ljungstrom patent there is a space between the outer ends of the plates or disks and the inner periphery of the bowl, thus forming a passage beyond the plates through which the skim milk passes to its outlet and in which any foreign matter may be deposited.

My invention, so far as the form or construction of the plates, which produces a condition in which the width of the spaces between any given plate and its adjacent plates are gradually narrowed from the inner ends of said spaces outward, is concerned, is that shown in the Ljungstrom patent. On the other hand, instead of, as in the Ljungstrom patent, the disks terminating an appreciable distance from the inner periphery of the bowl so as to form a skim milk flow and foreign matter passage between the ends of the plates and the inner periphery of the bowl, I adopt a novel construction which, in conjunction with the disks before described, forms my invention.

In my invention the disks or plates are extended practically to the inner periphery of the bowl, there being only such clearance between the outer edges of the disks and the inner periphery of the bowl as will enable

the ready removal and replacement of the disks or plates and their proper operation. At a short distance inward from the bowl, I provide the disks or plates with openings, apertures, or orifices for the passage of the skim milk to the exit point thereof from the bowl. There is still left between these orifices or holes and the inner periphery of the bowl a slight space in which the foreign matter can collect between the disks or plates and may attach itself to the surface of the disks or plates. While, in my invention, I take advantage of the results produced by the invention forming the subject-matter of the said patent of Fredrik Ljungstrom, No. 892,999, on the other hand, I obtain certain additional advantages, among which may be mentioned the fact that the skim milk, in its upward travel to the skim milk outlet, is still confined between the disks and is therefore subjected to further skimming under a positive condition for the production of additional cream. Further, any foreign matter may be collected and removed more readily as it will attach to the surface of the disks beyond the skim milk orifices of the bowl and can be removed simultaneously with the regular cleaning of the disks.

I will now describe the embodiment of my invention as illustrated in the accompanying drawing, which shows a section of a bowl having therein my improved liner.

In this drawing *a* is the rotating bowl; *b* the inlet tube; *c* the slot or openings which distribute the full milk between the disks or plates.

d are the plates which are curved, as shown, so that the space between the inner ends of adjacent disks is greater than the space between the same disks at the outer end, and moreover, this space gradually decreases from the inner to the outer end. As may be seen, these disks extend substantially to the inner periphery of the bowl, there being, as stated before, merely clearance sufficient for operation.

e is the skim milk discharge tube and *f* are apertures, openings or holes through the disks or plates *d* for the passage of the skim milk to the discharge tube *e*.

The operation may be readily understood. Full milk passes in through the central feed tube *b* and is projected by the slot or slotted wing *c* simultaneously between all the

plates. The cream passes up near the center wall. The skim milk passes upward to the orifices *f* and escapes through the skim-milk delivery tube or discharge tube *e*. Any foreign matter will be found beyond these orifices or holes *f* and mainly attached to the surface of the disks from which it may readily be removed when the disks are cleaned.

10 Having now fully described my invention, what I claim and desire to protect by Letters Patent is:—

1. In a centrifugal liquid separator, the combination with a bowl having an outlet for the skim milk, of a liner consisting of a series of superimposed separating plates extending from near the axis of the bowl substantially to the inner periphery of the bowl and forming passages between adjacent plates, each plate being so formed that the width of the spaces between it and its adjacent plate are less at the outer than at the inner end of said spaces, there being apertures through said plates for conveying the skim milk to the skim milk outlet.

2. In a centrifugal liquid separator, the combination with a bowl having an outlet for the skim milk, of a liner consisting of a series of superimposed separating plates extending from near the axis of the bowl substantially to the inner periphery of the bowl and forming passages between adjacent plates, each plate being so formed that the width of the spaces between it and its adjacent plate are less at the outer than at the inner end of said spaces, there being apertures through said plates for conveying the skim milk to the skim milk outlet, and means independent of the disks to feed the full milk or other liquid to be separated

simultaneously into all the spaces between the plates.

3. In a centrifugal liquid separator, the combination with a bowl having an outlet for the skim milk, of a liner consisting of a series of superimposed separating plates extending from near the axis of the bowl substantially to the inner periphery of the bowl and forming passages between adjacent plates, each plate being so formed that the width of the spaces between it and its adjacent plate is gradually narrowed from the inner ends of said spaces outward, there being apertures through said plates for conveying the skim milk to the skim milk outlet.

4. In a centrifugal liquid separator, the combination with a bowl having an outlet for the skim milk, of a liner consisting of a series of superimposed separating plates extending from near the axis of the bowl substantially to the inner periphery of the bowl and forming passages between adjacent plates, each plate being so formed that the width of the spaces between it and its adjacent plate is gradually narrowed from the inner ends of said spaces outward, there being apertures through said plates for conveying the skim milk to the skim milk outlet, and means independent of the disks to feed the full milk or other liquid to be separated simultaneously into all the spaces between the plates.

In testimony of which invention, I have hereunto set my hand, at Stockholm, on this 13th day of August, 1909.

ERIK AUGUST FORSBERG.

Witnesses:

TH. WAWRINSKY,
T. DAHLGOIST.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."