

No. 650,068.

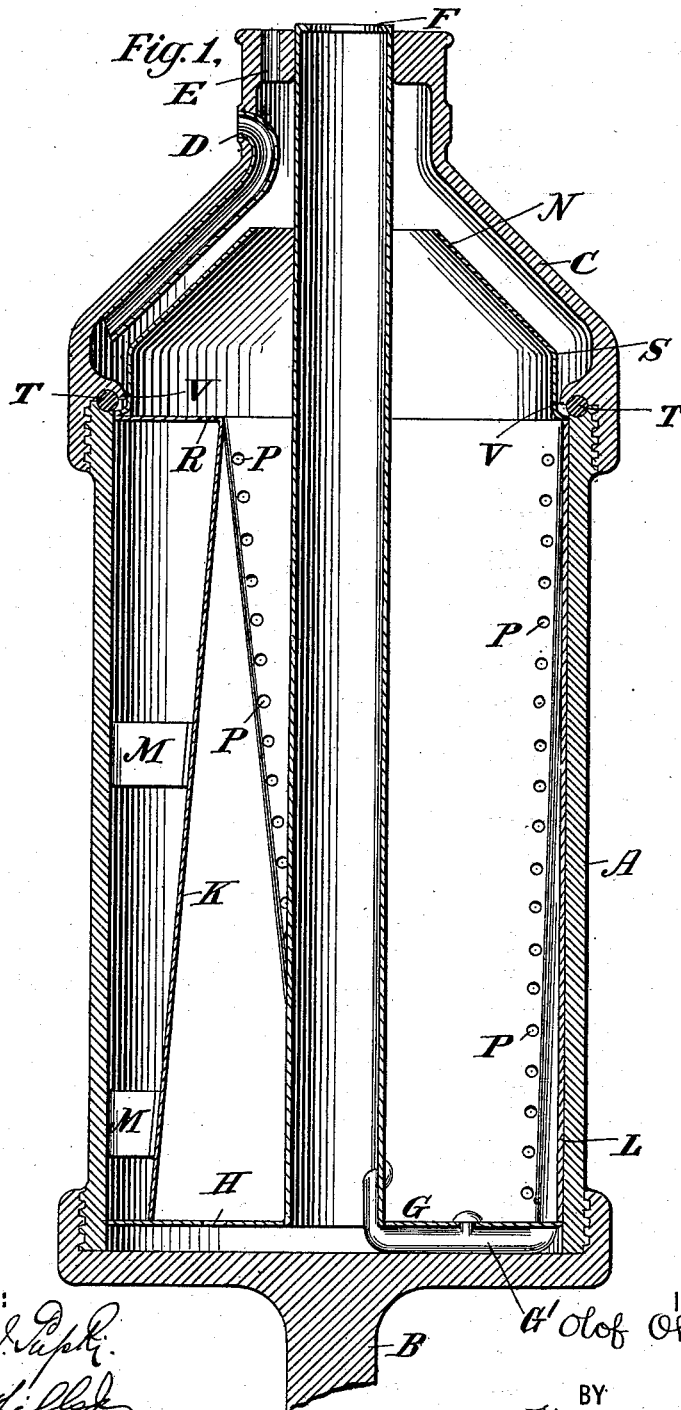
Patented May 22, 1900.

O. OHLSSON.  
CENTRIFUGAL CREAM SEPARATOR.

(No Model.)

(Application filed Dec. 5, 1896.)

5 Sheets—Sheet 1.



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Fig. 2.

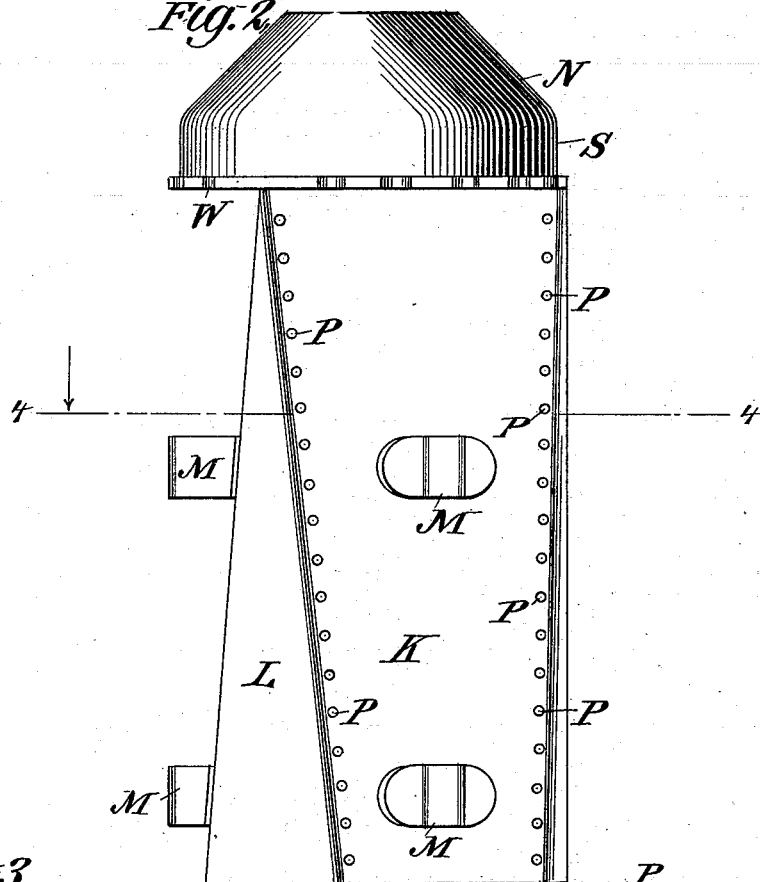
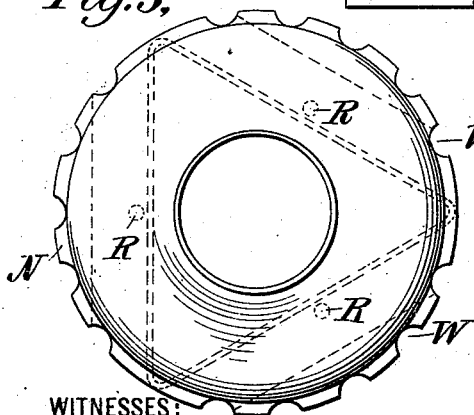


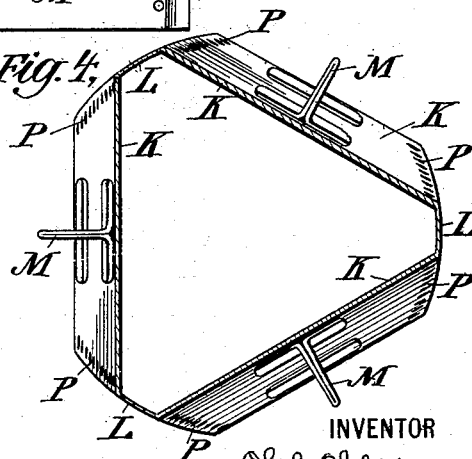
Fig. 3.



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Fig. 4.



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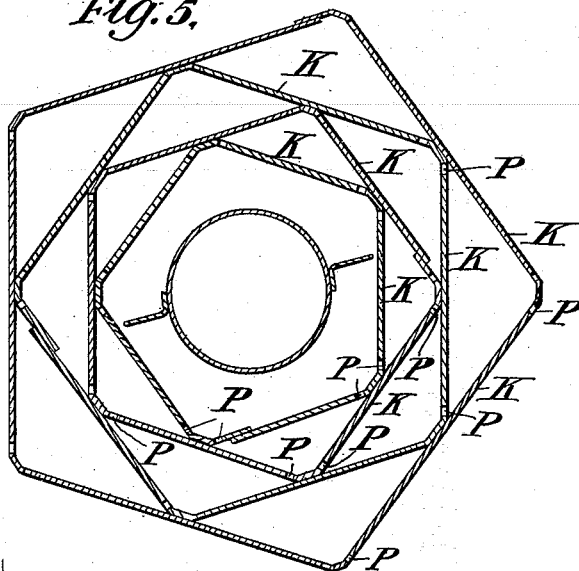
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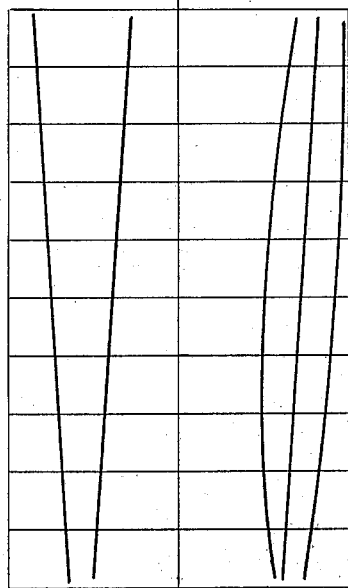
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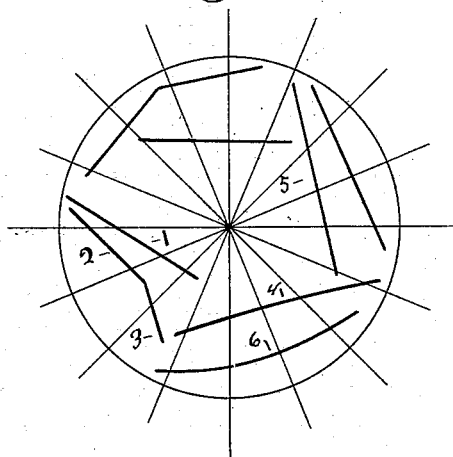
*Fig. 5.*



*Fig. 6.*



*Fig. 7.*



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5 Sheets—Sheet 4.

Fig. 8,

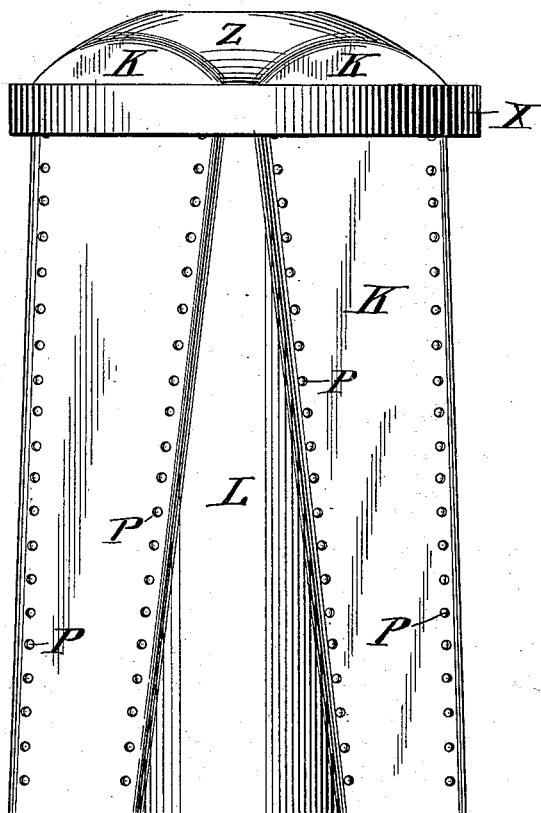
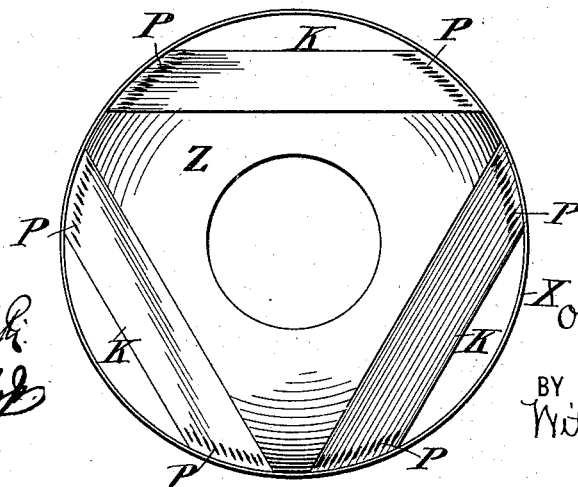


Fig. 9,



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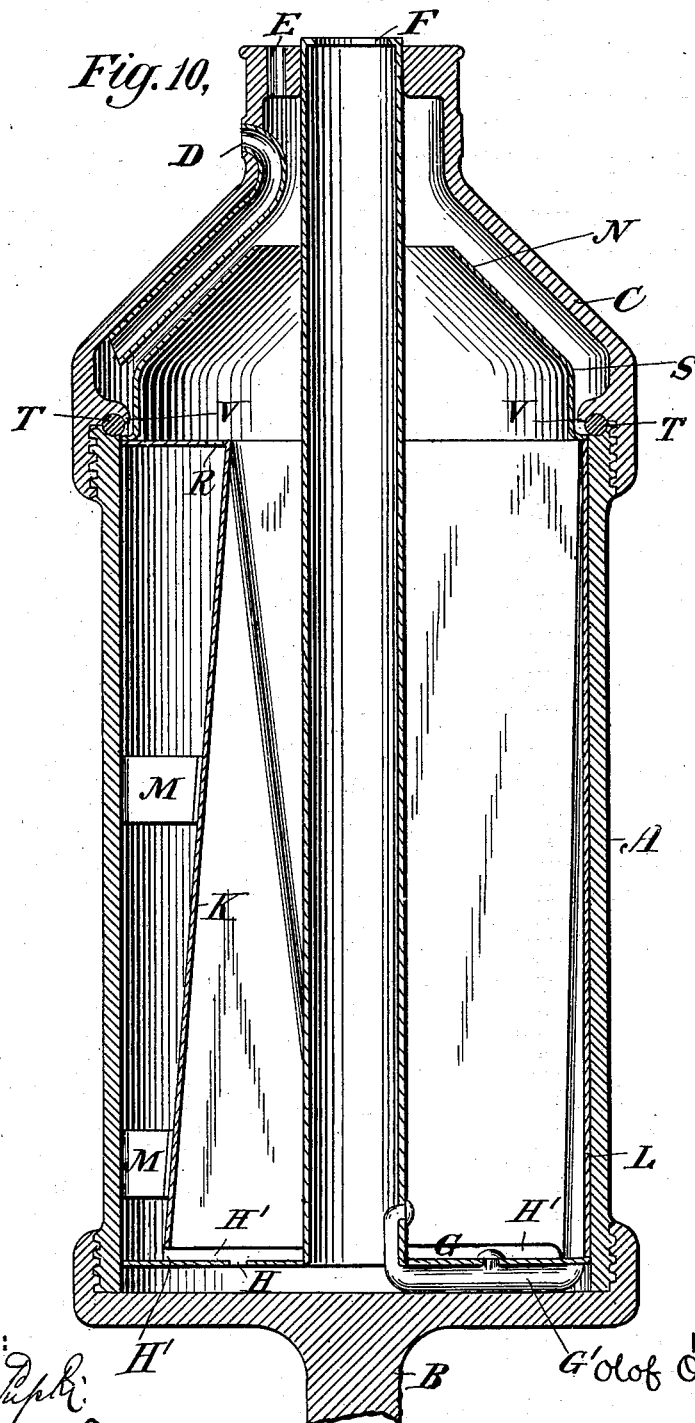
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(Application filed Dec. 5, 1898.)

(No Model.)

5 Sheets—Sheet 5.



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# UNITED STATES PATENT OFFICE.

OLOF OHLSSON, OF NEWARK, NEW JERSEY.

## CENTRIFUGAL CREAM-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 650,068, dated May 22, 1900.

Application filed December 5, 1896. Serial No. 614,599. (No model.)

*To all whom it may concern:*

Be it known that I, OLOF OHLSSON, a citizen of the United States, and a resident of Newark, in the county of Essex and State of New Jersey, have invented certain new and useful improvements in Centrifugal Creaming-Machines, of which the following is a specification.

The present invention has reference to that class of centrifugal creamers in which the body of liquid in the liquid-space of the bowl instead of being left to the sole action of the centrifugal force is more or less interfered with or guided in its movements by the presence of plates or obstructions in said liquid-space; and it has for its object to so modify the character and arrangement of said internal plates or obstructions as to increase the creaming efficiency of the machine, while at the same time simplifying the internal construction and facilitating balancing and cleaning.

The invention consists of the devices and combinations herein set forth.

Heretofore it has been common to employ in the liquid-space of the bowl plates or partitions which are arranged radially. It has also been common to employ in the liquid-space of the bowl plates or partitions which cut obliquely a plane containing the axis of the bowl; but in all such cases such partitions have not cut obliquely a plane passing at right angles through the axis of the bowl. It has also been common to employ internal partitions in the liquid-space of the bowl, which cut obliquely a plane passing at right angles through the axis of the bowl; but in all such cases the said partitions have not cut obliquely a plane containing the axis of the bowl. In the present construction the internal plate or partition or plates or partitions in the liquid-space of the bowl is or are so arranged as to have a substantially-plane portion which cuts obliquely a plane containing the axis of the bowl and also cuts obliquely a plane passing through the axis of the bowl at a right angle.

In the accompanying drawings, which form a part hereof, Figure 1 is a sectional view of a centrifugal creamer embodying my invention in one of its simplest forms. Fig. 2 is a side view of the internal frame of the machine. Fig. 3 is a top view of same, and Fig.

4 a horizontal section on the line 4 4 of Fig. 2. Fig. 5 is a diagrammatic section of the internal frame of another form of machine embodying the invention. Figs. 6 and 7 are diagrams of modified forms of apparatus embodying the invention. Figs. 8 and 9 are side and top views, respectively, of the internal frame of another form of machine embodying my invention. Fig. 10 is a sectional view of still another modification.

A is the centrifugal bowl. It has a suitable support B, through and by means of which it is rotated, and a suitable cover or top piece C, which carries or furnishes the skim-milk outlet D and the cream-outlet E. The full-milk-inlet device is shown at F, G, and H in the drawings. The full milk entering through tube F spreads out in the bottom of the bowl under the false and removable bottom G and rises up through a circle of holes H therein, being delivered there into the separating-chamber of the bowl at a point inside of the plates K and between the cream-wall and the periphery of the bowl. The false bottom G is secured to tube F by a riveted wire G', which also at the same time, as shown, raises the false bottom G above the bottom of the bowl, thus permitting the full milk to flow thereunder, as described.

In the liquid-space of the separating-chamber of the bowl in the form of apparatus shown in Figs. 1 to 4, inclusive, is a removable frame consisting of three guiding-plates K, alternating with three curved pieces L, peripherally connecting the guiding-plates, braces M, and cover or top piece N. Each guiding-plate K is arranged in the liquid-space of the bowl and separates the body of liquid that is radially outside of it from the body of liquid that is radially inside of it, and a substantially-plane portion of each plate cuts obliquely a plane containing the axis of the bowl, as shown by the section of one of the plates K in Fig. 1, and also cuts obliquely a plane passing through the axis of the bowl at a right angle, as shown by the section of all three of the plates K in Fig. 4, which is a sectional view of the internal separating or skimming device or frame of the machine, taken in a plane at right angles to the axis of the bowl. The plates K preferably extend from end to end of the bowl and may, as shown, extend horizontally from pe-

riphery to periphery of the bowl and are slightly inclined to the axis of the bowl and extend, substantially, from top to bottom of the bowl within the liquid-space of the bowl.

5 The peripherally-connecting pieces L are concentric with the bowl and serve to solidly connect the plates together at their peripheral edges into a frame and to keep them fixed with respect to one another. These  
10 pieces may be employed or not and may be varied, as desired. The braces M are to prevent the bulging or bending of the plates under the influence of the centrifugal force. They are secured to the plates, and they im-  
15 pinge against the inner wall of the bowl if and when the plates exhibit any tendency to bend outward under the centrifugal force, and they then prevent further bending. They may be employed or not, as desired. Each  
20 guiding-plate K has openings P along its edges that are nearest to the periphery of the bowl, one series or line of openings along each such edge for the skim-milk. There is also an opening R in the flat under side of  
25 the cover or top piece N at or near the point of each guiding-plate K where it approaches nearest to the axis of the bowl for the cream. The cover or top piece N of the internal frame is of the general conical shape of the  
30 cover C of the bowl, and it has an external circular shoulder S.

The bowl A has at its upper edge a seat for a rubber gasket or ring, as shown in Fig. 1. T is the rubber gasket or ring. The cover C  
35 has on its under edge a seat for the gasket and as a part of same an internal depending collar or lip V. When the cover C is to be screwed onto the bowl, the depending collar V passes down over the shoulder S so closely  
40 to it as to reliably carry down the gasket before it and force the gasket and every part of it to its proper seat between the bowl and the cover C. The gasket cannot remain or  
45 any part of it between the collar V and the vertical portion of the wall of the internal cover N, that constitutes the shoulder S, for there is not space enough left there for it. There is just enough space left to permit of  
50 the passage of the skim-milk.

The operation of the apparatus of Figs. 1 to 4 is as follows: The full milk entering the separating-chamber of the bowl through the openings H at the point described is subjected  
55 there to the centrifugal force. Separation goes on in all parts of this separating-chamber, in the parts radially inside of any one guiding-plate K as well as in the parts radi-  
ally outside of that guiding-plate. The heavier ingredient resulting from the separation  
60 inside of the guiding-plate is deflected by the guiding-plate from the natural (approximately radial) course that it would follow under the sole influence of centrifugal force and is by the double obliquity of the guiding-plate  
65 to the radial lines of the bowl guided obliquely across the plate toward the periphery of the bowl. The lighter ingredient result-

ing from the separation outside of the guid-  
ing-plate under consideration is deflected by  
the guiding-plate from the natural inward  
70 course that it would follow under the sole in-  
fluence of centrifugal force and is guided  
along the length of the plate to the end of the  
plate where the plate approaches nearest to  
the axis of the bowl, and there it passes to-  
75 ward the center of the bowl. Owing to the  
double obliquity of the plates with respect to  
the radial lines of the bowl there will be one  
point of the plate that is nearer than any  
other to the axis of the bowl, and at or near  
80 that point the cream should be released from  
restraint and permitted to flow to the cream-  
wall, and toward that point of release the  
cream separated outside of the plate is guided  
in converging lines. Thus the separated or  
85 partly-separated skim-milk and cream are re-  
spectively guided on opposite sides of the  
guiding-plate in directions that are doubly  
oblique to the radii of the bowl; but the cream  
is guided in lines that tend to converge along  
90 the length of the plate toward a point of the  
plate, whereas the skim-milk is guided in  
lines that do not tend to converge, but that,  
on the contrary, at any given part of the plate  
are substantially parallel to each other and  
95 obliquely approach an edge or an end of the  
plate. The skim-milk from the inner body  
of liquid is thus guided more quickly and  
more directly toward the periphery and with  
less interference with its natural bent under  
100 the influence of the centrifugal force than is  
the cream from the outer body of liquid  
guided toward the center. This increases the  
efficiency of the machine, as does also the con-  
vergence of the cream-lines. Moreover rapid  
105 currents are avoided and a state of compara-  
tive quiescence is maintained in the separa-  
ting-chamber, with a slow general upward  
drift, and the once separated constituents are  
kept from intermixing. The separated skim-  
110 milk collecting at the periphery of the bowl  
rises through the openings W of the rim of  
the internal cover or top piece N and passes  
between collar V and shoulder S and is dis-  
charged through the skim-milk outlet D.  
115

The internal cover or top piece N is closed  
on the under side to the outer spaces outside  
of the guiding-plates (except at R, as de-  
scribed) and is open to the other or inner  
spaces. For the purposes of the broad claims  
120 herein made the cover N is not essential and  
may be present or absent, as desired.

The number of guiding-plates in the liquid-  
space of the bowl may be varied. Thus Fig. 5  
shows an internal skimming device or frame  
125 intended for a large bowl and having four dif-  
ferent inclosing sets of five guiding-plates  
each in horizontal section, like four pentagons  
inscribed one within another, making a strong  
and compact construction. The guiding-  
130 plates K of Fig. 5 each of them cuts obliquely  
a plane containing the axis of the bowl and  
also cuts obliquely a plane passing through  
the axis of the bowl at a right angle. The

guiding - plates may be plane or slightly curved so long as they are substantially plane and have the double obliquity described above, although I prefer in that regard the construction and arrangement shown in Figs. 1 to 5. Fig. 6 shows diagrammatically a sectional view of different forms of plates when viewed in a plane containing the axis of the bowl. In that diagram the outer parallelogram indicates the bowl, the central vertical line its axis, and the horizontal lines its radii. Fig. 7 shows diagrammatically a sectional view of different forms of plates when viewed in a plane at right angles to the axis of the bowl. In that diagram the circle indicates the bowl, its center the axis of the bowl, and the radial lines its radii. While I prefer that the point of the guiding-plate that is nearest to the center should be somewhere midway of its width (as is the case in all the guiding-plates shown in Figs. 1 to 5 and in those numbered 4, 5, and 6 shown in Fig. 7) rather than exactly at one edge or the other, as is the case with the plates numbered 1, 2, and 3 of Fig. 7, still the latter form of guiding-plate could be used with some advantage and without departing from the spirit of my invention so far as concerns the broad claims herein made.

Figs. 8 and 9 show a form of device slightly modified from that shown in Figs. 2, 3, and 4. The stay-plates M are done away with and the internal cover N, as well as its conical upper part and its horizontal lower parts with cream-openings R, is done away with. In Figs. 8 and 9 X is a thin centering-ring to center the upper part of the device in the bowl. Z is a rounded top or cover connecting the rounded or curved tops of the plates K with one another and covering (except centrally) the space inside of the plates K. The spaces outside of the plates K have no cover whatsoever.

Fig. 10 shows a construction like Fig. 1 except that the skim-milk openings P are omitted. The plates K in this instance are slightly raised from the false bottom G, as shown at H'. In this case the skim-milk separated inside the plates passes out at the bottom of the plates.

The use of the doubly-oblique plates or partitions of my invention develops a high skimming efficiency in the device as a whole, permitting of the reduction of the number of partitions to a minimum without reduction in efficiency, and thereby producing a skimming device which while of maintained efficiency is at the same time light in weight, simple in construction, easily washed when removed from the bowl, and readily centered and held while in use in the bowl, and a device which produces little or no churning effect on the cream and develops no deleterious currents, but attains a desirable quiescence with steady slow general drift in the separating-chamber and speedy and efficient removal of the separated ingredients.

Many changes in the form and arrangement and size and degree of obliquity of the guiding-plates might be made without departing from my invention. Two or more frames might be superposed one upon the other within the bowl. In the preferred form of my invention (for instance, as shown in Figs. 1 to 4 and Figs. 8 and 9) the frame encircles the bowl-axis and might be described as composed of circumferentially-alternate sections, first of the faces of a pyramid whose axis coincides with the axis of the bowl, and, second, of parts of a cylinder whose axis also coincides with that of the bowl.

For the purposes of the broad invention and claims the openings P might be omitted so long as the separated skim-milk could properly escape.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a centrifugal separating-machine, the combination with a bowl; of a separating device located in the liquid-space of the bowl and including one or more plates so located and arranged as to have a substantially-plane portion thereof cut obliquely a plane containing the axis of the bowl and also cut obliquely a plane passing through the axis of the bowl at a right angle.

2. In a centrifugal separating-machine, the combination with a bowl; of a separating device located in the liquid-space of the bowl, and including one or more plates so located and arranged as to have a substantially-plane portion thereof cut obliquely a plane containing the axis of the bowl and also cut obliquely a plane passing through the axis of the bowl at a right angle, said separating device having a passage at the lateral edges of said plate or plates.

3. In a centrifugal separating-machine, the combination with a bowl; of a separating device located in the liquid-space of the bowl and including one or more plates so located and arranged as to have a substantially-plane portion thereof cut obliquely a plane containing the axis of the bowl and also cut obliquely a plane passing through the axis of the bowl at a right angle, said separating device having a passage at the lateral edges of said plate or plates, and said bowl having suitable means for feeding it arranged to deliver the liquid to be separated on the inner side of said plate or plates.

4. In a centrifugal separating-machine, the combination with a bowl; of a separating device located in the liquid-space of the bowl and including one or more plates extending substantially from end to end of the bowl and so located and arranged as to have a substantially-plane portion thereof cut obliquely a plane containing the axis of the bowl and also cut obliquely a plane passing through the axis of the bowl at a right angle.

5. In a centrifugal separating-machine, the combination with a bowl; of a separating device located in the liquid-space of the bowl



and including one or more plates extending substantially from end to end of the bowl and so located and arranged as to have a substantially-plane portion thereof cut obliquely a plane containing the axis of the bowl and also cut obliquely a plane passing through the axis of the bowl at a right angle, said separating device having a passage at the lateral edges of said plate or plates.

6. In a centrifugal separating-machine, the combination with a bowl; of a separating device located in the liquid-space of the bowl and including one or more plates extending substantially from end to end of the bowl and so located and arranged as to have a substantially-plane portion thereof cut obliquely a plane containing the axis of the bowl and also cut obliquely a plane passing through the axis of the bowl at a right angle, said separating device having a passage at the lateral edges of said plate or plates, and said bowl having suitable means for feeding it arranged to deliver the liquid to be separated on the inner side of said plate or plates.

7. In a centrifugal separating-machine, the combination with a bowl; of a plurality of internal separating-frames concentrically arranged in the liquid-space of the bowl and encircling the axis thereof, each of said frames having plates each of which has a substantially-plane portion thereof which cuts obliquely a plane containing the axis of the bowl and also cuts obliquely a plane passing through the axis of the bowl at a right angle.

8. In a centrifugal separating-machine the combination with a bowl; of a plurality of internal separating-frames concentrically arranged in the liquid-space of the bowl and encircling the axis thereof, each of said frames having plates each of which has a substantially-plane portion thereof which cuts obliquely a plane containing the axis of the bowl and also cuts obliquely a plane passing through the axis of the bowl at a right angle, said frames having passages at the lateral edges of the plates.

9. In a centrifugal separating-machine the combination with a bowl; of a plurality of internal separating-frames concentrically arranged in the liquid-space of the bowl and encircling the axis thereof, each of said frames having plates each of which has a substantially-plane portion thereof which cuts obliquely a plane containing the axis of the bowl and also cuts obliquely a plane passing through the axis of the bowl at a right angle, said bowl having suitable means for feeding it at one end inside said frame and suitable means for discharging it at the other end.

10. In a centrifugal separating-machine the combination with a bowl; of a plurality of internal separating-frames concentrically arranged in the liquid-space of the bowl and encircling the axis thereof, each of said frames having plates each of which has a substantially-plane portion thereof which cuts obliquely a plane containing the axis of the

bowl and also cuts obliquely a plane passing through the axis of the bowl at a right angle, said frames having passages at the lateral edges of the plates, and said bowl having suitable means for feeding it at one end inside said frame and suitable means for discharging it at the other end.

11. In a centrifugal separating-machine the combination with a bowl; of a plurality of internal separating-frames concentrically arranged in the liquid-space of the bowl and encircling the axis thereof, each of said frames having plates extending substantially from end to end of the bowl each of which has a substantially-plane portion thereof which cuts obliquely a plane containing the axis of the bowl and also cuts obliquely a plane passing through the axis of the bowl at a right angle.

12. In a centrifugal separating-machine the combination with a bowl; of a plurality of internal separating-frames concentrically arranged in the liquid-space of the bowl and encircling the axis thereof, each of said frames having plates extending substantially from end to end of the bowl each of which has a substantially-plane portion thereof which cuts obliquely a plane containing the axis of the bowl and also cuts obliquely a plane passing through the axis of the bowl at a right angle, said frames having passages at the lateral edges of the plates.

13. In a centrifugal separating-machine the combination with a bowl; of a plurality of internal separating-frames concentrically arranged in the liquid-space of the bowl and encircling the axis thereof, each of said frames having plates extending substantially from end to end of the bowl each of which has a substantially-plane portion thereof which cuts obliquely a plane containing the axis of the bowl and also cuts obliquely a plane passing through the axis of the bowl at a right angle, said frames having passages at the lateral edges of the plates, and said bowl having suitable means for feeding it at one end inside said frame and suitable means for discharging it at the other end.

14. In a centrifugal creaming-machine, the combination, substantially as described, with a bowl and a cover adapted to be secured to the bowl and a suitable rubber gasket and seat for same, the cover having a depending collar V, of an internal skimming device or frame having a suitable cover or top piece, said internal cover having the shoulder S, whereby the rubber gasket is readily and reliably forced to its proper seat and the parts are reliably secured together for use.

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

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Witnesses:

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