No. 708,730. Patented Sept. 9, 1902.

C. B. PHILLIPS.

CREAM SEPARATOR.

Application filed Aug. 12, 1901.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1.

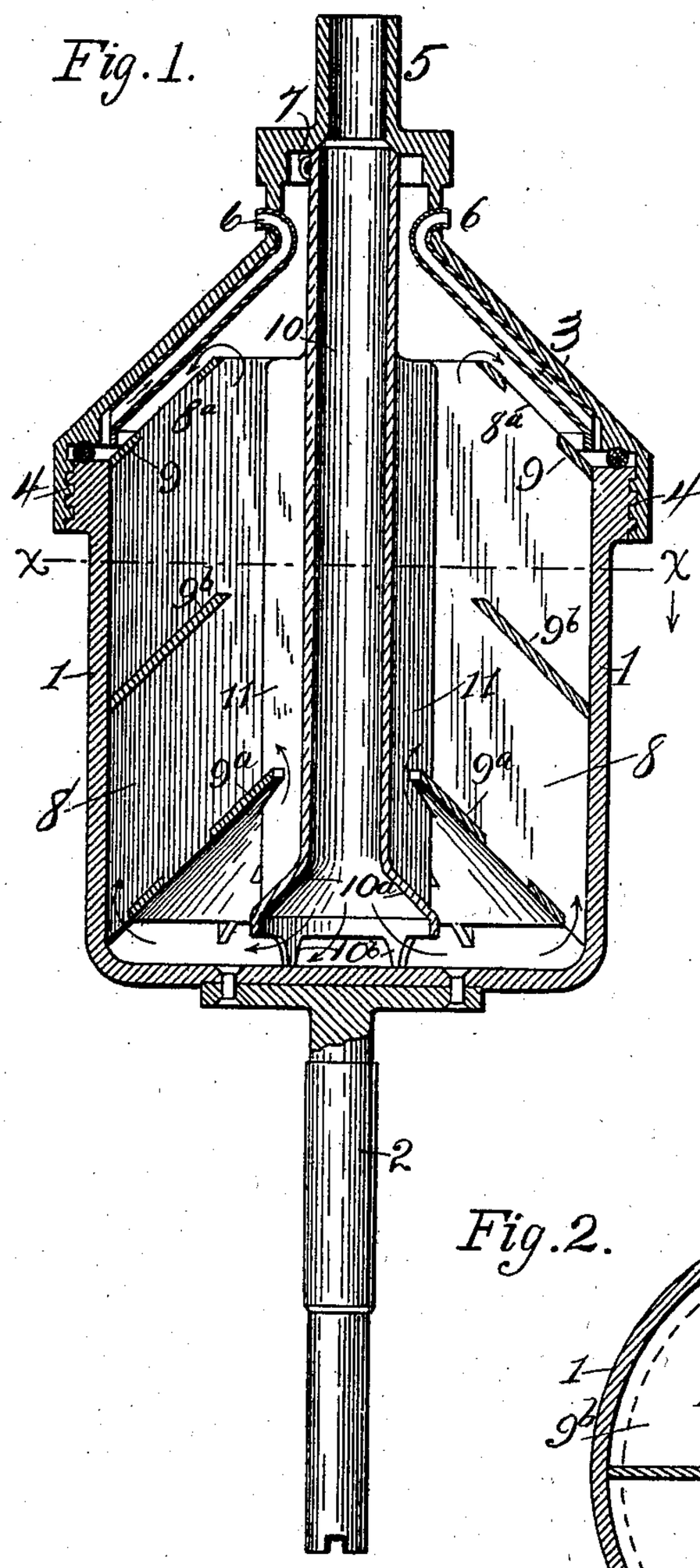


Fig. 3.

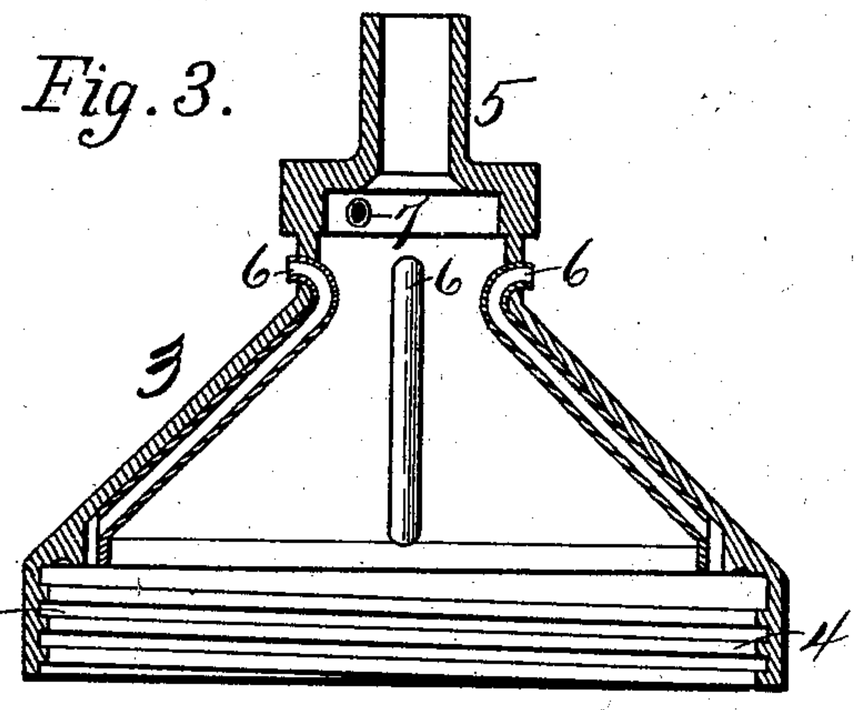


Fig. 4.

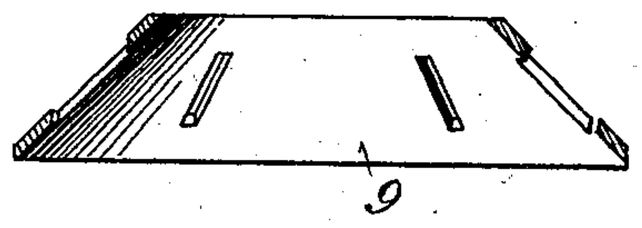
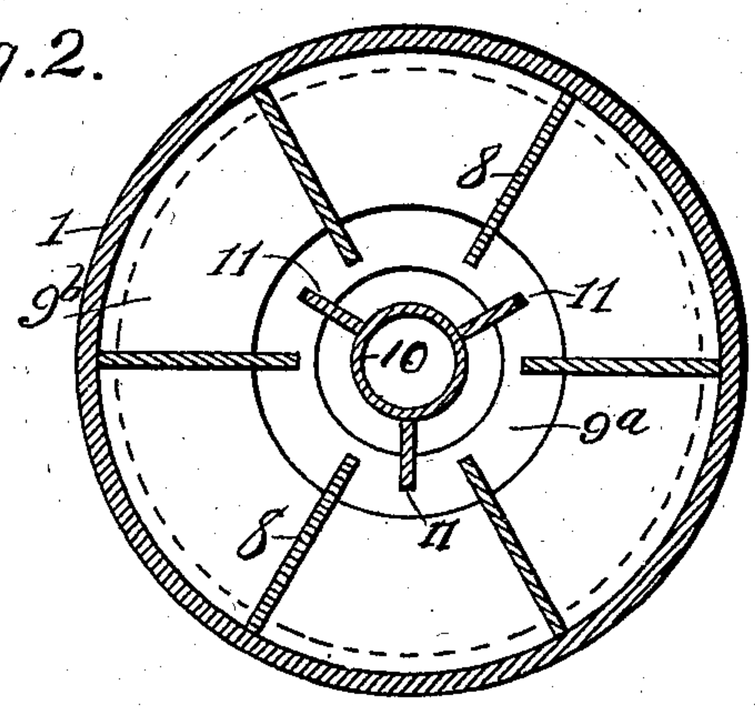


Fig. 2.



WITNESSES:

David C. Walter

L. E. Brown.

INVENTOR:

Charles B. Phillips,

By his Attys.

Munn & Co.

No. 708,730. Patented Sept. 9, 1902.

C. B. PHILLIPS.

CREAM SEPARATOR.

(Application filed Aug. 12, 1901.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 5.

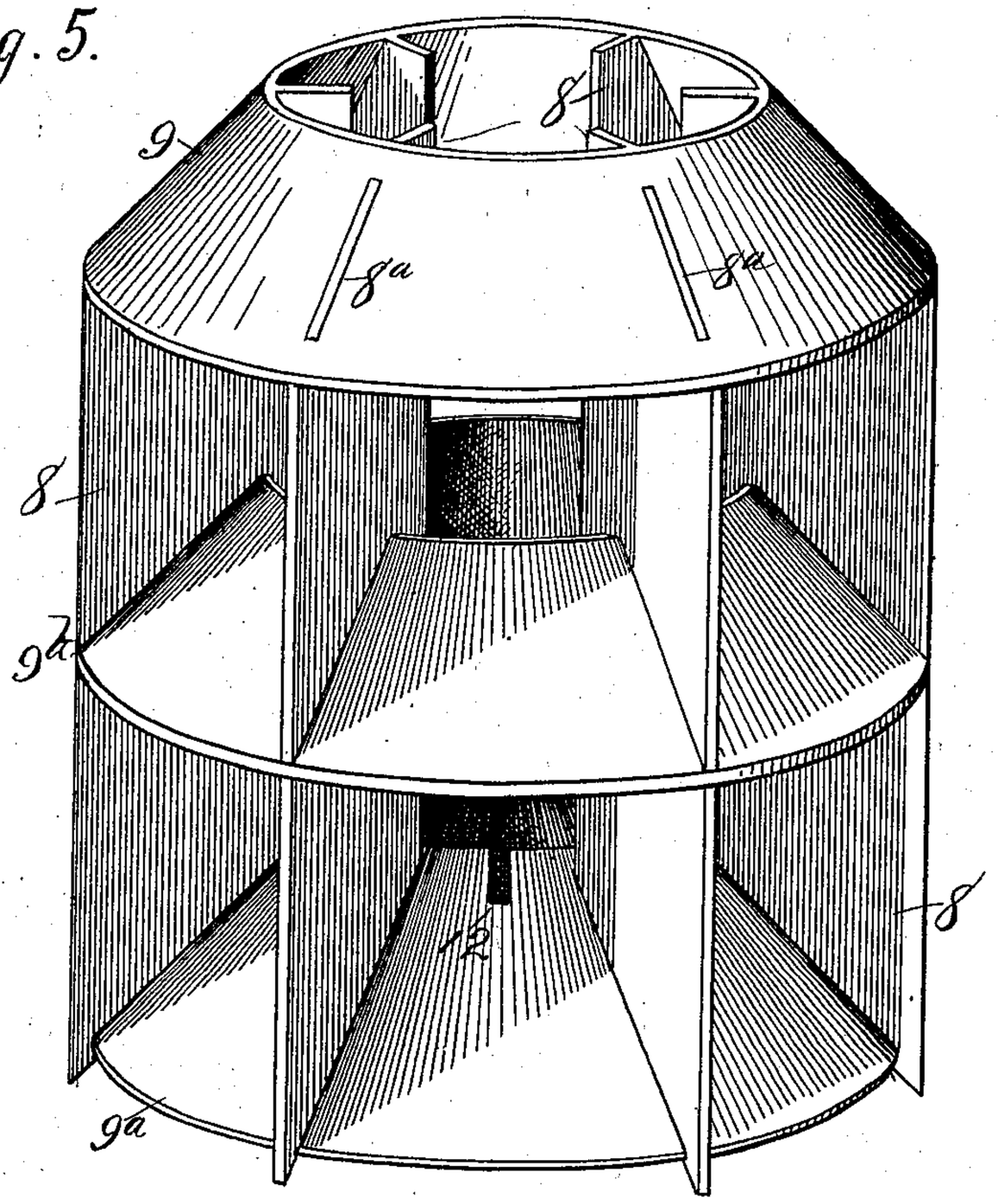
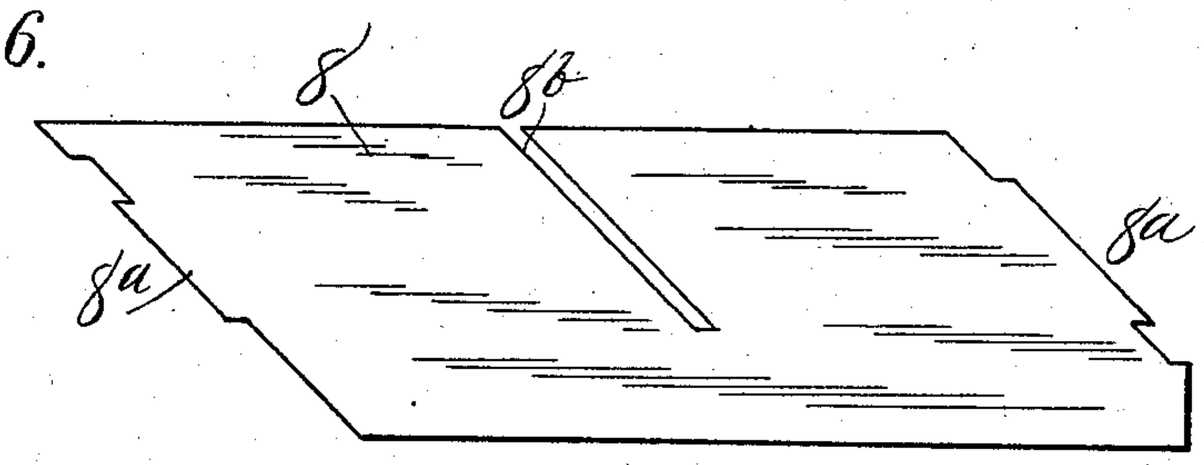


Fig. 6.



WITNESSES:
David C. Walter
L. E. Brown.

INVENTOR.
Charles B. Phillips,
By his Attys,
F. Hudson Hill.

UNITED STATES PATENT OFFICE.

CHARLES B. PHILLIPS, OF BLISSFIELD, MICHIGAN.

CREAM-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 708,730, dated September 9, 1902.

Application filed August 12, 1901. Serial No. 71,729. (No model.)

To all whom it may concern:

Be it known that I, CHARLES B. PHILLIPS, a citizen of the United States, residing at Blissfield, in the county of Lenawee and State of Michigan, have invented certain new and useful Improvements in Cream-Separators; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

My invention relates to a machine for the centrifugal separation of cream from milk; and its object is to provide a strong, simple, and efficient device which shall be durable, accurate, and readily accessible in all of its parts for cleansing.

A further object of my invention is to utilize the inlet-tube, hereinafter referred to as a "shaft" or "axle," for the top of the separator-bowl, hereinafter referred to.

My device further consists in the details of arrangement and construction hereinafter pointed out.

I attain the objects above mentioned by means of the devices and arrangement of parts hereinafter described and shown, and illustrated in the accompanying drawings, in which—

Figure 1 is a central sectional elevation of a separator-bowl and its contents, showing its spindle and its upper bearing independently of the supports for the bowl and independently of the bowl-driving mechanism, which are not shown or described and which constitute no part of this invention. Fig. 2 is a sectional top plan view of the same, taken on line $x\ x$, Fig. 1. Fig. 3 is a central vertical sectional elevation of the cap of the bowl hereinafter referred to detached; Fig. 4, a like view of the top deflector-plate hereinafter referred to. Fig. 5 is a perspective view of my conical and radial deflector-plates assembled in proper relation to each other and rigidly and permanently secured together, and Fig. 6 is an elevation of the side of one of my radial wings or plates detached.

Like numerals of reference indicate like parts throughout the drawings.

In the drawings, 1 is a bowl mounted upon and secured at bottom to a spindle 2. The bowl is provided with a cap or cover 3, of conical form, which cap is screwed upon the top of the bowl, as at 4. The top of the cap or cover is extended upwardly in tubular form, as at 5, serving as a feed-inlet for the milk to be separated and as a shaft or axle for the top of the bowl, this part being suitably journaled in a yoke or other bearing on top of the machine. (Not shown in the drawings.) The removable cap has the usual outlets for the milk, as at 6, and for the cream, as at 7.

Within the cavity of the bowl is a device made up of strips and pieces of sheet metal rigidly secured together, which device exactly fits the interior of the bowl and which may be slipped out for cleansing when the cap is removed. This device removed from the bowl is shown in perspective in Fig. 5. 8 8 are equidistant radial vertical wings secured at top to the upper conical deflector or cone 9 and at bottom to the lower conical deflector or cone 9^a. At their upper and lower ends each of the pieces 8 is provided with short projections 8^a, which fit into corresponding slots in the upper and lower conical deflectors or cones. 9^b is an intermediate conical deflector or cone which fits in the inclined slots 8^b, cut into the outer margins of the pieces 8. The parts 8 9 9^a 9^b being assembled as here described are brazed or soldered together, so that the device illustrated in Fig. 5 is extremely solid and rigid. When this device is in place within the bowl, the margins of the radial wings and of the upper and intermediate conical deflectors or cones are in contact with the inner wall of the bowl. Between the outer margin of the lower deflector and the inner wall of the bowl is a narrow circumferential space. The inner margins of the radial wings do not meet, and there is left a vertical circular opening, through the center of which the down-tube 10 passes. At top this tube rests against the under side of the cap in alinement with the tubular part 5. At bottom the tube 10 flares, as at 10^a, and is supported on short legs 10^b, resting upon the bottom of the bowl, thus leaving ample radial openings at the bottom of the tube for the passage of milk from the

tube out into the bowl. Projecting radially from the sides of the tube 10 are narrow strips of metal 11, which engage radial slots 12, cut in the inner margin of the deflector or cone 9^a, which extends inwardly farther than the margins of the other two deflectors.

To assemble the parts, the tube 10 is first placed in position. The part illustrated in Fig. 5 is next slipped downwardly into the bowl, the strips 11 entering the slots 12 in the lower deflector. The cap 3 is now screwed into place, and the bowl being properly mounted and connected up in its machine the device is ready for operation. The parts being assembled and the bowl with its contained parts being revolved at the usual high velocity, the milk to be treated is fed into the tubular part 5, down through the pipe 10, and passes out into the bowl through the openings between the legs 10^b. The heavier constituents of the milk seek the passage between the wall of the bowl and the outer margin of the deflector or cone 9^a, and thence follow the wall of the bowl upwardly until they come in contact with the intermediate deflector or cone 9^b. Here the milk is caused to flow inwardly along the under side of the deflector or cone 9^b until its inner margin is reached. Here the milk is again permitted to flow outwardly, and at this point another pronounced separation of the cream and milk takes place, the cream being here carried into the cream-zone, where it remains. The milk pursuing its course again follows the inner wall of the bowl upwardly until it encounters the top deflector 9. Now the milk is again turned inwardly toward the center of the bowl until it reaches the inner margin of the upper deflector. Any cream entrained with the milk is again carried into the cream-zone and is finally separated from the milk, the latter passing outwardly into the outlet-tubes 6. Meanwhile the cream, which by reason of its lesser gravity has remained near the center of the bowl, flows upwardly and finally escapes through the outlet tube or tubes 7. The radial wings or vanes 8 11 perform the double office of supporting the parts rigidly in operative relation to each other and of carrying the fluid around with the bowl, preventing the fluid from lagging or taking different rates of revolution in different zones of the bowl. These radial wings also serve in some degree as agitators or beaters, aiding in the process of the separation of the milk and cream particles.

Having described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a cream-separator, the combination with a bowl, of a vertical series of cones, a plurality of which extend to the wall of said bowl, and of a cone stopping short of said wall to form a passage-way between the edge of said cone and the wall of the bowl.

2. In a cream-separator, the combination with a bowl of a vertical series of cones, the upper and intermediate cones of which extend to the interior wall of the bowl, and of a bottom cone which stops short of the wall of said bowl whereby there is formed an annular passage-way.

3. In a cream-separator, the combination of a series of hollow truncated cones arranged one above the other, a series of vertical radial wings rigidly connected with and supporting said cones, a separator-bowl, means for normally securing said series of cones and radial wings in operative relation within said bowl, the outer and larger edge of the upper and the intermediate truncated cones being in direct contact with the inner wall of the separator-bowl to force the material to travel inward as it rises past each of said cones, the lowermost cone of the series having a passage-way between its outer edge or margin and the interior wall of the separator-bowl.

4. In a cream-separator, the combination of a bowl, a series of hollow truncated cones arranged one above the other, a series of vertical radial wings rigidly connected with and supporting said truncated cones, said radial wings and upper and intermediate cones being in contact with the inner wall of the separator-bowl, the lowermost truncated cone having a space between its edge and the wall of said bowl, and having its inner edge extended toward the center of the bowl beyond the inner edges of the upper and intermediate cones.

5. In a cream-separator, the combination of a series of deflecting hollow truncated cones arranged one above the other, a series of vertical radial wings rigidly connected with and supporting said cones, a separator-bowl, means for normally securing said series of cones and radial wings in operative relation within said bowl, the outer and larger edge of the upper and the intermediate truncated cones being in contact with the inner wall of the separator-bowl, the lowermost cone of the series having a passage-way between its outer edge or margin and the interior wall of the separator-bowl, and a down-feed tube disposed axially of said bowl.

6. In a cream-separator, a separator-bowl, a series of inclined cones arranged one above the other within said bowl, each of said cones above the lowermost deflector having its outer margin or edge in removable contact with the inner wall of the separator-bowl, and the lowermost cone having its outer edge or margin out of contact with the inner surface of the bowl to provide a space between the bowl and said outer edge for the passage of milk.

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

CHARLES B. PHILLIPS.

Witnesses:
F. M. DOTSON,
L. E. BROWN.