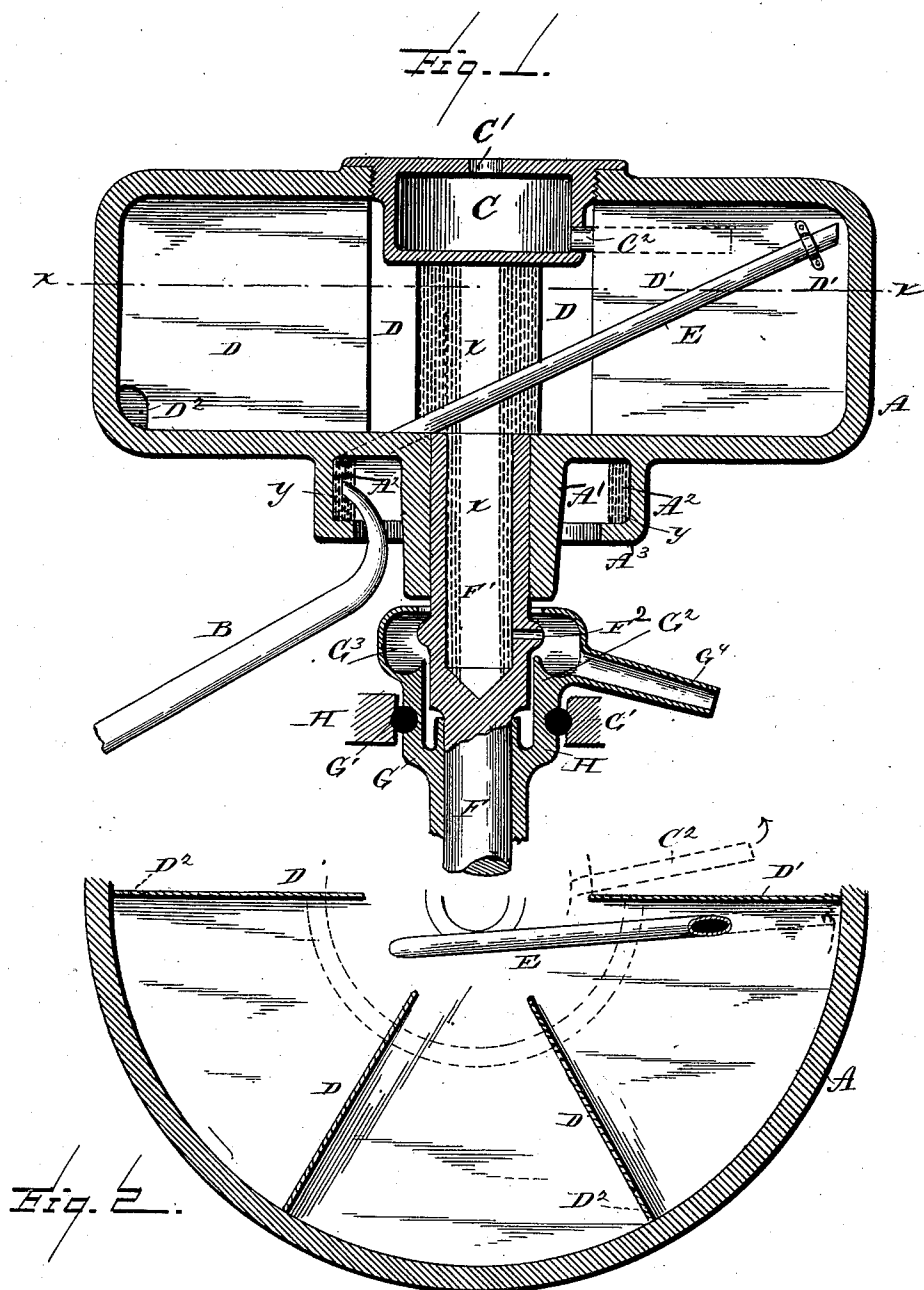


(No Model.)

C. A. BACKSTROM.  
CENTRIFUGAL LIQUID SEPARATOR.

No. 368,045.

Patented Aug. 9, 1887.



Witnesses

L. C. Mills,  
W. D. Duwall

Inventor

C. Axel Backstrom  
By his Attorney

E. B. Stocking

# UNITED STATES PATENT OFFICE.

C. AXEL BACKSTROM, OF TRENTON, NEW JERSEY, ASSIGNOR TO THE BACKSTROM CENTRIFUGAL SEPARATOR COMPANY, OF NEW JERSEY.

## CENTRIFUGAL LIQUID-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 368,045, dated August 9, 1887.

Application filed January 15, 1887. Serial No. 224,463. (No model.)

*To all whom it may concern:*

Be it known that I, C. AXEL BACKSTROM, a citizen of the United States, residing at Trenton, in the county of Mercer, State of New Jersey, have invented certain new and useful Improvements in Centrifugal Liquid-Separators, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention has relation to centrifugal machines of that class which are designed for the separation of liquids having constituents of different specific gravity, and although herein specified as for the purpose of separating cream from milk, the invention is not limited to any particular use of the same.

The object of the invention is, among other things, to produce a centrifugal machine of the class described which shall be adapted for the unobstructed passage from the separating bowl or chamber of the constituent having the lightest specific gravity—that is, solely by action of gravity.

Another object in view is to produce a machine all the parts of which are accessible for cleaning purposes.

Other objects and advantages will appear in the following description, and the novel features of the invention will be particularly pointed out in the claims.

Referring to the drawings, Figure 1 is a central vertical section of a separating-bowl and its spindle and their accessories constructed in accordance with my invention. Fig. 2 is a horizontal section on the line *xx* of Fig. 1.

Like letters indicate like parts in both figures.

A represents the bowl of a centrifugal machine, which is provided at its bottom with a central depending hub, A', and an annular receptacle, A<sup>2</sup>, embracing the hub—that is, formed as a depending flange from the bottom—and provided with an inwardly-projecting flange, A<sup>3</sup>, terminating a distance from the hub A' sufficient for the introduction of a skimming-pipe.

I designate the part just described as a "discharge-receptacle," because it is intended for the reception of the skimmed milk, which is discharged from the bowl in a manner herein-after described. At the top of the bowl A is a supply-vessel, C, which in this instance is

provided with an aperture, C', and is screw-threaded or otherwise set into the bowl, and has a discharge-pipe, C<sup>2</sup>, projecting radially into the bowl.

D represents a series of vertical blades, all of which, excepting one, D', have a single port, D<sup>2</sup>, the port D<sup>2</sup> of one blade being at the lower outer corner thereof and the port of the next succeeding blade being at the upper outer corner thereof, and so on throughout the entire series, the blade D', however, as above stated, having no port whatever.

The supply-pipe C<sup>2</sup> from the supply-vessel C is arranged at one side of the imperforate blade D'. A discharge-pipe, E, is arranged with its receiving end near the inner wall and top of the bowl at the opposite side of the imperforate blade D', to which it is soldered or otherwise secured, while its delivery end communicates with the discharge-receptacle A<sup>2</sup>. The discharge-pipe E passes at one side of the center of the drum, as clearly shown in Fig. 2.

F represents the bowl-spindle, and it is hollow, as at F', so as to form a chamber communicating with the bowl and depending below the inner surface of its bottom, and is provided with a discharge-port, F<sup>2</sup>. The hollow spindle constitutes a chamber which has no other outlet than the port F<sup>2</sup>, so that the action of gravity alone will fill (or keep partly filled) the same with cream, and the weight of the cream collected therein will force the same out of the discharge-port without necessarily requiring any other or extraneous means for that purpose.

I have herein described the spindle F as a hollow spindle, and I desire it understood as meaning a spindle having a chamber, as F', in its upper end, the solid contiguous lower portion of the spindle serving as the bottom of said chamber. In this manner I distinguish my spindle from those hitherto employed, each of which was hollow throughout the entire length thereof and delivered a liquid longitudinally therethrough.

G represents the guide or bearing for the spindle, and is retained in position by a rubber or other elastic or yielding cushion, G', embracing the bearing and resting in a portion, H, of any suitable frame-work. The bearing G is extended upwardly, as at G<sup>2</sup>, and

is otherwise constructed at its top in the form of a cream-receiver,  $G^3$ , having a discharge-spout,  $G^4$ . The discharge-orifice of the chamber or hollow portion  $F^7$  of the spindle communicates with the cream-receiver  $G^3$ .

This being the construction, the operation of my invention is as follows: Milk being supplied to the vessel C continuously in accordance with the discharge of cream and milk from the bowl, there is produced during the rotation of the bowl a current from the discharge-pipe  $C^2$  toward the next vertical blade in the series, which is provided with a port,  $D^2$ , through said port to the next blade, and through its port at its top, and so on through the series, the current passing from the top to the bottom and from the bottom to the top of the bowl until it impinges against the imperforate blade  $D'$ , when the milk (from which, during its passage through the bowl, the cream has been separated and formed in an annular body,  $x$ , at the center of the bowl) passes into the receiving end of the discharge-pipe and is delivered into the discharge-receptacle  $A^2$ , from which it is skimmed by the pipe B during the rotation of the bowl. Centrifugal force causes the skimmed milk in the receptacle  $A^2$  to assume an annular form, as indicated by the dotted lines Y. As soon as the annular body of cream reaches the point of intersection of the hollow shaft with the bottom of the bowl it falls down the inner wall thereof, and finally is discharged through the port  $F^2$  into the cream-receiver  $G^3$ , and from thence through the pipe  $G^4$  into any suitable receptacle. Now, it will be noticed that the supply-vessel C may be removed from the bowl and that the latter is accessible in all its parts for cleaning purposes, as also is the hollow spindle, and by lifting the bowl and spindle from its bearing the cream-receiver, formed as a part of the latter, is also accessible for cleaning purposes; and, finally, the discharge-vessel, being arranged outside of the bowl, although attached thereto or formed as a part thereof, is also more readily accessible for cleaning purposes than if formed within the bowl.

I deem an unobstructed delivery of the cream laterally by the port  $F^2$  through the hollow shaft one of the essential features of this invention, and in this regard I do not limit my invention to a use of the particular blades or to the particular milk-discharge embodied therein, in this instance, as other well-known constructions for the primary separation of the cream from the milk may be embodied in the bowl, so long as the cream forms an annular body near the center of the bowl.

What I claim is—

1. In a centrifugal machine, a separating bowl or chamber having an outer annular discharge-receptacle, and a discharge-pipe extending from near the inner wall of the bowl or chamber and communicating with said receptacle, and the depending chambered spindle provided with a lateral discharge-port, substantially as specified.

2. In a centrifugal machine, a separating bowl or chamber having an outer annular discharge-receptacle, and a discharge-pipe extending from near the inner wall of the bowl or chamber and communicating with said receptacle, and a depending chambered spindle provided with a lateral discharge-port, in combination with a skimming-pipe, substantially as specified.

3. In a centrifugal machine, a separating bowl or chamber having an outer annular discharge-receptacle, and a discharge-pipe extending from near the inner wall of the bowl or chamber and communicating with said receptacle, and a depending chambered spindle provided with a lateral discharge-port, in combination with a cream-receiver embracing the spindle and provided with a discharge-pipe, substantially as specified.

4. In a centrifugal machine, the combination of a separating bowl or vessel having a series of vertical blades, one of which is imperforate, an outer annular discharge-receptacle, and a discharge-pipe communicating therewith, with the depending chambered spindle communicating with the bowl and provided with a discharge-port, and a receptacle embracing the spindle and having a discharge-pipe, substantially as specified.

5. The separating-bowl  $A'$ , having at its bottom the hub  $A'$  and the depending annular inwardly-flanged discharge-receptacle  $A^2$ , and a pipe, B, arranged within and at one side of the center of the bowl to communicate with the said receptacle, substantially as specified.

6. The combination, with the bowl A, having the vertical blades D, each provided with a port,  $D^2$ , and the imperforate blade  $D'$ , of a discharge-pipe, E, and a depending chambered spindle, F, having the lateral discharge-port  $F^2$ , substantially as specified.

7. In a centrifugal machine, the combination, with the separating-bowl, of a depending chambered spindle, each having unobstructed communication with the other and each having a discharge-opening, that of the spindle being laterally disposed, whereby an annular body of a lighter constituent may be delivered by gravity from the bowl directly into the spindle, substantially as specified.

8. The combination, with the bowl of a centrifugal machine, of a depending chambered spindle having unobstructed communication with that part of the bowl into which a lighter constituent of a liquid is collected by the action of centrifugal force in separating it from a heavier constituent, and having a discharge-port extending laterally through the wall of the spindle, substantially as specified.

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

C. AXEL BACKSTROM.

Witnesses:

E. B. STOCKING,  
W. SARGENT DUVAL.