E. J. HOUSTON & E. THOMSON,

Centrifugal Creamer.

No. 239,659 Patented April 5, 1881.

FIG. 1.

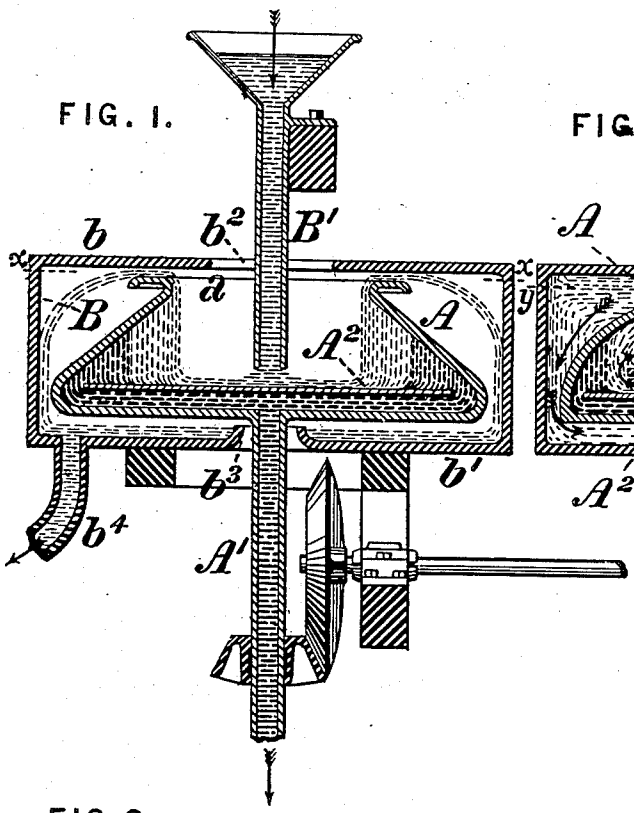


FIG. 2.

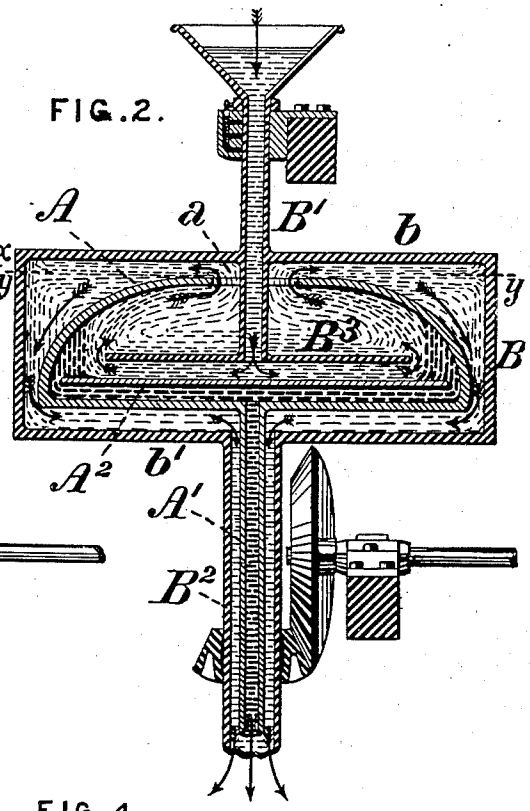


FIG. 3.

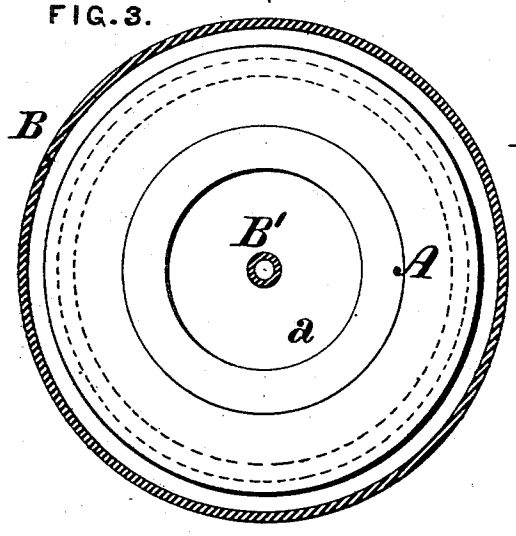
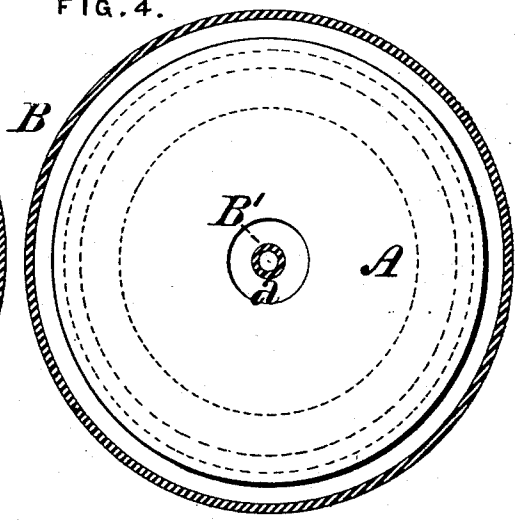


FIG. 4.



WITNESSES.

Robert A. Tripple

H. E. Everding

INVENTORS.

Edwin J. Houston,

Elihu Thomson,

by J. Thornton Bell,

atty.

UNITED STATES PATENT OFFICE.

EDWIN J. HOUSTON AND ELIHU THOMSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNORS TO THEODORE BERGNER, OF SAME PLACE.

CENTRIFUGAL CREAMER.

SPECIFICATION forming part of Letters Patent No. 239,659, dated April 5, 1881.

Application filed October 29, 1877.

To all whom it may concern:

Be it known that we, EDWIN J. HOUSTON and ELIHU THOMSON, both of the city and county of Philadelphia, in the State of Pennsylvania, have jointly invented certain new and useful Improvements in Centrifugal Separators, of which improvements the following is a specification.

Our invention relates to machines of the class in which the separation of the lighter and heavier constituents of liquids or semi-fluids is effected by the action of centrifugal force; and our improvements are designed to provide means by which the process of centrifugal separation may be extended to novel applications, and may be carried on continuously and effectively in an apparatus of simple and economical construction and mode of operation.

To these ends our improvements consist in the combination of a rotating separating-vessel having a solid or imperforate periphery and an upper and lower discharge-opening, in which vessel the separation of the liquid is effected, with an inclosing-case which receives, after the operation of separation, the lighter ingredients or constituents of the liquid, the lighter and the heavier ingredients being separately and continuously delivered to suitable receptacles.

The improvements claimed are hereinafter more fully set forth.

In the accompanying drawings, Figures 1 and 2 are vertical central sections through centrifugal separators embodying our improvements, the inclosing-cases being, respectively, fixed and movable; and Figs. 3 and 4 are horizontal sections through the same at the lines $x\,x$ of Fig. 1 and $y\,y$ of Fig. 2, respectively.

To carry out our invention we provide a separating-vessel, A, which is swelled outward toward its base, in form substantially of either a frustum of a cone or segment of a sphere, and is secured firmly upon a tubular vertical axis or shaft, A′, to which rapid rotation is imparted by gearing or bolts in the ordinary manner. The periphery or body of the vessel A is solid or imperforate throughout, and the vessel is provided with a central opening or mouth, a, at top, and a central opening in its bottom corresponding in diameter with the bore of the shaft A′.

A horizontal deflecting-plate, A^2, is secured within the vessel A, a short distance above its bottom, the diameter of said plate being such that the width of the annular space between its periphery and the body of the vessel may be about equal to the distance between the plate and the bottom of the vessel.

A tight cylindrical case, B, concentrically incloses the separating-vessel A, said case being closed at its ends by a cap, b, and bottom plate, b', respectively, and being either secured to a fixed support or rotating with the vessel, as may be preferred. In the instance of a fixed case, as shown in Figs. 1 and 3, a central opening, b^2, is formed in the cap b, the diameter of which opening must be less than that of the mouth a of the separating-vessel, so as to prevent the escape of liquid, and a smaller central opening, surrounded by an upturned flange or rim, b^3, is formed in the bottom plate, b', for the free passage of the shaft A′.

A discharge-tube, b^4, is connected to any convenient portion of the bottom plate, b', and serves to lead off the lighter separated ingredients.

The liquid to be treated is fed to the separating-vessel through a central supply-tube, B′, passing through the opening b^2 in the cap b of the case and through the mouth a of the separating-vessel, and terminating a short distance above the deflecting-plate A^2.

In the rotating case shown in Figs. 2 and 4 the discharge-tube b^4 is replaced by a tubular shaft, B^2, communicating at top with the case and concentric with the shaft A′, and the supply-tube B′, which is secured to and rotates with the separating-vessel and case, terminates at bottom in the center of a supplemental deflecting-plate, B^3, located a short distance above the main deflecting-plate A^2, and of smaller diameter than the same.

The arrangement of a case rotating with the separating-vessel is designed more particularly for operations in which a high rate of rotative speed is necessary or advisable, and is specially applicable to the rapid clearing of muddy water for paper, dye, or chemical

works, and the continuous separation of cream from milk.

In the operation of our improvements the liquid to be treated is fed to the separating-vessel A in a continuous stream, graduated in quantity, as required, through the supply-tube B′, and is received upon the deflecting-plate A^2, the interposition of which prevents its passage directly to the opening of the lower tubular shaft. Under the influence of the centrifugal force developed by the rapid rotation of the vessel A the denser ingredients or constituents of the supplied liquid accumulate at and toward the greatest diameter of the vessel A, as shown by the heavy dots in the drawings, while the lighter ingredients or constituents, arranging themselves nearer the axis of rotation, as shown by the light dots, are discharged around the mouth *a* of the vessel into the case B, from which they are withdrawn into a suitable receptacle through the discharge-tube b^4, or through the tubular shaft B^2, according as a fixed or a rotating case is employed. The denser ingredients or constituents pass under the deflecting-plate A^2 into the tubular shaft A′, from which they are removed from time to time, as required, by a pump. We thus provide a separator having a single source of supply and two distinct discharges, and susceptible of continuous operation without interference of the supplied liquid with the separated products. The supplemental deflecting-plate B^3 serves to effectually separate the incoming liquid from the separated lighter ingredients passing upward to be discharged over the mouth of the vessel.

It will be obvious that in the operation of our invention stoppages of the apparatus for the insertion and removal of material, as in ordinary centrifugal machines, are unnecessary, and the operation of separation may be continuously carried on until any desired quantity of liquid has been treated.

Our improvements are further applicable to many instances in which decantation, filtering, or straining has hitherto been the only practicable mode of treatment—as, for example, in clay elutriation, the clarifying of liquids, such as wines, beer, varnishes, or oil, the separation of semi-solid fats from oil, &c.—and are particularly adaptable to cases in which, from the nature of the materials dealt with, centrifugal machines of the ordinary type cannot be employed—for example, in the separation of two mingled liquids of different densities, one from the other, as in creaming milk.

We claim as our invention and desire to secure by Letters Patent—

1. The combination, in an apparatus for the centrifugal separation of materials of different densities, of a rotating separating-vessel having a single supply and two separate discharge openings, an inclosing-case communicating with one of the discharge-openings of said vessel, and a tubular shaft upon which the separating-vessel is mounted, and which communicates with the other discharge-opening thereof, substantially as set forth.

2. The combination, in an apparatus for the centrifugal separation of materials of different densities, of an open-mouthed separating-vessel mounted upon and rotating with a tubular shaft, with which it communicates at bottom, a deflecting-plate within said vessel above the opening of the tubular shaft, a central supply-tube opening into said vessel above the deflecting-plate, and an inclosing-case provided with a lower discharge-opening, substantially as set forth.

3. The combination, in an apparatus for the centrifugal separation of materials of different densities, of a rotating separating-vessel, mounted on and communicating at bottom with a tubular shaft, and an inclosing-case with which the separating-vessel communicates at top, said inclosing-case being provided with a discharge-passage surrounding the tubular shaft of the vessel, substantially as set forth.

4. A vessel for centrifugal separation having an open top or mouth and an imperforate periphery or body, said vessel being swelled outward toward its base and communicating thereat with a tubular axis or shaft, upon which it is mounted, substantially as set forth.

5. The process of creaming milk mechanically, skimming off the cream mechanically, and removing the skimmed milk mechanically by centrifugal force.

6. The process of creaming milk mechanically, skimming off the cream mechanically, and augmenting the volume of the charge, so as to remove both the cream and the skimmed milk separately by centrifugal force.

7. The process of creaming milk mechanically, skimming off the cream mechanically, and supplying fresh milk under a regulated feed, so as to drive off the cream and skimmed milk separately, while maintaining incipient and progressive separations of the supply into accretions of cream and skimmed milk.

8. The process of creaming milk and skimming off the cream by the action of centrifugal force.

9. The process of creaming milk by centrifugal force and feeding in skimmed milk, new milk, or milk and water, to drive off the cream.

EDWIN J. HOUSTON.
ELIHU THOMSON.

Witnesses:
J. R. MASSEY,
SAML. REITER.