No. 648,664. Patented May 1, 1900.

M. L. HOYT.

CENTRIFUGAL LIQUID SEPARATOR.

(Application filed Apr. 27, 1899.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

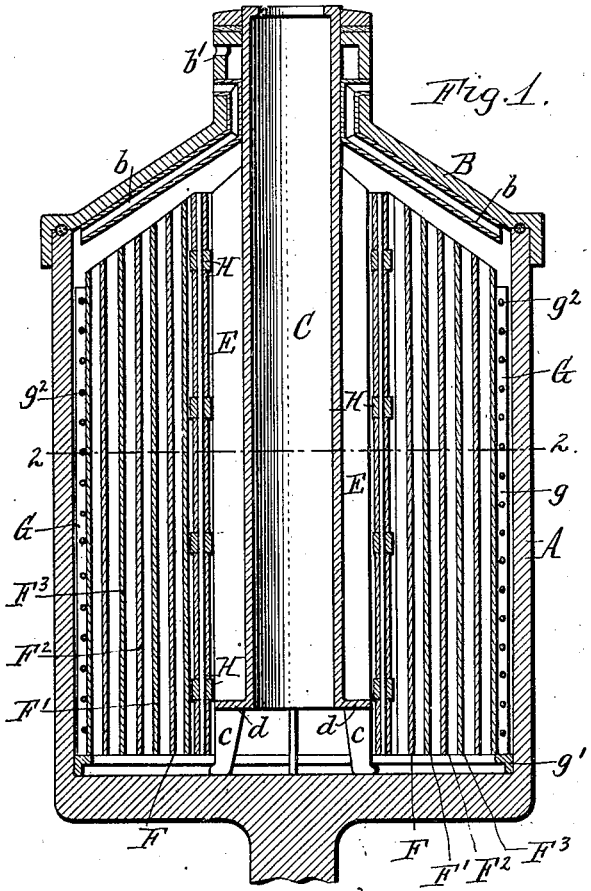


Fig. 3.

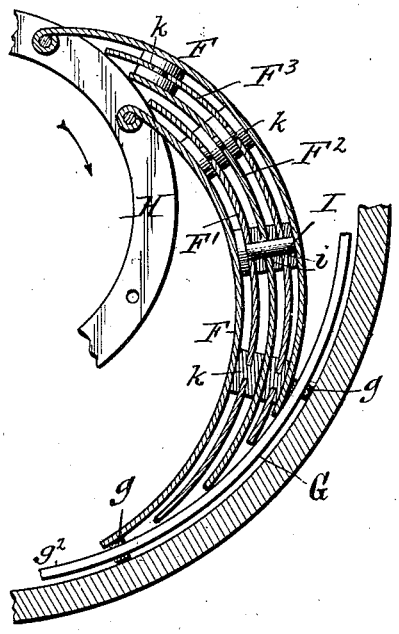
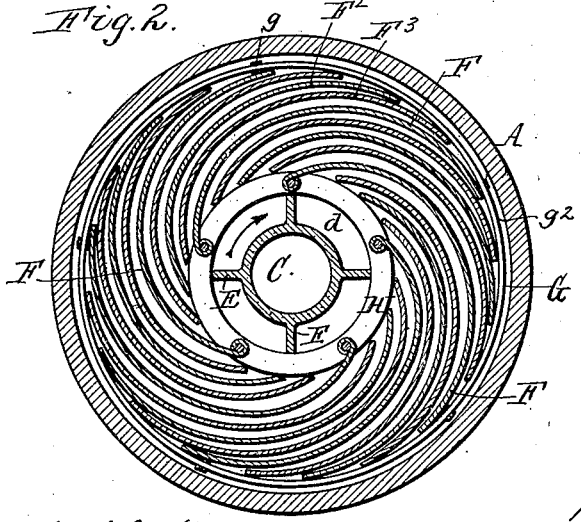


Fig. 2.



Witnesses.
Chas. F. Burkhart.
Henry L. Deck.

M. L. Hoyt. Inventor.
By Wilkinson Brown
Attorneys.

No. 648,664. Patented May 1, 1900.

M. L. HOYT.

CENTRIFUGAL LIQUID SEPARATOR.

(Application filed Apr. 27, 1899.)

(No Model.) 2 Sheets—Sheet 2.

Fig. 4.

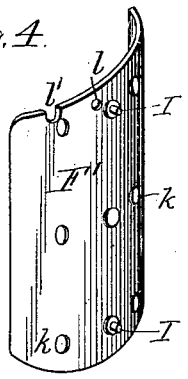


Fig. 5.

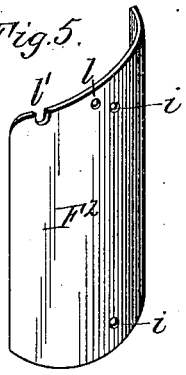


Fig. 6.

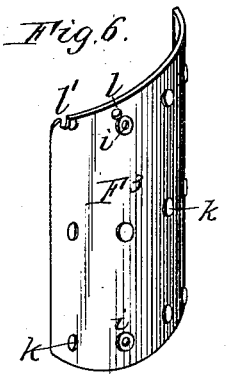


Fig. 7.

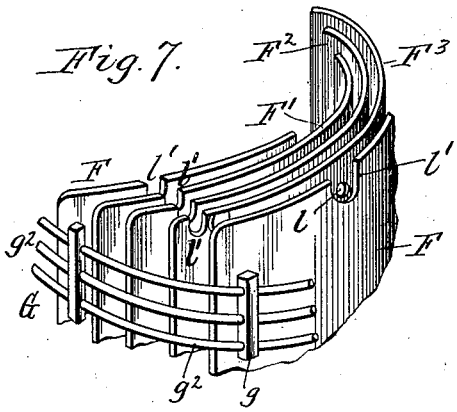


Fig. 8.

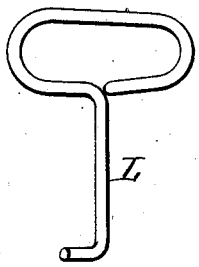
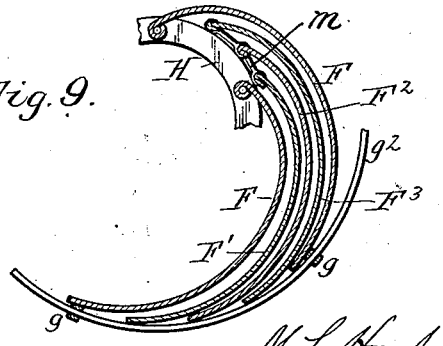


Fig. 9.



Witnesses:
Chas. F. Burkhart.
Henry L. Deck.

M. L. Hoyt Inventor.
By Wilhelm & Bonner
Attorneys.

UNITED STATES PATENT OFFICE.

MATTHEW L. HOYT, OF BIRCHTON, NEW YORK, ASSIGNOR TO D. H. BURRELL & CO., OF LITTLE FALLS, NEW YORK.

CENTRIFUGAL LIQUID-SEPARATOR.

SPECIFICATION forming part of Letters Patent No. 648,664, dated May 1, 1900.

Application filed April 27, 1899. Serial No. 714,694. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW L. HOYT, a citizen of the United States, residing at Birchton, in the county of Saratoga and State of New York, have invented new and useful Improvements in Centrifugal Liquid-Separators, of which the following is a specification.

This invention relates to the laminate division contrivances which are placed in the liquid-space of centrifugal liquid-separators, particularly centrifugal creamers, and which consist of numerous leaves or blades by which the body of liquid is divided into numerous thin layers in which the separation is more rapidly and completely effected than when the liquid is acted upon in a single body or mass. A contrivance of this general character is described in Letters Patent of the United States granted to me January 5, 1897, No. 574,607. In the contrivance of this patent the blades are movably connected, so that they can be opened out or unfolded for cleaning when the device is removed from the bowl and so that the outer edges of the blades support themselves against the peripheral wall of the bowl when the device is in use.

The object of the present invention is to support the blades when the device is in use rigidly and independent of the peripheral wall of the bowl, while the attachment of the blades is such that they can be separated or detached for cleaning when the device has been removed from the bowl.

In the accompanying drawings, Figure 1 is a vertical section of the bowl of a centrifugal liquid-separator, showing the general arrangement of the division contrivance, but omitting the registering devices and space-blocks of the removable blades. Fig. 2 is a horizontal section in line 2 2, Fig. 1. Fig. 3 is a horizontal section, on an enlarged scale, of a portion of the division contrivance, showing the registering devices and space-blocks of the removable blades, the thickness of the parts and the spaces between the blades being exaggerated to represent the parts more clearly. Figs. 4, 5, and 6 are detached perspective views of three blades constituting a group of removable blades, Figs. 4 and 6 representing, respectively, the front and rear plates of the group, and Fig. 5 the intermediate plate. Fig. 7 is a perspective view of the upper portions of a group of three removable blades and of the two fixed blades between which the group of removable blades is arranged. Fig. 8 is a perspective view of the hook which is employed for removing the groups of removable blades from their supporting-frame. Fig. 9 is a horizontal section showing the blades of each group movably connected at their inner edges by links, the registering devices and the space-blocks being omitted.

Like letters of reference refer to like parts in the several figures.

A represents the bowl of a centrifugal liquid-separator, which may be of any usual or suitable construction. As shown in the drawings, the bowl is provided with the usual removable cover B, which contains the escape-pipes b for the skim-milk and the cream-discharge b'.

C represents the central feed-pipe, which projects through the neck of the cover and is provided at its lower end with feet c, by which the lower end of the pipe is supported at a short distance above the bottom of the bowl. The lower end of the pipe is provided with an outwardly-projecting horizontal flange d.

E represents upright wings secured to the outer side of the feed-pipe.

F F' F^2 F^3 represent the blades or leaves of the division contrivance, which are arranged in an upright position in the liquid-space of the bowl. These blades are arranged tangentially or eccentric around the axis of the bowl and are preferably curved, as shown, and arranged with their concave sides forwardly in the direction in which the bowl rotates, as indicated by the arrow in Fig. 2. Blades arranged in this manner intersect the radial lines of the bowl and greatly expedite and improve the separation. While I prefer to employ curved blades, I do not wish to limit myself to this form, as other forms may be employed. The blades or leaves are partly fixed blades and partly detachable blades. The fixed blades F are secured at their outer edges to a surrounding cage or jacket G and at their inner edges to horizontal rings H, arranged one above the other. These fixed blades are arranged at such a distance apart that a group of detachable blades F' F^2 F^3 can be arranged

in the space between every two fixed blades. The number of detachable blades in a group may vary as circumstances may require, three being shown in each group in the drawings, of which the blade F′ is the front plate of the group in the direction in which the blades rotate with the bowl, as indicated by the arrows in Figs. 2 and 3, the blade F^3 the rear blade, and the blade F^2 the intermediate blade.

The inclosing jacket or cage may be constructed in any suitable manner. As shown in the drawings, it is composed of upright bars *g*, a bottom ring *g′*, and horizontal curved rods or wires g^2, connecting the bars *g*. The bars *g* rest against the peripheral wall of the bowl and center the contrivance in the bowl. This cage holds the outer edges of the blades at a short distance inwardly from the peripheral wall of the bowl, leaving a considerable space between said wall and the outer edges of the blades. This space permits of the free upward flow of the skim-milk along the inner side of the peripheral wall of the bowl and accommodates a considerable deposit of solid impurities, which is thereby prevented from clogging the spaces between the outer edges of the blades, from which the separated skim-milk issues through the openings in the case or jacket.

The inclosing cage or jacket G is rigidly connected by the fixed blades F with the inner rings H, these parts forming a rigid annular frame having between the fixed blades eccentric upright spaces or pockets for the reception of the several groups of detachable blades.

The front blade F′ of each group is provided on its rear side with a suitable number of rearwardly-projecting pins or studs I, which pass through openings *i* in the intermediate blade F^2 and the rear plate F^3, one such pin or stud being shown on the plate in the drawings. These openings are so arranged in the several blades that when the three blades are engaged with each other by the studs and openings the blades will stand in the proper relative position one slightly behind the other, or in echelon circumferentially, as shown in Fig. 3. These studs and openings form very simple and effective interlocking devices which enable the several blades of each group to be easily assembled in the proper relation and which hold the blades rigidly in apposition and prevent the shifting of one blade on another in the surface direction of the blades.

k represents space-blocks which are secured to both sides of the front blade F′ and rear blade F^3. These blocks are conveniently formed of rivets, which are secured in openings in these blades and have flat heads of the proper thickness on both sides of the blade. The heads of the interlocking studs preferably form, as shown, the corresponding space-blocks on the front side of the front blade F′, and the interlocking openings in the rear blade are formed in the corresponding space-blocks. Since the front and rear blades F′ F^3 are provided with these space-blocks on both sides, no space-blocks are required on the intermediate blade F^2 and on the fixed blades F. The corresponding space-blocks are arranged in the front and rear blades of the group in line with each other, so that the pressure of one blade against the other falls upon the space-blocks on these blades and not upon the unsupported parts of the blades between the space-blocks, which would tend to indent the blades.

Means are provided for conveniently removing the detachable plates from between the fixed blades. The means shown in the drawings for this purpose are a hook L and openings *l*, formed in the upper portions of the removable blades in line with each other, so that this hook can be inserted into these openings of the detachable blades constituting a group, and the latter can be raised by an upward pull. In order to expose these lifting-openings in each group of detachable blades, the fixed plate F, which stands outside of said group and in rear of the same circumferentially, and the group of detachble blades F′ F^2 F^3, which stand outside of this fixed blade, are provided in their upper edges with notches *l′*, which stand in line with said lifting-openings *l* and expose the same, as represented in Fig. 7.

When the division contrivance has been removed from the bowl, the removable blades are readily withdrawn from the frame containing the fixed blades and can be separated for thoroughly cleaning the same. The frame and its blades are also easily cleaned, as the spaces between the fixed blades are sufficient for that purpose.

The several blades constituting a group of removable blades can be connected at one edge by links *m*, as indicated in Fig. 9, so that the blades of each group are loosely connected in such a manner that they can be opened out or unfolded for cleaning.

I do not wish to claim, broadly, in this application an annular series of separable blades provided with interlocking devices which hold the blades rigidly in apposition, because such subject-matter is claimed in my application filed May 24, 1899, Serial No. 718,003.

I claim as my invention—

1. A laminate division contrivance for centrifugal liquid-separators consisting of an annular frame adapted to be placed in the bowl of the separator and composed of an inner member, an outer member and connecting members, and division-blades which intersect the radial lines of the bowl and which are removable from said frame and rest normally between the outer and inner members thereof, substantially as set forth.

2. A laminate division contrivance for centrifugal liquid-separators consisting of a frame adapted to be placed in the bowl of the separator and composed of inner rings, outer

rings and means whereby said rings are connected, and division-blades removably arranged between the inner and outer rings of said frame, substantially as set forth.

3. A laminate division contrivance for centrifugal liquid-separators consisting of an annular frame adapted to be placed in the bowl of the separator and composed of an inner member, an outer member, and division-blades which are affixed to and connect said inner and outer members, and division-blades which are removable from said frame and which rest normally between the outer and inner members thereof, substantially as set forth.

4. A laminate division contrivance for centrifugal liquid-separators consisting of a frame adapted to be placed in the bowl of the separator and composed of inner rings, outer rings and division-blades affixed to said rings and connecting the same, and division-blades removably arranged between said frame-blades, substantially as set forth.

5. A laminate division contrivance for centrifugal liquid-separators consisting of a frame adapted to be placed in the bowl of the separator and composed of an inner member, an outer member and connecting members and tangential division-blades removably arranged in said frame between the inner and outer members thereof and provided with interlocking devices which hold the blades rigidly in apposition, substantially as set forth.

6. A laminate division contrivance for centrifugal liquid-separators consisting of a frame adapted to be placed in the bowl of the separator and provided with division-blades which are affixed to the members of the frame, and groups of division-blades which are removably arranged in said frame between said affixed blades and provided with interlocking devices which hold the blades of each group rigidly in apposition, substantially as set forth.

7. A laminate division contrivance for centrifugal liquid-separators consisting of a frame adapted to be placed in the bowl of the separator and tangential division-blades removably arranged in said frame and provided with registering studs and openings, the studs being secured to one blade and passing through the openings of the adjacent blade or blades, substantially as set forth.

8. A laminate division contrivance for liquid-separators having a containing-frame and groups of division-blades removably arranged therein, said blades being provided in their upper portions with lifting-openings arranged in line and adapted to receive a lifting instrument and having in their upper edges notches which expose the lifting-openings in the blades behind such notched blades, substantially as set forth.

Witness my hand this 18th day of April, 1899.

MATTHEW L. HOYT.

Witnesses:
LOOMIS BURRELL,
F. A. TINKER.