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CENTRIFUGAL SEPARATOR

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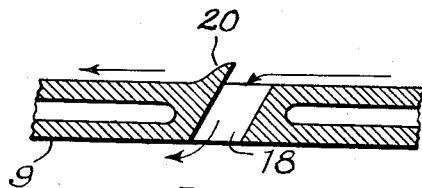
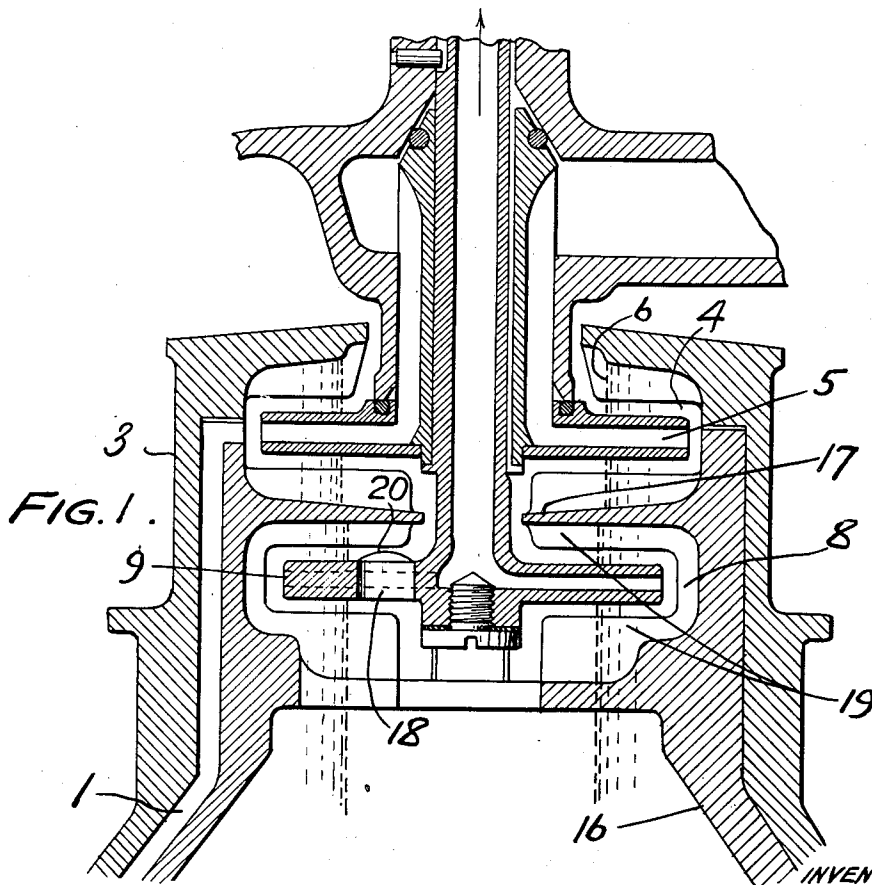


FIG. 2.



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CENTRIFUGAL SEPARATOR

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4 Claims. (Cl. 233—22)

My invention relates to centrifugal separators of the type in which the two separated components of a liquid are discharged from the centrifugal bowl by means of stationary disc-shaped discharge members or paring devices, concentric with the bowl's axis, and projecting respectively into discharge chambers communicating respectively with the inner and outer separating zones of the bowl. One advantage of this type of separator is that admixture of air (which takes place to a great extent with tubular or snail-like parers or skimmers as well as in the open type of centrifuge unprovided with parers or skimmers) is largely prevented in centrifuges provided with disc-shaped parers provided with peripheral inlets, which lead out the liquids in more nearly foamless state. Nevertheless, where such centrifuges are used for the separation of certain liquids, particularly cream and skim milk, a partial re-mixing of the separated liquids may sometimes take place because of formation of froth when the stationary discharge member contacts with the rotating mass of liquid. As the specific gravity of the froth is considerably lower than that of the liquids, the froth may deposit itself as a more or less heavy layer on the liquid levels in the bowl. Sometimes the layer of froth may become very thick and it may overflow the edge of the boundary wall between the two discharge chambers, and then a partial re-mixing will result. According to the present invention this danger is avoided by providing the discharge member for the froth-producing component with axial channels, crossing the outlet channels for the liquid and being positioned inside, or extending a substantial distance inside, the liquid level. Through these channels the froth is conducted away from the boundary wall to the other side of the discharge member. The froth discharge channels should advantageously be provided with oblique edges which catch the rotating froth mass. In this way a kind of pumping action is produced upon the froth mass, and it may therefore be said that the froth is pumped over from the boundary wall to the other side of the discharge member. On that side of the discharge member to which the mass of froth is pumped a free space of considerable volume should be provided for such component, so that a liquid surface of great extension is formed. As the froth is there again brought into rotation, the air is ultimately separated, so that the froth is first reduced and then disappears.

Fig. 1, illustrating one embodiment of the invention, is a vertical sectional view through the

upper part of a centrifugal bowl and the two discharge chambers. Fig. 2 is a section through a part of one of the parers.

In the neck 3 of the centrifugal bowl two discharge chambers 4 and 8, for skim milk and cream respectively, are arranged. The discharge chamber 8, which, in the embodiment shown, is arranged below the discharge chamber 4, receives separated cream from the inner zone of the bowl. The discharge chamber 4 receives separated skim milk from a channel 1 communicating with the outer or peripheral zone of the bowl. Extending into chambers 4 and 8 are stationary disc-shaped parers or discharge members 5 and 9 respectively. In chamber 4 there is a rotating mass of liquid having the cylindrical level 6. In chamber 8 there is also a rotating mass of liquid, the level of which has a somewhat smaller radius than the level 6 in chamber 4. The chambers 4 and 8 are separated from each other by a radially projecting wall 17 which extends a considerable way inside said liquid levels. If the liquid in chamber 8 is cream, it is very important that it shall not in the least degree leak over to the chamber 4. In the form of a liquid the cream cannot leak over, since the wall 17 extends sufficiently far inside the possible innermost position of the cream level. In some circumstances, however, froth may form in chamber 8 by the action of stationary member 9 upon the rotating cream mass, which froth deposits itself on the liquid surface. The amount of froth may possibly so increase that it will overflow the edge of the wall 17 and get into the chamber 4. In order to avoid this the member 9 is provided with a number of nearly axially directed channels 18 through which the froth may flow off to the chamber in the bowl situated below the member 9, where it is distributed on the large liquid surface contained therein so that the air will gradually escape therefrom. The chamber 8 is provided with radially arranged ribs 19 in order to insure that both the mass of liquid and any froth present are in the highest possible degree caused to follow the rotation of the bowl. The froth mass is thereby subjected to the influence of the centrifugal force and is kept pressed on the surface of the liquid, while the centrifugal force tends to separate the admixed air therefrom. The channels 18 in member 9 should advantageously have rather large cross sections, so that the necessary amount of froth can surely pass through. They should preferably also be oblique, so that they (so to speak) pare off the surface of the froth mass and thereby more easily conduct the froth to the

lower side of the member. At the upper orifice the channels should also be provided with an oblique edge formed by a lip or rim 20, which likewise has a paring effect on the froth mass and is advantageous in regard to the above described pumping effect on the froth.

What I claim and desire to protect by Letters Patent is:

1. In a centrifugal separator comprising a rotatable bowl, means forming two discharge chambers adjacent each other and rotating with the bowl and communicating respectively with the outer and inner separating zones of the bowl, said means including a partition closing one chamber from the other except at the inner ends, disc-like paring devices within the respective chambers, and means to prevent froth formed in one of said discharge chambers from leaking to the other, said means comprising channels through the paring member in said froth-producing chamber, said channels being positioned nearer to the inner end than to the outer end of the paring member, the wall of each of the channels more distant from the axis of the bowl being, from one end to the other, so much further from the center than the inner edge of said partition that substantially all froth accumulating inside the level of liquid and on the side of the paring member facing the second of said chambers will be conveyed to the other side of the paring member.

2. In a centrifugal separator comprising a rotatable bowl, means forming two discharge chambers adjacent each other and rotating with the bowl and communicating respectively with the outer and inner separating zones of the bowl, said means including a partition closing one chamber from the other except at the inner ends, disc-like paring devices within the respective chambers, and means to prevent froth formed in one of said discharge chambers from leaking to the other, said means comprising channels through the paring member in said froth-producing chamber, said channels being positioned nearer to the inner end than to the outer end of the paring member, the wall of each of the channels more distant from the axis of the bowl being, from one end to the other, substantially further from such axis than the inner edge of said partition and thereby adapted to convey froth, accumulating inside the level of liquid and on the side of the paring member facing the second of said chambers, to the other side of the paring member, said means comprising also a lip at the rearward side, in direction of rotation of the liquid, of each channel, extending above the surface of the parer and providing an oblique edge

to pare froth off the rotating mass and direct it into the channel.

3. In a centrifugal separator comprising a rotatable bowl, means forming two discharge chambers adjacent each other and rotating with the bowl and communicating respectively with the outer and inner separating zones of the bowl, said means including a partition closing one chamber from the other except at the inner ends, disc-like paring devices within the respective chambers, and means to prevent froth formed in one of said discharge chambers from leaking to the other, said means comprising channels through the paring member in said froth-producing chamber, said channels being positioned nearer to the inner end than to the outer end of the paring member, the wall of each of the channels more distant from the axis of the bowl being, from one end to the other, substantially further from such axis than the inner edge of said partition and thereby adapted to convey froth, accumulating inside the level of liquid and on the side of the paring member facing the second of said chambers, to the other side of the paring member, said channels extending obliquely in the direction of rotation from the side of the parer nearer the partition to the other side of the parer to thereby pare off the surface of the mass and facilitate the passage of the froth through the paring device.

4. In a centrifugal separator comprising a rotatable bowl, means forming two discharge chambers adjacent each other and rotating with the bowl and communicating respectively with the outer and inner separating zones of the bowl, said means including a partition closing one chamber from the other except at the inner ends, disc-like paring devices within the respective chambers, and means to prevent froth formed in one of said discharge chambers from leaking to the other, said means comprising channels through the paring member in said froth-producing chamber, said channels being positioned nearer to the inner end than to the outer end of the paring member, the inner edges of the mouths of said channels opening into the froth-producing chamber being not substantially nearer the axis of the bowl than the inner edge of said partition so that substantially the entire areas of the mouths of said channels opening into the froth-producing chamber are further from said axis than the inner edge of said partition, said channels being thereby adapted to convey froth, accumulating inside the level of liquid on the side of the paring member facing said partition to the other side of the paring member.

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