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CENTRIFUGAL SEPARATOR

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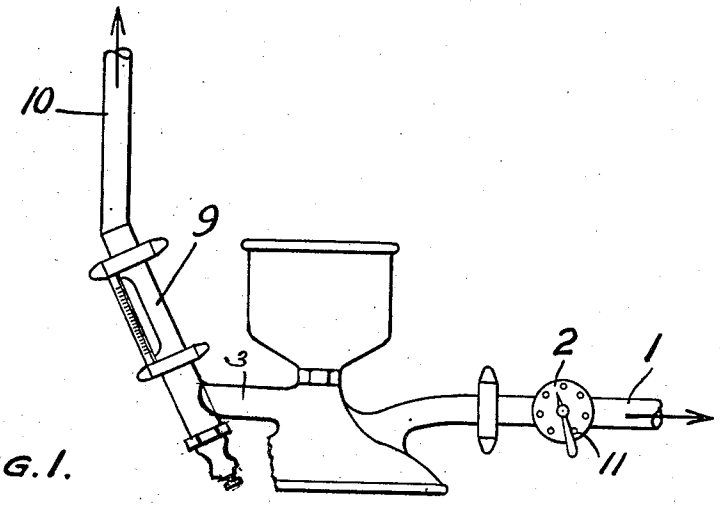


FIG. 1.

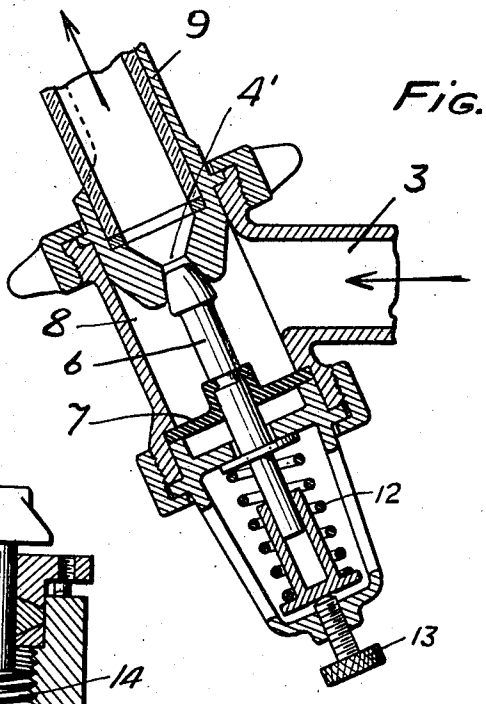
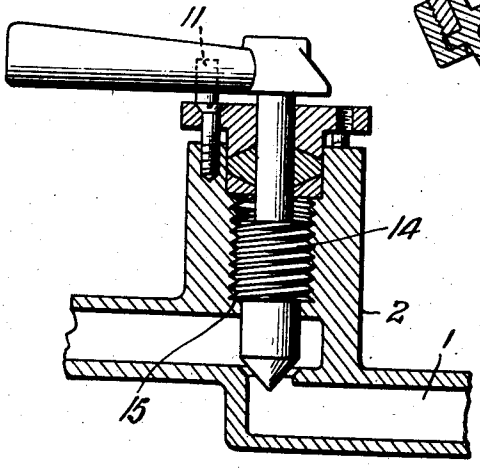


FIG. 2.

FIG. 3.



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CENTRIFUGAL SEPARATOR

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In Sweden November 12, 1936

1 Claim. (Cl. 233—21)

This invention is directed to an improvement in centrifugal separators, particularly centrifugal separators provided with stationary paring members projecting into the bowl for the discharge of separated liquids.

In centrifugal separators of this type it is necessary to observe certain precautions in controlling the flow of the separated liquids in the discharge pipes in order to obtain satisfactory operating conditions. The purpose of the stationary paring members which project into the rotating mass of liquid in the bowl is to enable discharge of the separated liquids in frothless condition. In order to accomplish this the paring member must extend sufficiently far into the rotating mass of liquid that the liquid overlaps its edge to a sufficient degree.

Since this overlap is dependent upon the pressure in the fixed discharge lines, it is necessary for satisfactory operation of the centrifuge to control with some care the pressure in these discharge lines; for, if the pressure is too low, the overlap on the paring disc will be too slight and froth will be formed in the separated liquid, while, if the pressure is too high, the overlap may become so great that the liquid will leak over the edge of the boundary wall of the chamber in which the paring disc is located.

The present invention relates to an arrangement in centrifugal separators of the type referred to, by means of which a simple and reliable adjustable control of the pressure in the discharge lines is made possible. The arrangement is characterized by the provision in one of the fixed discharge lines of adjustable throttling means of such character that the pipe cannot be completely closed, but always is open to some extent. Preferably, in the separation of whole milk, such throttling means will be placed in the skim milk discharge line, but it may, in accordance with this invention, be placed either in the skim milk or the cream discharge line. In the second discharge line is placed throttling means adapted to maintain a substantially constant counterpressure and which is adjustable to predetermine such counterpressure.

The nature of the invention to which this application is directed may be more fully described in connection with the accompanying drawing, which is illustrative of a preferred embodiment of the invention, and in which Figure 1 is an elevation, partly in section, of a centrifugal separator equipped in accordance with my invention, Figure 2 is a detail view in section of a form of automatically adjustable throttling means for use in accordance with my invention, and Figure 3 is a detail view in section of the other throttling means.

In Figure 1 in the skim milk discharge pipe 1 of the separator there is provided an adjustable throttling member 2 of conventional design which may be so positioned and secured with the aid of an arresting pin 11 that with normal throughput of milk through the machine it provides the greatest counter-pressure in the skim milk discharge line under which the separator can work without overflowing. Obviously the arresting pin 11 may be placed in different positions in order to adapt operation to different throughputs or to give different desired counter-pressures. As shown in Fig. 3, the valve may be of the well known globe type, having a double threaded screw 14 of such deep pitch that one full turn of the handle will open it wide. When turned toward closed position the lower end of the screw strikes a shoulder 15 in the valve body and prevents complete closure.

An efficient automatic and adjustable throttling valve, of the kind hereinbefore described, for application to the cream discharge line 3, is shown in Fig. 2. It comprises a spindle 6 which is movable axially in relation to the opening 4' and serves, by its movement, to control the throughput and hence the counter-pressure in the cream discharge line 3. To the spindle 6 is secured a flexible diaphragm 7, which serves to close the chamber 8 surrounding the spindle and through which the cream flows. The cream passes from the chamber 8 through the opening 4' into a flow meter 9 and thence into the outlet pipe 10. Thus, one side of the diaphragm 7 is acted on by the pressure in the cream discharge line 3, while the other side of the diaphragm is acted on by atmospheric pressure plus a suitable pressure exerted by a spring 12, the latter pressure being adjustable by means of a thumb nut 13.

Accordingly, if the pressure in the cream discharge line 3 in chamber 8 is increased in any way, whether by operation of the adjustable throttling means 2 in the skim milk line or by any other means, the diaphragm 7 is moved to compress the spring 12 so that the area of the opening 4' is increased, and the pressure in the cream chamber is accordingly reduced. After a few oscillations a new position of equilibrium will be reached, and the spindle 6 will occupy a new axial position at which there is equilibrium between the pressure in the cream chamber and that afforded by the atmospheric pressure and the force of the spring 12.

While in the separator described above the automatically adjustable throttling member shown in Figure 2 has been described as positioned in the cream discharge line in combination with a manually adjustable regulating device in the skim milk discharge line, it is clear that without departing from the scope of my invention the positions of these throttling means may be reversed, and the device shown in Figure 2 incorporated in the skim milk discharge line.

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

The combination, with a centrifugal separator having two paring members, one for the heavier and the other for the lighter constituent, of separate closed discharge conduits communicating with the respective paring members, and throttling means in both conduits; one of said throttling means comprising a valve and means limiting its movement toward, and preventing its movement to, closed and completely open positions, the valve being adjustable to limit the range of its movement and movable within such range to control the throughput and the counterpressure at the outlet from one paring member while preventing overflow; the other throttling means comprising a valve adapted to maintain a substantially constant counterpressure at the outlet from the other paring member, the last named valve comprising a tension device adapted to move it toward open or closed position upon increase or decrease of such counterpressure and means to adjust the tension device to predetermine such counterpressure.

PER HILDING STAAFF.