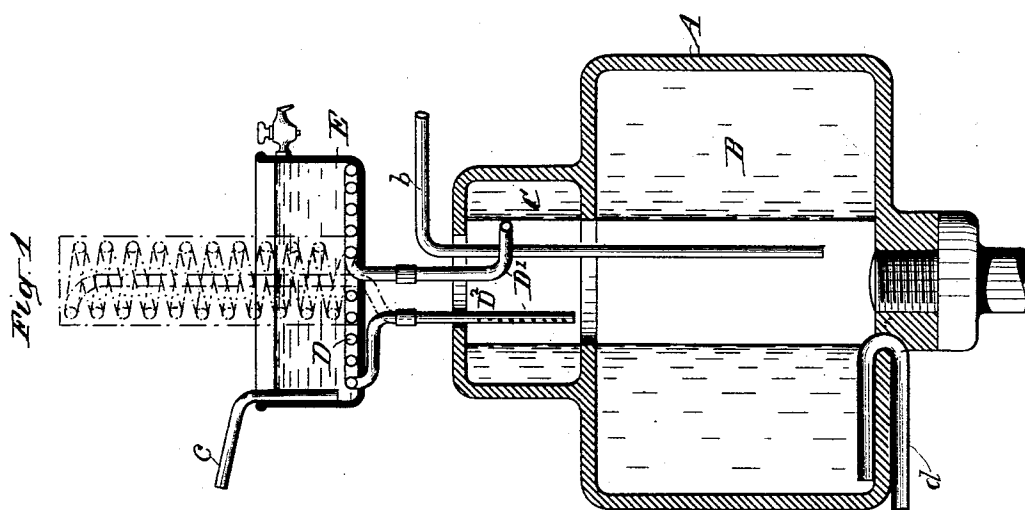
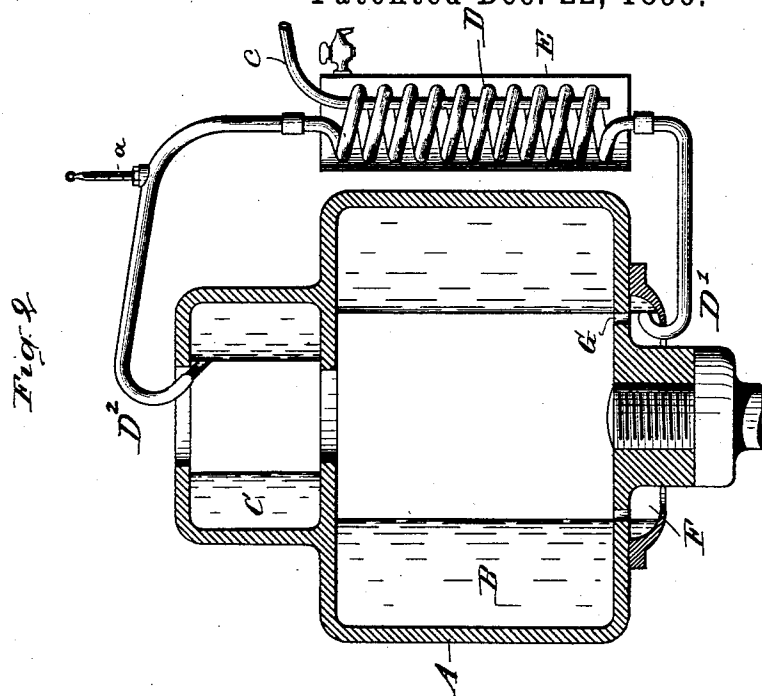


(No Model.)

E. G. N. SALENIUS.
CENTRIFUGAL APPARATUS.

No. 573,707.

Patented Dec. 22, 1896.



Witnesses:

Herbert Blossom,
Peter A. Ross

Inventor:

Erik G. N. Salenius

By Henry Conner
Attorney

UNITED STATES PATENT OFFICE.

ERIK GUSTAF NICOLAUS SALENIUS, OF STOCKHOLM, SWEDEN.

CENTRIFUGAL APPARATUS.

SPECIFICATION forming part of Letters Patent No. 573,707, dated December 22, 1896.

Application filed January 16, 1892. Serial No. 418,333. (No model.) Patented in Sweden September 8, 1891, No. 4,370; in France November 27, 1891, No. 217,709; in England December 1, 1891, No. 20,959; in Norway December 2, 1891, No. 2,989; in Belgium December 17, 1891, No. 97,607; in Germany March 26, 1892, No. 77,862; in Victoria June 24, 1892, No. 9,752; in New South Wales June 27, 1892, No. 3,829; in Austria-Hungary November 2, 1892, No. 19,146 and No. 42,058; in Queensland September 4, 1893, No. 2,132, and in Finland September 26, 1893, No. 480.

To all whom it may concern:

Be it known that I, ERIK GUSTAF NICOLAUS SALENIUS, a subject of the King of Sweden and Norway, and a resident of Stockholm, Sweden, have invented an Improved Centrifugal Apparatus, (for which patents have been granted to me in Sweden, No. 4,370, dated September 8, 1891; in Norway, No. 2,989, dated December 2, 1891; in Germany, No. 77,862, dated March 26, 1892; in France, No. 217,709, dated November 27, 1891; in Great Britain, No. 20,959, dated December 1, 1891; in Austria-Hungary, No. 19,146 and No. 42,058, dated November 2, 1892; in Belgium, No. 97,607, dated December 17, 1891; in Victoria, No. 9,752, dated June 24, 1892; in New South Wales, No. 3,829, dated June 27, 1892; in Queensland, No. 2,132, dated September 4, 1893, and in Finland, No. 480, dated September 26, 1893,) of which the following is a specification.

My invention relates to a centrifugal apparatus to be employed in treating milk for separating the cream or butter, or both, from the blue milk; and the object of my invention is to provide means for varying the temperature of the mass in the drum of the apparatus; that is, to cool it down to a certain temperature below the normal or raise its temperature above the normal to a certain extent. Ordinarily the temperature requires to be lowered, but the principle of operation is the same whether the temperature be raised or lowered.

In the accompanying drawings I have illustrated two forms of apparatus embodying my invention.

Figure 1 is a sectional elevation of a compound centrifugal drum provided with a refrigerator or temperature-changer arranged above it, and Fig. 2 is a similar view showing the temperature-changer arranged at the side of the drum.

Referring to Fig. 1, A is the drum of the centrifugal apparatus, B being the lower and C the upper compartment thereof. E is a temperature-changer—in this case a refrigerator—arranged above the drum and consisting in the main of a tray containing some refrigerating liquid and a coil of pipe D, form-

ing a receptacle, submerged therein. To one end of this coil D is connected a skimming-pipe D', which takes the cream from the compartment C, forces it up to and through the refrigerating-coil D, and thence down to the drum again through a pipe D², which is connected with the other end of the coil D. This illustrates fully and clearly the whole invention and the mode of operation. If the liquid in the tray E was hot, then the temperature would be correspondingly raised. The principle resides in the forcing of the liquid mass by its own rotation to a coil or conduit having a different temperature from that of the drum and then back again to the drum.

As shown in Fig. 1, the return-pipe D² has jet perforations in its side whereby the incoming refrigerated cream is thrown against the cream-wall in compartment C. If the force of the jets be sufficient, butter will be separated, but if not the butter will not be separated and the cream alone will be separated, and the lighter separated constituent will rise, flow over the edge of the drum, and be thrown off by the centrifugal force into the usual outer casing inclosing the drum and not shown in the drawings.

In Fig. 1 I have shown in dotted lines the refrigerator in the form of an upright chamber containing a coil. This is merely to illustrate another arrangement of the coil. Indeed the temperature-changer may have any practicable form.

In Fig. 2 the refrigerator is placed at the side of the drum A, and the skimming-pipe D' is represented as taking the liquid from an annular compartment F at the bottom of the drum, forcing it upward through the coil D and delivering it into the compartment C through a pipe D². The milk or cream flows from the compartment B into the annular compartment F through holes G. On the pipe D² is a thermometer *a* to test the temperature.

Both figures of the drawings show drums with more than one compartment, but the invention may be carried out with a plain drum. For example, the compartment C of Fig. 1

might be merged with the compartment B to form a simple one-chambered drum.

The drawings show the milk or cream as forced in a continuous manner through the coil in the refrigerator and back to the drum. In any case, however, the operation is continuous, and the cooling goes on continuously with the separation of the cream or butter by centrifugal force.

10 In Fig. 1, *b* is a pipe through which milk is supplied to the drum, *c* is a pipe which supplies the liquid to the temperature-changer, and *d* is a pipe for drawing off the blue milk from the chamber B.

15 In Fig. 2, *c* is a pipe through which liquid is supplied to the temperature-changer.

In Fig. 1 I have shown only the means for cooling the cream to the proper temperature for churning. It will be obvious that the milk in chamber B may be cooled to the proper temperature for separating the cream from the blue milk by the same means.

Fig. 2 shows how the milk may be taken from the lower compartment or chamber, cooled, and delivered into the upper compartment, or, if it be a simple drum of one compartment, delivered back into the same compartment as in the case of a simple separator.

30 In neither of the figures have I deemed it necessary to show the usual well-known features of a centrifugal apparatus, which have no relation to this invention, and I have omitted the usual pipes, as *b* and *d* in Fig. 1, for supplying the milk to the drum and removing the blue milk.

Having thus described my invention, I claim—

40 1. In a centrifugal apparatus, the combination with a drum, means for supplying milk to said drum, and means for changing the temperature of a liquid, as a refrigerator, arranged exterior to said drum, of a skimming-pipe extending from the drum to a recepta-

cle in the refrigerator and adapted to skim the liquid from the drum by the rotation of the latter, and a return-pipe extending from the receptacle in the refrigerator to the interior of the drum to return the refrigerated liquid to the drum, said return-pipe being adapted and arranged to discharge its contents against the wall of liquid in the drum.

2. In a centrifugal apparatus, the combination with a drum, and a refrigerator consisting of a vessel E, situated adjacent to the drum and containing a substance having a temperature lower than that of the liquid in the drum and a coil D, in said refrigerating substance, of a skimming-pipe D', connected at one extremity with one end of the coil D and having its other extremity inserted in the drum and adapted to skim the liquid from the wall thereof in the drum, a return-pipe D², connected at one extremity with the opposite end of the coil D, and having its other extremity inserted in the drum, and means for supplying liquid to said drum.

3. In a centrifugal apparatus, the combination with a drum having two compartments, of a refrigerator adjacent to the drum and containing a coil, a skimming-pipe, one extremity of which is connected with one end of the coil and the other extremity of which extends into one of the compartments of the drum and is adapted to skim the liquid therefrom, by the rotation of the drum, a return-pipe connected at one extremity with the other end of said coil, the other extremity of said return-pipe extending into the other compartment in said drum.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

ERIK GUSTAF NICOLAUS SALENUS.

Witnesses:

ERNST SVANGVIST,
C. W. ERDMAN.