

M. LARSEN.
 EMULSIFYING MACHINE FOR CONTINUOUS RUN.
 APPLICATION FILED APR. 18, 1918.

1,372,172.

Patented Mar. 22, 1921.

4 SHEETS—SHEET 1.

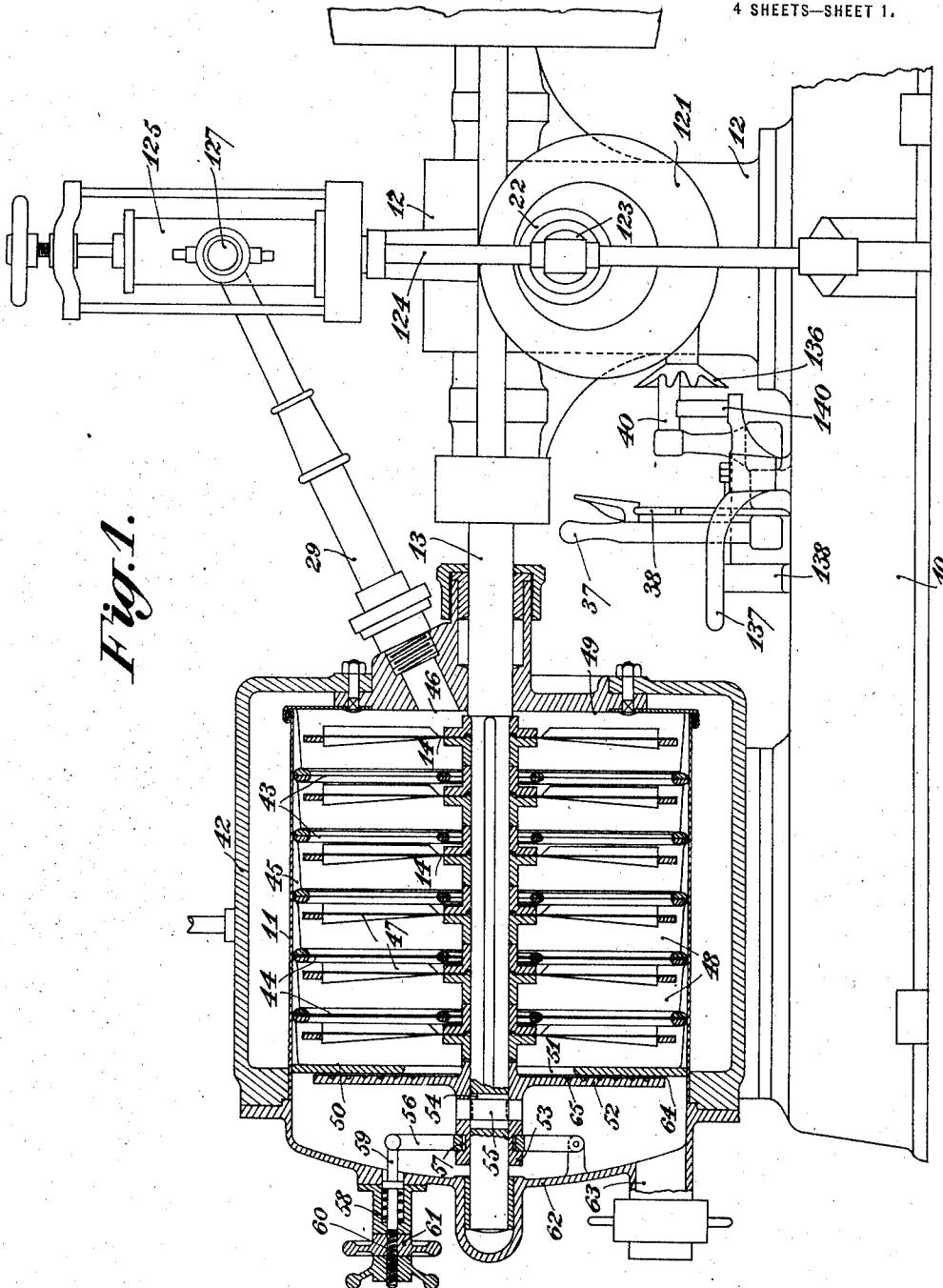


Fig. 1.

Inventor:
 Martin Larsen
 By Carl P. Laefel
 his Attorney

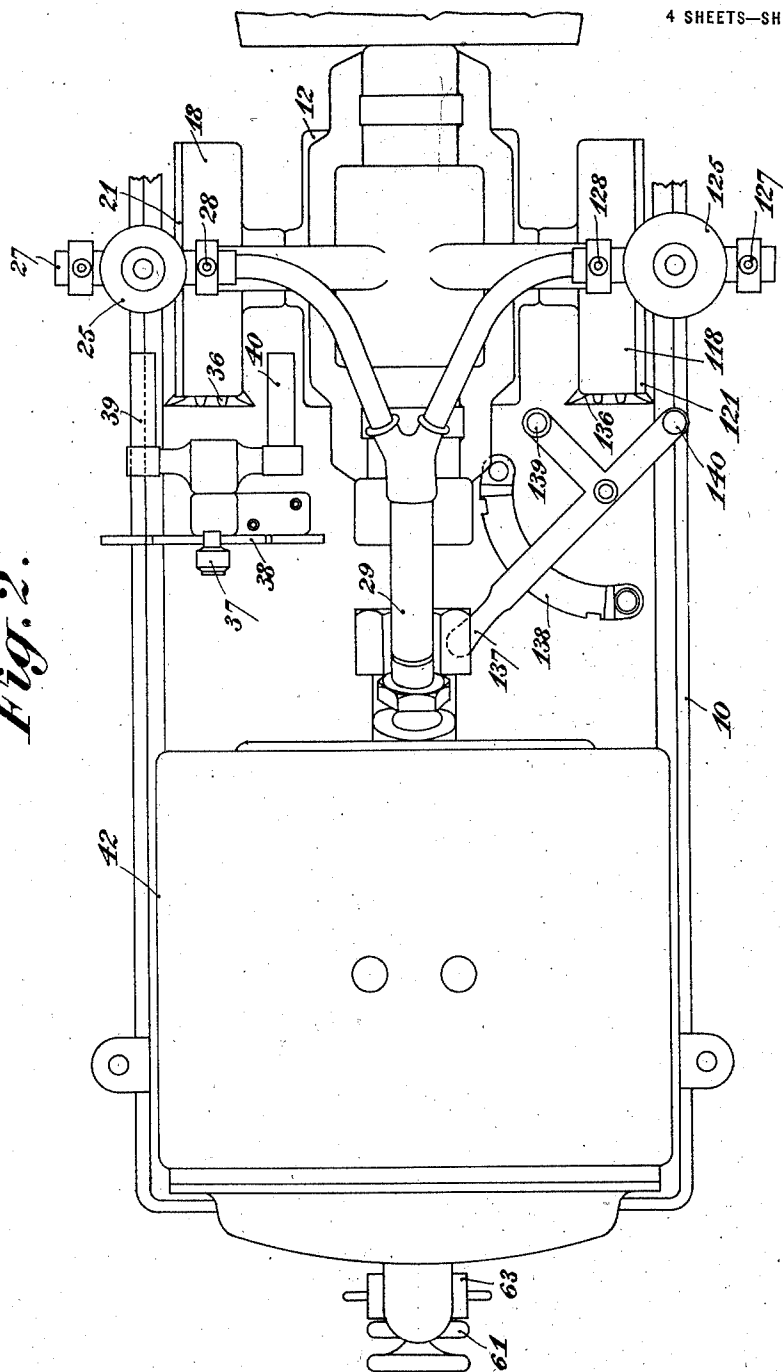
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4 SHEETS—SHEET 2.

Fig. 2.



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4 SHEETS—SHEET 3.

Fig. 4.

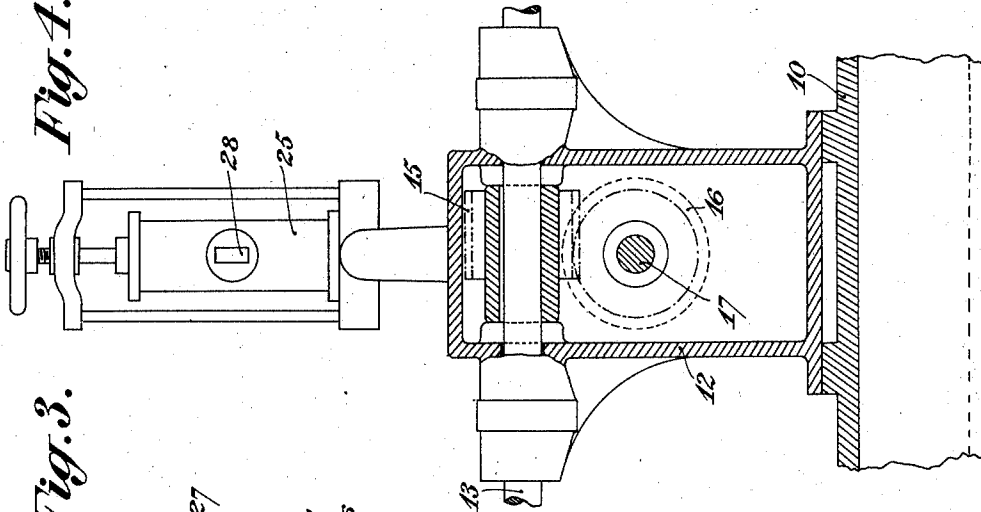
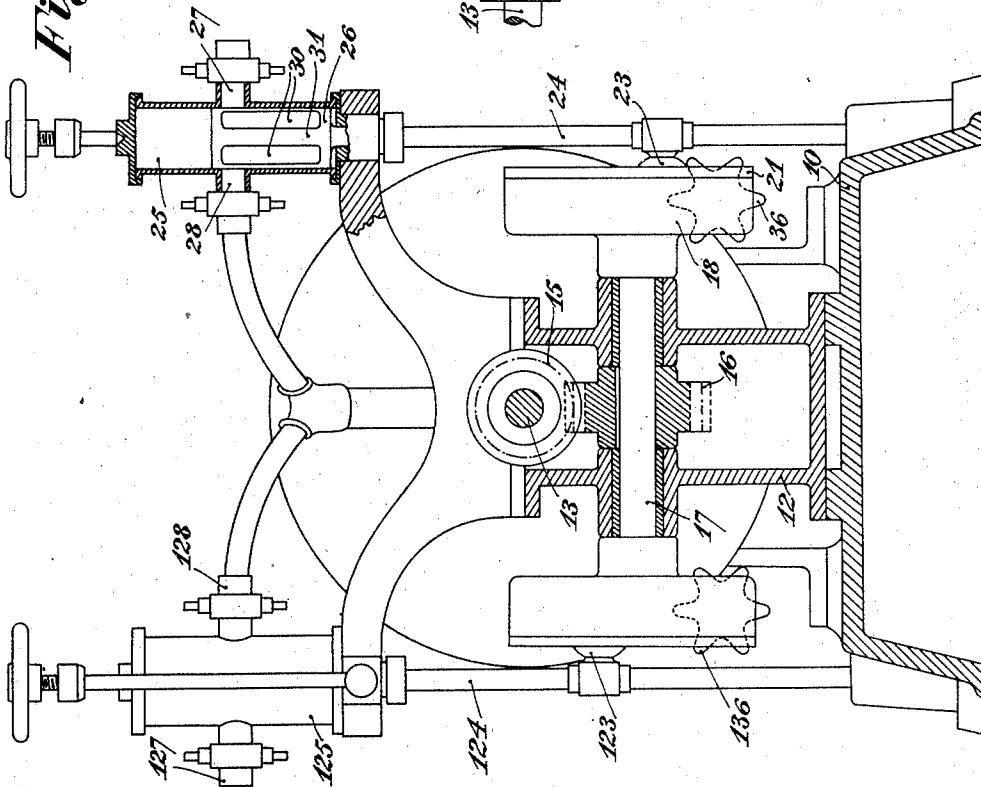


Fig. 3.



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Fig. 5.

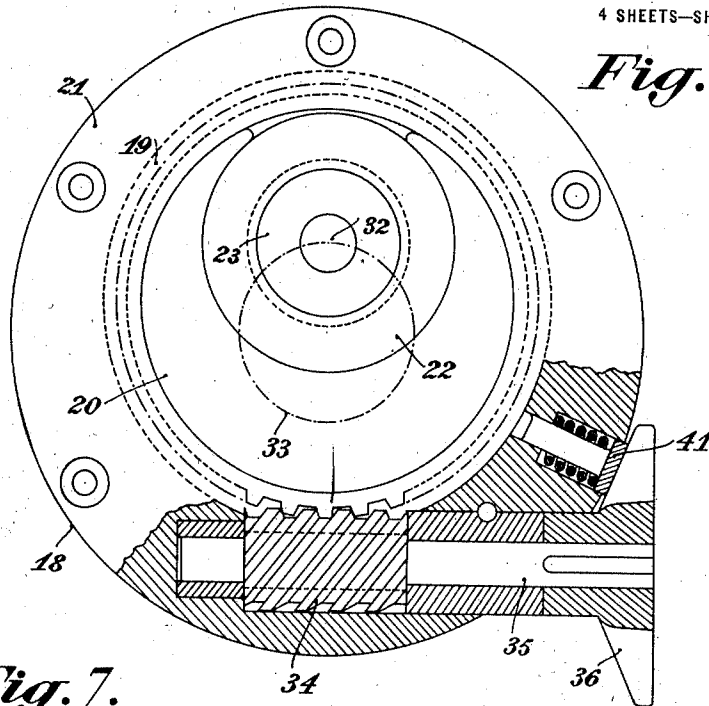


Fig. 7.

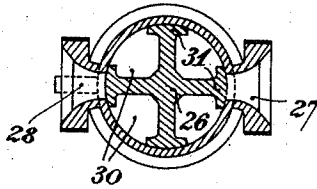
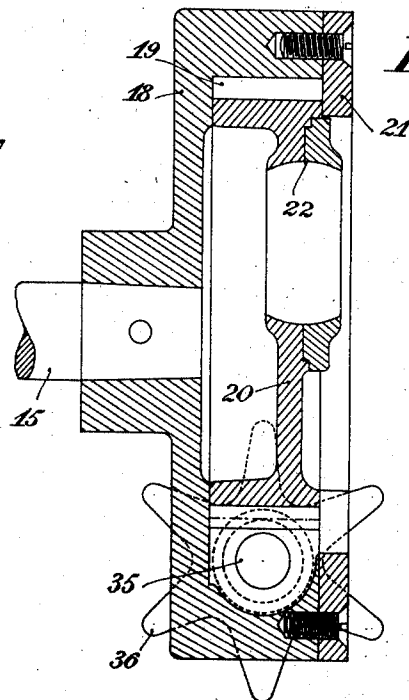


Fig. 6.



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UNITED STATES PATENT OFFICE.

MARTIN LARSEN, OF SILKEBORG, DENMARK.

EMULSIFYING-MACHINE FOR CONTINUOUS RUN.

1,372,172.

Specification of Letters Patent. Patented Mar. 22, 1921.

Application filed April 18, 1918. Serial No. 229,272.

To all whom it may concern:

Be it known that I, MARTIN LARSEN, a subject of the King of Denmark, residing at Silkeborg, in the Kingdom of Denmark, have invented certain new and useful Improvements in Emulsifying-Machines for Continuous Run, of which the following is a specification.

This invention refers to emulsifying machines for continuous run. It is the object of this invention, by simple means and small power-consumption, to attain a very quick and regular emulsification of fatty substances, oils and the like, in a liquid which, for instance when the machine is used for making margarin, may be milk. The invention makes it possible to work with quite definite mixture-relations between oil and fatty substances, or the like, and liquid, and also makes it possible to vary this relation during the run, as required.

In order to make the invention clearly understood, a full description of it is given in the following, referring to the form of construction set forth on the accompanying drawings.

Figure 1 is a side-view of the machine, with the emulsion-tank in vertical, longitudinal section.

Fig. 2 is a plane drawing of the machine.

Fig. 3 is a front-view of the machine, with a part of the measuring mechanism for oil and liquid in vertical, transverse section.

Fig. 4 is a part of the measuring mechanism in vertical, longitudinal section.

Figs. 5-7 are other details of the measuring mechanism.

On the bed-plate 10, the emulsion tank 11 is disposed behind a hollow, vertical standard 12, through which is passed the driving-shaft 13 for the stirring-device 14 in the emulsion tank. In the standard 12 there is disposed on the shaft 13 a worm 15 (see Fig. 4), which, by means of a worm-wheel 16, drives a transverse shaft 17, which at each end carries a pulley 18 and 118, with an eccentric recess 19 (see Fig. 5). In this recess, in each pulley, there is disposed a disk 20, which is held in place by means of a ring 21 or 121, and which is furnished with an eccentrically situated roller-race 22 (see also Fig. 6) for a ball 23 or 123, which is secured to the side of a rod 24 or 124. The latter is turnable and vertically shiftable, partly in a guide in the bed-plate 10 and

partly in a stuffing-box in the bottom of a cylinder 25 or 125, with whose piston 26 or 126 it is connected. On the side of the cylinder there is an inlet 27 and 127, which is connected with a feed-tank or the like (not shown) for the one or the other ingredient of the mixture respectively, f. i., milk and oil or melted fatty substances respectively, and opposite the inlet there is an outlet 28 and 128, which is connected with a pipe 29 leading to the emulsion-tank 11. In the piston 26 or 126 there are several measuring-chambers 30 (Figs. 3 and 7), and between these there are cylinder segments 31 which, according to their position, shut off or open said inlet or outlet, so that the liquid or oil supply is given to the emulsion-tank in quantities proportional to the turning and lifting degree of the pistons.

When the pulley 18 or 118 rotates, the center 32 of the balls 23 or 123 will describe a circle, 33 in Fig. 5, and at the same time the vertical middle-plan of the ball and the piston-rod 24 or 124 will swing back and forth at a certain angle around the axis of the piston-rod, so that the piston-rod and piston perform both an up-and-down and a revolving movement. The turning and lifting degree of the pistons, which determines the quantities of liquid and oil supplied to the emulsion-tank, depends itself upon the eccentricity of the ball-center 32 in relation to the pulley 18 or 118. This eccentricity may, during the run, be varied by means of the following mechanism.

The disk 20 in each of the pulleys 18 and 118 is toothed on its periphery, and its teeth engage a worm 34 on a shaft 35 which is chordally disposed in the pulley 18 or 118 (Figs. 5 and 6), and which externally carries a star-wheel 36 or 136. On the bed-plate 10 there are turnably disposed two hand-levers 37 and 137, each of which, by means of segments 38 and 138, may be adjusted into an intermediate position or into one or other of the two extreme positions, and each of which has two pins 39 and 40 or 139 and 140, respectively, which, when the lever is in the one or the other of its extreme positions, lies in the course of the arms of the star-wheel 36 or 136, either on the right or the left side of the wheel, so that the wheel, and thereby also the worm, 34, at each revolution of the pulley 18 or 118, is turned to a certain angle to the right or left. Hereby the disk 20 is also turned,

and the eccentricity of the ball-center 32, or the circle 33, is increased or diminished. When the hand-levers assume their central positions, the star-wheels 36 and 136 run free from the pins 39 and 40 or 139 and 140, so that the given turning and lifting degree of the pistons 26 and 126, and thereby also the mixture-proportion between the liquid and the oil is maintained unaltered. In order that the star-wheel and the worm 34 will not turn unintentionally, there is disposed a suitable friction brake, as shown at 41, Fig. 5.

The emulsion-tank 11 is cylindrical and surrounded by a temperating jacket 42, with inlet and outlet for a temperating means. It contains a number of resistance members or strainers 43 and 44, with intermediate distance-pieces 45. The resistance-members 43 situated nearest the inlet 46 are very open (coarse) and are not strainers in the general sense, since they consist, f. i. only of a few radially disposed metal strips or wires. The resistance-members 44 situated farthest from the inlet are perforated metal plates, and the size of the holes diminishes from strainer to strainer, so that the one farthest from the inlet has the smallest holes.

The above-mentioned stirring-device 14 on the shaft 13 consists of disks in which wings 47 are formed by cutting and bending out the plate of which they are made. These disks work in each of the chambers 48 between two of the resistance-members and between the end resistance members and the walls 49 and 50.

The mixture consisting of a certain quantity of milk or the like and a certain quantity of fat, oil, or the like, which mixture enters the emulsion-tank at 46, will immediately be set in rotating motion by the first disk 14, 47, as the stirring-device is driven at high speed, or from 1000 to 2000 revolutions per minute according to the size of the apparatus. The rotating mass will be more or less retarded in its rotation during its passage through the first resistance member 43, thus causing an intimate mixture and a fine atomization of the mass, which is then again set into rotation by the next stirring disk 14, 47, after which the rotation is again more or less retarded by the second resistance-member 43, and so on. The mass rotating in front of each strainer 44 can only pass the strainer in the form of fine jets, chiefly in an axial direction, and these jets will then be intercepted and whirled around by the stirring disk rotating behind the strainer, whereby the intimate mixture gradually accomplished in the front, right end of the tank is made still more regular and homogenous.

Behind the wall 50 situated opposite the inlet 46, which wall has a central opening

51, there is a disk 52, whose nave 53, by means of a wedge 55 passed through a slit 54 in the shaft 13, is unrevolvably connected with the shaft, and which, by means of a lever 56 engaging in a groove 57 in the nave 53 and connected with a spring-actuated rod 59 with screwthreads 60 and hand-wheel nut 61, can be displaced on the shaft, so that its front surface can be brought more or less close to the back surface of the wall 50. The chamber behind the disk 52 is closed by a cover 62, which is provided with an outlet 63 and also carries the axle-pin for the lever 56, a guide for the rod 59, and a bearing for the rear end of the shaft 13.

The mass which, in the above-described manner, has been actuated by the last stirring-disk 14, 47, after passing the last strainer 44, must, therefore, on its way from the opening 51 to the outlet 63, pass the chamber 64 between the wall 50 and the rotating disk 52 which, actuated by the spring 58, after the unscrewing of the nut 61, will approach the wall 50 more and more. If there should be comparatively hard particles in the mass, f. i., stearin or the like, which might give the product, f. i., margarin, a granular consistency, these particles may be completely mashed by making the chamber 64 sufficiently narrow; while, on the other hand, if there are no such particles in the mass, the chamber 64 may be made wider, or as wide as possible, or the outlet 63 may be disposed directly on the wall 50. In order to enhance the smoothing effect, the disk 52 may be furnished, on its front surface, with a spiral-shaped groove 65.

The details shown are, as has already been said, only by way of example, and, although they have given good practical results, the invention is not confined to them, and it is especially not confined to the use of a measuring-member (26 or 126), or the like, in each of the pipe-branches (28 or 128) connected with the pipe 29 or the outlet 46.

I claim:—

1. Emulsifying machine, including an emulsion-tank with inlet for the mixture ingredients and outlet for the emulsified mass, a number of stationary resistance-members disposed consecutively in said tank between the inlet and the outlet, a solid wall in front of said outlet, a stirring-device in said tank having rotating members between said resistance-members, and a rotating smoothing-member coöperating with said solid wall in front of the outlet.

2. Emulsifying machine, including an emulsion-tank with inlet, connected with feed-pipes for the mixture-ingredients, and with outlet for the emulsified mass, a number of stationary resistance-members disposed consecutively in said tank between the inlet and the outlet, a stirring-device in said tank having rotating members between

said resistance-members, a measuring-member in the feed-pipe for a mixture-ingredient, and means for regulating this measuring-member.

5 3. Emulsifying machine, including an emulsion-tank with inlet for the mixture-ingredients and outlet for the emulsified mass, a number of stationary resistance-members disposed consecutively in said tank
10 between the inlet and the outlet, a solid wall in front of said outlet, a stirring-device in said tank having rotating members between said resistance-members, a rotating smoothing-member, which collaborates
15 with said solid wall in front of the outlet, means for adjusting the distance of said smoothing-member from said solid wall, and means for determining the relative proportion of the mixture-ingredients previous to
20 their entry into said tank.

4. Emulsifying machine, including an emulsion-tank with inlet for the mixture-ingredients and outlet for the emulsified mass, a number of stationary resistance-
25 members disposed consecutively in said tank between the inlet and the outlet, a stirring-device in said tank having rotating members between said resistance-members, a driving-shaft for said stirring-device, a
30 measuring-member for determining the relative proportion of the mixture ingredients, means for transmitting the motive power of the driving-shaft to said measuring-member, and means for adjusting said
35 transmission.

5. Emulsifying machine, including an emulsion-tank with inlet for the mixture-ingredients and outlet for the emulsified mass, a number of stationary resistance-
40 members disposed consecutively in said tank between the inlet and the outlet, a stirring-device in said tank having rotating members between said resistance-members, a driving-shaft for said stirring-device, a
45 transverse shaft driven from said driving-shaft, measuring-members in each of the feed-pipes, means for transmitting the motive power of the transverse shaft to the measuring-members, and means for adjusting
50 said transmission.

6. Emulsifying machine, including an emulsion-tank with inlet for the mixture-

ingredients and outlet for the emulsified mass, a number of stationary resistance-
55 members disposed consecutively in said tank between the inlet and the outlet, the resisting influence of said members to the passage of the mass increasing toward the outlet, and a stirring-device in said tank having rotating members between said resistance-
60 members.

7. Emulsifying machine, including an emulsion tank having an inlet for the ingredients and an outlet for the emulsified mass, agitating and mixing means within
65 said tank, valve members controlling the supply of the ingredients to said tank, a driving shaft for the mixing means, and relatively adjustable operating connections between said shaft and the valve members,
70 the adjustment of such connections varying the relative proportions of the ingredients supplied to the tank.

8. Emulsion machine, including an emulsion tank, having an inlet for the ingredients and an outlet for the emulsified mass, agitating and mixing means within said
75 tank, a driving shaft for said mixing means, valve pistons controlling the supply of the ingredients to said tank, and operating connections between said driving shaft and the
80 valve pistons to impart a combined oscillatory and rectilinear movement to the pistons and thereby maintain the supply of the ingredients to the tank in invariable predetermined
85 relative proportions.

9. Emulsifying machine, including an emulsion tank having an inlet for the ingredients and an outlet for the emulsified mass, agitating and mixing means within said
90 tank, a driving shaft for said mixing means, means carried by said shaft to reduce the mass to uniform consistency as the emulsified mass is discharged through the outlet, and means for adjusting said reducing
95 means upon the shaft to control the flow of the mass through the outlet.

In testimony, that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

MARTIN LARSEN.

Witnesses:

ERNEST BOUTARD,
NIELS BUSCH-JENSEN.