This invention relates to the manufacture of oleomargarine, but particularly to the manufacture of oleomargarine in plants where large quantities of oleomargarine are produced daily.

An object of this invention is to produce a simple and efficient method of manufacturing oleomargarine in stream-line production with the view of materially reducing labor costs, costs of operation, and eliminating the handling of the product, which has heretofore been necessary, and has not only delayed production but has militated against an entirely sanitary product.

Another object is to produce new and improved apparatus, particularly adapted for use in the manufacture of oleomargarine, to the end that production may be increased and costs reduced and a more uniform and satisfactory product obtained.

Other objects and advantages of this invention will hereinafter appear, and, for purposes of illustration, but not of limitation, an embodiment of the invention is shown on the accompanying drawing, in which:

The figure is a side elevation partly in section and partly diagrammatic showing the apparatus employed in manufacturing oleomargarine.

As will hereinafter more clearly appear, an important characteristic of this invention resides in the arrangement of the various steps employed in the manufacture of oleomargarine, and the like, in such manner that they operate successively in a substantially continuous manner from the delivery of the emulsion from the churn or vat, to the finished product ready for packaging. The mechanisms and devices necessary for carrying out the several steps operate conjointly, or in timed relation, to each other, thereby eliminating handling of the oleomargarine during the course of manufacture and requiring only inspection from time to time to insure the proper and satisfactory working of the various parts, but manual conveying or transporting of the material from one step to another is entirely eliminated. This not only provides for carrying out of the processes automatically, but insures producing oleomargarine, the quality of which is at all times uniform and sanitary.

In the drawing, 10 designates a churn or vat to receive or produce the emulsion from the materials used in the manufacture of oleomargarine. It is well known to those skilled in this art that the oils and other ingredients used in the making of oleomargarine, differ to a considerable extent, but since such materials, or the character of the emulsion, form no part of the present invention, further description thereof is not considered necessary. From the reservoir 10 the emulsion is delivered through a pipe 11 controlled by a hand valve 12 to a pump cylinder 13 from which leads a discharge line 14. A check valve 15 controls the admission of fluid to the pump cylinder, and a check valve 16 controls the discharge of fluid therefrom.

The pumping operation in this instance is accomplished by a reciprocating piston 17 driven in any suitable manner from a crank 18. It will be apparent that on the suction stroke of the piston 17 the fluid is drawn past the check valve into the cylinder 13, and upon the pressure or upward stroke of the piston 17 the check valve 15 is closed and the check valve 16 is open, thereby forcing a predetermined charge of fluid into the discharge pipe 14. The operation of the pump can be controlled in order to predetermine the amount of fluid discharged therefrom. No means is shown for accomplishing this purpose, but it will be readily understood that this can be effected in several ways, such as by varying the capacity of the cylinder or the stroke of the piston according to the requirements of service.

The pipe 14 extends upwardly and terminates in a downwardly turned end portion 19 and has a spray nozzle 20 at the end thereof to break up or spray the fluid or emulsion into a downwardly inclined sluice-way 21. As the emulsion is sprayed from the nozzle 20, it is immediately brought in contact with cold water discharged into the sluice-way from a pipe 22, which leads from a suitable brine tank (not shown). The temperature of the water is controlled in any suitable manner, but it must be such that when the sprayed emulsion contacts it, the emulsion is changed to a crystalline or granular form, and it, together with the cold water, flows by gravity down the sluice-way 21.

Arranged directly beneath the discharge end of the sluice-way 21 is a housing 23 suitably mounted for rotation upon a base 24. Arranged within the housing 23 are a plurality of vertically disposed buckets 25 disposed in a circle. The buckets 25 have open upper ends and are formed with a plurality of vertically elongated slots 26. Each bucket is rotated at a relatively high rate of speed by an electric motor 27 operatively connected to each respective bucket by gearing 28. It will be understood that a motor is provided for rotating each bucket. The charge of water and crystals from the sluice-way 21 are dis-
charged into one of the buckets 25 as the housing 23 is intermittently rotated. Since the buckets 25 are driven at a high rate of speed the water is thrown off through the vertical slots 26 and the speed of rotation of the buckets should be regulated so that just the right amount of water is discharged, it being desirable to retain a certain percentage of water with the crystals. Consequently, the amount of water retained with the crystals may be predetermined, preferably empirically, according to the speed of rotation of the individual buckets. The cold water thrown off by the buckets 25 flows to a collecting chamber 28 in the base 24, from which it is delivered or pumped through the line 30 to the brine tank. Suitable screening (not shown) of the reclaimed water may be effected in any desired manner to recover any crystals which may have been thrown out with the water.

A platen 31 provides the bottom of each bucket 25 and has pins 32 which project outwardly from the edges thereof into the vertical slots 26. A rod 33 has a loose connection with the platen at one end, and is provided with a roller 34 on the opposite end to ride on the base 24. The cam track 35 is designed to raise the platen 31 after the respective bucket 25 has substantially completed its revolution with the housing 23, sufficiently to enable the paddles 26 to scrape the material in the bucket therefrom and advance the same along a guide 36. As the platens 31 move upwardly the pins 32 clear the slots 26 of any material which may have lodged therein so that for the next succeeding charge the slots are clear to enable the liquid to be thrown off during the working portion of the buckets. It will be understood that the housing 23 may be driven in any desired manner; for example, it may rotate continuously at a relatively slow rate of speed or intermittent motion may be imparted thereto in such manner that it stops long enough to receive a charge to one bucket and discharge of material from another bucket.

The paddle conveyor 36 advances the material along the guide 36 to a housing 38, in which a worm 48 is disposed. While the material is in the housing 38, a quantity of salt is delivered from a hopper 41 arranged above the guide 36, the amount of salt being so determined as to be sufficient to produce a desired consistency of the material. In the lower portion of the hopper 41 is a reciprocating discharging slide 42 driven in any suitable manner and having openings 43 in opposite end portions. As the discharging device or slide reciprocates salt flows into the opening 43, and when free of the hopper the salt drops into the housing 38. This takes place at each end of the stroke of the slide 42 in order to discharge a sufficient amount of salt to different parts of the housing 38.

The material in the worm housing is to some extent mixed by the action of the worm, which also forces the substance between pairs of gears A, B and C, which are arranged in succession and communicate with each other. As indicated by the arrows, the pairs of gears A, B and C rotate in opposite directions, the pitch of the worm being opposite to the amount of the substance, and act through squeezing operations to pump the material in advancing direction. In order thoroughly to work the oleomargarine, the gears, the teeth of each pair of which are in mesh, operate at different rates of speed. The pair of gears A rotate faster than the gears B, and the gears B are driven at a higher rate of speed than the gears C. In order to obtain the right consistency of the oleomargarine, and to render it more plastic, the sets of gears A, B and C are heated in any suitable manner, such as by passing coils of hot water through them in any suitable or well known manner. These gears are also jacketed, as indicated at 49, to receive warm water of the order of 80°F. to obtain the desired temperature of the material.

From the gears C the oleomargarine passes to a set of independently driven gears D, the speed of which can be regulated but which preferably rotate at approximately the same rate of speed as the gears C. These gears also are driven in a direction opposite to the direction of movement of the material. It will be apparent that a quantity of oleomargarine is forced between adjacent teeth of the several gears, and, as the latter rotate the material moves around, the excess being eventually squeezed out and discharged therefrom.

Mounted adjacent the uppermost portion of the uppermost gear of the set D, is a wheel 44, which is driven by and in timed relation to the gears D. Extending from the periphery of the wheel 44 are a series of arms 49 and 50, which make an indentation or depression in the oleomargarine disposed between a pair of adjacent teeth. Thereafter, as this material is advanced, a predetermined charge of milk, or milk combined with other materials, from a hopper 56 sufficient to fill such depression, is delivered in any suitable manner, as by a pair of adjustable feed gears 47. This enables the exact amount of milk to be delivered to the oleomargarine, and in such manner that it can be readily mixed and blended therewith.

From the gears D the oleomargarine is forced into a blender chamber 48, in which it is whipped by a series of blender arms 49 and 50, which stir up and agitate the material in a manner well known in the art. The form, construction and operation of the blender arms is conventional, and detail description thereof is not considered necessary.

From the blender chamber the oleomargarine is delivered to pairs of gears E and F similar to the gears heretofore described, except these gears are chilled in any suitable manner, as by cooling coils arranged throughout and a cooling jacket 52 enclosing the gears. From the gears F the material is discharged through a forming head 51, after which the oleomargarine is suitably packaged for shipment.

From the above description it will be understood that for a definite batch of oleomargarine, the moisture content can be closely controlled. This eliminates an objection which has heretofore been experienced in the customary procedure of manufacturing oleomargarine. It would be found that at one time the percentage of water in the finished product was much greater or less than at other times, and it was not possible to obtain uniform results. Furthermore, according to this process, the correct amount of salt and milk, or mixture containing milk, can always be had for a certain batch, inasmuch as it can be readily determined how much of these materials are required for a certain amount of oleomargarine, and the automatic operation insures against error. By passing the material through the process intermittently or in definite charges, these advantageous results are principally made possible, thereby obviating difficulties.
and objections heretofore experienced in the trade.

It is to be understood that numerous changes in details of construction, arrangement and operation may be effected without departing from the spirit of the invention, especially as defined in the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. The method of continuously and uniformly producing margarine, which consists in spraying predetermined charges of emulsion into a cold liquid bath of maintained temperature to form granular particles, centrifuging said particles and liquid to remove a predetermined quantity of the liquid, working the resultant mixture at a temperature above that of the liquid bath, forming depressions in said mixture, filling said depressions with milk to insure uniform charges of the latter to the mixture, and again working said mixture.

2. The method of producing margarine, which consists in delivering charges of emulsion to a cold liquid bath to form granular particles, removing a predetermined quantity of the liquid, working the resultant product, forming depressions in said product, and in then filling said depressions with an ingredient necessary to the finished product, whereby measured quantities of said ingredient are added to the product.

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