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2 SHEETS—SHEET 1.



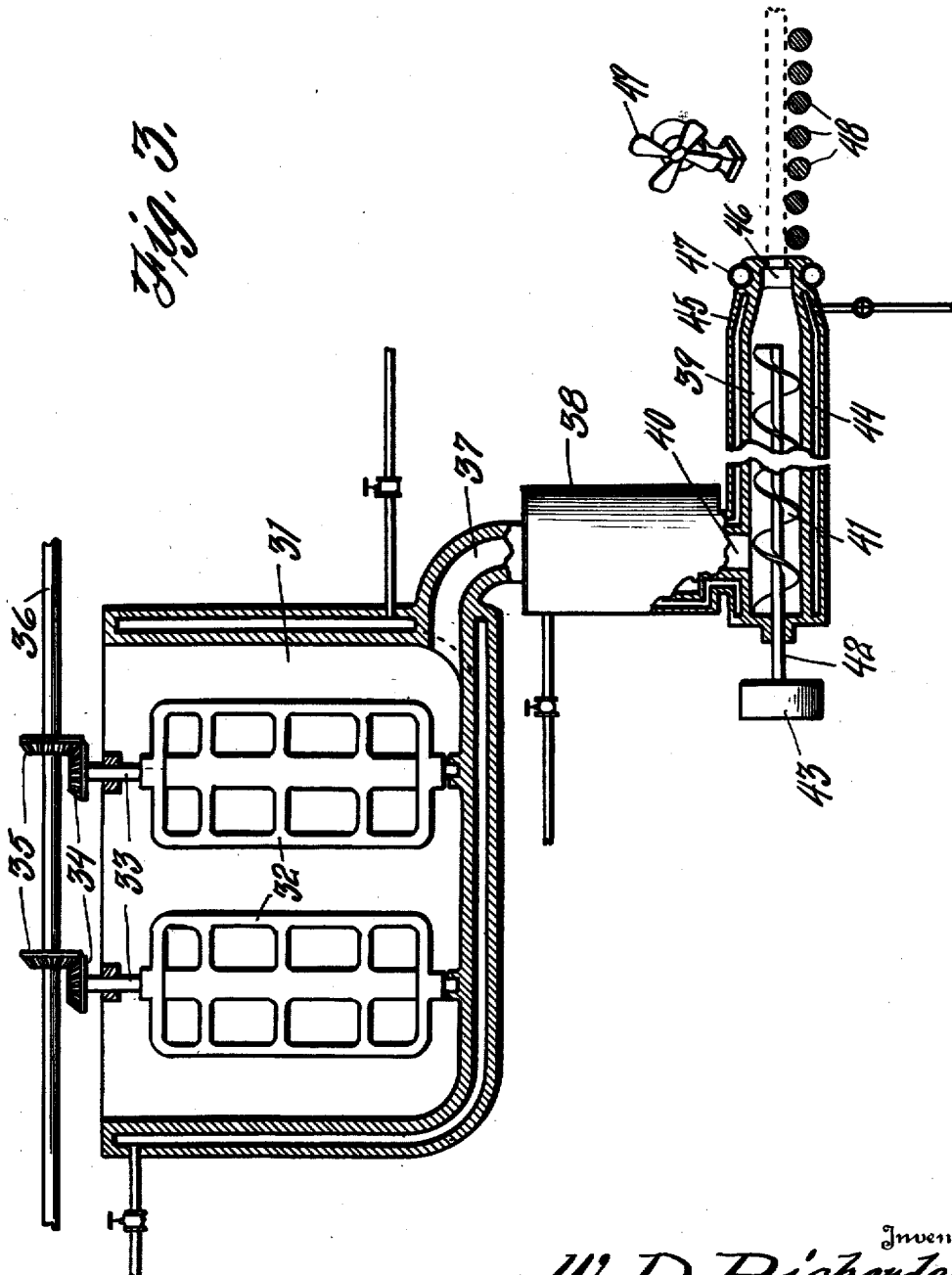
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METHOD FOR SOLIDIFYING NORMALLY SOLID SUBSTANCES.
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1,312,424.

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2 SHEETS—SHEET 2.



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UNITED STATES PATENT OFFICE.

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METHOD FOR SOLIDIFYING NORMALLY-SOLID SUBSTANCES.

1,312,424.

Specification of Letters Patent.

Patented Aug. 5, 1919.

Application filed January 8, 1916. Serial No. 70,980.

To all whom it may concern:

Be it known that I, WILLIAM D. RICHARDSON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods for Solidifying Normally-Solid Substances, of which the following is a specification.

My invention relates to improvements in apparatus for and method of solidifying, when in a liquid or plastic condition, normally solid substances, such as liquid or plastic soap, oleomargarin, butter or the like.

In accordance with the well known method of manufacturing soap, the liquid or molten soap is taken from the kettle and introduced into a crutcher, or the soap may be made in the crutcher. While in the crutcher, this soap is agitated and mixed with desired additional ingredients, such as sodium carbonate, sodium silicate, borax, and the like. The soap is then preferably dropped from the crutcher into a frame, forming a mold, with removable sides, and usually arranged upon a truck. In this mold, the liquid or molten soap is allowed to cool and solidify and this usually requires from one to four days' time, depending upon conditions, such as temperature, air circulation, and the like. After the soap has thus solidified the sides of the frame are removed, and the frame of soap is then cut into slabs, by what is known as a slabbing machine. These slabs are subsequently cut into cakes or bars, by a cutting machine, after which the cakes or bars are dried, pressed, wrapped and packed. This ordinary method of solidifying soap and forming it into cakes or bars is time consuming and expensive. Besides this, the frames or molds occupy a large amount of storage space. In the slabbing and cutting operations much waste soap is produced which must be remelted, reframed, reslabbed, and recut. When in the frames or molds air holes are often formed in the soap, and when this is discovered, the cakes or bars having them must be remelted and again passed through the usual process.

It is customary, in the manufacture of oleomargarin, to bring together in a suitable mixer, oils, fats, ripened milk, cream, and in some instances coloring matter. After

these ingredients are mixed together and emulsified for a sufficient length of time, the emulsion is allowed to come in contact with cold water in order to solidify it, or the same may be solidified by means of cooling rolls. The solidified material is then put into trucks and worked through various mixers, workers and blenders, during which processes, salt, butter, ripened milk and cream, are added in accordance with the manufacturing formula for the brand of oleomargarin being made. This method of manufacture is time consuming, expensive, and requires several different operations, and much unnecessary hard labor.

My invention aims to provide means for solidifying, when in a liquid or plastic state, normally solid materials or compositions, such as soap, butter, oleomargarin or the like, in a cheap, expeditious, convenient and highly satisfactory manner.

In the accompanying drawings forming a part of this specification and in which I have shown apparatus suitable for the practice of my methods or invention,

Figure 1 is a central vertical longitudinal sectional view through an apparatus, adapted for use in my method of solidifying soap,

Fig. 2 is a transverse sectional view with parts broken away, taken on line 2—2 of Fig. 1, and,

Fig. 3 is a central vertical longitudinal sectional view through an apparatus adapted for use in my method of solidifying oleomargarin or the like.

Attention being called first to Fig. 1, the numeral 5 designates a mixing crutcher, preferably having a jacket 6, for receiving steam or other suitable heating medium. In this crutcher, the soap from the kettle is agitated and mixed with any desired ingredients, such as sodium carbonate, sodium silicate, borax or the like. The soap may be made in the crutcher, if desired. The agitating means for the soap consists of a dasher 7, carried by a vertically rotating shaft 8, driven by a beveled gear 9. This bevel gear receives rotation from a bevel gear 10 carried by a shaft 11. The crutcher 5 is provided at its lower end with a preferably tapered bottom 12, carrying a depending tube 13. This tube discharges into the top of a preferably V-shaped receiving tank or chamber 14.

The bottom of the tank 14 is preferably substantially semicircular in cross-section, as shown at 16, and receives therein a spiral conveyer 17, driven by a horizontal shaft 18 having a pulley 19 rigidly mounted upon the outer end. The function of this conveyer is to force the more or less liquid or plastic soap from the bottom of the tank 14 into a discharge pipe or mouth 19', which discharges into a receiving hopper 20, provided with a double wall or jacket 21, forming a space for receiving a cooling medium, such as brine or the like. This double walled receiving hopper is carried by or formed upon a long preferably horizontal cooling and compression tube or casing 22, and leads into the upper portion thereof, as shown at 23. The tube 22 is provided with a jacket or outer wall 22', forming a space in free communication with the jacket space of the hopper 20, and also adapted to receive a cooling or freezing medium such as brine or the like. The tube 22 receives a preferably spiral compression conveyer 24, carried by a shaft 25. This shaft has a pulley 26 rigidly mounted upon its free end and receives rotation from any suitable source. The outlet or discharge end of the tube 22 is preferably provided with a contracted neck 27, having a contracted orifice or opening 28, of the desired cross sectional area and shape for the bars of soap to be formed. The more or less liquid or plastic soap entering the intake end of the tube 22 is engaged by the conveyer and in the presence of the cooling medium is impelled forwardly toward the outlet end thereof. By the time the soap reaches the orifice 28, it is converted into a solid and is forced through the orifice 28, in this solid condition and under suitable pressure. This compression tends to remove all air holes from the soap. In order that there may be no tendency for the solid composition or soap to stick or adhere to the walls of the orifice 28, such walls are preferably surrounded by a steam jacket or tube 28', whereby the exterior of the soap is melted, during its passage through the orifice to maintain a suitable lubrication. Any other suitable means may be employed to heat the walls of the contracted outlet orifice. The soap passing through the orifice 28 is sufficiently solidified so that it will not be deformed or distorted by the ordinary handling in the usual processes for cutting the soap. The soap discharges through the orifice 28 onto rollers 29, and may be conveyed thereby to a cutting machine. While passing upon these rollers 29 the soap is preferably subjected to a drying action from a fan 30, as shown.

In Fig. 3, I have shown apparatus for solidifying oleomargarin. The numeral 31 designates a jacketed tank or mixer which may be suitably heated, and adapted for the

reception of all of the ingredients which enter into the formula for the oleomargarin. Within this tank 31 are arranged agitating means embodying vertical dashers 32, driven by shafts 33, carrying bevel gears 34. These bevel gears are driven by bevel gears 35, driven by a shaft 36. The oleomargarin in the liquid or plastic state is discharged from the tank 31 through an outlet pipe 37 and is conducted or drawn through this pipe by gravity or by means of a pump 38, which preferably has a jacket for the reception of a cooling medium, such as brine, whereby such pump serves as precooling means. The pump 38 discharges into a horizontal cooling and compression tube or casing 39, as shown at 40. Mounted for rotation within this compression tube is a spiral conveyer 41, carried by a shaft 42, receiving its rotation from a pulley 43. This tube 39 is jacketed or provided with a double wall forming a space 44, for receiving a cooling medium, such as brine. The forward end of the tube 44 is provided with a tapered or reduced neck 45, having a reduced outlet orifice 46. This orifice is surrounded by a heading jacket or tube 47, adapted to receive steam or the like. Arranged near the orifice 46 are conveyer rolls 48 and a pan 49 is disposed adjacent thereto. The more or less liquid or plastic oleomargarin upon entering the intake end of the tube 39 is acted upon by the conveyer 41 and impelled forwardly toward the orifice 46 under suitable pressure while being subjected to the action of the cooling medium. By the time the oleomargarin has reached the orifice 46 it is solidified, and this solid composition is forced through the orifice, compressed, and passes therefrom in the form of bars or the like, having the desired cross sectional size and shape. The walls of the orifice may be heated to provide suitable lubrication, as hereinabove explained.

In the practice of my methods of solidifying soap, butterin and other normally solid compositions, I have found it desirable, as an aid in the final solidification, to allow the composition as it discharges from the shaping orifice, to come in contact with cold air. This contact with cold air may be effectively brought about by directing a cold air current, from an electric fan or blower, upon the composition. I have also found it advantageous to carry out my methods in a refrigerated room, the air in which has been chilled below ordinary room temperature although I have found that satisfactory results may be obtained by the practice of my methods in a room having ordinary room temperature.

It is to be understood that the forms of my invention herewith shown and described are to be taken as preferred examples of the same, and that various changes may be re-

sorted to without departing from the spirit of the invention or the scope of the subjoined claim.

Having thus described the invention, I
5 claim:

The herein described method of forming normally solid material into bars or the like, which consists in introducing the material while heated and in a more or less plastic or
10 liquid state into one end of an elongated space, subjecting the mass throughout the greater portion of its length and throughout substantially the entire cross sectional
15 area of said greater portion of the length to agitation and longitudinal propelling action toward the opposite end of the elongated space, the agitation being stopped at a point spaced a substantial distance from the lead-

ing end of the mass, simultaneously subjecting the mass throughout its entire length 20 to the action of a cooling fluid whereby the mass becomes more or less solid at the leading end portion, and propelling the leading end portion of the mass without agitation and by means of the agitated portion of the 25 mass through an uninterrupted contracted passage of substantial length to compress the more or less solid end portion and form the same into a bar of suitable shape.

In testimony whereof I affix my signature 30 in presence of two witnesses.

WILLIAM D. RICHARDSON.

Witnesses:

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