C. O. PHILLIPS.

APPARATUS FOR MOLDING SOAP.

APPLICATION FILED JUNE 5, 1920.

1,391,971.

Patented Sept. 27, 1921.

4 SHEETS—SHEET 1.

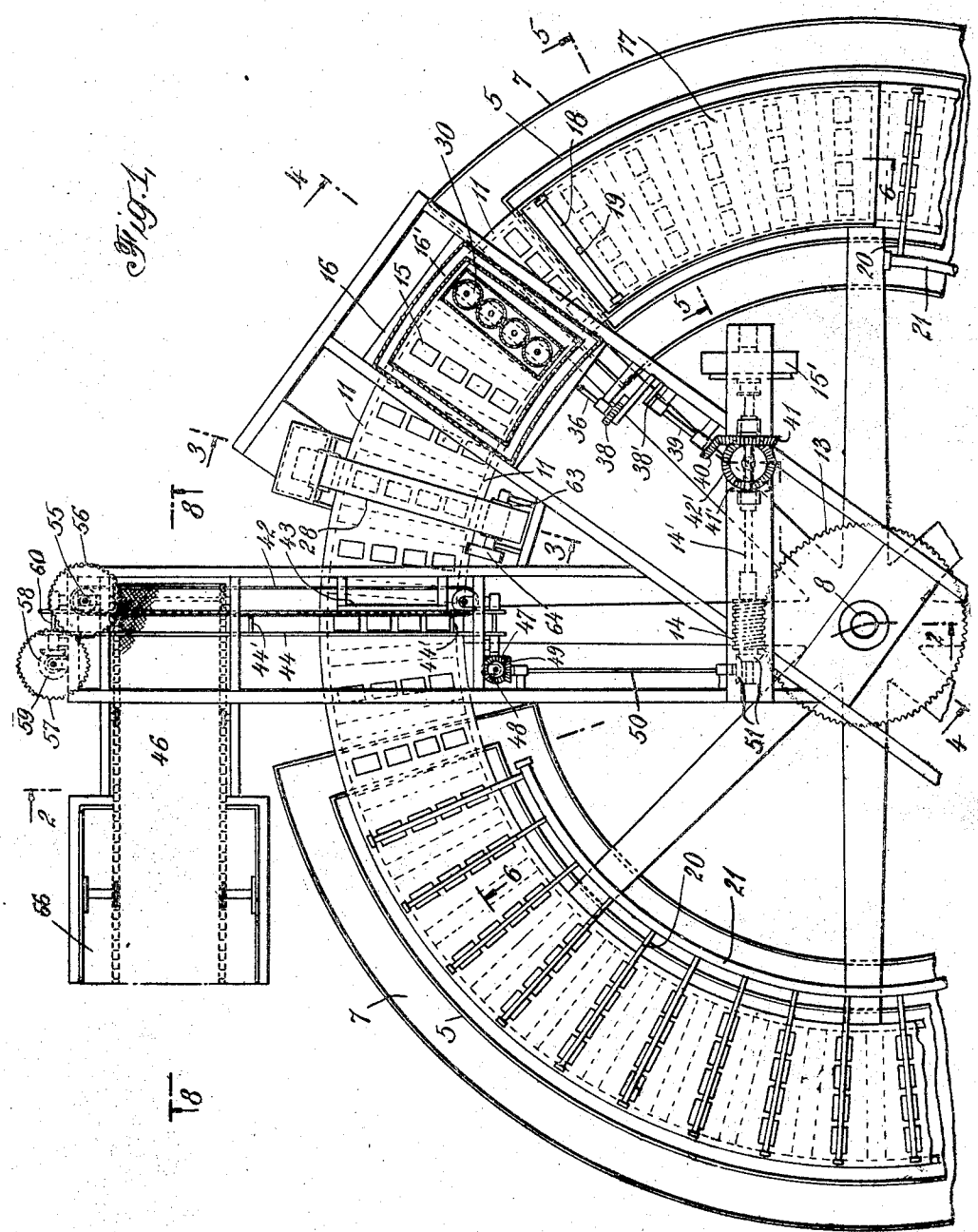


Fig. 1.

Inventor

Cecil O. Phillips

By his Attorneys

Pennie Davis Marvin & Edmonds

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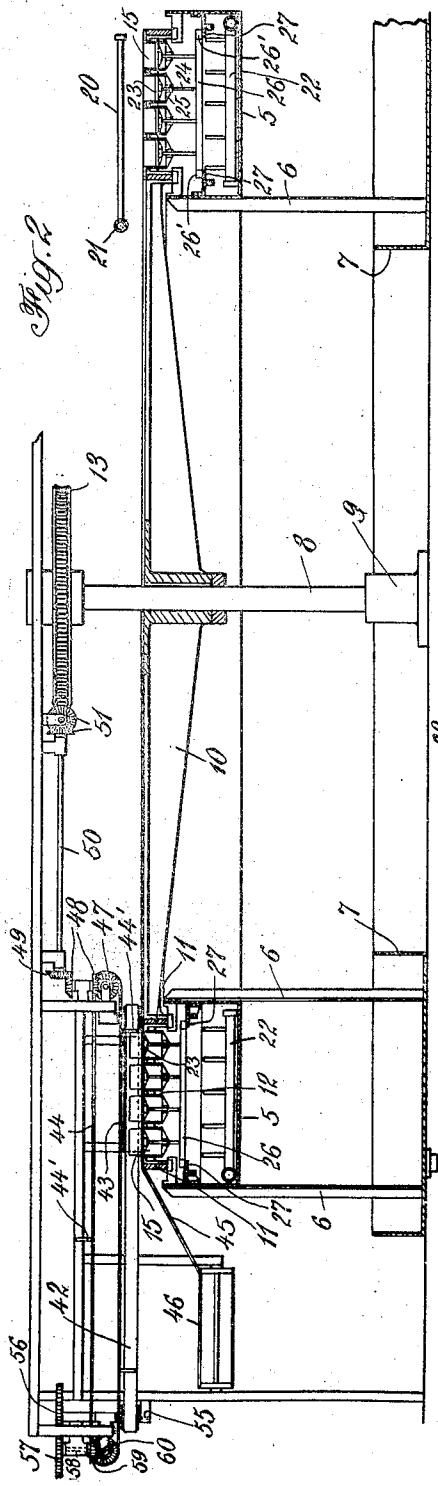


Fig. 2.

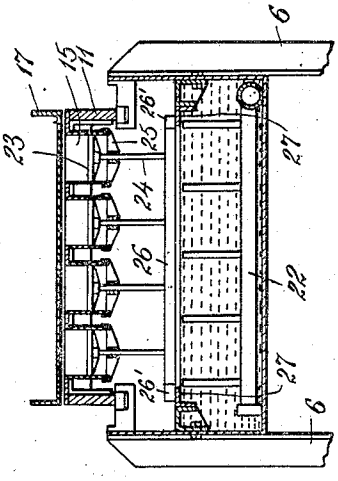


Fig. 5.

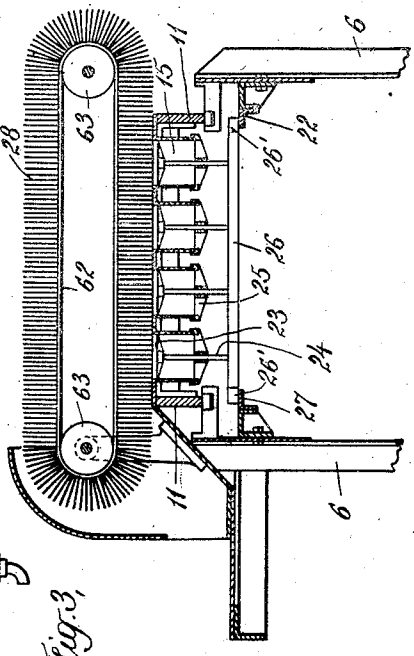


Fig. 3.

Inventor

Cecil O. Phillips

By his Attorneys

Pennie Davis Marvin & Edmonds

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4 SHEETS—SHEET 3.

Fig. 4,

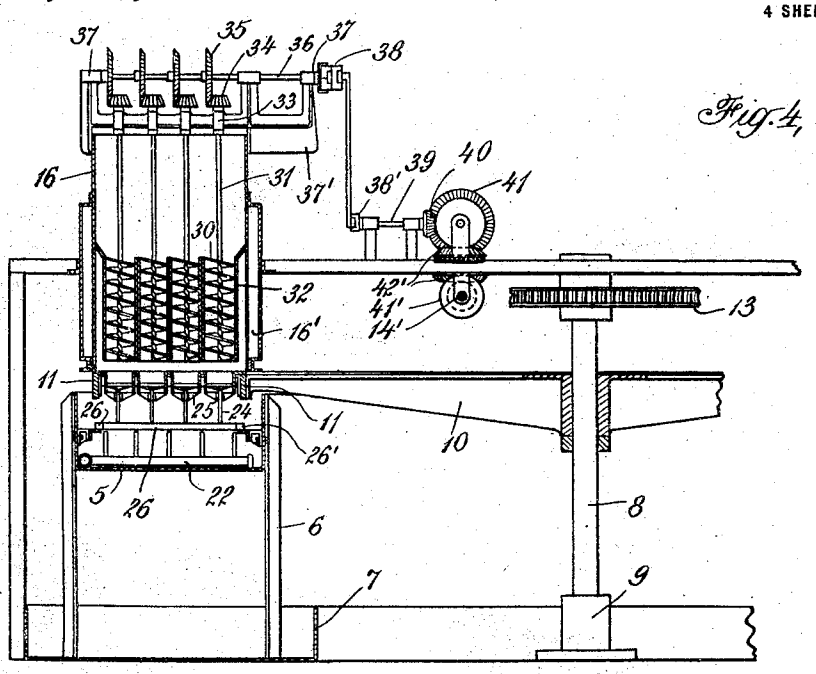


Fig. 7

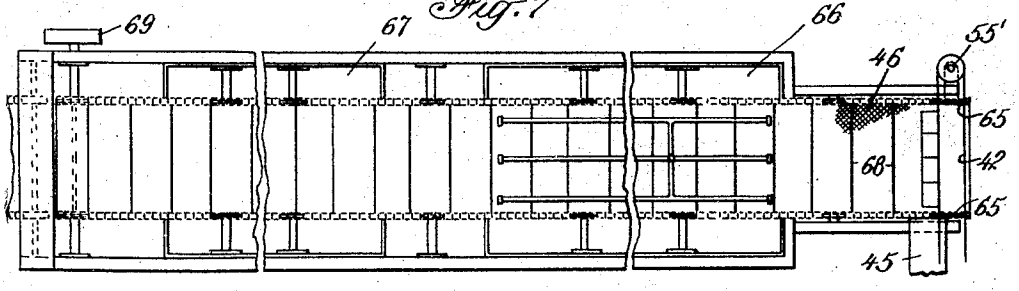
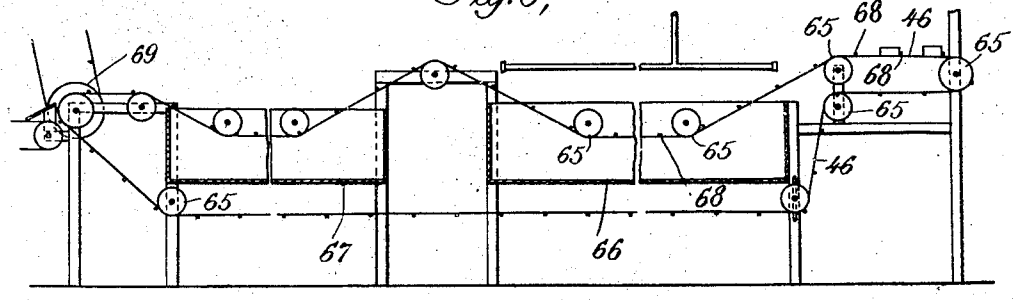


Fig. 8,



Inventor

Cecil O. Phillips.

By his Attorneys

Pennie Davis Marvin & Edmonds

C. O. PHILLIPS.

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4 SHEETS—SHEET 4.

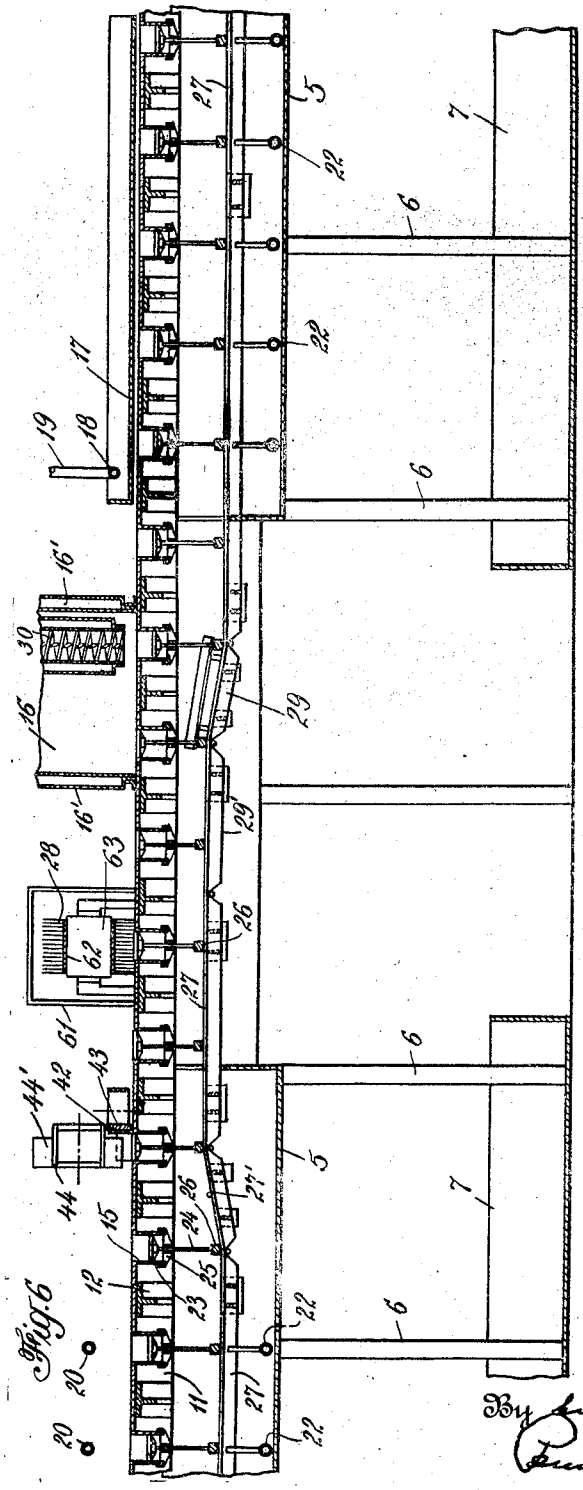


Fig. 6.

Inventor

Neil C. Phillips

By his Attorneys,

Dennis Davis Mauro & Edwards

UNITED STATES PATENT OFFICE.

CECIL O. PHILLIPS, OF NEW YORK, N. Y., ASSIGNOR TO THE AMERICAN COTTON OIL COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW JERSEY.

APPARATUS FOR MOLDING SOAP.

1,391,971. Specification of Letters Patent. Patented Sept. 27, 1921.

Application filed June 5, 1920. Serial No. 386,913.

To all whom it may concern:

Be it known that I, CECIL O. PHILLIPS, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Molding Soap; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to an improved apparatus for molding and cooling molten soap in a rapid and efficient manner.

In a copending application Serial No. 386,912, filed June 5, 1920, executed concurrently herewith, a method of molding and cooling soap has been described in which the soap while still molten is delivered into molds of approximately the shape of the desired cake and cooled therein by indirect and direct contact with cold brine. The partially cooled cakes of soap are then discharged from the molds and are directly subjected to cold brine to further chill the cakes and substantially complete the hardening of the soap. The soap cakes are then washed with fresh water to free the outer surface from brine. In the application referred to, an apparatus is illustrated and described in which the molds are arranged on the periphery of a rotating drum and certain accessory devices are provided for removing the soap from the molds.

The improved apparatus which forms the subject-matter of the present invention is adapted for use in applying the method described in the aforesaid application and is differentiated from the apparatus disclosed in that application by the arrangement of the molds on a rotating table whereby the cakes of soap are caused to travel first in indirect contact with cold brine, and subsequently in direct contact with brine sprayed thereon. Suitable means are provided to deliver the hardened cakes of soap from the molds and to subsequently subject the cakes to further hardening by contact with cold brine, after which the cakes are washed with water to remove the brine. The apparatus described in the present application presents numerous features of novelty, particularly as it is distinguished from the rotary drum apparatus described in the application previously referred to, and while the structure is described in more or less complete detail, in order that it may be clearly understood, it is obvious than many changes may be made in the details of construction and arrangement of the parts within the scope of the invention.

The various objects and advantages of the invention will be more clearly apparent and as it is better understood by reference to the following specifications and accompanying drawing in which:

Figure 1 is a plan view of a portion of the rotating table with the molds thereon;

Fig. 2 is a section on the line 2—2 of Fig. 1;

Fig. 3 is a section on the line 3—3 of Fig. 1;

Fig. 4 is a section on the line 4—4 of Fig. 1;

Fig. 5 is a section on the line 5—5 of Fig. 1;

Fig. 6 is a development in elevation of the rotary table and the accessories thereto;

Fig. 7 is a plan view of the auxiliary hardening and washing tanks; and

Fig. 8 is an elevation of the structure illustrated in Fig. 7.

Referring to the drawing, 5 indicates an annular tank supported by angle braces 6. Beneath the tank 5 a tank 7 is provided to receive any overflow from the tank 5, which may be delivered to a suitable waste pipe. At the axis of the tank 5 a shaft 8 is mounted in a step bearing 9, and supports spokes 10, extending radially therefrom, two rings 11 connected by braces 12 between each series of molds are supported on and surround the spokes 10. The shaft 8 is driven through the worm wheel 13 from a suitable source of power through a worm 14 and worm shaft 14′ carrying a pulley 15′ and the table is accordingly rotated at the speed best adapted to the accomplishment of the desired object. In general, this object is the feeding of molten soap to molds 15, a plurality of which are arranged between the rings 11, as the molds pass beneath a soap container 16 which may have a steam jacket 16 to maintain the soap in a liquid condition. Thereafter the molds are caused to travel beneath a pan 17 which may be supplied with cold brine from a header 18 connected by a pipe 19 to a source of cold

brine. As the soap is still in a molten condition, it must be carefully protected from direct contact with the brine which would damage the soap in this condition. As soon, however, as the surface of the soap has been chilled sufficiently to form a shell, the soap may be further cooled by the direct application of sprays of brine from headers 20 supplied through a pipe 21 with cold brine from a source thereof. This application of the brine spray is continued for a sufficient period to make the soap cake sufficiently hard to permit its removal from the mold, the cooling being facilitated by the spraying of brine against the underside of the molds from suitable headers 22, supplied with cold brine from a source thereof.

The molds 15 are provided with movable pistons 23 supported on stems 24 which are guided in spiders 25 secured to the lower edges of the molds and the stems 24 are connected to bars 26 having cam rollers 26′ mounted at each end thereof. These rollers travel on cam tracks 27 and during the initial cooling as the molds pass beneath the pan 17, the cam tracks may be slightly elevated so that the pistons 23 are gradually forced upwardly to take up the shrinkage of the soap. During the passage of the molds 15 beneath the brine sprays, the pistons 23 remain stationary and continue in the position assumed until the soap cakes have sufficiently hardened when the molds reach the point of discharge. Here the cam tracks 27′ are elevated to force the pistons 23, upwardly and the cakes of soap are removed from the table in the manner hereinafter described. The pistons 23 are then raised slightly above the surrounding surface by the cam tracks 27 and in this position are brushed and are thereafter lowered slightly by the cam tracks 29′ to a position in which they are flush with the surrounding surface before they pass beneath the soap container 16 where they are positively retracted by an auxiliary cam track 29. The cam track 27 27′ and 29 29′ are preferably adjustable throughout their length to permit the desired amount of travel of the pistons 23. Thus the thickness of the soap cakes may be varied at will and the apparatus may be adjusted to take care of the shrinkage of the soap during cooling.

With this general understanding of the function and arrangement of the apparatus, the details will be more clearly understood. Thus the soap container 16 for the molten soap is provided with a plurality of feeding worms 30 arranged on shafts 31 within the cylinders 32. The shafts 31 are supported in bearings 33 and are provided with bevel pinions 34 meshing with corresponding gears 35 on the transverse shaft 36, which is supported in bearings 37 in a frame 37′, mounted on the soap container 16. The shaft 36 is actuated through a pawl and ratchet feed 38 which is in turn operated by a crank 38′ on a shaft 39 having a bevel pinion 40, which meshes with the corresponding gear 41 which in turn is driven, through the gears 42′ by the gears 41′ on the worm shaft 14′. As the table rotates under the actuation of the shaft 8 and the molds 15 are moved beneath the soap container 16, the liquid soap is forced into the molds and is charged therein by the feeding worms 30 while the molds are passing beneath the soap container. The molds travel thence, as previously described beneath the pan 17 and the soap is subjected to indirect cooling of the cold brine in the tray and thereafter to the direct action of the brine which is sprayed onto the molds.

As the molds successively reach the discharge point, the pistons 23 of the molds are lifted as previously described and further progress of the soap cakes is arrested by contact with a continuously moving belt 42 which is backed by a board 43 to prevent distortion of the belt. At the same time, the soap cakes are engaged by one of the flights 44′ on a belt 44 which removes the soap cakes from the pistons onto the incline 45 and they are thus delivered to a traveling belt conveyer 46. The belt 44 is actuated through bevel gears 47, 48, 49 and shaft 50, which are in turn actuated through bevel gears 51 from the worm shaft 14′ and the belt 44 is timed to bring one of the flights 44′ into contact with the cakes of soap as the latter are released from the molds. The belt 42 is actuated through a shaft 55, gears 56 and 57, a shaft 58 and bevel gears 59, one of which is arranged on the shaft 60 which supports the belt 44. The purpose of the belt 42 is to prevent distortion of the soap cakes as the latter are moved from the table, the belt 42 furnishing a surface which is in unison with the belt 44 which removes the cakes.

As previously stated, the pistons 23 of the molds remain in elevated position after the soap cakes are moved from the table and are subjected to a brush 28. Any suitable form of brush may be employed, but preferably the brush is mounted on a belt 62 supported by pulleys 63 which may be actuated through any suitable driving mechanism, for example, through a pulley 64. If desired, the pistons 23 of the molds may be elevated slightly above the table during the brushing operation to insure that they are thoroughly cleaned and prepared for the reception of further quantities of liquid soap.

The belt conveyer 46 is supported upon a series of idler pulleys 65 and passes through a pair of tanks 66 and 67 in the first of which a sufficient supply of cold brine is maintained to nearly submerge the cakes of soap on the belt conveyer 46. The second tank 67 is supplied with fresh water to wash the brine from the hardened soap. The belt

conveyer 46 may be provided with flights 68 to insure the travel of the soap therewith. The belt conveyer 46 may be driven in any suitable manner, for example, through a pulley 69. It is to be understood that the tanks 66 and 67 may be of suitable length to insure accomplishment of the desired object which is the final cooling of the soap by the cold brine and the washing of the brine from the soap. After passing the tank 67 the soap may be removed from the belt conveyer 46 and is ready for further treatment preparatory to shipment.

In the operation of the apparatus as hereinbefore described, the molten soap from the crutchers and compounded with the usual ingredients is introduced into the soap container 16 and is maintained therein by the steam jacket at the proper temperature. The molds on their support are slowly and continually advanced in succession to a position beneath the soap container and are thus successively filled with molten soap. The pistons in each mold are held flush with the surrounding surface of the mold sections until the molds are beneath the soap container. The pistons are then retracted in the manner previously described and the soap enters the molds by gravity and is subsequently charged therein by the action of the feeding worms. The intermittent action of the worms is so timed that the soap is forced downwardly into the molds as the latter pass beneath the worms. The action results in the filling of the molds with molten soap and a substantial avoidance of the occlusion or inclusion of air bubbles or air pockets in the molds.

As the filled molds advance beyond the soap container the soap is subjected to the indirect cooling action of the cold brine in the pan 17 and simultaneously to the action of cold brine sprayed directly onto the undersides of the molds. The soap is thus given a preliminary chill so that the outer surface of the cakes becomes hardened. The molds pass thence from beneath the pan 17 and cold brine is sprayed directly upon the upper surface of the cakes, while the brine spray continues to act upon the undersides of the molds. The resulting action is a rapid and efficient cooling and hardening of the soap cakes which continues as the molds advance to the discharge point.

During the preliminary cooling beneath the pan 17 an appreciable shrinkage of the soap occurs and this is compensated for by the arrangement of the cam tracks 27 which slightly elevate the pistons during this period of the travel. The soap in the molds is compacted sufficiently to take care of the shrinkage so that the soap in the molds is of symmetrical form. After the period of shrinkage the pistons remain stationary throughout the travel of the molds until the discharge point is reached. By this time the soap has become sufficiently hardened to permit removal from the molds and the pistons are successively elevated to bring their upper surface into the plane of the surrounding surface, so that the cakes may be removed by the mechanism previously described. The cakes are prevented from advancement farther by the belt 42 and are discharged on to the conveyer 46 which delivers them to the after cooling brine tank.

In the latter tank the soap is slowly advanced and is exposed to the direct action of the cold brine to completely harden the soap. If, however, the soap so removed from the brine tank were still covered with brine, it would present a chalky appearance when dried and would be unsuitable for sale because of its appearance. Accordingly the soap after cooling in the brine tank is delivered by the conveyer 46 to the washing tank where it is subjected to the action of fresh water which removes the traces of brine, the soap being delivered from the washing tank entirely free from any objectionable amount of brine. The soap may then be dried and pressed and is ready for the market.

The thickness of the cakes of soap can be readily varied without modifying the structure of the apparatus by simply adjusting the cam tracks to maintain the pistons in the desired position. By raising or lowering the cam tracks, a thinner or thicker cake can be produced at will. It is evidenced, moreover, that the molds may be of different sizes and shapes, for example, such that the resulting cake may be oval, round or square as desired.

Inasmuch as certain materials are corroded by the brine, the apparatus should be constructed of material which is not acted upon by brine or if the materials are of such a character as to be readily corroded, the apparatus should be enameled or otherwise protected. The parts of the apparatus which are immersed in the brine may thus be coated with enamel or constructed of metal alloys which are unaffected by brine. Soaps of different character and compositions may be molded and cooled in the apparatus and according to the method which it is designed to carry out. The soap may thus be "floating" or "non-floating" soap of high purity or it may be a laundry or other soap containing other detergent ingredients admixed therewith. The soap, prior to molding and cooling, is subjected to the usual preliminary treatments well understood in the art and is brought to the soap container 16 at a temperature in the neighborhood of 150 to 175° F. and is charged into the molds at approximately the same temperature. While the apparatus as illustrated and described is a preferred embodiment of the invention, it is

to be understood that the invention comprehends numerous changes in the details which do not affect the accomplishment of the desired result.

I claim:

1. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a vertical axis, means for filling the molds with molten soap and means for conveying the molds in indirect contact with a cooling liquid.

2. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds above a fixed axis, means for filling the molds with molten soap, means for conveying the molds in indirect contact with a cooling liquid and means for subsequently spraying the soap in the molds with the cooling liquid.

3. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds above a fixed axis, means for filling the molds with molten soap, means for conveying the molds in indirect contact with a cooling liquid, means for subsequently spraying the soap in the molds with the cooling liquid, and means for ejecting the soap from the molds.

4. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a vertical axis and means for subjecting the soap in the molds to the indirect action of a body of cooling liquid, and means for afterward directly spraying the soap in the molds with the cooling liquid.

5. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a vertical axis, means for subjecting the soap in the molds to the action of a body of cooling liquid, the soap being protected from direct contact with the liquid during the initial period of its travel, and independent means for ejecting the soap from the molds.

6. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a fixed axis, means for filling the molds with molten soap, means for conveying the molds in indirect contact with a cooling liquid, means for subsequently spraying the soap in the molds with the cooling liquid, means for ejecting the soap from the molds, and supplemental means for cooling and hardening the soap.

7. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a fixed axis, means for filling the molds with molten soap, means for conveying the molds in indirect contact with a cooling liquid, means for subsequently spraying the soap in the molds with the cooling liquid, means for ejecting the soap from the molds, and supplemental means for cooling by direct contact with a cooling liquid and for subsequently washing the soap.

8. An apparatus for molding and cooling soap comprising a plurality of molds, cooling means above the molds and adapted to absorb heat from the soap therein, means for moving the molds about a vertical axis, each mold having a piston, and operating means therefor, and means for establishing the position of the pistons in the molds.

9. An apparatus for molding and cooling soap comprising a plurality of molds, cooling means associated with the molds and adapted to absorb heat from the soap therein, means for moving the molds about a vertical axis, each mold having a piston and operating means therefor, means for establishing the position of the pistons in the molds, said means being adjustable to permit variation of the thickness of the cakes of soap.

10. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a vertical axis, each mold having a piston, and operating means therefor, means for establishing the position of the pistons in the molds, and means for successively filling the molds with molten soap and subsequently cooling the soap therein.

11. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a vertical axis, each mold having a piston, and operating means therefor, means for establishing the position of the pistons in the molds, means for successively filling the molds with molten soaps and subsequently cooling the soap therein, and means for ejecting the cooled soap.

12. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a vertical axis, each mold having a piston, and operating means therefor, means for establishing the position of the pistons in the molds, means for successively filling the molds with molten soap and means for subjecting the soap to the action of a cooling liquid.

13. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a vertical axis, each mold having a piston, and operating means therefor, means for establishing the position of the pistons in the molds, means for successively filling the molds with molten soap, means for subjecting the soap to the action of a cooling liquid, the soap being protected from the liquid during the initial period of its travel.

14. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a vertical axis, each mold having a piston, and operating

means therefor, means for establishing the position of the pistons in the molds, means for successively filling the molds with molten soap, means for subjecting the soap to the action of a cooling liquid and means for ejecting the cooled soap.

15. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a vertical axis, each mold having a piston, and operating means therefor, means for establishing the position of the pistons in the molds, means for successively filling the molds with molten soap, means for subjecting the soap to the action of a cooling liquid, means for ejecting the cooled soap, and supplemental mean for further cooling and hardening the soap.

16. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a fixed axis, means for successively filling the molds with molten soap, a pan filled with cooling liquid arranged so that the bottom is in close proximity to the soap in the molds during the initial period of travel of the filled molds and means for spraying the under sides of the molds with the cooling liquid.

17. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a fixed axis, means for successively filling the molds with molten soap, a pan filled with cooling liquid arranged so that the bottom is in close proximity to the soap in the molds during the initial period of travel of the filled molds, means for spraying the under sides of the molds with the cooling liquid, and means for spraying the soap in the molds with the cooling liquid after the initial period of travel thereof.

18. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a fixed axis, means for successively filling the molds with molten soap, a pan filled with cooling liquid arranged so that the bottom is in close proximity to the soap in the molds during the initial period of travel of the filled molds, means for spraying the under sides of the molds with the cooling liquid, means for spraying the soap in the molds with the cooling liquid after the initial period of travel thereof, and means for discharging the soap from the molds.

19. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds about a fixed axis, means for successively filling the molds with molten soap, a pan filled with cooling liquid arranged so that the bottom is in close proximity to the soap in the molds during the initial period of travel of the filled molds, means for spraying the under sides of the molds with the cooling liquid, means for spraying the soap in the molds with the cooling liquid after the initial period of travel thereof, means for discharging the soap from the molds, and supplemental means for cooling and hardening the soap after its discharge from the molds.

20. An apparatus for molding and cooling soap comprising a plurality of molds, means for moving the molds above a fixed axis, means for filling the molds with molten soap, means for conveying the molds in indirect contact with a cooling liquid, means for subsequently spraying the soap in the molds with the cooling liquid, means for ejecting the soap from the molds, and means for cleaning the molds preparatory to receiving a fresh charge of molten soap.

In testimony whereof I affix my signature.

CECIL O. PHILLIPS.