F. A. SECORD.

APPARATUS FOR HARDENING AND MOLDING SOAP.

APPLICATION FILED JUNE 11, 1914.

1,294,545.

Patented Feb. 18, 1919.

3 SHEETS—SHEET 1.

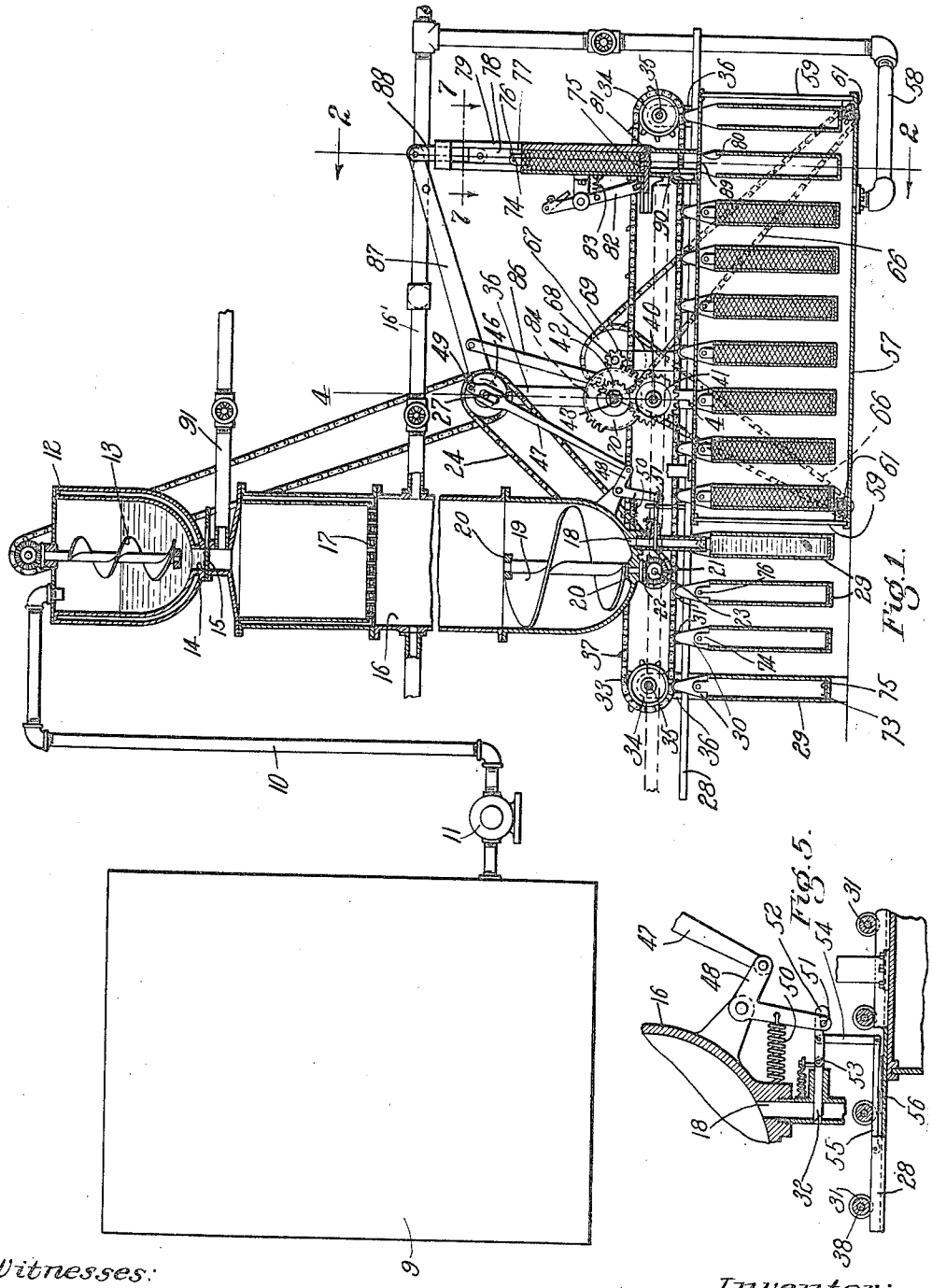


Fig. 1.

Fig. 5.

Witnesses:

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Leonard A. Powell.

Inventor:

Frederick Award Secord,

by his attorney, Charles S. Gooding.

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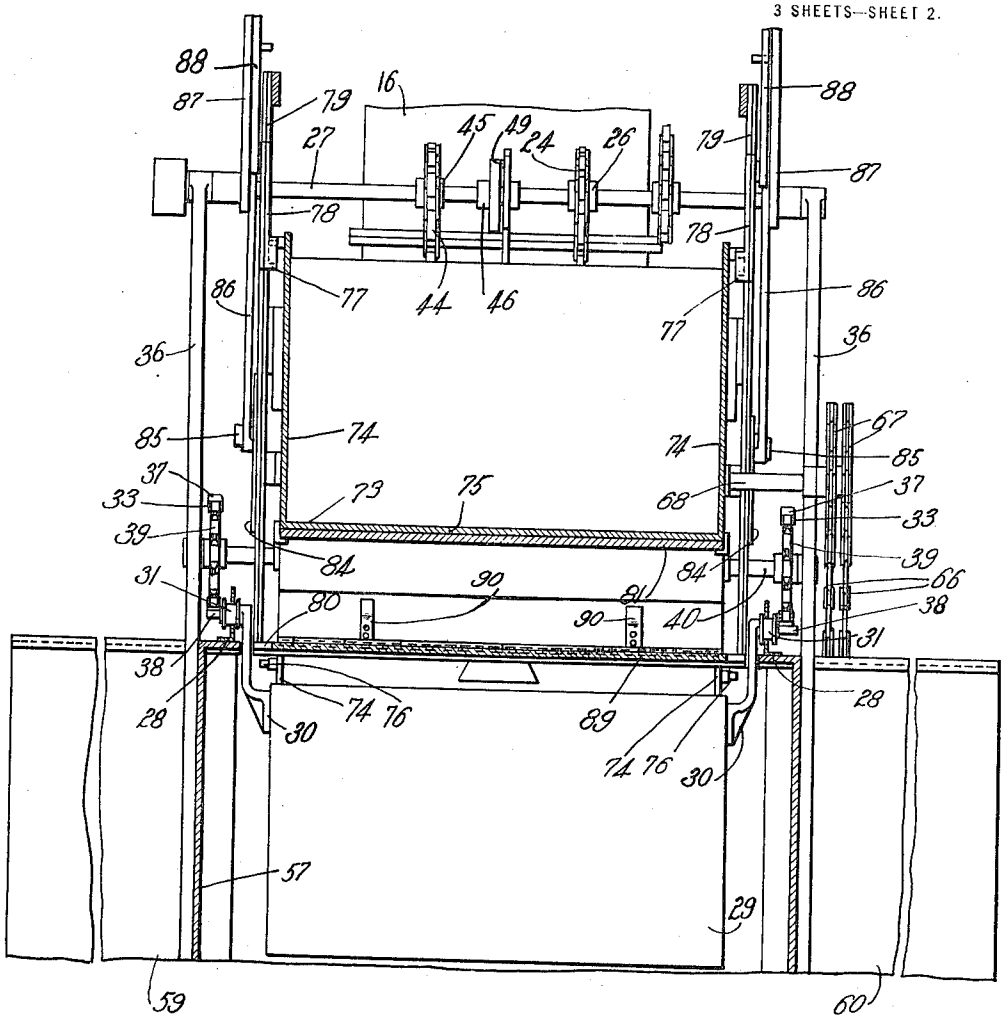


Fig. 2.

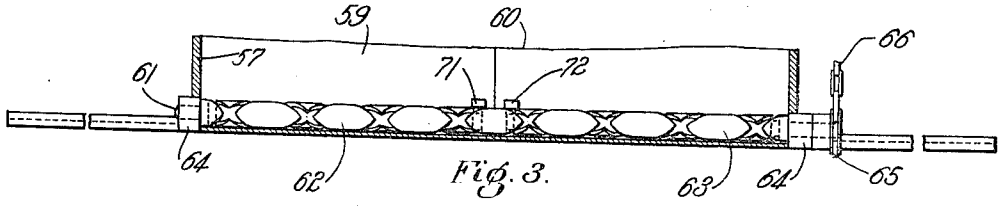


Fig. 3.

Witnesses:
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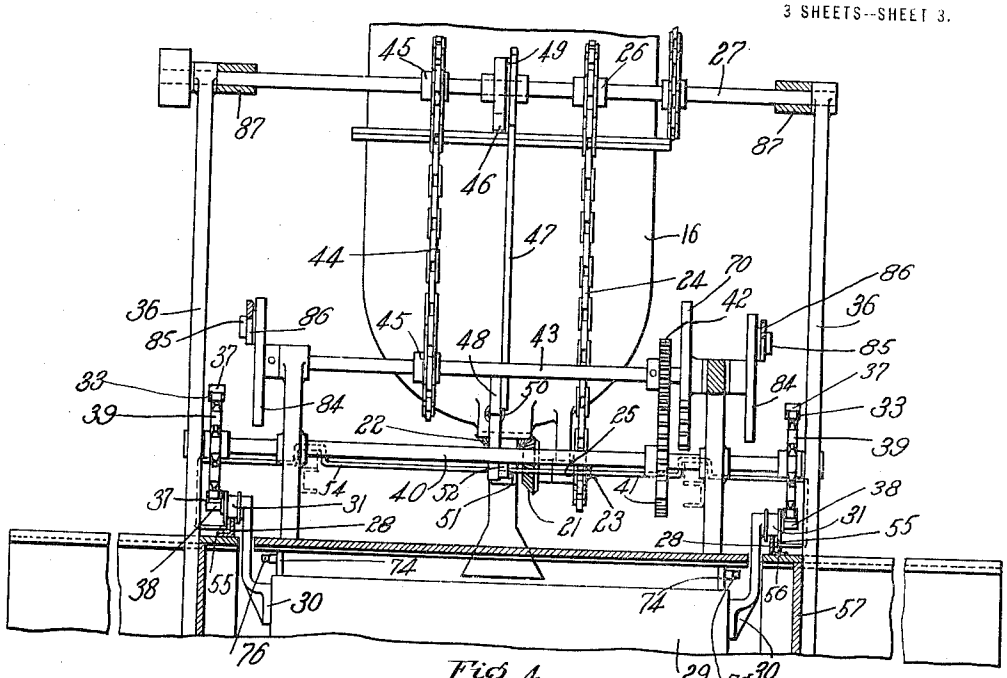


Fig. 4.

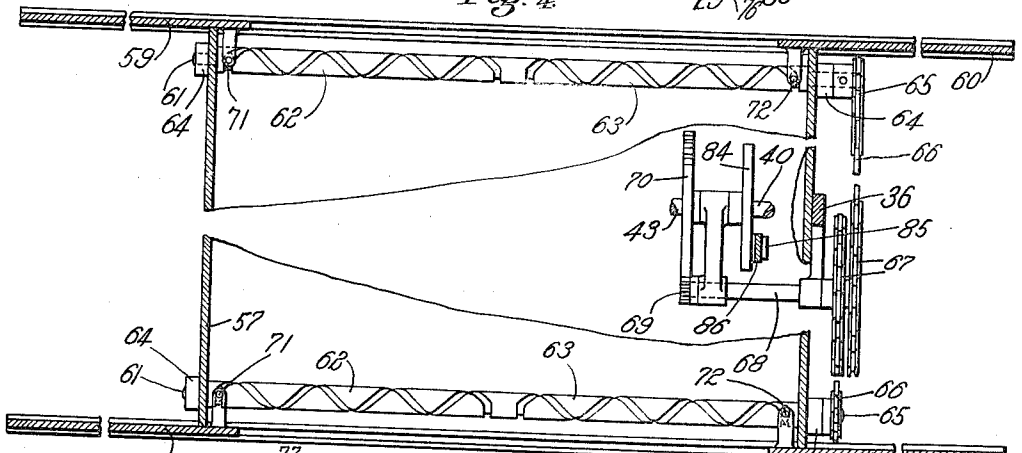


Fig. 6.

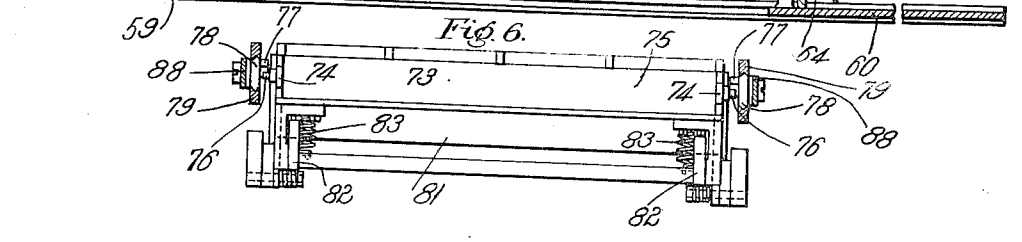


Fig. 7.

Witnesses:

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UNITED STATES PATENT OFFICE.

FREDERICK AVARD SECORD, OF ST. JOHN, NEW BRUNSWICK, CANADA, ASSIGNOR OF ONE-THIRD TO ALEXANDER PIERCE PATERSON AND ONE-THIRD TO CHARLES HENRY PETERS, BOTH OF ST. JOHN, NEW BRUNSWICK, CANADA.

APPARATUS FOR HARDENING AND MOLDING SOAP.

1,294,545. Specification of Letters Patent. Patented Feb. 18, 1919.

Application filed June 11, 1914. Serial No. 844,576.

To all whom it may concern:

Be it known that I, FREDERICK AVARD SECORD, a subject of King George V of England, residing at St. John, in the Province of New Brunswick, Canada, have invented new and useful Improvements in Apparatus for Hardening and Molding Soap, of which the following is a specification.

This invention relates to apparatus for hardening and molding soap or like substances and has for its object to provide an apparatus adapted to receive a mass of liquid soap from a mixing machine, commonly known in the art as a crutcher, and harden said soap to such a degree of hardness that it will retain its shape after the tray or mold into which it has been formed has been removed in order that said substance especially when soap may be cut or stripped into bars.

The usual length of time required to harden soap to the extent above stated by present methods is usually from four to six days, whereas with the apparatus herein described the operations may be completed in substantially sixty minutes or less, and after the first mass of soap has passed through said apparatus a hardened mass may be delivered thereby substantially every seven minutes, provided a constant supply of ingredients are fed to said mixer.

The invention consists in means for conducting masses of soap from said mixer to the soap cutting instrumentalities, and during said movements in exposing said soap to currents of cold dry air.

The invention further consists in the combination and arrangement of parts set forth in the following specification and particularly pointed out in the claims, whereby the above object and other objects hereinafter appearing may be attained.

Referring to the drawings:

Figure 1 is a vertical section, partly in elevation, and parts broken away, of an apparatus embodying my invention.

Fig. 2 is a section partly in elevation taken on line 2—2 of Fig. 1.

Fig. 3 is a detail elevation of one of the ends of the casing illustrating the mechanism for opening and closing the doors therefor.

Fig. 4 is a section taken on line 4—4 of Fig. 1.

Fig. 5 is a detail view illustrating the means for automatically opening the gate at the bottom of the tank.

Fig. 6 is a plan view somewhat diagrammatic of the mechanism for opening and closing the doors of the casing.

Fig. 7 is an enlarged section illustrating a portion of the mold elevating means and the means for operating the supporting shelf for said mold during the upward movements thereof, see line 7—7 Fig. 1.

In the drawings, 9 is a kettle of the usual type employed by soap makers in melting the ingredients from which soap is made. From the kettle 9 the ingredients, after being heated to the desired temperature, are pumped through a pipe 10 preferably by means of a pump 11 into a mixing machine commonly known in the art as a crutcher 12, said mixing machine being provided with a rotary stirrer 13 by means of which the ingredients while in their melted state may be thoroughly mixed.

The crutcher 12 is provided with an outlet orifice 14 having a gate 15 arranged to reciprocate transversely of said orifice to open and close the same, said orifice being arranged at the bottom of said crutcher. A tank 16 is arranged preferably directly beneath the crutcher 12 and is adapted to receive the soap from said crutcher in a liquid state. A foraminated partition 17 is arranged adjacent the upper end of said tank 16 for the purpose of diffusing the soap which is discharged from said crutcher into said tank.

As said soap drops from the partition 17 in small particles, said particles are engaged by currents of dry cold air at a temperature preferably about zero and conducted or supplied to the interior of the tank 16 by means of a pipe 16′ connected with any suitable cold air supplying means not shown in the drawings. Said cold air as it contacts with said small particles of soap causes said particles to become partially solidified or hardened before they arrive at the lower end of the tank 16. A discharge pipe 18 is connected at the lower end of said tank 16 through which the soap from said tank is removed in the desired or predetermined quantities.

Means are provided adjacent the lower end of the tank 16 by which the soap de-

posited therein may be agitated and the discharge thereof assisted, said means preferably consisting of a rotary screw 19 journaled to rotate in bearings 20 formed in said casing, adapted to be rotated by a gear 21 meshing with a gear 22 fast preferably to the lower end of the screw 19. The gear 21 is secured to a shaft 23 which is operatively connected preferably by means of a chain 24 and sprockets 25 and 26 to a driving shaft 27.

A track 28 is arranged beneath the tank 16 which is adapted to guide a plurality of molds 29 beneath the discharge pipe 18, said molds having brackets 30 at opposite ends thereof and carrying rolls 31 which roll along said track 28 and sustain said molds thereon. These molds are presented one at a time to the discharge pipe 18 which is then opened by a gate 32 permitting a predetermined amount of soap to be forced preferably by the screw 19 into said mold.

The speed at which said soap is discharged from said tank is regulated by the rotation of the screw 19. After one of said molds has been filled the same is moved along the track 28 and another mold presented beneath the pipe 18 in readiness to receive its allotment of soap. To move said molds along said track at the desired time and speed, a pair of endless chains 33 are arranged at opposite ends of said molds adjacent the tracks 28, said chains engaging sprockets 34 mounted upon shafts 35 journaled to rotate in the side frames 36. Arranged along said chains at predetermined distances apart are projections 37 adapted to engage studs 38 for the rolls 31.

At the proper time in the operation of the apparatus the chains 33 are operated to move the molds successively beneath the discharge pipe 18, said feeding movement being preferably accomplished by a pair of sprockets 39 fast to a shaft 40, said shaft having an intermittent gear 41 fast thereon which is intermittently rotated by a gear 42 fast to a shaft 43, a rotary motion being imparted to the shaft 43 from the shaft 27 preferably by means of a chain 44 and sprockets 45.

It will be seen by referring to Fig. 1 of the drawings that one-half of a rotation of the intermittent gear 42 is adapted to move the chains the distance between a successive pair of molds, thus leaving the remaining one-half portion of the rotation of said gear and the shaft upon which the same is mounted to accomplish the filling of the mold beneath the tank 18.

The operation of the gate 32 is automatic, that is to say, as soon as a mold has been moved beneath the discharge pipe 18 said gate is adapted to be opened by a cam 46 fast to the shaft 27. A cam slide 47 is connected at its lower end to a bell crank lever 48 pivoted on the tank 16, the upper end of said slide having slidable engagement with said shaft 27 and adapted to be operated by the cam 46 which engages a cam roll 49 upon said slide. The cam 46 is positioned on the shaft 27 so as to operate the slide 47 at the time the shaft 40 is at rest, that is, when one of the molds is beneath the discharge pipe 18, the very first portion of said cam being capable of rocking the bell crank lever 48 upon its pivot in one direction in which position it is held until the end of said cam is reached, whereupon said bell crank lever is returned to its first position by a spring 50. A pin 51 is preferably provided at the lower end of the bell crank lever 48 which pin is adapted to be connected with the gate 32 at the proper time to open said gate. It is essential however that the opening of said gate be controlled by the molds 29 in order to prevent said gate being opened when there is not a mold beneath said discharge pipe.

To accomplish this feature of the invention, the gate 32 is provided with a latch 52 pivotally connected at 53 to said gate. The latch 52 in turn is connected by links 54 to levers 55 pivoted upon the rails of the track 28, said levers being located directly beneath the discharge pipe 18. A spring 56 normally retains said levers 55 projecting slightly above said rails and in positions to be engaged by the rolls of the mold as said mold is moved into place beneath said discharge pipe, the weight of said mold being sufficient to depress said levers together with the latch 52, thereby moving said latch into the path of the pin 51 carried by the bell crank lever 48.

It will thus be obvious that with the parts in the positions just referred to that upon the rocking of the bell crank lever 48 by means of the cam 46, said gate 32 will be opened and the soap contained in said tank discharged through said pipe 18 into the mold therebeneath, this taking place during a portion of the rotation of the shaft 27 preferably one-half thereof.

In order to permit the soap to be discharged from the tank 16 it is necessary that it be somewhat plastic or at least not in its hardest state, but just as soon as said soap has been deposited in said mold the sooner it is hardened sufficiently to permit cutting into bars or stripped, the better. To hasten the hardening of the soap contained in said mold, said mold is moved immediately after it is filled into a casing 57 which extends along the track 28 for a predetermined distance. To the casing 57 cold air is supplied through an inlet pipe 58 from a cold air producing device of any of the well known types not shown in the drawings, the temperature of said cold air being preferably zero which temperature has been found

the most advantageous in the cooling or hardening of soap.

The ends of the casing 57 are preferably provided with doors 59 and 60 which, at the proper time, are automatically opened and closed to permit the molds to be moved into and out of said casing. The means for opening and closing said doors preferably consists of a shaft 61 arranged transversely of said casing parallel with said doors, said shaft having oppositely threaded portions 62 and 63 extending from points adjacent the center thereof to points adjacent the outer edges of said doors.

The shaft 61 is journaled to rotate in bearings 64 adjacent the opposite ends thereof, said shaft having a sprocket 65 secured thereon adapted to be operatively connected by a sprocket chain 66 with a sprocket gear 67 mounted upon a counter shaft 68, said counter shaft being operatively connected by intermittent gears 69 and 70 with the shaft 43, said intermittent gears being arranged relatively to the intermittent gears 41 and 42, whereby said shaft 68 will be rotated just before the molds are moved forwardly to open said doors and immediately upon the completion of movement of said molds to close said doors.

As hereinbefore stated the sections 62 and 63 of the shaft 61 are each provided with oppositely disposed screw-threads, said threads adapted to be engaged by followers 71 and 72 secured to the doors 59 and 60 respectively. An intermittent rotation of said shaft 61 in one direction will cause said followers to travel from the inner ends of their respective threaded sections to the outer ends thereof and return the same to their inner positions.

The movement of the molds 29 along the track 28 continues intermittently until said members reach the opposite end of the casing 57 at which point is located means to remove the soap contained in said mold which at this time is sufficiently hard to retain its shape without necessitating the surrounding thereof by the mold.

To facilitate the removal of said soap the molds are preferably formed with an inner frame 73 consisting of end members 74 and a bottom member 75. The end members 74 extend slightly above the top of the members 29 and have projecting outwardly therefrom studs 76. As the members 29 are moved along the track 28 the studs 76 are moved into a position above shelves 77 projecting inwardly from slides 78 arranged to reciprocate in vertical guide ways 79 mounted upon the casing 57.

At the proper time in the operation of the apparatus the slides 78 are elevated whereupon said inner frames will be moved from their position within the mold 29 upwardly through an opening 80 in the top of the casing 57 into a position substantially above said casing, in which position said frames are supported by a shelf 81 which shelf is preferably withdrawn during the upward movements of said frame to permit the discharge thereof, by a lever 82 which is released after said frame has reached its uppermost position and permitted to be returned by a spring 83 to a position beneath said frame, thus permitting the return thereof, while the slides 78 are again returned to their lowermost position in readiness to receive the next mold.

The movements of said slides are accomplished at the desired time preferably by means of crank disks 84 secured to the shaft 43, said disks having pins 85 thereon which engage links 86, said links extending upwardly and engaging levers 87 pivotally mounted upon the shaft 27. The outer ends of said levers are connected by links 88 to the slides 78. During the upward movement of the slides 78 together with their soap frames a trap door 89 pivotally mounted at the opening 80 is adapted to be opened by the movement of said frames and closed by springs 90 immediately upon the passing of said frames, thus closing the opening 80 and preventing the cold air from escaping therethrough from the casing 57. From the shelf 81 the soap in the frame 73 may be handled in any suitable manner in order to cut and strip the same. These means however are not shown in the drawings.

The general operation of the apparatus hereinbefore specifically described is as follows: The ingredients which compose the soap are placed in the kettle 9 and after being heated and melted they are pumped through the pipe 10 by the pump 11 to the mixer or crutcher 12 where they are mixed the desired length of time after which they are permitted to discharge through the outlet orifice 14 into the tank 16 above the partition 17 in a liquid state from which they drop through the perforations in said partition into the tank below, or if desired, said soap may be forced by means of any suitable pressure which may be admitted through a pipe 91 through said perforations. In passing through the partition 17 the soap is diffused or divided into small particles which contact with currents of cold dry air supplied through the pipe 16′ which partially hardens or solidifies said particles of soap.

As said soap arrives at the bottom of the tank 16 it is agitated by the agitator 19 and in case said soap is too hard it is cut up by said agitation and at the proper time and in predetermined quantities it is automatically discharged through the discharge pipe 18 into the mold therebeneath, from whence it is conveyed along the track 28 through the casing 57 where it is still further cooled by the current of cold air entering said cas-

ing through the pipe 58, said casing being of a sufficient length to permit the soap to be exposed to said air long enough to harden the same so that it will retain its shape when laid upon a table, without the use of a frame or mold.

The arrangement of the various steps of the operation hereinbefore described are such that the entire amount of time required to convey the soap from the crutcher 12, in its liquid state, to the shelf 81 is substantially less than sixty minutes, thus making a great saving in the time required to harden a mass of soap, as heretofore by the use of the common methods it has usually taken from four to six days to accomplish the same result.

From the foregoing description it will be seen that simple and efficient means are provided for accomplishing the objects of the invention, but while the elements herein shown and described are well adapted to perform the functions set forth, it is obvious that various minor changes may be made in the proportions, shape and arrangement of the several parts, without departing from the spirit and scope of the invention as defined in the appended claims.

Having thus described my invention what I claim and desire by Letters Patent to secure is:

1. In an apparatus for hardening and molding soap a mixer, a tank adapted to receive soap from said mixer in a liquid state, means for supplying cold dry air to said tank to partially solidify said soap, and means for removing predetermined quantities of soap from said tank.

2. In an apparatus for hardening and molding soap a tank adapted to receive soap in a mass of liquid, a foraminated partition in said tank adapted to diffuse said mass of liquid, means for supplying cold air to said soap while in its diffused state, means arranged adjacent the lower end of said tank adapted to agitate said soap and force the same from said tank, and means to remove predetermined quantities of said soap from said tank.

3. In an apparatus for hardening and molding soap a tank adapted to receive soap in a liquid state, means for supplying cold air to said tank to cool said soap, said tank having a discharge orifice, a gate adapted to regulate the discharge of soap through said orifice, a plurality of molds, means for successively presenting said molds to said discharge orifice, and means for operating said gate to permit a predetermined amount of soap to enter each of said molds.

4. In an apparatus for hardening and molding soap, a tank, means for supplying cold air to said tank to partially harden the soap therein, a casing, means to conduct cold air to said casing, and instrumentalities adapted to remove a predetermined quantity of soap from said tank and convey the same through said casing to harden said soap.

5. In an apparatus for hardening and molding soap a tank, means to diffuse liquid soap into said tank, means for supplying cold air to said tank to partially harden said soap, mechanism adapted to automatically remove predetermined quantities of said soap from said tank, a casing, means to supply cold air to said casing, and means adapted to convey the soap removed from said tank through said casing whereby the same is hardened.

6. In an apparatus for hardening and molding soap a tank adapted to receive soap in a liquid state, means for supplying cold air to said tank to partially harden said soap, mechanism for presenting molds to said tank, mechanism adapted to automatically discharge predetermined quantities of said soap from said tank into said molds, means for hardening the soap in said molds, and means for moving said molds from said tank to said hardening means.

7. In an apparatus for hardening and molding soap a tank adapted to receive soap in a liquid state, means for supplying currents of cold air through the soap passing into said tank to partially harden said soap, mechanism for presenting molds to said tank, mechanism for discharging predetermined quantities of soap from said tank into said molds, a casing, means for supplying cold air to said casing, means for conveying said molds through said casing to harden the soap in said molds, and mechanism for removing the hardened masses of soap from said molds.

8. In an apparatus for hardening and molding soap a tank adapted to receive soap in a liquid state, means for supplying cold air to said tank to partially harden said soap, mechanism for presenting molds to said tank, means for discharging soap from said tank into said molds, and instrumentalities adapted to harden the soap in said molds.

9. In an apparatus for hardening and molding soap a tank adapted to receive soap in a liquid state, means for supplying cold air to said tank to partially harden said soap, mechanism to present molds to said tank, a gate adapted to be opened to discharge soap from said tank into said molds, and means rendered operative upon the movements of said molds to said tank adapted to open said gate.

10. In an apparatus for hardening and molding soap a tank adapted to receive soap in a liquid state, means for supplying cold air to said tank to partially harden said soap, mechanism to present molds to said tank, means adapted to discharge soap from said tank into said molds, a casing, means

for supplying cold air to said casing, mechanism adapted to convey said molds from said tank through said casing to harden said soap, a shelf arranged outside of said casing, and instrumentalities adapted to remove said hardened soap from said molds and place the same upon said shelf.

11. In an apparatus for hardening and molding soap a tank adapted to receive soap in a liquid state, means for supplying cold air to said tank to partially harden said soap, mechanism to present molds to said tank, means adapted to discharge soap from said tank into said molds, a casing, means for supplying cold air to said casing, mechanism adapted to convey said molds from said tank through said casing to harden said soap, gates for said casing, and means for automatically opening and closing said gates to permit said molds to enter and be removed from said casing.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

FREDERICK AVARD SECORD.

Witnesses:

FLORENCE A. COUGHLAN,

GLADYS L. DODGE.