No. 838,127. PATENTED DEC. 11, 1906.

K. E. MARKEL.

APPARATUS FOR PRODUCING BARS OF SOAP.

APPLICATION FILED OCT. 25, 1905.

4 SHEETS—SHEET 1.

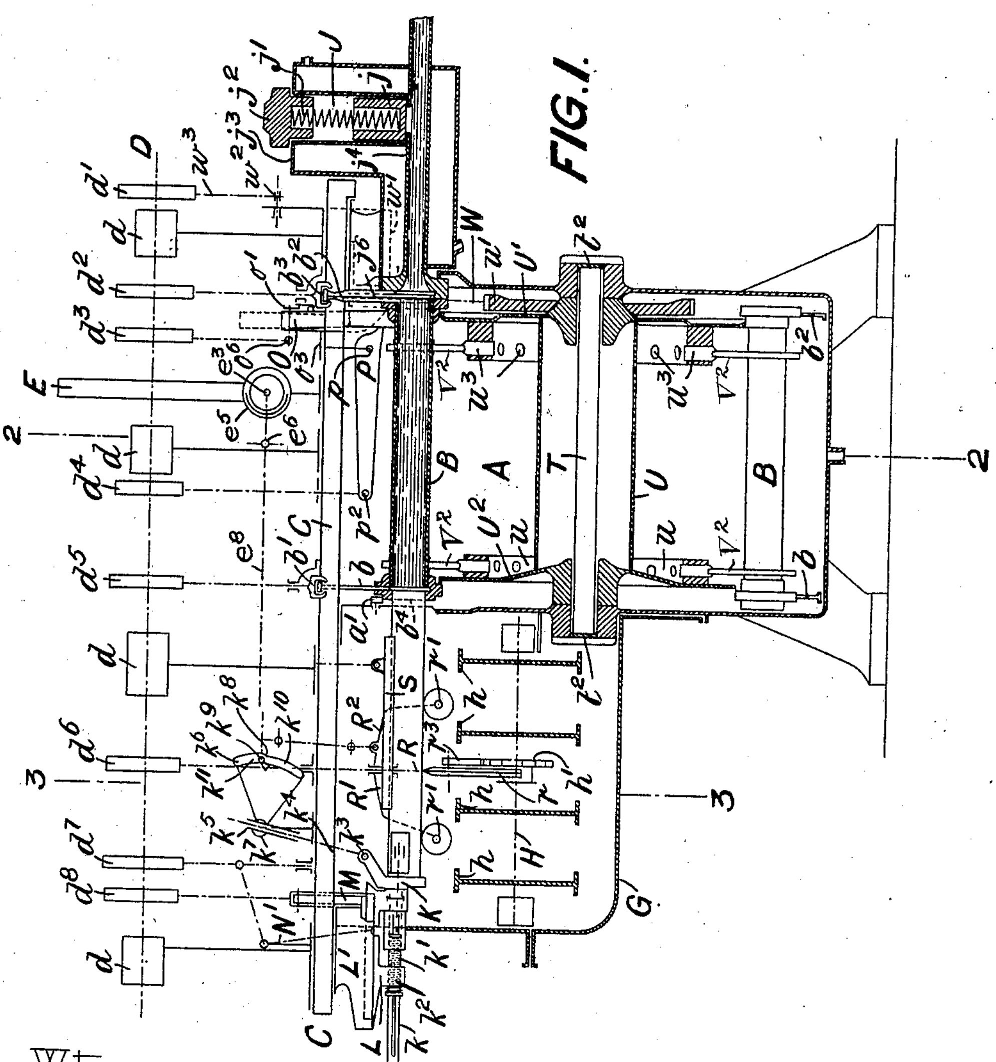

FIG. 1.

Witnesses
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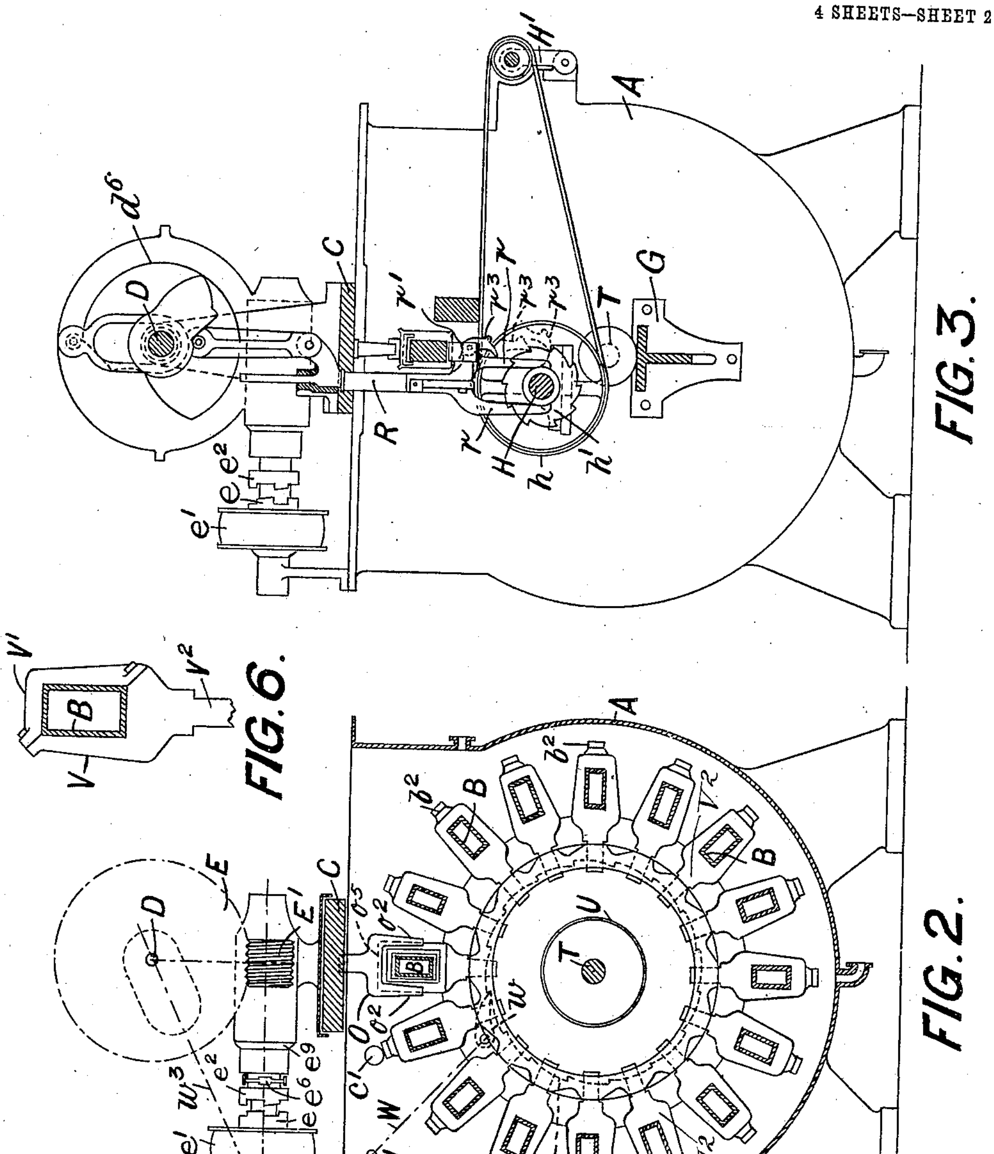

FIG. 3. FIG. 6. FIG. 2.

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4 SHEETS—SHEET 3.

FIG. 4.

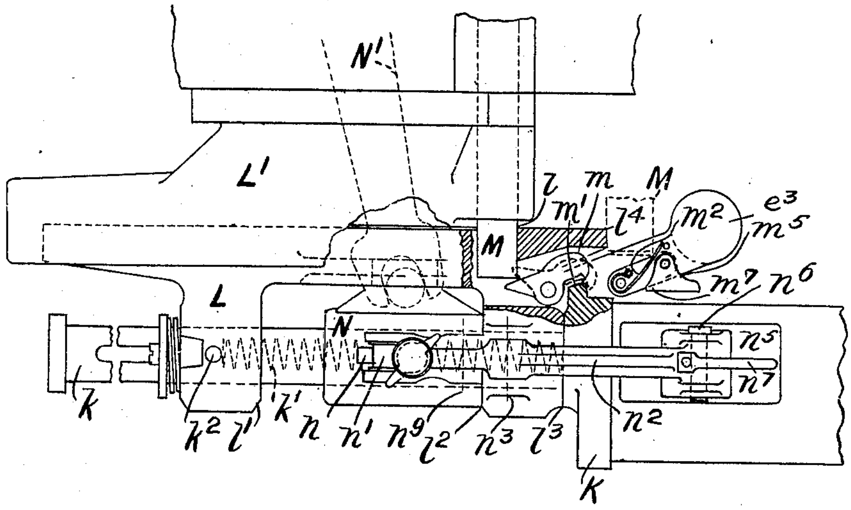
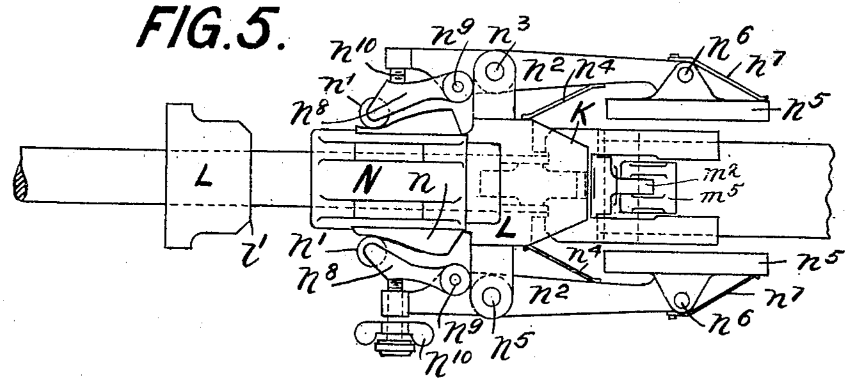


FIG. 5.



Witnesses

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4 SHEETS—SHEET 4.

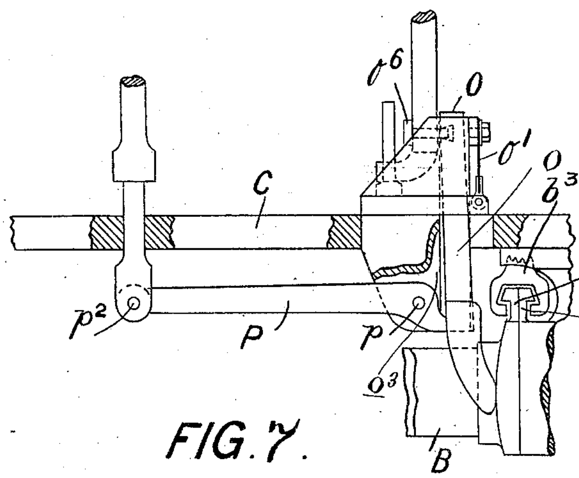

FIG. 7.

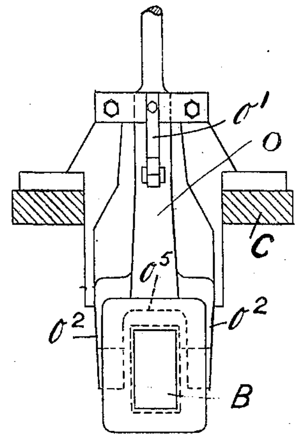

FIG. 8.

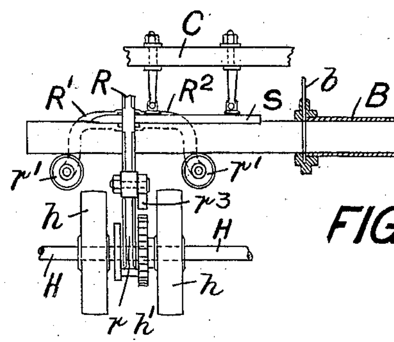

FIG. 9.

Witnesses

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UNITED STATES PATENT OFFICE.

KARL EMIL MARKEL, OF WARRINGTON, ENGLAND.

APPARATUS FOR PRODUCING BARS OF SOAP.

No. 838,127. Specification of Letters Patent. Patented Dec. 11, 1906.

Application filed October 25, 1905. Serial No. 284,372.

To all whom it may concern:

Be it known that I, KARL EMIL MARKEL, managing director of Messrs. Joseph Crosfield & Sons, Limited, a subject of the King of Great Britain, residing in Warrington, in the county of Lancaster, in the Kingdom of England, have invented certain new and useful Improvements in Apparatus for Producing Bars of Soap, (for which application has been made in Great Britain, No. 23,187, dated October 27, 1904,) of which the following is a specification.

This invention has for its object an apparatus and machine for producing soap bars by a nearly continuous process with rapid cooling.

The generally used method of cooling soap at the present time consists in running it into frames in a molten condition and allowing it to cool gradually. The objections to this method are, first, soap which has taken several days to cool is softer, of a worse color, and shrinks more than that which has cooled quickly; second, a large amount of capital is locked up in the form of soap in frame; third, a large amount of waste, often as much as twenty per cent., is caused when cutting the soap. As these objections are overcome when soap is cooled rapidly, many attempts have been made to devise means of achieving this. In attempting the construction of a machine for this purpose the natural course to adopt was one where the soap was cooled continuously when leaving the pan. The difficulties encountered, however, were as follows: first, that the difference between the friction of the inside and the outside layer of the bar of soap tended to cause the inner part to travel faster than the outer one; second, that wherever soap is moved or disturbed while in the plastic condition its physical structure is affected, causing softness and an unsightly appearance when it has set solid. I define the plastic condition of soap as that when it has cooled below its melting-point, but has not yet had time to crystallize. These considerations suggested that the nearest approach to a continuous process would be reached by constructing a machine where the soap was allowed to cool at rest in revolving tubes which were constantly bringing round solid soap ready to be pushed out by liquid soap, a system which for want of a better term might be called "an intermittently-continuous one."

The numerous schemes which I have come across for the rapid cooling of soap suffer from one or more of the following defects: first, want of continuity of process; second, difficulty of handling bars leaving machine; third, unreliability of all multitubular coolers where bars are pushed out by liquid soap, as there is nothing to insure the bars being elected simultaneously, and since the friction in no two tubes can possibly be identical the bars will come out at different speeds; fourth, moving soap in the plastic condition; fifth, necessity of high pressure, causing consequent wear and tear on tubes. Now my invention is designed to overcome these evils and to produce bars of soap by a practically continuous process with very rapid cooling.

In carrying out my invention I form a cylinder-frame rotating on a horizontal axis, its periphery being formed of a complete series of horizontal tubes placed at right angles to the circumference, open at both ends, and these ends all being in the same two vertical planes. This cylinder revolves in a tank of water and is submerged, all except the highest tube or two. Above the water-line and immediately at one side of this cylinder of tubes and concentric with the center line of each tube of this cylinder as it comes opposite it is the soap-delivery pipe connected with a pump and jacketed so that the soap can be thoroughly liquid therein and be delivered at once to any pipe that is immediately opposite. Between this delivery-pipe and the ring of tubes are two cut-offs working side by side, one cutting off the liquid soap when there is no tube in position and the other closing up the end of the rotating tube so as to prevent the soap running out. Opposite the delivery-pipe at the farther side of the ring of tubes is a third cut-off. The cooled bars of soap after being ejected from the tubes are placed on a transverse revolving band with an intermittent motion.

In order that the invention may be fully understood, reference will now be had to the accompanying drawings, in which—

Figure 1 is a sectional elevation of the machine shown mostly in diagrammatic form. Fig. 2 is a sectional view of Fig. 1 on the line 2 2; Fig. 3, a similar view to Fig. 2 on the line 3 3. Fig. 4 is an elevation in partial section of the device for receiving and holding the end of the bars as they are being ejected. Fig. 5 is a plan view of Fig. 4. Fig. 6 is a detail view showing the method of fixing the cooling-tubes. Figs. 7 and 8 are side and end views, respectively, in partial section, of a device for maintaining the tubes tight up to the feed device when the tubes are stationary; and Fig. 9 is a detail view showing the arrangement for receiving the soap bar as it issues from the tube.

Throughout the drawings the cams, shafts, intermediate links, and like parts are only shown diagrammatically for the sake of clearness except in the case of the detail views.

In the drawings, A is the body or frame, which also forms the cooling-liquid tank or bath, in which the cooling-tubes B revolve.

C is a bridge-piece fixed across the tank A and carries most of the mechanism, including the worm and clutch driving-gear, of which the worm-wheel E is mounted on shaft D, which latter is supported on bracket-bearings *d d d d*. Shaft D also carries the several cams for the different motions throughout the machine. The extended end of bridge C is connected to and firmly supported by a bracket G, which is again firmly secured to the frame A. The bracket G also supports the conveyer-shaft H, while a supplementary bracket H', Fig. 3, attached on the side of the frame, supports the tail-pulleys of the conveyer.

A clutch e is attached to pulley e' and revolves freely on the worm-shaft e^3. It is held in position by a bearing-bracket on one side and a fixed collar between the two clutches, which are recessed to admit it, on the other side. The clutch e^2 is free to slide laterally over two feather-keys sufficiently to engage and disengage with the clutch e, the feathers insuring the revolution of shaft e^3 with clutch e^2 when it is in gear. Clutch e^2 is moved to and fro by cranked lever e^5, which is pivoted at e^6 and connected to rod e^8, which is connected to the automatic mechanism at its other end.

e^9 is a washer-brake to instantly arrest the rotation of shaft e^3 and worm E' by the clutch e^2 being thrust against it when thrown out of gear.

With the expulsion of each bar of soap the necessary cycle of operations is set in motion and finally stopped automatically, ready for the one following, the moving into position of the cooling-tubes being included in these operations. The time of rest is during the expelling of and refilling with the cooled bar and liquid soap, respectively, the liquid soap being the medium for expelling the cooled bar. The force required to eject the cooled bar is greatest at the start.

To secure the necessary variation of pressure, the pump is worked continuously and the feed-pipe is fitted with an accumulator J, of a capacity equal to the amount of soap pumped while the feed is cut off from the cooling-tube, plus a margin for emergency, into which the liquid soap is naturally diverted immediately its flow into the cooling-tube is arrested. The accumulator-piston j then rises, compressing spring j' until it closes with and lifts the weight-bearer j^2, which is loaded equal to the normal pressure required to start moving the cooled bar. The accumulated soap is given out while the cooled bar is being ejected and, together with the amount directly pumped at the same time, equals the required amount to refill the tube. The full pressure is arrested by the weight-bearer resting on the cylinder-top j^3, after which the reduction of pressure down to the minimum is graduated by spring j' giving out until piston j again rests on its bearings at j^4. The emergency action comes into operation in the event of an increased resistance at starting the cooled bar or for any permanent obstruction and can be controlled automatically by a special separate arrangement of weight increase and pump control combined. The cooling-tubes B are successively moved into conjunction with the liquid-soap-feed supply, both ends of the tubes and the feed-supply being fitted with cut-offs necessary for their periodical isolation. The cut-offs b b^2 j^6 have heads fitting into sockets b' b^3 of their respective slides, by means of which they are opened and closed. As the feed-bracket is permanent, the head of the cut-off j^6 is always in position in socket b^3; but as the heads of the cut-offs b and b^2 have to pass in and out as the tubes revolve they, with the sockets, are fitted together loosely to prevent any possible obstruction one by the other when in motion, the play or slackness being taken up and again equalized, as required, by the cams. Prior to entering the sockets the heads of the cut-offs b and b^2 as they come round pass under rollers c', which insures their being in true position to enter. A roller a' supports the cooling-tube from upward strain against the pull of opening cut-off b.

In first starting the machine and in order to use the automatic arrangements at once it is preferable to insert suitable plungers or pistons in the tubes to act in lieu of cooled bars for the time being. As each plunger is expelled and replaced by a bar of soap the normal process becomes established. The period of immersion of the tubes during one revolution of the whole of them performs the complete cooling of the bars.

The further description of the several motions will be made in detail as each one comes into operation in describing the process, while, for greater simplicity to proceed, it is assumed that the plunger stage is passed, the bars are in full progress, and the automatic starting of the mechanism has just taken place. Thus we have, as shown in the drawings, a cooling-tube B in position, cut-offs b b^2 j^6 fully open, and a cooled bar fully forced out by the liquid soap, which as it followed the soap up has recharged the tube ready for again cooling, while the solid bar by forcing pressure-plate K back to a given point has automatically started the mechanism, fully described as follows: On emerging from cooling-tube B the cooled soap bar contacts pressure-plate K, which is attached to sliding piece k, which contains a spring k', which is compressed against stop k^2. (See Figs. 4 and 5.) As spring k' becomes more compressed its increasing resistance counterbalances the increasing ease with which the soap bar would otherwise be moved as it projects farther out of the tube, and so maintains the necessary resistance to the liquid soap to insure the tube continuing solidly filled, while pressure-plate K by offering an equal and solid resistance to the end of the soap bar also counteracts any tendency for the pressure that delivers the soap bar to force the internal part of the bar faster than the external part owing to frictional resistance being created between the tube sides and the outside of the soap bar by which the outside of the bar might be held back while the inner part would slide on as through a tube or shell. On pressure-plate K at joint k^3 rod k^4 is connected, which is free to slide in sleeve k^5 to accommodate the varying length of centers when working, which sleeve k^5 is securely connected to quadrant k^6 by means of spindle k^7, to which both are attached and which is free to oscillate in a fixed bearing-bracket. The slot in quadrant k^6 is concentric with its own center of oscillation, except at a given short section at k^8. It is thereby of neutral action, except at k^8. The function of k^8 is to throw driving-clutch e^2 in and out of gear to produce the automatic action of the mechanism. The neutral remainders of the slot maintain the connection of the parts concerned while not acting on the clutch and at the same time securely lock the clutch in or out of gear, as the case may be.

The delivery of the soap bar corresponds to the travel of neutral section k^{10} of quadrant k^6 until a given small proportion of the bar is left undelivered, when the angled section k^8 of quadrant k^6 by the continued pressure of the bar against pressure-plate K k^3 forces rod e^8 through sliding joint k^9, which is supported on a rocking link and actuates cranked fork e^5, which thrusts clutch e^2 into gear with clutch e, by which the cam-shaft D is set in motion.

The complete engagement of the clutches by the angled section k^8 corresponds to the completed length of a delivered soap bar, so that simultaneously the cooled bar is in the correct position and the clutches are in full gear for the first activity of the mechanism to take place; also, the extended end of the cooling-tube, which still envelops the bar at b^4, retains it for the time being as a plug to support the liquid soap behind it until the cut-off b is closed. The drawings correspond to the description at this stage. Now by cam d^5 cut-off b is closed immediately at the end of the solid bar. The bottom edge of cut-off b is beveled off on one side inward, which further insures a clean separation of the liquid soap from the end of the solid bar. This bevel also provides a lap-joint at the base, which, with the slide-laps at the other edges, securely retains the imprisoned liquid soap from squeezing out, and since the edge is beveled to just meet the internal bevel of the tube when it is full depth into its recess the liquid soap in the groove is free to be squeezed back past the bevel until the end of the bevel and the internal tube edge just meet, when the soap forming the bar becomes divided from any remainder in the groove. It must now be noted that the motion of pressure-plate K is communicated to slide L, which in turn moves freely in a fixed bracket L′. In forcing back the pressure-plate K, therefore, the vertical sliding stop M, also attached to fixed bracket L′, is projected down, so as to hold the slide L at l and prevent motion to any other part than pressure-plate K for the time being. Sleeve N is also free to slide along piece k between the two points l' and l^2. This sleeve has on two opposite sides and in duplicate form cam-paths n n, Figs. 4 and 5, against which rollers n' n' in the ends of levers n^2 n^2, jointed at n^3 n^3 on slide L, are pressed by means of springs n^4 n^4.

Levers n^2 n^2 carry clip-plates n^5 n^5 at their other ends mounted on joints n^6 n^6, which allows freedom of adjustment to their work, being retained in position ready to admit the soap bar by springs n^7 n^7. Levers n^2 n^2 are also provided with loose pieces n^8 n^8, jointed at n^9 n^9, and thumb-screws and nuts n^{10} n^{10} for finely adjusting their grip on the bar. When pressure-plate K has closed against slide L at l^3, the ends of levers n^2 n^2 extend beyond it, so that clip-plates n^5 n^5 are on either side of the projected soap bar ready to grip it. Now while cut-off b is closing sleeve N is drawn against position l' by cam d^7 through cranked lever N′, which by cam-paths n n on sleeve N, acting against the roller ends of levers n^2 n^2 in an outward direction, causes the opposite ends to close inward, so that clip-plates n^5 n^5 grip hold of the soap bar. The bar is now ready to be drawn back out of the machine. Vertical stop M is now lifted by cam d^8 to a position clear of slide L, leaving the latter free to be moved, when by a further throw of cam d^7, sleeve N now being in solid contact with slide L at l', slide L is moved back a sufficient amount to draw the soap bar amply clear of the machine to allow of its further manipulation.

It must here be noted that in the position shown vertical stop M is depressing the tail end of a small catch m, Fig. 4, which on the removal of vertical stop M falls down over shoulder m' on the pressure-plate K, so that the pressure-plate K is locked up to slide L, by which the power stored in spring k' is negatived for the time being and held in reserve for future use, to be described in its place. After cut-off b is closed and during the gripping and holding of the bar cam d^2 closes cut-offs b^2 j^6. These are constructed so as to fill up the tube and feed-pipe beyond the grooves in which they slide and present solid and level surfaces together, to prevent lodgment of soap between them as it flows past while they are open. Feed cut-off j^6 is arranged with a lap-joint at its base similarly to cut-off b, but with this difference, that as liquid soap goes on both sides of it it is arranged to squeeze out the residue left under its remaining flat portion. In conjunction with this the cut-off b^2 has a flat edge only, which corresponds with the flat remainder on cut-off j^6. These together close down level with the cooling-tube simply. Thus when the lap on cut-off j^6 has once definitely divided the liquid soap that remaining under the flats of both cut-offs is squeezed away in one direction and compressed into the already-filled cooling-tube with beneficial pressure effect on the solidity of its contents. In this case it is necessary to avoid the lap. With the cut-off j^6 the lap is absolutely necessary, since the soap it retains is always liquid and is subjected to increased pressure until the next tube is in position for further delivery of soap, as explained fully in connection with the pumping arrangements.

By the motion of slide L, just described, the relative position of vertical stop M to slide L is reversed, the distance traveled being equal to the length from points l to l^4 plus the thickness of vertical stop M. Vertical stop M now descends and again prevents the motion of slide L only in the opposite or return direction. The descent is also less at present than the depth it lifted from, for reasons hereinbefore explained. Following this by cam d^7, through lever N′, sleeve N is moved as before, but in the opposite direction, back to its original position, as shown, by which the soap bar is released from the grip of clips n^5 n^5. Concurrently with the moving of slide L and vertical stop M the cooling-tube is unclamped from the feed-supply by cam d^4 in the following manner: The cooling-tube is secured to the feed-supply by means, first, of a clamp-bar O, which is supported against pressure at its top end by plate o'; second, by multiplying-lever P, which from its fulcrum p applies the pressure to bar O, and, third, by cam d^4 pressing upon lever P at point p^2. As this arrangement takes the place of bolts for making a tight joint between the faces of cut-offs b^2 and j^6, a high pressure is necessary. Multiplying-lever P provides this high pressure with a minimum of strain on its actuating-cam and by a slight flexibility due to its length compensates any faint variations of substance under the clamp, so avoiding solid overstrain to any parts concerned. Also the point of the lever P projects, say, one-eighth inch between the forked arms o^2 o^2 of bar O. Bar O in descending into position has a similar amount of free motion between its own slide back at o^3 and the cooling-tube flanges against which it clamps until it is nearly down, when its solid bridge at o^5 contacts the point of lever P, which throws it forward by the amount of projection of said point, so that in this position it is nearly touching, leaving only the actual clamping to be done by the stroke of the cam. By cam d^3 clamp-bar O, which is attached to it by joint o^6, is lifted up clear of the cooling-tube, as indicated by dotted lines. The tube is then clear of obstruction and ready for the revolving motion. After these movements the soap bar is lowered vertically below the level of clips n^5 and placed on conveyer h h h h by downtake-bar R, operated by cam d^6 and explained as follows:

First. Downtake-bar R is supported in position by a fixed bracket at the top and by its own extended forked slide projections r r over the conveyer-shaft H at the bottom and is attached to cam d^6 by a suitable joint, as shown best in Fig. 3. Two arm-brackets R′ R^2 are attached to R. On brackets R′ R^2 two rollers r' r', Fig. 9, are attached, their top surfaces being horizontally in line with the base of cooling-tube B, so that as the soap bar is forced out it passes over and finally rests upon them.

Second. Between the arms of joint k^3 on pressure-plate K a small lever m^2, Fig. 4, is arranged and held up in position by a spring. At the outer end plate m^5 is also hinged and its substance disposed so that its center of gravity lies beyond the point of suspension. This is counterbalanced and its normal level preserved by its inner edge resting against lever m^2 at m^7 and is thereby free, with the downward oscillation of lever m^2, to adjust itself to the level of the opposing plane of resistance—the soap bar—to be further described.

Third. The position of vertical stop M described up to this point corresponds with and its base just rests upon the top of lever m^2 in the position now described.

Fourth. S, Figs. 1 and 9, is a top guide to prevent side deviation of the soap-bar while traveling out and is stationary, being fixed to bridge C by suitable supports.

By the foregoing description it is obvious that the downward motion of downtake-bar R carries the soap bar with it; but as the pressure of the soap bar against pressure-plate K when forcing it forward causes the bar end to stick more or less against it vertical stop M is lowered by cam d^8, and lever m^2, with plate m^5, is depressed onto the soap bar at the same time as cam d^6 begins to lower downtake-bar R and sufficiently to insure unsticking the bar end and so secure uniform motion of the bar by gravitation. The conveyers h h h h are of such distance below that when the bar rests upon them it is quite clear of clips n^5. Conveyer-shaft H is now turned a given amount, by which the soap bar is conveyed forward sufficiently far to remove it from over rollers r' r' in the following manner: Pawl r^3, which is attached to downtake R, simply moves through space until after the soap bar is deposited on the conveyers and sufficiently farther to insure rollers r' r' dropping clear of the soap bar as it lies on the conveyers, when by the continued motion of downtake R pawl r^3 engages ratchet h', which being secured on shaft H turns conveyers h h h h the required amount, each tooth in ratchet h' being equal to the amount of circle required to be traveled at the conveyer-surface. The whole downtake arrangement is then free and returns to its first position.

During the removal of the bar onto the conveyers the cooling-tubes, being free, are revolved so as to bring the next tube to the one just recharged into the same position for connection to the feed-supply in the following manner:

First. Drum-shaft T is held in suitable bearings by end plates, between which and the shaft ends are disks t^2 t^2, of compressible material.

Second. Revolving drum U has flanged ends U′ U², to which socket-rings u u are attached and at one end ratchet-wheel u'. The whole is free to revolve on shaft T.

Third. The tube-carriers, as seen in Fig. 6, are composed of divided clamp V and V′ and stem V². The V′ part of the clamp is solid with stem V² and in position supports the cooling-tube in the direction of rotation. Stems V² are fitted into sockets u^3 on the revolver-drum rings u.

Fourth. Ratchet-wheel u' is engaged by pawl w, which is carried by rocking lever W, which is hinged on pin w' and oscillated by cam d' through rod w^3 and joint w^2. The teeth in ratchet u' correspond in radial position to the cooling-tubes, one for each tube, so that each stroke of lever W always turns drum U by the exact amount necessary to place the succeeding tube in position. The axes of lever W and pawl w are arranged in relation to ratchet u', so as to give a slowing-down movement as the tube comes into position. Pawl w remains where it stops until after the tube is clamped up, when it returns to its starting-point. Clamp-bar O now drops into position over the newly-placed cooling-tube by means of cam d^3. It is then clamped up, as already explained, by cam d^4 through mulitplying-lever P. Concurrently with the dropping of the clamp-bar vertical stop M is again lifted by cam d^8 clear of slide L, and slide L, sleeve N being solid against it at l^2, is moved back through crank-lever N′ by cam d^7, as before, to its original position, taking up the neutral section k^{11} of quadrant k^6 to that point. Vertical stop M now partly descends to its original position, locking slide L, but not touching catch m. Cut-off b is now opened by cam d^5. Cut-offs b^2 and j^6 are then opened by cam d^2. At this moment vertical stop M by cam d^8 descends its full original depth and releases catch m. Spring k' being thus freed, thrusts pressure-plate K back to its original position to meet the next outcoming soap bar, first throwing clutch e^2 out of gear by the angled section k^8 of quadrant k^6, then taking up the remaining neutral section k^{10} to complete its travel, as previously explained, only in the reverse direction. The mechanisms are now all at rest until the outcoming soap bar again forces pressure-plate K forward to again engage the driving-clutches, when the cycle of operations is repeated. Where needed, the respective parts are provided with suitable means for fine adjustment.

In the drawings, with the exception of cam d^6 in Fig. 3, the shapes of the various cams are not indicated, as these can be easily worked out by any mechanic when the motions it is desired to produce are understood from the above description. It will be obvious that in most cases double cams will be necessary.

In thus describing my invention I would point out the new principles which are involved in it. First, the bar is pressed out against a resistance or spring piece which minimizes the difference between the outer and inside friction; second, the spring-piece being a solid block prevents the center of the bar from being pushed out in advance of the exterior portion; third, the tubes revolve through a tank of cold water or other cooling medium which can be continuously renewed, while, fourth, the hot soap enters the tube when not exposed to the cooling medium and at once fills it with liquid soap, and it is only when the tube has been filled with the liquid soap that it begins to solidify, while at the same time, the end of the bar being for a short time exposed to the pressure of the soap, the soap solidifies into the plastic state in a thoroughly homogeneous condensed manner. The tubes need not necessarily be cylindrical, but can be square or of any desired cross-section. It is immaterial whether the tubes revolve in a tank or whether the tank and tubes revolve together.

I declare that what I claim is—

1. In an apparatus for the manufacture of bars of soap, the combination of a plurality of tubes rotatable about a common center; means for retaining a cooling medium about said tubes; means for admitting liquid soap

to said tubes at one end thereof; and means for withdrawing bars of soap from said tubes at the other end thereof.

2. In an apparatus for the manufacture of bars of soap, the combination of a plurality of cooling-tubes; a liquid-soap-feeding device; means for bringing one end of said tubes in rotation into connection with said feeding device; and means for receiving bars of soap discharged from the other end of said tubes.

3. In an apparatus for the manufacture of bars of soap, the combination of a rotating structure; a plurality of tubes mounted in said structure; a feed for liquid soap; means for bringing said tubes in turn opposite said feed; means for clamping each of said tubes in turn to said feed; and cut-off devices connected to said feed and to said tubes.

4. In an apparatus for forming bars of soap, the combination of a rotatable structure; a plurality of tubes mounted on said structure; a feed device; means for bringing each of said tubes in turn opposite said feed device; cut-offs on said feed device and said tubes; means for actuating said cut-offs; a bar with play longitudinally of the tubes; forked arms on said bar; means for raising and lowering said bar away from and over each tube opposite the feed device; and a multiplying-lever adapted to act on said bar to clamp the tubes in turn to the feed.

5. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes rotatable in a cooling mixture; a liquid-soap-feeding device running hot liquid soap into said tubes in turn from the feeding device; means for bringing said tubes a second time to said feeding device; means for again running liquid soap into said tubes and forcing out the congealed bar of soap; and means for regulating the resistance of the bar as it issues from the tube.

6. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes; means for congealing liquid soap contained in said tubes; means for feeding liquid soap under pressure to the tubes; means for permitting said liquid soap to press on said congealed soap in the tubes; and means exterior of the tubes for receiving the bar of congealed soap.

7. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes; a feeding device for liquid soap; means for connecting each of said tubes in turn to said feeding device; means for receiving bars of soap ejected from the tubes by the liquid soap; and means for cooling liquid soap in said tubes.

8. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes; a liquid-soap-feed device; means for filling each of said tubes in rotation with liquid soap; means for congealing and cooling said soap; and means for simultaneously removing the congealed bar of soap from said tube and filling said tube with liquid soap.

9. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes rotatable about a common center; means for ejecting bars of soap from said tubes; means for receiving bars ejected from said tubes; and means for counteracting the decrease of friction between said bars and said tubes as said bars are gradually ejected.

10. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes rotatable about a common center; means for feeding liquid soap to the tubes and thereby ejecting congealed bars of soap from said tubes; closing means at both ends of said tubes; and means for operating said closing means.

11. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes rotatable about a common center; a liquid-soap feed to said tubes; means for congealing liquid soap contained in said tubes; and means for receiving and supporting the bars of soap ejected from said tubes.

12. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes rotatable about a common center; means for feeding liquid soap to said tubes in rotation; means for cooling and solidifying soap in said tubes; means for counteracting the decrease in friction as the solidified soap is ejected from said tubes by the pressure of the incoming liquid soap; and means for receiving the solidified soap as it is ejected from said tubes in rotation.

13. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes rotatable about a common center; means for feeding liquid soap to said tubes in rotation; means for solidifying the feed-in soap into bars; a pressure-plate receiving the forward end of said bars when partially ejected; and means for conveying the bars in rotation away from the apparatus.

14. In an apparatus for cooling soap, the combination of a plurality of cooling-tubes; means for bringing said tubes in rotation opposite a liquid-soap feed; means for solidifying soap in said tubes into bars and returning said tubes opposite said liquid-soap feed; means for bringing the liquid soap in said feed into contact with the bars of soap in said tubes, whereby the bar is forced out of said tubes; a spring-actuated pressure-plate; a gripping device in the path of the forward end of the ejected bars; and means connected with the pressure-plate for setting in operation the means for rotating the cooling-tubes.

15. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes rotatable about a common center; means for filling said tubes with liquid soap; means for solidifying the soap in said tubes;

carrier means for receiving the bars as ejected from the tubes; a pressure-plate and gripping means for receiving the forward end of the ejected bars; conveyer means; and means for lowering the bars of soap onto said conveyer means.

16. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes; means for forming bars of soap in said cooling-tubes; means for ejecting said bars of soap; carrier means; means for guiding the ejected bars of soap onto said carrier; conveyer means; and means for lowering said carrier with the bars onto said conveyer means.

17. In an apparatus for forming bars of soap, the combination of a plurality of tubes; means for ejecting the bars of soap formed in the tubes; means for preventing the deformation of said bars during ejection; and means for conveying said bars away from the apparatus.

18. In an apparatus for forming bars of soap, a plurality of cooling-tubes; means for feeding liquid soap into said tubes; means for solidifying said liquid soap in said tubes into bars; means for ejecting each bar of soap from said tubes in rotation; a pressure-plate in the path of the ejected bars; means connected to the pressure-plate for holding said bars; a carrier for receiving said bars; means for conveying said bars out of the apparatus; and means intermediate said pressure-plate and said plurality of tubes for intermittently opsitioning said tubes.

19. In an apparatus of the character described for forming bars of soap, the combination of a plurality of cooling-tubes; a pressure-plate in the path of solidified bars of soap ejected from said cooling-tubes; means connected with said pressure-plate for gripping the sides of said bars; means for holding said pressure-plate in its forced-back position; means for releasing said gripping means; and means for unsticking said bars of soap from said pressure-plate.

20. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes; means for solidifying liquid soap in said tubes into bars of soap; means for ejecting the bars of soap in rotation from said tubes; carrier means for receiving said bars; means for lowering said carrier means; a pulley; a ratchet-wheel connected to said pulley; a pawl connected to said carrier means; and means for guiding said pawl against said ratchet-wheel and lowering said carrier means.

21. In an apparatus for forming bars of soap, the combination of a plurality of cooling-tubes; means for feeding liquid soap under pressure into said tubes and ejecting solidified bars of soap from said tubes; means for rotating said tubes intermittently and bringing them in rotation opposite the liquid soap; a pressure-plate in the path of the ejected bars of soap; a rotatable pulley; a shaft supporting said pulley; a clutch on said shaft; means connected with said shaft for rotating said plurality of tubes; and means intermediate said clutch and said pressure-plate for operating said clutch in a given position of said pressure-plate.

22. In an apparatus for forming soap in bars, the combination of a tube; means for feeding a charge of liquid soap thereto; and means for retaining and cooling said charge until the same has hardened and thereafter ejecting the same by the introduction of a new charge of liquid soap.

23. In an apparatus for forming soap in bars, the combination of a tube; means for feeding a charge of liquid soap thereto; means for retaining said charge until the same has hardened; and a retarding device acting with increasing resistance against the charge as it is ejected from the tube by the introduction of a new charge of liquid soap.

24. In an apparatus for forming soap in bars, the combination of a tube; means for feeding liquid soap thereto under a gradually-decreasing pressure; means for retaining the charge within the tube until it has hardened; and a retarding device acting with increasing resistance against the charge as it is ejected from the tube by the introduction of a new charge of liquid soap.

25. In an apparatus for forming soap in bars, the combination of a tube; and means for feeding liquid soap thereto with gradually-decreasing pressure, whereby the liquid soap will exert its greatest force or pressure against the previously-formed bar within the tube at the beginning of the ejectment of said bar from the tube.

26. In an apparatus for forming soap in bars, the combination of a tube; means for feeding a charge of liquid soap thereto under pressure; and a yielding device adapted and arranged to prevent the deformation of the bar as it is ejected from the tube by the subsequent charge of liquid soap.

In witness whereof I have hereunto signed my name, this 14th day of October, 1905, in the presence of two subscribing witnesses.

KARL EMIL MARKEL.

Witnesses:
WILLIAM PIERCE,
HAROLD COULSON.