

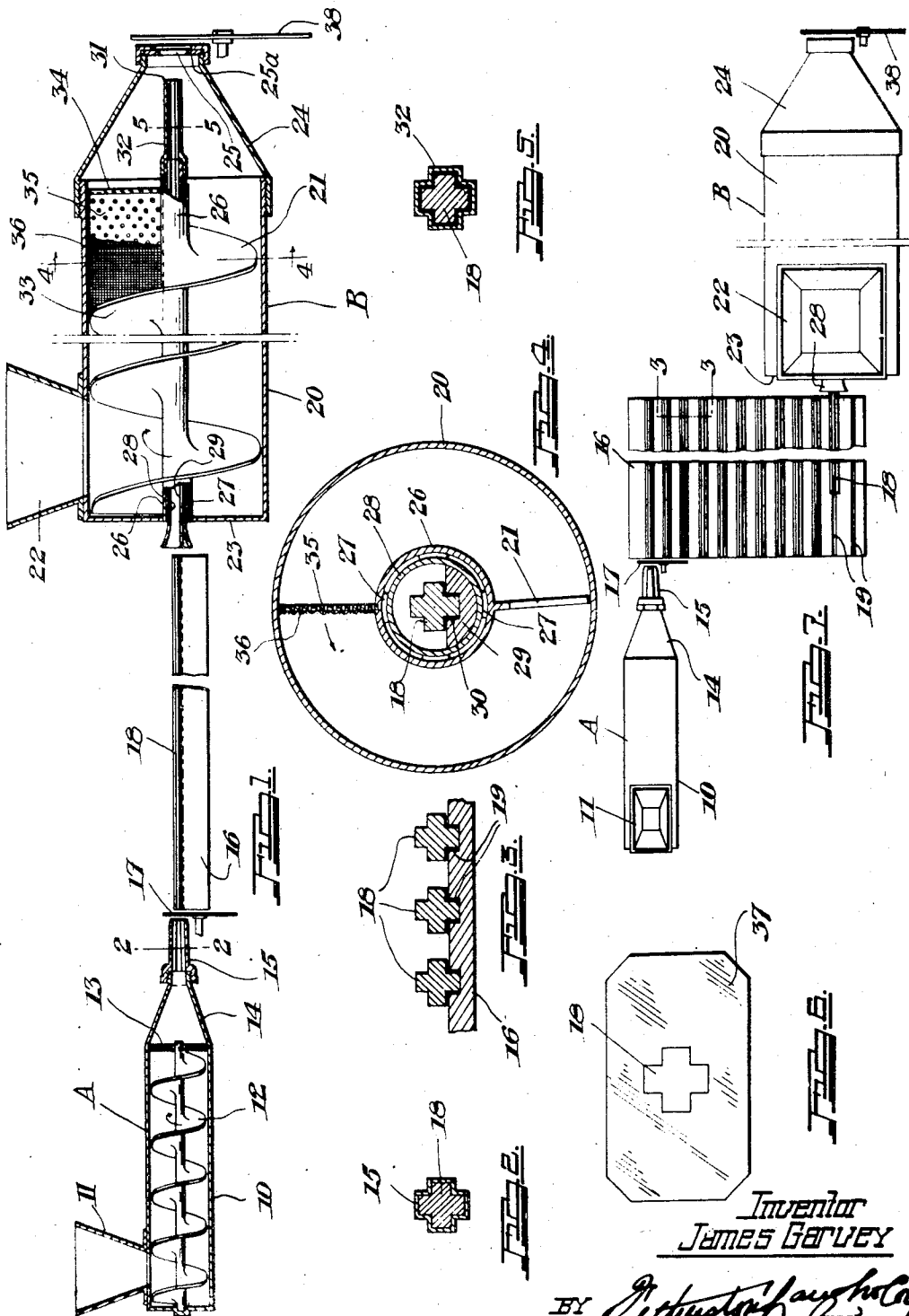
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MANUFACTURE OF MILLED TOILET SOAP

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MANUFACTURE OF MILLED TOILET SOAP

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7 Claims. (Cl. 25—8)

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This invention relates to the manufacture of milled toilet soap cakes and more particularly to the production of designs in such cakes.

At present all milled toilet soap cakes commercially produced are marked only by stamped designs on the faces. These designs cannot be made of contrasting colour to the main body of the soap and, moreover, disappear after the soap has been used for a comparatively short time. Some specialty soaps have had designs printed on transparent paper applied to one face by pressing the paper onto this face with the printed side innermost and thus protected by the paper. Although such designs may remain visible during the life of the soap, they have not been widely used because there is a tendency for the transparent paper to peel off and also because, even if it does not, the result of its application is that only one face of the cake will lather.

There have been many attempts to produce milled toilet soap cakes having soluble designs extending through them from face to face but none has been practically successful. According to some earlier proposals, a hole in the shape of the required design was punched through the cake and a soap plug having the dimensions and shape of the hole was then inserted in the latter, the cake containing the plug being then subjected to the usual final pressing operation. This not only involved additional operations of a batch type and extra machines but was found not to give a satisfactory union between the cake and the plug so that the plug often became loose and fell out. The proposal was never commercially practical. Other proposals have been based on the use of two mechanically connected plodders, one behind the other, the rear plodder discharging through a tube arranged axially of the front plodder and terminating at its forward end in a die shaped in accordance with the required design. The difficulty with putting such a proposal into practical commercial operation is that, although satisfactory results might be obtained for short runs, the required synchronism between the rates of feed of the two plodders cannot be maintained for any length of time owing to practically unavoidable variations in moisture content, temperature, batch composition of the soap, which cause variations in the viscosity of the soap, and owing also to mechanical difficulties. When synchronism of the rates of feed of the two plodders is not maintained the design in the composite bar is distorted and may be broken. It is obvious that for practical commercial operation the product must be

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absolutely uniform over comparatively long periods of time.

According to the method and apparatus of the present invention the difficulties of putting the last mentioned prior proposal into practical operation are entirely avoided, and soap cakes can be continuously produced under commercial conditions having completely uniform designs made of soap extending axially through them from face to face. The essential idea of the invention consists in inserting preformed soap rods having the cross-sectional shape of the required design into an axially arranged tube in a plodder, this tube being of such dimensions that the rods may pass freely through it and having an open front end which lies in the plodder nozzle between the front end of the plodder feed screw and the restricted discharge opening of the plodder. Each rod is pushed through the tube until its front end projects just far enough beyond the front end of the tube to be gripped by the body soap which is travelling through the plodder past the front end of the tube. As soon as the rod is gripped the advancing pressure on it is released and the rate of its further travel is determined entirely by the rate of travel of the body soap, i. e., the rod is pulled through the plodder nozzle by the advancing body soap. It will be appreciated that such an arrangement eliminates all difficulties of synchronism inherent in the prior double plodder proposals discussed above. If, for any reason, the rate of feed of the body soap increases or decreases, then the rate of travel of the rod necessarily alters to exactly the same extent because the rod is subject to no advancing or retarding force from any outside source. In the prior double plodder proposal a reduction in the rate of feed of the rear plodder and an increase in the rate of feed of the front plodder might result in a complete break in the design. Such an occurrence is impossible according to the present invention, because there is nothing to prevent the rod from advancing just as fast as the body soap will carry it.

The invention will be described in more detail by reference to the attached drawing which illustrates a suitable form of apparatus for putting it into practice. In the drawing,

Fig. 1 is a partially diagrammatic sectional elevation of the apparatus,

Fig. 2 is a cross-section on the line 2—2 of Fig. 1,

Fig. 3 is a partial cross-section on the line 3—3 of Fig. 7,

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Fig. 4 is a cross-section on the line 4-4 of Fig. 1.

Fig. 5 is a cross-section on the line 5-5 of Fig. 1.

Fig. 6 is a face view of a completed cake of soap made in accordance with the invention, and Fig. 7 is a diagrammatic view of the apparatus shown in Fig. 1.

The apparatus as shown includes two plodders, a plodder A for making the soap rods in the form of the design, and a plodder B for making the completed cakes including the design. The plodder A may be of any ordinary type and, as shown, includes a cylinder 10 fed from a hopper 11 and containing a feed screw 12. Soap is discharged from the cylinder 10 by the feed screw 12 through the usual strainer unit 13 into the plodder nozzle 14, where it is compressed. Attached to the end of the nozzle 14 is a die 15 of appreciable length having the internal cross-section of the design which is to be made and tapering slightly towards its discharge end. In the drawing, it has been assumed that the desired design is in the form of a cross which is shown in process of formation in Fig. 2. A continuous rod having the cross-section of the cross issues from the discharge end of the plodder A and is received on any suitable support, such as a tray 16 diagrammatically shown in the drawing. It is cut into shorter rods 18 of appropriate lengths to fit the support by a cutter 17 of any suitable conventional type, such as that consisting of a circular frame with a wire stretched across it. The tray may be adapted to support a number of rods 18 side by side, as shown in Figs. 3 and 7, and is provided with a number of parallel slots 19 for this purpose, the rods 18 being, as shown in Fig. 3, easily slidable in these slots.

The plodder B, like the plodder A, has a cylinder 20 fed with soap from a hopper 22 and containing a feed screw 21. The feed screw carries soap from the rear 23 of the cylinder towards the tapered nozzle 24, which terminates at its forward end in a restricted opening 25 defined by a forming plate 25a. The feed screw 21 has a hollow shaft 26 within which is supported on bearings 27 a stationary hollow tube 28 designed to permit a rod 18 to pass freely through it. Within the tube is a removable support 29 shaped like a section of the tray 16 with a longitudinal slot 30 like the slots 19 and adapted to support but allow free longitudinal movement of a rod 18. The tube 28 is open and accessible at the rear 23 of the plodder and extends forward beyond the forward end of the feed screw 21 and the hollow shaft 26 and terminates at its forward end at 31 between the forward end of the feed screw 21 and the restricted opening 25, preferably close to the latter as shown. The forward portion 32 of the tube is of appreciable length and preferably has thin walls. As can be seen from Fig. 5, it has the indented cross-sectional shape both internally and externally of the desired design, and its internal cross-sectional dimensions are just slightly greater than the cross-sectional dimensions of the desired design, so that a rod 18 can just pass freely through it.

If the internal cross-sectional dimensions of the portion 32 are too large in relation to the cross-sectional dimensions of the rod, there is a danger that the soap surrounding the rod will back up in the portion 32 around the rod and jam the latter in the tube.

Mounted between the last two flights 33 and 34 of the feed screw 21 is a perforated plate 35

(shown partly broken away in Fig. 1) with which may be associated a strainer screen 36. The function of this plate, which is fully discussed in copending application Serial No. 538,296, filed June 1, 1944, is, briefly, to break up the plastic soap fed by the feed screw 21 into a series of strips having a longitudinal grain, and to coil these helically about the hollow shaft 26 of the feed screw so that the mass of plastic soap advanced through the nozzle 24 towards the opening 25 moves in the direction of the axis of the coils and has a helical grain.

The operation of the apparatus described is as follows:

The tray 16 carrying rods 18 of the desired cross-sectional shape, e. g., a cross, is moved manually to bring one of the slots 19, occupied by a rod 18, into alignment with the slot 30 in the support 29 in the stationary tube 28 of the plodder B. The rod 18 is then pushed forward into the tube 28. Mechanical means might be devised for this purpose but the operation can quite satisfactorily be carried out manually. The rod is preferably longer than the overall length of the tube 28 and is pushed forward in that tube until its front end just projects from the forward end 31 of the tube. It will be seen that in this position the rod is supported in the tube for free longitudinal movement in the direction of travel of plastic soap being fed through the plodder B. This plastic soap is fed progressively by the feed screw through the nozzle 24, where it is subject to radial compression exerted substantially transversely of its axis of travel and gradually increasing owing to the taper of the nozzle, as the opening 25 is approached. The soap is thus strongly compressed around the front portion 32 of the tube 28. Since this tube has the external cross-sectional shape of the rod 18, the plastic soap passing over it is shaped internally in accordance with the external shape of the rod, the opening in the soap produced by the presence of the portion 32 being simply of somewhat greater dimensions than the rod 18. As the plastic soap passes the forward end 31 of the tube 32 it is compressed about the end of the rod 18 projecting therefrom and grips the latter strongly. As the advancing movement of the soap continues towards the opening 25 the rod, being perfectly free to move longitudinally, is drawn along with the soap completely surrounded by the latter. As successive portions of the rod are exposed by reason of this longitudinal motion, they are in turn surrounded and gripped by the plastic soap travelling past the forward end 31 of the tube 28. The result is that the rod is drawn through the tube 28 solely by the plastic soap which is being fed through the plodder B and is progressively surrounded by that soap. The latter is extruded from the opening 25 in a bar which contains the rod 18 and has a cross-sectional shape determined by the shape of the opening. This bar is cut at appropriate intervals transversely of its axis into cakes 37, such as shown in Fig. 6, by a suitable cutter 38.

When, as a result of the action just described, the rear end of a rod 18 disappears into the rear end of the tube 28, the operator moves the tray to bring a new rod into line with the tube and simply pushes the new rod forward into the tube until it just touches the rear of the preceding rod. The operator will then maintain only just enough yielding pressure simply to maintain contact between the rods, until he feels that the rod which he is touching is being advanced independently

of his action because its forward end has been gripped by the plastic soap in the plodder B. It is important that this contact between successive rods be maintained because, if it is not, the body soap, which is under very high pressure, will fill in the space behind the rear end of one rod before the front end of the next rod appears at the forward end of the tube, and not only may make it impossible for the front end of the next rod to be projected beyond the forward end of the tube in such a way as to be gripped by the body soap, but may actually back up into the tube and block the latter completely.

It will be seen from this description that the rate of movement of the rods 18 through the plodder B depends solely on the rate of movement of the plastic soap which is to surround them, i.e., of the soap which will form the body of the final cake. If, for any reason, the rate of movement of the body soap increases, the rods are simply pulled through a little faster. If it decreases they are pulled through more slowly and, if for some reason the plodder B stops, then the movement of the rods 18 through it stops also. There is, thus, no problem of synchronizing the operation of two plodders. The rate of operation of the plodder A is in no way related to the rate of operation of the plodder B. There is in fact no reason why the rods to be fed to the plodder B should not be made at a different time and place from the time and place of their use in the manufacture of the final cake in that plodder. The trays 16 are simply one suitable means of storing the rods which are made by the plodder A. That plodder could quite well operate to make a large number of rods which might then be stored in any appropriate way and subsequently used in the plodder B at a time when the plodder A might not be operating at all. The invention thus allows the plodder B to operate with exactly the same flexibility as if it were making ordinary soap without a design extending therethrough.

The shaped forward portion 32 of the tube 28 is particularly necessary for designs of indented cross-sectional shape such, for instance, as letters of the alphabet and the cross shown in the drawings. These are referred to as being of indented cross-sectional shape, because they present indentations on their external surfaces. Thus, the cross may be regarded as a square which is indented at each of its four corners. The reason that the external and internal shaping of the forward portion of the tube is so necessary for these designs is that otherwise rods having the cross-section of such designs would tend to be collapsed by the heavy pressure of the surrounding body soap exerted unequally on different parts of the cross-section of the rod, if this body soap had not been previously substantially conformed in internal shape to the external shape of the rod which it was to grip. However, the shaped forward portion may not be necessary for certain simple designs such, for instance, as squares or triangles, although it is always desirable even for these. It is desirable that the forward end of the tube be quite close to the restricted opening 25. If it is too far back in the plodder nozzle 24 there may be a tendency towards distortion of the rod in its travel from the forward end 31 of the tube to the opening 25.

The rods will normally be of soap of different characteristics from those of the plastic soap, generally of a different colour from the latter. However, the rods need not necessarily be of soap. They might be of some other material adapted

to dissolve in water at substantially the same rate as the soap, if that were considered commercially desirable.

It will be appreciated that the apparatus would work just as satisfactorily from the point of view of the production of soap cakes containing axially extending designs, if the grain of the body soap were straight, as it is in the plodder A, instead of helical. However, the characteristics of the final cake during use would not be nearly as satisfactory for the reasons given in the copending application referred to above. If desired, the rods may be formed with a helical grain, as well as the body soap.

What I claim as my invention is:

1. The method of producing soap cakes with a continuous design extending axially there-through, which comprises supporting a preformed rod of water soluble material having the cross sectional shape of the desired design for free longitudinal movement with its front end exposed in a zone in which radial compression is adapted to be exerted substantially transversely to the longitudinal axis of said rod, then feeding plastic soap through said zone in the direction of the longitudinal axis of said rod, causing said plastic soap as it passes through said zone to be radially compressed substantially transversely to said longitudinal axis and to surround and grip said rod progressively and draw said rod along with it, maintaining a further like rod in contact with the rear end of the rod which is being drawn along with said plastic soap, until said further rod extends at its forward end into said zone, and is itself surrounded and gripped by and drawn along with said plastic soap, extruding said soap through a restricted opening in the form of a bar containing said rods, and cutting said bar transversely of its axis to form cakes of soap.

2. The method of producing soap cakes according to claim 1, in which the rod is composed of soap having different characteristics from those of the plastic soap.

3. The method of producing soap cakes with a continuous design extending axially there-through, which comprises supporting a preformed rod of soap having the cross sectional shape of the desired design for free longitudinal movement with its front end exposed in a zone in which increasing radial compression is adapted to be exerted substantially transversely to the longitudinal axis of said rod and which terminates at a restricted opening, then feeding through said zone in the direction of the longitudinal axis of said rod plastic soap having different characteristics from those of the soap of said rod, causing said plastic soap as it reaches the vicinity of said opening in passing through said zone to be radially compressed to an increasing extent substantially transversely to said longitudinal axis and to surround and grip said rod progressively and draw said rod along with it, maintaining a further like rod in contact with the rear end of the rod which is being drawn along with said plastic soap, until said further rod extends at its forward end into said zone, and is itself surrounded and gripped by and drawn along with said plastic soap, extruding said soap through said restricted opening in the form of a bar containing said rods, and cutting said bar transversely of its axis to form cakes of soap.

4. The method of producing soap cakes with a continuous design extending axially there-through, which comprises supporting a pre-

formed rod of soap having the cross sectional shape of the desired design for free longitudinal movement with its front end exposed in a zone in which radial compression is adapted to be exerted substantially transversely to the longitudinal axis of said rod, forming strips of plastic soap having different characteristics from those of the soap of said rod, coiling said strips helically, then feeding said coiled plastic soap through said zone in the direction of the axis of the coils and in the direction of the longitudinal axis of said rod, causing said plastic soap as it passes through said zone to be radially compressed substantially transversely to the longitudinal axis of said rod and to surround and grip said rod progressively and draw said rod along with it, maintaining a further like rod in contact with the rear end of the rod which is being drawn along with said plastic soap, until said further rod extends at its forward end into said zone, and is itself surrounded and gripped by and drawn along with said plastic soap, extruding said soap through a restricted opening in the form of a bar containing said rods, and cutting said bar transversely of its axis to form cakes of soap.

5. Apparatus for producing a soap bar with a continuous design of indented cross-section extending axially therethrough, which comprises a plodder having a restricted opening at the forward end thereof and means for feeding plastic soap to said opening and extruding it therefrom, a tube extending into the plodder from the rear end thereof towards the forward end and designed to permit a preformed soap rod having the cross-sectional dimensions of the desired design to pass freely therethrough, said tube being open and accessible at the rear of the plodder and terminating at its forward end, between said opening and the forward end of said feeding means, in a portion of appreciable length having

the indented cross-sectional shape both internally and externally of the desired design but having inside cross-sectional dimensions just slightly greater than those of the desired design, whereby a preformed soap rod having the cross-sectional dimensions of the desired design may just pass freely through said portion.

6. Apparatus according to claim 5, in which the tube terminates at its forward end close to the restricted opening at the forward end of the plodder.

7. Apparatus for producing a soap bar with a continuous design extending axially therethrough, which comprises a plodder having a restricted opening at the forward end thereof and a feed screw for feeding plastic soap to said opening and extruding it therefrom, a perforated plate mounted between two adjacent flights of said screw near the forward end thereof, said plate extending from one of said flights to the other and extending from the axis of said screw to substantially the periphery of said flights, whereby all soap fed by said screw is forced to pass through said plate, a tube extending into the plodder from the rear end thereof along the axis of the feed screw and designed to permit a preformed soap rod having the cross-sectional dimensions of the desired design to pass freely therethrough, said tube being open and accessible at the rear of the plodder and terminating at its forward end close to said restricted opening in a portion of appreciable length having the cross-sectional shape both internally and externally of the desired design but having inside cross-sectional dimensions just slightly greater than those of the desired design, whereby a preformed soap rod having the cross-sectional dimensions of the desired design may just pass freely through said portion.

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