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[54] **PROCESS FOR MAKING MARBLEIZED SOAP OR DETERGENT**

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Related U.S. Application Data

[63] Continuation-in-part of Ser. No. 875,091, Nov. 10, 1969, abandoned.

[52] **U.S. Cl.** **264/75,** 252/109, 252/134, 264/78, 264/89, 264/102, 264/211, 264/349

[51] **Int. Cl.** **B29b 1/04,** B29f 3/12

[58] **Field of Search** 264/75, 78, 245, 37, 211, 264/102, 349, 89; 252/109, 134

[56] **References Cited**

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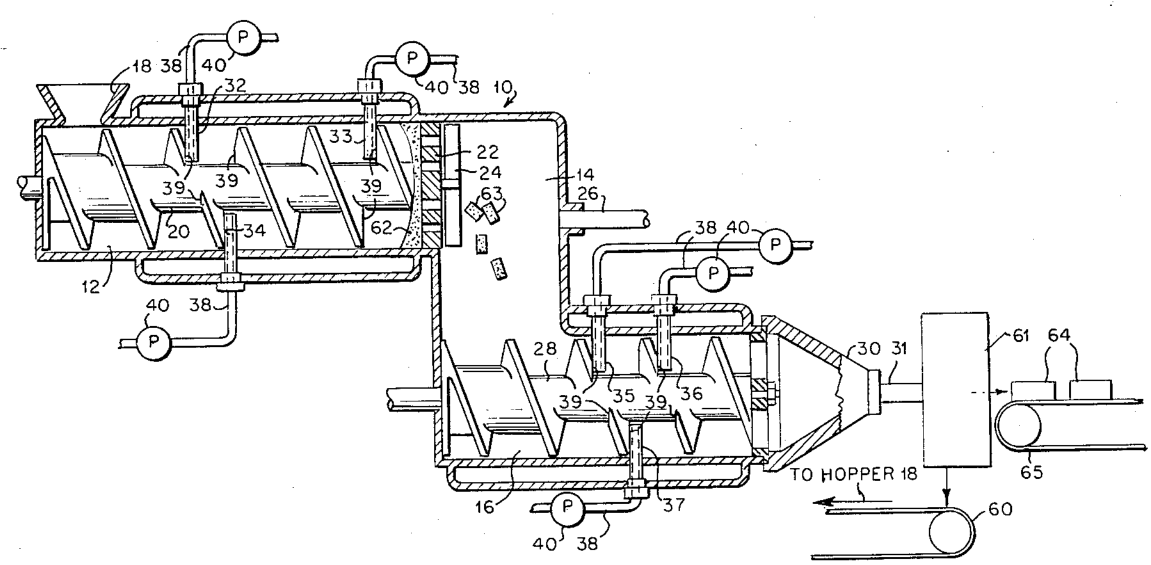
[57] **ABSTRACT**

A marbleized mass of soap in the form of a log is produced by passing soap particles through a modified two-stage plodder and injecting a soap additive, e.g., a dye, into the compressed soap mass during extrusion of the soap. The process and apparatus can be used also to produce marbleized detergent logs.

7 Claims, 5 Drawing Figures



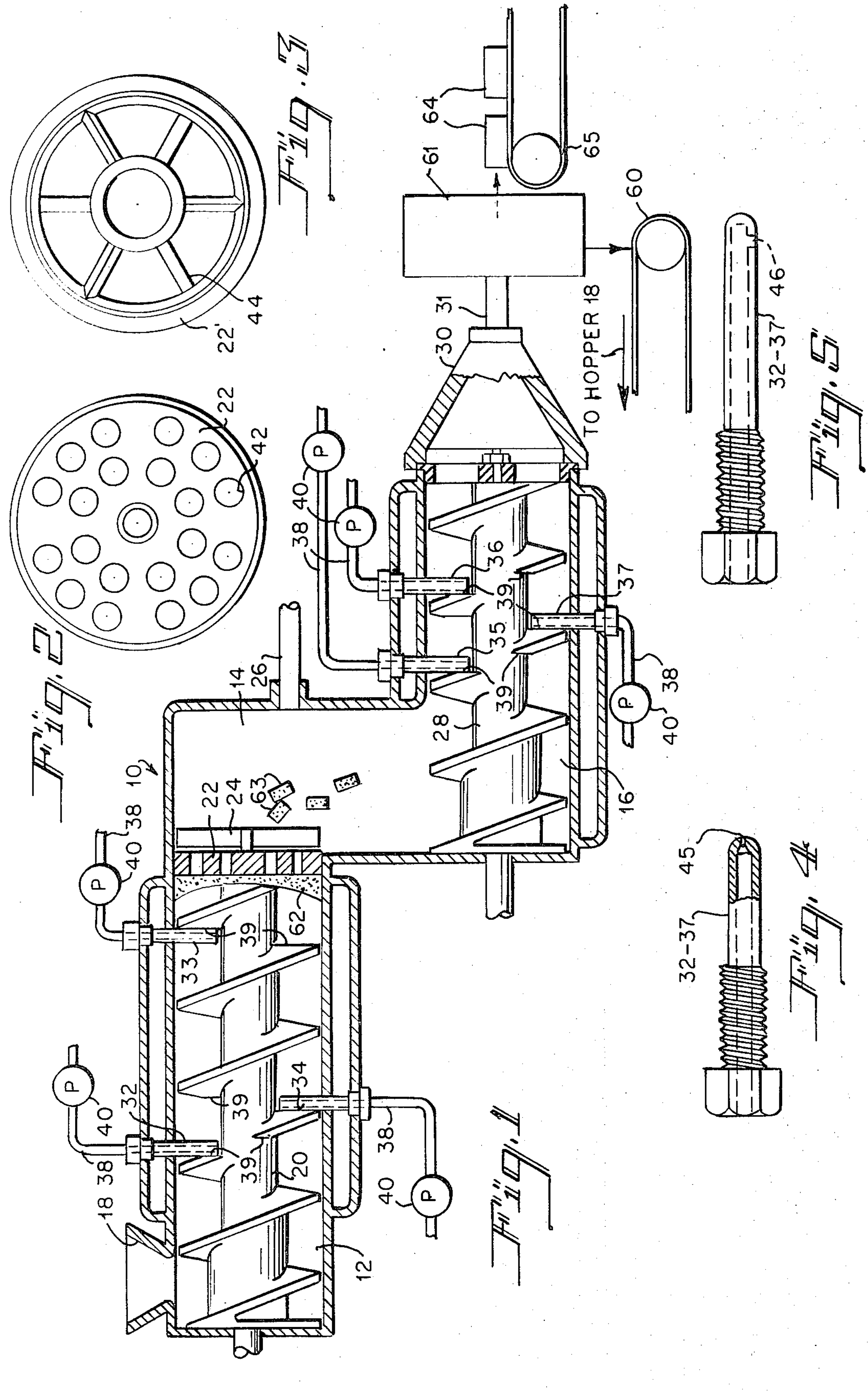


Fig. 1
Fig. 2
Fig. 3
Fig. 4
Fig. 5
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PROCESS FOR MAKING MARBLEIZED SOAP OR DETERGENT

REFERENCE TO OTHER APPLICATION

This application is a continuation-in-part of my copending application, Ser. No. 875,091, filed Nov. 10, 1969, now abandoned.

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to a method and apparatus for the production of marbleized soap masses including detergent masses.

2. Description of the Prior Art

Marbleized soap masses have been produced, most frequently in the form of a marbleized soap bar having various colors distributed apparently at random throughout the soap mass. As presently known, such soap masses have been produced either by a framing process or by introduction of a dye into the vacuum chamber between stages of a two-stage soap plodder. Soap framing — a batch process — has its inherent disadvantages, and the introduction of the dye into the vacuum chamber is subject to the disadvantages that the ability to control the appearance of the finished product is relatively limited in that the dye-addition location is fixed. Soap logs produced in this fashion frequently suffer from a relatively high degree of dye-migration to the outer portion of the soap mass and consequent non-uniform distribution of the dye throughout the soap mass, lack of adequate contrast, and the lack of relatively reproducible variations in the finished soap patterns.

SUMMARY OF THE INVENTION

It has now been found that a marbleized soap mass can be produced by injecting a soap additive composition under pressure into the compressed soap mass as it passes through one of the stages of a modified two-stage soap plodder. The additive injection can be effected through one or more nozzles in either the first or the second compression stage and the additive can be continuously or intermittently injected.

In the preferred embodiment of this invention, a marbleized soap is produced in which the injected additive is a dye and the marbleized product is an otherwise homogeneous mass having colored streaks distributed throughout the mass to produce a variegated appearance. The invention is also useful in producing heterogeneous soap masses in which the injected additive is a composition such as a sequestering agent, a deodorant, a perfume or lanolin. The addition of these later materials by the method of my invention greatly reduces prior processing problems inherent in the use of such additives. As used herein, the term "marbleized" soap referes to all of the described soap masses although for purposes of simplicity the description of my invention hereafter will be directed to the production of variegated soap masses by dye injection.

The process and apparatus of my invention will produce a marbleized mass having greater or less contrast between differently colored areas according to the process variables including the soap formulation, the plasticity of the soap mass, the amount of additive used, the point of additive injection, the size of extrusion equipment used and similar variables. Thus, the present description is directed to applicant's preferred embodiment in which variations within the mass are in distinct zones distributed substantially throughout the mass. Many of the process variables within reasonable limits are non-critical but relate only to degree of contrast to be obtained between differently colored areas of the soap mass.

In a typical soap production according to my invention a kettle soap is mixed with desired addition agents such as perfumes, fillers, germicides, emollients, water, salt, etc. and milled. The milled chips are fed to the first stage — or refiner barrel — of a modified two-stage plodder in which the soap chips are compressed under the action of an extrusion screw at a temperature of 70°F to 160°F preferably 85°F to 125°F. A dye solution (0.5 to 30 percent solution) is injected into the compressed soap mass as it passes through the first stage of the plodder.

The compacted soap is discharged from the first stage of the plodder through a specially designed end plate. Whereas in the usual form of a soap plodder the first stage discharge comprises a combination of a 20 to 40 mesh woven screen and a metal backing plate having a myriad of small holes (e.g. in a soap plodder with a 10 inch cylinder diameter the backing plate has ⅜ inch diameter holes) through which extrusion of the soap mass produces numerous ribbons or filaments of soap; I provide a pressure plate which is relatively open having large holes or shaped apertures. By way of comparison, the usual first stage discharge plate and screen has openings which occupy 27% or less of its face area, i.e., it is 27%, or less, open; the pressure plate used in the method and apparatus of my invention is at least 35% and preferably at least 50% and up to 85% open.

The soap with entrapped dye solution is extruded through the relatively large openings of the pressure plate and cut into pellets as it enters into a vacuum chamber enclosing the discharge side of the pressure plate.

In the vacuum chamber entrapped air within the soap pellets is removed. The soap pellets pass through the vacuum chamber and into the plodder second stage which compresses the soap pellets and extrudes the soap as a continuous log of marbleized soap. Thereafter, the marbleized log is cut and stamped into soap bars in the manner known in the art and waste from the cutting and stamping is recycled to the first stage feed.

DESCRIPTION OF THE DRAWINGS

FIG. **1** is a somewhat schematic cross-sectional view of a modified two-stage soap plodder and associated apparatus adapted for use according to the teaching of the present invention.

FIG. **2** is a plan view of a pressure plate used in the apparatus shown in FIG. **1.**

FIG. **3** is a plan view of an alternate pressure plate to that shown in FIG. **2.**

FIG. **4** is a side elevation partly in section of an injection nozzle.

FIG. **5** is a side elevation of a modified injection nozzle.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to FIG. **1,** a two-stage soap plodder **10** is shown consisting of a water jacketed upper barrel **12**

— sometimes called the refiner barrel — a vacuum chamber **14** and a water jacketed lower barrel **16.** Barrels **12** and **16** are cylindrical and contain, respectively, extrusion screws **20** and **28** each of which is rotatably driven by conventional means (not shown) the flights of each screw passing close to the interior wall of each barrel. Particles of soap — chips or pellets — are introduced to one end of the upper barrel **12** through inlet hopper **18** and are picked up by the feed-end flights of extrusion screw **20.** Rotation of extrusion screw **20** in barrel **12** compacts the soap particles and urges the compacted soap along the axis of barrel **12** and through a pressure plate **22.** Blade cutter **24** is provided on the face of pressure plate **22** and operates to cut the soap extruded through plate **22** into pellets one-half to 4 inches in length.

Having passed through pressure plate **22** and rotary cutter **24,** the soap pellets enter vacuum chamber **14** in which gases entrapped in the soap are removed by the action of a vacuum on the order of approximately 25–29 inches of mercury. Chamber **14** is evacuated through vacuum line **26.** The soap pellets discharged fall upon the feed end flights of a second extrusion screw **28** in lower barrel **16.** Rotation of extrusion screw **28** within barrel **16** compacts the pellets, urges the compacted soap along the axis of barrel **16,** and extrudes a continuous log **31** of soap through a nose plate **30** having an exit aperture shaped according to the form of soap log desired.

In the practice of the present invention, a soap additive is injected into the compacted soap during its passage through plodder **10.** The injection is made by means of one or more of a series of nozzles **32 – 37** extending through the walls of the plodder barrels **12** and **16**; each nozzle is provided with a stream of additive by a conduit **38** and positive displacement pump **40.** As shown in FIG. **1,** these nozzles can be located in either or both of the bottom barrel and the top barrel and the location of each nozzle can be varied along the length of the barrel. The dye should be injected into, and entrapped within the soap while the latter is under the compressive influence of the extrusion screw. Therefore, the injection nozzle should not be any closer to the feed end of the barrel than the point at which the soap in the barrel becomes compressed nor so close to the discharge end of the barrel that the dye passes out of the barrel as a separate liquid phase, i.e., before it becomes entrapped within the soap. Suitable nozzle positions are spaced from the discharge end of the barrel a distance equal to about 5% to about 75% of the barrel length.

While a series of six nozzles are shown in FIG. **1,** this is merely illustrative of different injection sites that can be used. I have found it preferable when working with a single additive to inject the additive at only a single point and this preferably in upper barrel **12** at a point along the axis of barrel **12** at a distance of 5 to 45% of the barrel length from pressure plate **22.** However, simultaneous injection through more than one nozzle can be used, especially when it is desired to inject more than one soap additive, e.g., in the injection of different dye streams.

Nozzles **32 – 37** project into the space between barrels **12, 16** and extrusion screws **20, 28.** The latter are provided with a registering notch **39** for each nozzle. It is possible to avoid the use of nozzles and accomplish the desired injection through orifices in the flights or shaft of a hollowed out extrusion screw. However, the use of nozzles is preferred since they also act as picker pins to reduce slippage and churning in the plodder barrel and thereby aid in increasing the rate of soap extrusion.

As stated above, I prefer to inject additive in the upper barrel **12** at a point relatively close to pressure plate **22,** i.e., through nozzle **33** in FIG. **1.** FIG. **1** shows the configuration of the discharge end of upper barrel **12** when the additive injection occurs within upper barrel **12.** In order to avoid excessive mixing of the soap and additive mass, a relatively open pressure plate is used, i.e., one that is at least 35% and preferably 50% open. This can be accomplished by using a plate having a plurality of large holes **42** or shaped apertures distributed across the plate surface each extending through the plate to permit the passage of soap.

The openings in plate **22** should be as large as possible while providing for the maintenance of vacuum in chamber **14** and the development of adequate pressure — 40 to 350 psig - within barrel **12** to compact the soap chips or pellets fed to hopper **18** into a continuous mass of soap. For example when using a 10 inch plodder, i.e., the inside diameter of barrels **12** and **16** is 10 inches, a suitable pressure plate **22** has holes **42** distributed across its surface each hole having an inside diameter of 1 to 1¼ inches. This insures that relatively large soap pellets **63** pass into vacuum chamber **14.** An alternate construction of pressure plate **22** is shown in FIG. **3.** In this instance, a plate **22'** is provided having an open face except for a series of struts **44.** This type of pressure plate is especially useful with smaller diameter extrusion screws e.g., 6 inch.

Screw **20** is provided with the last screw flight terminated a short distance — typically 2 inches — from pressure plate **22.** This permits a heel of soap **62** to form between screw **20** and pressure plate **22** and aids in the maintenance of vacuum in chamber **14** and the development of pressure in barrel **12.** In FIG. **1,** the soap is shown only at heel **62** and pellets **63.** This remainder of the soap throughout plodder **10** has been omitted to allow for the showing of details in the drawing.

When additive injection occurs only in the lower barrel **16,** the discharge end of upper barrel **12** can be enclosed by the usual form of pressure plate which comprises a combination of a 20 to 40 mesh screen and a metal backing plate having a myriad of small holes distributed across its surface. As an aid to the distribution of additive throughout the soap mass when the additive injection occurs in lower barrel **16,** a baffle plate can be provided in nose plate **30** or between nose plate **30** and barrel **16.**

In FIGS. **4** and **5,** typical injection nozzles **32 – 37** are shown. In FIG. **4,** the nozzle is provided with an end outlet port **45** whereas in FIG. **5** a side outlet port **46** is provided for location in the plodder barrel facing its discharge end.

After log **31** is discharged from nose plate **30** it is treated according to conventional practice by a cutting and stamping apparatus **61** from which individual bars **64** of suitable shape are discharged on conveyor belt **65.** Bars **64** having capacity shapes or landed shapes can be produced. I have found that soap scraps from the cutting and stamping apparatus **61** can be recycled to inlet hopper **18,** as by conveyor belt **60** and processed through the plodder **10** without destroying the marbleized appearance of the product. Understandably, the soap produced when scraps are recycled is more highly colored than when the soap is processed without recycle but this is often a desirable result. The amount of scrap recycle to hopper **18** can amount to as much as 30% of the total soap fed to hopper **18.**

The conditions under which marbleized soap is produced in plodder **10** are those normally encountered in soap plodding. In particular, the soap is processed through plodder **10** at temperatures between 70°F and 160°F and preferably between 85°F and 125°F; these temperatures referring to the temperature of the soap in the plodder and at the discharge from nose plate **30.** The soap plodder can be operated at normal capacity and throughput is limited by the allowable temperature rise within the soap mass. Pressures within barrels **12** and **16** will be 40 – 350 psig.

Illustrative of the production of bars of soap having a marbleized appearance are the following examples.

Example I

Green Streaks on White

Chips of soap comprising 36.68 percent coconut fatty acid sodium soap, 44.47 percent tallow acid sodium soap and 6.15 percent coconut fatty acids, are mixed with germicide, preservative and perfume in the proportions:

Ingredients		Weight Percent
36.68:	44.47 coco: tallow sodium soap chips	81.65
	coco fatty acid	6.15
	Germicide TBS:TCC 3:1 ratio	2.0
	Perfume	1.0
	Water	8
	NaCl	1.2

The soap chips, germicides, preservative, perfume and water are mixed and milled. Fifty pounds per minute of milled chips are charged to the hopper **18** and forced by means of extrusion screw **20** through pressure plate **22** into the vacuum chamber **14.** A 10 inch (barrel diameter) plodder was used, pressure plate **22** having 1¼ inch holes **42.**

A 10 percent dye solution containing Monastral Fast Green dye in aqueous solution was injected through a single nozzle **33** located in barrel **12** approximately 5 inches from plate **22.**

The dye was injected in a pulsating flow cycle whereby 11 ml. were injected in 3 seconds followed by a 28 second period during which no dye was injected. A highly desirable marbleized pattern with sharp contrasting green and white areas extending throughout the soap mass was produced.

Example II

Green Streaks on White Soap

Milled soap chips having the composition given hereinafter were fed to the hopper **18** of a double-barrel vacuum plodder.

Ingredients	Weight %
20 coco: 80 tallow sodium soap	82.8
Preservatives	.2
Perfume	1.0

-Continued

Ingredients	Weight %
NaCl	0.5
Water	15.5

The above example was processed in the same way as example one, except that the injection was in the lower barrel **16,** i.e., the position represented by nozzle **37.** The rate of addition of the colorant solution was varied from 1 cc/8.33 lbs. of mixed soap to 1 cc/.256 lbs. of mixed soap. The best rate found during this run was around 1 cc/1.28 lbs. of mixed soap.

The best results are observed in processing soaps of relatively high plasticity, as these soaps pass through the plodder without excessive mixing of the injected dye throughout the soap mass. Plasticity can be improved by the addition of suitable agents, e.g., petrolatum, mineral oil, glycerine, or by hardening of certain ingredients prior to use.

In general, soap formulations within the following ranges may be used:

Coco soap (i.e. palm, olive, stearic, etc.)	—	5 to 95%
preferably	—	5 to 45%
Tallow soap (i.e. choice white grease etc.)	—	5 to 95%
preferably	—	45 to 95%
Free fatty acid	—	0 to 30%
preferably	—	5 to 10%
Water	—	0 to 26%
NaCl	—	0.1 to 5%

Other known soap formulations may be used and the soap component can be replaced by detergent materials such as sodium fatty alcohol sulfates, alkyloxyhydroxypropane sulfonates, and sodium fatty acyl taurates. Translucent soaps can also be used and these can contain nacreous pigments comprising transparent platelets of high refractive index which produce pearlescent soap bars.

Dye compositions containing water or oil soluble dyes particularly color-fast compositions can be used. Suitable dyes used include those sold under the following names:

Monastral Fast Green
Monastral Fast Blue
Heliogen Green
Heliogen Blue
F D & C Red No. 4
D & C Red No. 19

Dye concentrations between 0.5 and 30% are added either continuouly or in a pulsating flow of from 0.04 ml. to 5.0 ml. of dye solution per pound of soap. It has been observed that a pulsating flow of dye facilitates the use of larger dye quantities without undue mixing of the dye as the soap passes through the plodder, i.e., the addition of dye in pulses provides a product in which the contrast between additive colored zones and base colored zones is greater than when the dye additive is added at a constant rate. The pulse cycle may vary up to 8 seconds of additive injection followed by a 75 second period during which no additive is injected.

I claim:

1. The method of making a marbleized soap or detergent mass which comprises simultaneously compressing a base soap or detergent while injecting from 0.04 to 5.01 ml. per pound of said base soap or detergent of an additive composition comprising a 0.5 to 30% dye solution into said base soap or detergent in the extrusion means of a two stage soap plodder at one or more points along the axis of movement of the soap through a stage spaced 5 to 75% of the length of said stage from the point of discharge therefrom and extruding from the soap plodder, at a temperature of about 70°F. to about 160°F., a marbleized mass of base soap or detergent containing the additive.

2. The method of claim **1** in which the base is soap, and injection occurs in the first stage of said plodder, and the first stage discharges through a relatively open pressure plate.

3. The method of claim **2** in which the point of injection is spaced from the point of discharge a distance equal to 5 to 45% of the length of said first stage.

4. The method of claim **3** in which the extrusion temperature is 85°F to 125°F.

5. The method of claim **1** in which injection occurs in the second stage of said plodder.

6. The method of claim **2** in which said additive injection is accomplished by a pulsating flow injection, the periods of the pulse cycle during which additive is added and during which additive is not added being up to about 8 seconds and 75 seconds respectively.

7. The method of claim **2** in which the base soap contains 5 – 95% coco soap, 5 – 95% tallow soap, 0 – 30% free fatty acid, 0 – 26% water, 0.1 – 5% NaCl.

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