T. M. GODFREY.

MANUFACTURE OF SOAP.

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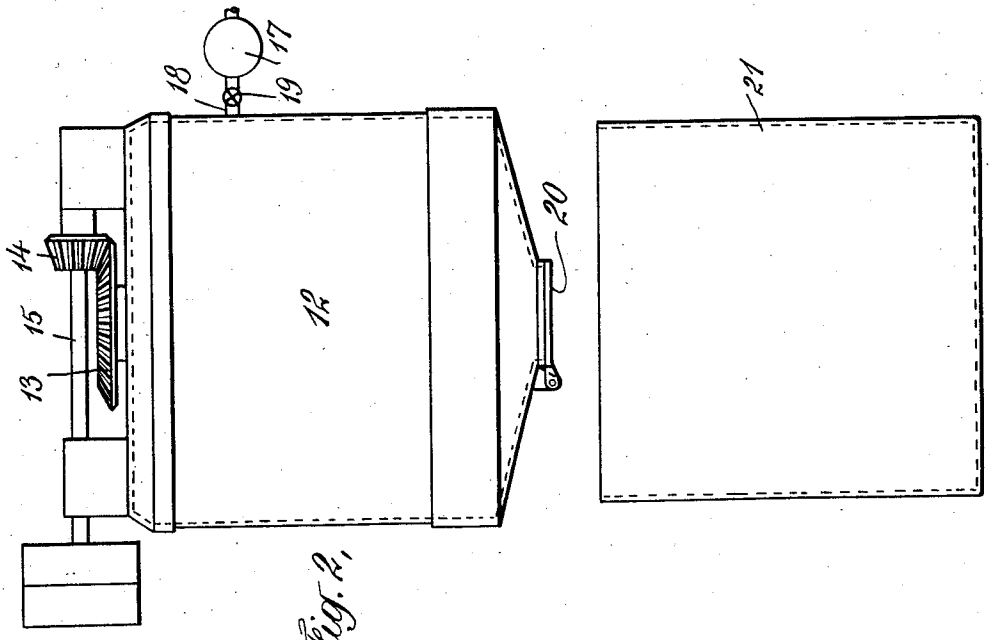



Fig. 2.

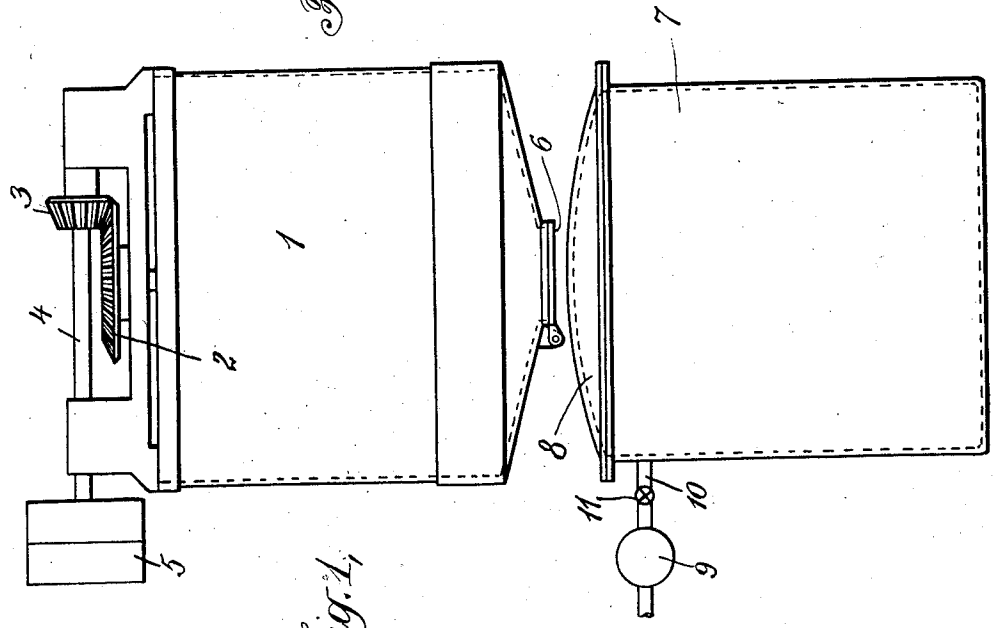



Fig. 1.

Inventor
Truman M. Godfrey
By his Attorneys
Finnie Davis Marvin & Edmonds

# UNITED STATES PATENT OFFICE.

TRUMAN M. GODFREY, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE N. K. FAIRBANK COMPANY, OF GUTTENBERG, NEW JERSEY, A CORPORATION OF NEW JERSEY.

## MANUFACTURE OF SOAP.

1,414,015. Specification of Letters Patent. Patented Apr. 25, 1922.

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*To all whom it may concern:*

Be it known that I, TRUMAN M. GODFREY, a citizen of the United States, residing at Chicago, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in the Manufacture of Soap; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

The present invention relates to the production of soap, intended principally for laundry and toilet purposes, of such a character that it is quickly soluble and of a unique fluffy and attractive appearance, presenting a characteristic delicacy of structure and whiteness of color peculiarly acceptable to market conditions.

The main characteristic or leading feature of the invention consists in entrapping within a body of soap while in a viscous molten condition a disseminated body of bubbles of air; and, thereupon, expanding the air bubbles by lowering the pressure which prevailed during the aeration of the mass. Another characteristic is the novel product represented by the fluffy aggregate of connected soap particles.

In order that my invention may be more clearly understood, I have illustrated in the accompanying drawing, two forms of apparatus adapted for employment in carrying out the method. It is to be understood, however, that the details of the apparatus may be varied without departing from the invention. In the drawing, Fig. 1 is an elevation illustrating one form of apparatus; and Fig. 2 is a similar elevation illustrating another and slightly different form of apparatus.

The new product may be made from any usual soap stock, either toilet or laundry, this stock first being aerated, while in a suitable viscous molten condition, by a mixing or crutching operation of such a character as will introduce into and disseminate throughout the mass, a large quantity of well distributed air bubbles. The mass, while still in the viscous molten condition is then subjected to a vacuum (or a greatly diminished pressure) whereupon the air entrapped in the viscous mass expands and causes the soap to "rise," greatly increasing its volume and causing it to assume an appearance not unlike very light bread, or, if the diminution in pressure is extreme, causing it to assume an appearance similar to a stiff lather. As soon as the mass has cooled to room temperature, the normal air pressure is admitted, and the product may be readily broken up into the desired size for packing; which may be either in the condition of lumps, flakes or powder.

The extent of the "puffing" of the soap characteristic of the invention may be controlled by varying the degree of aeration, and also by varying the degree of reduction of the air pressure during the period of subsequent expansion of the bubbles; that is to say, the more thorough the preliminary aerating operation, and the more uniform the distribution of the air bubbles, the more effective and complete will be the subsequent expansion, and, furthermore, the more complete the vacuum, the greater will be the puffing effect.

The moisture content of the finished product is of importance inasmuch as a soap which is moist and sticky tends to mat together easily upon handling. Accordingly, if the puffed soap contains an excess of moisture, this excess may conveniently be driven off by leaving the puffed soap under vacuum until it is brought to the desired condition of dryness.

No specially designed machinery will be required for the practice of the invention. Thus, the soap may be aerated in an ordinary crutcher, and may then be run into a tank which can be made air-tight and connected up with any suitable exhauster for producing the required vacuum; or, the aerating or crutching machinery may be contained directly within the tank, so that the soap will not need to be transferred therefrom after aerating. It will, of course, be understood that the same results may be accomplished by aerating the soap under super-atmospheric pressure, and then releasing the pressure until atmospheric pressure is reached. The essential characteristics of the invention, in other words, consist in the preliminary entrapping and dissemination of the air bubbles throughout the molten viscous mass, and the subsequent expansion of the air bubbles, which depends entirely upon the relative pressures prevailing before and after expansion; for instance, a soap could be puffed to the same extent were it aerated under 5

atmospheres pressure and released to atmospheric pressure, as if it were areated at atmospheric pressure and evacuated to one-fifth of an atmosphere pressure.

Referring to Fig. 1 of the drawing, 1 indicates a crutcher of usual form and construction and having stirring or beating means (not shown) adapted to be driven through a beveled gear 2 and cooperating pinion 3 from a shaft 4, the latter being provided, for example, with a pulley 5 whereby the shaft is connected to a source of power. The crutcher is provided at its bottom with a closure 6 through which the material treated is released at the conclusion of the crutching operation. A vacuum tank 7 is disposed preferably beneath the crutcher and is provided with a movable cover adapted to seal the tank against ingress of air. A vacuum pump 9 is connected to the tank 7 by a pipe 10, a suitable valve 11 being provided in the pipe 10.

As a specific example of the novel operation proposed, a quantity of molten soap is introduced in the crutcher 1 and thoroughly crutched until air is disseminated throughout the mass. When the crutching operating is complete, the closure 6 is opened and the cover 8, having been previously removed, the soap drops into the tank 7. The cover 8 is then replaced and the vacuum pump 9 is started to pull a suitable vacuum on the tank and thus withdraw air from above the soap and cause the air crutched into the soap to expand, with resulting production of the highly porous puffed soap. The soap is allowed to remain in the tank 7 until it has cooled to substantially room temperature, when the pressure is permitted to return to atmospheric and the cover 8 is removed. The soap thus treated will be found to have been puffed to a point which renders it a fluffy aggregate of connected soap particles which have a more or less crystalline appearance. The material may perhaps be best described by the term "solidified lather."

In Fig. 2 of the drawing, the apparatus is substantially similar except for a slight modification of the crutcher 12 which is provided with stirrers or beaters (not shown) driven through a beveled gear 13 and beveled pinion 14 from the shaft 15. A pressure pump 17 is connected by a pipe 18, having a valve 19, to the crutcher 12 so that the crutching operation may be carried out under a super-normal pressure. A closure 20 is provided at the bottom of the crutcher 12 and an open tank or soap frame 21 is preferably disposed beneath the crutcher to receive the product therefrom when the closure 20 is opened.

The method as applied in this apparatus is substantially similar to the method last described. The molten soap is first introduced into the crutcher 12 and is then thoroughly crutched, compressed air being introduced at the same time by the pump 17 to maintain a suitable pressure within the crutcher. When the crutching operation is complete, the closure 20 is opened and the soap flows into the tank or soap frame 21. This permits the compressed air crutched into the soap to expand, and the soap is permitted to cool, so that there is produced a product similar to that above described, and made up of a fluffy aggregate of soap particles.

The puffed soap made in accordance with the invention has the advantage that the soap is rendered very quickly soluble because of the greater amount of surface exposed by the thin cell walls separating the air bubbles. These cell walls are of surprising thinness and delicacy and dissolve almost instantly in warm water. So, also, as hereinbefore indicated the color of the soap is greatly improved because the innumerable evenly distributed tiny air bubbles cause the puffed soap to appear decidedly whiter than the original unpuffed batch. The appearance of the puffed soap is particularly attractive, its delicate fluffiness being suggestive of lather. By drying the puffed soap to the correct degree, a powder or flake may be easily produced by merely crushing to the desired fineness.

Having thus described my invention, what I claim is:

1. The method of treating soap, which comprises disseminating a multitude of air bubbles throughout the soap while the soap is in a molten viscous condition and then diminishing the pressure under which the aeration took place so as to expand the air bubbles within the mass of soap, and permitting the puffed mass thus produced to cool; substantially as described.

2. The method of treating soap, which comprises disseminating a multitude of air bubbles throughout the soap while the soap is in a molten viscous condition and then diminishing the pressure under which the aeration took place so as to expand the air bubbles within the mass of soap, permitting the puffed mass thus produced to cool and driving off any excess moisture present so as to bring the product to the desired degree of dryness; substantially as described.

3. The method of treating soap, which comprises disseminating a multitude of air bubbles throughout the soap while the soap is in a molten viscous condition and then diminishing the pressure under which the aeration took place so as to expand the air bubbles within the mass of soap, permitting the puffed mass thus produced to cool and driving off any excess moisture present so as to bring the product to the desired degree of dryness, said mosture being driven off by leaving the puffed soap under vacuum; substantially as described.

4. The method of treating soap, which comprises disseminating a multitude of air bubbles through the soap by a crutching operation while the same is in a viscous molten condition, and then subjecting the mass to the action of a vacuum, whereupon the entrapped air in the viscous mass expands, and cooling the puffed mass so as to obtain a product of cellular structure with thin cell walls; substantially as described.

5. The method of treating soap, which comprises disseminating a multitude of air bubbles through the soap by a crutching operation while the same is in a viscous molten condition, then subjecting the mass to the action of a vacuum, whereupon the entrapped air in the viscous mass expands, and cooling the puffed mass so as to obtain a product of cellular structure with thin cell walls, and continuing the vacuum until the product has been brought to the desired condition of dryness; substantially as described.

6. As a new article of manufacture, soap in the form of a fluffy aggregate of minute cells filled with air and having extremely thin connected walls formed by the soap, said soap being substantially instantly soluble in warm water.

7. As a new article of manufacture, soap flake or powder consisting of a crushed fluffy aggregate of minute cells, having extremely thin connected walls which are formed by the soap, said soap being substantially instantly soluble in warm water.

In testimony whereof I affix my signature.

TRUMAN M. GODFREY.