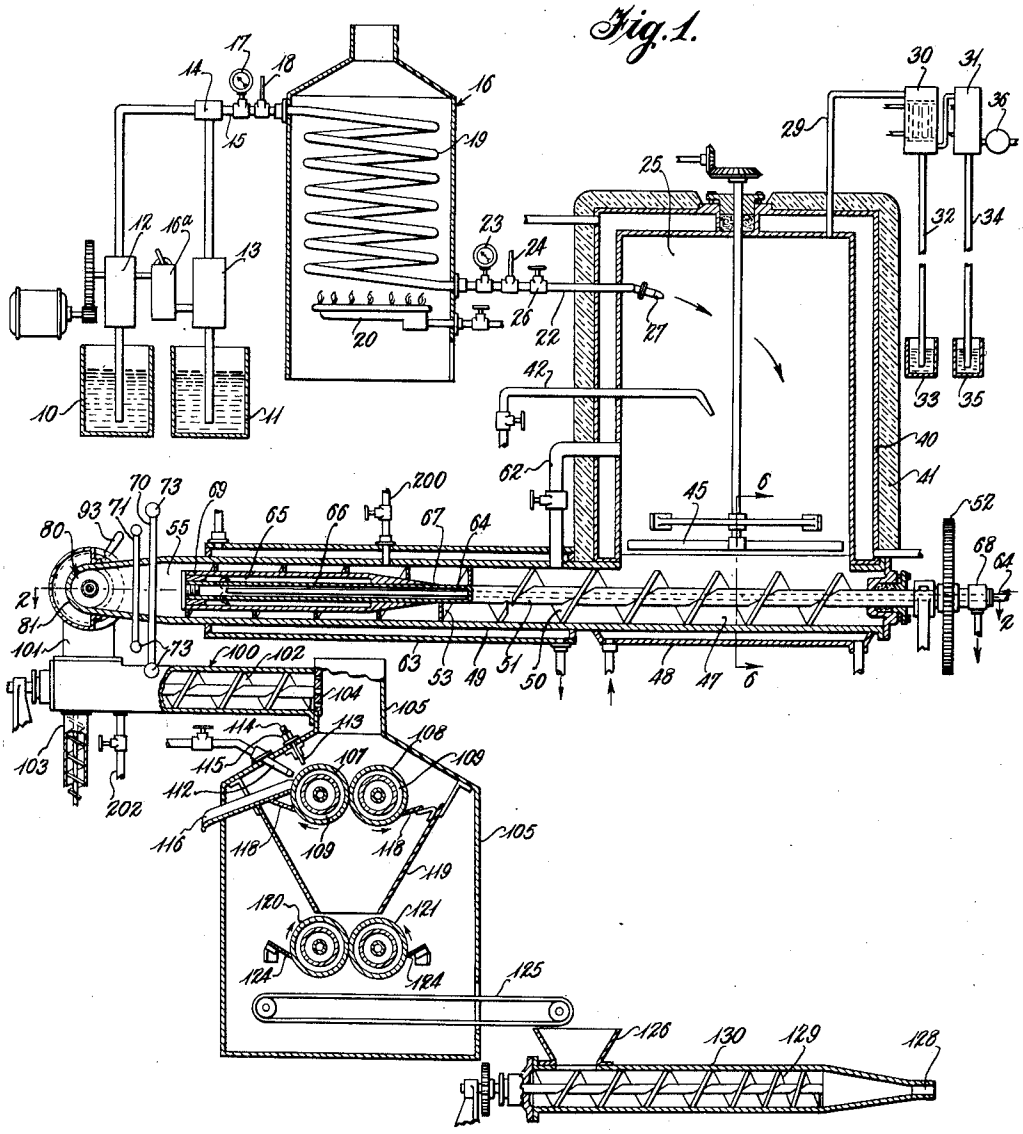
Sept. 2, 1941. B. CLAYTON 2,254,996

METHOD AND APPARATUS FOR MAKING AND PROCESSING SOAP

Original Filed Jan. 5, 1937 2 Sheets-Sheet 1

Fig. 1.



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METHOD AND APPARATUS FOR MAKING AND PROCESSING SOAP

Original Filed Jan. 5, 1937 2 Sheets-Sheet 2

Fig. 2.

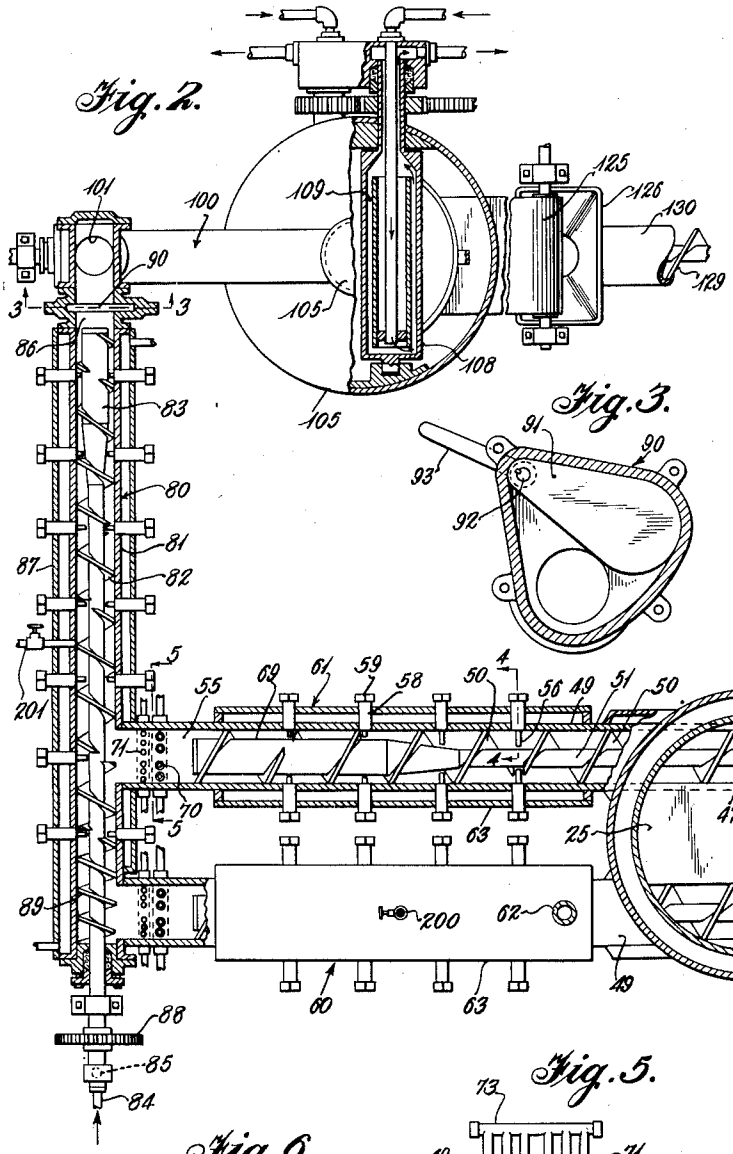


Fig. 3.

Fig. 4.

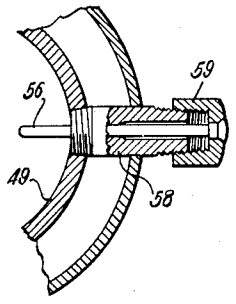


Fig. 5.

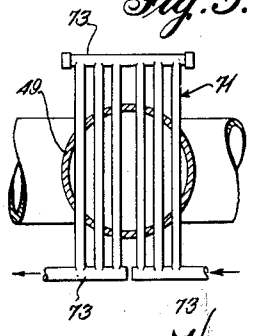
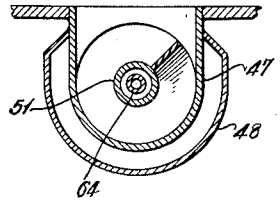


Fig. 6.



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2,254,996

METHOD AND APPARATUS FOR MAKING AND PROCESSING SOAP

Benjamin Clayton, Houston, Tex., assignor to Refining, Inc., Reno, Nev., a corporation of Nevada

Original application January 5, 1937, Serial No. 119,168. Divided and this application December 7, 1938, Serial No. 244,460

3 Claims. (Cl. 252—367)

One feature of the invention is the production of a friable soap as an intermediate or final product and which has new characteristics differentiating it from soaps now known.

In producing this friable product substantially anhydrous soap is cooled from molten, plastic, or semi-plastic condition, preferably while out of contact with the atmosphere or oxidizing agents, to form a solidified soap having incipient planes of fracture throughout. Upon extrusion this soap breaks up almost entirely into a powder or into small masses which are easily crushed into a fine powder. This friable soap has unexpected properties in that it can be directly and uniformly hydrated by adding water thereto.

It will uniformly absorb water in considerable amount as distinct from ordinary drastically dried soap powders which will form a gel when such an amount of water is added and thus cannot be uniformly hydrated when water is added thereto. This friable soap, as well as a novel method and apparatus for producing same, is a part of the present invention.

In the preferred mode of operation the soap is produced continuously. It may be delivered from the apparatus in powder or flake form and having the desired moisture content, or it may be continuously produced in the form of bars or cakes. In this connection the friable soap may be produced as an intermediate product, if desired, by cooling the soap from molten, plastic, or semi-plastic condition while it is substantially anhydrous, water being later added in controlled amount. This mode of operation is a part of the present invention, as well as the production of friable soap as an end product.

In forming the friable soap any suitable method can be used for forming a mass of soap which is in molten, plastic or semi-plastic condition. The soap should be substantially anhydrous, containing at most not more than a very few per cent of water. It is brought into this condition by application of heat, and extreme fluidity immediately preceding cooling is not requisite. The soap should be kept from the atmosphere while at the high temperatures necessary, thus preventing oxidation, discoloring, and other deleterious reactions. If the soap-making materials used are of such character as to form glycerine, this glycerine can be advantageously removed in whole or in part before cooling the mass, and a mass of molten, plastic, or semi-plastic soap will usually contain no great proportion of glycerine. However, the friable nature of the product is apparently not destroyed by presence of material amounts of glycerine, if this is desired in the finished soap.

The next step is to cool this soap from its molten, plastic, or semi-plastic condition in such manner that incipient planes of fracture extend throughout the cooled mass, making it extremely friable. This cooling can best be accomplished during continuous movement of the soap, and it is important that the moisture content of the soap should not be greatly increased prior to cooling, otherwise the friable nature of the soap will be destroyed.

The resulting product will break up largely into soap powder if the stream of friable soap is extruded, and any remaining masses can be readily broken up by application of small crushing pressure.

The resulting powder, or the masses of friable soap not yet disintegrated into a powder, have the unexpected property of directly and uniformly absorbing moisture even though it is a drastically dried product. A desired amount of water may be added to a mass of the soap and gentle mixing will cause uniform hydration of the soap. On the other hand, the water may be supplied to the soap continuously as fast as produced, if a continuous process is utilized.

However, the method and apparatus is not limited to the production of this friable soap as an intermediate or final product and many features are new regardless of this use. For instance, the system for removing the soap from the vacuum chamber and subsequently processing the soap is new, as is also the cooling system which permits attenuation of the soap to facilitate removal of heat therefrom. So also, the method of introducing the reaction products into the vacuum chamber is new, and the complete system permits hydration and addition of builders or other material during continuous movement of the soap.

Other new features forming a part of the invention will be evident from the following description.

One convenient and very satisfactory apparatus for making and processing soap of this friable or non-friable character is disclosed in the attached drawings, in which:

Fig. 1 shows the complete apparatus, partially in section.

Fig. 2 is a section of the conveyor system taken on the line 2—2 of Fig. 1.

Fig. 3 is a sectional view of one form of valve, being taken as indicated by the lines 3—3 of Fig. 2.

Fig. 4 is a view of one type of member extending into the conveyor for breaking up the soap stream, being taken as indicated by the line 4—4 of Fig. 2.

Fig. 5 is taken as indicated by the line 5—5 of Fig. 2 and shows one of the cooling grids.

Fig. 6 is a sectional view taken on the line 6—6 of Fig. 1.

The materials used in the process include a saponifiable material which may be any material capable of being saponified to form soap, for instance, various fats, glyceride-type oils, greases, etc. The saponifying material may be any material which will act with the saponifiable material to form reaction products including soap and a vaporizable material, such, for instance, as glycerine or water, or both. Examples of such saponifying materials are aqueous alkaline solutions of caustic soda, caustic potash, etc. In using the apparatus disclosed, these materials are respectively contained in tanks 10 and 11 and may be therein heated to increase the fluidity or facilitate satisfactory mixing.

Proportioned quantities of these materials are mixed in any suitable way. In the continuous system shown, proportioned streams are withdrawn by pumps 12 and 13 and delivered to a mixer 14 through closed conduits. The pumps may be interconnected by a variable-speed means 16a to control the proportions. The mixer 14 may be of any suitable type and mechanical mixers can be used, though a satisfactory mixture can be obtained by injecting one material into a stream of the other as it flows through a chamber of the mixer 14. In the continuous system shown the pumps develop sufficient pressure to force the mixture through the heating zone.

This mixture moves through a pipe 15 to any suitable type of heater 16, the pipe 15 being equipped with suitable devices 17 and 18 to indicate the pressure and temperature of the mixture. Various types of heaters can be used which provide a heating zone through which the mixture continuously flows. The type illustrated is particularly suited to a continuous process and includes a coil of pipe 19 heated by a burner 20 or by any other heating means. A suitable thermostat may be used to control the amount of heat applied.

In the heating zone defined by the coil 19 complete saponification takes place under heat and pressure and the reaction products discharging through a pipe 22 comprise a mixture of soap, water, and glycerine in the event that an aqueous alkaline solution was used as the saponifying material. In this pipe the water will be in the form of steam, and the glycerine will be either in liquid or vapor state in whole or in part. The pipe 22 is equipped with a pressure gauge 23 and a thermometer 24.

These reaction products are continuously discharged into a separating chamber 25 through a valve 26 and a nozzle 27 which may be used to throttle the flow if desired. However, in some instances no throttling action at this point is necessary. The nozzle 27 is preferably so directed that the soap in the reaction products impinges against the walls of the chamber 25 and moves downward therealong as a thin stream. This nozzle may be tangentially directed if desired, in which event the soap may move downward in a curved path.

In the chamber 25 vapors of water or glycerine or both separate from the soap and move through a pipe 29 to a condenser system if it is desired to condense the vapors. If both water and glycerine vapors are present, it is possible to fractionally condense same by use of a glycerine condenser 30 and a water condenser 31. The condensed glycerine moves downward through a barometric column 32 with its lower end submerged in glycerine in a tank 33, this barometric column being of sufficient height to balance the low pressure maintained in the chamber 25. The water vapors are condensed in the condenser 31 and move through a barometric column 34 to a tank 35. A vacuum pump 36 is connected to the condenser 31 and maintains a low pressure in the chamber 25 by forcibly withdrawing the vapors therefrom.

To facilitate separation of vapors in the chamber 25, heat may be supplied to this chamber either internally or externally, or both. A jacket 40 surrounds this chamber and is preferably covered with a heat-insulating cover 41. Any suitable hot medium can be circulated through this jacket. Heat may be supplied internally by introducing a hot vaporous material, such as steam or hot inert gases, through a pipe 42. Such steam or hot inert gas introduced into the chamber 25 exerts its own partial pressure and facilitates removal of glycerine vapors from the soap if it is desired that the glycerine content of the finished soap be low. Sufficient heat is applied, either in the heater 16 or in the chamber 25, or both, to insure that the soap reaches the bottom of the chamber 25 in molten, plastic, or semi-plastic condition.

A rotating scraper 45, suitably driven, moves the soap from the bottom wall of the chamber 25 into two troughs 47 extending transversely across this chamber and forming a part of the conveyor system. Each of these troughs can be heated or cooled as desired by circulation through jackets 48 extending therearound.

Extending as a continuation of each trough is a conveyor housing 49 of cylindrical shape, and a suitably driven soap-advancing screw 50 is positioned in each housing and extends into the corresponding trough 47. Each screw provides a shaft 51 driven by a gear 52, and provides a helical vane 53 of a diameter only very slightly smaller than the conveyor housing 49 so as to continuously force the soap into a chamber 55. If desired, each screw 50 may be formed in flights, separated by spaces receiving members 56 which extend into the conveyor housing. To make each of the members 56 removable and adjustable, it may extend through a nipple 58, being carried by a cap 59 threaded to the nipple as shown in Fig. 4. These members serve to break up the soap stream, and serve to mill or plod the soap during advancement. This construction thus provides conveyors 60 and 61 for continuously removing the soap from the chamber 25. In some instances a single conveyor is sufficient.

Each conveyor is preferably provided with a pipe 62 which returns to the chamber 25 any vapors which may separate from the soap while in the conveyor.

It is desirable to cool the soap while in the conveyors 60 and 61. A cooling medium may be circulated through a jacket 63 surrounding each conveyor housing 49. In addition, it is often desirable to internally cool the annular stream of soap moving in each conveyor. In this capacity, the shaft 51 of each conveyor is hollow and a pipe 64 extends therein. A cooling medium, such

as water, may be forced into the pipe 64 and discharged into a space 65 surrounding a sleeve 66, this water returning through the annular space 67 around the pipe 64 inside the shaft 51, being ultimately discharged through a head 68.

It is often desirable to make that end of the shaft 51 next the chamber 55 of larger diameter, to provide an enlargement or head 69. This decreases the available space for the soap and acts to compress same. In addition, it causes attenuation of the soap, thus facilitating cooling thereof.

The heat conductivity of the soap in such a soap stream is quite low and in many instances it is desirable to further cool the soap by moving this soap stream through one or more cooling grids 70 and 71 which may extend through the chamber 55. Each of these cooling grids is formed of a plurality of pipes positioned close to each other so that the soap must move through the rather small spaces therebetween. Water or other cooling medium is circulated through these pipes, for instance, by connecting these pipes to headers 73 such as shown in Fig. 5. By thus further attenuating the soap very efficient cooling may be obtained.

The two soap streams discharged from the conveyors 60 and 61 move into an intersecting conveyor 80, the chambers 55 opening on a passage formed in a conveyor housing 81 in which a screw 82 rotates. This screw is formed similarly to the screw 50, providing an enlarged head 83 and being hollow so that water or other cooling liquid can be circulated therethrough when introduced into a pipe 84, this water being discharged through a pipe 85. The screw 82 is similarly formed in flights between which members corresponding to the members 56 extend. The soap is thus milled and plodded during passage through the conveyor 80 and is further compressed by the enlarged head 83 before discharge into a chamber 86. The conveyor housing 81 is jacketed as indicated by the numeral 87 and a cooling medium is circulated through this jacket to further cool the soap. The screw 82 is turned as by a gear 88 preferably at a faster rate than the screws 50, especially as it is desirable to make the conveyor housing 81 somewhat smaller in diameter than the conveyor housing 49. In addition, the helical vane forming a part of the screw 82 is preferably of smaller pitch near the conveyor 60 than throughout the remainder of its length, this smaller pitched portion being indicated by the numeral 89.

If desired, the soap may be delivered from the chamber 86 into the atmosphere, being extruded through a valve 90, the subsequent portion of the equipment illustrated being disconnected. This mode of operation can be utilized if the soap has been cooled to such an extent that exposure to the atmosphere will not result in deleterious reactions, such as discoloring or spontaneous combustion. Depending upon operating conditions in the preceding part of the system, the soap thus discharged from the valve 90 may be a friable mass which breaks up wholly or in part upon extrusion.

The valve 90 may be of any suitable type, being illustrated in Figures 2 and 3 as including a gate 91 pivoted at 92 and adjusted by an arm 93 so as to extend partially across the chamber 86. This valve acts in part as a vacuum seal, being preferably adjusted so that the available opening through which the soap discharges is completely filled by the soap stream. Thus, even if the chamber 25 is under a high vacuum, no air will move rearward through the conveyors to impair the vacuum in this chamber. In this connection, the soap stream in the conveyor 80 acts as a vacuum seal, and if the chamber 25 is maintained under high vacuum, pressure on the soap will progressively increase during flow through the conveyor system described.

In many instances it is preferable to continue the processing of the soap beyond the valve 90 for purposes of hydration, addition of builders or fillers, etc. Thus, the soap moving through the valve 90 may move directly into a conveyor 100, or may drop thereinto through a member 101. This conveyor provides a screw 102 which may be rather loose fitting and which is rotated to further plod and advance the soap. If desired, various builders or fillers may be introduced into the soap at this time, for instance, by moving same under pressure through a pipe 103. Such material may be moved along the pipe 103 and into the soap by use of a screw rotating in this pipe. Materials thus introduced into the conveyor 100 will be intimately mixed with the soap therein. The conveyor 100 builds up sufficient pressure to extrude the soap through one or more orifices, preferably through a perforated plate 104, into a housing 105.

The soap emergers from the openings of the perforated plate and drops as a powder or in small masses into a throat formed between rotating rolls 107 and 108 where any masses of soap are crushed and where the soap is further attenuated and compressed into a thin layer. These rolls are hollow to provide chambers 109 and a cooling medium is circulated through these chambers. This is an excellent way of further cooling the soap, for heat can be taken from the thin layer of soap to effectively cool all portions thereof. In this connection, it is sometimes preferable to operate the system in such a manner that the soap discharged through the valve 90 is still at quite a high temperature, even so high that deleterious reactions might be set up therein if exposed to the atmosphere for a prolonged time. The rolls 107 and 108 will further cool the soap, and the housing 105 shields the soap from direct and prolonged contact with the atmosphere.

It is often possible to use the rolls 107 and 108 for hydrating the soap, especially if the soap is of such a nature that water can be directly added thereto to be uniformly adsorbed thereby. In this connection, the entire external length of the roll 107 may be wetted by water sprayed thereon or supplied through an elongated nozzle 112 to form a layer or film of water along this external surface. Any excess water above the desired quantity may be removed by a scraper 113 extending along this external surface and adjustable in radial position relative thereto. This scraper 113 may be mounted on one or more screws 114, and nuts 115 may be used to vary the distance between the wiping edge and the periphery of the roll 107 to form a film of water on the roll of a desired thickness. Any excess water drains from the housing 105 through a trough 116. As the film of moisture comes into contact with the soap the water is uniformly taken up by the soap, the squeezing action of the rolls acting to further distribute the water uniformly.

The soap drops from between the rolls 107 and 108, or is scraped therefrom by scrapers 118, and moves into a hopper 119 which discharges into a

throat formed by rolls 120 and 121 which are also hollow so that a cooling medium can be circulated therethrough. If desired, further moisture can be applied at this point.

The soap drops from between the rolls 120 and 121, or is scraped therefrom by scrapers 124, and reaches a belt conveyor 125 which extends through a small opening of the housing 105 and conducts the soap to a hopper 126. The soap at this point may be in powdered or flake form and if desired may be marketed as such. However, if it is desired to form the soap into a bar the hopper 126 may discharge into an extruding device which will compact the soap and extrude same through an orifice 128. A screw 129 rotating in a housing 130 may serve to compact the soap into a homogeneous mass, supplying sufficient pressure to extrude the soap as a continuous stream through the orifice 128. This stream of soap may be cut into bars as desired.

In general, it can be said that this system can be operated to produce various different forms and types of soap. Proper control of pressure and temperature conditions at various points in the system will largely control in this regard, and the condition of the soap in the bottom of the chamber 25 is one important factor. Primarily, the temperature and pressure conditions in the coil 19 and in the chamber 25 control the character of this soap which is withdrawn from the lower end of the chamber 25.

It will be clear that the pressure in the coil 19 decreases progressively from the inlet end to the exit end due primarily to pipe friction retarding the flow. For instance, when using the throttling nozzle 27 the pressure in the pipe 22 may be in the neighborhood of 50 lbs. per sq. in. or even considerably more if desired, while the pressure in the pipe 15 may be much higher, often as high as 350 to 450 lbs. per sq. in. If no throttling action is desired the vacuum in the chamber 25 will carry back a considerable distance into the coil 19. From the angle of temperature, it will be clear that this temperature increases progressively during flow through the coil 19.

These conditions of temperature and pressure in the coil 19 should be so regulated as to give complete saponification therein. In addition, all of the water, and all or at least a part of the glycerine, should be vaporized in the coil 19 if the friable soap product is to be produced. If the flow of reaction products is throttled, as by the nozzle 27 or the valve 26, some or all of the remaining unvaporized glycerine will flash into vapor at the lower pressure existing in the chamber 25. Such a vacuum condition in this chamber is very desirable in that it reduces the boiling point of the glycerine and permits the soap to be withdrawn from the chamber in substantially glycerine-free condition if desired. The presence of steam in the chamber 25 will further lower the boiling point of the glycerine due to the law of partial pressures.

The friable nature of the soap results from cooling same from a molten, plastic, or semi-plastic condition. Such a condition can sometimes be brought about by utilizing sufficient heat in the coil 19 and without adding additional heat in the chamber 25 but it has been very desirable to utilize a heating medium in the jacket 40 especially when starting up the apparatus and preferably throughout continuous operation thereof. Application of heat to this chamber will decrease the necessary temperature in the coil 19 and will insure that the soap withdrawn from the lower end of this chamber will be in molten, plastic, or semi-plastic condition.

It will thus be apparent that no definite range of temperatures and pressures in the coil 19 can be named, for these will vary with the temperature and pressure in the chamber 25 and also with the particular saponifiable material utilized. Further, no definite temperatures can be set forth as necessary for maintaining the soap in molten, plastic, or semi-plastic condition, for these temperatures will vary with different soaps. In general, however, it can be said that soaps made from cotton-seed oil should be at a temperature above about 455° F., and soaps made from palm oil or tallow should usually be at temperature above 518° F. if such soaps are to be in molten condition. Somewhat lower temperatures are permissible if the soap is to be in plastic or semi-plastic condition.

The temperature of the reaction products in the pipe 22 may be above these values, for some cooling of the soap takes place in the chamber 25 unless a large amount of heat is added at this time. Some cooling is not detrimental, for it has been found that the soap when once molten can be cooled somewhat without changing it from molten, plastic, or semi-plastic condition. In fact, molten soap can be reduced to a temperature somewhat below that necessary to bring it into molten condition and yet be quite fluid. If no large amount of heat is added in the chamber 25, best operating temperatures in the pipe 22 will often be above 500° F. if the soap is to be in molten, plastic, or semi-plastic condition in the bottom of this chamber. With many saponifiable materials, best results have been obtained when temperatures in the pipe 22 were as high as 570° F. or even higher, when no large amount of heat was added to the chamber 25.

The preferred mode of operation is to use coil temperatures sufficiently high that the soap reaching the side walls of the chamber 25 will be quite fluid so as to readily move downward therealong. This facilitates separation of vapors from the soap due to the fact that this soap moves downward as a relatively thin layer, thus exposing a large surface to the low-pressure in the chamber 25. This feature of flowing the soap along the walls of the chamber 25 also prolongs the time necessary for the soap to reach the bottom of this chamber and thus give additional time for vapors to separate. The tendency for this downward-flowing soap to somewhat cool can be attributed to loss of heat by radiation, or to vaporization of glycerine during this downward movement. However, even if no large amount of heat is added to the chamber 25, this cooling usually does not exceed 50° F., and can be made much smaller or even eliminated, if sufficient heat is added to this chamber. Application of sufficient heat to the chamber 25 may even slightly increase the temperature of the soap.

The controlling factor is that the soap in the bottom of the chamber 25 should be in molten, plastic, or semi-plastic condition preparatory to cooling. In the system shown, the soap will be substantially anhydrous and will usually contain little, if any, glycerine.

Cooling of such soap to form the friable mass should preferably be accomplished while out of contact with the atmosphere, for soap in molten,

plastic, or semiplastic condition will quickly oxidize or discolor if exposed to air. Rapid cooling is preferable. With the system shown it is possible to cool the soap in a short time, usually between four and twenty minutes, depending upon the length of the conveyors and the amount of soap moving through the system. While slower cooling can sometimes be used, it has been found that rapid cooling is preferable in that it assists in forming the incipient planes of fracture throughout the soap which results in its friable nature. Attenuation of the soap prior to or during cooling will greatly facilitate rapid cooling, and the internal and external cooling of the soap streams in the conveyors, in conjunction with the cooling grids 70 and 71 will be found very effective for this purpose. In addition, cooling on rolls is even more effective in this regard.

By way of example, the system can be used to produce the friable and directly hydratable soap mentioned above by operating under the following temperatures and pressures given. With a saponifiable material comprising 70% tallow and 30% cocoanut oil, and with a solution of 31° Bé. caustic solution as a saponifying material, pressures in the pipe 15 have been used between 350 and 450 lbs. per sq. in. with a coil 19 composed of pipe of ¼" internal diameter and about 550 ft. long. These pressures will be different with coils of different length and internal diameter. The pressure in the pipe 22 may be about 50 lbs. per sq. in. though this is not critical, and the temperature therein in this example may be from 560 to 570° F. The reaction products will be discharged through the nozzle 27 against the walls of the chamber 25, the soap under these conditions being sufficiently molten to run down these walls. Due to expansion and radiation losses, the temperature of the soap in the bottom of the chamber 25 will be in the neighborhood of 500° F. or somewhat higher, the temperature in the jacket 40 being about 530° F. A vacuum of 27—28 inches of mercury in the chamber 25 will permit removal of substantially all of the glycerine in this example. This soap is cooled in the conveyors 60, 61 and 80 to produce a friable soap. If this cooling is sufficient to prevent deleterious reactions upon exposure to the atmosphere, the resulting stream of friable soap can be discharged from the valve 90 directly into the atmosphere.

Very satisfactory results can be obtained by such operation and an exceptionally fine quality of soap can be produced. Under these conditions, it has been found possible to make a friable soap which is directly hydratable by adding water thereto, this soap being substantially anhydrous and substantially glycerine free when it is thus discharged from the valve 90. This stream of friable soap will mostly break up upon extrusion through this valve, forming powdered soap. Some friable soap masses may be formed upon extrusion but can be easily crushed to produce a fine powder. Considerable water can be added to this powder and by any simple mixing operation it will be uniformly absorbed to produce a soap powder hydrated to the desired extent. The amount of hydration thus possible varies with different soaps, but with most soaps 8 to 20% or more water can be added in this way either in a single step or in successive steps.

On the other hand, it is not necessary to cool the soap while in the conveyors to such an extent that it can be discharged into the atmosphere from the valve 90. By way of example, it can continue its movement by moving through the conveyor 100, being further cooled on the rolls 107 and 108, and being hydrated at this point. The soap will drop in flake or powdered form from the rolls 107 and 108 and can be used in this form, or it can be further cooled on the rolls 120 and 121, and additional water can be added at this point, if desired. The soap is then withdrawn by the belt conveyor 125 and is ready for use. If bar soap is desired, this product can be moved through the extrusion device 130, being extruded as a bar through the orifice 128. This bar can be cut up to form cakes.

The hydratable character of this soap is not changed by adding various fillers or builders in the conveyor 100. Further, the presence of some glycerine does not in itself defeat this hydratable characteristic, though best results have been obtained when substantially all of the glycerine has been removed.

The system herein disclosed can be used to continuously make other types of soap of a nonfriable nature. For instance, if lower temperatures are used in the coil 19, the soap can be collected in powdered or granular form in the chamber 25 and withdrawn by the conveyor system shown. So also, if the absolute pressure in the chamber 25 is higher this type of soap may be collected in the chamber 25 even with the coil temperatures mentioned above. Such powdered or granular soap may still contain all or a portion of the glycerine if desired, and all or a portion of the water may be allowed to remain therein under proper conditions of temperature and pressure in the system. As before, this type of soap will be continuously withdrawn by the conveyors 60, 61, and 80, being cooled therein. If cooled to a sufficient degree, this soap can be discharged into the atmosphere through the valve 90 in the form of a temporarily adhering mass of soap particles. Alternatively, the soap can be delivered from the valve 90 to the conveyor 100, and fillers or builders may be there added. This soap may thus be conditioned in a continuous process so that when it is discharged through the perforated plate 104, it is in condition for use.

If powdered or granular soap is withdrawn from the chamber 25, this soap may be hydrated by adding moisture thereto during flow through the conveyor system. For instance, water or steam may be supplied through pipe 200 into the conveyors 60 and 61, or through a pipe 201 to the conveyor 80. Further, water may be introduced into the conveyor 100 through a pipe 202 to hydrate the soap. Such a method of hydration by directly introducing the water into one or more of the conveyors is to be avoided if the friable and uniformly hydratable soap is to be produced. However, this method of hydration can be successfully used with other types of soap. If used, it is sometimes preferable to introduce the water while the soap is still at such temperature that the water will be vaporized, thus more uniformly distributing the water.

The hydrated soap resulting from this mode of operation may be used as delivered from the perforated plate 104, or may be compressed into bars in an extruding device. So also, the soap thus extruded through the perforated plate 104 may be compressed between the rolls shown to form flakes which may be used in this form or compressed into a bar if desired. In this instance the soap reaching the rolls will already

be hydrated and the rolls need not serve this function of adding water to the soap.

If a powdered soap is to be collected in the chamber 25, one or more baffles may be provided in the upper end so that the vapors move through a tortuous path. This will tend to separate any minute particles which might tend to be carried upward with the vapors. Such baffles are usually not necessary if the process is so operated as to produce molten, plastic, or semi-plastic soap in the chamber 25. Regardless of whether the soap is withdrawn from the chamber 25 in molten, plastic, semi-plastic or powdered condition, the conveyor system will continuously withdraw this soap without impairing any vacuum which exists in this chamber, for the soap and the valve 96 will act to seal this chamber from the atmosphere.

The system disclosed has wide utility in making various types of soap from various ingredients, and the present invention has novelty in the process, the apparatus, and the friable soap product produced.

This application is a division of application Serial No. 119,168 originally filed January 5, 1937, as a joint application of Benjamin Clayton and Benjamin H. Thurman, and now Patent No. 2,190,615, granted February 13, 1940 to Benjamin H. Thurman.

I claim:

1. Apparatus for withdrawing substantially anhydrous soap in molten, plastic, or semi-plastic condition from a chamber and cooling said soap, which comprises, a soap conducting housing communicating with said chamber, means for moving a stream of soap from said chamber along said housing, means for sealing said housing to seal said chamber from the atmosphere during withdrawal of said soap, including stationary pipe means extending across the space of said housing adjacent the outlet thereof to form a grid through which said soap is moved, and means for circulating a cooling medium through said pipe means to cool said soap.

2. The method of processing soap which comprises the steps of withdrawing as a stream substantially glycerine free soap in a highly heated condition from a container through a passageway sealed from the atmosphere, and forcing the same through a grid-like structure while advancing a cooling medium through said structure whereby to cool said soap as the same is discharged from the chamber and seal said container from the atmosphere.

3. The steps in the method of making soap and recovering glycerine therefrom which comprise the withdrawal of soap in a substantially glycerine free and anhydrous condition from a vapor separating chamber through a closed passageway and forcing the same between a series of spaced cooling pipes interposed in the line of movement thereof whereby the soap is cooled continuously during its withdrawal and before contact with the atmosphere and said chamber is sealed from the atmosphere during said withdrawal.

BENJAMIN CLAYTON.