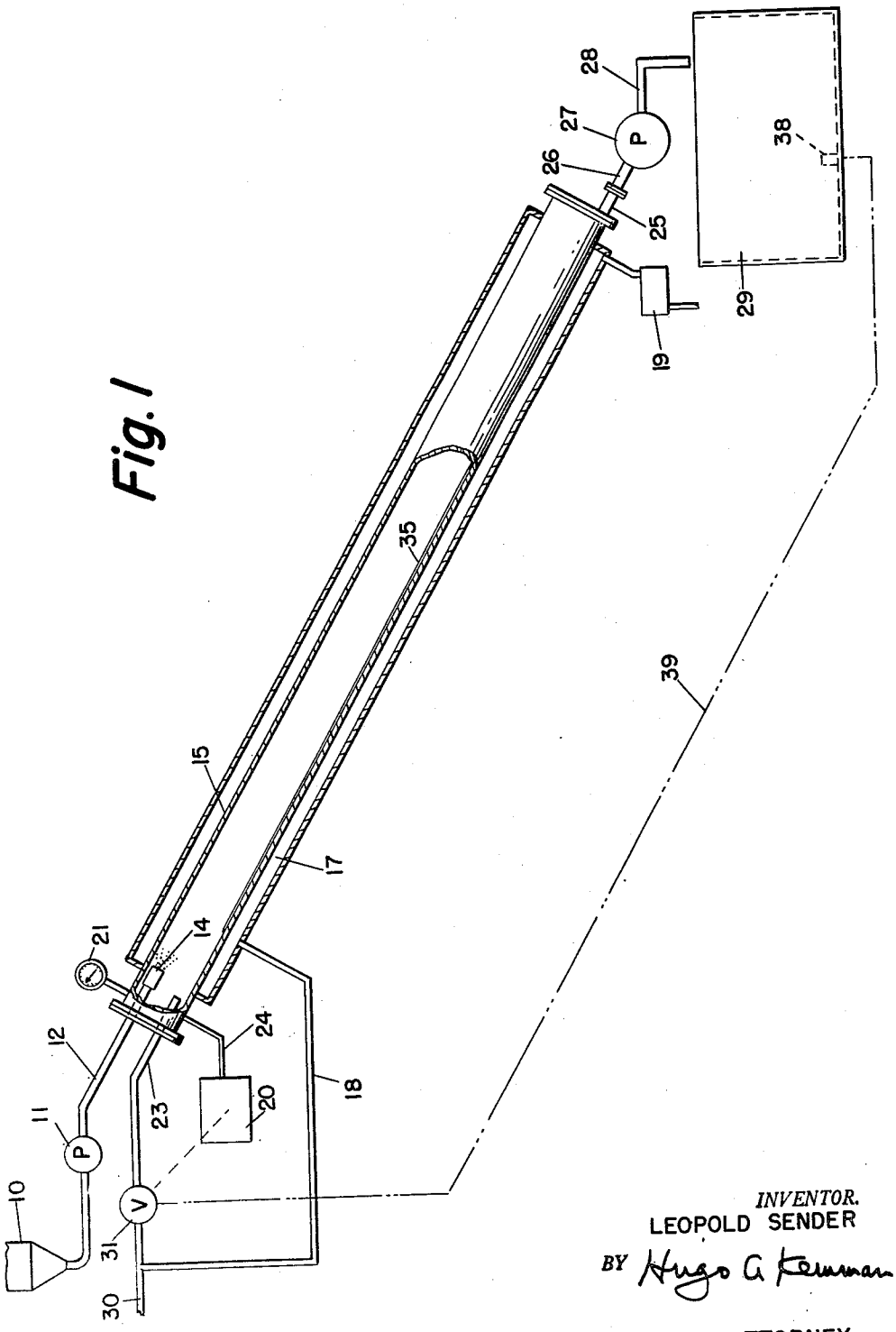
Aug. 27, 1957 L. SENDER 2,804,172

SOAP DEAERATION

Filed July 10, 1951

2 Sheets-Sheet 1

Fig. 1



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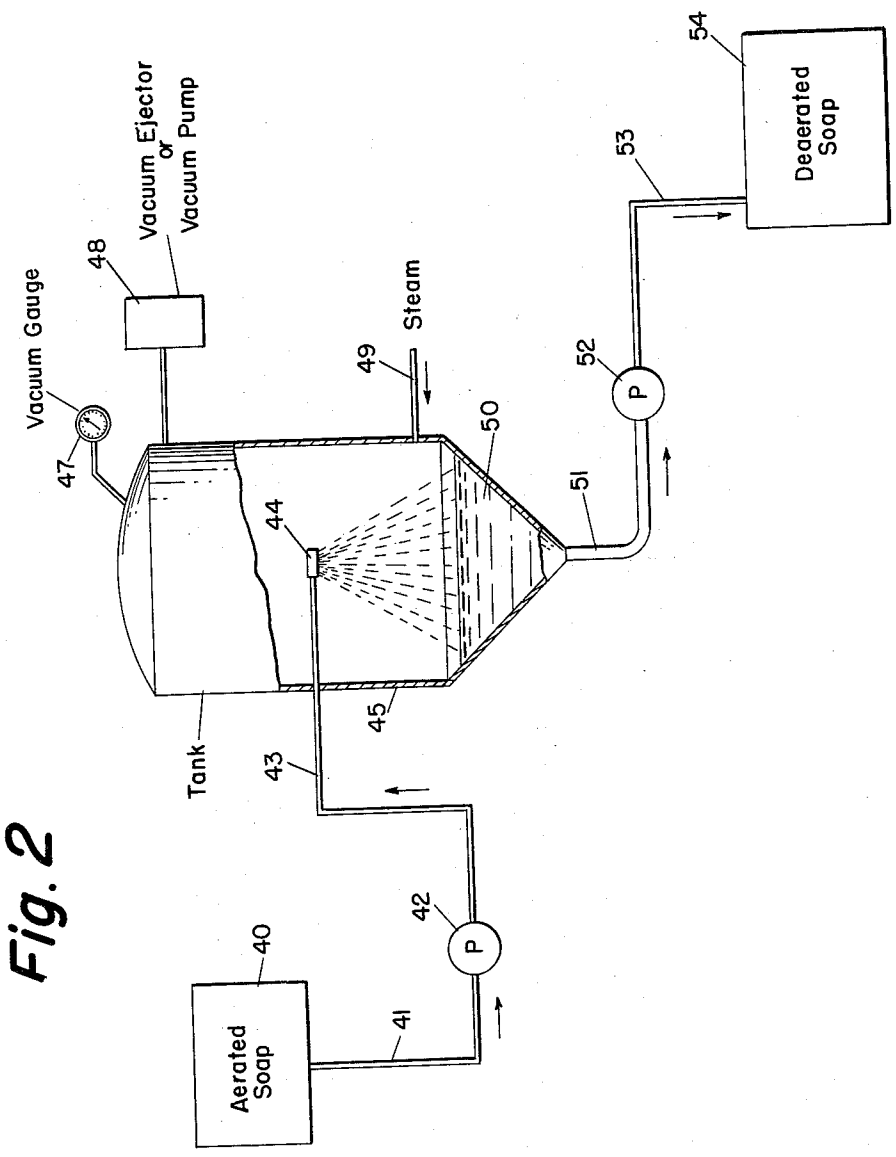

Fig. 2

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SOAP DEAERATION

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8 Claims. (Cl. 183—114)

The present invention relates to a method and apparatus for deaerating molten soap.

A method for the continuous production of soap is described in U. S. Patent 2,300,749, wherein a fat is mixed with a saponifying reagent for a brief period of time, a graining agent is added, and the resulting soap containing mixture is passed to a centrifugal rotor and there subjected to contrifugation to separate the aqueous phase resulting from said mixing and graining operation from the soap-containing mass resulting from said operation. In such a process, there may be more than one stage for the addition of alkali followed by centrifugation, with the final centrifugal separation resulting in a continuous and separate discharge of the aqueous phase such as nigre or pitch-water on the one part and neat soap on the other part.

One type of centrifuge that may be used for this separation is illustrated in U. S. Patent 1,634,243, wherein the separated substances are discharged over weirs in the centrifuge bowl, and these discharges are separately collected in covers. In order to develop centrifugal force adequate for the separation, these rotors turn at a high R. P. M., and have a high peripheral speed. The result is that the substances overflowing the outlets discharge in the form of fine dispersed particles. These particles strike the walls of the covers surrounding the centrifuge bowl and are there collected and flow away through the spouts. A considerable amount of air is entrained as a discontinuous phase when the particles strike the walls of the covers, and air thus incorporated in a soap mass separates very slowly, and some remains dispersed in the soap, affecting its texture. One method of overcoming this difficulty is to continuously flow steam into the covers to displace the air. The steam vapor entrained in the soap condenses, so that there is no dispersed vapor in the soap mass as it discharges. This is effective, however, only when the discharging soap has a water vapor pressure close to atmospheric, for, if it is colder, the quick condensation of the steam makes it difficult to maintain the space in the covers free from air.

The object of the present invention is to provide an improved apparatus and method whereby the discharging soap mass containing air may be deaerated or freed from such air.

Details and advantages of the present invention will be apparent from the following specification and accompanying drawings, wherein

Figure 1 is a schematic view of one form of apparatus for deaerating neat soap, and

Figure 2 is a schematic view of a modified form of apparatus for deaerating neat soap.

Referring to Figure 1 a continuous stream of molten aerated neat soap is supplied at a suitable rate from a reservoir **10** by pump **11** through conduit **12** to a nozzle **14** extending within an elongated deaerating chamber **15**. Chamber **15**, for example, may be formed of a tubular steel cylinder 8 feet long and 6 inches in diameter. Nozzle **14** feeds molten soap to the interior of chamber **15** so as to provide a relatively thin molten soap film **35** on the lower interior surface of chamber **15** which flows continually toward the outlet **25**. Chamber **15** is inclined at a suitable angle, as for example 30° from the horizontal, to permit a predetermined period of dwell or travel time of the liquid soap film in the chamber **15**. The chamber **15** is provided with a suitable surrounding steam-heated jacket **17** connected to a source of steam supply **18** and provided with a condensate trap **19** whereby the temperature to which the chamber **15** is heated can be controlled for maintaining the soap therein in molten flowable condition. The lower end of chamber **15** is provided with an outlet **25** extending flush with the inner surface of the chamber. Outlet **25** is connected to a conduit **26** and a wet vacuum pump **27** which serves to convey the deaerated soap to reservoir **29** through conduit **28**. Vacuum pump **27** also provides a reduced pressure within chamber **15**, for example, from 9 to 15 in. Hg. A gauge **21** indicates the vacuum existing in the chamber **15**. Live steam is supplied at the inlet end of chamber **15** by a supply line **30** controlled by a regulator valve **31** which is actuated by a controller **20**. Controller **20** is connected to chamber **15** by line **24** so that it is responsive to the amount of live steam supplied by line **23** to chamber **15**. The amount of live steam supplied by line **23** to chamber **15** can thus be controlled by the variation of pressure in chamber **15**. An alternative control for the steam supply can be obtained by providing a temperature responsive element **38** in soap reservoir **29** which is connected by suitable means **39** to control valve **31** in steam line **30**.

In carrying out my process neat soap stock, for example, having a specific gravity 0.947 and 62.8% by weight of total fatty acid was continuously fed at a temperature of 201° F. through nozzle **14** to chamber **15** so as to form a relatively thin layer or film **35** of molten soap. The chamber **15** was maintained under reduced atmospheric pressure at about 13 in. Hg and dry live steam was continuously fed by line **23** into chamber **15**. The vacuum and live steam in chamber **15** served to deaerate the soap, the steam serving to sweep the free air from the chamber. The temperature of the jacket **17** was maintained at about 220° F. The completely deaerated neat soap stock fed to reservoir **29** had a specific gravity of 1.030 and 62.8% by weight total fatty acid.

Another illustrative run was made by feeding molten neat soap stock to chamber **15** at a temperature of 194° F. The initial soap stock had a specific gravity of 0.925 and a total fatty acid content of 64.2% by weight. A vacuum of 10 in. Hg was maintained in chamber **15** during the run while live steam was admitted to chamber **15** by line **23** at a rate so that the soap issuing through outlet **25** was completely deaerated and had a specific gravity of 1.028 and total fatty acid content of 64.2% by weight. Molten soap may be fed through the apparatus illustrated at about 1000 to about 2500 pounds per hour at a vacuum ranging from 2 or 3 in. Hg to about 25 in. Hg for completely deaerating the molten soap.

Figure 2 illustrates a modified apparatus for deaerating molten liquid neat soap stock which is supplied from reservoir **40** through conduit **41** by pump **42** and through conduit **43** to nozzle **44** extending within tank **45**. The tank is connected to a vacuum ejector or vacuum pump **48**. A gauge **47** indicates the vacuum in tank **45**. Live steam is supplied to tank **45** by line **49**. The molten soap is sprayed through nozzle **44** in tank **45** and is also subjected to a stream of live steam from line **49**. The deaerated soap stock forms a pool **50** in the bottom of tank **45** and is withdrawn through conduit **51**, pump **52** and conduit **53** to a deaerated soap reservoir **54**.

The present invention provides a very efficient continuous means for deaerating neat soap stock which other-

wise cannot be directly processed into satisfactory finished cakes or bars using conventional soap plant equipment and methods. In accordance with my invention the molten soap is spread into a relatively thin film and is continuously fed through a deaerating zone which is maintained under controlled reduced atmospheric pressure while live steam is admitted to the zone to purge or sweep free air liberated from the aerated soap. The pressure in the deaerating zone may be maintained advantageously for example at about 9 to about 15 in. Hg or, if desired, at a pressure close to the water vapor pressure of the soap being deaerated. The deaeration of the soap may be accomplished by any suitable apparatus such as the illustrative constructions previously described. The molten soap is preferably spread into a relatively thin layer of film which is subjected to the action of vacuum and live steam in a deaerating zone to deaerate the soap. As illustrated in Figure 1, the molten soap flows continuously through a deaerating zone which is subjected to vacuum to reduce the atmospheric pressure in the zone and live steam is simultaneously admitted to the zone to sweep free air out of the zone. As shown in Figure 2, the soap may be sprayed in a chamber provided with a steam atmosphere to deaerate the soap. The water content of the soap may be increased or decreased simultaneously with the deaeration by varying the pressure maintained in the deaerating zone and/or varying the temperature of the soap mass. In general it is preferred to have the moisture content of the deaerated soap at about the same amount as in the aerated soap. The moisture content of the deaerated soap may thus be controlled by adjusting the pressure in the deaerating zone or by maintaining the temperature of the aerated soap leaving the deaerating zone at the same temperature of the aerated soap fed to the deaerating zone.

Any molten aerated soap may be processed in accordance with my invention to produce a non-aerated neat soap for making bar soap having smooth polished surfaces and desirable plasticity so that the bar can be slightly twisted or deformed during use without rupturing as contrasted with soap bars made from aerated soap stock which have a poor surface appearance due to air bubbles and lack of suitable plasticity.

For convenience in the claims the term "attenuated form," or its equivalent, is used to mean a film, spray, or other thin or fine form.

It is to be understood that details of the process and apparatus herein described may be varied by those skilled in the art and such modifications and variations are intended to be included within the scope of the appended claims.

I claim:

1. A process for deaerating soap having air entrained therein as a discontinuous phase which comprises subjecting said soap in molten condition and in attenuated form to reduced pressure in an enclosure to liberate air therefrom, introducing steam into and passing said steam through said enclosure in contact with the surface only of said soap for sweeping air liberated from said soap from said enclosure, and regulating the temperature of said soap and the pressure within said enclosure to control the water content of said soap.

2. A process for deaerating soap having air entrained therein as a discontinuous phase which comprises flowing said soap in molten condition through a chamber, subjecting said soap in attenuated form to reduced pressure while in said chamber to liberate air therefrom, introducing steam into and passing said steam through said chamber and into contact with the surface only of said soap for sweeping air liberated from said soap from said chamber, and regulating the temperature of sad soap and the pressure within said chamber to control the water content of said soap.

3. A process for deaerating soap having air entrained therein as a discontinuous phase which comprises separately introducing into and flowing through a chamber a continuous stream of said soap in molten condition and a continuous stream of steam while maintaining a vacuum within said chamber of between 2 and 25 inches Hg, attenuating said soap while in said chamber to liberate air therefrom, contacting the surface only of said soap with said steam to displace from the surface of said soap the air thus liberated, and regulating the temperature of said soap and the pressure within said chamber to control the water content of said soap.

4. The process of claim 3 wherein the vacuum within the chamber is maintained between 2 and 15 inches Hg.

5. The process of claim 4 wherein the vacuum within the chamber is maintained between 9 and 15 inches Hg.

6. The process of claim 3 wherein the pressure within the chamber is maintained close to the vapor pressure of the water in the soap while in the chamber.

7. The process of claim 3 wherein the soap is attenuated into film form.

8. The process of claim 3 wherein the soap is attenuated into spray form.

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