June 25, 1968 A. W. WAKEMAN 3,389,836

FOAM PRODUCING AND DISPENSING DEVICE

Original Filed March 16, 1965 3 Sheets-Sheet 1

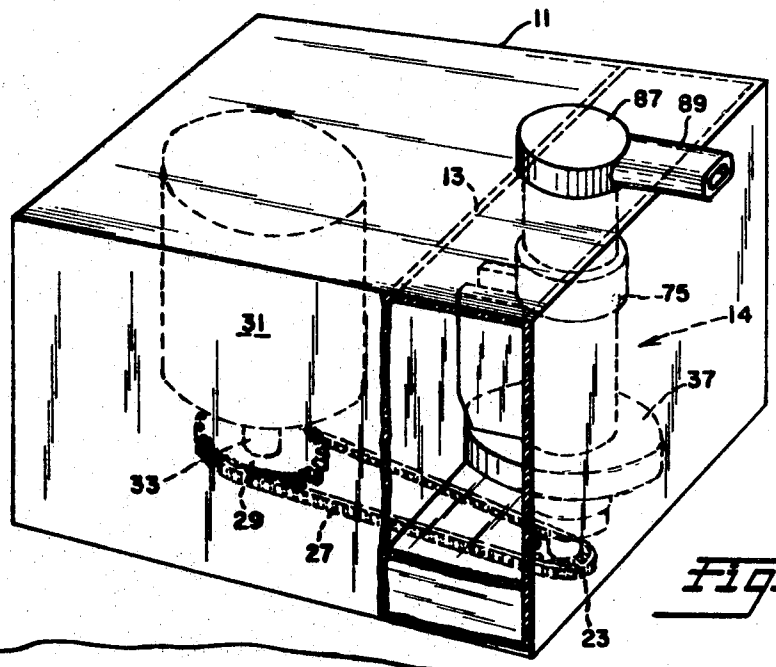


Fig. 1

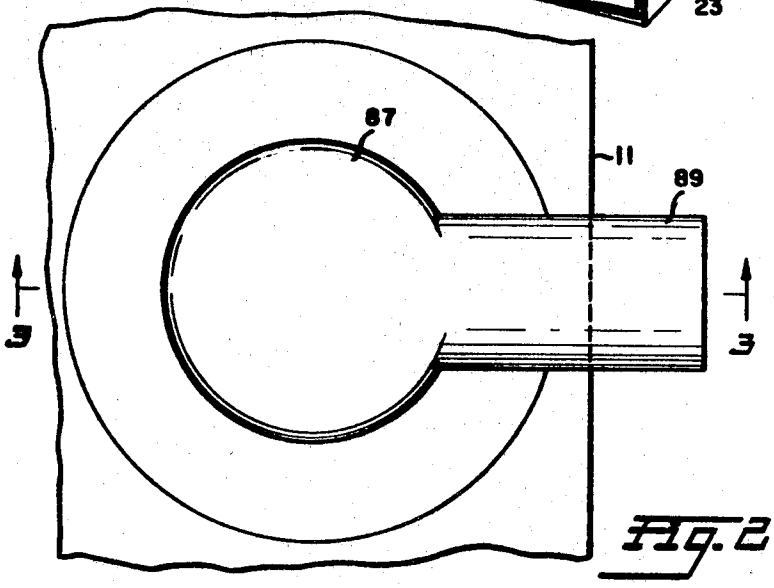


Fig. 2

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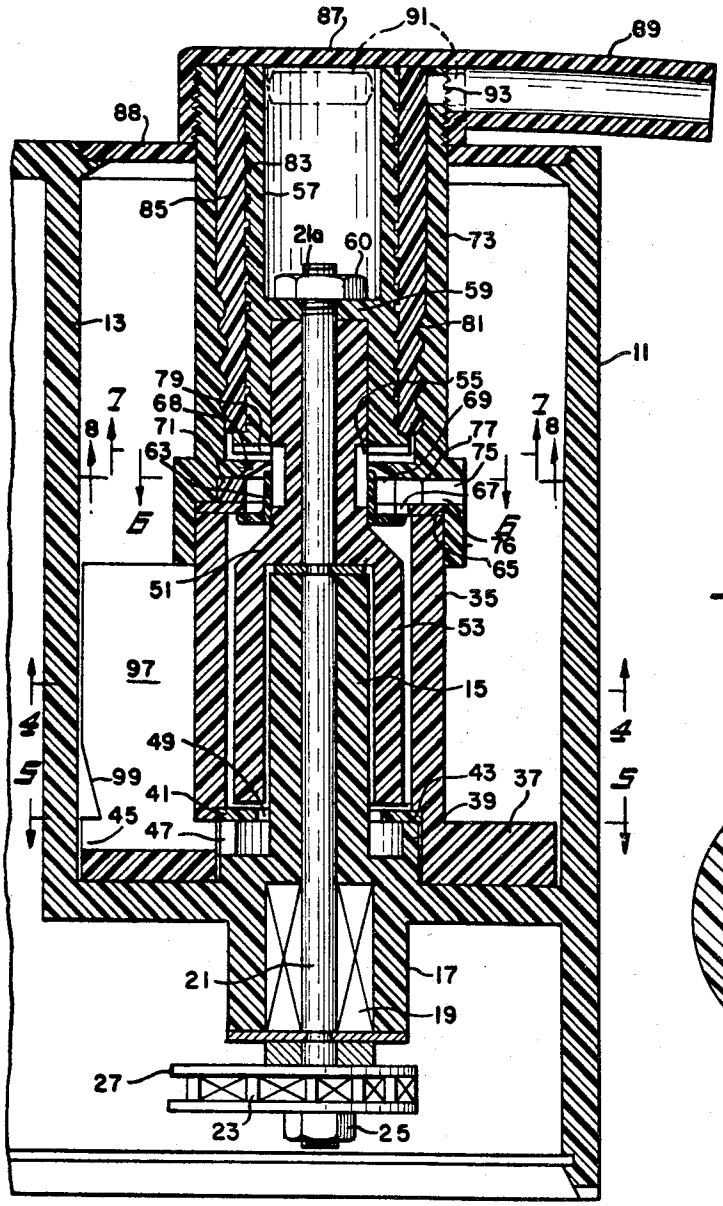


Fig. 3

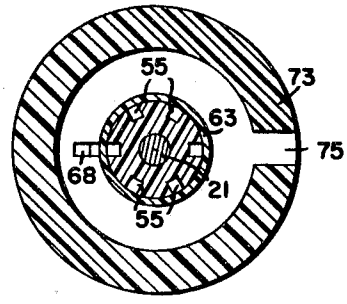


Fig. 8

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Fig. 4

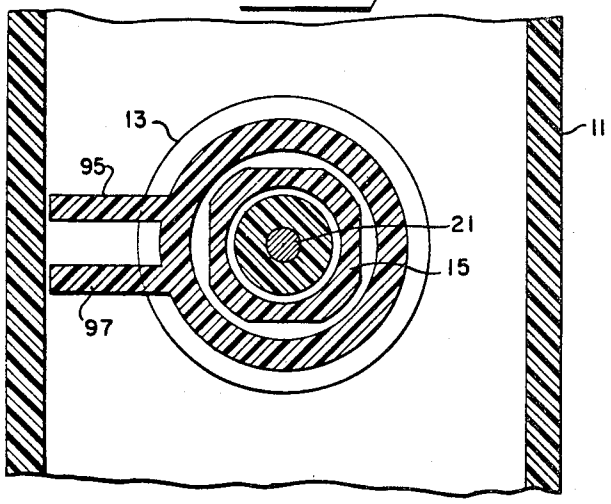
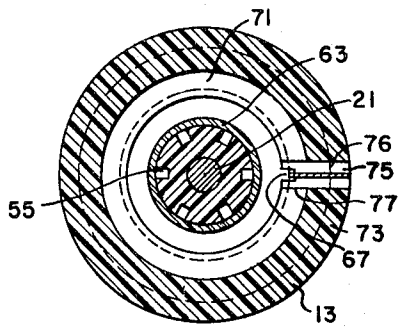


Fig. 6



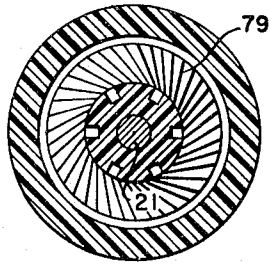


Fig. 7

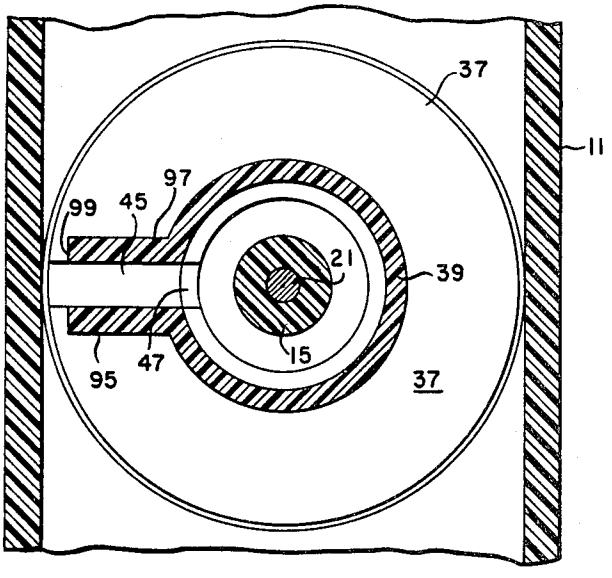


Fig. 5

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United States Patent Office 3,389,836
Patented June 25, 1968

3,389,836

FOAM PRODUCING AND DISPENSING DEVICE

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Original application Mar. 16, 1965, Ser. No. 440,152, now Patent No. 3,368,719, dated Feb. 13, 1968. Divided and this application Jan. 6, 1967, Ser. No. 623,155
8 Claims. (Cl. 222—189)

ABSTRACT OF THE DISCLOSURE

Generally, the present device consists of a liquid reservoir having a pump housing therein which surrounds a rotatable pump means for pumping the liquid from the reservoir upwardly within the pump housing. The amount of fluid delivered from this lower pump housing is metered and mixed with air from an entrance port, thus generating a foam mixture. The foam is then forced upwardly into a passageway containing a body having a cellular structure with intercommunicating cells. This body is rotated together with the pump means and bears against an upper pump housing which is internally threaded. As a result, further air is drawn into the entrance port thus providing a continuous supply of foam and at the same time the friction of the cellular structure bearing against the upper housing elevates the temperature of the foam which may then be dispensed out of a spout or the like.

The present application is a division of my co-pending application Ser. No. 440,152, filed Mar. 16, 1965, now Patent No. 3,278,198.

This invention relates to foam dispensing devices and more particularly to devices for generating and dispensing foam at elevated temperatures.

There are many types of foam dispensing devices available at the present time, with the most popular type of device being the well-known pressurized can type of dispenser. This type of device is, by its nature, usable only once after which time the container is discarded. This results in a relatively expensive product but worthwhile because of the convenience of the easy means for producing the foam.

In a number of applications it would be desirable to produce foam which is heated to a temperature above normal room temperature. The best known example of the use of heated foam is in the shaving lather field. None of the pressurized cans on the market today have a means independent of a time consuming and relatively slow outside heating source for raising the temperature of the foam dispensed therefrom.

Commercial foamers are available and are in extensive use in barbershops. However, while it may be practical for a commercial barber to use a heating element to maintain the liquid temperature of a solution and the produced foam at well above room temperature for an entire day, it is nevertheless true that these devices require approximately one-half hour to heat and several minutes to generate foam after standing overnight. Obviously, such a device would not be practical for a consumer to use in his own home where it would normally be used only once a day.

Accordingly, it is an object of this invention to provide a device for producing and dispensing foam at an elevated temperature.

It is a further object of this invention to provide such a device which is capable of producing foam at an elevated temperature substantially instantaneously without the need of an independent heating element.

Yet another object of this invention is to provide a device which will generate foam from a liquid soap by means for a motor driven pump and heat the foam by means of the friction generated during the rotation of the pump.

Still another object of this invention is to provide a device for generating and dispensing foam at an elevated temperature which is compact in size, relatively simple in operation, and which may be produced economically.

These and other objects of this invention will become apparent from the following description when taken in conjunction with the drawings wherein:

FIG. 1 is an illustrative view of the entire device with a section thereof broken away, and with the general internal mechanisms shown in phantom;

FIG. 2 is a partial plan view of the foaming device of FIG. 1;

FIG. 3 is a sectional view taken along the lines 3—3 of FIG. 2;

FIG. 4 is a sectional view taken along the lines 4—4 of FIG. 3;

FIG. 5 is a sectional view taken along the lines 5—5 of FIG. 3;

FIG. 6 is a sectional view taken along the lines 6—6 of FIG. 3; and

FIG. 7 is a sectional view taken along the lines 7—7 of FIG. 3.

Whereas the illustrative drawings and the subsequent description are directed to a device specifically designed for producing shaving lather, it is to be understood that this invention may be used for generating foam from many different types of liquid for various purposes.

Turning now more specifically to the drawings, FIG. 1 generally shows an enclosure **11** which is suitably sized to contain therein a motor **31** and a pump assembly generally indicated at **14**. The motor output is taken through shaft **33**, chain **27** and sprocket **29** to the sprocket **23** of the pump **14** to provide the driving power therefor. The output of the pump is through the spout **89** which is secured to the pump by means such as a cap **87**.

The details of the pump itself are illustrated in FIGS. 3 through 7. Part of the enclosure **11** has an integral wall **13** which creates a liquid reservoir within the enclosure and within which the major portion of the pump **14** is enclosed.

Also integral with the enclosure **11** and the wall **13** are an upwardly extending cylindrical member **15** and a downwardly extending cylindrical member **17**. A standard type bearing member **19** is enclosed within the cylinder **17** for providing the necessary support and bearing surface for the shaft **21** which extends upwardly from the sprocket **23** and through the upwardly extending cylindrical projection **15**.

A lower pump housing **35** which may be cylindrical in configuration has a circular flange member **37** at the base thereof which rests at the bottom of the reservoir. An inner lip **43** of the lower pump housing bears against a reducing washer **41** which in turn rests upon a shoulder **39** also integral with the wall **13**. A channel **45** is provided at one point in the flange **37** and extends from the outer circumference thereof inwardly across the flange as is more clearly seen in FIG. 5.

Channel **45** engages with a slot **47**, which provides a passage to the circular opening **49** created between a washer **41** and the cylindrical member **15**, thus providing a passage for the fluid from the reservoir through the pump housing and the reducing washer **41** to the interior of the pump housing **35**.

The actual pump for the present device includes both a lower pump **53**, a mixing chamber **69** and an upper pump **57**. As will be evident from FIG. 4, the lower pump **53** is essentially a centrifigal pump having a four-sided configuration with beveled corners which, when rotated,

will pull the liquid out of the reservoir and upwardly to the top of the lower pump 53.

The upper pump member 57 has a vertical cross-sectional H configuration and the center section 59 is secured to the upper end of the extending portion of the lower pump by means such as a nut 60 secured to the threaded end 29 of the shaft 21. Thus, both the lower pump 53 and the upper pump 57 rotate with the shaft 21.

The upper pump housing 73 rests upon a washer 65 which in turn abuts against the upper end of the lower pump housing 35. It should be noted that the upper pump housing, lower pump housing and washer 65 may be formed as one integral unit.

A flexible seal 63 is frictionally fitted about the upper portion of the lower pump 53 and extends outwardly into contact with the washer 65. The amount of fluid which passes from the lower pump housing to the upper pump housing is controlled by a notch 67 in the washer 65 which extends inwardly so as to allow the fluid to bypass the seal 63. The lower pump pressure is controlled by the differential between the inside diameters of the washers 41 and 65.

As shown, the upper pump housing has a port 75 therethrough which matches with the opening 77 in a split washer 71 which, in turn, rests upon washer 65. Again, it will be obvious that this entire structure could be molded as an integral piece with the housing. The orifice 75 and the opening 77 in the split washer 71 provide an air passage into a mixing chamber 69 wherein the fluid passing through the metering notch 67 and the air entering from the passage mix and form a foam. This foam passes upwardly beyond the seal 63. If desired, a plurality of grooves 55 may be cut about the circumference of the upper portion of the lower pump 53 to aid in foam entrapment.

In order to assist in the discharge of excess fluid from the mixing chamber 69 and the simultaneous induction of air into the chamber when the device is first put into operation, a vertical rectangular vane 76 may be placed in the air passage. Vane 76 extends into chamber 69 and functions during the priming cycle, discussed below.

Secured to the base of the upper pump member 57, or integral therewith, may be an impeller 79 more clearly shown in FIG. 7. This impeller would further aid in impelling the foam mixture outwardly and upwardly into the rotating body member. This body member has a cellular structure with intercommunicating cells and may be of many types of material, such as urethane foam or the like. Body member 85 is fitted about the upper pump housing 57 and is retained thereon by a plurality of circular grooves 83. Body member 85 also extends outwardly and bears against the inner surface of the upper pump housing which has an internal threaded portion 81. This combination of the rotating body member 85 and the internally threaded housing draws the foam upwardly through the body member which, in turn, causes air to be drawn inwardly through port 75. Thus, a continuous foam production occurs in the mixing chamber.

Since the cellular body 85 is rotating with the shaft 21, friction is created between the inner surface of the housing 73 and the body. Therefore, as the foam is forced through the cellular body, the heat developed by the friction elevates the temperature of the foam.

The device as shown in FIG. 3 is further provided with a priming means in order to assure proper operation even if the dispenser has not been used for a period of time. It will be noted that the notch 67 controls the amount of liquid which passes into the mixing chamber as explained above. Initially, this controlled amount of liquid is forced to the outer periphery of the mixing chamber before foam production begins. A priming slot 68 provides a passage in the extension of the upper housing in order that a small amount of this liquid may be passed upwardly into contact with the cellular body. The amount of liquid is controlled by the size of the slot so that enough liquid is passed to wet the sponge prior to the production of foam, but not enough to be discharged through the upper end of the sponge.

An exit port 93 in the upper pump housing 73 provides a means for the foam created to be dispensed outwardly from the pump. The spout 89 and the cap 87 are formed with an elongated orifice 91, shown in phantom in two positions, so as to provide a means for reducing the orifice 93. Additionally, the orifice is elongated in order to provide a temperature control for the foam to be dispensed. If the entire orifice 93 is uncovered, then the foam will pass rapidly outwardly through the spout 89. However, if the size of the orifice 93 is reduced by rotation of the cap 87 and spout 89, the flow of the lather will be reduced because of the restricted opening. If the flow of the lather is restricted, it will remain within the cellular body 85 for a longer period of time and thus will be heated to a greater extent by the friction developed therein. The adjusted size of the orifice will also affect the particular consistency of the foam. Thus, if the size of the orifice is restricted, the foam produced will be both hotter and dryer than the foam produced with the orifice uncovered.

In order to assure proper flow of the liquid from the reservoir into the lower pump housing, extending wall members 95 and 97 may be provided so as to form a subreservoir above channel 45. Additionally, the members 95 and 97 are beveled at the lower ends thereof as at 99. When the pump is first started, if there is any hardened material, such as soap, near the channel 45, the first fluid which will be drawn into the orifice 47 will be down from between the extending members 95 and 97. This donward flow will tend to cause any residue to be pulled through the beveled portion 99 so as to mix thoroughly with the fluid and dissolve before there is any possibility that it could clog the pumping mechanism.

The motor may be controlled by any type of on-off switch (not shown) so as to provide a convenient means for controlling the dispensing of the foam.

It will now be seen that the present inventon provides a unique device for creating and dispensing foam and raising the temperature of the foam without independent heating units. It is to be understood that the drawings and description are illustrative only and that the use of various modifications of the components shown and described would not depart from the scope of the invention.

I claim:

1. A device for producing and dispensing foam at an elevated temperature comprising,

a liquid reservoir,

a lower pump housing within the base of said reservoir,

liquid port means of a predetermined size between the interior of said pump housing and the lower interior of said liquid reservoir,

rotatable lower pump means within said pump housing for forcing liquid from said reservoir upwards through said pump housing,

sealing means between the upper end of said pump housing and said pump,

a metering port between said sealing means and said pump housing,

internally threaded upper pump housing means secured to said lower pump housing,

a mixing chamber between said upper and lower pump housing means connected to said metreing port,

an air port through said upper pump housing in communication with said mixing chamber,

rotatable upper pump means secured to and extending from said rotatable lower pump means within said upper pump housing,

impeller means on the lower portion of said upper pump means,

a body having a cellular structure with intercommuni-

cating cells secured to said upper pump means and extending to said upper pump housing,

a rotatable shaft extending through the base of said reservoir,

means for securing said pump means to said shaft for rotation therewith,

means for rotating said shaft, and

spout means in communication with the upper portion of said body.

2. The device of claim **1** further comprising,

a pair of walls extending from said lower pump housing outwardly into said liquid reservoir and extending upwardly from the lower portion of said housing so as to form a channel in said reservoir, said channel extending above said liquid port means, and

beveled edges on said walls extending inwardly at the lower edges thereof.

3. A device for producing and dispensing foam at an elevated temperature comprising,

a liquid reservoir,

a pump housing within said liquid reservoir,

rotatable pump means within said housing,

first port means interconnecting said liquid reservoir with said pump means,

second port means for introducing air within said pump means,

a mixing chamber communicating with said first and second port means,

a body having a cellular structure with intercommunicating cells secured to said rotatable pump means in communication with said mixing chamber,

means rotating said pump means, and

spout means communicating with said body.

4. The device of claim **3** further comprising channel means connected to said pump housing for directing fluid from said reservoir to said first port means.

5. The device of claim **3** wherein said mixing chamber and said cellular structure are interconnected by means of a foam passage and a fluid priming passage.

6. A device for producing and dispensing foam at an elevated temperature comprising,

a reservoir for containing a liquid,

pump means including a stationary housing within said reservoir,

a mixing chamber for receiving the output of liquid from said pump means,

means through said housing for delivering air to said mixing chamber,

a body having a cellular structure with intercommunicating cells mounted within said housing and bearing thereagainst,

interconnecting means between said body and said chamber,

means for rotating said body during operation of said pump means, and

an exit port in said housing for receiving the output from said body.

7. The device of claim **6** further comprising means for varying the size of said exit port.

8. The device of claim **6** wherein said interconnecting means comprises a foam passage and a fluid priming passage.

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