

Sept. 29, 1953

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2,653,848

FOAM CREATING APPARATUS

Filed Aug. 25, 1951

2 Sheets-Sheet 1

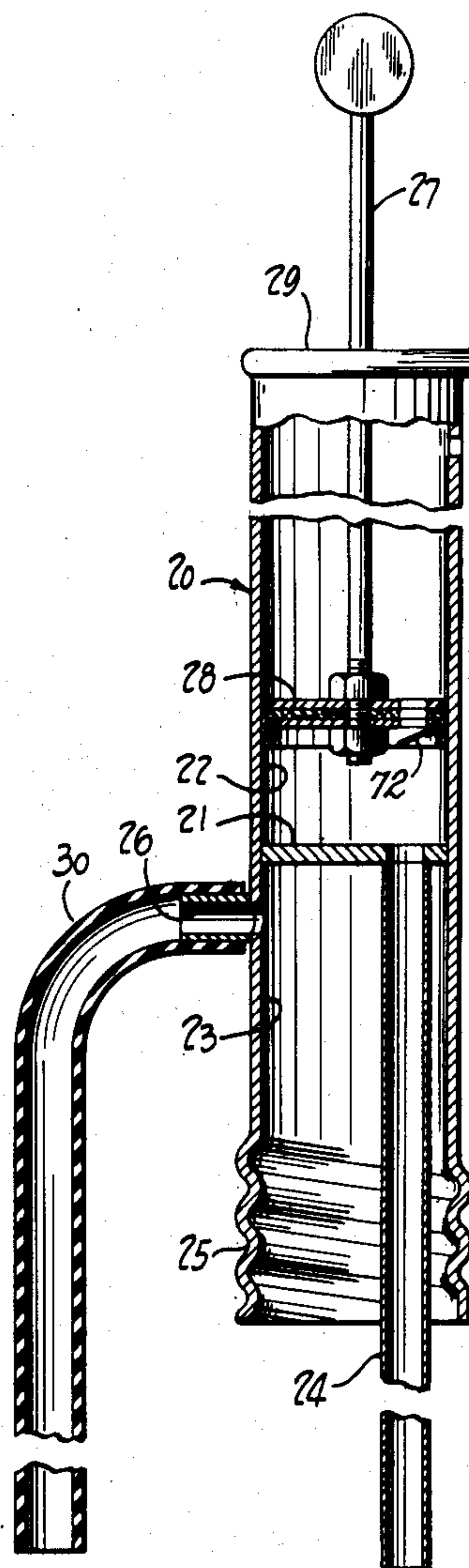
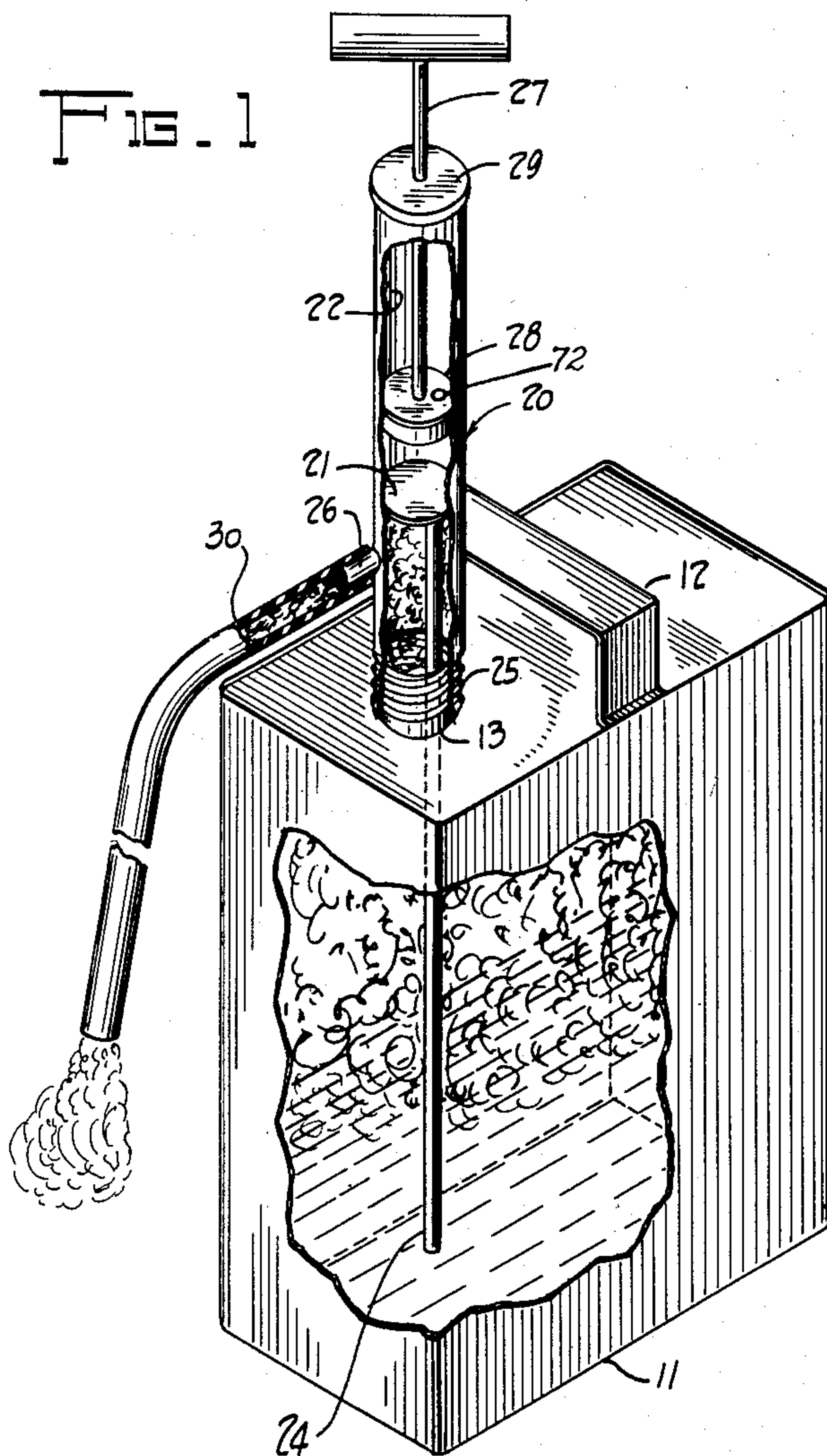


FIG. 2

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2 Sheets-Sheet 2

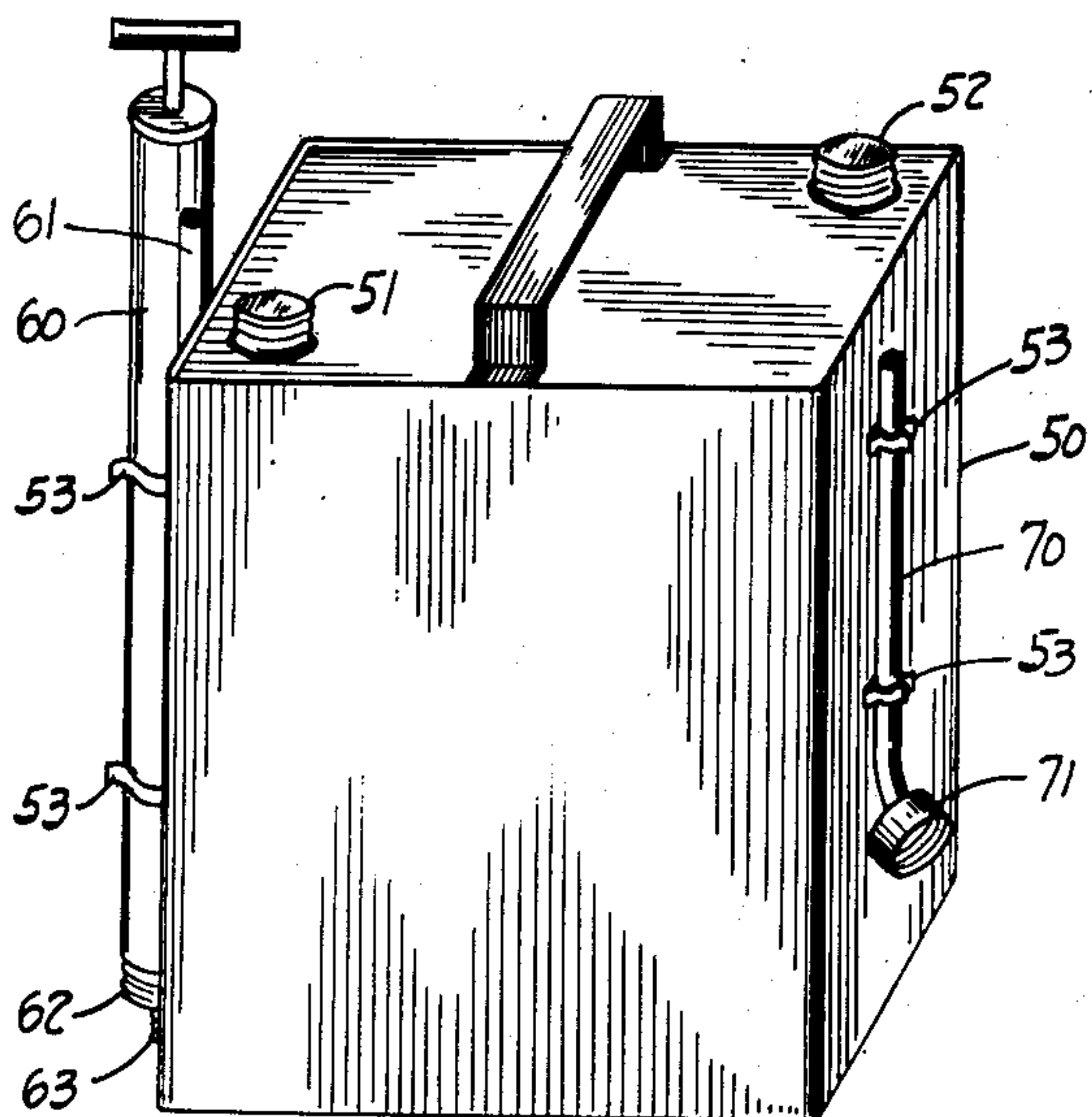


FIG. 3

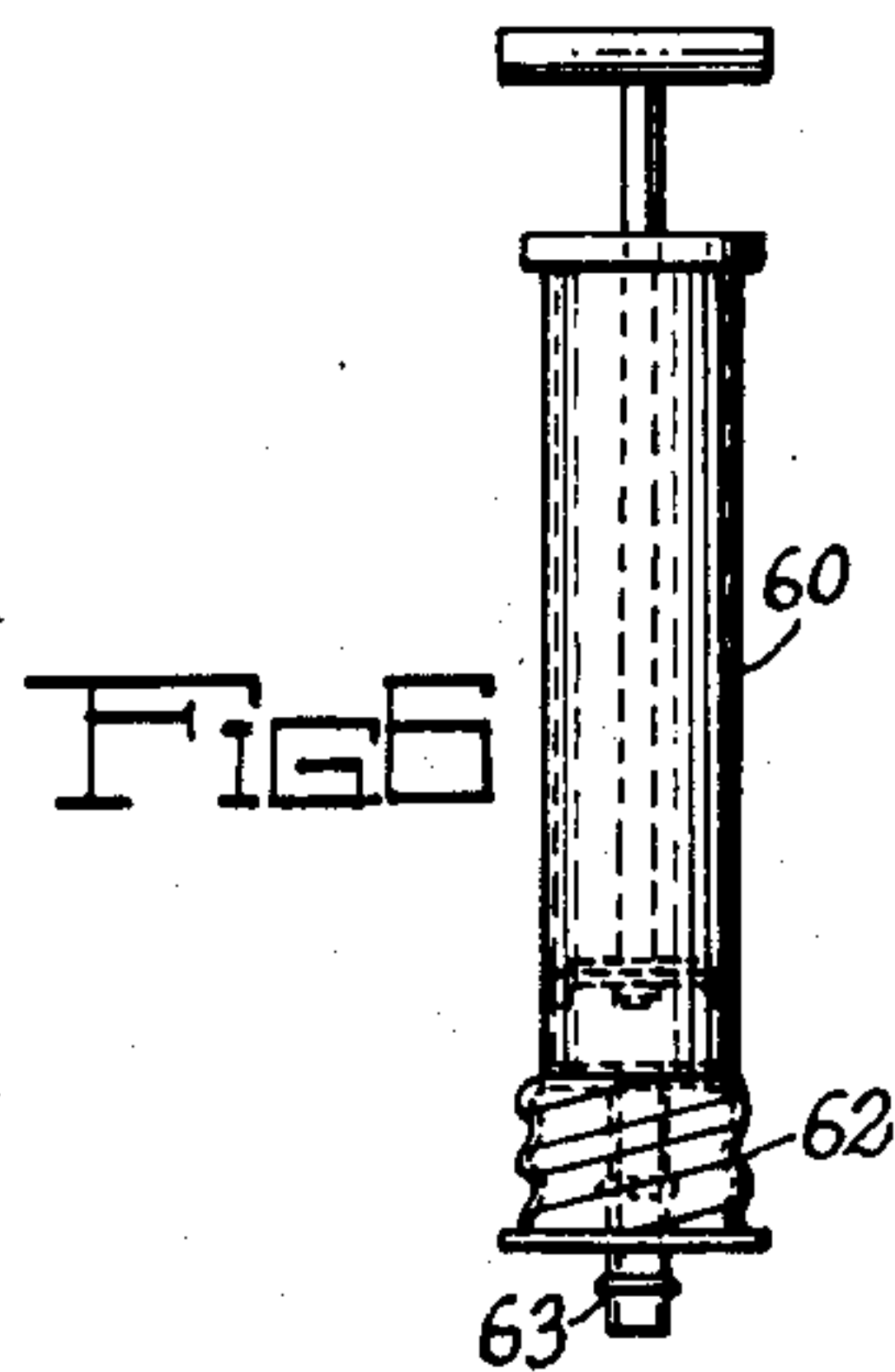


FIG. 6

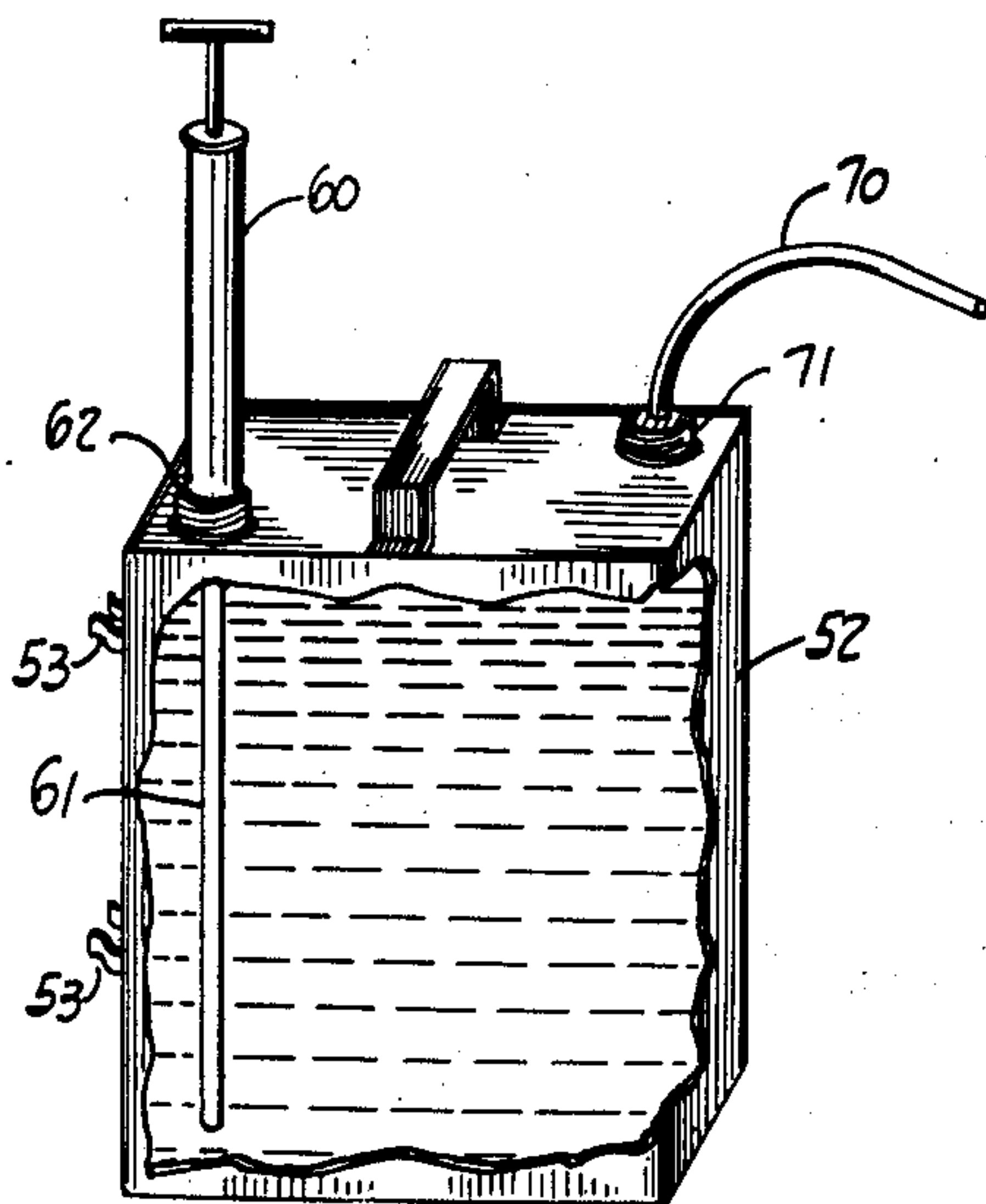


FIG. 4

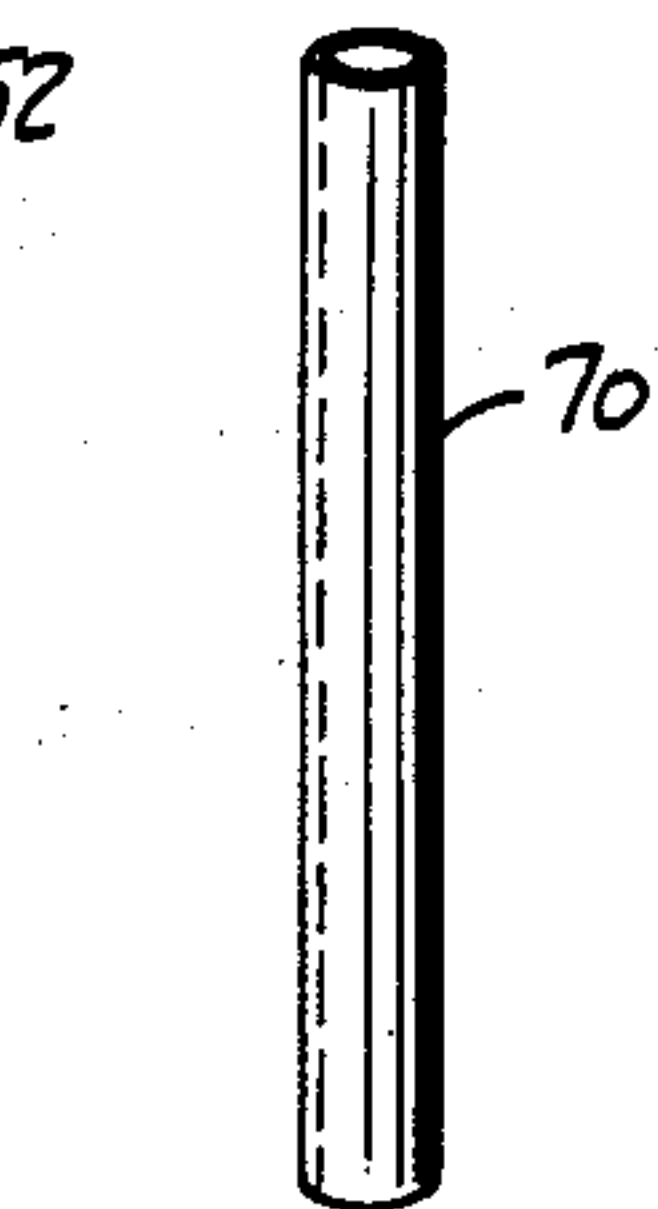


FIG. 5

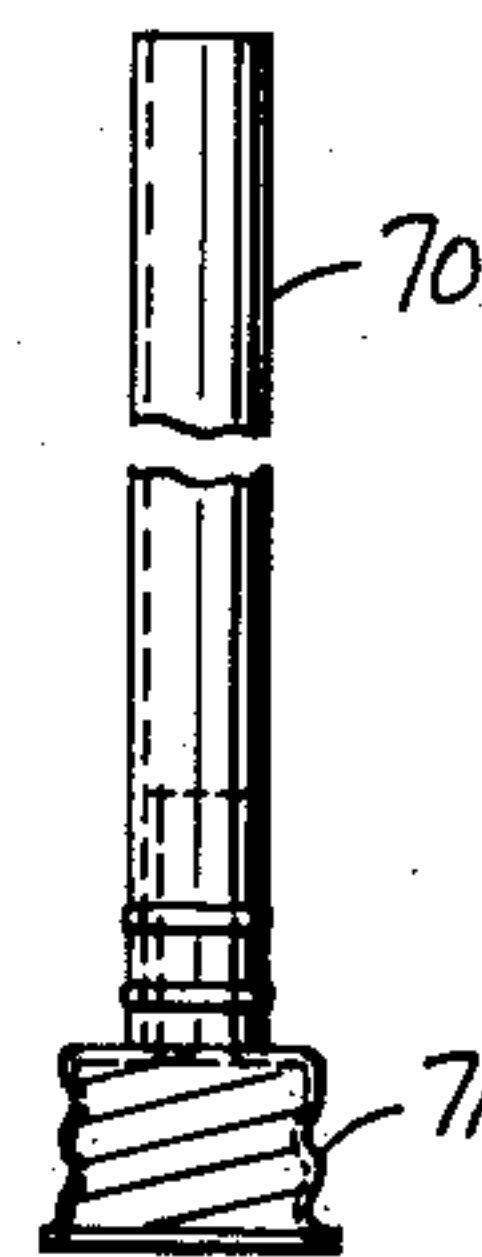


FIG. 7

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## UNITED STATES PATENT OFFICE

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## FOAM CREATING APPARATUS

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Application August 25, 1951, Serial No. 243,732

3 Claims. (Cl. 299—83)

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This invention relates to foam creating apparatus and particularly to an attachment for converting a commercial container for detergent solutions into an integral part of such apparatus whereby a cleansing foam may be created directly from the contained solution without any secondary or intermediate handling of the solution.

Conducive to a better understanding of this invention, it may be well to point out that upholstery textiles and carpeting materials have been cleaned heretofore by washing with a liquid detergent such as soapy water. Such methods introduce large quantities of water into the fabric being cleaned which has to be removed after the cleaning process is completed.

Furthermore the best cleaning results can not be obtained by this method. It has been found that the most efficient cleaning agent is in the soap-suds themselves, and not in the soapy water carrying the suds.

It is the ordinary practice of manufacturers of such detergent solutions to market their products in tin-plate cans of quart or larger sizes having a screw-cap or seal on the neck of the container, through which neck the solution may be emptied when the screw cap is removed.

In order to obtain the cleansing suds apart from the liquid, it has been the practice to advise users to pour a small portion of the solution into an open vessel, such as a bowl and then whip the solution into a dry lather by means of a paddle held in the hand. The resultant foam is then manually applied to the fabric to be cleaned. This method of producing suds is both inconvenient and fatiguing to the user.

It is therefore, one of the primary objects of this invention to provide novel means for forming soap suds in the original container of the soap solution and to deliver dry foam directly to the surface to be cleaned without the necessity of any intermediate handling of the soap solution.

A further object is to provide a simple, inexpensive device that can be attached to existing containers at the threaded neck thereof in place of the regular screw cap, which may then be discarded.

A further object is to provide improved tubular means for creating a dry suds substantially free of moisture without the use of any screens, or other passage way obstructions.

The above objects of the invention and other objects ancillary thereto will be best understood from the following description considered in connection with the accompanying drawings forming a part of the present specification.

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In the drawing:

Figure 1 is a perspective view of a conventional tin-plate container having my improved foam producer connected thereto;

Figure 2 is a sectional elevation on an enlarged scale showing the improved foam producer;

Figures 3 to 7 inclusive illustrate an alternate form of foaming apparatus adapted for use with tin-plate containers having two threaded necks thereon;

Figure 3 is a perspective view of a conventional tin-plate container of the type having two threaded necks thereon showing the foaming device in its dismantled condition and secured to the side of the container by means of retaining clips;

Figure 4 is a perspective view showing the air pump and foaming hose attached to the threaded necks of the container;

Figure 5 is a front elevation of the foaming hose;

Figure 6 is a front elevation of the air pump and threaded mounting cap; and

Figure 7 is a front elevation of the foaming hose showing it attached to its threaded mounting cap.

In the preferred form of the invention adapted for use with a single necked container 11 as shown in the Figures 1 and 2 of the drawings, the device consists of a tubular body member 20 made of sheet metal.

The body 20 has a screw thread 25 at its lower end and a closure 29 at its upper end. A partition disk 21 positioned intermediate the ends of the body member divide it into upper and lower chambers 22 and 23 respectively.

An air injector tube 24 runs from the upper chamber 22 through the partition 21 to the interior of the container 11. The tube 24 is of sufficient length to extend nearly to the bottom of the container with which the device is intended to be used.

Reference numeral 28 indicates a piston which is movable back and forth in the upper chamber 22 by means of a handled rod 27 which extends through the cap 29. A suitable valve 72 is provided so that the piston and upper chamber 22 operate as an air compressing pump upon reciprocating movement of the pump rod 27.

An outlet nipple 26 is located at the upper end of the lower or condenser chamber 22 proximate the partition disk 21. A foamer hose 30 is attached to the nipple 26. The hose 30 is made of flexible rubber and forms the rich, dry foam required for optimum cleaning ability.

As a result of lengthy research by this appli-



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cant, it has been found that the length of the foamer hose 30 must bear a definite ratio to its bore in order to produce a dry foam that will easily clean without unduly wetting the fabric surface. This ratio has been found to be approximately sixty-five to one, the length of the hose being sixty-five times that of the diameter of the bore.

In the preferred form illustrated, a twenty-five inch length of  $\frac{3}{8}$ " hose is used. Shorter hose lengths produce a wetter foam while longer lengths increase the effort needed to force the foam through the tube. With a greater tube ratio the foam is more dense and in the nature of a heavy lather which is undesirable since the lather structure has a tendency to lay above the fabric surface and resists being forced into intimate contact with the area to be cleaned. A  $\frac{3}{8}$ " bore tube was chosen as the preferred type since a smaller bore increases the effort needed to pump, while a larger bore requires an inconveniently long hose.

In use with a conventional one-necked container 11, such as shown in the Figure 1, the sealing cap is removed from the threaded neck 13 and discarded. The body 20 is then positioned over the neck opening and the air injector tube 24 is passed through the neck into the body of the container below the level of the contained soap solution.

The body screw thread 25 is engaged with the threaded neck 13 and the entire body rotated thereon until it is drawn up to form an air tight seal. The piston rod 27 is then moved up and down in a pumping action. This pumping action forces air into the container through the injector tube 24 whose outlet must always be below the level of the contained soap solution. The compressed air bubbles up through the soap solution aerating it and forming large wet soap bubbles at the surface of the liquid. Continued pumping increases the air pressure within the container and forces these large bubbles into the confines of the lower or condensing chamber 23 where they are compacted and broken up into smaller bubbles or suds.

From the condensing chamber 23 they enter the foaming hose 30 through the outlet 26 at the upper end of the condensing chamber 23. The hose 30 being of substantially smaller diameter than the condensing chamber 23, the suds must be radically reduced in size in order to enter and pass through the hose. As a result of this second compacting action the soap bubbles leave the open end of the hose 30 in the form of a dry, rich foam than can be easily applied whenever desired by merely pointing the end of the hose at the area to be cleaned.

The device is also adapted for use with conventional threaded-neck glass gallon jugs, as well as with the metal containers described.

It will thus be seen that the use of the above described device permits the soap solution to be instantly converted into a dry cleansing foam directly upon leaving its container without the necessity of any intermediate handling as was required before the perfection of this invention.

Figures 3 to 7 inclusive show alternate forms of the device suitable for use with a container 50 having two capped necks 51 and 52.

Figure 3 shows the device in unassembled form attached by means of spring clips 53 to the sides of the container. Reference numeral 60 indicates a hand operated piston type air pump having a screw cap 62 at its lower end. An air in-

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jector tube is attached to a nipple 63 at the air outlet of the pump. A foamer tube 70 is secured at its end to a second screw cap 71. The bore and length of the foamer tube 70 is based on the sixty-five to one ratio described hereinabove. In its preferred form it is twenty-four inches long and has a  $\frac{3}{8}$ " bore.

In assembling the device the screw caps of the necks 51 and 52 are removed. The pump cap 62 is screwed on the neck 51 with the injector tube 61 extending into the container below the level of the contained soap solution as shown in the Figure 4. The screw cap 71 of the foamer tube 70 is engaged with the threaded neck 52. Upon injection of air into the container by means of the pump 60, air is forced through the soap solution forming wet soap suds which are compressed into dry foam as they are pushed through the foamer tube 70 by the air pressure built up by the pump.

The structure just described is inexpensive to manufacture, convenient to use, and fills a long felt want in an industry whose growth is retarded by reason of the cumbersome method for using its product.

It will now be clear that there is provided a device which accomplishes the objectives heretofore set forth. While the invention has been disclosed in its preferred form, it is to be understood that the specific embodiment thereof as illustrated and described herein is not to be considered in a limited sense as there may be other forms or modifications of the invention which should also be construed to come within the scope of the appended claims.

I claim:

1. Foam creating means and substitute closure member for the sealing cap of a container, adapted for dispensing a soap solution from the said container through the neck thereof comprising a tubular body member designed to fit removably over the said neck and having a closed top, an air tight partition positioned intermediate the ends of the body member and forming upper and lower chambers therein, air compressing means in the upper chamber, means communicating with the upper chamber for delivering compressed air to the container below the level of the contained liquid, whereby to create a disturbance in the liquid and to form bubbles above the liquid level and a pressure in said container, a bubble outlet nipple on the body member communicating with the lower chamber at the upper end thereof, and foam generating means connected to the said nipple and adapted to receive a stream of bubbles therefrom, the said generator comprising a smooth bore tubular member having a length approximately sixty-five times its bore diameter whereby each bubble passed there-through is broken down into myriads of minute bubbles and thereby creating foam.

2. Foam creating means and substitute closure member for the sealing cap of a container, adapted for dispensing a soap solution from the said container through the neck thereof comprising a tubular body member designed to fit removably over the said neck and having a closed top, an air tight partition positioned intermediate the ends of the body member and forming upper and lower chambers therein, air compressing means in the upper chamber, means communicating with the upper chamber for delivering compressed air to the container below the level of the contained liquid, whereby to create a disturbance in the liquid and to form bubbles



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above the liquid level and a pressure in said container, a bubble outlet nipple on the body member communicating with the lower chamber at the upper end thereof, and foam generating means connected to the said nipple and adapted to receive a stream of bubbles therefrom, the said generator comprising a smooth bore tubular member having a length of 24 inches and a bore of  $\frac{3}{8}$  inch, whereby each bubble passed there-through is broken into myraids of minute bubbles and thereby creating foam.

3. Foam creating means and substitute closure members for the sealing caps of a two-necked container, adapted for dispensing a soap solution from the said container comprising, air compressor means designed to fit removably over the first of said necks and including means for delivering compressed air to the container below the level of the contained liquid, whereby to create a disturbance in the liquid and to form bubbles

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above the liquid level and a pressure in said container, and foam generating means designed to fit removably over the second of said necks and adapted to receive a stream of bubbles from the said container, the said generator comprising a smooth bore tubular member having a length approximately sixty-five times its bore diameter whereby each bubble passed therethrough is broken down into myraids of minute bubbles and thereby creating foam.

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