

Oct. 18, 1938.

D. J. DOLAN

2,133,499

BUBBLE PRODUCING AND DISPLAY MEANS

Filed Dec. 12, 1936

2 Sheets-Sheet 1

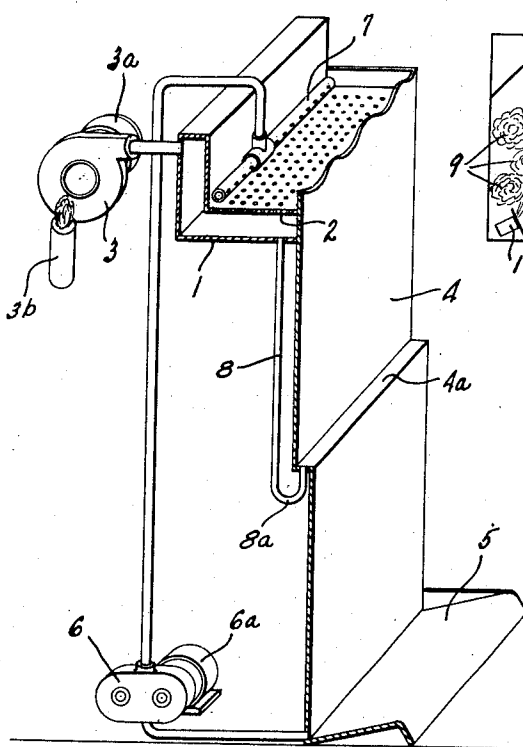


FIG. - 1

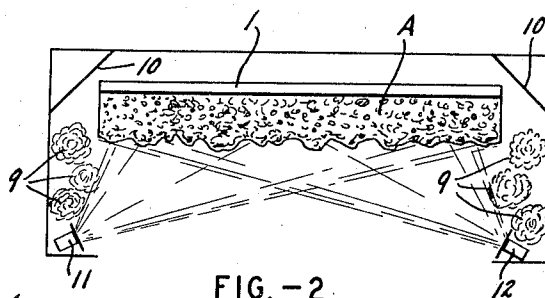


FIG. - 2

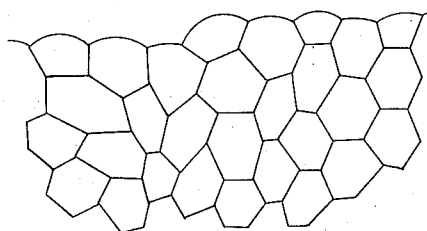


FIG. - 3

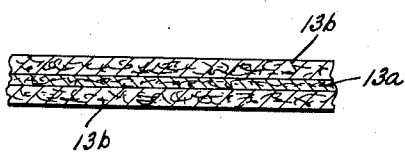


FIG. - 4

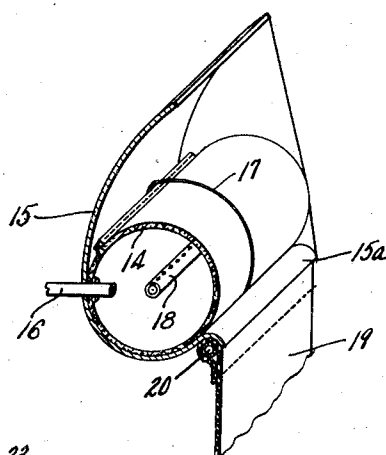


FIG. - 5

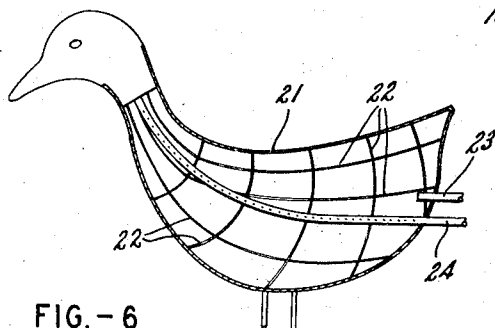


FIG. - 6

INVENTOR
DAVID J. DOLAN
BY *Brockett, Hyde, Higley & Meyer*
ATTORNEYS

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D. J. DOLAN

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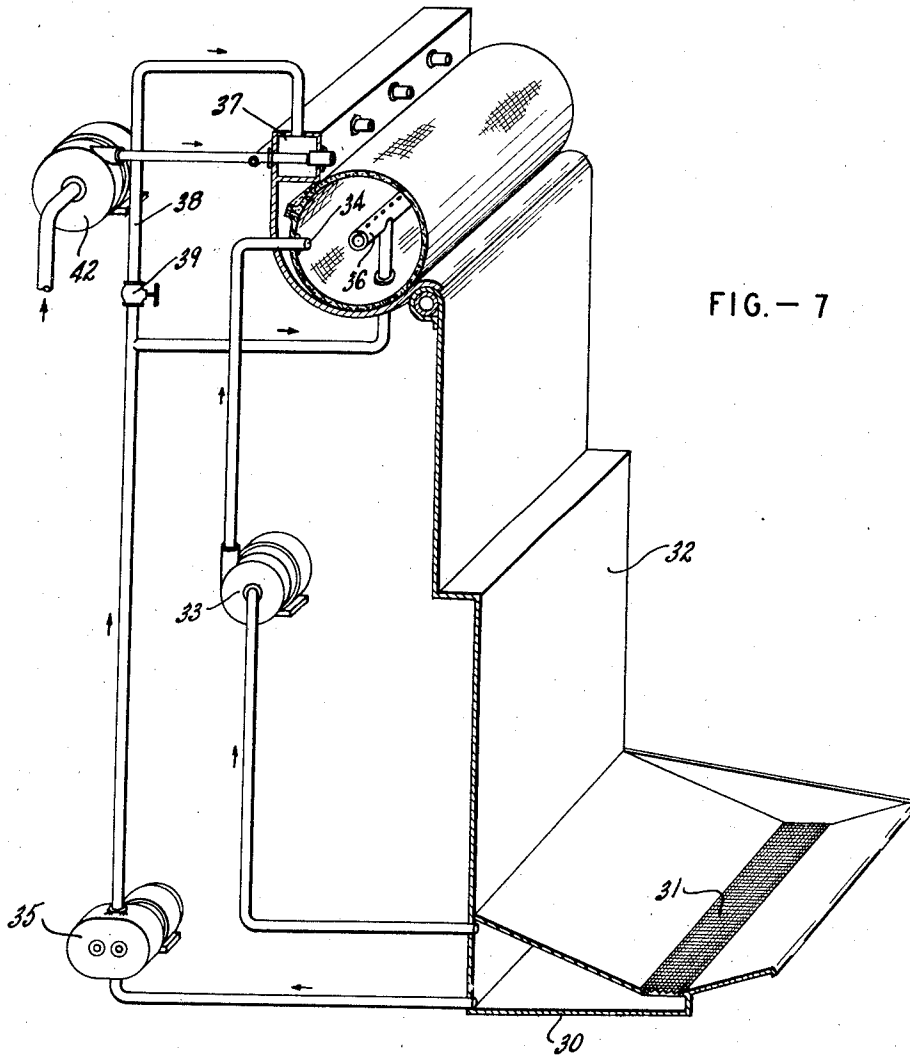


FIG. - 7

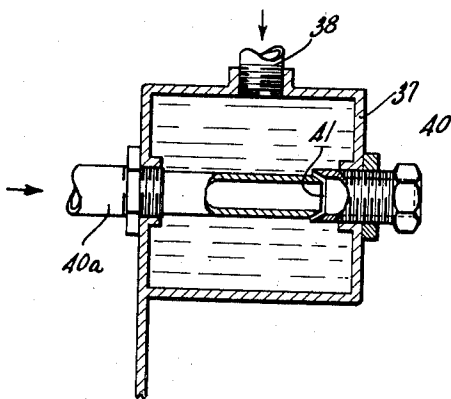


FIG. - 8

INVENTOR
DAVID J. DOLAN
BY *Brockett, Hyde, Higley & Meyer*
ATTORNEYS

UNITED STATES PATENT OFFICE

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BUBBLE PRODUCING AND DISPLAY MEANS

David J. Dolan, Cleveland Heights, Ohio

Application December 12, 1936, Serial No. 115,558

27 Claims. (Cl. 46—8)

This invention relates to display effects and the means for producing them, and more particularly to effects suitable for stage or advertising display and employing a mass of bubbles.

The objects of the invention are generally to provide novel apparatus for producing such mass of bubbles, and to provide a most effective display of the mass.

The exact nature of this invention together with further objects and advantages thereof will be apparent from the following description taken in connection with the accompanying conventionalized drawings, in which Fig. 1 is a perspective view partly in section, showing apparatus embodying the invention and arranged to provide a background simulating a waterfall or like effect; Fig. 2 is a plan view in reduced size, of a stage effect employing apparatus similar to that illustrated in Fig. 1; Fig. 3 is a typical section through a mass of bubbles produced with the apparatus of Fig. 1; Fig. 4 is an enlarged section showing a fabric employable in another form of apparatus; Fig. 5 is a perspective partly in section showing a form of apparatus employing a fabric such as that illustrated in Fig. 4; Fig. 6 is a sectional elevation showing another form of apparatus employing the same fabric; Fig. 7 is a view similar to Fig. 1 but indicating a modified form of apparatus; and Fig. 8 is an enlarged sectional elevation showing a detail of parts appearing in Fig. 7.

With reference now to the drawings and first to Fig. 1 thereof, 1 is a container of horizontally elongated form and maintained in an elevated position by any suitable means, not shown. The container has a foraminous upper wall part 2, and may be of sheet metal or the like, with its wall part 2 formed with small perforations as illustrated. Means such as a blower 3 suitably driven in any convenient manner such as by a motor 3a, are provided for maintaining a pressure of air or other gas within the hollow of the container 1. The container may have a rearward upstanding portion into which the air is delivered and which serves to distribute the air so that the perforations in the wall 2 will be at substantially uniform pressure. At the forward edge of the container and in the illustrated form comprising a part of the latter, is a sheet member 4 extended downwardly, with an offset part 4a, and at the base of which is a trough-like receiver 5. A pump 6 driven as by a motor 6a is connected by the piping indicated to take liquid from the receiver 5 and deliver it to a distributing pipe 7 disposed adjacent the wall 2 and perforated as indicated to cause the pumped liquid to main-

tain the face of the wall 2 wetted by a layer of the liquid. A part, such as the upper extremity of the sheet member 4, extends slightly above the forward edge of this wall member, and similar means are provided at its ends so as to retain this liquid against running off the face of the wall.

In operation of the apparatus a soap solution is provided in the receiver 5, which by means of the pump 6 and pipe 7 is maintained distributed over the wall member 2 and the perforations therein. The blower 3 being operated to maintain a pressure within the container 1, a series of bubbles is generated at each of the perforations so that a frothy mass of bubbles or foam is generated, which mass overflows the upper edge of the sheet member 4 and wets its forward surface. The member being of metal or similar material to which when wetted the mass of bubbles will cling, the latter, clinging also to each other, will slide down the surface at the rate at which it is generated at the wall 2 and will ultimately cover the forward surface of the sheet 4. The offset 4a, of which there may be several, assists in preventing portions of the mass from separating in their downward travel. During such travel the bubbles drain and eventually the liquid of their skins is collected in the receiver 5 whence it is recirculated by the pump 6 through the circuit described.

Under proper operating conditions of pump and blower to deliver proper proportions of soap solution and air, but little liquid will collect within the container 1. However, a pipe 8 having a U-bend 8a may be arranged as illustrated to drain the container without permitting escape of air.

Obviously the necessary volume of air will be much greater than that of the recirculating soap solution and the size of the individual bubbles produced will be dependent upon conditions such as the amount of liquid overlaid upon the wall 2, the pressure maintained within the container 1, and the size of the perforations in the container wall 2.

If desired, the bubbles may be filled with smoke to give them an opalescent appearance and make their bursting visible, by the simple expedient of placing a smoke candle or equivalent smoke producer 3b adjacent the inlet of the blower 3, so that the blower will have inspirator effect to draw in the smoke and deliver it within the bubbles being produced. Similarly, as where it is desired to lighten the mass of bubbles, a gas supply pipe may be located adjacent the blower inlet. The amount of smoke or gas thus intro-

duced into the bubbles may be easily regulated by the adjacency of the smoke candle or by regulating the amount of gas delivered by its supply pipe.

5 With reference now to Fig. 2, apparatus such as that in Fig. 1 is employed to provide a mass of bubbles in the form of a wide sheet A, the sheet being of sufficient height and width to have substantial area. Artificial trees 9 may be arranged
10 at the sides of the sheet, and a background 10 arranged behind the apparatus to be visible from above and at the sides of the mass of bubbles and painted to display rocks, foliage and the like, in such manner that the mass of bubbles will be
15 perceived as closely simulating a waterfall. To make the latter less uniform in contour, increase its appearance of motion, and generally improve the waterfall simulation, the upper extremity of the sheet 4 may have an uneven edge as indicated
20 in Fig. 1.

Exceedingly beautiful and startlingly brilliant effects may be produced by illuminating the mass of bubbles simultaneously from a pair of widely spaced lamp means as at 11 and 12, Fig. 2, the
25 lamps projecting different colors upon the mass of bubbles. The bubbles will then send back sparkling light to the observer in different colors and intensities dependent upon the angle of incidence from the lamps. The exact explanation
30 of the chromatic phenomenon is not known to me but perhaps resides in the fact that in such a mass of bubbles, as indicated in Fig. 3, each contiguous pair is separated by a film disposed in a plane, these planes are disposed haphazardly
35 at all conceivable angles, and act with at least partially reflecting properties. At the same time the near face parts of the outermost bubbles are convex, and probably somewhat diffuse the reflected colors.

40 At any rate, where the lights 11 and 12 are colored and particularly of different primary colors, from any point of observation between them the mass will at certain locations be predominantly one color, at others of the other color,
45 and still at others of the resultant secondary color, the color and intensity difference in portions of the mass being the greater the more uneven is the mass in contour.

The lamp means 11 and 12 may preferably be of such nature as to produce color changes.
50 Thus they may be provided with revolving color screens driven to produce sequential color variations, as will be apparent.

I have found a mass of bubbles in the order of
55 $\frac{3}{4}$ inch diameter to be easily produced by apparatus such as illustrated in Fig. 1, employing air and a soap solution containing glycerine, and to be of very satisfactory size for the color effects described.

60 A simpler and cheaper apparatus, however, one more easily transported and less subject to damage, employs a container wall of fabric in place of the perforated sheet metal above described. For the purpose I have successfully employed a composite fabric such as illustrated in
65 Fig. 4, comprising an element 13a of wicking disposed between a pair of felt elements 13b, the elements being secured together as by stitching at intervals to form a single sheet unit 13.

70 The manner of employment of such fabric in apparatus of the nature of that above described, is illustrated in Fig. 5. An elongated closed bag 14 is made up of the fabric and a trough member 15 of sheet metal or the like is provided for support of the bag, horizontally disposed in elevated

position. An air supply line 16 leads into the bag and wires 17 may be arranged at intervals to maintain the bag within the trough member 15 when inflated. For supply of soap solution, a distributing pipe 18, suitably perforated, is arranged within the bag to spray its inner surface
5 with soap solution. The arrangement of jets in the pipe 18 is not critical as the capillary action of the fabric of the bag will in itself have strong tendency to maintain a uniform wet distribution
10 among its fibers.

Once the bag is thoroughly wetted with the soap solution by the pipe 18 and air is supplied through the line 16—it being understood that these supply arrangements may be provided as
15 already described in connection with Fig. 1,—a mass of bubbles will be generated on the outer surface of the bag. The trough member 15 being formed as illustrated, to deliver this mass in a forward or other common direction, the mass
20 will take the form of a sheet generally as before, of width equal to the length of the bag 14, and of maximum thickness determined by the opening of the trough 5. Where a waterfall is to be simulated, a curtain 19 of flexible waterproof
25 material such as rubber or oilcloth, may be arranged to direct the downward advance of the mass of bubbles generally as already described in connection with the rigid sheet 4. Such curtain has the advantages that it may be maintained in
30 some motion during operation of the apparatus as by a stream of air from behind, to give movement to the bubble mass upon its surface and thus improve the simulation, and also may be rolled up for convenient transportation. The
35 curtain may be hung upon a rod 20 over which a lip 15a on the bag-supporting trough 15 rests.

The use of the fabric lends itself to easy production of simulation of many different objects. Thus, as illustrated in Fig. 6, the body part of a
40 swan or duck is outlined by arranging a bag 21 upon a form or frame 22 of wire or the like, the body being provided with imperforate head and legs so that the bag surface is located where the feathers would appear. Air being supplied
45 through the pipe 23 and soap solution through the spray pipe 24 after the manner of the apparatus in Fig. 5, and the fabric of the bag being of fine mesh, the outer surface of the bag may be covered with a thin layer of frothy
50 foam strongly suggestive of white feathers.

Another simulation, not illustrated but which has been successfully made, is that of stalactites and stalagmites, these being produced simply by
55 vertical disposition of an elongated bag. As will be apparent, other bag shapes may be employed to represent other objects, all within the scope of this invention.

With reference now to Fig. 7 of the drawings, a form of apparatus is shown suitable for a purpose similar to that of Fig. 1 and employing a fabric bag as in Fig. 5.

In the apparatus here illustrated, however, means are provided for reducing the bubble mass produced by the bag, back to its gaseous and
65 liquid components. To this end a container 30 having an elongated mouth screened as at 31, is provided with the trough-like structure indicated leading to this mouth, the whole being located at the foot of the bubble directing wall
70 32; so that the mass of bubbles produced at the surface of the bag will travel over the surface of the wall 32 and onto the screen 31 within the trough. The blower 33 which serves the air inlet 34 of the bag has connection with the 75

upper part of the hollow of the container 30 so that when the blower is operating it will produce a vacuum within the container as well as pressure within the bag. The pump 35 handles the soap solution liquid generally as in Fig. 1, withdrawing this liquid from a connection at the lower part of the container 30 and delivering it to the distributing pipe 36 within the bag, by the connections illustrated.

It will be evident that during operation of the blower 33 and pump 35, the bubble mass produced at the bag and ultimately progressing to the trough bottomed by the screen 31, will be pulled into the screen by the suction effect of the blower 33. The mesh of the screen being sufficiently fine that the bubbles will burst rather than be drawn through the screen, it will be apparent that not only is the soap solution liquid recirculated and practically entirely conserved, but also even the gaseous contents of the bubbles is recirculated as well, and the accumulation of bubbles at the base of the apparatus is limited. Thus this form of apparatus is superior where operation must be had in a confined space.

To improve the simulation of a waterfall as above described, I here provide means for producing a few bubbles of large size adjacent the bag which produces the mass of small bubbles, these large bubbles being preferably filled with gas so that they will rise somewhat as a mist from the falls.

For this purpose I arrange a container 37 for soap solution above the bag, with means such as the pipe 38, valved at 39 to be fed from the pump 35, whereby this container may receive a controlled amount of soap solution from the liquid system of the apparatus. Associated with this container 37 are a number of nozzle pipes 40 directed outwardly of the container and for each pipe 40 a gas supply pipe 40a. Within the container such pipe means are so related as to provide therebetween a narrow annular opening 41 beneath the surface of the soap solution. A blower 42 is arranged to serve all the pipes 40a as by the header indicated in Fig. 7, by delivery thereto of a gas lighter than air, a mixture of such gas and air, or simply air. Preferably each nozzle pipe 40 is threadedly mounted to adjust the size of its opening 41 as indicated in Fig. 8.

When the container 37 is provided with soap solution and the blower 42 is operating, large bubbles will be produced at the mouths of the pipes 40, a series of such bubbles from each pipe, and these large bubbles will rest upon the mass of small bubbles produced by the bag, or rise from the latter, dependent upon their gas content. By closing the valve 39 while the blower 42 is operating, the nozzles 40 may be employed to blow the bubble mass from the bag instead of themselves producing large bubbles.

I have found the apparatus illustrated particularly in Fig. 8, to be very effective in producing surprisingly large bubbles. The gas flow through the nozzle draws in soap solution through the orifice 41, so that as the bubble being produced becomes larger, its skin is fed with soap solution. Obviously the greatest size of bubble will be produced with this apparatus when the latter is disposed to deliver its bubbles downwardly instead of to the right as illustrated.

What I claim is:

1. Apparatus for the purpose described comprising a container having a foraminous wall located higher than the container bottom, means

for maintaining said wall wet with a film of soap solution to provide soap films at its foramens, and means for supplying a gas under pressure within said container to produce a mass of bubbles at the outer surface of said wall.

2. Apparatus for the purpose described comprising a container having a fabric wall, means for maintaining said wall wet with a soap solution, and means for supplying a gas under pressure to said container to provide a mass of bubbles upon the outer surface of said wall.

3. Apparatus for the purpose described comprising a container having a foraminous wall, means for maintaining said wall wet with a soap solution, means providing pressure within said container to produce a mass of bubbles at the outer surface of said wall, and means providing a stepped path for said bubble mass leading downwardly from said wall.

4. Apparatus for the purpose described and comprising a container having an upwardly facing foraminous wall, means providing pressure within said container, means for maintaining said wall wet with a film of soap solution to produce a mass of bubbles at the outer surface of said wall and including means for draining said bubble mass and for returning their soap solution to said wall.

5. Apparatus for the purpose described and comprising a container having a foraminous wall, means providing pressure within said container, means for wetting said wall with a soap solution to produce a mass of bubbles upon said wall, means providing a path for said bubble mass leading from said wall, means for draining said container, and means for delivering the drained soap solution to said bubble mass on said path.

6. Apparatus of the class described comprising a container having a foraminous wall, pump means providing pressure within said container, means for wetting said wall with a soap solution to produce a mass of bubbles at said wall, means providing a path for said bubble mass leading from said wall, means for draining said path and including a receiver for the recovered soap solution, and pump means for returning said recovered solution to said wall wetting means.

7. Apparatus for the purpose described comprising an elevated container having a horizontally elongated foraminous wall, means for maintaining said wall wet with a soap solution, means providing pressure within said container to produce a mass of bubbles at said wall, and means having a surface over which said bubble mass may advance downwardly in sheet form from said wall.

8. Apparatus for the purpose described comprising a container having a fabric wall, means for spraying said wall with a soap solution, and means providing pressure within said container to produce a mass of bubbles upon said wall.

9. Apparatus for the purpose described comprising a container having a fabric wall, means within said container for spraying said wall with a soap solution, and means providing pressure within said container to produce a mass of bubbles upon said wall.

10. Apparatus for the purpose described comprising a container having a fabric wall of substantial area, frame means for supporting said wall, means within said container for spraying said wall with a soap solution, and means providing pressure within said container to produce a mass of bubbles upon said wall.

11. Apparatus for the purpose described comprising a fabric bag, means for wetting said bag with a soap solution, and means for inflating said bag to produce a mass of bubbles upon its outer surface.

12. Apparatus for the purpose described comprising a fabric bag, means within said bag for spraying its inner surface with a soap solution, and means providing pressure within said bag to produce a mass of bubbles upon its outer surface.

13. Apparatus for the purpose described comprising a frame, a fabric bag fitting about said frame, means within said frame for spraying the inner surface of said bag with a soap solution, and means providing pressure within said bag to produce a mass of bubbles upon its outer surface.

14. Apparatus for the purpose described comprising a container having a fabric wall, means for spraying portions of said wall with a soap solution, said fabric being sufficiently absorptive to distribute said solution to portions not touched by the spray, and means providing pressure within said container, said fabric being sufficiently porous to produce a mass of bubbles upon its outer surface under said pressure.

15. Apparatus for the purpose described comprising container means having a finely foraminous surface arranged to produce and retain a coating of small bubbles, sufficient to maintain said surface invisible.

16. Apparatus for the purpose described comprising means providing a mass of bubbles, and means for displaying said mass and including means for illuminating said mass simultaneously with widely separate colors from different locations.

17. Apparatus for the purpose described comprising means providing for generation of a mass of bubbles at a rate sufficient to maintain said mass and impart motion to its constituent bubbles, and means for illuminating said mass simultaneously with different colors from laterally opposite locations.

18. In apparatus for producing bubbles and including blower means for supplying the bubble blowing pressure, said blower means having an air inlet, smoke producing means located adjacent said inlet whereby said blower means may have inspiration effect upon the smoke.

19. In apparatus for producing bubbles and including blower means for supplying the bubble blowing pressure, said blower means having an air inlet, gas supply means located adjacent said inlet whereby said blower means may have inspiration effect upon the gas therefrom.

20. Apparatus for the purpose described comprising means for producing bubbles from liquid and gaseous components, and means for reducing said bubbles into said components, and including a container having a mouth disposed in the path of said bubbles, means providing a vacuum within said container, and a screen disposed in said

mouth to cause said bubbles to burst while permitting their said components to be drawn into said container.

21. Apparatus for the purpose described comprising means for producing bubbles from liquid and gaseous components, means for reducing said bubbles into said components, and means for returning said components to said producing means and including pump means having outlet connection to said bubble producing means and inlet connection to said bubble reducing means.

22. Apparatus for the purpose described comprising means for producing a mass of bubbles from liquid and gaseous components, means for displaying said mass, means for reducing said mass into said components, and means for returning said components to said producing means and including pump means having outlet connection to said bubble mass producing means and inlet connection to said mass reducing means.

23. Apparatus for the purpose described comprising means for producing bubbles from liquid and gaseous components and including separate pump means for said components, means for reducing said bubbles into said components and including a container for said components, and means connecting said container to said pump means for returning said components to said producing means.

24. Apparatus for the purpose described comprising means for producing bubbles from liquid and gaseous components and including pump means for said gaseous component, means for reducing said bubbles into said components and including a container for said components, means connecting an upper part of said container with the inlet of said pump means, and means including a liquid pump arranged to deliver said liquid component from a lower part of said container to said bubble producing means.

25. Means for producing large bubbles and comprising pipe means arranged to provide a gaseous component, said pipe means having a mouth and an opening distributed thereabout adjacent said mouth, and means providing a supply of liquid soap solution at said opening for passage therethrough into said pipe means, and therein about said gaseous component.

26. Means for producing large bubbles and comprising pipe means arranged in two adjacent aligned sections, slightly separated to provide a small peripheral opening, means providing a supply of liquid soap solution at said opening, and means providing gaseous pressure at the opposite end of one of said pipe sections whereby to produce bubbles at the far end of the other pipe section.

27. Apparatus for the purpose described and comprising means for producing a mass of small bubbles in a wide stream progressing downwardly, and means for producing occasional large bubbles at the upper part of said mass.

DAVID J. DOLAN.