Nov. 9, 1948. A. ABRAMSON 2,453,178

BUBBLE ORNAMENTAL DEVICE AND METHOD

Filed Feb. 21, 1946

Fig. 1.

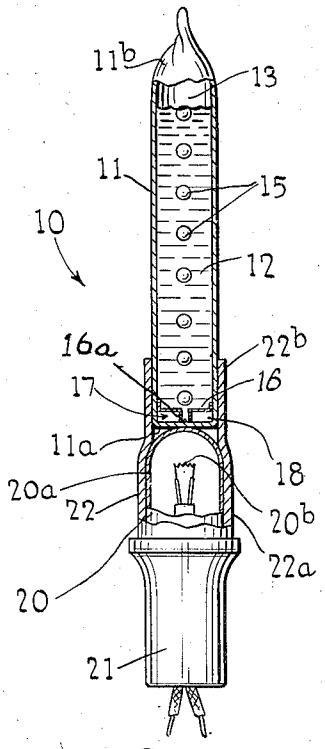


Fig. 2.

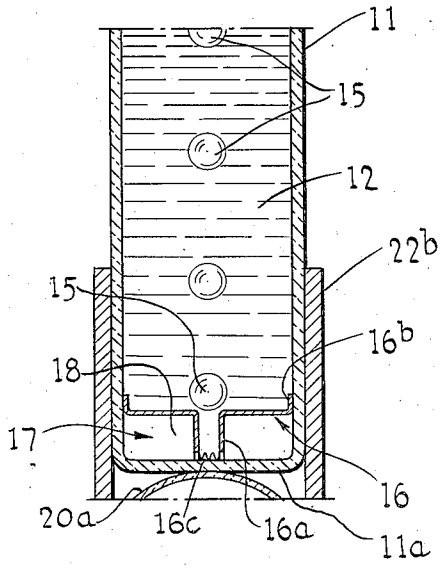


Fig. 3.

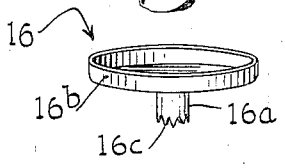


Fig. 4.

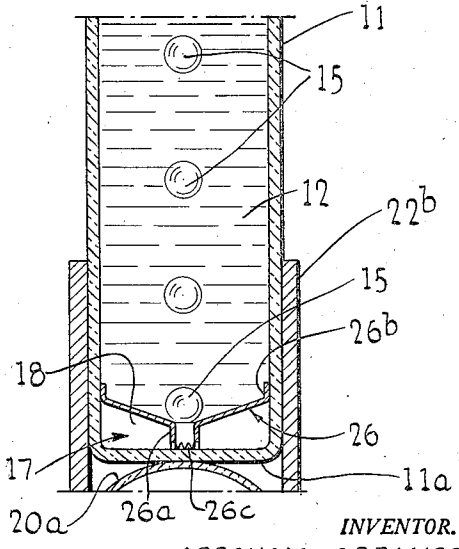
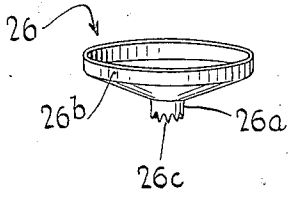


Fig. 5.



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BUBBLE ORNAMENTAL DEVICE AND METHOD

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Application February 21, 1946, Serial No. 649,159

11 Claims. (Cl. 240—10)

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This invention relates to the manufacture of bubble-ornament devices, and more particularly is directed to the constructions of such device and a method of operating same.

Among the objects of the invention is to generally improve devices of the character described and the method of operation thereof which shall comprise few and easily assembled parts, which shall be economical to manufacture and adapted for quantity production so as to provide a cheap and inexpensive product, which shall be dependable and reliable in operation requiring a minimum of external heat supply, which shall be positively self-starting in bubble action, and which shall be practical and efficient to a high degree in use.

This invention is a continuation in part to the subject matter covered in applicant's like copending applications filed herewith and application S. N. 598,569 (Patent No. 2,412,379) and 598,570, filed June 9, 1945 for Decorative illuminated devices and method.

Other objects accordingly consist of features of constructions and method, combinations of elements, arrangement of parts and steps in operation which will be exemplified if the constructions and method hereinafter described and of which the scope of the application will indicate in the following claims.

In the accompanying drawing in which possible illustrative embodiments of the invention are shown:

Fig. 1 is a front elevational view, partly broken away to expose the interior construction, showing a bubble-ornament device constructed to embody the invention

Fig. 2 is an enlarged fragmentary front elevational view of the device shown in Fig. 1

Fig. 3 is a perspective view of the flat disc diaphragm removed from the assembly

Fig. 4 is a fragmentary front elevational view showing a modified form of the invention constructed with a funnel diaphragm, and

Fig. 5 is a perspective view of the funnel diaphragm removed from the assembly.

Heretofore, ornamental bubbling devices of the character described used for various purposes required a high degree of skill in manufacture and assembly to obtain reliable predetermined desired result and reproductions. In the present invention such devices are made simple in construction and in method of operation, yet operate with positive assurance to give predetermined desired results with the unfailing reliability and dependability of performance.

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To this end, as seen in the drawing there is provided an improved bubble-ornament device 10 constructed to embody the invention which is seen to include a vertically disposed transparent tube body made of glass or other translucent material designated as 11 having an integral closed lower or bottom end 11*a*, preferably made flat, and a sealed top end 11*b*. Said body portion 11, when the device 10 is intended to simulate a Christmas tree decoration may be made in appearance, such as outline, form, shape and size to simulate a candle.

In the form of the invention shown in Figs. 1 and 2, the tube body 11 contains a suitable readily volatilizable liquid 12, such as ether, wood alcohol or any others, well known in this art which is translucent, has a low boiling point and preferably is non-flammable for example, methylene chloride, or a mixture of methanol and carbon tetrachloride. The liquid 12 may be placed into the tube body 11 through the upper or top end 11*b* thereof before fusing the latter for hermetically sealing said liquid 12 therein at a level so as to leave an adequate chamber or space 13 in said tube end 11*b*. Said sealed space 13 above the liquid 12 may be evacuated to permit lowering the boiling point normally required for the liquid 12. Said space 13 constitutes a condensing and heat dissipating means for liquefaction of bubbles 15 rising in the liquid 12 to the level thereof, as shown in Fig. 1.

There is also provide a flat disc diaphragm 16 formed with a downwardly extending nozzle 16*a* of relatively thin sheet material preferably fitted or seated in fixed position at the lower end of the tube body 11, with a serrated end 16*b* of said nozzle 16*a* abutting the tube bottom end 11*a*, and said diaphragm 16 spaced a short distance from said tube bottom end 11*a* so as to leave a shallow chamber or section 17 between said diaphragm 16 and the tube bottom end 11*a* wherein activating vapors 18 are generated as a vapor pocket in section 17 as hereinafter described.

When ether is used as the liquid 12, copper or brass is a desirable sheet material to use for the diaphragm 16 as it forms a protective means to eliminate possible explosive derivatives.

For supplying heat to operate device 10 any suitable source may be provided. As for example, as shown in Fig. 1, tube 11 is supported with the lower or bottom end 11*a* thereof located in close proximity to lamp bulb 20*a* of an incandescent lamp 20. The latter, as here shown, is mounted in an electric socket 21 of a Christmas

tree lighting outfit (not shown) of any well understood construction by means of a sleeve holder or connector 22 made of fiber, glass, plastic or other non-combustible material. The lower end 22a of sleeve holder 22 may fit snugly over the lower or bottom tube end 11a so that the holder 22 provides a relatively firm interconnecting support or rigid coupling. The holder 22 also serves as a conduit to guide the surrounding air heat conducting medium from glowing lamp filament 20b of the lamp bulb 20a to the vapors 18 confined in shallow space 17 within the tube bottom end 11a, thus serving as a direct heating means for said vapor pocket.

Heretofore, it has often been found that a bubbling device of the character described would not readily start bubbling operation when first applying heat and it is thereupon necessary to shake or otherwise mechanically agitate or jar the device. One feature of the invention in the above construction is the provision of a more positive self-starting of the bubbling operation.

To this end in device 10 as shown in Figs. 1 and 2, the disc diaphragm 16 is preferably wedged and sealed in the position shown about the periphery thereof and may be provided with an angular edge rim or flange 16b to increase the gripping effect or sealing surface and retain the diaphragm 16 in said set or fixed position with relatiton to the tube bottom end 11a. The nozzle 16a extending down from said diaphragm 16 and through said space 17, the nozzle abutting end 16c being serrated or otherwise formed to give limited access from said space 17 into the nozzle 16a which when said device 10 is operating communicates the end of liquid column 12 at said diaphragm 16 with vapor pocket 18 in space 17 therebelow to permit formation of bubbles 15 in passing of a portion of said vapor pocket through the nozzle 16a as hereinafter described.

In practising the invention, assuming the socket 21 is positioned on a Christmas tree (not shown) or arranged for other decorative display purposes and connected in an electric circuit power supply (not shown) for lighting the lamp 20 in the well understood manner, heat and light radiated from the lamp filament 20b is effective to vaporize any liquid 12 in the tube bottom space 17 and to form said vapor pocket and maintain said space 17 substantially filled with vapor 18.

The heat from lamp filament 20b beside producing said vaporization also provides heat to cause intermittent "flash" expulsion of a portion of the confined vapors 18 forming said pocket to expand through said nozzle 16a into the liquid 12 thereabove in the form of a stream of flowing bubbles 15 rising through the liquid column 12. The sleeve holder 22 serves as a conduit to confine the heat conduiting medium, namely, air, therein.

Thus there is provided the degree of heat necessary from a minimum heat source at lamp filament 20b, sufficient light beams from the latter being projected through said diaphragm nozzle 16a to illuminate the liquid column 12 and bubbles 15 to produce an attractive activated bubble lighting effect.

The lighting of bulb 20 also illuminates the side walls of the transparent tube body 11 to the top end 11b thereof and imparts an appearance suggestive of a lighted candle.

The improved method embodying the invention in the form above described will now be apparent. The column of volatile liquid 12 within the tube body 11, which, when said device 10 is operating, extends between the diaphragm 16 and the top tube space 13, and is under less than atmospheric pressure because of the evacuated condition of said top space 13. Said liquid 12 has external illuminating radiant heat applied thereto, as by means of the glowing lamp filament 20b, which is directed to maintain bottom space 17 substantially filled with vapor and said vapor pocket 18 bubble-free. Heat from said lamp filament 20b is then being supplied to the vapor pocket 18 in said space 17, that is, in an effective degree sufficient to generate pressure periodically in excess of that due to the column of liquid 12 whereby "flash" expulsion of a portion of the vapor pocket 18 takes place intermittently expanding said vapor portion through nozzle 16a as bubbles 15 which float up in a stream through the liquid column 12. After each of said "flash" expulsions the pressure of vapors 18 in said pocket for an instance apparently is reduced and permits a small amount of liquid 12 to trickle into the bottom space 17 where it is vaporized for replenishing said bubbleless vapor pocket 18. The vapor pressure in said space 17 is thus successively built up in repeated succession and said "flash" expulsions passing through nozzle 16a and expanding form bubbles 15 of relative uniform size streaming up through the liquid column 12. The flowing bubbles 15 rising through liquid column 12 produced are directly illuminated by light beams emanating from the lamp filament 20b in passing through said nozzle 16a as seen from Figs. 1 and 2.

The bubbles 15 of the flowing stream on reaching top space 13 after passing through the liquid column 12 are cooled, condense and liquify, and return to the liquid 12 in tube body 11 for replenishing same to continue the cycle of operation above described as long as said illuminating radiant heat from lamp filament 20b is directed to act on said vapors 18 of said pocket in bottom space 17. To be more accurate, said bubble-forming action continues to take place as long as there exists a heat gradient or differential temperature between the hotter portion of the vapor pocket 18 in space 17 forming bubbles 15 and the cooler liquid after liquefaction of bubbles in evacuated top space 13.

Self-starting of the bubbling operation of device 10, when the lamp 22 is first lighted, takes place with space 17 filled with liquid 12. The end 16c of the diaphragm nozzle 16a abutting tube bottom 11a and the small quantity of liquid confined within said nozzle 16a thereat provides a heating focal point for initiating and accelerating the generation of vapor which continues rapidly up through the diaphragm nozzle 16a until all the liquid in space 17 either rises therefrom or is evaporated and space 17 is left substantially filled with vapor to provide the bubble-free vapor pocket 18. Thereafter the bubbles forming action of said "flash" expulsion continues as has been described above.

In Figs. 4 and 5 a modified construction of the invention is shown. Here in place of the disc diaphragm 16 there is a funnel diaphragm 26 provided with a shorter nozzle 26a having a serrated end 26b. By using the funnel diaphragm 26 instead of the disc diaphragm 16 as seen from Figs. 2 and 4, space 27 under diaphragm 26 is made relatively smaller than space 17 under diaphragm 16 thereby decreasing the heating requirements in forming vapor pocket 28 and compared with that in forming vapor pocket 18.

The modification shown in Fig. 4 operates the

same as that described above for device **10**, and as shown in Figs. 1 and 2.

While the diaphragms **16** and **26** are shown with serrated nozzle ends **16***c* and **26***c* respectively, it is to be understood that devices made without such serrations have been found to operate satisfactorily. When no serrations are used, the ends of each nozzle should be so seated against the tube end bottoms **11***a* as to allow limited passage from the spaces **17** and **27** into the nozzles **16***a* and **26***a* respectively. Said serrations, however, serve as practical means to aid assembly and more positively determine said limited passage.

In the above construction a static condition, that is, failure of the bubbling operation to be self-starting without the necessity of jarring the tube **11** on turning on the heat which is often experienced, is largely overcome and there is provided thereby a more practical operating bubble ornamental device than those of the prior art.

It is therefore seen that there is provided improved devices and a method of operation in which the objects of the invention are achieved and which are well adapted to meet all conditions of practical use.

As various possible embodiments may be made in the above invention for use for different purposes and as various changes might be made in the embodiments and method above set forth, it is understood that all the above matters here set forth, or shown in the accompanying drawing are to be interpreted as illustrative and not in a limiting sense.

Thus having described my invention, I claim as new and desire to secure by Letters Patent:

1. In a device of the character described for producing ornamental bubble effects, a column of volatile liquid under reduced atmospheric pressure, means for applying heat externally adjacent the end of said liquid column to a degree just above the normal temperature of said liquid column, a bubble-free vapor pocket of predetermined capacity generated at the heated end of the column, and diaphragm means for separating said pocket from the liquid column end including a nozzle extending into the pocket, said nozzle having a restricted end opening communicating the pocket with said liquid column wherethrough "flash" expulsion and expansion of portions of the vapor pocket as bubbles into the liquid column takes place.

2. A device for producing ornamental bubble effects in a liquid column comprising means including a fixed diaphragm to form a bubble-free vapor pocket of predetermined capacity under pressure in excess of that of said liquid column, and a nozzle extending from said diaphragm into the pocket for communicating said vapor pocket with said liquid column to release and expand for "flash" expulsion portions of the vapor pocket under excess pressure as bubbles through said nozzle and into the liquid column.

3. A device as defined in claim 1 in which said diaphragm means and nozzle forms a funnel shaped structure.

4. In a device of the character described producing ornamental bubble effects, a vertically disposed sealed transparent tube body, a translucent low-temperature boiling liquid column filling a mid-portion of said tube body, a thin sheet material diaphragm immovably positioned in the lower end of the tube body formed with a nozzle extending toward the bottom of said tube body to provide limited space under said diaphragm, heated vapors of said liquid column occupying space at a pressure to retain said liquid column above the diaphragm, said nozzle communicating the vapors with the liquid column to permit "flash" expulsion of expanding portions of said vapor as bubbles through the nozzle into the liquid column.

5. A device as defined in claim 4 in which the end of said nozzle is serrated and abuts the tube end bottom.

6. A device as defined in claim 4 in which said diaphragm is of tapered construction and with the nozzle forms a funnel.

7. In a device of the character described producing ornamental bubble effects, a vertically disposed sealed transparent tube body a translucent low-temperature boiling liquid column partially filling said tube body, a thin sheet material diaphragm immovably positioned in the lower end of said tube body to provide a section space at the bottom thereof, heated vapors of said liquid column expanded to occupy the section space with the liquid column retained above the diaphragm, a nozzle extending from said diaphragm into said section space communicating said vapors with the liquid column therethrough "flash" expulsion of expanding portions of said vapors as bubbles up through said nozzle and into the liquid column, said tube body having a heat dissipating upper end space over said liquid columns to which the bubbles rising in the column pass for liquefaction, and heating means directed to the end of said nozzle in the tube body bottom for producing the bubble effects.

8. A device as defined in claim 7 having a restricted communication passage from the section space into the nozzle to form part of a focal point for initiating the generation of the vapors during the starting period for operating the device.

9. A device as defined in claim 7 having a restricted communication passage from the section space into the nozzle to form part of a focal point for initiating the generation of the vapors during the starting period for operating the device, said nozzle terminating in a serrated edge abutting the tube body bottom.

10. A device as defined in claim 7 in which said diaphragm and nozzle are funnel shaped having the funnel nozzle end positioned to limit a communicating passage from the section space into the nozzle and to serve as a focal point for initiating the generation of vapors during the starting period for operating the device.

11. A device as defined in claim 7 in which said diaphragm and nozzle are funnel shaped having the funnel nozzle end positioned to limit a communicating passage from the section space into the nozzle and to serve as a focal point for initiating the generation of vapors during the starting period for operating the device, said nozzle end being serrated and positioned to abut the tube body bottom.

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REFERENCES CITED

The following references are of record in the file of this patent:

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