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ORNAMENTAL ILLUMINATING DEVICE

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This invention relates to ornamental illuminating devices. More particularly the invention is concerned with illuminating devices of the type wherein vapor bubbles ascend through a column of liquid.

Certain features of my invention pertain to the means for generating the vapor bubbles, and accordingly one object of my invention is to provide a means of this character which will function satisfactorily with heat supply sources of small calorific output such as, for example, low-wattage electric light bulbs of the type of the 15-volt miniature Christmas tree lamp. Among other objects in this connection is to provide a means of this character which will comprise few and simple parts; which shall be economical to manufacture and yet be fabricated from common pelliculid materials, such as glass or plastics, so as to permit the light emanating from the source of heat supply to directly illuminate the liquid column; which may easily be assembled in the illuminating device; and whose operation will be consistent, dependable and efficient to a high degree.

Another object of my invention is to provide a device of the character described having simple and improved means for supporting and housing the source of heat supply and the tube in which the liquid column is contained.

A further object of my invention is to provide a device of the character described which is adapted for use in a standard miniature Christmas tree lamp socket, which shall present a neat and pleasing appearance, and which shall be light in weight, durable in construction, inexpensive to produce and efficient to operate.

Other objects of the invention will in part be obvious and in part hereinafter pointed out.

The invention accordingly consists in the features of construction, combinations of elements, and arrangement of parts which will be exemplified in the construction hereinafter described, and of which the scope of application will be indicated in the appended claims.

The accompanying drawings, in which are shown various possible embodiments of the invention

Fig. 1 is a side view of an illuminating device embodying my invention, a portion of the housing being broken away to show the interior construction;

Fig. 2 is a vertical sectional view through the device shown in Fig. 1 with the electric light bulb lit but before the generation of vapor bubbles has begun;

Fig. 3 is an enlarged fragmentary view of a portion of the device shown in Fig. 2 after the vapor bubbles have started to ascend;

Fig. 4 is a fragmentary vertical sectional view of a modified form of my invention with the electric light bulb lit but before the generation of vapor bubbles has begun; and

Figs. 5 and 6 are views similar to Fig. 4 but showing various positions of the bubble generating means after the vapor bubbles have started to ascend.

Referring now to the drawing and more particularly to Figs. 1-3, I have there shown an illuminating device 10 embodying my invention especially constructed for use in connection with Christmas tree decoration. The device 10 comprises, in general, a source 12 of illumination and heat, a column 14 of liquid, and a housing 16 for said column and for said source of heat and illumination, and bubble generating means 18 contained within the liquid column 14.

In accordance with my invention I can use in my device a source of heat supply and illumination which has a low calorific output, although, during operation, it is maintained at a relatively high temperature. Such source preferably comprises a low-wattage bulb B which operates on about fifteen volts so that it may be used in conjunction with a Christmas tree series lighting outfit of standard construction. The glass envelope 20 of the bulb B may be made squat in stature so as to allow it to be disposed within a relatively low housing 16 and thus enhance the aesthetic appearance of the device. The screw plus portion 22 of the bulb B is of standard construction.

The housing 16 comprises upper and lower thin-walled, bell-like halves 24 and 26 joined in any suitable manner, as by a layer of adhesive 28. The said halves 24 and 26 are preferably fabricated from materials such as tinted Celluloid or formaldehyde condensate in order to provide a colored semi-opaque wall around the glass envelope 20. Suitable ornamentation may be imprinted upon the outer surface of the housing 16 which may be of any desired shape.

The lower half 26 of the housing is provided with an aperture 30 wherethrough the plug portion 22 of the bulb B projects. A suitable cement 32, firmly secures the bulb B to the portion of the housing section 28 surrounding the aperture 30. The upper cup 24 is also provided with an aperture 34 co-axial with the aperture 30. Snugly received in said aperture 34 is the lower end of a pelliculid tube 36 in which a bubbling liquid 38 is contained.

In order to more firmly support the said tube 38 and prevent same from shifting during transportation and use of the device 10, I may provide an integral annular flange 40 surrounding the aperture 34. Furthermore, a thin layer of adhesive 42 may be disposed between the flange 40 and the tube 36. Small vents 44 and 46 are formed in the upper and lower halves of the casing to allow a slight circulation of air through the housing.
The tube 38 in which the liquid 38 is disposed is fabricated from a pellicul material, such as for example glass cellulose acetate or the like which is unaffected by the liquid employed. The tube may be made straight or fashioned into any desirable ornamental shape. Its upper end is hermetically sealed off by the gradually tapered, twisted portion 48. The lower end is closed by the rounded portion 56 and is disposed immediately adjacent or in contact with the glass envelope 20 to facilitate heat exchange therebetween.

The liquid 38 is of low boiling point and I may employ fluids such as for example wood alcohol, ether or methylene chloride. If it is desired to enhance the ornamental effect, the liquid 38, tube 36, or both, may be colored or a thin film of pellicul coloring matter coated on the inner or outer surfaces of the tube 36.

As indicated in Figs. 1 through 3, only a portion of the tube 36, is filled with liquid, the balance of the tube being evacuated so as to provide a partial vacuum 52 in which vapor is generated in the lower end of the tube as hereinbefore described, may condense and return to the body of the liquid 38.

Ordinarily, in bubbling devices, a heat source of relatively large calorific output is required, this being necessitated by convective circulation in the body of liquid during heating, which entails heat dissipation. In order to enable the use of low calorific sources of heat supply, I provide means for localizing the transferred heat in a small quantity of liquid so that the portion of the liquid in which the bubbles are actually generated is but a small fraction of the entire liquid mass. This localization of the transferred heat is accomplished by preventing or restricting fluid circulation between the body of liquid in which the bubbles are generated and the remaining portion of the liquid mass.

In accordance with my invention the means for dividing the bubbling liquid into two disparte bodies is so constructed and is fabricated from such materials that light emanating from the source of heat and light supply will pass through it and illuminate the entire column of liquid as well as the pellicul tube. Moreover, the parts of such means are so formed that they may be made in large quantities apart from the pellicul tube, and upon simple insertion act as bubble generating means.

To accomplish these ends, in general, by providing a member 54 which is fashioned from a pellicul material, such as glass, cellulose acetate, or the like, unaffected by the liquid 38 employed. Said member is movably disposed within the tube 36. During non-operating periods and when the source of heat supply is first energized, following a non-operating period, the member 54 cooperates with a seat portion 55 of the tube 36 adjacent an end thereof to completely or partially seal off the underlying body of liquid 38. This permits localized heating of such unheated body of liquid without substantial dissipation of the applied heat through circulation. The said member is urged downwardly by any suitable means, as for example its own weight.

The member 54 and cooperating seat are further so formed that when said member is shifted from its seat during the course of the operation, the passageway therebetween will be enlarged to permit efflux of the generated vapor. The outer dimensions of the member 54 are smaller than the inner dimensions of the tube above the seat 55, thereby allowing upward flow of vapor around said member. The member 54 must be sufficiently heavy to prevent being forced to the top of the tube upon initiation of the vapor-forming stage, but must not be so heavy that under the vapor pressure obtainable with a 300-watt heating unit, heat applied in the liquid will be unable to raise said member off the cooperating portion of the bottom of the tube.

It will be apparent that the member 54 and seat 55 may be fashioned in various shapes. By way of example, and without in any manner limiting myself to this form of my invention, I have illustrated the member 54 as a glass tube having one end thereof closed by a wall 56. The open lower end of the tube 54 cooperates with the concave seat 55 at the bottom 50 of the tube 36. When heat is first applied as shown in Fig. 2, for a relatively short period of time no vapor will be formed in the liquid 38. At such time, depending upon the tightness of the seal between the tube 54 and the seat 55, a certain slight degree of suction will be noted in the liquid. As the temperature beneath the tube 54 rises, a point will be reached where vapor will begin to form within the localized small fluid mass. The tube 54 is then raised slightly off its seat 55. A portion of the initially formed vapor is deflected around the bottom of the tube 54 and up into the large overlying mass of fluid. During this initial phase the balance of the vapor will ascend into the top of the tube 54 and rapidly expel most of the fluid beneath the said tube. A small quantity of fluid, however, remains near the bottom of the tube 36 below the seat 55 where the same is vaporized.

During continued action of the bubbling device, a stage such as shown in Fig. 3 will be reached wherein a small body of liquid 38 will be disposed at the bottom 50 of the tube 36 where such liquid is vaporized, and the member 54 will be slightly spaced away from its seat 55 to permit a limited replenishing flow of fluid from the main body of the bubbling liquid to the localized portion where heat depends upon the weight of the tube 54 and its configuration, a rapid chattering of said tube will occur when this tube is intermittently forced up to release generated vapor and subsequently drop down as replenishing liquid from the main body flows to the bottom of the tube.

In the modified form of my invention, shown in Figs. 4, 5 and 6, the bubbling device 60 comprises a source 12 of illumination and heat supply, a column 14 of liquid and a housing 16 for said column and said source similar to that shown in the Figs. 1-3 form of my invention. However, in lieu of the tube 54 shown in this first form, I employ a solid glass cylinder 62 whose lower surface 64 engages the seat 55 to seal off a small body of liquid 66 in a manner similar to the action of the tube 54. Surrounding the cylinder 62 is an open-ended tube 68 whose inner diameter is slightly larger than the outer diameter of the cylinder 62 and whose outer diameter is slightly less than the inner diameter of the tube 36 above the seat 55. In this fashion the tube 68 acts as an auxiliary seal in cooperation with its seat 56, as well as a vertical sealing means for the cylinder 62. When the cylinder 62 is raised during the operation of the device, the vapor formed will first pass between the said cylinder and the tube 56, as shown in Fig. 5. As
larger amounts of vapor are generated the auxiliary sealing tube 68 will be raised from its seat 69, as shown in Fig. 6, and vapor will pass over both the inner and outer surfaces of the tube 68.

It will be apparent that in both forms of my invention the bubble-generating members are of extremely simple construction. These members may, moreover, be made apart from the tube 68 and slipped into said tube prior to the introduction of the liquid, evacuation of air and sealing off of the tube by forming the tip 43.

It may also be mentioned that both the tip 43 and bottom 50 of the tube are so constructed that they taper from the full diameter of the tube and thereby form seats for cooperating with the bubble-generating members. The tube, therefore, will work equally well if inverted. However, I presently prefer to dispose the tube as shown in the several figures since in this position it most closely simulates a candle.

It will thus be seen that there is provided a device in which the several objects of this Invention are achieved, and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiments above set forth, it is to be understood that all matters herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

The bubble-generating members hereinafter disclosed are employed to cause formation of bubbles when sources of heat are used which are of too low a calorific output to boil the entire mass of liquid. The term "low-wattage" as herein employed, as applied to the source of heat supply, means a heat source of calorific output insufficient to form bubbles in the liquid of a given bubbling device without the use of a bubble-generating member such as herein provided.

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

1. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat, the combination of a hollow pellucid member, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two separate bodies, said means being wholly contained therein and being movable with respect to said member from a position in which it contacts said hollow pellucid member to a position spaced away therefrom.

2. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat, the combination of a hollow pellucid member, a low boiling point liquid contained within said member, and means comprising a second member movably disposed and wholly contained within said first named member and a seat portion on said first named member cooperating with said second named member, said second member being movable from a position in which it contacts said seat portion to a position in which it is spaced therefrom.

3. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat, the combination of a hollow pellucid member, a low boiling point liquid contained within said member, and means comprising a second member movably disposed and wholly contained within said first named member and a tapered seat portion on said first named member cooperating with said second named member, said second member being movable from a position in which it contacts said seat portion to a position in which it is spaced therefrom.

4. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat, the combination of a hollow pellucid member, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two bodies, said means comprising a second member movably disposed and wholly contained within said first named member and a tapered seat portion on said first named member cooperating with said second named member, said second member being movable from a position in which it contacts said seat portion to a position in which it is spaced therefrom.

5. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat, the combination of a hollow pellucid member, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two bodies, said means comprising a second member movably disposed and wholly contained within said first named member and a seat portion on said first named member cooperating with said second named member, the outer dimensions of said second member being less than the inner dimensions of said first member above said seat, said second member being movable from a position in which it contacts said seat portion to a position in which it is spaced therefrom.

6. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat, the combination of a hollow pellucid member, a low boiling point liquid contained within said member, and means comprising a second member movably disposed and wholly contained within said first named member and a seat portion on said first named member cooperating with said second named member, the outer dimensions of said second member being less than the inner dimensions of said first member above said seat, said second member being urged by its own weight against said seat, said second member being movable from a position in which it contacts said seat portion to a position in which it is spaced therefrom.

7. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat, the combination of a hollow pellucid member, a low boiling point liquid contained within said member, and means comprising a second member movably disposed and wholly contained within said first named member and a seat portion on said first named member cooperating with said second named member, the outer dimensions of said second member being less than the inner dimensions of said first member above said seat, said second member being urged by its own weight against said seat, said second member being movable from a position in which it contacts said seat portion to a position in which it is spaced therefrom.
means whereby to vary the degree of sealing of said underlying body of liquid during operation of said device.

6. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat and light, the combination of a hollow pellucid member, a seat portion adjacent the bottom of said member, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two disparate bodies, said means comprising an imperforate pellucid member movably received in said first member and cooperating with said seat, said means being movable from a position in which it contacts said seat to a position spaced therefrom.

9. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat and light, the combination of a hollow pellucid member having a tapered bottom, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two disparate bodies, said means comprising an imperforate pellucid cylinder which cooperates with the tapered bottom of said hollow member to substantially seal off the liquid underlying said cylinder, said cylinder being movable relative to said member from a position in which it contacts said tapered bottom to a position spaced therefrom.

10. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat and light, the combination of a hollow pellucid member having a tapered bottom, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two disparate bodies, said means comprising a pellucid tube having one end thereof closed, the open end of said tube cooperating with the tapered bottom of said pellucid member to seal off the liquid underlying said tube, said tube being movable relative to said member from a position in which it contacts said tapered bottom to a position spaced therefrom.

11. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat and light, the combination of a hollow pellucid member having a tapered bottom, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two disparate bodies, said means comprising a pellucid tube having one end thereof closed, the open end of said tube cooperating with the tapered bottom of said pellucid member to seal off the liquid underlying said tube, said tube being movable from a position in which it contacts said tapered bottom to a position spaced therefrom.

12. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat and light, the combination of a hollow pellucid member having a tapered bottom, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two disparate bodies, said means comprising a pellucid tube having one end thereof closed, the open end of said tube cooperating with the tapered bottom of said pellucid member to seal off the liquid lying below said cylinder, said cylinder being movable relative to said member from a position in which it contacts said tapered bottom to a position spaced therefrom.

13. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat and light, the combination of a hollow pellucid member having a tapered bottom, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two disparate bodies, said means comprising a pellucid cylinder cooperating with the tapered bottom of said pellucid member to seal off the liquid lying below said cylinder, said cylinder being of lesser diameter than the inner dimensions of said pellucid member adjacent the bottom thereof, said cylinder being movable from a position in which it contacts said tapered bottom to a position spaced therefrom.

14. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat and light, the combination of a hollow pellucid member having a tapered bottom, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two disparate bodies, said means comprising a solid pellucid cylinder cooperating with the tapered bottom of said pellucid member to seal off the liquid lying below said cylinder, and means to support said cylinder in said member for vertical movement relative thereto, said cylinder being movable from a position in which it contacts said bottom to a position spaced therefrom.

15. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat and light, the combination of a hollow pellucid member having a tapered bottom, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two disparate bodies, said means comprising a solid pellucid cylinder cooperating with the tapered bottom of said pellucid member to seal off the liquid lying below said cylinder, and means to support said cylinder in said member for vertical movement relative thereto, said cylinder being movable from a position in which it contacts said bottom to a position spaced therefrom.

16. For use in an ornamental bubbling device employing a low-wattage electric light bulb as a source of heat and light, the combination of a hollow pellucid member having a tapered bottom, a low boiling point liquid contained within said member, and means adjacent the bottom of said member for dividing said liquid into two disparate bodies, said means comprising a solid pellucid cylinder cooperating with the tapered bottom of said pellucid member to seal off the liquid lying below said cylinder, and means to support said cylinder in said member for vertical movement relative thereto, said cylinder being movable from a position in which it contacts said bottom to a position spaced therefrom.

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