April 8, 1952 L. C. HUFF 2,591,818

VAPORIZING DEVICE

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Fig. 1.

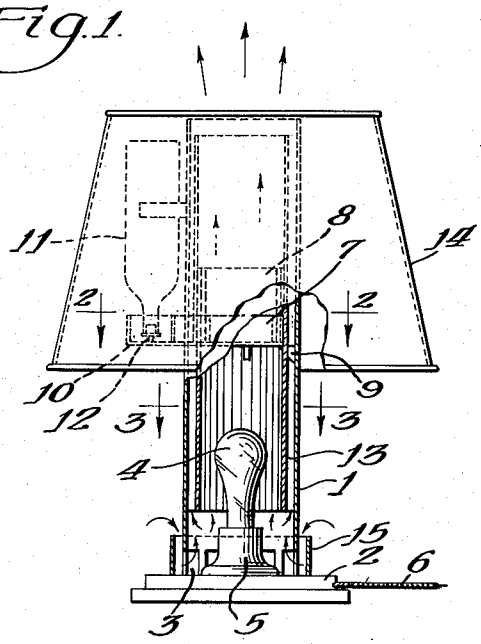


Fig. 2.

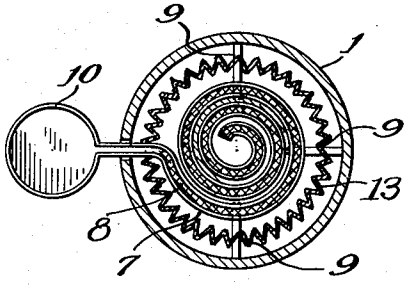


Fig. 3.

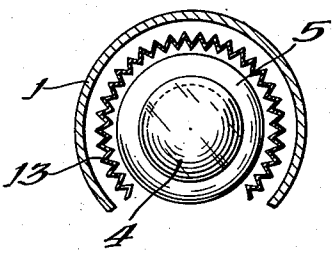
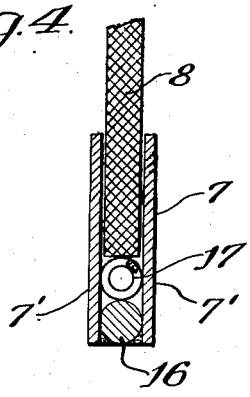


Fig. 4.



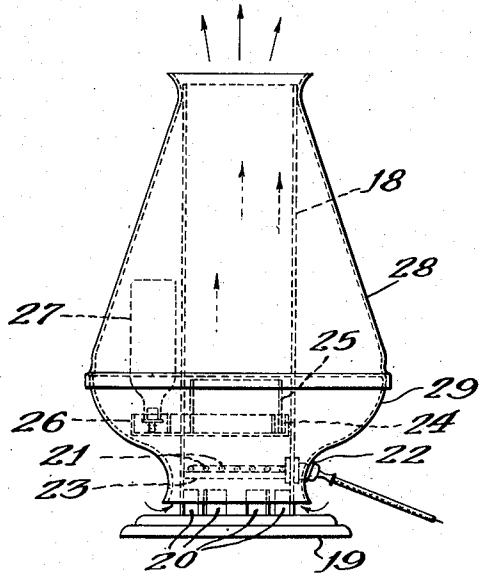


Fig. 5.

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VAPORIZING DEVICE

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6 Claims. (Cl. 21—120)

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This invention relates to an improved vaporizing apparatus or device particularly suitable to effect the vaporization of medicinal or germicidal liquids, as well as deodorants and the like.

The present invention is directed to an improved and desirable construction for vaporizing relatively small amounts of liquid into the air of a home or small office, the amount being small in comparison to that which must be vaporized and passed into air conditioning or circulating systems of large offices or factories. For example, it has recently been determined that small quantities of triethylene glycol vaporized into the air of a room or building is very effective in killing airborne bacteria and virus type of germs. This particular material is odorless and harmless to humans, but by reason of its killing and sterilizing effect on nearly all air-borne germs, it has proven desirable in preventing colds and other diseases such as measles, chicken pox, diphtheria, mumps and the like.

It is also an object of the present invention to provide a device of relatively simple construction that may be easily filled with a material for vaporization and which is portable so that it may be placed readily in any desired location.

It is a still further object of the invention to provide a heating means and a wick arrangement which permits regulation and control of the quantity of liquid to be vaporized.

Briefly, the present invention provides a liquid vaporizing device or apparatus which comprises in combination an open-ended stack or flue, a continuous convoluted liquid retaining and wick-holding trough positioned intermediately within the stack, a liquid supply means connecting to the trough, a continuous band of wicking within the trough, heating means in the lower portion of the stack below the wick trough, and air-inlet means at the lower end of the stack below the heating means, whereby air may be heated and passed upwardly and around the wick in order to vaporize and disseminate the particular medicinal or other type liquid.

It is a particular advantage of the design and construction of the vaporizer of this invention to provide the wick retaining trough in a convoluted or spiral shape in order that the wick material may be placed in the trough in a continuous band and provide a relatively large area or surface from which liquid may be vaporized by a heated and upwardly flowing stream. The trough is preferably of a relatively narrow construction and the various convolutions spaced from one another such that the air stream can pass therebetween.

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The reservoir supplying liquid to the trough is preferably placed outside the stack such that it may be readily supplied with the desired liquid. The reservoir may be in the form of an open tank or alternately, may provide a receptacle to accommodate a bottle or tank of desired liquid which in turn feeds the reservoir and the wick retaining trough through a self-feeding cap or the like.

The heating means may be a light bulb or an electric resistance coil such that electric current may be utilized to supply the source of heating and causing a convection current of air upwardly through the stack. A vertical stack arrangement is also desirable in that many forms of covers or housings may be placed around the stack and liquid reservoir and provide a device which is pleasing to the eye.

The rate of vaporization may be regulated and controlled through the regulation of the heating means, as well as by using various lengths of wicking within the liquid supplying trough.

Other features and advantages will be apparent upon reference to the accompanying drawing and the following description thereof.

Figure 1 of the drawing is an elevational view, partially in section, indicating one embodiment of the vaporizing apparatus.

Figure 2 of the drawing is a sectional plan view indicating the placement of the wick retaining trough within the stack, as indicated by line 2—2 in Figure 1 of the drawing.

Figure 3 of the drawing is a sectional plan view through the lower portion of the stack as indicated by line 3—3.

Figure 4 is a sectional view through one type of wick retaining trough, indicating the positioning of the wicking.

Figure 5 of the drawing is an elevational view of a modified form of the apparatus.

Referring now to Figures 1, 2 and 3 of the drawing, there is shown a vertical stack 1 which rests on a base 2 and has an open upper end. The lower end of the stack 1 is raised above the base 2 by suitable legs, or has a plurality of slots or perforations 3 such that air may be drawn in at the lower end of the stack and pass upwardly therethrough. In this embodiment, a light bulb 4, having a suitable socket 5, provides the means for heating the air and providing a convection current through the stack 1. A cord 6 passing through the base 2 is provided to connect the socket and bulb with a suitable electrical energy source.

At a point above the light bulb 4, or at an intermediate position within the stack 1, there is pro-

vided a convoluted or spiraliform wick retaining trough 7 that is adapted to retain a continuous band of wicking 8. The trough 7 is positioned and supported in the stack by means of suitable lugs or brackets 9 and one end of the trough extends through the stack to a suitable reservoir 9. As is shown in Figure 2 of the drawing, the wick retaining trough 7 is of relatively narrow construction having a cross section suitable to hold and retain the lower edge of a band of wicking, and the construction is such that the plurality of inwardly spiralling convolutions are spaced from one another, permitting air to pass upwardly through the internal portion thereof and around the band of wicking material which is maintained saturated by the liquid supplied to the reservoir 10, and therefrom to the trough 7.

In this embodiment, the reservoir 10 is supplied with liquid from an inverted tank or bottle 11, which in turn feeds liquid to the reservoir through a self-feeding cap 12. The latter may be of a usual type suitable to supply and maintain a desired level in a trough. However, it is not intended to limit the present invention to having liquid supplied through any particular type of reservoir or self-feeding mechanism, for as has been noted hereinabove, an open reservoir or tank may be utilized, or in addition, liquid may be supplied through a suitable line having flow regulating means.

In operation, it may be seen that the air within stack 1 is continually heated by the bulb 4 and a continuous convection current set up that will pass air upwardly through and around the wicking 8, causing vaporization of the liquid and dissemination of vapor to a room, by the air stream issuing from the top end of the stack. Various size bulbs may be used to provide a varying heat supply, or alternately, with electrical energy, a suitable rheostat or the like may be used to vary the energy supplied to the resistance element of the bulb. In order to supply higher temperatures, other conventional forms of electrical resistance coils may be used in the lower portion of the stack 1, in lieu of the bulb 4. It is also a feature of the embodiment of Figure 1 to utilize an inner metal sleeve 13, which is spaced from the wall of stack 1 and provides additional heating surface for effecting the heating of the rising air stream in a more efficient manner. Preferably, the sleeve 13 is corrugated, as indicated in Figures 2 and 3 of the drawing, to provide increased surface area, and extends for substantially the full height of the stack. The annular space between the sleeve 13 and the stack 1 also provides an air space through which a continuous current of hot air will flow upwardly back of the sleeve and prevent condensation of any of the vapor within the upper part of the device.

For appearance purposes, a suitable shade 14 is placed around the stack and the liquid supplying reservoir 10 and bottle or container 11. Thus, the device may be made to look like an ordinary type of lamp and permit its use in a home or office, while at the same time the compact form provides an apparatus or device that may be readily moved from one position in a house or room to another. In the embodiment of Figure 1, a ring or band 15 extends upwardly from the base 2 and around the slotted end of the stack 1 in order to hide the slots or perforations 3 which are provided for air intake purposes, and thus where a lamp bulb 4 is used as a heating means, the band 15 provides a reflector for light passing out of the holes and thus causes a light to shine upwardly along the base of the stack 1 to give a pleasing appearance.

Figure 4 of the drawing indicates a method for constructing the trough 7 and for holding the wick 8 therein at a proper elevation. The wick retaining trough 7 is formed in this embodiment by means of two side plates 7' and a rod 16, the latter is brazed or soldered between the plates to form a bottom member and the plates 7' are sufficiently close together to hold the lower edge of the band of wicking 8 in a relatively tight slip fit. It is not intended to limit the present invention to this particular type of construction for the convoluted wick retaining trough; however, the rod and side plate construction may be readily formed and shaped into a spiral or convolute form in accordance with this invention as the means for holding a continuous band of wicking. It is also desirable to utilize a partially open or perforated spacer 17 on top of the rod 16 and below the bottom edge of the wicking 8, in order to insure the travel of the liquid medium throughout the entire length of the trough and the maintenance of the band of wicking 8 at a uniform height throughout the entire length of the trough. The spacer 17 may be a chain, a helical coil spring, or like member, extending for the full length of trough 7. The present drawing shows an open coil spring as the spacer 17 placed within the bottom of the trough 7 and the lower edge of the band of wicking 8 is wedged down into the trough 7 until it rests on the top of the spring.

In Figure 5 of the drawing, there is shown a modified form of the apparatus, having a different heating element than that utilized in Figure 1, and a different form of housing or covering around the stack, while the other parts of the apparatus are substantially as shown and described in Figure 1 of the drawing. The vertical stack 18 is supported on a base 19 and has suitable openings 20 at the lower end thereof and an open upper end, such that air may be passed upwardly therethrough and carry the vaporized liquid. The electrical heating element or resistance coil 21 is positioned horizontally within the lower portion of the stack 18 and is supplied with electrical energy through an electrical connector 22. The coil 21, is of course, supported and spaced in an open grid-like form permitting air to pass upwardly therethrough without any substantial blocking of the flow. The supporting member 23 is necessarily of some insulating or non-conducting material such as poreclain or the like. Positioned above the heating element is a spiraliformed wick retaining trough 24 and wick 25 such as has been shown and described in connection with Figures 1 and 2 of the drawing. Similarly, a reservoir 26, having a liquid supply source from a bottle or tank 27, is connected with the trough member 24. In this modified form of the device, a cone-shaped housing or cover 28 is provided around the stack member 18 and is supported on a lower bowl-shaped section 29.

The operation of the vaporizer indicated in Figure 5 is substantially the same as that shown and described in connection with Figure 1 of the drawing. The heated air stream passes upwardly through the stack member 18 passing between and around the wicking 25 such that the hot air stream and the vaporized liquid is disseminated through the open top end of the stack.

The rate of vaporization may similarly be controlled by means of regulating the length and height of the band of wicking 25 maintained within the trough 24, and by the electrical energy supply to the coil 21. The current being varied through a rheostat or other electrical adjustment means. Each of the embodiments indicated in the drawing have been provided with a housing or shade that hides the liquid reservoir and the upper portion of the stack; however, it may be pointed out that as far as the operation of the unit itself is concerned, the housing is not a necessary part of the apparatus, but is provided in a desirable embodiment in order to provide a finished looking apparatus that is not of an unsightly nature.

The embodiment of Figure 5 does not have the inner sleeve, which was shown in Figures 1 and 3 of the drawing as sleeve 13, although it is desirable to provide additional heating surface for the unit and a means of preventing condensation of the liquid within the top end of the stack. An inner sleeve also aids in cooling the lower end of the stack member, however, where condensation is not a problem, and where the stack itself is covered up at the lower end thereof, as in Figure 5, it may not be necessary to provide the inner sleeve. It is, of course, not intended to limit the operation of the present vaporizing apparatus to being used with any particular medicament, germicide or deodorant, for obviously, many types and forms of liquids may be used to suit a desired purpose or, if desired, the apparatus may be used as a humidifier to provide water vapor in a room.

I claim as my invention:

1. A liquid vaporizing apparatus comprising in combination an open-ended stack, an elongated liquid retaining and wick holding trough extending in a horizontally flat convolute form and positioned intermediately within said stack, a continuous band of wicking having its lower edge positioned within said trough, a liquid reservoir connecting to said trough, heating means within the lower portion of said stack below said trough, a stack supporting base and air inlet means at the lower end of said stack below said heating means.

2. A liquid vaporizing apparatus comprising in combination an open-ended vertically disposed stack having an untreated air inlet at its lower end and a treated air outlet at its upper end, a continuous liquid retaining and wick holding trough extending in a flat inwardly spiralling convolute form supported horizontally within said stack, a continuous band of wicking supported within and extending upwardly from said trough, a liquid reservoir connecting to one end of said trough and positioned exteriorly of said stack, an adjustable heating means within the lower portion of said stack below said wick retaining trough, air inlet means at the lower end of said stack permitting air to pass upwardly through said heating means and said wick holding trough, a stack base, and a housing encompassing said stack and liquid reservoir.

3. The apparatus of claim 2 further characterized in that said heating means comprises electrical resistance heating means and current adjustment means connected therewith.

4. The apparatus of claim 2 still further characterized in that an inner sleeve is positioned within and spaced from the inner wall of said stack throughout substantially the full height of the latter, providing additional heating surface and a shield reducing the temperature of said stack.

5. A portable liquid vaporizing apparatus comprising in combination, a vertically disposed stack, having an open upper end and air inlet perforations at the lower end thereof, a single continuous wick holding trough extending in a flat spiral at an intermediate level within said stack, one end of said trough extending through said stack and connecting with a liquid supplying reservoir positioned exteriorly of said stack, a removable continuous band of wicking having its lower edge supported within said trough, a base below said stack, an electrical lamp bulb and socket within the lower portion of said stack below said trough, suitable to create an upward draft of heated air through said stack and said trough in contact with said band of wicking and for volatilizing the liquid supplied to said trough, a corrugated sleeve within said stack providing an annular air space along the inner wall thereof, a light reflecting band spaced from the lower portion of said stack around the air inlet perforations whereby light from said bulb and being emitted from said perforations is reflected upwardly around the exterior of said stack, a lamp type of shade supported around the upper portion of said stack and said reservoir.

6. The vaporizing apparatus of claim 5 further characterized in that said wick holding trough is constructed of separate side and bottom members permitting the formation of said trough into a continuous convolute, and perforate spacing means within the trough suitable to hold the lower edge of said wicking at a uniformly spaced distance above the bottom of said trough.

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

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