Dec. 8, 1953 M. A. BILOFSKY ET AL 2,662,159

VAPORIZER

Filed May 31, 1952

Fig. 1

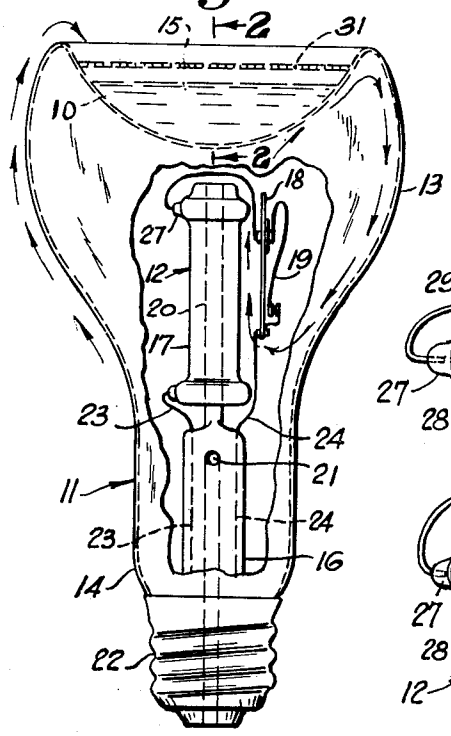
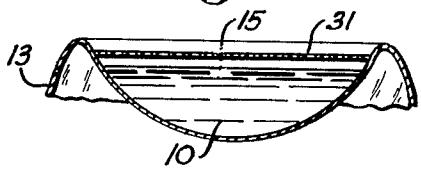


Fig. 2



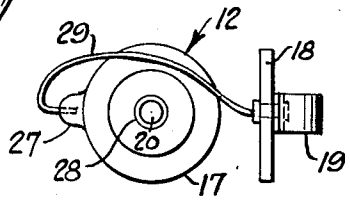
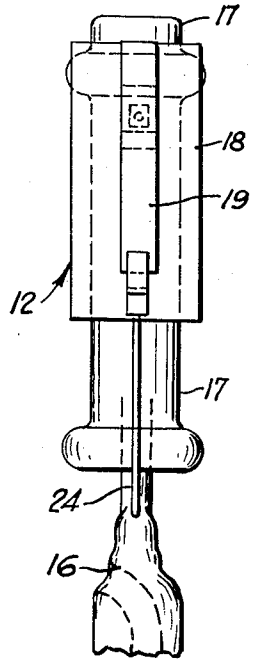


Fig. 4

Fig. 5



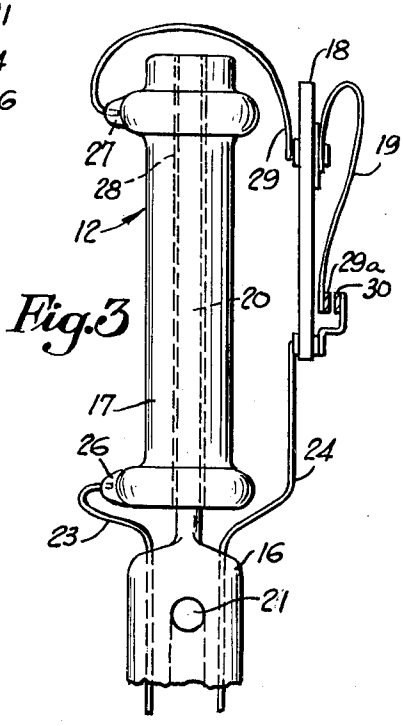


Fig. 3



Fig. 6

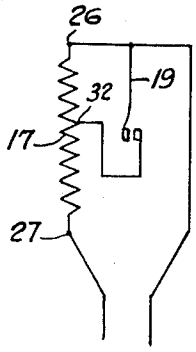


Fig. 7

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VAPORIZER

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4 Claims. (Cl. 219—38)

1

This invention relates to improvements in vaporizers.

It is an object of the instant invention to provide a vaporizer in which a substantially constant rate of vaporization is maintained.

A further object is to incorporate the heating element directly in the vaporizer in order to decrease the usual amount of equipment required and to decrease labor.

Other objects of the instant invention will become apparent in the course of the following specification.

In the accomplishment of the aforesaid objectives, the improved vaporizer is constituted of a chemically inert and electrically non-conductive envelope resembling an electric light bulb except that in the enlarged end of the bulb a dish-like receptacle is formed for the material to be vaporized. Within the envelope is an electrical heating unit constituted of a resistor and a bimetallic element supported in spaced arrangement on one end of an electrically insulated stem inserted through the neck of the envelope. The opposite end of the stem terminates in a screw type lamp base attached to the neck of the envelope for insertion in any upwardly directed female electric light socket. The resistor and bimetallic element are connected in series or in series and partially in parallel to opposite poles on the lamp base. Means are provided for preventing the heat of the resistor from being transmitted directly to the bimetallic element and the resistor is designed to raise the temperature of the material to be vaporized sufficiently above the ambient temperature to give the desired vaporization rate while the bimetallic element is designed to turn the circuit on and off as the temperature in the envelope varies from the desired temperature.

The invention will appear more clearly from the following detailed description when taken in conjunction with the accompanying drawings showing by way of example the preferred embodiment of the inventive concept.

In the drawings:

Figure 1 is an elevational view of the vaporizer constructed in accordance with the principles of this invention;

Figure 2 is a sectional view along the line 2—2 of Figure 1;

Figure 3 is an elevational view of the heating unit removed from the vaporizer shown in Figure 1 but on an enlarged scale;

Figure 4 is a top view of the heating unit shown in Figure 3;

Figure 5 is a side view of the heating unit shown in Figure 3;

2

Figure 6 is a schematic diagram showing a series electrical circuit for the heating unit of Figure 3; and

Figure 7 is a schematic diagram similar to Figure 6 but showing a series and partially parallel circuit for the heating unit of Figure 3.

Referring now in greater detail to the drawings where like reference numerals indicate like parts, reference numeral 10 indicates the material to be vaporized, 11 the envelope, and 12 the heating unit.

The material 10 may be any substance readily adapted to vaporization, for example, medicinal preparations in which disorders of the respiratory organs are treated by inhaling the vapors.

The envelope 11 is preferably made of glass since chemically inert in many instances, electrically non-conductive, and substantially heat resistant. However, other materials having similar properties or designed to accomplish the same results could be used. The envelope 11 is in the form of an electric light bulb having an enlarged end 13 and an integrally formed narrow neck 14. The enlarged end 13, however, differs from the known bulb in that it has formed therein the dish-like receptacle 15 in which the material for vaporization is placed usually after the envelope is screwed in a vertical position in a female electric socket as later shown. It will be obvious that the dish-like receptacle could be located in other than the end of the enlarged portion of the envelope.

The heating unit 12 is constituted of the stem 16 on the inner end of which is a resistor 17 while adjacent the resistor is a shield 18, and on the side of the shield most remote from the resistor is a known spring tension bimetallic element 19.

The stem 16 may be made of glass with the inner end constricted as at 20 and having formed therethrough at the opposite or outer end an opening 21. The opening 21 serves as an air vent during the sealing operation and may be closed thereafter if desired. The outer end terminates in a screw base 22 designed to be threaded in an upwardly directed female electrical outlet (not shown). The screw base substantially encloses the end of the neck 14. Electrically insulated from each other in the stem 16 intermediate the screw base and the constricted portion 20 are the electrical conductors 23 and 24, one end of each of which are electrically connected to the usual poles on the screw base in a known manner.

The resistor 17 may have a central opening 28 (Figs. 3 and 4) through which the constricted portion 20 of the stem 16 is inserted. The resistor

may further have the two end terminals 26 and 27 or the two end terminals 26 and 27 and an intermediate tap 32 (Fig. 7). The free end of the conductor 23 in the stem 16 is electrically connected to the terminal 26 of the resistor. The heat developed by the resistor, when connected as later shown, is calculated to raise the temperature inside the envelope 11 sufficiently to vaporize the material 10 at the desired rate with due allowance for the ambient temperature in the place of operation.

The shield 18 is a dielectric panel of heat resisting material, for example a phenolformaldehyde plastic with an asbestos filler. As illustrated, the shield substantially covers one side of the resistor and is held as far therefrom as possible within the limits of the opening in the narrow neck through which the heating unit must pass when assembled with the envelope. At the top, the shield 18 is held in place by the electrical conductor 29 from the end terminal 27 of the resistor 17. The electrical conductor 29 is selected with due regard for the necessity of preventing it from acting as a heat conductor from the resistor as well as preventing it from acting as an individual heating unit when the current is passed therethrough. Any suitable means may be used for fastening one end of the conductor 29 to the panel bearing in mind that one end of the following described spring tension bimetallic element must be electrically connected thereto.

On the side of the shield 18 most remote from the resistor 17 is the known spring tension bimetallic element 19. At one end, the bimetallic element is fastened to the shield 18 in a manner to make electrical contact with the conductor 29. At the free end, the bimetallic element terminates in the contact point 29*a* (Fig. 3). Coacting with the contact point 29*a* is another terminal 30 secured in a known manner to the shield and electrically connected to the conductor 24. As illustrated, the coacting contacts 29*a* and 30 are shown separated which in operation represents a condition in the enevolpe where the temperature has been raised above the desired temperature of vaporization so that the resistor is momentarily disconnected. As the temperature in the envelope falls, the contacts 29*a* and 30 will close by the bimetallic element to once again place the resistor in operation. The spring tension of the element can be correlated with the required temperature. Due provision is made to prevent arcing of the contacts 29*a* and 30.

Two circuits are illustrated for electrically connecting the bimetallic element 19 to the resistor. In the circuit illustrated in Figure 6, the bimetallic element is connected in series with the resistor 17.

In the circuit illustrated in Figure 7, the resistor 17 is provided not only with the end terminals 26 and 27 but also with the intermediate tap 32. The bimetallic element is electrically connected between the terminal 26 and the intermediate tap 32 so that at the start or cold condition of the vaporizer, that is the closed position of the contacts and not the open position of the contacts as shown in Figure 7, the bimetallic element will substantially short out a portion of the resistor to decrease the resistance thereof and to increase the heat output. When the desired temperature is attained, the movable contact of the bimetallic element will open to direct all the current through the resistor and to give less heat. The second circuit actually gives low-range and high-range heat.

In operation:

The vaporizer is screwed into a standard lamp socket in a vertical position. When the current is turned on, the resistor 17 heats up and heats the air around it. The heated air rises until it is deflected by the bottom of the dish-like receptacle. The air moves outwardly and upwardly along the contour of the inner surface of the receptacle giving up a portion of its heat thereto. The air then returns to the heater following a downward path as indicated by the arrows and giving up more heat to the sides of the envelope. The substance to be vaporized is raised in temperature by the heat transferred thereto by the receptacle. The temperature of the substance reaches an equilibrium when the heat lost by the substance and the sides of the bulb exactly balances the rate at which heat is received from the air inside the bulb. The heat of the envelope warms the contiguous air causing currents of air to rise along the outer surface of the bulb. Some of the rising air eddies into the dish and then rises carrying off with it the vapors of the heated substance.

In accordance with the present invention, the bimetallic element 19 is located directly in the path of air current which has just passed the dish-like receptacle 15, so that the temperature of this air current is a direct function of the temperature of the receptacle and of the material therein. This makes it possible to provide a direct control for the temperature of the material. The rate of vaporization for a particular substance can also be controlled by the grid 31 removably or firmly inserted in the receptacle as illustrated, which limits the flow of air over the heated substance.

While there is above disclosed but one embodiment of the vaporizer, it is possible to produce still other embodiments without departing from the inventive concept herein disclosed, and it is desired therefore that only such limitations be imposed on the appended claims as are stated therein, or required by prior art.

What is claimed is:

1. A vaporizer comprising an envelope, the envelope having a bulb portion integrally formed with a narrow neck, the bulb portion having formed therein a dish-like receptacle for the substance to be vaporized, the envelope being chemically inert and having a melting point above the vaporization temperature of the substance to be vaporized; the device further comprising an electrical heating unit disposed in the envelope adjacent the inner surface of the receptacle, the heating unit comprising a resistor, a circuit for the resistor disposed through the narrow neck, a bimetallic element for the circuit in spaced arrangement with the resistor, the bimetallic element decreasing the heat output of the resistor when the temperature in the envelope substantially exceeds the temperature of vaporization rate of the substance to be vaporized and increasing the heat output of the resistor when the temperature in the envelope falls below the temperature of vaporization rate, and means for shielding the bimetallic element against the direct heat of the resistor, the bimetallic element being located adjacent said receptacle and in the path of air current which has passed said receptacle.

2. A vaporizer comprising an envelope of chemically inert and heat and electricity resistant material, the envelope having a bulb-like

portion integrally formed with a narrow neck, the bulb-like portion having formed therein a dish-like receptacle for the substance to be vaporized; the device further comprising an electrical heating unit disposed in the envelope, the heating unit comprising a resistor, a bimetallic element in spaced arrangement with the resistor, a circuit electrically connecting the bimetallic element in series with the resistor, the heat output of the resistor and the bimetallic element being correlated with the temperature of the rate of vaporization of the substance to be vaporized, means supporting the resistor and the bimetallic element in the envelope adjacent the inner surface of the dish-like receptacle, and a heat insulating shield disposed intermediate the resistor and the bimetallic element.

3. A vaporizer comprising a chemically inert envelope, said envelope being resistant to heat and electricity and having a bulb-like portion integrally formed with a narrow neck, the end of the bulb-like portion having formed therein a dish-like receptacle for the substance to be vaporized; the device further comprising an electrical heating unit disposed in the envelope, the heating unit comprising a resistor, the resistor having two end terminals and one intermediate tap and the heat output of the resistor being correlated with the vaporization rate temperature of the substance to be vaporized, a spring tensioned bimetallic element with one fixed and one movable contact coacting with the resistor, the spring tension of the bimetallic element being correlated with the heat output of the resistor, a circuit for electrically connecting the end terminals of the resistor to a source of electrical energy, means for electrically connecting the fixed terminal of the bimetallic element to one end terminal of the resistor, means for electrically connecting the movable contact of the bimetallic element to the intermediate tap of the

resistor, means for supporting the bimetallic element in spaced relationship with the resistor, and means for heat insulating the bimetallic element from the direct heat of the resistor.

4. A vaporizer comprising an envelope of dielectric and heat resistant and chemically inert material, the envelope having a bulb-like portion integrally formed with a narrow neck, the end of the bulb-like portion having formed therein a dish-like receptacle with open top for the substance to be vaporized when the envelope is upright, and a grid disposed in the receptacle adjacent the open top; the device further comprising an electrical heating unit for the inside of the envelope, the unit comprising an elongated stem of dielectric and heat resistant material disposed through the neck with the inner end of the stem adjacent the bottom surface of the receptacle, a screw base with two electrically insulated poles for the opposite ends of the stem, two spaced electrical conductors disposed in the stem, means for electrically connecting one end of each conductor to one pole of the screw base, an electrical heating element correlated with the temperature of the rate of vaporization of the substance to be vaporized disposed on the inner end of the stem, a circuit for the heating element through the conductors in the stem, and means for automatically maintaining the heating element substantially above the vaporization rate temperature of the substance to be vaporized.

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