Feb. 21, 1928. 1,659,663

G. F. NELSON.

APPARATUS FOR PRODUCING AND USING COLD VAPORS

Filed Oct. 25, 1924

Fig. 1.

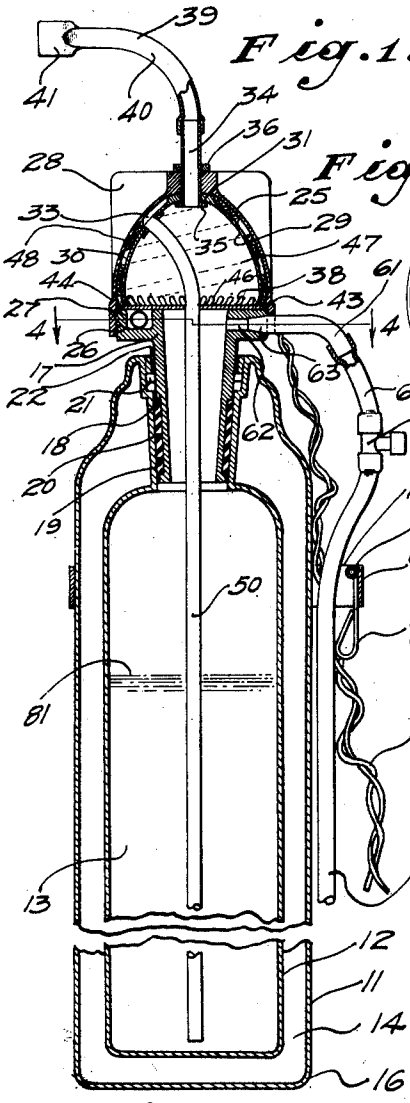


Fig. 2.

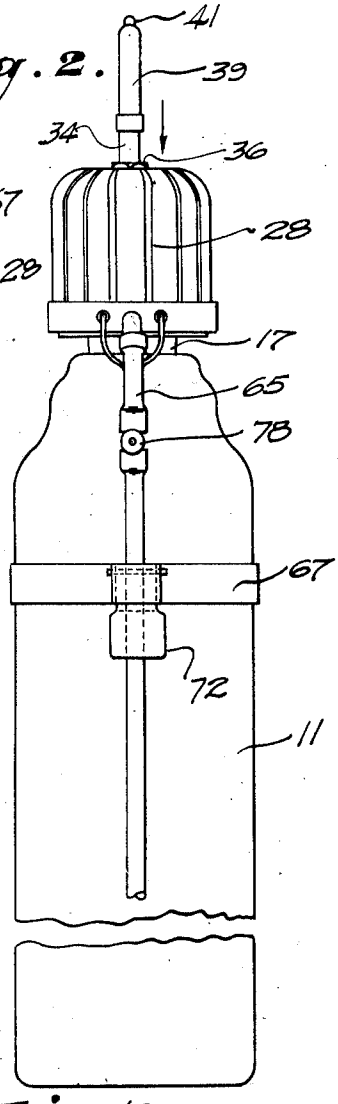


Fig. 3.

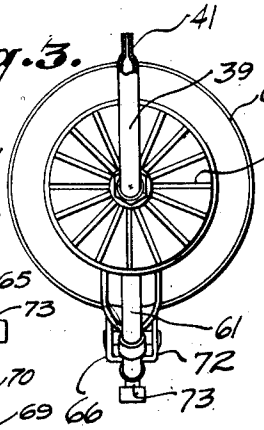


Fig. 5.

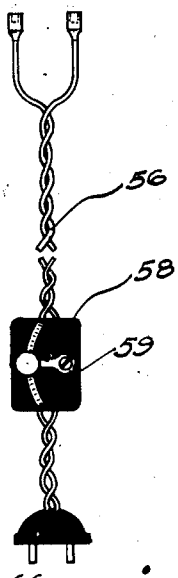


Fig. 4.

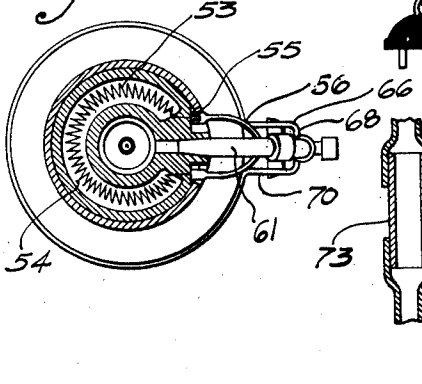


Fig. 7.

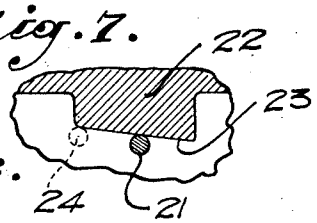


Fig. 6.

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UNITED STATES PATENT OFFICE.

GEORGE F. NELSON, OF BERKELEY, CALIFORNIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO PUROX COMPANY, OF DENVER, COLORADO, A CORPORATION OF COLORADO.

APPARATUS FOR PRODUCING AND USING COLD VAPORS.

Application filed October 25, 1924. Serial No. 745,828.

This invention relates to apparatus for producing and using cold vapors, and it particularly concerns an apparatus suitable for use in treating skin ailments, such as presented to the Patent Office in my application entitled Method for treating skin ailments, filed October 25, 1924, Serial No. 745,829.

I have discovered that skin infections or ailments may be almost instantly counteracted by treating the infected portions by the application of a cold producing medium to the extent that the infected skin is frozen to a peculiar white color just preceding blistering or burning. For the successful treatment of these skin ailments, I have found that considerable care must be exercised to arrive at this degree of temperature characterized by the peculiar white color. If this color is not reached, the treatment will not be entirely effective, and if this white color is exceeded, the flesh or skin will be burnt or blistered, and more harm than good experienced.

It is an object of this invention to provide an apparatus for producing and applying a cold medium. This device may be in the form of a container in which an expanding gas-producing material is contained. Suitably attached to the container is a nozzle by which the vapors or cooling medium may be applied to an infected surface.

It is another object of this invention to provide in a device of the character described a means for causing a flow of gas through the nozzle thereof. This means may comprise a means for creating a pressure in the container, thus forcing the gas through the nozzle.

It is also an object of this invention to provide in a device of the character described, means for promoting the formation of a cooling medium of expanding gas. This may comprise a gasifying chamber in which the gas-producing medium flows. Adjacent to the gasifying chamber is situated heating means which causes the gas-producing medium to expand into gaseous form, as it enters the chamber. Also to assist in the forming of gas, I provide a turbulence chamber through which the gas-producing medium passes to enter the gasifying chamber. In this chamber the gas-producing medium is broken up into small particles which readily take on heat necessary for its expansion.

It is a still further object of this invention to provide in a device of this character a means for preventing the gas-producing medium from flowing through the nipple before it has formed into a gas. To accomplish this, I provide a means for regulating pressure in the container. It will be seen that if gas-producing material flows through the nozzle, it is an indication that pressure is excessive and forces the gas-producing medium through the gasifying chamber too quickly to be gasified. By adjusting the regulating pressure means, pressure may be reduced as desired to give the medium more time in the presence of a heat-dispersing medium to be converted into an expanding gas.

It is another object of this invention to provide a means for varying the temperature of the heating element. In this manner I may control the rate of production of gas.

Other objects and the advantages of the invention will be made evident hereinafter.

Referring to the drawings which are for illustrative purposes only, and in which I show a preferred embodiment of my invention,

Fig. 1 is a vertical sectional view through an apparatus embodying the features of my invention.

Fig. 2 is an elevational view taken at right angles to Fig. 1.

Fig. 3 is a plan view of Fig. 2.

Fig. 4 is a section taken as indicated by the line 4—4 of Fig. 1.

Fig. 5 is a view showing a means for controlling the temperature of the heating element employed in this modification of my invention.

Fig. 6 is an enlarged sectional view showing a means for regulating pressure in the container.

Fig. 7 is an enlarged fragmentary view showing means in which the stopper is locked in the mouth of the container employed in the invention.

With reference to the drawing, the numeral 11 represents a container, having an inner wall 12, which provides a gas-producing medium chamber 13. To provide an evacuated space 14, there is an outer wall 16, this evacuated space being for the purpose of heat-insulating the chamber 13. A plug

member 17, having a tapered portion 18, is inserted into the tapered mouth 19 of the container 11. For providing a gastight seal between the mouth 19 and the tapered portion 18, I provide a packing member, as indicated at 20. For retaining the plug in place I provide pins 21 on the tapered portion 18, which are arranged to inter-engage with lug portions 22 formed in the upper end of the mouth of the container 13. As clearly shown in Fig. 7, the plug is inserted into the mouth and rotated slightly. The pin, by this rotation, is caused to ride along the lower sloping face 23 of each lug 22, moving the pin from the position indicated by the dotted lines 24 into the position indicated by the full lines in Fig. 7. It will be seen that as the pin moves sidewardly, it is forced downwardly by the face 23, this being effective in securing the plug member tightly in the mouth of the container.

An outer dome 25 having a threaded portion 26 is screwed onto the large cylindrical portion 27 of the plug member 17, this outer dome 25 having heat-dispersing fins 28 extending radially therefrom, as shown in Figs. 1, 2 and 3. Situated inside the outer dome 25 is an inner dome 29 having a thin wall 30 and an upper button portion 31 formed at the top of the dome. This button 31 engages with the inner wall of the outer dome 25 and is for the purpose of spacing the thin wall 30 away from the inner face of the outer dome member, so as to provide an annular turbulence chamber 33. Extending through a hole in the button 31 and a hole in the upper portion of the outer dome 25 is an egression tube 34 having an inner annular lip 35, which is brought into engagement with the outer face of the inner dome 29, and is clamped thereagainst by means of a nut 36, this arrangement serving to secure the inner dome 29 in place within the outer dome 25. As shown in Fig. 1, the extreme lower portion of the inner dome 29 is provided with a multiplicity of openings 38.

Secured on the extending end of the egression tube 34 is a nozzle 39 having a bent portion 40 and a flattened portion 41 for spraying the expanded gas. Secured between the upper face 43 of the cylindrical portion 27 of the plug 17 and the lower shoulder 44 of the outer dome 25 is a partition plate 46, which serves to form a gasifying chamber 47 within the inner dome member 29, the lower edge of the inner dome 29 engaging with the upper face of the partition member 26.

Disintegrators in the form of ribbons of fine wire mesh 48 are arranged spirally in the turbulence chamber 33, these disintegrators being for the purpose of giving turbulence to gas-producing material in a manner to break it up, and to assist in the gasifying thereof, as this gas-producing material passes through the turbulence chamber 33. A gas-producing medium tube 50 extends from a point near the bottom of the chamber through the partition 46, and connects with the upper portion of the turbulence chamber 33, being secured as shown in Fig. 1 to the thin wall 30 of the inner dome member 29, this tube 50 serving as a means for introducing gas-producing material into the turbulence chamber 33.

Means for promoting gasifying of the gas-producing material as it passes into the gasifying chamber 47 is provided, as shown in Fig. 4, in the form of a heating coil 53 situated in an annular channel 54, provided in the cylindrical portion 27 of the plug 17, the heating coil 53 being situated below the partition member 46. Terminals 55 of the heating coil 53 extend to the exterior of the cylindrical member 27 and are arranged for attachment, as shown in Fig. 4, with an electric cord 56.

For varying the heat of the coil 53, I provide in the electric cord 56, as shown in Fig. 5, a rheostat element 58 having an arm 59 which may be swung in either direction to control the current being supplied through the cord 56 to the coil 53.

A pressure relief means is provided in the form of a bent tube 61 which is secured in an opening 62 in the cylindrical portion 27, as by the conical end 63 thereof, this opening 62 having communication with the interior of the chamber 13. On the extending end of the bent tube 61 is connected a flexible tube 65 which may extend to a suitable exhaust receptacle or the like, not shown. An escape shut-off valve is provided in the form of a securing band 67, which is placed upon the container 11, as shown, and has an outwardly bent portion 68. On a pin 69 secured between the side walls 70 of the outwardly bent portion 66 is a thumb clamp 72. The thumb clamp 72 is arranged to constrict the flexible tube 65 to prevent a passage of gas thereto from the chamber 13 by depressing the thumb clamp.

Disposed in the line of flexible tubing 65 is a pressure regulating means in the form of a T body 73. As clearly shown in Fig. 6, in the branch 74 of the body 73 is provided a valve which comprises a ball 75 which is held against a seat 76 by means of a spring 77. The pressure of the spring against the ball 75 is regulated by means of a cap 78 which is advanced or retracted on the threaded end 79 of the branch 74 to effect variation in the compression of the spring 77.

In operation, the use of the device just described is substantially as follows:

The plug member is removed from the mouth 19 of the receptacle and the receptacle is filled, as indicated at 81, with a suitable

gas-producing medium. This gas-producing medium is preferably liquid oxygen or liquid air. After the container has been filled, as indicated at 81, the plug is again inserted and locked in place, as previously described. As the liquid oxygen boils, due to the taking on of heat, gas is formed in the upper part of the chamber which may escape therefrom through the bent tube 61 and the flexible tube 65 to a suitable exhaust.

When it is desired to use the apparatus which is of such a size that it may conveniently be held in the hand of an operator, the thumb clamp 72 may be depressed so as to prevent an escape of the gas forming in the upper portion of the chamber 13 through the tubing 65. It will be seen that the closing of the relief passage causes a pressure to form within the chamber 13. The pressure as it forms in the chamber 13 forces liquid through the gas-producing medium tube 50 and into the upper portion of the turbulence chamber 33. As the liquid passes through the turbulence chamber 33, it is caused to take a very tortuous path and is broken up into small particles by its contact with and passage through the disintegrators 48.

As the liquid passes from the lower end of the turbulence chamber 33 through the openings 38, it will taken on heat produced by the heating coil 53, thus changing the liquid into a gaseous form. The expanding gas, produced from the liquid, may then pass to the egression tube 34 and from thence through the nozzle 40, being sprayed through the flattened portion 41 thereof.

If during the use of the apparatus it is found that some liquid is sprayed through the nozzle 41, it indicates that the liquid passes through the turbulence chamber 33 and the gasifying chamber 47, without having sufficient time to take on enough heat to cause the gasifying thereof. The reason for this rapid passage through the chamber 33 and the chamber 47 is due to an excess of pressure in the chamber 13. By rotating the cap 78 of the regulating means 73, the pressure on the ball 75 by the spring 77 is reduced and the ball may be forced away from the seat 76 by the gas pressure in the chamber 13 with greater facility, thus reducing the pressure in the chamber 13 and reducing the flow of liquid through the chambers 33 and 47.

If the ocassion demands the supplying of more expanding gas than the device may at that time be providing, this additional supply may be had by increasing the current supply to the heating coil 53 by means of the rheostat 58, thus causing more heat and consequently a more rapid gasifying of the liquid. To increase the flow to take care of the demand, the cap 78 is screwed downwardly so as to create a greater pressure in the chamber 13 which causes a greater flow of liquid through the chamber 33 into the gasifying chamber 47 and the nozzle 40.

From the foregoing description it will be seen that the device presented by my invention serves to very efficiently provide an expanding gas or cooling vapor. It will be seen that it may be readily regulated to provide more or less gas by regulating the flow of electric current through the heating coil by use of the rheostat and the regulator 73. The apparatus is of a size and shape convenient for holding in the hand. The infected area being treated may be kept under close observation.

I claim as my invention:

1. In an apparatus of the class described, the combination of: walls forming a chamber, said chamber being arranged to contain a gas-producing medium; walls forming a gasifying chamber; manually operable flow-creating means whereby said gas-producing medium is caused to flow into said gasifying chamber; and heating means operable independently of atmospheric temperature for contributing to the gasifying of said gas-producing medium in said gasifying chamber.

2. In an apparatus of the class described, the combination of: walls forming a chamber, said chamber being arranged to contain a gas-producing medium; walls forming a gasifying chamber; manuually operable flow-creating means whereby said gas-producing medium is caused to flow into said gasifying chamber; heating means operable independently of atmospheric temperature for contributing to the gasifying of said gas-producing medium in said gasifying chamber; and means for varying the capacity of said heating means.

3. In an apparatus of the class described, the combination of: walls forming a gas-producing medium chamber, said gas-producing chamber being arranged to contain a gas-producing medium; walls forming a turbulence chamber, said medium passing thereinto from said gas-producing medium chamber and being separated into particles therein; walls forming a gasifying chamber into which said medium flows from said turbulence chamber and is gasified therein; and means for using said gas.

4. In an apparatus of the class described, the combination of: walls forming a gas-producing medium chamber, said gas-producing chamber being arranged to contain a gas-producing medium; walls forming a turbulence chamber, said medium passing thereinto from said gas-producing medium chamber and being separated into particles therein; walls forming a gasifying chamber into which said medium flows from said

turbulence chamber and is gasified therein; means for promoting the gasifying of said medium; and means for using said gas.

5. In an apparatus of the class described, the combination of: walls forming a gas-producing medium chamber, said gas-producing chamber being arranged to contain a gas-producing medium; walls forming a turbulence chamber, said medium passing thereinto from said gas-producing medium chamber and being separated into particles therein; walls forming a gasifying chamber into which said medium flows from said turbulence chamber and is gasified therein; a heating element for promoting the gasifying of said medium when said medium passes into said gasifying chamber; and means for using said gas.

6. In an apparatus of the class described, the combination of: walls forming a gas-producing medium chamber, said gas-producing chamber being arranged to contain a gas-producing medium; walls forming a turbulence chamber, said medium passing thereinto from said gas-producing medium chamber; a disintegrator situated in said turbulence chamber for separating said medium into particles; walls forming a gasifying chamber into which said medium flows from said turbulence chamber and is gasified therein; and means for using said gas.

7. In an apparatus of the class described, the combination of: walls forming a gas-producing medium chamber, said gas-producing chamber being arranged to contain a gas-producing medium; walls forming a turbulence chamber, said medium passing thereinto from said gas-producing medium chamber; a disintegrator situated in said turbulence chamber for separating said medium into particles; walls forming a gasifying chamber into which said medium flows from said turbulence chamber and is gasified therein; means for promoting the gasifying of said medium; and means for using said gas.

8. In an apparatus of the class described, the combination of: walls forming a gas-producing medium chamber, said gas-producing chamber being arranged to contain a gas-producing medium; walls forming a turbulence chamber in which said medium is separated into particles; means for causing said medium to flow into said turbulence chamber; walls forming a gasifying chamber into which said medium flows from said turbulence chamber and is gasified therein; and means for using said gas.

9. In an apparatus of the class described, the combination of: walls forming a gas-producing medium chamber, said gas-producing chamber being arranged to contain a gas-producing medium; walls forming a turbulence chamber in which said medium is separated into particles; means for causing said medium to flow into said turbulence chamber; walls forming a gasifying chamber into which said medium flows from said turbulence chamber and is gasified therein; a heating element for promoting the gasifying of said medium when said medium passes into said gasifying chamber; and means for using said gas.

10. In an apparatus of the class described, the combination of: walls forming a gas-producing medium chamber, said gas-producing chamber being arranged to contain a gas-producing medium; walls forming an opening in said chamber through which gas forming on said gas-producing medium may escape; means for constricting said opening so as to create a pressure and cause said medium to flow into said turbulence chamber; walls forming a gasifying chamber into which said medium flows from said turbulence chamber and is gasified therein; and means for using said gas.

11. An apparatus as in claim 10 in combination with means for varying the rate at which said medium flows into said turbulence chamber.

12. In an apparatus of the class described, the combination of: a container providing a gas-producing medium chamber; a plug adapted to be inserted into a mouth of said container, said plug providing a gasifying chamber; a gas-producing medium tube connecting between said gas-producing medium chamber and said gasifying chamber through which tube a gas-producing medium may flow into said gasifying chamber; means for causing said gas-producing medium to flow into said gasifying chamber; and means for promoting the gasifying of said medium in said gasifying chamber.

13. In an apparatus of the class described, the combination of: a container providing a gas-producing medium chamber arranged to contain a gas-producing medium; a plug arranged for insertion into a mouth of said container, said plug providing a gasifying chamber and a turbulence chamber disposed therearound, said gasifying chamber and said turbulence chamber being in communication with one another; a gas-producing medium tube extending from said gas-producing medium chamber to said turbulence chamber through which said gas-producing medium tube said gas-producing medium flows; means for causing said gas-producing medium to flow through said gas-producing medium tube; and means for promoting the gasifying of said gas-producing medium as it enters said gasifying chamber.

14. In an apparatus of the class described, the combination of: a container providing a gas-producing medium chamber adapted to contain a gas-producing medium; a plug adapted to be inserted into a mouth of said container; an outer dome secured to said

plug; an inner dome secured inside said outer dome, said inner and outer domes providing a gasifying chamber and a turbulence chamber; a nozzle secured to said inner and outer domes in communication with said gasifying chamber; a disintegrator arranged in said turbulence chamber; a gas-producing medium tube extending from said gas-producing medium chamber and connecting to said inner dome in communication with said turbulence chamber; a pressure relief tube connected in communication with said gas-producing medium chamber; and means for closing said tube in a manner to cause a pressure in said gas-producing medium chamber, thereby causing said gas-producing medium to flow through said gas-producing medium tube, said turbulence chamber and into said gasifying chamber where it is converted into gaseous form.

15. In an apparatus of the class described, the combination of: a container providing a gas-producing medium chamber adapted to contain a gas-producing medium; a plug adapted to be inserted into a mouth of said container; an outer dome secured to said plug; an inner dome secured inside said outer dome, said inner and outer domes providing a gasifying chamber and a turbulence chamber; a nozzle secured to said inner and outer domes in communication with said gasifying chamber; a disintegrator arranged in said turbulence chamber; a gas-producing medium tube extending from said gas-producing medium chamber and connecting to said inner dome in communication with said turbulence chamber; a pressure relief tube connected in communication with said gas-producing medium chamber; means for closing said tube in a manner to cause a pressure in said gas-producing medium chamber, thereby causing said gas-producing medium to flow through said gas-producing medium tube, said turbulence chamber and into said gasifying chamber where it is converted into gaseous form; a regulating valve disposed in said pressure relief tube whereby the pressure in said gas-producing medium chamber is regulatably controlled; and a heating coil carried by said plug below said gasifying chamber for promoting the gasifying of said gas-producing medium as it enters said gasifying chamber.

In testimony whereof, I have hereunto set my hand at Berkeley, California, this 18th day of October, 1924.

GEORGE F. NELSON.