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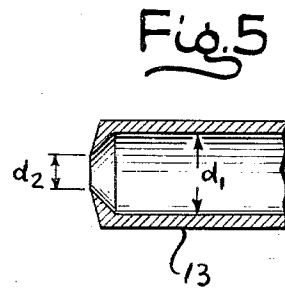
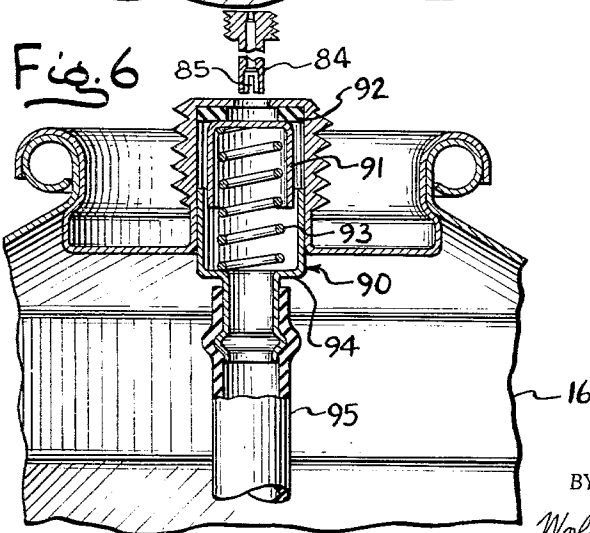
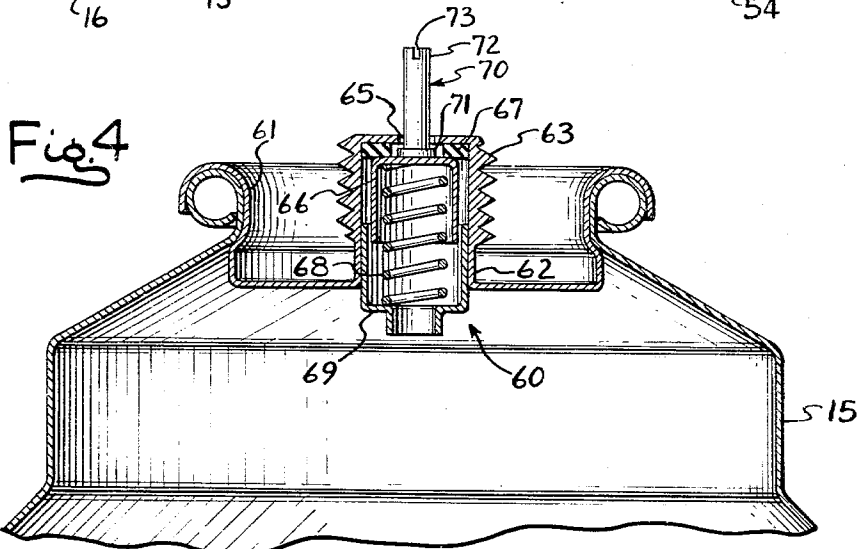
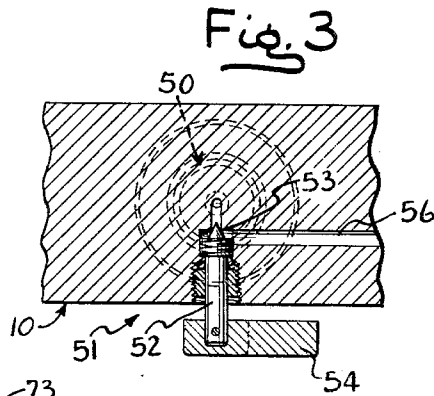
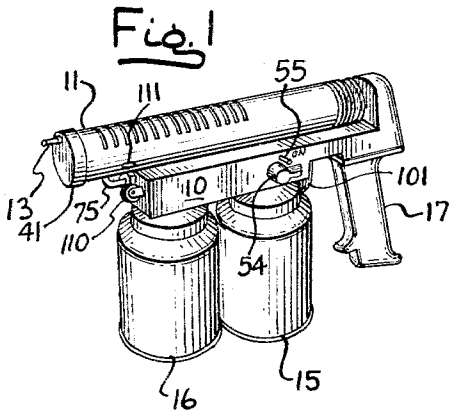
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3,214,860

THERMAL AEROSOL DISPENSER

Filed March 18, 1963

2 Sheets-Sheet 1



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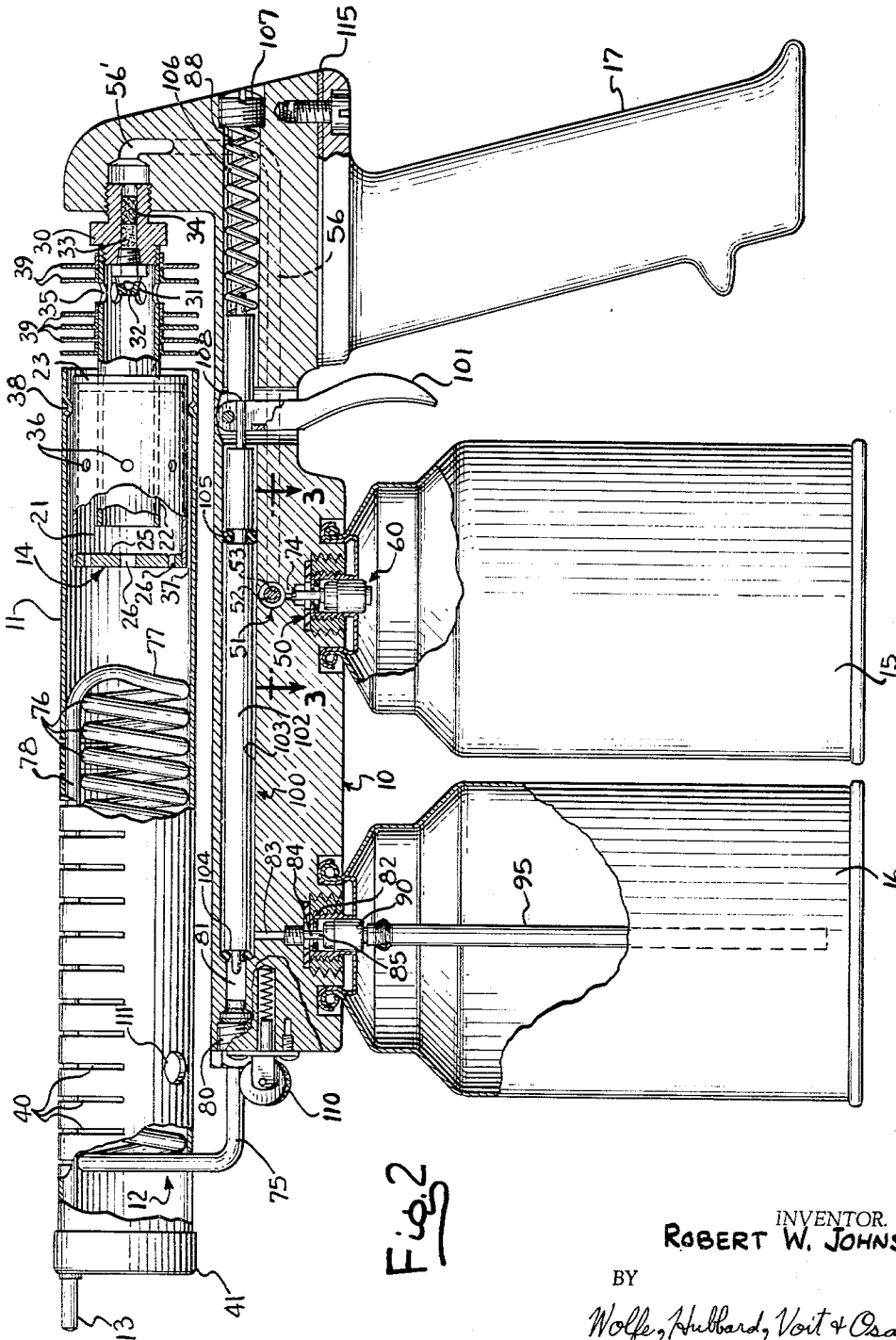
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THERMAL AEROSOL DISPENSER

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THERMAL AEROSOL DISPENSER

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Filed Mar. 18, 1963, Ser. No. 265,985

10 Claims. (Cl. 43-129)

The present invention relates to aerosol dispensers and more particularly to an improved apparatus for generating a fog of insecticide, bactericide, fungicide, or the like.

In prior U.S. Patent 3,074,199 issued January 22, 1963, there is described an aerosol dispenser of the fogging hand-held type employing a compressed hydrocarbon as a fuel and including a horizontal burner tube containing a coil into which an aerosol liquid is led under pressure and progressively vaporized resulting in the ejection of large volumes of fog from the end of the coil. The aerosol liquid may, for example, consist of insecticides dissolved in a mixture of mineral oils having progressive boiling points as discussed in the patent.

It is an object of the present invention to provide an aerosol fog dispenser which is more efficient than prior devices of this type, i.e., which requires fewer B.t.u. for each thousand cubic feet of fog, enabling up to three hours of operation from a single 12 oz. can of compressed butane.

It is an object related to the above to provide an aerosol fog dispenser which may be readily used by the average householder without any training or experience whatsoever. Thus it is an object to provide an aerosol fog dispenser which is small in size and which is capable of producing tremendous volumes of fog adequate for all domestic, and most industrial, purposes but which nevertheless operates quietly at a low heat rate and without visible flame. It is a related object to provide an aerosol fog dispenser which is easily lit and operated, which is controlled by a simple on-off valve, which requires no adjustment whatsoever, and which is easily extinguished when the spraying operation has been completed. Stated in general terms it is, therefore, the main object of the present invention to provide a highly efficient, high volume, fog generator which operates so easily and quietly as to remove the feeling of apprehension sometimes associated with the use of devices of this type when used by persons having no prior experience.

It is another object, related to the foregoing, to provide a fog dispenser which provides an optimum vaporizing temperature and which insures the proper degree of vaporization of an oil base aerosol liquid having component fractions vaporizable over a range of temperatures. It is an object to provide a fog dispenser in which temperature build-up or overheating cannot occur regardless of how the device is manipulated by the user. Thus while the flow of aerosol liquid through the device is under the control of the user and while the burner is constantly turned on there is no risk of overheating and thus decomposing the aerosol liquid when the trigger is pressed, even though the burner may have been operating idly over a substantial time interval. This insures full effectiveness of the pyrethrins, or other ingredients, in insecticides and bactericides which are readily decomposed at elevated temperatures.

It is yet another object to provide a fog generator and dispenser having an improved heat cycle in which the temperature of the aerosol liquid is raised gradually from room temperature to a maximum with progressive vaporization of certain components of the aerosol liquid without localized hot spots at any point along the path of the flow and followed by a reduction in temperature just prior to discharge of the fog at the end of the

vaporizing coil so that the effluent is at a low safe temperature. As a result of the progressive increase in temperature the liquid aerosol may be brought to the fogging range rapidly with the result that the response is substantially instantaneous when the release trigger is pressed. It is, moreover, an object of the invention to provide a fog dispenser in which the fog is ejected at a higher velocity than is usually characteristic of such devices thereby facilitating penetration of the fog stream deeply into cracks and openings or other places where insects might take refuge.

It is one of the objects of the present invention to provide an aerosol fog dispenser in which the aerosol liquid is not only heated progressively but which is completely free of any pulsating effect or "surging," particularly when the trigger is pressed following a long time interval and resulting from the "flash" vaporization which tends to occur under some circumstances in conventional devices of this type.

It is yet another object of the present invention to provide a fog generator and dispenser which operates stably over long periods of time. Thus it is an object to provide a dispenser in which the fuel pressure, and hence the rate of liberation of B.t.u., remains constant regardless of whether the device is operated for only a few minutes at a time or continuously for a number of hours. Consequently, the device is to be contrasted with the prior devices in which the pressure may, under certain circumstances, drop because of the refrigerating effect of the boiled-off fuel as it passes from the liquid to the gaseous state, necessitating the changing of gas cylinders, i.e., the substitution of a cylinder at room temperature from time to time, when continuous operation is desired. In this connection, it is an object to provide a fog dispenser in which the insecticide or other aerosol liquid is maintained under constant pressure which does not in any way depend upon the pressure of the fuel gas. It is a more specific object to provide an aerosol dispenser in which separate liquified gases, having widely different pressures at room temperature, are employed for the burner and for forcing the aerosol liquid into the vaporizing coil, respectively. More specifically, it is an object to provide a fog generator and dispenser employing butane as fuel having an inherent low pressure on the order of 20 lbs. per square inch at room temperature thereby minimizing the throttling which must occur in order to reduce the pressure to that required at the burner and in which a small charge of propane having a normal pressure which is much higher, 120 lbs. per square inch, is incorporated in the insecticide container for insuring flow of the aerosol liquid through the vaporizing coil.

It is still another object of the present invention to provide a hand-held aerosol fog dispenser in which the hand grip remains cool and comfortable under all conditions. In this connection it is an object of the invention to provide an aerosol fog dispenser which is extremely light, which weighs only a fraction of the weight of prior devices and which makes use of thin gauge fuel and insecticide canisters so that the device may be used without fatigue, and readily manipulated by women, or even by children of responsible age. It is an object, moreover, to provide an aerosol dispenser which is safe, which permits either the gas or insecticide container to be replaced as necessary during the operation of the device without risk, and which minimizes the danger of igniting the ejected fog.

In general it is an object to provide a portable fog dispenser which is simple both in construction and operation, which does not require periodic maintenance, which may be used for many purposes simply by replac-

ing the liquid aerosol container with one containing aerosol of a different type, and which may be manufactured at a cost sufficiently low as to enable the features and advantages to be utilized by a wide market.

The objects and advantages of the invention will become apparent upon reading the attached detailed description and upon reference to the drawings in which:

FIGURE 1 is a perspective view of an aerosol fog dispenser constructed in accordance with the present invention.

FIG. 2 is a vertical elevation of a dispenser constructed in accordance with the invention and with certain portions shown broken away or in section in order to facilitate understanding the construction and operation of the device.

FIG. 3 is a transverse section taken along the line 3—3 in FIG. 2 showing the "on-off" valve.

FIG. 4 is an enlarged section taken through the upper end of a fuel gas container used in practicing the invention.

FIG. 5 is an enlarged section of the nozzle of the vaporizer coil.

FIG. 6 is an enlarged section taken through the upper end of the aerosol liquid container.

While the invention has been described in connection with a preferred embodiment, it will be understood that I do not intend to be limited to such embodiment, but intend to cover the various alternative and equivalent constructions included within the spirit and scope of the invention as defined by the appended claims.

Turning now to the drawings, there is disclosed an aerosol dispenser having a gun-like appearance including a valve body 10, and a burner tube 11 mounted horizontally above it. Occupying the front portion of the tube is a vaporizing coil 12 having a tip or nozzle 13. Arranged at the rear end of the burner tube 11 is a burner assembly 14. Depending below the valve body 10 is a fuel container 15 which supplies fuel to the burner and an aerosol liquid container 16. The latter feeds aerosol liquid, for example an oil base insecticide, to the vaporizer coil for discharge of fog at the nozzle 13. For manual support and manipulation, the valve body 10 is provided with a handle or pistol grip 17.

Turning attention first to the details of the burner construction, the burner assembly 14 includes a burner cylinder 21 telescoped over a hollow stem 22, the burner tube being press fitted onto a flange 23 which may be integral with the stem. Press fitted into the front end of the cylinder is a burner disc 25 having a plurality of openings 26. The rear end of the stem 22 projects rearwardly from the burner tube.

For the purpose of admitting gas through the burner, a nipple 30 is screwed into the rear end of the stem 22. Centered within the nipple 30 is an orifice insert 31 having an orifice 32 of small diameter on the order of 0.008 inch. Immediately adjacent the orifice member 31, and for the purpose of insuring that the gas fed to the orifice includes no solid particles, is a filter consisting of a porous plug 33 and wad of cotton 34. Immediately surrounding the orifice member 31 are a plurality of aspirating openings 35 drilled in the wall of the stem 22. It will be apparent that whenever fuel gas, for example, butane, is fed to the orifice for ejection at high velocity, the entrained air, entering through the aspirating openings 35, is intimately mixed with the gas and passed into the burner cylinder 21 where the mixing is completed. The air-gas mix, passing through the openings 26 in the disc 25, then burns within the burner tube 11.

In the preferred embodiment the burner cylinder 21 is girdled by a row of spaced openings 36 about its midsection and the burner cylinder has a diameter which is slightly less than the inner diameter of the burner tube thereby to provide an annular clearance space 37. For the purpose of maintaining the burner cylinder centered within the burner tube, the tube is preferably formed with

a series of dimples 38. The clearance space 37 provides for the addition of a small amount of secondary air which is drawn inwardly into the burner tube carrying with it some of the air-gas mix from the openings 36 in the cylinder.

So as to keep the hollow stem 22 at a low temperature and to minimize transmission of heat by conduction to the handle of the device, a plurality of discs 39 are pressed onto the stem with sufficient area in contact as to provide efficient heat transfer. The discs 39, it may be noted, also add to the appearance and styling.

For the purpose of admitting additional secondary air and to permit the escape of the products of combustion while substantially confining the flame in the burner tube, the upper surface of the burner tube is formed with a plurality of transverse slots or vents 40 which are equally spaced from one another and which extend down about half way into the burner tube. In order to muffle the flow and confine it substantially within the tube, the slots 40 are preferably of limited width, on the order of $\frac{1}{32}$ inch and to a depth equal to half the diameter. In a practical device, fourteen such slots are employed.

For supplying fuel to the burner assembly 14, the fuel container 15 is screwed into a socket 50 formed in the underside of the valve body 10 adjacent the handle 17. The socket communicates with an on-off valve 51 (see FIG. 3) having a threaded valve stem 52 which cooperates with a seat 53 under the control of a lever 54 at its outer end. A stop 55 limits the throw of the lever 54 and defines the "on" condition of the valve. From the valve 51 gas flows through a conduit 56 formed in the valve body, which conduit extends upwardly as indicated at 56', to the nipple 30.

To prevent the flow of gas from the fuel container 15 until the same is screwed into position, a check valve 60 is provided at its upper end. Turning to the details of the valve 60 (see FIG. 4), it will be noted that the can is provided with a cap 61 having a central cylindrical neck or boss 62, the outer surface of which is threaded, as indicated at 63, for reception in the socket 50. Centrally within the boss 62 is an opening 65. For sealing this opening, a valve plunger is provided in the form of an inverted cup 66 which engages an annular gasket 67 surrounding the opening. For urging the valve plunger 66 in the upward or closing direction, a coil spring 68 is provided which is seated on a cylindrical retainer 69 which is press fitted with respect to the inner wall of the boss 62. Radial clearance is provided between the retainer 69 and plunger 66.

In accordance with the aspects of the present invention, the check valve is unseated, and a throttling escape opening is provided by an auxiliary valve plunger indicated generally at 70. This valve plunger carries a flange 71 at its inner end for maintaining it captive and has an outwardly extending shank with a tip 72 formed with a cross slot 73. In a practical case the shank may have a diameter of 0.085 inch which, using an opening 65 of 0.090 inch, provides an annular escape passage 0.0025 inch in radial thickness. Such passage being of limited area, provides a first stage of throttling. Additional throttling occurs in the cross slot 73, and at the valve seat 53; thus reducing the pressure within the container to a lower or "line" pressure applied to the gas conduit 56. The throttling which occurs in the burner orifice 32 thus constitutes a final stage of throttling thereby reducing the gas to the pressure utilized in the burner. Substantially less throttling is required using butane, having a pressure of 20 lbs. per square inch, than would be required for, say, propane. For the purpose of engaging the tip 72 of the valve a land 74 is provided in the socket 50.

It will be apparent, therefore, that prior to installation the check valve is sealed against the escape of the gas from the container. When the container is screwed into the socket, the tip 72 of the pin 70 seats on the land 74, thereby unseating the check valve member 66 from the

gasket 67 permitting escape of gas through the orifice surrounding the pin. The throttled gas flowing through the valve 50 is further throttled through the orifice 32. After being mixed with the aspirated air, the gas-air mix flows through the openings in the disc 25 of the burner assembly for burning within the burner tube.

In accordance with the present invention, a vaporizing coil is provided within the burner tube having an inlet end and a discharge end and consisting of a series of helical convolutions occupying a substantial portion of the length of the burner tube 11, with the inlet end being located remote from the burner so that the entering aerosol liquid approaches the burner gradually for progressive increase in temperature. More specifically, the vaporizing coil, indicated at 12, has an inlet end 75 arranged at the forward end of the burner tube and is formed into a plurality of helical convolutions 76. The final convolution 77 is closely coupled to the burner. At the end of the final convolution, the final portion 78 of the vaporizing coil is reversely bent parallel to the tube axis to provide a straight run terminating in the nozzle 13 which penetrates a cap 41 at the forward end of the burner tube.

In accordance with one of the features of the present invention, the terminal, straight run portion 78 of the vaporizing coil is brought out alongside of the coil convolutions and preferably interposed between the coil and the slotted upper surface of the burner tube 11. It is found that this arrangement produces a number of advantages. In the first place the aerosol liquid entering at the inlet end 75 of the vaporizing coil is located remotely from the burner and is relatively cool. As the aerosol liquid flows through the vaporizing coil, the temperature is gradually raised so that when it reaches the final convolution 77 the temperature is maximum. In a practical case, it is found that the temperature of the fluid in the coil rises from substantially room temperature at the forward end or inlet end 75 gradually to a maximum of about 385° in the terminal convolution 77. From this point to the nozzle 13 the final straight run portion of the vaporizing coil is maintained at a relatively low average temperature by reason of its proximity to the burner tube 11. In order to increase the velocity of the stream flowing from the nozzle 13 and to bring about a further reduction in the temperature of the affluent, the nozzle preferably has a terminal restriction as indicated in FIG. 5. Here it will be noted that the diameter is reduced from about 0.13 inch which constitutes (d_1) the normal inner diameter of the coil to approximately 0.05 inch (d_2). By leading the terminal portion 78 to the nozzle 13 outside of the coil, and preferably along the top edge thereof, the center of the coil is left unobstructed for access of the flame emanating from the burner. Because of the lack of obstruction and because of the fact that the convolutions of the coil are uniformly spaced along the adjacent spaced vents 40, the products of combustion are free to flow out through all of the vents. Moreover, the end portions of the vents serve to admit secondary air which completes the process of combustion so that all of the B.t.u. content of the gas is utilized. A burner and burner tube constructed as described above is found to burn cleanly and efficiently without smoke or deposition. Operation is quiet and the flame, confined within the tube, is barely visible.

For supplying aerosol liquid to the inlet 75 of the vaporizing tube, the inlet is engaged by a pressure fitting 80 which is screwed into the front end of the valve body and which communicates with a horizontal passageway 81. Immediately below the passageway 81 there is formed in the valve body a threaded socket 82 which engages the threaded upper end of the container 16. Interconnecting the passageway 81 and the socket 82 is a vertical bore 83. Threadedly received in the lower end of the bore 83 is a small, hollow, downwardly projecting valve operator 84 having a cross slot 85 at its tip.

In accordance with the present invention, a charge of liquified gas at high pressure is charged into the container 16 along with the aerosol liquid for discharging the liquid under pressure into the vaporizing coil 12, with the propellant gas being so chosen as to be at least partly soluble in the aerosol liquid and of such specific gravity that any excess tends to float upon the aerosol liquid forcing it up through a central dip tube. Where an aerosol liquid having an oil base is used, I prefer to use liquified propane gas as a propellant. In the case of a 12 oz. container, approximately 1½ ounce of propane, by weight, may be employed, with about one ounce entering into solution.

Means are provided for sealing the container prior to installation. Such sealing may be accomplished by a valve assembly 90 having a valve member 91 cooperating with a gasket 92. The valve member 91 is urged against the gasket by a spring 93 which is seated on a retainer 94. Thus it will be apparent that the escape of aerosol liquid, under the urging of the charge of pressurized gas, is prevented until the container 16 is screwed into the socket 82. As the container is screwed in, the plunger or valve operator 84 serves to unseat the valve member 91 thereby permitting flow of the liquid into the passageway 83. A dip tube 95 extends to the bottom of the container so that the entire contents of the container 16 may be discharged prior to any escape of the propelling gas.

For the purpose of manually controlling the release of the aerosol liquid into the vaporizing coil under the pressure of the propellant, I provide a manually manipulated valve 100 under the control of a trigger 101. Such valve is preferably in the form of a plunger 102 extending through a longitudinal bore 103 which runs lengthwise through the valve body. At the front end of the plunger is a valve seat 104 which is preferably formed by a resilient O-ring. Escape of the aerosol liquid along the length of the plunger is prevented by a second O-ring 105 which is, as shown, captive in a groove formed on the plunger and which bears against the wall of the bore 103. For the purpose of urging the plunger into seated position, a coil spring 106 is provided which is held in compression by a threaded set screw 107 screwed into the valve body. For the purpose of retracting the plunger 102 and unseating the valve seat 104, a shoulder 108 is formed on the plunger in the path of movement of the trigger 101. It will be apparent, then, that with the trigger in its normal relaxed state, the aerosol liquid is sealed against escape while applying a small amount of pressure in the trigger retracts the plunger 102 so that the aerosol liquid may flow into the passageway 81 and thence to the initial convolution of the vaporizing coil.

In accordance with one of the more detailed aspects of the present invention a flint-type lighter is provided at the front end of the valve body cooperating with an ignition port at the front end of the burner tube. This insures that the burner tube has a sufficient charge of air-gas mix for positive ignition after the flow of gas is turned on. In the present instance the lighter indicated at 110 is of the type employed in cigarette lighters with the ignition port 111 arranged in the path of the sparks.

While the operation of the device will be apparent in view of the above detailed description, it may be helpful to summarize a typical cycle. The two containers 15, 16 are screwed into place thereby unseating the check valves associated with each of them. The control knob 54 associated with the valve 51 is next moved counter-clockwise, with the degree of opening being limited by the positioning of the pin 55. Preferably the pin is so positioned as to correspond to a heat rate of 3,000 B.t.u. per hour. The resulting flow of gas through the conduit 56 and burner jet member 31 causes air to be aspirated through the openings 35 in the burner stem so that an intimate air-gas mixture is discharged through the burner openings 26. After the gas has been turned on for two or three seconds, adequate to fill the burner tube with air-

gas mix, the lighter 110 is operated. The flame propagates rearwardly from the opening 111 to establish a flame at the burner which projects part way into the vaporizer coil and with the heat being concentrated in the last few convolutions thereof. Air entering at the ends of the transverse slots 40 supplies any deficiency needed for combustion and the products of combustion escape upwardly at the center portions of the slots.

After waiting only a few seconds for the vaporizer coil to come up to temperature, the operator depresses the trigger 101, unseating the plunger 102 from the valve seat 104 so that the aerosol liquid is free to flow upwardly through the dip tube 95 and into the inlet 75 of the vaporizing tube. While the pressure of the propane or other suitable propellant at room temperature is high, on the order of 100 lbs. per square inch, there is sufficient throttling of the liquid so that the flow takes place slowly and at a controlled rate even though the trigger is fully depressed. As the aerosol liquid flows through the vaporizer coil into the region of higher temperature, the various fractions thereof are converted to vapor form creating progressive vaporization, accompanied by a high degree of turbulence, with the vaporizing coil. The fluid and vapor friction produces a back pressure which tends further to limit the range of flow of the aerosol liquid from the container 16. Preferably the tip or nozzle 13 of the coil is necked down as indicated in FIG. 5 to increase the projection of velocity of the fog and this, too, serves to increase the back pressure slightly. In any event the effect of pulling the trigger 101 is to produce immediate volumes of white fog which expands to fill the room or area being treated at a rate on the order of 3,000 cubic feet per second. Because of the high velocity of projection, the present device is particularly useful for injecting the fog into cracks and other confined spaces which may be penetrated by the narrow elongated nozzle 13.

After a few seconds of operation the trigger may be released and the effluent directed into an adjacent region or space. If desired, the trigger may be left "turned off" for a period of several minutes or indeed indefinitely without fear of overheating the vaporizing coil. Under normal operation, up to approximately three hours of use may be secured from one cylinder of butane fuel which is sufficient to convert to the form of fog approximately seven containers of aerosol liquid. Thus, when exhaustion of the aerosol liquid is indicated by a slowing down of the rate of discharge of fog, it is a simple matter to unscrew the container 16 for replacement with a fresh one.

The heat rate of the device is sufficiently low so that there is very little drop in the pressure of the butane supplied from the container 15 as a result of the "boiling off" or "refrigeration effect." Thus, if desired, the trigger may be pressed continuously with no falling off in the rate of discharge of the effluent. Moreover, the heat rate is sufficiently low so that the device remains at a comfortable equilibrium temperature. Not only is there very little conduction of heat directly from the burner tube, or the stem 22 connected to it but any heat which may be transferred to the valve body is inhibited in its flow to the handle of the device by deposition of a layer of asbestos or other suitable insulating material such as indicated at 115.

Experience shows that the device operates so quietly and with so little evidence of flame that householders and others have very little reluctance to use it even without prior experience. The device is therefore particularly suitable for use indoors as well as out and is free of any of the "surging" or other instability which has sometimes characterized devices of this general type.

While the dispenser has been described in connection with the dispersal of insecticide, it will be apparent that the device is by no means limited thereto and any material capable of forming a fog may be dispensed with

equal safety and convenience. If desired, the dispenser may be converted from one type of aerosol to another simply by unscrewing the container 16 and replacing it with another containing a different material, something which can be accomplished within a few seconds. Since there is nothing in the device to wear out and provided that approved aerosol liquids are employed leaving little or no residue in the vaporizing coil, the present aerosol dispenser may be operated for years without necessity for cleaning or other maintenance.

And while the use of propane as a propellant for the aerosol liquid, particularly where it is only partially dissolved, might be assumed to constitute a hazard, tests and practical experience show that the total amount is so small, is released at such a low rate, and is dissipated at such high velocity from the nozzle that the device may be operated with safety even indoors.

I claim as my invention:

1. In an aerosol fog dispenser, the combination comprising, a valve body, a burner tube thereon, a burner in said burner tube, a container of liquified fuel gas secured to said body and having a valve for communicating with said burner, a container of aerosol liquid secured to said body, a vaporizing coil in said burner tube having its inlet connected to the container of aerosol liquid and having an associated manually operated valve for controlling admission of aerosol liquid to the coil, said container of aerosol liquid including a dip tube and charge of liquified gas for propelling the liquid through said valve into said vaporizing coil for vaporization by said burner.

2. In an aerosol fog dispenser, the combination comprising a horizontally extending elongated valve body, a horizontally extending elongated burner tube arranged above the valve body and having a burner at its rear end, a container of liquified fuel gas screwed into the valve body at its rear end and having an interposed shut-off valve for connecting the same to said burner, a container of aerosol liquid under pressure screwed into the valve body at its front end, a vaporizing coil in said burner tube in the form of a helix having an inlet end and a discharge end, said vaporizer coil being so arranged so that the inlet end is adjacent the front end of the burner tube and extending therefrom for direct connection to the front end of the valve body, a control valve in the front end of said valve body interposed between said insecticide container and the inlet end of the vaporizing coil, a trigger at the rear end of said valve body having a valve operator extending through said body to the valve at the forward end so that when the valve is opened aerosol liquid progresses in said vaporizer coil from the front end of the burner tube to the rear of said burner tube with the final convolution thereof being located immediately adjacent the burner, the discharge end of said coil being reversely bent in the axial direction so that it extends forwardly of the burner tube and out of the front end thereof for discharge of the effluent fog.

3. In an aerosol fog dispenser, the combination comprising a valve body, a burner tube mounted on the valve body having a burner at its rear end, a container of liquified fuel secured to said valve body and having a shut-off valve for communicating with said burner, a vaporizing coil in said burner tube, a container of aerosol liquid secured to said valve body and having a dip tube communicating with the vaporizing coil, said valve body having a manually operated valve for controlling admission of aerosol liquid to the vaporizing coil, said liquified fuel being butane having a relatively low pressure, and a charge of liquified propane having relatively higher pressure in the container of aerosol liquid for propelling the liquid up said dip tube against the back pressure in said coil for vaporization by said burner.

4. In an aerosol fog dispenser, the combination comprising a valve body, a burner tube mounted on the valve body having a burner at its rear end, a container of liquified fuel gas secured to said valve body and having a

shut-off valve for communicating with said burner, a vaporizing coil in said burner tube having a substantially constant diameter over its length and an abrupt restriction at its discharge end, a container of aerosol liquid secured to said valve body and having a dip tube communicating with the vaporizing coil, said valve body having a manually operated valve for controlling admission of aerosol liquid to the vaporizing coil, said liquified fuel gas having a relatively low pressure, and a charge of liquified gas of relatively higher pressure in the container of aerosol liquid for propelling the liquid against the back pressure of the vaporized aerosol so that the aerosol is discharged at high velocity from said restriction.

5. In an aerosol fog dispenser, the combination comprising a valve body, a burner tube mounted on the valve body having a burner at its rear end, a container of liquified fuel gas secured to said valve body and having a shut-off valve for communicating with said burner, a vaporizing coil in said burner tube, a container of aerosol liquid secured to said valve body and having a dip tube communicating with the vaporizing coil, said valve body having a manually operated valve for controlling admission of aerosol liquid to the vaporizing coil, said liquified fuel gas having a relatively low pressure, and a charge of liquified gas of relatively higher pressure in the container of aerosol liquid for propelling the liquid up said dip tube through said valve into said vaporizing coil for vaporization by said burner.

6. In an aerosol fog dispenser, the combination comprising, a horizontal valve body, a horizontal burner tube arranged in spaced relation above said valve body and supported thereon, a burner at the rear end of the burner tube, a pistol grip at the rear end of the valve body, a container of liquified fuel gas screwed into said valve body adjacent said pistol grip, means including a shut-off valve for interconnecting said container of fuel gas and said burner, a container of aerosol liquid screwed into said valve body at the front end thereof adjacent said fuel container, a vaporizing coil in said burner tube and having an inlet and a discharge end, said inlet end being arranged at the front end of the burner tube and helically wound progressing rearwardly toward the burner so that the last convolution thereof is directly ahead of said burner, the discharge end of said coil terminating in a straight run portion which extends parallel to the axis and out of the front end of the burner tube, said container of aerosol liquid having a dip tube and a charge of liquified gas so that the liquid forced by the gas pressure through the vaporizer coil progresses gradually from ambient to a high temperature at the region of the burner for progressive vaporization of the aerosol liquid, a control valve at the front end of said valve body interposed between the container of liquid aerosol and the inlet of the vaporizing coil, a trigger at the rear end of said valve body adjacent said grip, and a valve actuator extending longitudinally through the valve body from the trigger to the valve at the front end.

7. In an aerosol fog dispenser, the combination comprising, a horizontally arranged burner tube having a gas burner at its rear end, a vaporizing coil in said burner tube in the form of a series of spaced helical convolutions extending over a substantial portion of the length thereof with the inlet being at the forward end of the burner tube and the final convolution adjacent said burner, a cap for enclosing the front end of the burner tube, said burner tube having restricted spaced openings along its upper surface for escape of the products of combustion, the discharge end of the vaporizing coil terminating in a reversely bent substantially straight run portion interposed between the coil convolutions and the wall of the burner tube leaving the center of the vaporizing coil free and unobstructed for entry of the flame from said burner, the vaporizing coil terminating in a nozzle which extends through said cap, means for feeding gas-air mix to said burner, and means for feeding aerosol liquid under pressure to the inlet

end of said vaporizing coil for progressive vaporization of the aerosol liquid as it travels through said vaporizing coil in the direction of the burner.

8. In an aerosol fog dispenser, the combination comprising, a horizontally arranged burner tube having a gas burner at its rear end, a vaporizing coil in said burner tube in the form of a series of spaced helical convolutions extending over a substantial portion of the length thereof with the inlet being at the forward end of the burner tube and the final convolution adjacent said burner, a cap for enclosing the front end of the burner tube, said burner tube being transversely slotted along its upper surface with a series of narrow kerfs for escape of the products of combustion, the discharge end of the vaporizing coil terminating in a straight run portion interposed between the coil convolutions and the slotted upper surface of the burner tube leaving the center of the vaporizing coil free and unobstructed for entry of the flame from said burner, the vaporizing coil terminating in a nozzle which extends through said cap, means for feeding gas-air mix to said burner and means for feeding aerosol liquid under pressure to the inlet end of said vaporizing coil for progressive heating and vaporization of the aerosol liquid from ambient as it travels through said vaporizing coil in the direction of the burner.

9. In an aerosol fog dispenser, the combination comprising, a horizontal valve body, a horizontal burner tube spaced above said valve body and having a front end and a rear end, a burner telescoped into the rear end of the burner tube and having a stem extending rearwardly therefrom, the rear end of said stem being secured to the valve body, an orifice centered in said stem and having adjacent aspirating holes in said stem, a container of liquified fuel gas screwed into the underside of the valve body at the rear end thereof, means including a shut-off valve in said valve body for communicating with said orifice, a vaporizing coil in said burner tube having spaced convolutions extending over a substantial portion of the length of the tube and having an inlet end and a discharge end, said inlet end penetrating said burner tube and depending from the front end of the latter and adjacent the front end of the valve body, a container of aerosol liquid screwed into the underside of the valve body at the front end thereof, means at the front end of said valve body for connecting the inlet end of the vaporizing coil so that said inlet end provides physical support for the front end of the burner tube thereby minimizing the heat conduction paths between said burner tube and said valve body, said stem having fins thereon for inhibiting conduction of heat from the rear end of the burner tube to the valve body, a handle depending from the rear end of the valve body, said handle having interposed between it and said valve body a layer of heat insulation thereby to inhibit conduction of heat into said handle to maintain the latter at a low temperature even during extended periods of operation of said burner.

10. In an aerosol fog dispenser, the combination comprising, a valve body, a horizontal burner tube arranged above said valve body and spaced from it, said burner tube having a burner at the rear end thereof, front and rear threaded sockets in the underside of said valve body, means providing communication between the rear socket and said burner, a container for liquified fuel gas having a threaded cap for screwing into the rear socket and formed with a central opening, a check valve in said cap, a plunger in said opening for engaging said check valve, said plunger having a shank with a flange at its inner end for maintaining the plunger captive, said valve body providing a land surface for engaging the tip of the shank when the fuel container is screwed into said socket for unseating of said check valve, said shank having a predetermined clearance space with respect to said central opening for throttling of the gas to a pressure suitable for said burner, a vaporizing coil in said burner tube having an inlet and a discharge nozzle, a container of aerosol liquid screwed

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into the front socket, means providing communication between the inlet end of the vaporizing coil and the aerosol liquid container, the aerosol liquid container having a self-contained charge of liquified gas for pressurizing the same for forcing of liquid aerosol from the container into the vaporizing coil. 5

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