April 4, 1944. H. R. RICH 2,345,687

PRESSURE VAPORIZER

Filed March 26, 1943

Fig. 1.

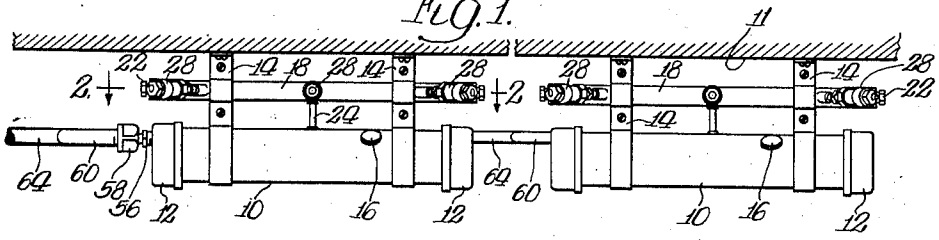


Fig. 2.

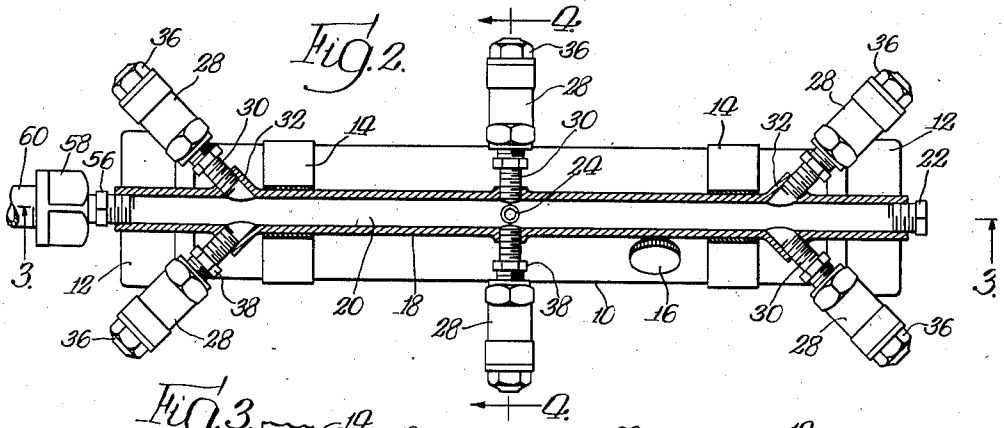


Fig. 3.

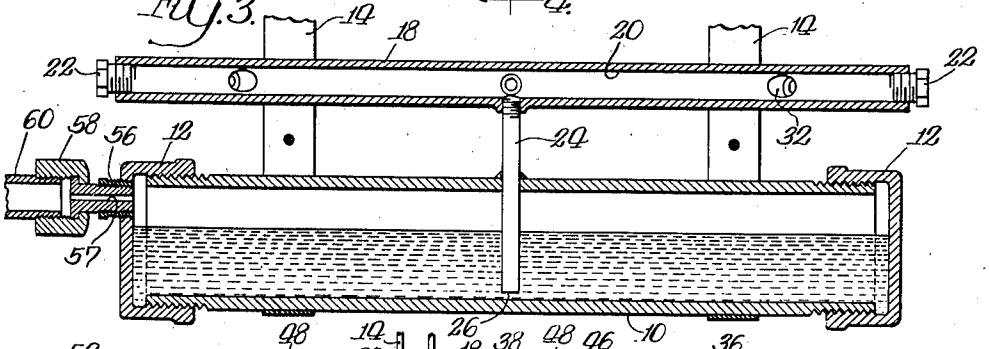
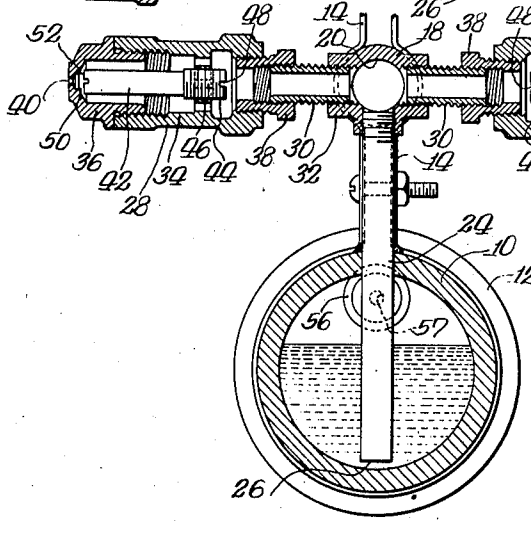


Fig. 4.



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Patented Apr. 4, 1944

2,345,687

UNITED STATES PATENT OFFICE

2,345,687

PRESSURE VAPORIZER

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Application March 26, 1943, Serial No. 480,628

5 Claims. (Cl. 299—86)

My invention relates to spray devices and particularly to mechanical sprays for atomizing a fluid and spreading it in the form of a layer of vapor over a relatively large area.

Among the objects of my invention is to provide a new and improved fluid spray device which is designed to emit a cloud of atomized vapor by use of fluid pressure wherein the pressure may be relatively light without sacrificing evenness or desired density in the distribution of the vapor.

Another object of my invention is to provide a new and improved unit type of spray device having a multiple number of vapor emitting outlets spaced at various distances from the reservoir so constructed and being so adjustable that a cloud of vapor which is emitted can be controlled so that a desired distribution can be accomplished with regard to both direction and density.

A further object of my invention is to provide a device for producing a layer or stratum of vapor and spreading it evenly over a room by utilization of a central fluid pressure system and one or more individual reservoirs containing another fluid in such a manner that only the fluid contained in the reservoirs is emitted from the spray device, the purpose being to use the fluid which supplies the pressure merely as a source of pressure without itself being emitted from the spray device, therefore making it unnecessary for the pressure fluid to be filtered or conditioned in any way.

A still further object is to provide a pressure system for treating a space with an insecticidal vapor which is disseminated initially close to the ceiling by using one or more liquid reservoirs adapted to be filled with a predetermined amount of liquid, depending upon the type of treatment desired, each reservoir being equipped with a sufficient number of spray devices closely associated with it for drawing liquid in uniform quantities from the respective reservoir and for spreading vapor in all directions. The object contemplates connecting each reservoir individually to the central source of fluid pressure to assure uniform pressure in each of the individual reservoirs and make them capable of being simultaneously controlled at one central point.

With these and other objects in view, my invention consists in the construction, arrangement and combination of the various parts of my device whereby the objects contemplated are attained, as hereinafter more fully set forth, pointed out in my claims and illustrated in the accompanying drawing, in which:

Figure 1 is an elevational view of two of my devices shown attached to the ceiling of a room to be treated.

Figure 2 is a longitudinal sectional view of one of the devices taken on the line 2—2 of Figure 1.

Figure 3 is a vertical section taken on the line 3—3 of Figure 2.

Figure 4 is a cross-sectional view taken on the line 4—4 of Figure 2 and drawn to a slightly larger scale.

In the past vaporizers for liquids and fluids have been used for the general purpose of filling a room, or other space, with a cloud of vapor for the purpose of killing insects and insect life which might be in the room or hidden in cracks and corners of the walls, ceiling and floor. If vaporization treatment of a room or space is to be successful, every crack and corner of the room must be filled with vapor. It is especially necessary that the vapor be as uniform and dense at the ceiling elevation as it is in parts of the room at lower levels. The ceiling is found to be the most difficult place to treat properly. If the ceiling and the upper part of the walls adjacent the ceiling are not treated, insects will find a refuge there, and no amount of treatment of the lower portion of the room will rid the place completely of their presence. Without the use of vaporizers of special construction, considerable pressure would be required in order to project the vapor effectively over the space adjacent the ceiling.

Attention is directed to the applicant's prior Patent No. 2,250,034 issued July 22, 1941, which was devoted to a device for spreading a stratum of vapor initially near the ceiling level of a room in order to accomplish the above described result. To afford a greater economy in the use of pressure for the spray devices certain changes in the mechanical set up have been found advisable. The present application is one employing a nozzle for the emission of the insecticide fluid only, instead of the jet previously employed which mixed different fluids during the discharge. Use of a nozzle instead of a jet requires a mechanical structure quite different and a principal of operation likewise different.

In the drawing there is shown a tank 10 designed to hold liquid insecticide, or other fluid substance, which is to be emitted in the form of a spray or vapor into a room to be treated. The tank may be a conventional cylindrical tank positioned with its axis horizontal, and closed at the ends by means of caps 12. The tank in Figure 1 is attached to the ceiling 11 by means of straps 14. A filling aperture is located near the top side of the tank and is closed by means

of a cap 16. The tank forms a primary reservoir and may be filled to a point close to the top with the fluid insecticide. The tank is arranged so that it may be filled with just the right amount of liquid for a specified treatment preventing waste of the liquid after the spraying operation has been effectively completed.

A second horizontally disposed and substantially cylindrical tank 18 is located above the tank 10 and has its longitudinal axis parallel to the axis of the tank 10. The upper tank may, if preferred, be spaced from the tank 10 in a position immediately above it. Also, as shown in the drawings, the upper tank has a cylindrical interior 20 substantially smaller in cross-sectional diameter than the interior of the tank 10. Plugs 22 close the ends of the tank 18.

The upper tank, in effect, forms a secondary reservoir and is supported by the same straps 14 which support the lower tank. At a point near the center of the secondary reservoir, and at the bottom, there is positioned the upper end of a standpipe 24 which extends downwardly through the top of the tank 10 so that the bottom end 26 of the standpipe is positioned adjacent the bottom of the liquid holding space within the tank 10.

The upper or secondary reservoir 18 is provided with a plurality of nozzles 28 which, as best shown in Figure 2, extend in different angular directions outwardly therefrom. The nozzles, instead of being built into the upper reservoir, may be constructed individually and attached thereto by means of a threaded connector 30, which is screwed into a correspondingly threaded boss 32 on the body of the tank. It should also be noted that, as shown in Figures 3 and 4, the axes of the nozzles are all in the same horizontal plane.

Individually each nozzle is provided with adjusting features and each comprises a casing or body 34, a cap 36, and a threaded inlet plug 38 which is attached to the connector 30. In the cap is an outlet orifice 40 which is relatively small in diameter. Behind the orifice is an adjustable plunger 42 which has an end 44, threadably mounted in a spider 46 within the casing. The plunger is provided with a screw driver slot 48 by means of which it can be rotated so as to either enlarge or diminish a space 50 between tip 52 of the plunger and the inside end of the orifice 40.

At the top of the tank 10 there is an inlet opening 57 for admitting fluid under pressure to the interior. A fitting 56 forming part of a pressure line has attached to it a coupling nut 58 and a pipe line 60. The pipe line is designed to conduct fluid and particularly gas under pressure to the tank. Where more than one tank is to be connected to a common source of fluid pressure, the pipe lines 60 from each tank are joined to a common main pipe 64.

In operation each of the lower tanks is filled preferably with a quantity of liquid, and particularly with an easily vaporizable liquid, to a level somewhere below the elevation of the opening 57 which is close to the top of the tank. The tank is customarily filled at the filler aperture under the cap 16. After the filler cap has been replaced on each tank, the apparatus is ready for operation. The same procedure applies whether there is one or a multiple number of the tanks.

Pressure is then generated by some conventional means not shown, and fluid under pressure, usually a gas, is carried through the main pipe line 64 to each pipe line 60 and thence through the opening into the top of the primary reservoir above the level of the liquid insecticide contained therein. When the pressure is sufficiently great, the liquid insecticide is forced out of the lower tank into the bottom 26 of the standpipe 24 and thence upwardly into the interior of the secondary reservoir. The liquid then spreads over the entire length of the secondary reservoir and into the several nozzles. Driven by the fluid pressure the liquid insecticide is blown in the form of a spray outwardly from the orifices 40. It will be apparent that none but the liquid insecticide need be driven outwardly from the nozzles. As soon as the level of the liquid in the tank 10 drops below the end 26 of the standpipe 24, the pressure is shut off and the operation ceases.

To completely regulate the direction and uniformity of distribution of the vaporized liquid emitted from the nozzles, the nozzles may be adjusted. The nozzles nearest the standpipe 24 may have the plunger 42 so set that they emit the same quantity of liquid as the end nozzles although there might be a slight drop in pressure between these nozzles and the nozzles more remote from the standpipe. Also, if the room to be treated should be of an irregular shape, nozzles directed toward the wall of the room farthest from the location of the spray device could be adjusted to emit vapor in greater quantity or under greater force than nozzles directed toward a nearer wall of the room. Thus, an even distribution of vapor can be maintained without waste which would otherwise result from spraying more liquid than necessary into some parts of the room.

Further, by reason of the fact that the gas which produces the pressure need never be passed through any of the nozzles, it becomes unnecessary to filter the pressure gas. Also, since only the vaporizable liquid is passed outwardly from the nozzles, the gas under pressure need be only under a relatively light pressure and expensive compressor machinery may be dispensed with. The invention contemplates the use of such gas as CO_2 from cylinders making it possible on occasions to dispense entirely with compressor machinery.

Therefore, as described, there has been provided an efficient and economical unit spray mechanism which is adapted to saturate the space within the interior of a room by spreading a stratum of vapor initially near the ceiling and which can be operated by a gas or fluid at a comparatively low pressure.

Some changes may be made in the construction and arrangement of the parts of my device without departing from the real spirit and purpose of my invention, and it is my intention to cover by my claims any modified forms of structure, or use of mechanical equivalents, which may be reasonably included within their scope.

I claim as my invention:

1. A fluid spray device for generating a stratum of atomized fluid comprising a horizontally disposed tank forming a primary fluid reservoir, a horizontally disposed tank forming a secondary fluid reservoir above and parallel to the primary reservoir, a standpipe connecting said reservoirs and extending from the bottom of the secondary reservoir at a point near the center into the primary fluid reservoir to a point near the bottom thereof, a plurality of sets of nozzles spaced along the secondary reservoir at various intervals and having the outlet orifices thereof pro-

jecting outwardly therefrom in various directions in the plane of the axis of said secondary reservoir, and a pipe line connected near the top of said primary reservoir for conducting fluid under pressure into said primary reservoir, said pressure being adapted to eject fluid uniformly from all said nozzles in the form of a stratum of vapor.

2. A fluid spray device for generating a stratum of atomized fluid comprising a horizontally disposed tank forming a primary fluid reservoir, a horizontally disposed container forming a secondary fluid reservoir above the primary reservoir, a standpipe extending from the bottom of the secondary reservoir into the primary fluid reservoir to a point near the bottom thereof, a plurality of sets of nozzles spaced along the secondary reservoir at various intervals and projecting outwardly therefrom in various directions in the plane of the axis of said secondary reservoir, and a pipe line connected near the top of said primary reservoir at one end thereof below the center line of the secondary reservoir for conducting an auxiliary fluid under pressure into said primary reservoir to the surface of the initial fluid therein, said pressure being adapted to eject the initial fluid uniformly from all said nozzles in the form of a stratum of vapor.

3. A fluid spray device for generating a stratum of atomized fluid comprising a horizontally disposed, relatively cylindrical tank forming a primary fluid reservoir having a normally closed filling aperture near the topside thereof, a horizontally disposed relatively cylindrical container forming a secondary fluid reservoir parallel to and smaller in diameter than the primary reservoir and spaced therefrom, a standpipe extending from the bottom of the secondary reservoir at a point near the bottom thereof, a plurality of sets of nozzles spaced along the secondary reservoir at various intervals and having the outlet orifices projecting outwardly therefrom in various directions in the plane of the axis of said secondary reservoir, a tubular connector between each said nozzle and the secondary reservoir having the axis thereof lying in the plane of the axis of said secondary reservoir, and a pipe line connected near the top of said primary reservoir at one end thereof for conducting an auxiliary fluid under pressure into said primary reservoir above the surface of the initial fluid therein, said pressure being adapted to eject the initial fluid uniformly from all said nozzles in the form of a stratum of vapor.

4. A fluid spray device for generating a stratum of atomized fluid comprising a primary fluid reservoir, a secondary fluid reservoir, a standpipe extending from the secondary reservoir into the primary reservoir to a point near the bottom thereof, a pipe line connected to the primary reservoir near the top side thereof for admitting gas under pressure, and a series of nozzles projecting from the secondary reservoir having the outlet orifices thereof in fixed position and spaced at different distances and directions from the standpipe, independent adjusting means in each nozzle adapted to vary the opening for the passage of fluid from the nozzle without changing the location of the respective outlet orifices whereby the quantity of fluid vapor emitted from the nozzles may be kept at a predetermined amount, location and direction irrespective of the distance between each respective nozzle and the standpipe.

5. A system of fluid spray devices for generating a stratum of atomized fluid comprising a plurality of horizontally disposed relatively cylindrical tanks forming respective primary reservoirs, a plurality of smaller horizontally disposed cylindrical tanks forming secondary reservoirs above and adjacent the primary reservoirs, said secondary reservoirs being separated one from another, a standpipe connecting each secondary reservoir with its respective primary reservoir and a series of nozzles projecting in various directions from each said secondary reservoir adapted to emit a cloud of atomized fluid when subjected to pressure, and a common pipe line including a main line under pressure having separate branch lines extending therefrom respectively to each of said primary reservoirs and connected thereto below the location of the secondary reservoirs and at a point near the top of each respective primary reservoir and below the filling aperture thereof, said common pipe line being adapted to supply fluid under uniform pressure to each of said primary and respectively adjacent secondary reservoirs.

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