Jan. 25, 1938. J. H. BRENNAN 2,106,627

SPRAYING DEVICE

Filed Aug. 18, 1937

Fig. 1

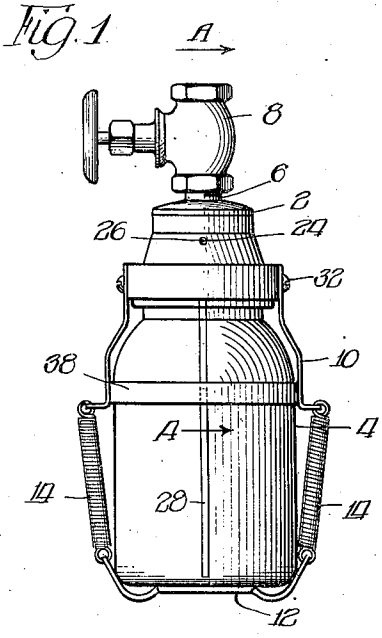
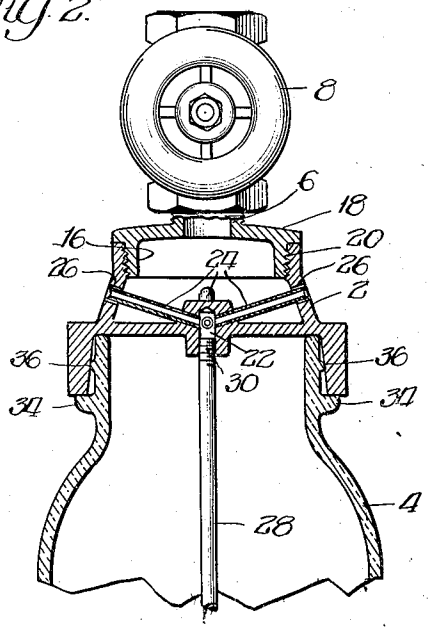


Fig. 2.



Inventor:
John H. Brennan,
By Pickard Spencer & Ely

Patented Jan. 25, 1938

2,106,627

UNITED STATES PATENT OFFICE

2,106,627

SPRAYING DEVICE

John H. Brennan, Minneapolis, Minn.

Application August 18, 1937, Serial No. 159,636

5 Claims. (Cl. 299—86)

This invention relates to a spraying device, more particularly a new and improved type of permanently installed spraying device adapted to be connected to high pressure steam lines or other fluid pressure lines available in industrial plants.

In creameries, dairies and other industrial plants it is often necessary, and usually desirable, to provide a means for spraying insecticidal and germicidal solutions for sanitation purposes. Such plants usually have high pressure steam lines available and these lines may be tapped with auxiliary lines which in turn may be utilized as a source of pressure to atomize or spray germicidal or insecticidal liquids.

Various spraying devices using fluid pressure have been proposed. One of the principal difficulties with such devices hitherto suggested is their inadequacy in failing to cover large areas and particularly their ineffectiveness in spraying a liquid horizontally or downwardly so that it never reaches the ceiling portions.

Certain of these devices also operate on the principle that fluid pressure is brought to bear on the opening or openings of the liquid delivery tubes substantially at right angles to the latter. If either the fluid pressure tube or the liquid delivery tube become slightly out of line due to vibration or other reasons, the spray will either cease or be rendered inefficient.

One of the objects of this invention is to provide a sprayer of the fluid pressure type in which liquids such as insecticides and germicides can be forced in all directions. A further object is the provision of a sprayer in which a solution is forced in the direction of the ceiling instead of the side walls. Another object is to provide a spraying device having a sprayer head with a plurality of nozzles enclosed and permanently adjusted to eliminate the possibility of any change of adjustment by expansion or contraction when used on a steam pressure line. An additional object of the invention is to provide a spraying device with a sprayer head assembly which simplifies accessibility to all parts of the device in order to remove any formations which might accumulate as a result of scale or lime passing into it from the source of pressure. Still a further object is to provide a simplified method of fastening the liquid container to the sprayer head in a manner such that it is easily removable without breakage. Another object is to provide a spraying device which is substantially drip-proof. Other objects will appear hereinafter.

These objects are accomplished in accordance with this invention by the provision of a spraying device comprising a steam or air pressure chamber which is connected through a suitable conduit controlled by a valve to a source of steam or air pressure. The top of the chamber is provided with means whereby it is removable so that the chamber may be cleaned and any formations removed which might accumulate as a result of scale or lime, usually formed or present in high pressure steam lines or source of fluid pressure. Removal of the top of the chamber is preferably effected by means of a threaded pressure type dome cap which screws into threads disposed on the inside of the walls of the pressure chamber.

The pressure chamber is likewise provided with one or more vents, preferably four, releasing pressure from the chamber to the surrounding atmosphere. In one portion of the pressure chamber, preferably in a central portion of the base, is disposed a preheating chamber. It has been found that the efficiency of some liquids is increased, for example, some insecticides, if they are heated and vaporized, not prior to the time of spraying, but at substantially the same time they come into contact with the pressure that atomizes the spray. The preheating chamber, disposed in the pressure chamber, serves this purpose.

From the preheating chamber a conduit or conduits lead to the aforementioned vents in the walls of the pressure chamber. These conduits correspond in number to the number of vents, preferably being four in number, and are smaller in diameter than the vents so that the steam or other fluid used as a source of pressure may escape. The exit portions of these delivery conduits are preferably substantially flush with the outer walls of the sprayer head, or slightly within the head. Likewise it is desirable to make them slightly concave in cross section at the tip. This arrangement renders the sprayer completely drip-proof, since the escaping steam or air pressure must pass completely around the ends of the delivery tube, and as a vacuum is created which draws the liquid from the container the liquid is completely enveloped and atomized before it has a chance to drip.

The preheating chamber to which the delivery conduits are connected is supplied with liquid from the container, preferably by a single supply conduit which is removable by means of screw threads or other means. The single supply conduit extends to a point near the bottom of the container which holds the liquid to be atomized or sprayed. One of the features of this invention is the provision of a cage for holding the container in place without the necessity of screwing the

container into the base of the sprayer head. In fact it has been found desirable to avoid screw threads in the Mason jar or other type of container because in the present invention the jar is much more easily removed when it is not screwed into the sprayer head. Furthermore, possibilities of breakage caused by screwing the jar in too tightly are avoided.

Other advantages and features of the invention will become apparent from a reading of the following specification in the light of the accompanying drawing in which:

Fig. 1 represents a side elevational view of the sprayer device;

Fig. 2 represents a sectional view through line A—A of Fig. 1.

As illustrated in Fig. 1, the sprayer device consists generally of a sprayer head 2 and a container 4 for the liquid to be sprayed or atomized. A source of steam or other fluid pressure is provided by conduit 6 controlled by valve 8. The container 4 is held in place by a metal carrier 10 provided with a bottom portion or clamp 12 held tightly against the bottom of container 4 by means of springs 14. Springs 14 exert enough pressure on clamp 12 to hold container 4 in place, but may be readily extended by a hand pull of clamp 12 to permit removal of container 4.

Referring to Fig. 2, the fluid pressure chamber is illustrated by numeral 16. This chamber, as previously described, has a removable dome or cap 18 which is provided with screw threads at point 20, corresponding threads being placed in the walls of the pressure chamber 16 at the same point.

At the base of pressure chamber 16 is disposed the outer portion of the preheating chamber 22. Connected to the inside of said preheating chamber 22 and emerging therefrom are a plurality of conduits 24 which serve to deliver the liquid to the surrounding room. These conduits are disposed within vents 26 in the side walls of the preheating chamber 16, leaving an annular space through which steam or other fluid may escape to the atmosphere and envelop the exit portions of conduits 24.

Liquid is supplied to the preheating chamber 22 through main supply line 28 disposed in container 4. Main supply line 28 is preferably removable by means of a screw thread arrangement 30 or other suitable means in order to clean preheating chamber 22.

Carrier arrangement 10 may be readily attached to sprayer head 2 by means of bolts 32 (Fig. 1) or other suitable means. Shoulders or thread 34 of container 4 are held firmly against the flanges of sprayer head 2. The junction between the flanges of the sprayer head and the container is not airtight, however, because if such were the case, a vacuum would be created in the container. The single thread 36 helps to space the top of the container from the lower portion of the sprayer head and permit the entry of air and at the same time facilitates the prevention of too much sidewise motion of the container. Metal band 38 encircles container 4 and is fastened by soldering or other suitable means to vertical metal stays of carrier 10. Thread 36 and band 38 both help to guide container 4 into place.

The device is simply operated by attaching the valve 8 to a source of high pressure steam or other pressure fluid. When valve 8 is opened, steam or other fluid enters through conduit 6 to pressure chamber 16. As it does so it impinges on the top of chamber 22 and if a hot fluid is used, it heats chamber 22 and the contents thereof. As soon as pressure chamber 16 is full, which is practically instantaneously, the steam or other fluid escapes through the annular spaces in the sidewalls of the pressure chamber formed by vents 26 and delivery conduits 24. As the steam or other fluid escapes, a suction or vacuum is formed in the vortex around the exit of each of the delivery tubes. This causes the liquid in container 4 to be drawn up through main supply line 28 to chamber 22 from whence it is drawn, and finally atomized into the air from delivery conduits 24. As illustrated in Fig. 2, delivery conduits 24 are arranged at an angle of about 30 degrees and hence, liquid particles and vapor are projected upward toward the ceiling of the surrounding room. Maximum efficiency in atomization or spraying of the liquid is thus obtained, and the combination of features described makes dripping practically impossible.

It will be apparent that variations may be made in the apparatus described without departing from the invention. Usually the vertical and lateral bands of carrier 10 are constructed of metal of substantial rigidity, but other types of materials capable of supporting container 4 may be used. Supply conduit 28 is normally larger than delivery conduits 24 but considerable variation may be made in the sizes of the various conduits. It is usually preferable to have a plurality of equally spaced delivery conduits to insure uniform distribution, but it is not absolutely essential that the conduits be equally spaced. While it is preferable to use four delivery conduits, the number may be varied, as, for instance, two, three, four, five or six delivery conduits.

One of the features of the invention resides in the fact that the main feed tube 28 is removable for cleaning without disturbing the adjustment of the nozzles. Ordinarily, the main feed tube for the nozzle of a sprayer is part of the nozzle and if removed, must be replaced with care or otherwise the nozzle will be out of adjustment. One of the further features of the present invention not heretofore discussed is the arrangement of the various elements of the sprayer to prevent condensed moisture from running into the insecticide or other liquid in the container. In most cases, as little as 0.5% water will spoil an insecticide. In sprayers of the steam pressure type heretofore most commonly used, after the steam pressure is shut off, the condensate that forms in the unit tends to run through the steam tube, then drip into the feed tube and into the insecticide jar. Any insecticide that is left is completely and almost instantly deteriorated. This cannot happen with the nozzle arrangement of the present invention.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent of the United States is:

1. In a fluid pressure spraying apparatus, a chamber provided with a fluid inlet and outlet vents to the surrounding atmosphere, a plurality of ducts passing through said chamber and forming circumferential openings in said vents, and means for supplying a liquid to be sprayed to said ducts.

2. In a fluid pressure spraying apparatus, the combination of a sprayer head containing a chamber provided with an inlet to a source of fluid pressure and a plurality of outlet vents in the walls thereof, a plurality of ducts passing through said chamber to said vents and forming

circumferential openings therein whereby a fluid passing through said openings will form a vortex at the exits of said ducts, and means comprising a single supply duct for supplying said delivery ducts with a material to be sprayed.

3. In a fluid pressure spraying apparatus, the combination of a sprayer head containing a chamber having an inlet conduit connected to a source of fluid pressure and vents to the atmosphere, a second chamber in heat exchange relationship with the aforementioned chamber, ducts from the inside of said second chamber running through the first chamber to said vents and forming circumferential openings between the exterior of each duct and the sides of each vent, and means for introducing into said preheating chamber a liquid to be sprayed.

4. In a spraying apparatus, the combination of a sprayer head, a removable container for a liquid to be sprayed, a pressure chamber in said sprayer head connected to a source of fluid pressure, a removable dome cap on said pressure chamber, a relatively small preheating chamber in heat exchange relationship with said pressure chamber, four equally spaced vents to the surrounding atmosphere in the walls of said pressure chamber, four delivery conduits extending upwardly from said preheating chamber through said pressure chamber to said vents, said delivery conduits each forming an annular space with the sides of a vent, and a removable single supply line extending from said preheating chamber to a point near the bottom of the liquid container.

5. In a spraying apparatus, a chamber provided with a fluid inlet and outlet vents to the surrounding atmosphere, a plurality of ducts passing through said chamber and forming circumferential openings in said vents, a container for liquid to be sprayed, means for supplying a liquid from said container to said ducts, said means being removably associated with said ducts.

JOHN H. BRENNAN.