April 13, 1926. 1,580,246

H. H. HELLER

ATOMIZER

Filed August 16, 1921

Fig. 1.

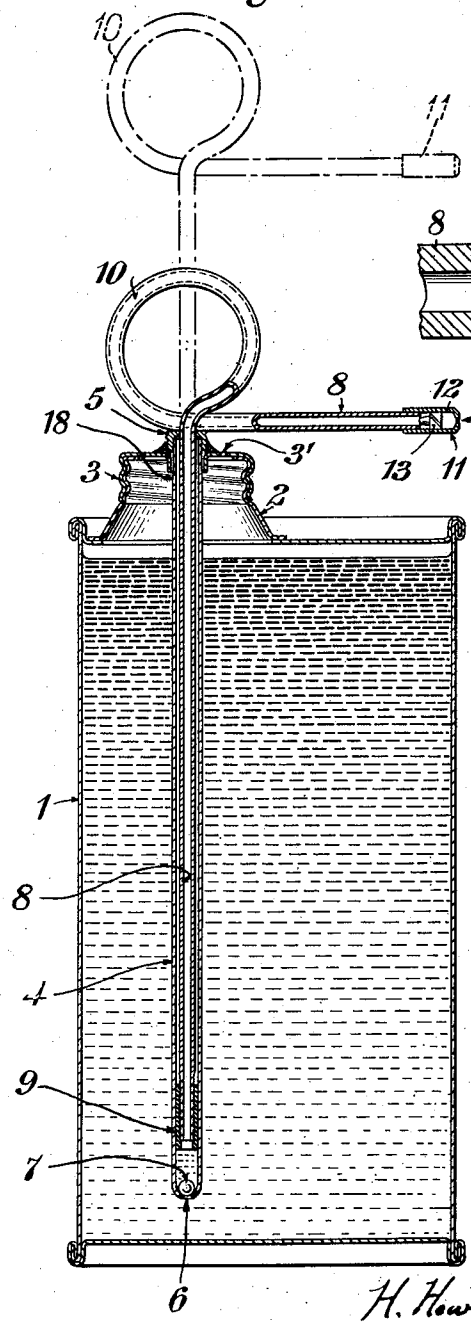


Fig. 2.

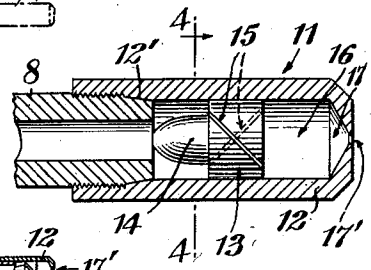


Fig. 3.

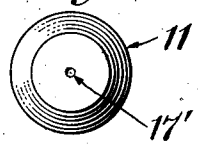
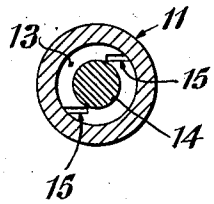


Fig. 4.



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BY Mackey and Gill ATTORNEYS.

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UNITED STATES PATENT OFFICE.

HARLEY HOWARD HELLER, OF SOUND BEACH, CONNECTICUT.

ATOMIZER.

Application filed August 16, 1921. Serial No. 492,812.

To all whom it may concern:

Be it known that I, HARLEY HOWARD HELLER, a citizen of the United States, residing at Sound Beach, in the county of Fairfield, State of Connecticut, have invented certain new and useful Improvements in Atomizers; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to atomizers particularly adapted for spraying insecticides and similar liquids.

It is the usual practice to spray an insecticide by means of an atomizer consisting of a receptacle or tank into which the liquid must be poured from the can in which it is supplied. The aperture through which the receptacle is filled is usually of small diameter, and the operation of pouring the liquid therein may be attended by more or less spilling of the liquid. It is also difficult to observe the level of the liquid in the receptacle and it frequently runs over before its flow from the can can be stopped. The hands are likely to become soiled, and the whole operation is more or less distasteful, particularly if the insecticide has a strong odor and cannot be readily removed from objects with which it comes in contact.

It is an object of this invention to overcome the disadvantages and disagreeable features attending the use of insecticides and similar liquids by providing an atomizer adapted to be substituted for the ordinary closure of the can or container in which an insecticide is originally supplied and to remain on the container as long as there is any liquid in it. The container thus forms the receptacle of the atomizing device, and the insecticide may be sprayed directly therefrom without the necessity of pouring it into another receptacle. The arrangement possesses the further advantage that atomizers designed to fit the containers of a particular brand or make of insecticide may be sold or perhaps even given away with first purchases to promote subsequent purchases of the same insecticide, on account of the fact that the users have in their possession atomizers which may be readily applied to similar containers.

A further object of the invention is the provision of an atomizer of compact construction comprising a small number of parts and which may be cheaply and rapidly manufactured from standard stock and easily assembled.

In accordance with the invention the atomizer comprises a cap, stopper or the like adapted to be substituted for the ordinary closure of a container and carrying an outer tube which, when the atomizer is in place, extends to the bottom of the container and is provided at its lower end with a check valve. Within the outer tube is a reciprocable inner tube carrying at its lower end a piston or plunger fitting closely within the outer tube. The inner tube passes through the cap which carries the outer tube and is bent in such a manner that it may be conveniently gripped and reciprocated within the outer tube to pump liquid through the inner tube to a nozzle at the outer end of this tube. Within the nozzle is freely mounted a member having narrow inclined passageways extending from one end to the other and through which the liquid is forced by the pumping action of the device. The narrow channels together with the swirling motion imparted to the liquid cause it to issue from the orifice of the nozzle in the form of a fine spray.

By movably mounting the member within the nozzle it will also act as a closure for the outer end of the inner tube to prevent entrance of air during the suction strokes of this member. The necessity for providing a valve at this point is thereby avoided with consequent reduction in the number of parts and cost of manufacture of the device.

The particular nature of the invention as well as other objects and advantages thereof will appear more clearly from a description of a preferred embodiment as shown in the accompanying drawing, in which

Fig. 1 is a vertical sectional view of a container and the atomizer associated therewith,

Fig. 2 is a much enlarged sectional detail, illustrating the discharge nozzle of the atomizer.

Fig. 3 is an end view thereof, showing the discharge orifice on a magnified scale; and

Fig. 4 is a section taken on line 4—4 of Fig. 2, showing the liquid-deflecting passages.

Referring to the drawings, 1 indicates a metallic can in which the insecticide or other liquid is supplied and which is provided with a neck 2 threaded in its upper portion for the reception of an ordinary screw cap form-

ing a closure for the can. In Fig. 1, such cap is shown as having been replaced by a cap 3, which forms part of the atomizer and is provided with one or more perforations 3'. An outer tube 4 is threaded into a nut 5 which is soldered to, or otherwise formed to be integral with cap 3. This outer tube is of sufficient length to reach nearly to the bottom of the can. It is rounded at the lower end to form a liquid inlet aperture 6, and also to constitute a valve seat for a ball valve 7.

Slidably mounted within the nut 5 and extending into the outer tube 4 is an inner tube 8, surrounded at its lower end by a piston or plunger 9 which fits closely within the outer tube. Above the nut 5 the inner tube 8 is bent to form a ring 10 into which a finger may be inserted to permit the inner tube to be reciprocated as a piston rod within the outer tube.

The inner tube 8 is provided at its outer end with a discharge nozzle 11 shown on an enlarged scale in Figs. 2 to 4 inclusive and consisting of a relatively short shell 12 which may be pressed upon the end of the tube, as shown in Fig. 1, or screwed thereon, as shown in Fig. 2, to permit it to be more easily removed. In the latter case, the end of the tube 8 and the inner face of the shell may be provided with wedging faces as at 12' to prevent leakage of liquid through the screw threads. Fitting closely within the shell 12 is a slidable member 13, constituting a deflector for the liquid and provided with a tail piece 14 which serves as a closure for the end of tube 8. The body portion of member 13 is in sliding contact with the wall of the shell and is provided with angularly disposed liquid-deflecting passageways 15 that open into a liquid-swirling chamber 16, the length of which varies in accordance with the position of the member 13, which depends upon the fluctuations of pressure in the liquid being forced through the nozzle. The end wall of the shell is provided with a tapering cavity 17 terminating in a discharge orifice 17'.

In using the device the ordinary closure of the can is removed and the cap 3 carrying the atomizer is screwed onto the neck 2. It is intended that the atomizer shall be kept on the can as long as there is any liquid in the latter.

When it is desired to spray the liquid the user slips one finger through the ring or loop 10 and, gripping the latter between the finger and thumb, moves the inner tube 8 up and down within the outer tube 4 in the manner of a pump. The air above the piston or plunger 9 and between the outer and inner tubes 4 and 8, respectively, is expelled into the interior of the can through a hole 18 at the top of tube 4 as plunger 9 ascends. During the upward or suction stroke of the plunger, the ball 6 is displaced from its seat, permitting the liquid to enter tube 4 and rise therein as long as the upward movement of inner tube 8 continues to raise plunger 9. Liquid will enter tube 4 by the suction effect therein caused by the upward movement of plunger 9 aided by the head of the liquid in the can, which will tend to fill the tube as space is created therein by the upward movement of the plunger. The hole 3' maintains the upper portion of the can above the liquid in communication with the atmosphere to insure that liquid be forced into the tube 4 as the plunger moves upward. The air ejected from the tube 4 during this stroke of the plunger also tends to increase the pressure upon the liquid in the can. During this stroke of the plunger the air pressure acting upon the outer face of member 13 will seat its tail piece 14 against the outer end of tube 8 to prevent air from entering this tube in consequence of which there will be no lessening or destroying of the suction effect of the plunger 9.

As the plunger 9 is driven downward on the pumping stroke, the pressure transmitted through the liquid in tube 4 seats ball 6 and the liquid in this tube flows, under the impulse of the plunger, up through the inner tube 8, around through ring portion 10 and into discharge nozzle 11. Encountering tail-piece 14 of member 13, the liquid first pushes the member away from the end of tube 8, against which it has been seated during the previous suction stroke of the plunger. As the liquid passes over the conical tail-piece it is spread into a tubular column better adapted to enter and pass through the deflecting passageways 15. As it emerges from these passageways, the liquid is directed by the latter against the wall of the swirling chamber 16, and is ejected through the discharge orifice 17' of the nozzle 11 in a cloud-like spray. The spray may be aimed in any desired direction by turning the inner tube within the nut 5 and tipping the can which will ordinarily be held in one hand while the tube and its plunger are being reciprocated by the other hand. The portion of the tube 8 immediately above nut 5 acts as a stop by coming to rest on top of this nut, thereby limiting the downward movement of tube 8 and plunger 9 to prevent the latter from striking ball 7.

From the foregoing it will be seen that the invention provides a simple, efficient sprayer particularly suited for use in connection with a large variety of containers in which insecticides and other liquids are supplied and which avoids the disadvantages attending the use of separate spraying devices which must be filled before use. By a proper choice of the attaching member 3 the device may be readily adapted for use with the particular type of container in which

the products of a certain manufacturer may be put up, thereby promoting the sale of these products as well as rendering their use more convenient in the hands of purchasers.

While the invention has been described particularly with reference to insecticides and a preferred embodiment has been shown and described, it will be understood that it is equally adapted for use with other kinds of liquids and that various changes in the details of construction may be made without departing from the principle of the invention as defined in the appended claims.

I claim:

1. Apparatus for spraying liquid directly from the container in which it is supplied comprising a member adapted to be substituted for the ordinary closure of the container, an outer tube attached to the member and adapted to extend into the liquid within the container, a check valve at the lower end of the outer tube, an inner tube mounted for reciprocation within the outer tube, a piston at the lower end of the inner tube, a nozzle at the upper end of the inner tube and a member closely and slidably fitted within the nozzle and provided with passageways for deflecting the liquid as it passes therethrough, said member being adapted to close the inner tube during the suction stroke of the piston.

2. An atomizer comprising a member adapted to be attached to a container for holding a liquid, an outer tube attached to said member and extending into the container, an inner tube mounted for reciprocation within the outer tube, a piston at the lower end of the inner tube, means at the upper end of this tube for spraying the liquid as it is expelled therefrom by downward movement of the piston and means operable to open and close said upper end of the inner tube and integral with the spraying means for spreading the liquid into a tubular column before it is acted upon by the spraying means.

3. An atomizer comprising a member adapted to be attached to a container for holding a liquid, an outer tube attached to said member and extending into the container, a check valve at the bottom of the outer tube, a closure for the upper end of this tube, an inner tube slidably mounted within the closure, a piston at the lower end of the inner tube, a nozzle at the upper end of this tube, and a member closely and slidably fitted in the nozzle and provided with passageways for deflecting the liquid as it passes therethrough, said member acting also as a closure for the upper end of the inner tube during the suction stroke of the piston.

4. An atomizer comprising a member adapted to be attached to a container for holding a liquid, an outer tube attached to said member for extending into the container, an inner tube mounted for reciprocation within the outer tube, a piston at the lower end of the inner tube, means at the upper end of this tube for spraying the liquid as it is expelled therefrom by downward movement of the piston, and means integral with the spraying means for spreading the liquid into a tubular column before it is acted upon by the spraying means, said spreading means also serving as a closure for the upper end of the inner tube during the suction stroke of the piston.

5. An atomizer comprising a member adapted to be attached to a container for holding a liquid, an outer tube attached to said member and extending into the container, a check valve at the lower end of the outer tube, an inner tube mounted for reciprocation within the outer tube, a piston at the lower end of the inner tube, a nozzle at the upper end of this tube, having a discharge orifice at its outer end, and a member movably mounted in the nozzle and provided with inclined passageways extending from end to end of the member for deflecting the liquid as it passes therethrough, said member acting as a closure for the upper end of the inner tube during the suction stroke of the piston.

6. An atomizer comprising an outer tube, an inner tube mounted for reciprocation within the outer tube, a piston at the lower end of the inner tube, a nozzle at the upper end of this tube, and a member movably mounted in the nozzle and provided with inclined passageways for deflecting the liquid as it passes therethrough, said member also acting as a closure for the upper end of the inner tube during the suction stroke of the piston.

7. A pump comprising an outer tube, an inner tube mounted for reciprocation within the outer tube, a piston at the lower end of the inner tube, a nozzle at the upper end of the inner tube, and means for closing the upper end of the inner tube, comprising a member closely and slidably mounted in the nozzle and provided with a passageway to permit liquid to pass therethrough.

In testimony whereof I affix my signature.

H. HOWARD HELLER.