July 31, 1945. H. S. GARABEDIAN 2,380,513

SPRAY NOZZLE

Filed Jan. 26, 1944

Fig. 1.

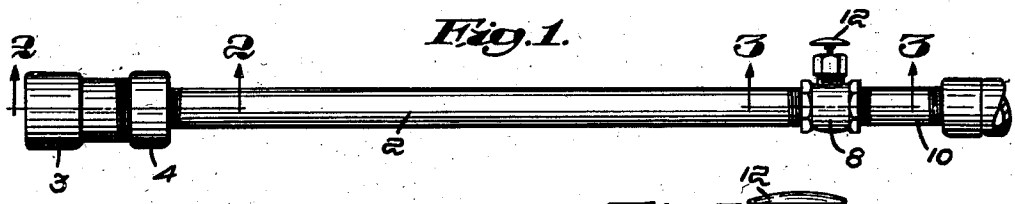



Fig. 2.

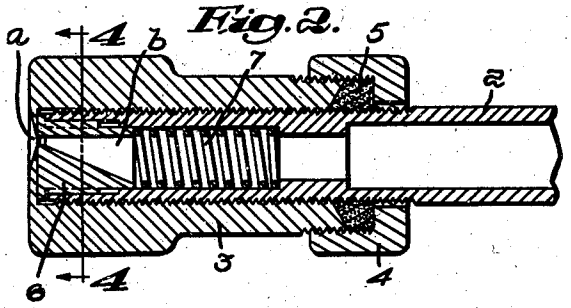



Fig. 3.

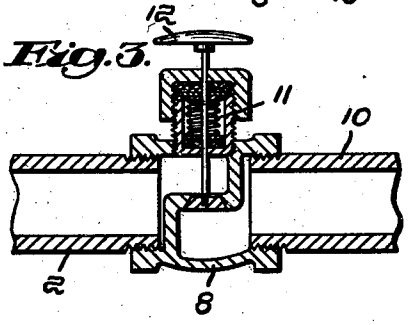



Fig. 4.

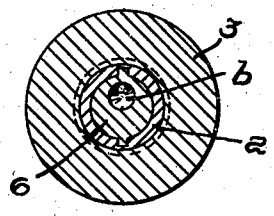



Fig. 5.

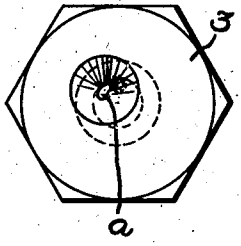



Fig. 6.

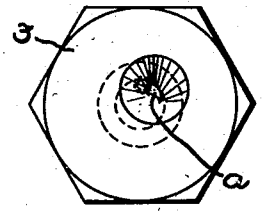



Fig. 7.

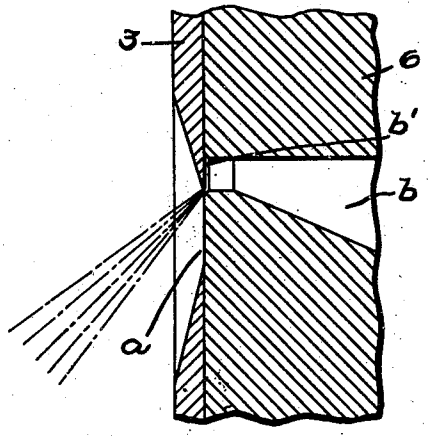
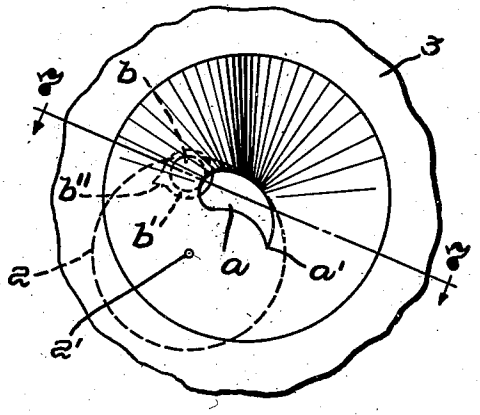



Fig. 8.




Inventor:
Haig S. Garabedian,
by J. M. Cready,
his Attorney.

Patented July 31, 1945 2,380,513

# UNITED STATES PATENT OFFICE

2,380,513

## SPRAY NOZZLE

Haig S. Garabedian, Watertown, Mass.

Application January 26, 1944, Serial No. 519,707

6 Claims. (Cl. 299—135)

This invention relates to spraying apparatus, and is especially concerned with the nozzle constructions of apparatus of this type.

In spraying insecticides, fungicides, and the like, on plants, shrubbery, and other vegetation, it is difficult to direct the spray against the lower sides of the leaves where it is needed fully as much as on the upper surfaces. The present invention aims to devise a nozzle structure with the aid of which this result can be effectively accomplished, in addition to providing the normal range of adjustment of the spray.

The nature of the invention will be readily understood from the following description when read in connection with the accompanying drawing, and the novel features will be particularly pointed out in the appended claims.

In the drawing,

Fig. 1 is a side elevation of a nozzle structure embodying this invention;

Figs. 2 and 3 are horizontal, sectional views taken on the lines 2—2 and 3—3, respectively, of Fig. 1;

Fig. 4 is a sectional view taken on the line 4—4, Fig. 2;

Figs. 5 and 6 are end views of the nozzle illustrated in Fig. 2 showing it in different positions of adjustment;

Fig. 7 is a sectional view on the line 7—7, Fig. 8; and

Fig. 8 is a view similar to Fig. 6 but showing the parts on a greatly enlarged scale and with the cap broken away.

Referring first to Figs. 1, 2 and 3, the nozzle structure there shown comprises a tubular body 2 preferably of considerable length so that it can be handled conveniently and will discharge its spray at a substantial distance from the operator. The left-hand end portion of this body is externally threaded to receive a correspondingly internally threaded cap 3. In order to prevent leakage between these parts a collar 4 is threaded on to the right-hand end portion of the cap 3 and cooperates with it to provide a stuffing box in which a packing 5 is located. Thus by turning up the collar 4 the packing can be compressed more or less as required to provide a tight joint between the cap and the body.

In this construction the body also includes an internal sliding plunger 6, keyed to the end portion of the body so that it cannot rotate relatively to it, and this member is pressed constantly toward the left by a spring 7 so that its flat end face always bears against the internal flat end face of the end portion of the cap 3.

The nozzle is intended to be connected to a hose in any convenient manner, and a slidable plunger type valve 8 connects the body 2 with the hose connecting member 10. The plunger of this valve is normally held closed by a spring 11, but it can be opened conveniently simply by pressing down on the button or end 12 of the plunger.

The problem with which this invention is chiefly concerned is that of devising means whereby either a solid stream or a spray can be delivered, as desired, and the spray can be adjusted to have a very fine mist-like character and can either be directed straight ahead or laterally at an abrupt angle to the axis of the body portion of the nozzle.

This object is accomplished chiefly by making the cooperating orifices in the plunger 6 and cap 3 of unique forms and arranging them in a novel relationship. As best shown in Figs. 5, 6, 7 and 8, the end of the cap 3 has an elongated and somewhat arc-shaped orifice *a* formed through it which is provided at one extremity with a rounded end and terminates at its opposite end in a gradually tapered corner. As the end surfaces of the cap 3 extend away from the orifice *a*, they are bevelled as best shown in Figs. 7 and 8, so that these surfaces form a very acute angle with the inner end surface of the cap. In other words, the edges of this orifice are sharp.

The plunger 6 has an orifice *b* formed through it which tapers as it extends forwardly and ends in a short cylindrical portion, the extreme outer end of which, however, is bevelled slightly, as shown at *b'* in Fig. 7.

It will be observed that the orifices in the parts 3 and 6 are eccentrically disposed with reference to the axis of the nozzle body. This is clearly seen in Figs. 2 and 8, it being observed that in the latter figure the outline of the body 2 is shown by the dotted circle, and the center or axis of this body is indicated at *z'*. The relationship of the orifices is such that when they are positioned as shown in Figs. 7 and 8, with the edge only of the left-hand end of the orifice *a* overlapped very slightly on the bevelled end surface of the orifice *b*, the spray will be directed laterally at an abrupt angle to the axis of the nozzle body. At this time the spray is very fine but if, now, the cap is turned in a counter-clockwise direction, Fig. 8, the spray will become coarser, until finally when the port or orifice *b* registers fully with the orifice *a*, an approximately solid stream will be directed straight ahead. When

the cap is adjusted still further in a counterclockwise direction, the end of the orifice *b* will be cut off more and more as this adjusting movement progresses, thus creating a spray which becomes finer and finer. Finally when the only registering poritions of these two orifices are the corners *a'* and *b''* of the respective orifices *a* and *b*, then the spray becomes an extremely fine mist and is directed at a very sharp angle laterally away from the axis of the nozzle. The portion *b''* is a lateral extension of the circumferential bevel *b'* so positioned as to register with the corner *a'* of the orifice *a*.

It will be evident from an inspection of Fig. 8 that the spray produced with the ports positioned as there shown will be directed toward the right across the end of the nozzle, while that produced when the parts *a'* and *b''* register with each other will be directed toward the left. The angle in the former case is approximately 45°, while in the latter the angle is even greater. This is an important advantage in spraying insecticides and fungicides on shrubbery or foliage of any kind where it is important to wet the lower, as well as the upper, surfaces of the leaves, because it is merely necessary in spraying the under surfaces to adjust the ports *a* and *b* so that a spray of the desired character is produced, and then to rotate the nozzle shaft or body **2**, while held in the hand, until it directs this spray upwardly. By moving it around in the foliage while held in this position, it will effectively wet the lower surfaces of the leaves. Wetting the upper surfaces presents no problem.

If, when the nozzle is adjusted for a very fine spray, or at any other time, it should become plugged with undissolved material, it is merely necessary to back up the cap slightly so as to produce a larger stream. This action will clear out the lodged material and permit the readjustment of a fine spray or mist again.

Because the plunger **6** is constantly held against the inner end surfaces of the cap **3** by the spring **7**, there is no opportunity for leakage between the end surfaces of these members, and the spray can readily be controlled with a high degree of accuracy. The valve **8** also adds to the convenience of operation of the device since it permits the instant shutting off or turning on of the water or spraying solution.

While I have herein shown and described a preferred embodiment of my invention, it will be evident that the invention is susceptible of embodiment in other forms without departing from the spirit or scope thereof.

Having thus described my invention, what I desire to claim as new is:

1. A spray nozzle comprising a tubular body and a cap mounted thereon for relative rotative adjustment, one on the other, around an axis extending lengthwise of said tubular body, said body having a discharge orifice in the end thereof on which said cap is mounted and said cap having a thin end wall provided with an orifice cooperating with that in said body to control the flow of liquid through the nozzle, the two orifices being eccentrically related to each other the orifice in said cap being elongated laterally and terminating at one end in a gradually tapered bevelled corner, and the cooperating edge of the orifice in said body being bevelled to cooperate with said corner in directing a fine spray at an abrupt angle laterally with reference to the axis of said body.

2. A spray nozzle comprising a tubular body and a cap mounted thereon for relative rotative adjustment, one on the other, said body having a discharge orifice in the end thereof on which said cap is mounted and said cap having an orifice cooperating with that in said body to control the flow of liquid through the nozzle, the orifice in said cap being elongated and terminating at one end in a gradually tapered bevelled corner and at its opposite end in a rounded bevelled edge, and the orifice in said body being bevelled to cooperate with the ends of said orifice in the cap in delivering a spray angled sharply toward opposite sides of the nozzle, depending upon which end of said cap orifice controls the spray.

3. A spray nozzle comprising a tubular body and a cap mounted thereon for relative rotative adjustment, one on the other, around an axis extending lengthwise of said tubular body, said body having a discharge orifice in the end thereof on which said cap is mounted and said cap having a thin end wall provided with an orifice cooperating with that in said body to control the flow of liquid through the nozzle, the two orifices being eccentrically related to each other the orifice in said cap being elongated laterally and having opposite ends shaped to produce sprays delivered in approximately opposite lateral directions whereby the direction utilized can be selected by the operator.

4. A spray nozzle comprising a tubular body and a cap mounted thereon for relative rotative adjustment, one on the other, around an axis extending lengthwise of said tubular body, said body having a discharge orifice in the end thereof on which said cap is mounted and said cap having a thin end wall provided with an orifice cooperating with that in said body to control the flow of liquid through the nozzle, the two orifices being eccentrically related to each other the orifice in said cap having an enlarged central portion tapering toward at least one end and the outer edge of said orifice being bevelled whereby a solid stream or a fine spray can be delivered depending upon the adjustment of said cap, the orifice in said body being bevelled to cooperate with a portion of the orifice in said cap in producing a fine spray angled sharply in a lateral direction with reference to the axis of said body.

5. A nozzle according to preceding claim 1, in combination with means for holding the inner end surface of said cap and the end face of said body pressed yieldingly but firmly together.

6. A spray nozzle comprising a tubular body, a cap mounted on the end of said body for rotative adjustment therearound, said body including a plunger mounted in the main portion of said body for sliding movement and having a hole extending longitudinally therethrough, means for holding said plunger against rotation in said body portion, a spring forcing said plunger outwardly and holding the end face of the plunger against the inner end surface of the cap, said plunger and the end of said cap having outlet openings therethrough, eccentrically positioned, and so related that by rotation of the cap the flow of water through the nozzle can be controlled and the character of the spray can be adjusted.

HAIG S. GARABEDIAN.