No. 713,852. Patented Nov. 18, 1902.

R. E. CHAPIN.

SPRAYING NOZZLE.

(Application filed Oct. 28, 1901.)

(No Model.)

Fig. 1.

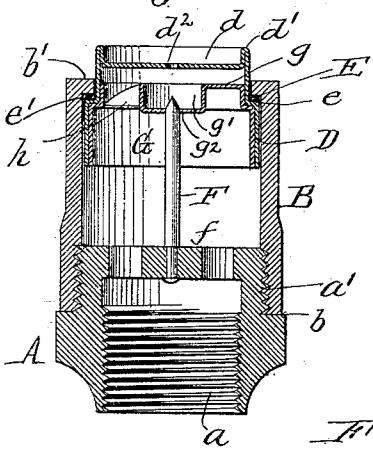


Fig. 2.

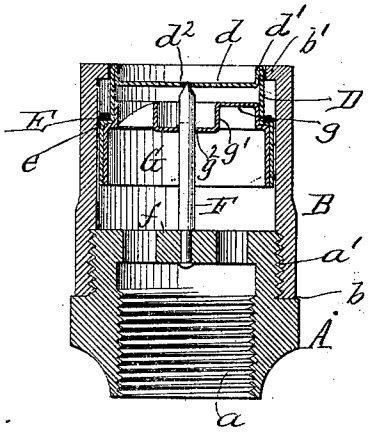


Fig. 3.

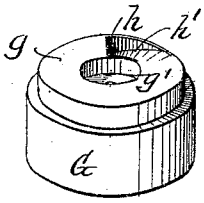


Fig. 5.

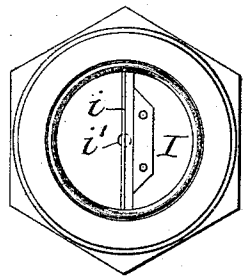


Fig. 4.

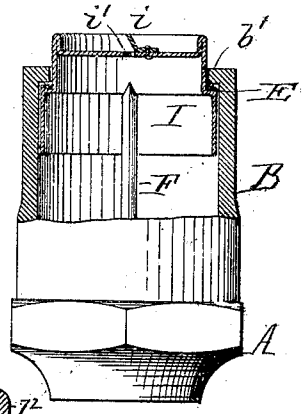


Fig. 7.

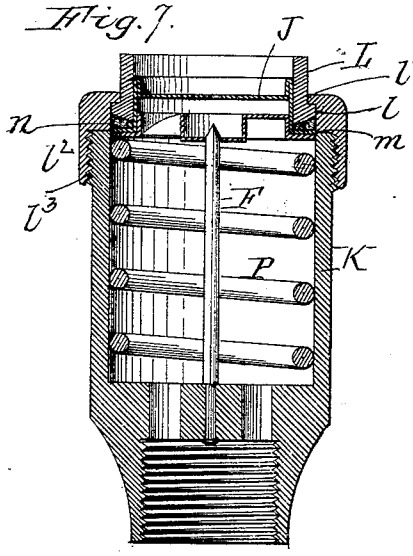


Fig. 8.

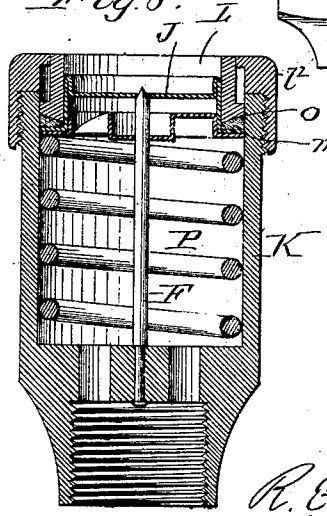
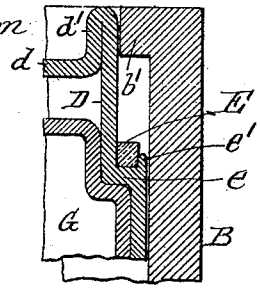


Fig. 6.



Inventor:
R. E. Chapin
By Wilhelm Bonner
Attorneys.

Witnesses:
F. F. Schuyinger.

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UNITED STATES PATENT OFFICE.

RALPH E. CHAPIN, OF BATAVIA, NEW YORK.

SPRAYING-NOZZLE.

SPECIFICATION forming part of Letters Patent No. 713,852, dated November 18, 1902.

Application filed October 28, 1901. Serial No. 80,183. (No model.)

To all whom it may concern:

Be it known that I, RALPH E. CHAPIN, a citizen of the United States, residing at Batavia, in the county of Genesee and State of New York, have invented new and useful Improvements in Spraying-Nozzles, of which the following is a specification.

This invention relates to a spraying-nozzle, and more particularly to a nozzle intended for spraying trees, plants, shrubbery, or the like with a liquid insecticide or other solution, which is capable of delivering the liquid in different forms of sprays or streams. The delivery-orifices of such nozzles are usually small and at times become clogged or stopped with the solid matter contained in certain spraying solutions.

One of the objects of the present invention is to produce a simple and desirable nozzle of this character provided with means whereby the delivery or discharge orifice can be readily cleared or cleaned out in the event of stoppage.

A further object is to so construct the nozzle that it will deliver the liquid in either a solid stream, an open bell-shaped spray, or a flat fan-shaped spray.

In the accompanying drawings, Figure 1 is a longitudinal sectional view of a nozzle, illustrating my invention. Fig. 2 is a similar view showing the delivery-cap in its inward or clearing position. Fig. 3 is a perspective view of the inner or "bell-spray" cap. Fig. 4 is a longitudinal sectional view of the nozzle provided with a "fan-spray" cap. Fig. 5 is a plan view of the nozzle with the fan-spray cap. Fig. 6 is a fragmentary vertical section of the nozzle on an enlarged scale. Fig. 7 is a longitudinal sectional view of a slightly-modified construction. Fig. 8 is a similar view showing the cap in its inner position.

Like letters of reference refer to like parts in the several figures.

Referring to the drawings, and especially to Figs. 1, 2, and 3, A represents the base of the nozzle or coupling which forms the connection between the nozzle barrel or casing B and the hose or pipe to which the nozzle is to be applied. The base or coupling A is provided at its inner end with the usual internal screw-thread *a* for connection with the hose or pipe and is preferably provided with an outer reduced portion *a'*, having an external screw-thread which engages with a corresponding internal screw-thread on the inner end of the barrel or casing B. The inner end of the barrel abuts against a shoulder *b*, formed on the base or coupling A at the base of the reduced portion to provide a tight joint. The barrel or casing B is preferably cylindrical and has an open outer end provided with an annular inwardly-projecting flange *b'*. Within the barrel or casing B is located an outer cup-shaped cap D, the diameter of the inner portion of the cylindrical wall of which is slightly smaller than the internal diameter of the barrel or casing, so as to leave a narrow annular space between the cap and the barrel or casing, and the outer portion of the cap is reduced or of smaller diameter than the inner portion and extends out through the opening at the outer end of the barrel or casing and is adapted to move back and forth therein. The head *d* of the cap is preferably depressed somewhat below the outer end of the cylindrical wall of the cap by pressing or forcing the same inwardly, thus bending the outer portion of the cylindrical wall back upon itself, as at *d'*, and doubling the thickness thereof. The head is provided with a central discharge-orifice d^2. The cap D in the use of the nozzle is normally held or projected outward to the normal position (indicated in Fig. 1) by the pressure of the liquid in the nozzle on the under side of the cap. In order to form a water-tight joint between the cap and the nozzle-barrel B, a packing annulus or ring E, of suitable material, is placed on the lateral shoulder *e*, joining the reduced and enlarged portions of the cap. This packing annulus or ring is held against the inner face of the flange *b'* on the barrel or casing by the liquid-pressure on the cap with sufficient force to form a water-tight joint. In order to prevent the packing-ring E from adhering to the inner wall of the barrel or casing and working on the cap away from the shoulder *e*, the outer edge of the shoulder of the cap is provided with a small upwardly-projecting annular bead or rim *e'*, which surrounds the outer peripheral portion of the packing ring or an-

nulus and prevents the same from contacting with the cylindrical wall of the barrel or casing, thus holding the packing on its shoulder.

F represents a centrally-arranged longitudinal clearer or cleaner pin, which is secured at its inner end to a spider or perforated diaphragm *f*, extending across the nozzle base or coupling A. The pin projects outwardly toward and in line with the outlet or discharge-orifice d^2 in the cap D, and when the latter is moved inwardly the end of the pin will enter the discharge-orifice and remove any foreign matter which may clog or obstruct the same.

G indicates an inner cap, which I term a "bell-spray" cap, which is located in the cap D for the purpose of causing an open bell-shaped spray. The cap G is cup-shaped and has a head *g*, which is provided with a centrally-depressed or inbent portion *g'*, in the center of which is a hole g^2, through which the clearer or cleaner pin extends. The cap G extends up within the outer cap D to within a short distance of the head thereof, and in order to permit this the inner or bell-spray cap is provided like the outer cap with a reduced outer portion, the external diameters of the inner and outer portions corresponding, respectively, with the internal diameters of the outer cap, so that the bell-spray cap will fit nicely within the outer cap D. The head of the bell-spray cap between the centrally-depressed portion *g'* and the cylindrical wall thereof is provided with a curved slot or opening *h* and an inwardly-projecting inclined tongue *h'*, which is preferably formed by making a curved U-shaped cut or slit in the head of the cap and bending inwardly the tongue thus formed. The central hole g^2 in the bell-spray cap in the normal position of the caps (indicated in Fig. 1) surrounds the clearer or cleaner pin and is stopped or closed thereby, so that the liquid cannot discharge through this central opening. The liquid is thus caused to discharge through the opening *h* and, owing to the location of this opening and the circular shape of the space between the inner and outer cap-heads, the liquid is caused to follow a gyratory or circular course in this space. This motion of the liquid causes the same to issue from the discharge-orifice d^2 in the form of an open bell-shaped spray.

The cylindrical wall of the depressed central portion *g'* of the bell-spray cap and the outer cylindrical wall of the cap on opposite sides of the discharge-opening *h* materially improve the gyratory motion of the liquid, and consequently the character of the resulting spray. The depressed portion *g'* of the bell-spray cap extends inwardly far enough to enable the clearer or cleaner pin to close the central opening g^2 therein when the parts are in their outer or normal position, and thus prevents an imperfect spray. When using the nozzle, if the discharge-orifice d^2 becomes clogged it is only necessary for the operator to strike the outwardly-projecting reduced portion of the outer cap against an object—for instance, a limb of the tree which is being sprayed—thus forcing the outer cap inwardly until the clearer or cleaner pin enters the discharge-orifice and removes the obstruction or foreign matter therein. The double thickness of the outer portion of the wall of the cap strengthens the same and prevents injury thereto. When the cap is moved inwardly, the packing-ring or annulus E is moved away from the inner face of the flange *b'*, breaking the water-tight joint and permitting a slight escape of the liquid around the outer walls of the outer cap D, and thus materially relieving the pressure necessary to force the cap inwardly.

In Figs. 4 and 5 the nozzle is provided with an outer cap I, which is slightly different from the caps illustrated in Figs. 1 and 2 and replaces the same. The cap I is provided with a diametrically-disposed inclined flange or rib *i*, which extends across the outer face of the head just to one side of the discharge-orifice *i'* and in the path of the issuing liquid. This diametrical flange or rib produces a flat or fan-shaped spray.

When a solid stream or jet is desired, the outer cap is retained in the nozzle and the inner bell-spray cap is removed. The liquid then discharges through the discharge-orifice d^2 in the form of a solid stream. When the bell-shaped spray is desired, the bell-spray cap G is inserted in the outer cap D and the bell-shaped spray is produced as above explained. When the flat spray is desired, the caps D and G are removed from the nozzle and the cap I substituted therefor. It will thus be seen that the single nozzle, with the different types of caps which can be readily inserted and removed from the nozzle, produces the several different sprays enumerated.

In Figs. 7 and 8 is illustrated a slightly-modified form of nozzle. In this form the outer cap J is of smaller diameter than the opening in the outer end of the barrel or casing K and an annular follower L is interposed between the cap and the barrel. This follower, which projects outwardly beyond the outer end of the outer cap, is provided at its inner end with an external laterally-projecting flange *l*, adapted to engage under the inwardly-extending flange *l'* of the barrel to limit the outward movement of the follower. The flange *l'* is formed on a ring l^2, which forms the outer end of the barrel and is attached to the main portion thereof by a screw-thread l^3. The cap J is provided at its inner end with a laterally-projecting flange *m*, engaging under the inner end of the follower, and between this flange *m* and the inner end of the follower is a packing material or ring *n*.

In order to effect a tight joint between the packing and the inner wall of the barrel or casing K, the inner end of the follower is pro-

vided with an inclined or conical face *o*, which when pressed against the packing has a tendency to force the packing outwardly against the inner wall of the barrel or casing K. In this construction a spiral spring P is provided which abuts at its inner end against the outer face of the spider or diaphragm in the nozzle-base and at its outer end against the annular flange *m* on the inner end of the cap J or a corresponding flange on the bell-spray cap when the latter is used. The spring thus holds the caps and follower outward. The operation of this modified construction is similar to that of the construction illustrated in Figs. 1 to 5, excepting that the water-pressure is not relieved and the follower constitutes the means for pressing the caps inward in place of the outwardly-projecting flange on the outer cap.

I claim as my invention—

1. The combination with a nozzle-barrel having an opening in its outer end, of a cap carried by and slidable longitudinally relative to said barrel, said cap having a transverse head provided with a discharge-orifice and an annular portion which projects outwardly beyond said head and the outer end of said barrel, substantially as set forth.

2. The combination with a nozzle-barrel, having an opening in its outer end, of a cap in said barrel having a cylindrical wall and a transverse head provided with a discharge-orifice, said head being pressed inwardly to provide an annular flange of double thickness which is adapted to project beyond the end of said barrel, substantially as set forth.

3. The combination of a nozzle-base, a barrel or casing detachably secured thereto and having an open outer end provided with an inwardly-extending annular flange, a cap having a discharge-orifice and provided with a reduced portion projecting through the open outer end of said barrel or casing and having an enlarged inner portion, a packing between said enlarged portion of the cap and said inwardly-projecting flange, and a clearer-pin connected to said base and adapted to enter said discharge-orifice substantially as set forth.

4. The combination of a nozzle-base, a cap having a discharge-orifice and movable toward and from said base, means for guiding said cap, a clearer-pin connected to said base and adapted to enter said discharge-orifice, and an inner cap movable with the outer cap and provided with a discharge-opening at one side of the center thereof and having a central hole through which the clearer-pin projects, substantially as set forth.

5. The combination of a nozzle-base, an outer cap having a discharge-orifice and movable toward and from said base, means for guiding said cap, a clearer-pin connected to said base and adapted to enter said discharge-orifice, and an inner cap located in said outer cap and provided with a discharge-opening at one side of the center thereof and provided with a depressed portion having a central hole through which said clearer-pin projects, substantially as set forth.

6. The combination of a nozzle-base, a barrel thereon, a removable outer cap supported by said barrel and provided with a discharge-orifice, and a removable inner cap provided with an opening at one side of the center thereof, substantially as set forth.

7. The combination of a nozzle-base, a barrel detachably secured thereto, a cap removably placed in said barrel and having an open inner end and a transverse head provided with a discharge-orifice, and means for making a water-tight joint between said cap and said barrel, substantially as set forth.

8. The combination of a nozzle-base, a barrel detachably secured thereto, a cap removably placed in said barrel and having an open inner end and a transverse head provided with a discharge-orifice, and a packing carried by said removable cap for making a water-tight joint between said cap and said barrel, substantially as set forth.

9. A nozzle-cap having a head provided with a central depressed portion and an outer cylindrical wall, a discharge-opening between said depressed portion and said outer wall, and an inclined tongue projecting inwardly between said inner and outer walls, substantially as set forth.

Witness my hand this 18th day of October, 1901.

RALPH E. CHAPIN.

Witnesses:
DON E. MCDONALD,
FRANK HOUSEKNECHT.