(No Model.)

W. WAINWRIGHT.

VAPORIZING SPRAY NOZZLE.

No. 442,762. Patented Dec. 16. 1890.

Fig. I.

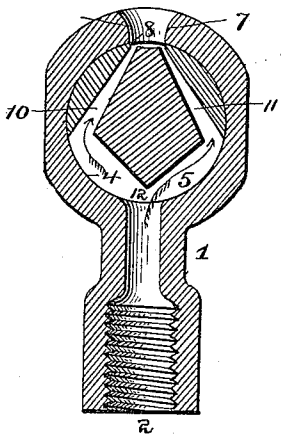


Fig. II.

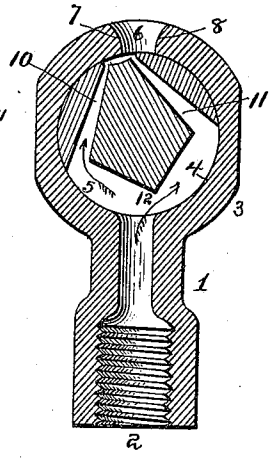


Fig. III.

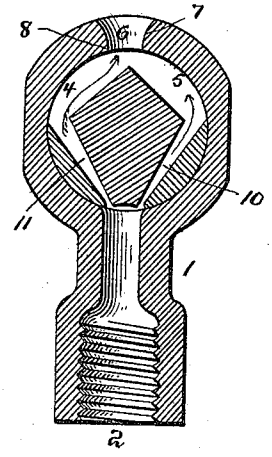


Fig. IV.

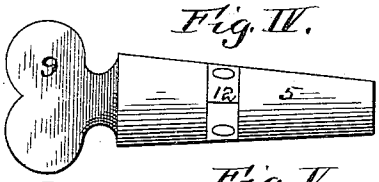


Fig. V.

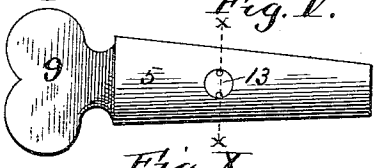


Fig. VI.

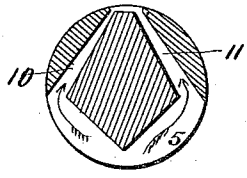


Fig. VII.

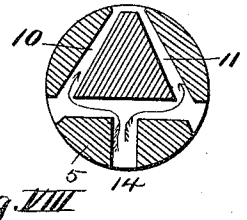


Fig. VIII

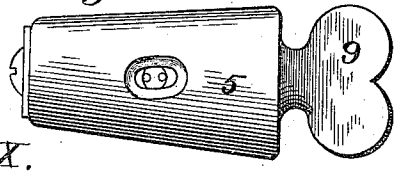


Fig. X

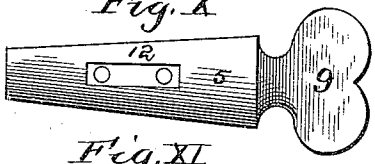


Fig. XI

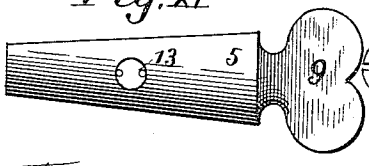
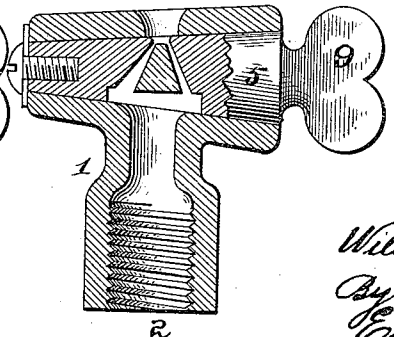


Fig. IX.



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Edson Bros,

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UNITED STATES PATENT OFFICE.

WILLIAM WAINWRIGHT, OF SAN FRANCISCO, CALIFORNIA.

VAPORIZING SPRAY-NOZZLE.

SPECIFICATION forming part of Letters Patent No. 442,762, dated December 16, 1890.

Application filed January 18, 1890. Serial No. 337,403. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM WAINWRIGHT, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Vaporizing Spray-Nozzles; 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.

My invention relates to improvements in spray-nozzles of that class which vaporize liquids under pressure and are used in orchards, vineyards, cotton-plantations, &c., for exterminating insect-pests which infect the plants and trees; and the objects of my invention are, first, to provide an improved nozzle which can be easily and quickly adjusted for throwing any of the desired forms of spray to suit the attendant and the plant on which the spray is to be projected; second, which will not offer obstruction or impediment to the escape of the liquid from the nozzle after it leaves the plug or key, and, third, which can be readily cleansed without removing the plug or key from its seat within the nozzle.

With these and other ends in view my invention consists of a nozzle having the walls of the outlet-orifice thereof beveled or inclined outwardly from its receiving-point or the seat of the plug to the outer face or discharge-point of said orifice, said bevel being at such an angle as to cause the walls to lie well away from and out of the path of the stream or atomized water, so that they do not offer any impediment or obstruction to the free passage of the water after it leaves the plug when a full spray is required, and they do not in any manner interfere with the spray.

My invention further consists in a plug or key having two passages formed therein at different angles and which are relatively arranged to conduct the two streams of water toward each other, the points of discharge of the angularly-arranged passages terminating in close proximity to each other, whereby the two streams of water under pressure are caused to impinge against each other as they issue from the plug and when the plug is in line with the discharge-orifice of the nozzle thereof to produce a full spray, and they thus produce a broad, flat, or thin sheet of spray, similar to the common gas-jet. The two passages in the plug converge toward each other from the receiving-orifice of the nozzle toward the discharge-orifice thereof, and they terminate at their receiving ends in a common chamber or passage that admits of a full and free supply of liquid to the passages in said plug. The discharge extremities of the passages also open into a common discharge-chamber of small area, and the plug can be adjusted to cause the discharge-chamber thereof to register with the discharge-orifice of the nozzle when it is desired to secure a full spray, or said plug may be adjusted to reduce the exposed area of the discharge-chamber by causing a part of said chamber to be covered by one edge or wall of the discharge-orifice. The inner edge or wall of the discharge-orifice of the nozzle is beveled or curved in the reverse direction to and from the termination of the bevel or inclination of the wall of the discharge-orifice to the seat of the plug in said nozzle, so that no sharp edge is provided between said beveled wall of the discharge-orifice and the plug-seat. This reverse bevel or curve at the inner edge of the discharge-orifice of the nozzle serves a useful purpose in the following particular, to wit: When the plug is turned to secure a reduced spray and a part of the discharge-chamber in the plug is concealed or cut off by a part of the wall of the discharge-orifice in the nozzle the liquid in the converging plug-passages are combined in the discharge-chamber of the plug and impinge against the beveled or curved edge at the inner part of the discharge-orifice in the nozzle, which acts to impart a twirling motion to the spray or liquid as it passes through the nozzle.

My invention further consists in the combination of parts and the peculiar construction and arrangement of such parts, as will be hereinafter fully described and claimed.

To enable others to more readily understand my invention, I will now proceed to a detailed description thereof, in connection with the accompanying drawings, in which—

Figure I is a transverse sectional view through a nozzle embodying my invention, with the plug adjusted in position to secure

a full spray. Fig. II is a similar sectional view with the plug adjusted to produce a smaller spray having a twirling motion imparted thereto as it issues from the discharge-orifice of the nozzle. Fig. III is a sectional view similar to Figs. I and II, with the plug reversed to cleanse the passages therein. Fig. IV is a detail view, in side elevation, of the plug removed from the nozzle, showing the receiving ends of the passages thereof. Fig. V is a similar view of the plug, showing the reverse side thereof and the discharge-orifice of the passages in the same. Fig. VI is a cross-sectional view of the plug on the line *x x* of Fig. V. Fig. VII is a view corresponding to Fig. VI of a modified form of the plug. Fig. VIII is a plan view of the nozzle, showing an elongated or oblong discharge-orifice therein. Fig. IX is a vertical sectional view taken longitudinally through the plug and nozzle of a modified form of my invention. Figs. X and XI are detail views from opposite sides of the plug constructed as shown in Fig. IX.

Referring to the drawings, in which like numerals of reference denote corresponding parts in all the figures, 1 designates the nozzle of my invention, which is made of a single piece of metal and is provided at one end with an inlet 2, and said nozzle may be secured to a hose or pipe by an internal or external screw-thread formed in the inlet thereof.

Above the inlet 2 the nozzle is provided with an integral enlarged or bulged part 3, which is bored out and ground to form a true seat 4 for the reception of the axially-turning plug or key 5, which is also made of a single piece of metal, and above this seat said nozzle is provided with a discharge-orifice 6, which is arranged in line with the inlet 2 of the nozzle. This discharge-orifice of the nozzle may be made either circular or round in general outline, as shown in Figs. I, II, and III, or the contour of said discharge-orifice may be oblong or elongated, as shown in Fig. VIII, with the major axis of said oblong opening in line with the corresponding axis of the plug.

The walls of the discharge-orifice are of peculiar configuration, in order to avoid offering any obstruction or impediment to the free escape of the liquid from the nozzle when a full spray is required. The wall of the discharge-orifice is beveled, flared, or inclined outwardly from a point or line near the seat of the plug toward the outer exposed face of the nozzle, as indicated at 7, the bevel or flare being such as to throw the wall 7 well away from the path of the spray when a full spray is required, so that the spray does not imping or strike against the flaring walls.

The innermost edge or line of the discharge-orifice from the termination of the bevel 7 thereof is beveled or curved at 8 in the opposite direction to the bevel 7, this curved or beveled edge 8 extending from the terminal of the bevel 7 to the seat 4 of the plug, whereby sharp angles or corners are avoided in the discharge-orifice of the nozzle.

The plug or key 5 is substantially of the ordinary tapering form, which is fitted tightly on its seat and secured in the nozzle in any of the well-known ways, the protruding end of said plug being provided with the ordinary hand-piece 9 for conveniently manipulating the plug. This plug is provided with two passages or conduits for the liquid, and these passages are arranged in a novel manner to secure a full supply of liquid and cause the streams to impinge against each other at the point of discharge from the plug to produce a broad thin sheet of spray, which is permitted to escape freely from the nozzle without contact with the walls of the discharge-orifice thereof. These passages 10 and 11 are formed transversely through the plug, and they converge toward each other from the receiving to the discharge points thereof, the discharge orifices of the passages being in close juxtaposition to each other, as shown in Figs. I, II, and IV, each of said passages being tapered longitudinally from its receiving to its discharge end. The rear extremities of the liquid-passages open into or communicate with a common receiving-chamber 12, which is formed in one side of the plug and is of sufficient width and length to insure a full supply of liquid to the two angularly-arranged passages 10 11. In Fig. VI, I have shown the receiving-chamber of the plug formed in the rear face thereof and extending across said exposed face; but I do not restrict myself to this precise construction, as the receiving-chamber 12 may be formed in the body of the plug in a straight line through the same and receive the liquid from the nozzle through a passage 14, formed in the plug at right angles to the axis of the straight chamber 12 therein, as clearly shown in Fig. VII.

The passages 10 11 are preferably arranged transversely through the plug on opposite sides of the transverse axis thereof, and the discharge extremities of said passages open into or terminate in a discharge chamber or depression 13, which is common to both passages and is formed in the plug at a diametrically-opposite point to the middle of the receiving-chamber 12 therein, the contour of this discharge-chamber being preferably round, as shown in Figs. V and XI.

In Figs. IX, X, and XI, I have shown a modified construction of the plug in which the two transverse passages 10 11 are arranged in the direction of the length of the plug in the middle thereof, said passages being tapered, as shown, and opening at their receiving ends in a common receiving-chamber 12, formed in one side of the plug, and at their discharge ends into a common discharge-chamber 13, the essential features of my invention being embodied in both modifications thereof shown and described herein.

The operation of my invention is simple and obvious from the foregoing description, taken in connection with the drawings.

When it is desired to secure a large vaporous spray, the plug is turned to bring the discharge chamber or depression 13 therein in line with the discharge-orifice of the nozzle and the receiving-chamber 12 in line with the inlet 2 of the nozzle. This adjustment of the plug causes the terminals of the passages 10 11 to lie in line with the discharge-orifice of the nozzle, as seen in Figs. I and IX, and as the liquid is forced under pressure through the passages 10 11 the jets or streams issuing therefrom are caused to strike or impinge against each other a short distance above the discharge-orifice, owing to the angular disposition of the two passages with relation to each other and to the discharge-orifices thereof terminating in close juxtaposition to each other, which operation produces a flat broad thin spray somewhat similar to the jet or flame of an ordinary gas-burner. To produce a thin fine spray, the plug is turned partly around, as shown in Fig. II, to cut off or conceal a part of the discharge chamber or depression 13 and the discharge-orifice of one of the passages, by a portion of the boundary-wall or beveled edge 8 of the discharge-orifice, and as the streams or jets from the two passages are concentrated in the small discharge-chamber 13 and impinge against the beveled edge 8 of the nozzle the spray is given a twirling motion and is broken into a very fine spray by said beveled edge 8. The fineness of the spray depends upon the adjustment of the chamber 13 in the plug with relation to the edge 8 of the discharge-orifice of the nozzle, and by adjusting the plug to increase or diminish the exposed area or surface of the chamber 13 the fineness of the spray can be regulated with ease and facility.

Should the passages or either of the chambers in the plug become choked with foreign substances, &c., it is only necessary to turn the plug a half-revolution to bring the larger or divergent ends of the passages outward, (the chamber 12 being immediately opposite the discharge-orifice and the chamber 13 in line with the inlet of the nozzle, as shown in Fig. III,) and by turning on the liquid under pressure the obstructions will be expelled from the plug passages or chambers by the force of the liquid exerted from the inner side of the nozzle.

By means of a nozzle constructed as herein shown and described I am enabled to produce a large volume of vaporous spray, or a spray of any degree of fineness required to suit the operator, and the nozzle can also be easily and expeditiously cleansed of any impeding matter that may lodge in either of the passages or chambers therein.

The object of providing the enlarged receiving-chamber 12 in the rear face of the plug is to insure a full and free supply of liquid to both passages and to give access to said passages for the purpose of cleansing the same by hand should it become necessary to remove the plug from its seat. Viewed from a practical standpoint this receiving-chamber is advantageous, as it reduces the amount of metal in the plug between the receiving and discharge chambers 12 13, so that it is practicable to bore the oblique or converging passages with fine drills, which would not be possible if the plug were formed in any other manner.

Although I have described and shown the discharge-orifice of the nozzle as being both round and oblong in general contour, as both of such shapes are contemplated by my invention, yet I prefer to employ the oblong discharge-orifice with its major axis in line with the corresponding axis of the plug, because such an orifice enables the two streams issuing from the passages to flatten or widen out into the broad thin sheet of spray without coming in contact with the walls of such discharge-orifice, in which event the spray would be spoiled.

I am aware that modifications in the minor details of construction and arrangement of parts, as well as in the form and proportion of the same, can be made without departing from the spirit or sacrificing the advantages of my invention, and I would therefore have it understood that I reserve the right to make such alterations as fairly fall within the scope of my invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. A spray-nozzle having a stop-cock attachment and provided with an oblong or oval discharge-opening with its major axis in line with the axis of the stop-cock, the walls of the discharge-opening being continuous from the seat of the plug to the outer face of the nozzle and beveled or flared outwardly from said seat, said flared walls being arranged in rear of the path of the spray issuing from the plug, substantially as and for the purpose described.

2. A spray-nozzle having a stop-cock attachment and provided with an oblong or oval discharge-opening with its major axis arranged transversely to the longitudinal axis of the seat of the plug, the walls of said opening being continuous from the seat to the outer face of the nozzle and diverging outwardly from the seat, as and for the purpose described.

3. A spray-nozzle having a stop-cock attachment and provided with a discharge-opening having the outwardly flared or beveled walls 7, which walls are arranged in rear of the path of the spray issuing from the plug, and the beveled edge 8 at the inner extremity of the wall 7, which beveled edge is reversely curved or inclined to the wall 7 and extends from the terminal of the wall 7 to the seat of the plug, substantially as and for the purpose described.

4. A spray-nozzle having a stop-cock at-

tachment the plug of which is provided with two continuous passages which extend entirely through the plug transversely of the same, said passages converging from their receiving ends to their discharge ends and having their discharge ends opening through one face of the plug and in close juxtaposition to each other, as and for the purpose described.

5. In a spray-nozzle, the axially-turning plug having two transverse passages which extend continuously through the plug and open at their ends through opposite faces of said plug, the passages converging toward each other from their receiving toward their discharge orifices, substantially as and for the purpose described.

6. In a spray-nozzle, an axially-turning plug provided with two transverse passages which open at their ends through opposite faces of the plug, and which passages converge from the receiving toward the discharge orifices thereof, and a receiving-chamber formed in the rear face of the plug and which is common to both of said passages and is arranged in line with the inlet of the nozzle, substantially as and for the purpose described.

7. A spray-nozzle having a stop-cock attachment the plug of which is provided with tapering passages which are formed obliquely through the same, the divergent extremities of the passages terminating in a receiving-chamber which is formed on the inner side of the plug and which aligns with the inlet of the nozzle, substantially as described.

8. In a spray-nozzle, a stop-cock attachment provided with the oblique passages and the receiving and discharge chambers on opposite sides thereof, the receiving and discharge chambers being located on opposite sides of the plug, and the passages extending from the receiving-chamber and terminating in the discharge-chamber, substantially as and for the purpose described.

9. In a spray-nozzle, a stop-cock attachment having its plug provided with two transverse passages which converge toward each other and have their discharge-orifices in close juxtaposition to each other, for the purpose described, and a discharge-chamber formed in one face or side of the plug and having the discharge-orifices of said passages opening into said chamber, as and for the purpose described.

10. In a spray-nozzle, an axially-turning plug provided with the receiving and discharge chambers, which are arranged on opposite sides thereof, and the discharge-chamber being of small area as compared with the area of the receiving-chamber, and the tapering oblique passages extending through the plug from the receiving-chamber to the discharge-chamber, for the purpose described, substantially as set forth.

11. The combination of a spray-nozzle having a discharge-opening provided with the outwardly beveled or diverging walls which are arranged in rear of the path of the spray, and a plug fitted in said nozzle and having the discharge-chamber in one face thereof, and the two converging passages which terminate in close juxtaposition to each other and open into the discharge-chamber, whereby the streams in the passages are caused to jet or impinge against each other to produce the spray, and the latter is free to escape from the nozzle without contact with the walls of the discharge-opening, substantially as described.

12. A plug or spigot made of a single piece of metal and provided with two tapering oblique passages, and the receiving and discharge chambers on opposite sides of said plug, and into which chambers the extremities of both passages terminate, combined with a nozzle having a seat for said plug, and the discharge-orifice having the diverging or beveled walls, substantially as and for the purpose described.

In testimony whereof I affix my signature in presence of two witnesses.

WM. WAINWRIGHT.

Witnesses:
JESSE A. LUSE,
JAS. DALY.