Aug. 11, 1925. 1,549,537

H. P. HANSEN

SPRAY NOZZLE

Filed May 29, 1923

Fig. 1.

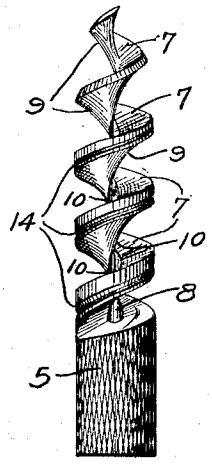


Fig. 2.

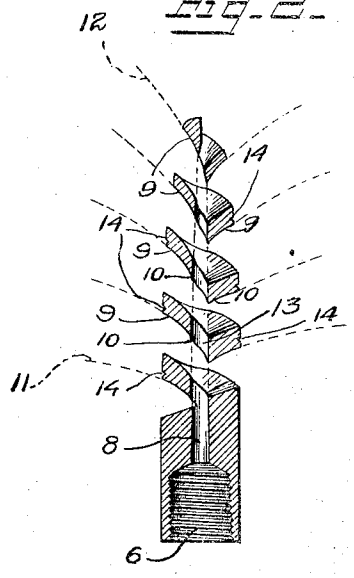
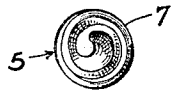


Fig. 3.



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UNITED STATES PATENT OFFICE.

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SPRAY NOZZLE.

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To all whom it may concern:

Be it known that I, HENRY PETER HANSEN, a citizen of the United States, residing at Albert Lea, in the county of Freeborn and State of Minnesota, have invented a new and useful Spray Nozzle, of which the following is a specification.

This invention relates to spray nozzles, and its general object is to provide a nozzle by means of which water or other fluid may be sprayed in the form of a fine mist, with the least possible resistance to the force with which the fluid is projected.

Many devices have been proposed for dividing the spraying fluid so as to effect this result, but all such devices have impeded the discharge of the fluid, and also failed to prevent the interference of the various fine streams, or sheets of fluid, with each other in such a manner as to result in an effective spray.

In the present invention I have constructed a spray nozzle provided with an extension in the form of a spiral blade having a gradually diminishing axial bore through which the fluid is discharged. Each successive spire of the blade cuts a thin sheet of fluid from the main stream, so that the fluid is discharged in the form of a thin spiral sheet. The surface of the blade is so shaped that the successive whorls of the sheet of fluid are divergent, thus preventing interference with each other, and at the same time reaching all points within the range of the nozzle.

My invention also includes various other improvements over the prior art, which will be more particularly explained in the following detailed description, which is to be read in connection with the accompanying drawing.

In the drawing:

Figure 1 is a plan view of my improved nozzle.

Figure 2 is a longitudinal section thereof.

Figure 3 is a front end elevation.

The nozzle which constitutes my invention, is preferably formed from a solid piece of brass, bronze or other suitable metal by milling. It comprises a stem portion 5 preferably having a knurled surface, and provided with a threaded socket 6 for attachment to the end of a spray rod or hose. The stem 5 has an extension in the shape of an advancing spiral blade, the successive spires of which are of gradually diminishing diameter toward the free end of the blade. The stem is provided with an axial bore 8, through which the fluid is discharged, and this bore extends through the blade 7 and gradually diminishes in diameter toward the end of the blade. The inner edge of the blade defines the periphery of the gradually diminishing bore and forms with the face 9 of the blade a sharp cutting edge 10, which cuts off a very thin sheet of fluid from the main stream by reason of the gradually diminishing bore, through which the latter passes. The surface 9, where it intersects the side of the bore, has a comparatively small slope with respect to the axis of the nozzle, but the surface gradually curves outwardly so that the sheet of water as it is separated from the main stream is gradually deflected outwardly more and more with the least possible friction. The surface 9 of the first spire terminates at the periphery of the nozzle in an angle, which is almost a right angle, thus projecting the sheet of water outwardly, in the direction shown by the dotted line 11 in Figure 2. In each successive spire the surface 9 curves less abruptly, so that the successive whorls of the sheet of water diverge from each other and form successively smaller angles with the axis of the nozzle, until in the last whorl, as indicated by the dotted line 12, the water is projected almost in a direct line upwardly. The divergence of the successive sheets of water, therefore, not only prevents the same from interfering with each other, but enables the spraying fluid to reach all points within a given range.

The blade 7 is of considerable thickness, so that its inner edge forms a substantial bearing surface, as indicated at 13, whereby to maintain the direction of the stream after the sheet is cut off at the edge 10, and to prevent the same from being dispersed. The outer edge of the blade 7 is also provided with a continuous groove 14 to prevent the fluid, which may become separated from the sheet 11 and adhere to the edge of the blade, from running over the flat surface and into the sheet thrown off of the succeeding spire.

It will also be noted that the progressively diminishing slope of the surface 9 causes less and less resistance to the fluid as the deflection of the latter becomes less, and this compensates for the gradually diminishing velocity of the stream as it approaches the

end of the bore 8. The result is, therefore, that the fluid is projected in all directions from the nozzle to practically the same distance, and forms practically a continuous spiral sheet of mist throughout its range.

My invention has been particularly designed for use in the spraying of trees, bushes or plants, but it may also be used as a lawn sprinkler, fountain nozzle, indoor fire extinguisher, or for any other purpose for which a spray nozzle is used. Its great carrying power reduces the fluid to a fine spray by reason of the manner in which the blade is shaped, so as to form the least resistance to the liquid. A nozzle of large capacity will produce just as fine a spray as a smaller nozzle, since the increased capacity is obtained by adding to the length of the spiral and the sheets of spray are not made thicker, but more of them are produced by adding to the number of spires in the blade. By reason of these facts, therefore, very little of the spray solution is wasted, making it more economical than other spraying devices now in use.

While the specific features of construction have been particularly described in order to explain the principles of the invention, it will be understood that this is merely illustrative, and that various modifications in shape, size and the like may be made therein without departing from the scope of the invention as claimed.

What is claimed is:

1. A spray nozzle comprising a stem with an axial bore, and having an extension in the form of a blade having the shape of an advancing spiral or auger, with the inner edges of the successive spires of the blade defining a tapered passageway in alinement with said bore, the surface of the blade facing the stream having a slope with respect to the axis which gradually and continuously diminishes toward the free end of the blade, said surface being also transversely curved so that its slope with respect to the axis gradually increases from the bore to its outer edge.

2. A spray nozzle, comprising a stem having an extension in the form of a blade which is in the shape of an advancing spiral or auger, said stem and extension having an axially tapered bore which is defined by the inner edges of the successive spires of the blade, whereby a continuous spiral sheet is cut from a stream passing through the bore, the spires being of sufficient thickness so that their inner edges form a substantial bearing surface for the stream, the surface of the blade facing the stream having a slope with respect to the axis which gradually and continuously diminishes toward the free end of the blade, whereby the successive spires of the sheet of water emitted diverge from each other as they recede from the nozzle.

3. A spray nozzle, comprising a stem having an extension in the form of a blade which is in the shape of an advancing spiral or auger, said stem and extension having an axially tapered bore which is defined by the inner edges of the successive spires of the blade, whereby a continuous spiral sheet is cut from a stream passing through the bore, the spires being of sufficient thickness so that their inner edges form a substantial bearing surface for the stream, the surface of the blade facing the stream having a slope with respect to the axis which gradually and continuously diminishes toward the free end of the blade and which is also transversely curved, so that its slope with respect to the axis gradually increases from the bore to its outer edge.

In testimony that I claim the foregoing as my own I have hereto affixed my signature.

HENRY PETER HANSEN.