May 19, 1931. E. G. MUNZ 1,805,782

SPRAY NOZZLE

Filed Jan. 16, 1928

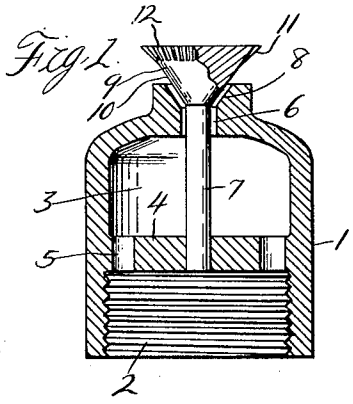


Fig. 1.

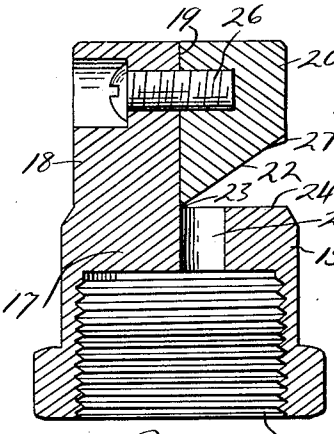


Fig. 2.

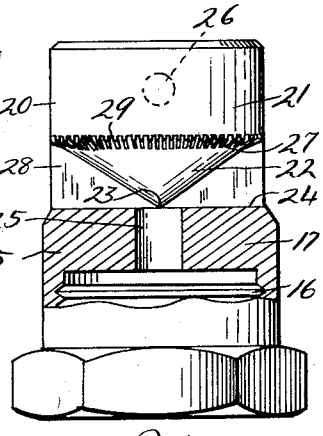


Fig. 3.

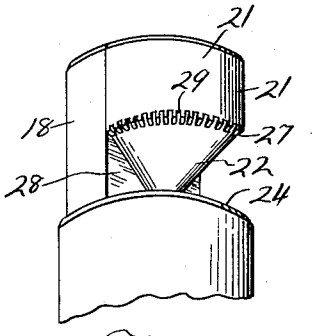


Fig. 4.

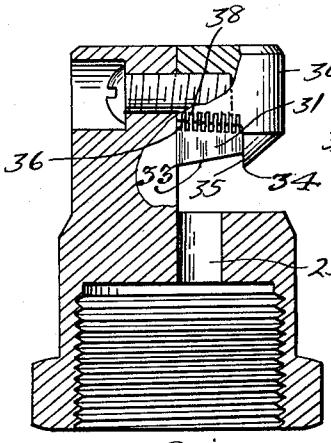


Fig. 5.

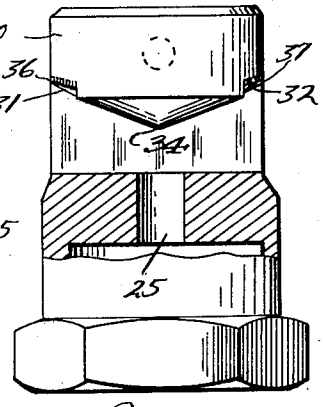


Fig. 6.

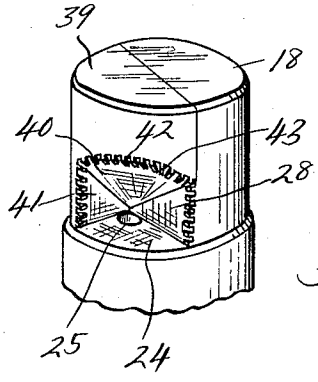


Fig. 7.

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UNITED STATES PATENT OFFICE

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SPRAY NOZZLE

Application filed January 16, 1928. Serial No. 247,195.

The invention relates to spray nozzles and is particularly applicable to spray nozzles adapted for use in sprinkling systems for lawns and the like.

This application is a continuation in part of a co-pending application, Serial No. 543,202 filed March 13, 1922 which was issued on May 1, 1928 as Patent No. 1,667,943.

The object of the invention is to obtain a spray nozzle of the non-rotating type in which means is provided for obtaining a greater spread of spray so that the nozzle may be used for irrigating a larger area than heretofore attainable with other spray nozzles of the same general type. Another object of the invention is to obtain an improved spray nozzle of the type wherein the liquid is discharged without whirling and is compelled to travel in the desired path or direction by a baffle or deflector arranged adjacent the discharge orifice.

These and other objects are attained by providing the nozzle constructions hereinafter more fully set forth and illustrated in the accompanying drawings, wherein

Figure 1 is a sectional elevation of a nozzle embodying my invention.

Figure 2 is a similar section through a modified construction.

Figure 3 is an elevation at right angles to the view illustrated in Figure 2.

Figure 4 is a perspective view of a portion of the nozzle.

Figure 5 is a sectional view of another modified construction.

Figure 6 is a view at right angles thereto.

Figure 7 is a perspective view of a modified construction.

In general my invention consists in providing a nozzle having means for forming the liquid into a thin film, means for directing the stream in the desired direction and means for subdividing the thin film into a series of finely divided streams so that the water will be projected further from the nozzle than if it were allowed to issue therefrom when in the form of a film. My invention consists further in constructing a series of nozzle heads having the advantages above enumerated as well as being adapted for a permanent irrigation installation.

Considering first the construction illustrated in Figure 1, the nozzle head 1 is interiorly threaded at 2 for attachment to a fluid delivery pipe and has an interior chamber 3 formed within the same above a cross partition 4. This partition is apertured at 5 for admitting water to the chamber 3. The nozzle head is provided with a discharge aperture 6 through which projects a rod 7, which latter is supported by the partition 4. The upper end of the nozzle head has a flaring mouth 8 in which is arranged the conical deflector or baffle member 9. This baffle member has its outer conical surface 10 spaced from the flaring mouth 8 leaving an annular passage through which the liquid is discharged upwardly and outwardly from the chamber 3. The surface 10 continues beyond the annular passageway and at the outer end of the member 9 the surface is flared outwardly at 11 and provided with a series of grooves 12 arranged around the periphery and of a depth such that the bottoms of the grooves are in substantial alignment with the conical surface 10.

With the construction as thus far described the water passes through the apertures 5 into chamber 3 and is discharged through aperture 6 and conical mouth 8, which together compel the water to be formed into an annular film that is forced outwardly without whirling and follows upwardly along the conical surface 10 until it is projected into space. When this annular film reaches the grooved portion 11 the water is collected into the series of grooves and is then projected from the nozzle as a series of finely divided streams instead of an annular film. The effect of collecting the liquid into the series of streams is to cause the water to be projected for a greater distance from the nozzle than would be the case where a plain conical baffle was employed. Therefore, when my improved nozzle is utilized in an irrigating system for a large area of ground, it is possible to employ fewer nozzles while obtaining full coverage of all of the area.

My invention is also applicable to nozzles wherein the spray instead of being of a full annular form is limited to a smaller angular coverage. Thus for instance the construction shown in Figures 2, 3 and 4 is of a type known as a half-spray and is designed to sprinkle a semi-circular area of ground. Such a construction is often used in irrigating systems where a nozzle is located close to a roadway or sidewalk and it is desired to prevent the irrigation of the roadway while insuring complete sprinkling of the territory adjacent thereto.

As shown in Figures 2, 3 and 4, 15 is the threaded nozzle head having a hollow chamber 16 and cross partition 17. 18 is a semi-cylindrical portion rising above the partition 17 having a flat face 19 to which is secured the spray directing member 20. This member consists of a semi-cylindrical upper portion 21 and a semi-conical portion 22, the latter having an apex 23. The partition 17 has a flat top surface 24 and has an aperture 25 therethrough arranged slightly off center so that the water discharged therefrom strikes against the conical surface 22 near the apex 23. 26 is a set screw for maintaining the member 20 in position against the upstanding portion 18 of the nozzle.

The conical surface 22 has a slightly flared portion 27 arranged adjacent the semi-cylindrical portion 21 and this flared portion is provided with a series of grooves 29, the depths of which are such as to bring them into alignment with the conical surface.

The operation of the nozzle as above decribed is as follows:

The water issuing through the discharge orifice 25 strikes the semi-conical deflecting surface 22 and is spread into a thin film and directed outwardly and upwardly along the conical surface. The angular spread of the film is limited to a semi-circle by the flat vertical deflecting surfaces 28 which are formed by the flat vertical face of the semi-cylindrical member 18. When the semi-conical film of water reaches the flared portion 27 the water is collected into a series of finely divided streams by the series of grooves 29 and since the bottoms of these grooves are in alignment with the conical surface, the water continues outwardly and upwardly in the same direction as the conical film. The result of this grooved arrangement is that the water is thrown further from the nozzle head and consequently the device can be utilized for sprinkling a larger area of ground with the same water pressure.

In addition to the half-spray type of nozzle above described, it is also desirable to provide nozzles for irrigating systems wherein the deflection of the water is limited to other predetermined directions. Thus as shown in Figures 5 and 6 the nozzle head is adapted to distribute the water in such a manner as to sprinkle a strip of ground, the water being projected in two streams issuing from the nozzle in diametrically opposite directions. Such a construction is obtained by replacing the spray directing member 20 as shown in Figure 2 by another spray directing member 30 attached to the semi-cylindrical upstanding portion 18 by the screw 26. The deflecting member 30 has the inclined surfaces 31 and 32 extending outwardly and upwardly from a lower ridge 33 in vertical alignment with the orifice 25. 34 is a depending portion extending below the surfaces 31 and 32 and having an inner surface 35 arranged substantially parallel to the deflecting surfaces 28 and spaced therefrom by a distance slightly greater than the diameter of the discharge orifice 25. The surfaces 31 and 32 have at their upper edges the flaring portions 36 and 37, which portions contain a series of serrations or grooves 38 arranged substantially parallel to the surfaces 28, having a depth such as to form a substantial continuation of the inclined surfaces 31 and 32. With this construction the water issuing from the orifice 25 is divided by the ridge 33 and deflected upwardly and outwardly by the surfaces 31 and 32. The water forms into a film upon these surfaces but before being projected outwardly is subdivided into a series of finely divided streams by the grooves 38. As in the preceding constructions the arrangement of the grooved surface causes the water to be distributed for a greater distance.

A further modification is illustrated in Figure 7 wherein the water is directed outwardly in the form of a quarter spray. As shown, the deflector 39 comprises a semi-cylindrical body cut away to form an outwardly and upwardly inclined surface 40 extending into the path of the discharge orifice 25. The body is also provided with a radial boundary surface 41 extending at substantially right angles to the deflecting surfaces 28 of the semi-cylindrical member 18. The water issuing from the orifice 25 is thus directed by the combined action of the surfaces 24, 28, 41 and 40 and serves to sprinkle an area of ground of substantially quadrant shape. For increasing the distance that the spray may be projected any or all of the surfaces above mentioned may be provided with the flared portions 42 in which are arranged a series of grooves or serrations 43 extending in the direction of the flow.

It will be observed that in all of the constructions illustrated in Figures 3 to 7 the same nozzle head can be used interchangeably with the respective deflectors 20, 30 and

39 in order to secure the desired deflection and spread of the water.

The nozzle heads are designed primarily for use in a system wherein the irrigating pipes are permanently installed below the surface of the ground and have a series of riser pipes extending vertically upward and adapted to receive the nozzle heads. Each nozzle head is thus always arranged vertically with the discharge orifice also extending in a vertical direction. The irrigation of the area is thus obtained by providing a deflecting surface in the path of the stream discharged from said orifice so as to deflect the stream outwardly and upwardly and form the same into a thin film. In all of the constructions described above the water issues in a vertical direction, is then deflected laterally and spread into a thin film and finally subdivided into a series of finely divided streams at the point where the water leaves the nozzle so that a greater distribution of water with the same water pressure is obtained. The advantage of using nozzles constructed in accordance with my invention will therefore be readily apparent since it enables a given area of ground to be entirely sprinkled with a fewer number of individual spraying heads, since each spray head or nozzle has a greater range of distribution than similar types of nozzles not employing the features of my invention.

What I claim as my invention is:

1. In a sprinkling system, the combination of a nozzle head having a substantially vertical discharge orifice, a conical deflecting surface arranged above the orifice in the path of the water issuing from said discharge orifice for spreading the same into a thin film, said surface being outwardly inclined in the direction of flow to direct the film laterally and outwardly, said surface being provided at its upper end with a series of unconfined grooves that extend in the direction of flow whereby said film is subdivided into a series of finely divided streams capable of being projected further than said film.

2. In a sprinkling system, the combination of a nozzle having a substantially vertical discharge orifice, a convex deflecting surface above and in the path of the water issuing from said nozzle, said surface having a series of unconfined grooves therein extending in the direction of flow.

3. In a sprinkling system, the combination of a nozzle head having a discharge orifice therein, a conical deflecting member arranged above the orifice in the path of the water issuing from said nozzle, said conical surface having a series of unconfined grooves therein extending in the direction of flow.

4. In a sprinkling system, the combination of a nozzle head having a substantially vertical discharge orifice therein, a deflecting member arranged above and in the path of the water issuing from said discharge orifice, a projecting portion formed on the surface of said deflecting member having a series of grooves therein extending in the direction of flow, the bottoms of said grooves forming a substantial continuation of the surface of said deflector.

5. In a liquid spray nozzle, a nozzle head having a hollow chamber provided with a substantially vertical discharge orifice, a conical deflector above said orifice in the path of the liquid issuing therefrom for spreading such liquid into a thin film and causing it to be directed outwardly and laterally, the conical deflector being provided at the periphery thereof with a series of unconfined grooves that extend in the direction of flow to the point where the liquid leaves the deflector whereby the film is subdivided into a series of finely divided streams capable of being projected further from said nozzle head than said film.

6. In a liquid spray nozzle, a nozzle head having a hollow chamber provided at its upper end with a substantially vertical discharge orifice provided with an outwardly flaring mouth, a conical deflector within but spaced from the mouth in the path of liquid issuing from the orifice for spreading the liquid into a thin film and causing it to be directed outwardly and laterally, said deflector being provided at the periphery thereof with a series of unconfined grooves that extend in the direction of flow to the point where the liquid leaves the deflector whereby said film is subdivided into a series of finely divided streams capable of being projected further from said nozzle head than said film.

7. In a liquid spray nozzle, a nozzle head having a substantially vertical discharge orifice, a deflector above the orifice and having a substantially conical surface in the path of liquid issuing from the orifice for spreading the same into a thin film and causing the film to be directed outwardly and laterally, and provided above said conical surface with a series of unconfined grooves extending in the direction of flow for subdividing the film into a series of finely divided streams capable of being projected further from said nozzle head than said film.

8. In a liquid spray nozzle, a nozzle head having a hollow chamber provided with a discharge orifice, a conical deflector in alignment with said orifice for spreading the liquid into a thin film of convex contour, and a convex enlargement or lip at the outer end of said convex deflector, said enlargement having a series of grooves therein, the bottoms of which are in substantial alignment with the surfaces of said convex deflector and which extend in the direction of the liquid stream, said enlargement being bounded by a circular arc of greater diameter than

the diameter of the convex deflector at the bottom of said grooves.

9. In a liquid spray nozzle, a nozzle head having a hollow chamber provided with a discharge orifice, a deflector in the path of the fluid issuing from said orifice, said deflector having a convex outwardly flaring deflector surface and a series of grooves in the path of the liquid issuing from said chamber, said grooves extending in the direction of flow of the liquid for converting the same into a series of finely divided streams capable of being projected further from said nozzle whereby a larger area may be irrigated under the same hydraulic conditions.

In testimony whereof I affix my signature.

ELMER G. MUNZ.