Dec. 22, 1931. E. G. MUNZ 1,837,575

SPRAY HEAD

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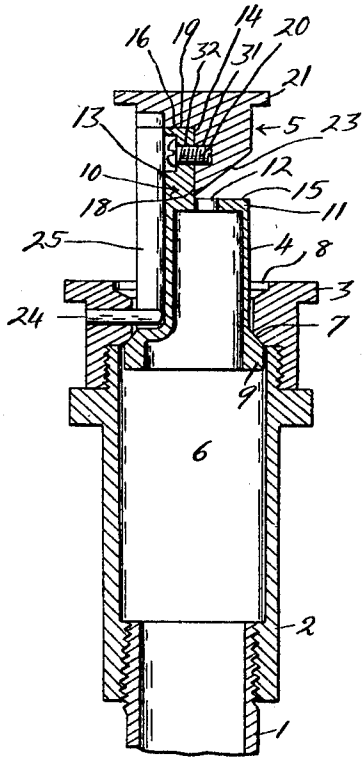



Fig. 1.

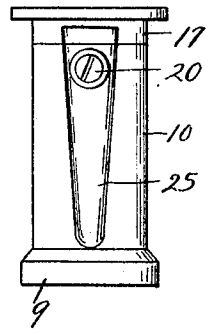



Fig. 2.

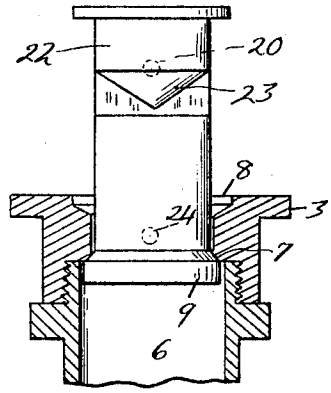



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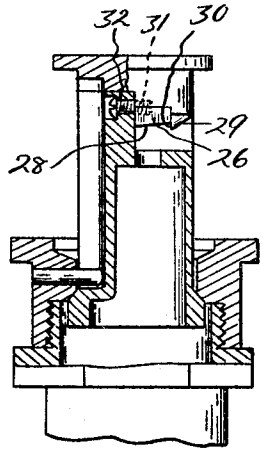



Fig. 4.

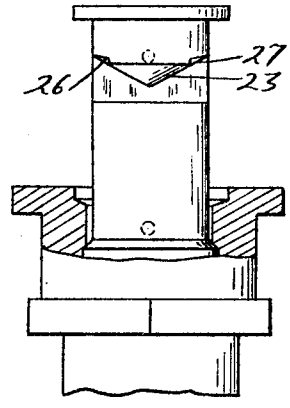



Fig. 5.

INVENTOR

Elmer G. Munz

BY Whittemore Hulbert Whittemore + Belknap

ATTORNEYS

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Fig. 6.

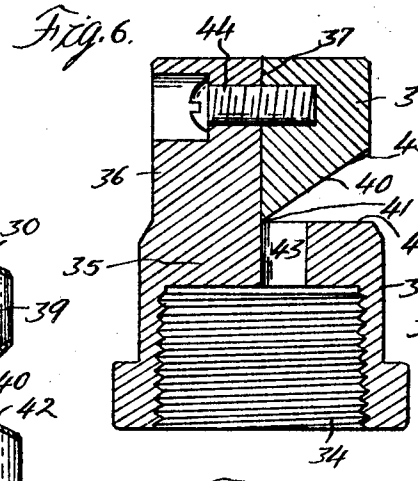



Fig. 7.

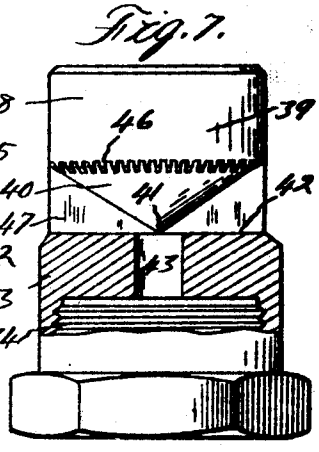



Fig. 8.

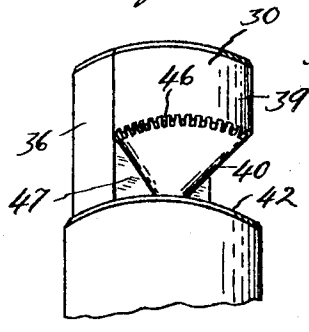



Fig. 9.

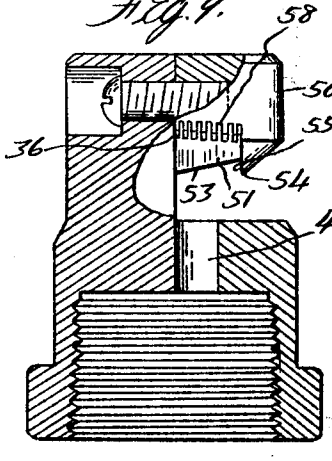



Fig. 10

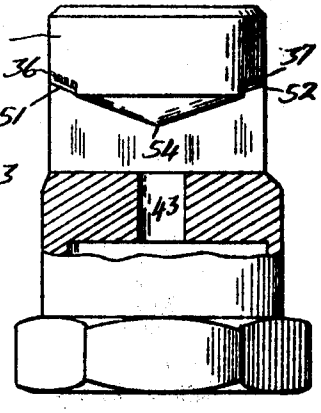
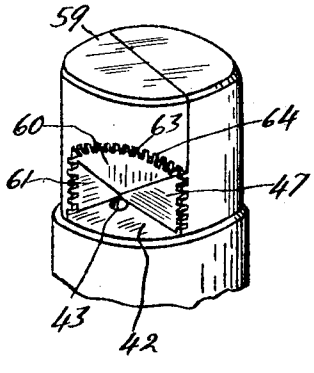



Fig. 11




INVENTOR

Elmer G. Munz

BY Whittemore Hulbert Whittemore + Belknap

ATTORNEYS

Patented Dec. 22, 1931 1,837,575

# UNITED STATES PATENT OFFICE

ELMER G. MUNZ, OF DETROIT, MICHIGAN

## SPRAY HEAD

Application filed November 18, 1929. Serial No. 408,046.

This invention relates generally to spray nozzles adapted for use in sprinkling systems for lawns and the like.

This application is a continuation in part of two co-pending applications in my name, one filed January 16, 1928 and bearing Serial Number 247,195, and the other filed February 13, 1928 and bearing Serial Number 254,083. One of the essential objects of the invention is to provide an improved construction of nozzle in which a nozzle head is provided with a face upon which a plurality of spray directing devices of different design may be accurately positioned and to which such devices may be interchangeably secured.

Another object is to provide a construction of this type to which the face aforesaid is adjacent a fluid discharge orifice, preferably extending parallel to the axis thereof, whereby a spray directing device upon said face will be in the path of liquid discharged from the orifice and will spread such liquid into a thin film and direct the same laterally and upwardly with respect to the orifice.

A further object is to provide a nozzle in which the film directing means is provided with a series of unconfined grooves that extend in the direction of flow to the point where the liquid leaves the nozzle, whereby said film is subdivided into a series of finely divided streams capable of being projected further from said nozzle head than said film.

With the above and other objects in view the invention consists of certain novel features of construction, combinations and arrangements of parts that will be hereinafter more fully described and particularly pointed out in the appended claim.

In the accompanying drawings:

Figure 1 is a longitudinal section through a spray assembly embodying my invention;

Figure 2 is a side elevation of the stem of the device;

Figure 3 is a sectional elevation of the assembly taken at right angles to the view illustrated in Figure 1;

Figure 4 is a sectional view of a slightly modified form of construction;

Figure 5 is a sectional elevation of the construction illustrated in Figure 4 at right angles thereto;

Figure 6 is a sectional elevation of another modified construction;

Figure 7 is an elevation at right angles to the view illustrated in Figure 6;

Figure 8 is a perspective view of a portion of the construction illustrated in Figures 2 and 3;

Figure 9 is a sectional view of another modified construction;

Figure 10 is a fragmentary elevation at right angles to the view illustrated in Figure 9;

Figure 11 is a perspective view of another modified construction.

Referring now to the drawings, 1 is a water supply pipe, 2 is a casing on the upper end of the water supply pipe, 3 is a collar on the upper end of the casing, 4 is a stem of tubular formation slidable longitudinally of the casing and collar, and 5 is a spray directing device detachably mounted upon the upper end of the stem. As shown, the casing 2 is open at its upper end and normally receives the stem 4. The collar 3 is provided at the upper end of the chamber 6 with a conical seat 7 and is provided in its upper face with a depression 8. The stem 4 is provided at its lower end with a lateral portion 9 for engagement with the seat 7 when the stem is in raised position and is provided at its upper end with a substantially L-shaped portion 10. The base 11 of the L constitutes a cross partition at the upper end of the chamber 6 and is provided with a discharge orifice 12 for water, while the upright portion 13 is provided with a flat face 14. Preferably the flat face 14 passes through the axis of the stem, and the upper face 15 of the base is at right angles to said face. The face 15 is thus semi-circular and is in a plane parallel to the flat surface 16 at the upper end of the upright portion 13. The spray directing devices may be formed in various sizes depending upon the area which the nozzle is adapted to spray. For instance, the construction illustrated in Figures 1 to 3 inclusive 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. Thus, as illustrated in these figures, the spray directing device 5 has a cylindrical body 17 provided with surfaces 18 and 19 for cooperating respectively with the surfaces 14 and 16 of the stem and is detachably connected to the upright portion 13 by means of a screw 20. The device 5 also has a lateral flange 21 engageable with the depression 8 when the stem 4 is in lowered position within the chamber 6. The lower portion 22 of the device 5 has formed thereon a half conical surface 23, the apex of which is spaced slightly above the surface 15 and preferably arranged coaxial of the stem 4. The discharge orifice 12 has its axis slightly offset from the axis of the stem so that the water emerging therefrom strikes the conical surface 23 and is deflected laterally. The flat surfaces 14 and 15 cooperate with the conical surface 23 to spray the water in such a manner as to cover a semi-circular area of ground.

In order to direct the spray in the correct angular direction with respect to the fixed casing 2, means is provided for preventing rotational adjustment of the nozzle member relative to its casing when the nozzle is in spraying position. This means is so formed as to permit free longitudinal sliding movement of the stem 4 with respect to the casing 2. As specifically illustrated, the means comprises a pin 24 projecting inwardly from the collar 3 and engaging a longitudinal slot 25 in the stem. This slot is tapered from the upper end where it is widest to the lower end where the width of the slot is substantially the same as the width of the pin. The arrangement is such that when the stem is in its lower position the pin 24 is loosely engaged in the wide portion of the slot 25, however, when the stem is in its upper position the pin has a fairly close fit with the smaller end of the slot, thus accurately determining the angular relation of the spray directing device 5 with respect to the casing 2.

Normally the stem 4 is arranged within the casing 2 with the flange 21 engaging the depression 8, the parts being maintained in this relative position by gravity. When the water supply is turned on the force of the water will elevate the stem 4 until the lateral portion 9 thereof engages the seat 7, forming a seal. The water then passes through the interior of the stem and the discharge orifice 12 to the spray directing device 5 and is deflected by the latter in the desired direction.

As heretofore stated, one of the features of the construction is the provision of means for interchangeably mounting different spray directing devices upon the same nozzle stem. In Figures 4 and 5 I have illustrated another type of spray directing member, useful for the distribution of water when sprinkling a strip of ground, the water being in this instance projected in two streams issuing from the nozzle in diametrically opposite directions. The construction is similar to that illustrated in Figure 1 except that the semi-conical portion 23 is cut away to form the two inclined surfaces 26 and 27 extending outwardly and upwardly from a lower ridge 28 in vertical alignment with the orifice 12. 29 is a depending portion extending below the surfaces 27 and 28 and having an inner surface 30 arranged substantially parallel to the deflecting surface 23 and spaced therefrom a distance slightly greater than the diameter of the discharge orifice 12.

Each of the spray directing devices described above is provided with perpendicular surfaces adapted to cooperate with the corresponding surfaces of the stem member to which they are secured. The advantage of this construction is that the spray directing member can be accurately positioned with respect to the discharge orifice for the member may be accurately seated upon the stem, while the threaded aperture 31 is being machined in alignment with the aperture 32.

In Figures 6 to 11 inclusive, each of the spray directing devices is provided with a series of unconfined grooves that extend in the direction of flow to the point where the liquid leaves the nozzle whereby the film is subdivided into a series of finely divided streams capable of being projected further from said nozzle head than said film. As illustrated in Figures 6, 7 and 8, 33 is the threaded nozzle head having a hollow chamber 34 and cross partition 35. 36 is a semi-cylindrical portion rising above the chamber 34 and having a flat face 37 to which is secured the spray directing member 38. This member consists of a semi-cylindrical upper portion 39 and a semi-conical portion 40, the latter having an apex 41. The partition 35 has a flat top surface 42 and has a discharge orifice 43 therethrough arranged slightly off-center, so that the water discharged therefrom strikes against the conical surface 40 near the apex 41. 44 is a set screw for maintaining the member 38 in position against the upstanding portion 36 of the nozzle. The conical surface 40 has a slightly flared portion 45 arranged adjacent the semi-cylindrical portion 39 and this flared portion is provided with a series of grooves 46, the distance of which are such as to bring them into alignment with the conical surface.

The operation of the nozzles above described is as follows:

The water issuing through the discharge orifice 43 strikes the semi-conical deflecting surface 40 and is spread into a thin film and

directed laterally along the conical surface. The angular spread of the film is limited to a semi-circle by the flat vertical deflecting surfaces 47 which are formed by the flat vertical surfaces of the semi-cylindrical member 36. When the semi-conical film of water reaches the flared portion 45 the water is divided into a series of fine streams by the series of grooves 46 and since the bottoms of these grooves are in alignment with the conical surface, the water continues outwardly and forwardly 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 just 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 9 and 10 the nozzle head is adapted to distribute 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 similar to that illustrated in Figures 4 and 5 and in the present instance is obtained by replacing the spray directing member 38, as illustrated in Figures 6, 7 and 8, by another spray directing member 50. As shown, this member 50 has inclined surfaces 51 and 52 extending outwardly and upwardly from a lower ridge 53 in vertical alignment with the discharge orifice. 54 is a depending portion extending below the surfaces 51 and 52 and having an inner surface 55 arranged substantially parallel to the deflecting surfaces 47 and spaced therefrom by a distance slightly greater than the diameter of the discharge orifice 43. The surfaces 51 and 52 have at their upper edges the flaring portions 56 and 57, which portions contain a series of serrations or grooves 58 arranged substantially parallel to the surfaces 47, having a depth such as to form a substantial continuation of the inclined surfaces 51 and 52. With this construction the water issuing from the orifice 43 is divided by the ridge 53 and is deflected upwardly and outwardly by the surfaces 51 and 52. 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 58. As in the preceding constructions, the arrangement of the groove surface causes the water to be distributed for a greater distance.

A further modification is illustrated in Figure 11 wherein the water is directed outwardly in the form of a quarter spray. As shown, the deflector 59 comprises a semi-cylindrical body cut away to form an outwardly and upwardly inclined surface 60 extending into the path of the discharge orifice 43. The body is also provided with a radial boundary surface 61 extending at substantially right angles to the deflecting surface 47 of the semi-cylindrical member. The water issuing from the orifice is thus directed by the combined action of the surfaces 42, 47, 61 and 60 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 63 in which are arranged a series of grooves or serrations 64 extending in the direction of flow.

It will be observed that in all of the constructions illustrated in Figures 6 to 11 inclusive, the same nozzle head can be used interchangeably with the respective deflectors 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 and 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 laterally 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:

A spray head comprising a hollow cylindrical stem having a horizontal cross partition provided with a vertical discharge orifice, a wall extending upwardly beyond said crosspartition and offset from said discharge orifice, said wall having a flat vertical surface extending upwardly adjacent said discharge orifice and having a top horizontal surface at right angles to said vertical surface, a detachable spray-directing member having a right angled recess formed by a bottom horizontal surface and a vertical side

surface, the bottom horizontal surface of said spray-directing member being engageable with the top horizontal surface of said wall and the side vertical surface of said spray-directing member being engageable with the vertical surface of said wall, means for detachably clamping together said vertical surfaces, and a spray-directing surface formed on said spray-directing member above said discharge orifice.

In testimony whereof I affix my signature.

ELMER G. MUNZ.