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MISTLESS TURBINE NOZZLE FOR USE AS A SPRINKLER AND SHOWER HEAD

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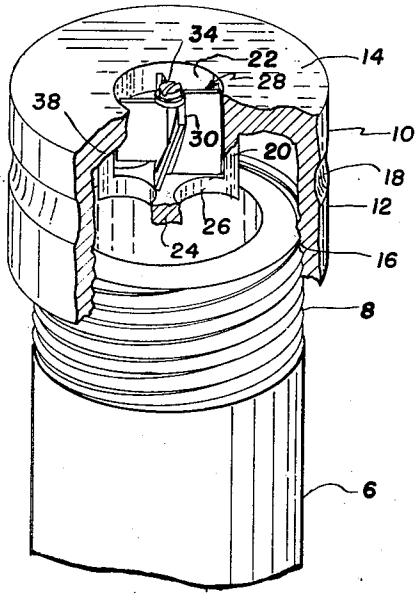


FIG. 1

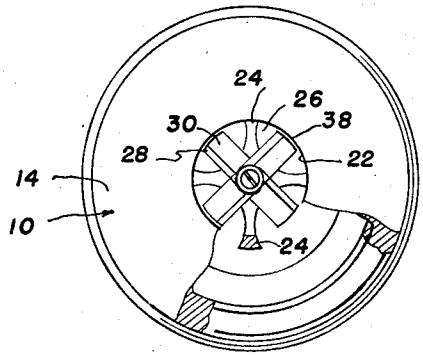


FIG. 2

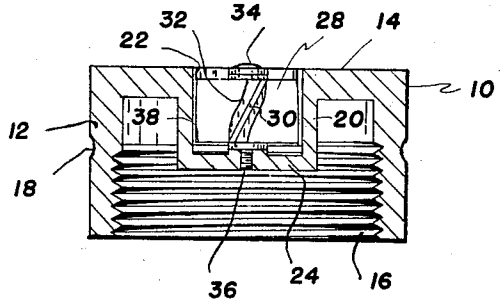


FIG. 3

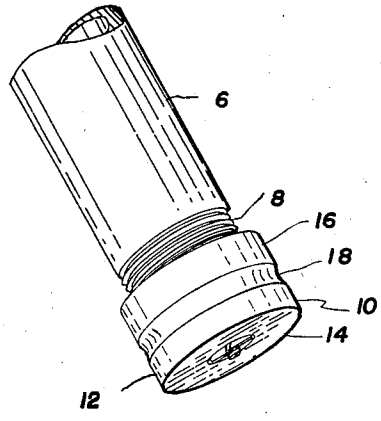


FIG. 4

INVENTOR.
HAROLD A. SWAN

BY

Knox & Knox

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MISTLESS TURBINE NOZZLE FOR USE AS A SPRINKLER AND SHOWER HEAD

Harold A. Swan, Coronado, Calif.

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2 Claims. (Cl. 239—381)

This invention relates generally to hydraulic apparatus and more particularly to a nozzle which is characterized by specially developed structure to effect the ejection of a stream of water in relatively large drops rather than a fine spray or mist.

In brief, the invention relates to the provision of a nozzle of the turbine or self-driven rotor type, incorporated in a screw-on cap element which is internally threaded for attachment to a conduit such as the water pipe in a shower or the threaded terminal of a hose. The cap is provided with a specially developed re-entrant boss which houses the turbine or rotor and which coacts in a special manner with the rotor by reason of critically shaped openings therein, to achieve the above mentioned projection of the water in relatively large drops rather than in finely divided spray form.

The primary object of this invention is to provide a nozzle which is easily attached to a threaded conduit and which will provide the above referred to type of water distribution, that is, a stream of large drop-like fragments of water without an accompanying mist or fine spray.

Another object of this invention is to provide a nozzle which is extremely rugged and which is very durable, and which is self-cleaning, the relative dimensioning of the openings leading to the rotor and the spacing between the vanes of the rotor being such that the rotor is not at all likely to become jammed even when used under adverse conditions.

Another object of this invention is to provide a nozzle which, when connected with a source of pressurized water, will provide a stream of large drops with no central void in the stream, this being accomplished by virtue of the feature incorporated in this nozzle of the beforementioned drop forming structure with a relatively small central obstruction in the nozzle, so that any void in the projected stream does not exist at any great distance from the nozzle outlet.

And a last object to be mentioned specifically is to provide a nozzle of the above mentioned type which is relatively inexpensive to manufacture and which is very convenient and safe to use.

With these and other objects definitely in view, along with other objects which will become evident hereinafter, this invention resides in the novel construction, combination and arrangement of elements and portions, as will be hereinafter fully described in the specification, particularly pointed out in the claims and illustrated in the drawing which forms a material part of this disclosure, and wherein similar characters of reference indicate similar or identical elements and portions throughout the specification and throughout the views of the drawing, and in which:

Figure 1 is a perspective view of the nozzle, portions thereof being broken away to disclose underlying portions and elements, and the view includes a representation of the male threaded end of a conduit which is also disclosed fragmentarily in this view;

Figure 2 is an end view of the nozzle, a portion being broken away as indicated in Figure 1;

Figure 3 is a vertical sectional view of the nozzle; and

Figure 4 is a view in perspective of the nozzle and a portion of a conduit connected therewith.

Referring now to the drawing in detail, the nozzle is designed for use with a conduit indicated at 6, and this conduit will have a male threaded terminal 8 for connection to the nozzle.

The nozzle, generally indicated at 10 comprises a cylindrical body or hollow cylinder 12, closed at one end by a substantially flat plate 14, so that the nozzle is generally cap-shaped. The cylindrical portion includes a threaded neck 16 at the end of the nozzle remote from the plate 14, and the external surface of the cylindrical portion may be relieved as indicated at 18, or knurled or otherwise treated to make the same easily manipulated and to increase the aesthetic value of the nozzle. Integral with the plate 14 and extending inwardly therefrom is a boss 20, and this boss as well as the plate 14 are centrally bored to provide space for the turbine hereinafter described. The bore 22, therefore, extends through the plate 14 and through the boss 20 for the major portion of the length of the latter, although a plate element 24 is preserved at the end of the boss remote from the plate 14, this plate element 24 extending, of course, transversely of the boss and being integral therewith.

A plurality of openings 26 are provided in the plate element 24, each element being arcuate as well illustrated in Figures 1 and 2, and it will be noted that the area of the plate remaining is quite small, so that the plate element 24 could be considered a cross of distinctive form with the arms of the cross secured to the end of the boss 20. However, the number of arms will be determined by the number of apertures or openings 26 and the term plate is used herein to prevent any miscomprehension of the fact that the principal relationship is the critical relationship between the openings 26 and the rotor 28, or more specifically the number of vanes 30 of this rotor. As illustrated, there are four openings 26 in the plate 24 and the rotor 28 has four vanes 30. The rotor must have an axial bearing 32 and an axial pin 34 having a suitably enlarged head is secured by means of a threaded shank 36 to the center portion of the plate 24. This axis pin 34, of course, extends the bearing 32 and the head of the pin holds the rotor against axial movement.

The radially outwardly disposed edges 38 of the vanes 30 extend in substantially parallel relation and adjacent to the inside surfaces of the boss 20. These edges 38 may be very slightly curved but, as stated, extend substantially parallel to the adjacent surfaces of the boss 20. It should be carefully noted that the cross-sectional area of each opening 26 is substantially equal to the cross-sectional area of the space between an adjacent pair of vanes 30, and the axial length of the vanes is preferably nearly equal to the average distance between an adjacent pair of vanes or the distance between the centers of an adjacent pair of vanes as measured on a circle extending through the centers of the vanes. This results in the water flowing through the nozzle being sliced or divided into segments which are not unduly elongated in any one direction, with the ultimate result that these segments upon ejection from the nozzle tend to arrive at somewhat spherical configuration, due primarily to the effect of surface tension, before friction with the air or other drops causes unwanted dispersion into finer globules. It will be evident, therefore, that there is a critical relationship between the openings 26 and the vanes 30, both dimensionally and numerically.

It is thought that this critical relationship has been fully set forth.

The nozzle described above is ideally suited for use as a showerhead and for certain types of sprinklers where fine atomization of the water is not desired.

The operation of this invention will be clearly comprehended from a consideration of the foregoing description of the mechanical details thereof, taken in connection with the drawing and the above recited objects. It will be obvious that all said objects are amply achieved by this invention.

Further description would appear to be unnecessary.

It is understood that minor variation from the form of the invention disclosed herein may be made without departure from the spirit and scope of the invention, and that the specification and drawing are to be considered as merely illustrative rather than limiting.

I claim:

1. A screw-on sprinkler and shower head nozzle for use with an externally threaded conduit, comprising: a hollow cylindrical body having a plate extending transversely across one end and an internally threaded neck at the other end; a hollow cylindrical boss on said plate and extending inwardly of said plate toward said threaded neck; said body, plate and boss being unitary; said plate having an outlet bore extending therethrough and said bore extending throughout the major portion of said boss; said boss having a second plate integral therewith and extending across the end thereof remote from said plate; said second plate having openings providing communication from said neck into said bore; and a rotor having inclined vanes and being mounted on said second plate and freely rotatable in said bore; said rotor being entirely within said bore and having its downstream end substantially flush with the first mentioned plate; the vanes of said rotor having radially outwardly disposed tip edges parallel to the adjacent inner surface of said boss; said vanes having a length measured axially of the rotor substantially equal to the distance between adjacent vanes as measured on a circle through the centers of the individual vanes, whereby water forced through the nozzle tends to be sliced into large drop-like fragments.

2. A screw-on sprinkler and shower head nozzle for use with an externally threaded conduit, comprising: a hollow cylindrical body having a plate extending transversely across one end and an internally threaded neck at the other end; a hollow cylindrical boss on said plate and extending inwardly of said plate toward said threaded neck; said body, plate and boss being unitary; said plate having an outlet bore extending therethrough and said bore extending throughout the major portion of said boss; said boss having a second plate integral therewith and extending across the end thereof remote from said plate; said second plate having openings providing communication from said neck into said bore; and a rotor having inclined vanes and being mounted on said second plate and freely rotatable in said bore; said rotor being entirely within said bore and having its downstream end substantially flush with the first mentioned plate; said openings corresponding in number with the number of said vanes and corresponding generally in size with the cross-sectional area of the space between each pair of adjacent vanes.

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