May 19, 1942. H. D. CLEMMONS 2,283,315

SPRAY NOZZLE

Filed July 22, 1940

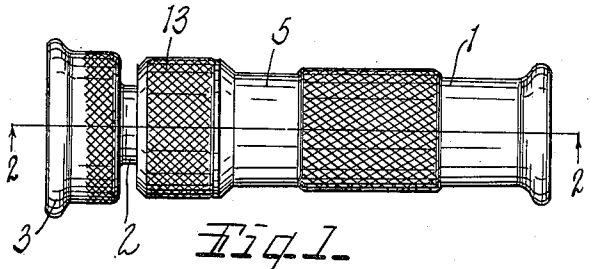


Fig. 1.

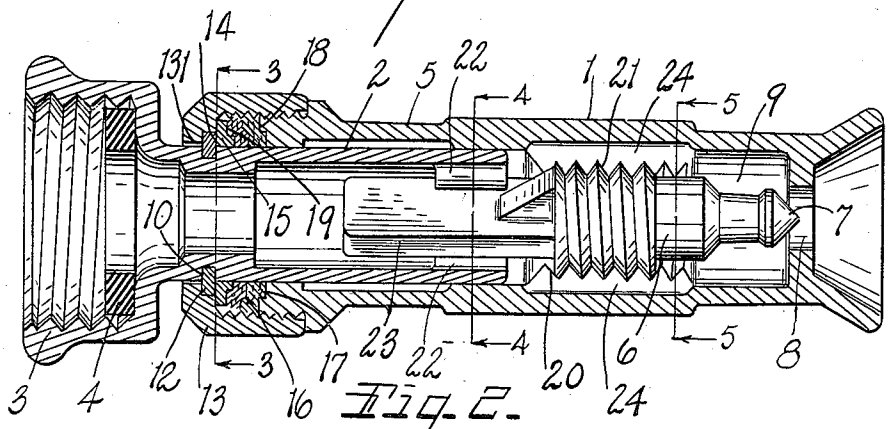


Fig. 2.

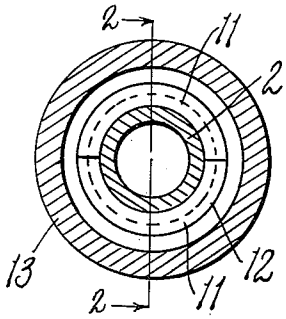


Fig. 3.

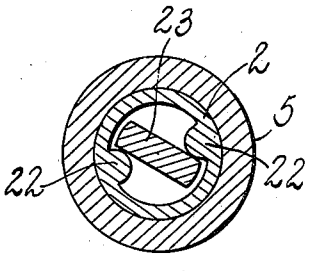


Fig. 4.

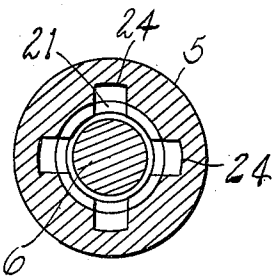


Fig. 5.

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SPRAY NOZZLE

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7 Claims. (Cl. 299—136)

The main objects of my invention are:

First, to provide an improved spraying nozzle for hose and the like adapted to greatly improve the projection and distribution of a stream of liquid therefrom.

Second, to provide a nozzle of the type described, characterized by the simplicity and economy of its parts and their improved effectiveness.

Third, to provide a nozzle of the type described which incorporates novel and improved fluid sealing provisions between relatively rotatable and stationary adjusting parts of the nozzle.

Fourth, to provide a nozzle of the type described wherein the control of the liquid stream projected thereby is effected by manipulation of a pair of relatively rotatable elements serving to project and retract a flow control member, the flow of the stream through the nozzle being directed by the ports in such manner that it is not subject to abrupt changes in direction likely to create turbulence and destroy the uniformity of atomization and distribution of the issuing liquid.

Further objects relating to economies and details of my invention will appear from the description to follow. The invention is defined in the claims.

A structure embodying the features of my invention is illustrated in the accompanying drawing, wherein:

Fig. 1 is a view in side elevation of a hose nozzle embodying my invention.

Fig. 2 is an enlarged sectional view on line 2—2 of Figs. 1 and 3.

Figs. 3, 4, and 5 are views in transverse section respectively on lines 3—3, 4—4, and 5—5 of Fig. 2, illustrating various structural features.

This invention relates to improvements in control nozzle of the type ordinarily employed in garden and the like hose, although the features thereof may well be adapted for application to other types of spray controlling members or nozzles. I therefore desire that the invention be not regarded as unduly limited in respect to its application.

In nozzles of the above type, it has been mainly the practice to employ a pair of fixed and rotatable members, the former of which is suitably attached to the hose and the latter of which rotates on the first named member and by said rotation effects the axial movement of a spray controlling element, generally conical in shape, which coacts with a discharge orifice. In such constructions, it has heretofore been the general practice to employ a hollow axially movable stem and to pass the liquid interiorly of said stem, openings or ports being provided immediately adjacent the said conical control member for the passage of the liquid from the interior of the stem out into a discharge chamber, from which chamber the stream issues through an annular channel defined by the control member and a discharge port or orifice.

Such nozzles are all characterized by the sharp reversal of the direction of flow of the liquid issuing from the interior of the stem, i. e., from a radially outward flow to radially inward, thence out the orifice. This results in a decided tubulence such as causes improper and non-uniform and unsatisfactory atomization, or entire failure to atomize, and the formation of relatively large globules at the nozzle orifice. In the present invention, I overcome these defects by a structure which enables a relatively long and continuous flow of the liquid interiorly of the nozzle in a direction substantially parallel to the axis thereof and without the sharp reversals of the flow which are primarily responsible for the objectionable action described above.

The invention also comprehends improved structure whereby the relatively rotatable parts are restrained from relative axial movement, the adjusting movement of the stem being effected solely by rotation of the telescoped parts and in the provision of improved sealing means in the form of washers and clamping means therefor, whereby leakage of liquid axially between the said relatively rotatable members is effectively prevented and at the same time the usual tendency of the washers to constrict and wear excessively is prevented.

Referring to the drawing, the reference numeral 1 indicates in general the nozzle of my invention, which consists of a tubular body member or support 2 enlarged and internally threaded at 3 for attachment to a hose, with a gasket 4 interposed, an outer sleeve-like head member 5 rotatably arranged on the said body member 2, and an adjusting member 6 which is in the illustrated embodiment of solid metal construction. Member 6 carries the conical flow control tip 7 on its outer end, which coacts with a discharge orifice 8 on the head member 5 to control and regulate the stream of water issuing from the discharge chamber 9.

As illustrated in Figs. 2 and 3, the body member 2 adjacent the enlargement 3 thereof is provided with an annular groove 10 adapted to receive two semi-circular halves 11 of an annular

split stop ring, which ring is designated by the reference numeral 12. The head member 5 has threadedly secured thereto the flanged annular collar member 13, which last named member is provided with an annular radial end flange 131 having an annular seat 14 to receive the aforesaid annular stop ring 12.

A compressing and sealing ring 15 for suitable packing material or washers 16 is telescoped on the body member 2 adjacent stop ring 12, the packing washers 16 being interposed between the compression ring 15 and the inner radial face 17 of the member 5. Ring 15 also serves as an axial stop member, coacting with split stop ring 12 and seat in the collar to prevent relative axial movement of the head and body members.

It will be noted that the inner head face 17 and the packing compression ring 15 are provided with annular steps or shoulders, that on the head being designated 18 and that on the ring 19. As illustrated, the shoulder on the head is located radially outwardly thereon and that on the ring is located immediately adjacent the periphery of the body member 2. It will be appreciated that the packing material is compressed by the threading of collar member 13 on the head, likewise that the two annular shoulders 18, 19 embed themselves in the packing and insure an improved and permanently uniform sealing action thereby.

Experience has shown that the packing material in use tends to contract about the inner or body member, thereby increasing the friction between the parts and wear on the washers. The annular shoulders described above serve to anchor the washers radially so as to prevent undue constriction thereof, thereby adding to the effective life of the material. It will be appreciated that relative axial movement of the members 2 and 5 is prevented by the split stop ring 12 and coacting collar member and compression ring 15. This also minimizes friction on the packing material.

Immediately adjoining discharge chamber 9, the head 5 is interiorly threaded for a substantial axial distance at 20 for engagement with threads 21 on the adjusting member 6, the adjusting member being thereby projected and retracted when the head is rotated on the member 2. In order to produce this axial movement of the adjusting member, it is of course necessary to prevent rotation thereof and this is effected by the provision of a pair of opposed lugs 22 on the inner surface of the member 2, which coact with the sides of the non-circular shank portion 23 in the manner illustrated in Fig. 4. There is a lost motion of approximately 90° with this arrangement when the direction of rotation of the sleeve-like head member is reversed, however this is not objectionable, and if it were could be readily corrected, as will be appreciated.

The fundamental concept of the present invention is the concept of providing for a comparatively unidirectional flow of fluid interiorly of the telescoped, relatively rotatable members and exteriorly of the member 6 so as to avoid the turbulence and unsatisfactory atomization referred to above, and it is for this purpose that the cross sectional area of the rear portion 23 of the stem is reduced. In order to enable the liquid or fluid stream to pass axially of the adjusting member adjacent the threaded portion 21 thereof, I provide a plurality of axially extending grooves or passages 24 in the internal threading 21 of the member 5, this construction being illustrated in Fig. 5. It is thereby insured that the water supplied from the hose or other source will pass axially through the body member 2 and grooves 24 into chamber 9 and thence through the annular orifice defined by the control element or tip 7 and opening 8 in the head member. This is accomplished without any sudden reversal of the direction of flow of the annular stream, it being only slightly deflected at one or two points. The relatively fixed and rotatable, hollow members 2, 5, respectively, are free from internal radial projections of substantial size such as would tend to substantially restrict and divert radially the flow of liquid therethrough, while the flow control or adjusting member 6 is, at the threaded portion thereof, of generally cylindrical section, free from internal radial projections beyond its cylindrical periphery effective to cause tubulence in the flow. It will also be noted that at the threaded connection between the flow adjusting member and head member 5 the axial passages through which the liquid flows are of substantial length, with resultant correction of any possible swirl or turbulence in the water immediately preceding the entry of the same into the discharge chamber 9 and further stabilizing the flow of liquid in the nozzle. The turbulent action present in all previous structures is completely eliminated, as are the undesirable results which accompany the same, namely, poor atomization and formation of excessively large globules at the nozzle end.

The foregoing construction is compact and simple in its parts and easily manufactured and assembled. Its provisions reduce wear and accordingly increase the life of the nozzle; namely, by the anchoring device for the sealing washers and the elimination of the relative axial movement of the body and head members, wear such as has characterized many previous devices is prevented.

I have illustrated and described my invention in an embodiment which is very practical. I have not attempted to illustrate or describe other embodiments or modifications as it is believed that this disclosure will enable those skilled in the art to embody or adapt my improvements as may be desired.

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

1. A nozzle of the type described comprising inner fixed and outer rotatable hollow tubular members disposed coaxially in telescoping relation, means for restraining said members from relative axial movement, said outer rotatable member having a discharge orifice therein and said inner fixed member being adapted for connection to a hose or like source of liquid supply, and a flow control member of solid cross section disposed concentrically of said fixed and rotatable members and axially adjustable relative thereto, said rotatable member having threaded connection with said control member and said fixed member having means engageable with the control member to prevent relative rotation of the control member and fixed member through more than a predetermined angle upon relative rotation of the fixed and rotatable members, whereby said control member is axially projected and retracted relative to said orifice, said threaded connection between the control member and rotatable member having axial passages therethrough freely communicating with said dis-

charge orifice at one end and with the interior of the fixed member, said fixed and rotatable members being free from internal radial projections of substantial size other than said orifice, such as would substantially restrict and divert radially the flow of liquid, and said control member being of elongated, generally cylindrical section at said threaded connection, free from external radial projections beyond its cylindrical periphery causing turbulence in the flow, whereby liquid passes exteriorly of the control member from said fixed member to said orifice without substantial or sudden changes in the direction of flow thereof.

2. A nozzle of the type described comprising fixed and rotatable hollow tubular members disposed coaxially in telescoping relation, means for restraining said members from relative axial movement, said rotatable member having a discharge orifice therein and said fixed member being adapted for connection to a hose or like source of liquid supply, and a flow control member disposed concentrically of said hollow members and axially adjustable relative thereto, one of said hollow members having threaded connection with said control member and the other of said hollow members being engageable with the control member to prevent relative rotation of the control member and fixed member upon relative rotation of the hollow members, whereby said control member is axially projected and retracted relative to said orifice, said threaded connection having axial passages therethrough freely communicating with said discharge orifice at one end and with the interior of said other member, said fixed and rotatable members being free from internal radial projections of substantial size other than said orifice, such as would substantially restrict and divert radially the flow of liquid, and said control member being of elongated, generally cylindrical section at said threaded connection, free from external radial projections beyond its cylindrical periphery causing turbulence in the flow, whereby liquid passes exteriorly of the control member from said other member to said orifice without substantial or sudden changes in the direction of flow thereof.

3. A nozzle of the type described comprising fixed and rotatable hollow tubular members disposed coaxially in telescoping relation, means for restraining said members from relative axial movement, and a flow control member disposed concentrically of said hollow members and axially adjustable relative thereto, one of said hollow members having axially elongated threaded connection with said control member and the other of said hollow members being engageable with the control member to prevent relative rotation of the control member and fixed member upon relative rotation of the hollow members, whereby said control member is axially projected and retracted relative to said orifice, said axially elongated means having axial passages therethrough, said fixed and rotatable members being free from internal radial projections of substantial size other than said orifice, such as would substantially restrict and divert radially the flow of liquid, and said control member being of elongated, generally cylindrical section at said threaded connection, free from external radial projections beyond its cylindrical periphery causing turbulence in the flow, whereby liquid passes exteriorly of the control member in a confined path for a substantial axial distance without substantial or sudden changes in the direction of flow thereof.

4. A nozzle of the type described comprising fixed and rotatable hollow members disposed coaxially in telescoping relation, means for restraining said members from relative axial movement, a flow control member disposed concentrically of said fixed and rotatable members and axially adjustable relative thereto, and means including a threaded connection between said control member and one of said fixed and rotatable members whereby said control member is axially projected and retracted upon relative rotation of the rotatable members, said threaded connection having an axial flow passage therethrough and said fixed and rotatable members being free from internal radial projections of substantial size other than said orifice, such as would substantially restrict and divert radially the flow of liquid, and said control member being of elongated, generally cyindrical section at said threaded connection, free from external radial projections beyond its cylindrical periphery causing turbulence in the flow, whereby liquid passes exteriorly of the control member without substantial or sudden changes in the direction of flow thereof.

5. A nozzle of the type described comprising a pair of relatively rotatable hollow members disposed coaxially in telescoping relation, one of said members having a discharge orifice therein and the other being adapted for connection to a hose or like source of liquid supply, a control member disposed concentrically of said first named rotatable members and axially adjustable relative to said orifice, and means including a threaded connection between said control member and said one of said members whereby said control member is axially projected and retracted upon relative rotation of the first named members, said threaded connection comprising coacting threaded portions on said members of substantial axial length and having an axial passage of substantial length therethrough freely communicating with said discharge orifice and with the interior of said other member and said fixed and rotatable members being free from internal radial projections of substantial size other than said orifice, such as would substantially restrict and divert radially the flow of liquid, and said control member being of elongated, generally cylindrical section at said threaded connection, free from external radial projections beyond its cylindrical periphery causing turbulence in the flow, whereby liquid passes exteriorly of the control member and through said orifice without substantial or sudden changes in the direction of flow thereof.

6. In a spray nozzle, the combination with a tubular body member having internal lugs adjacent its outer end, of a tubular head member rotatably mounted on said body member in sealed relation thereto and supported against axial movement thereon, said head member having a cylindrical delivery chamber with a central relatively restricted delivery orifice and having a portion between said delivery chamber and the end of said body member which is internally threaded, said threaded portion having a plurality of elongated delivery passages therein extending therethrough and opening to said delivery chamber, said body and head members being free from internal radial projections of substantial size on the up-stream side of said delivery chamber, such as would substantially di-

vert radially the flow of liquid therethrough, and a spray adjusting member having a threaded portion engaging said first named threaded portion and a shank portion extending into said body member in operative relation to the said lugs therein, said adjusting member being of substantially cylindrical section at said threaded portion, free from external radial projections beyond its periphery tending to cause turbulence in the flow, said adjusting member having a neck portion within said delivery chamber and terminating in a conical tip operatively associated with said delivery orifice.

7. In a spray nozzle, the combination with a tubular body member having internal lugs adjacent its outer end, of a tubular head member rotatably mounted on said body member in sealed relation thereto and supported against axial movement thereon, said head member having a central delivery orifice and having an internally threaded portion beyond the end of said body member, said threaded portion having a plurality of longitudinal delivery passages therein extending therethrough and in communication with said delivery orifice, said body and head members being free from internal radial projections of substantial size on the up-stream side of said delivery chamber, such as would substantially divert radially the flow of liquid therethrough, and a spray adjusting member having a threaded portion engaging said first named threaded portion and a shank portion extending into said body member in operative relation to the said lugs therein, said adjusting member being of substantially cylindrical section at said threaded portion, free from external radial projections beyond its periphery tending to cause turbulence in the flow, said adjusting member terminating in a conical tip operatively associated with said delivery orifice.

HERBERT D. CLEMMONS.