July 24, 1962 R. A. GILMOUR 3,045,927

SPRAY NOZZLE

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Fig. 1

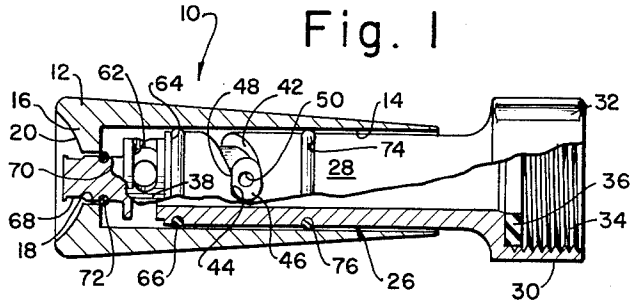


Fig. 2

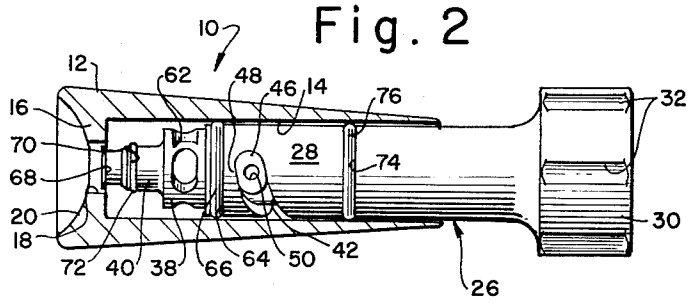


Fig. 3

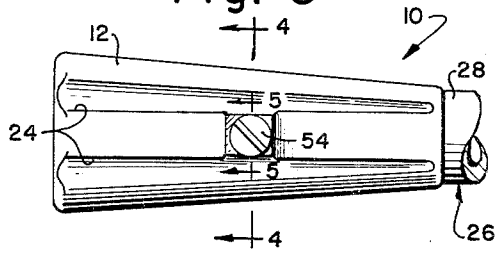


Fig. 4

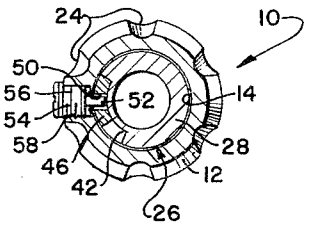
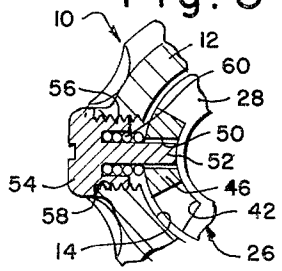


Fig. 5



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SPRAY NOZZLE

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Fig. 6

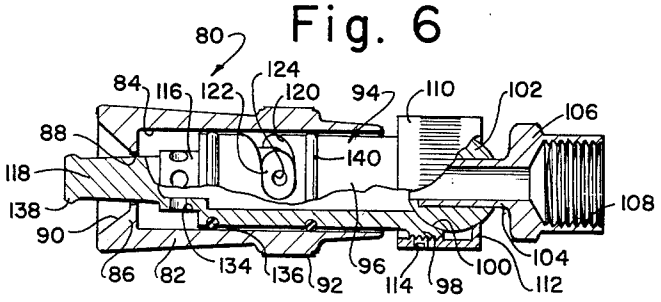


Fig. 7

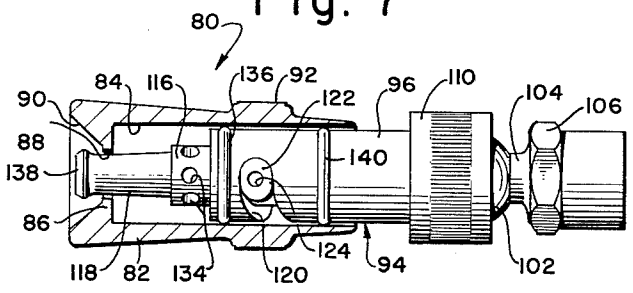


Fig. 8

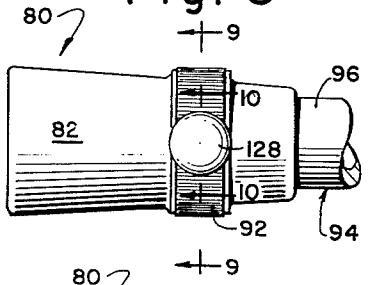


Fig. 9

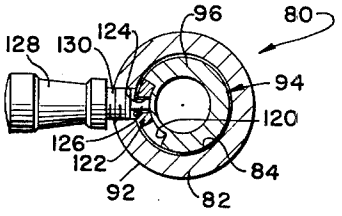
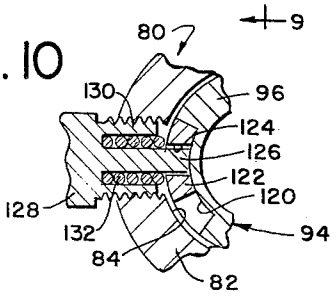


Fig. 10



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SPRAY NOZZLE

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Filed Jan. 17, 1961, Ser. No. 83,210
9 Claims. (Cl. 239—458)

This invention relates to fluid control devices and more particularly to a spray nozzle such as utilized in watering lawns, shower bath installations, and the like. This application constitutes a continuation-in-part of my co-pending application Serial No. 9,557 filed February 13, 1960, now abandoned, which, in turn, is a continuation-in-part of my earlier co-pending application Serial No. 806,301 filed April 14, 1959, now abandoned.

There have been several proposals in the prior art to construct a spray nozzle with inner and outer nozzle members rotatably mounted with respect to each other and provided with means for effecting relative longitudinal movement between the members, between a fully open position and a fully closed or opposite limiting position, in response to several relative rotations between the members. Some of these proposals have been produced commercially and have proven to be satisfactory in actual operation. In recent years, these rotatable type nozzles have been replaced to a considerable extent with pistol-grip nozzles which provide the advantage of substantially instantaneous control over the flow of water through the nozzle. That is, to control the flow so as to obtain a desired spray pattern with a pistol-grip type nozzle, it is necessary merely to effect movement of a trigger whereas with the rotatable type nozzle it is necessary to effect numerous relative twisting movements between the nozzle members requiring some little time and some little effort.

An object of the present invention is the provision of a spray nozzle of the rotatable type described which is movable between a fully open position to a fully closed or opposite limiting position by a relative rotation between the nozzle members of the order of 180° to thereby render the nozzle capable of being manually actuated into the position required to obtain the desired spray pattern in a fast and easy way.

One of the advantages of conventional rotatable type nozzles as compared with pistol-grip type nozzles is that the latter are not inherently self-maintained in the position corresponding to the desired spray pattern without the additional procedure of manually actuating a locking mechanism to retain the parts in the desired position. With rotatable type nozzles, the parts are self-maintained in any position corresponding to the position of the desired spray pattern without further manual manipulation but, as noted above, time-consuming and difficult manipulations are required in effecting movement of the nozzle parts to obtain the desired spray pattern.

Accordingly, another object of the present invention is the provision of a spray nozzle of the type described which is manually movable in a quick and easy way into different positions to obtain desired spray patterns and which is inherently self-maintained in the position to which it is moved.

Another object of the present invention is the provision of a spray nozzle which combines the advantages of prior art spray nozzles of the rotatable and pistol-grip types and substantially eliminates the disadvantages thereof.

A further object of the present invention is the provision of a spray nozzle of the type described having 180° cam and cam slot means between the nozzle parts thereof for effecting longitudinal movement of the nozzle parts between a full open position and a full closed or

opposite limiting position in response to a relative rotation betewen the nozzle parts of approximately 180°.

It will be understood that in providing a cam and cam slot arrangement of the type mentioned above, there are many severe problems presented. For example, the slope of a cam slot sufficient to effect relative longitudinal movement from one limiting position to the other between the nozzle members or parts in response to relative rotation therebetween of approximately 180° must be relatively steep. Thus, the slope is of such steepness that the pressure of the liquid being controlled may be sufficient to cause the nozzle parts to move out of their desired position. Consequently, it is necessary to provide a frictional control between the two parts which will prevent such relative movement and, at the same time, permit the operator to effect relative rotation, when desired, in a relatively easy manner. Moreover, particularly when dealing with hose nozzles, the arrangement must be such that the frictional contact between the two nozzle parts will not unduly increase due to corrosion, extreme temperature conditions, wear of parts and other circumstances which normally occur throughout an extended period of use.

Accordingly, it is a further object of the present invention to provide a spray nozzle of the type described having improved frictional shoe means arranged to be engaged within a helical guide groove or cam slot, such shoe means being capable of providing sufficient frictional contact between the nozzle parts so as to retain them against the action of fluid under pressure within the nozzle in any desired position and at the same time easily permit relative rotation between the nozzle members by the operator.

Another object of the present invention is the provision of a spray nozzle of the type described having improved friction shoe and helical guide groove means which is operable in the manner indicated above over an extended period of use.

Still another object of the present invention is the provision of a spray nozzle of the type described having improved means for controlling and shutting off flow through the outlet orifice thereof.

Still another object of the present invention is the provision of a spray nozzle of the type described which is simple in construction, efficient in operation and economical to manufacture.

These and other objects of the present invention will become more apparent during the course of the following detailed description and appended claims.

The invention may best be understood with reference to the accompanying drawings wherein an illustrative embodiment is shown.

In the drawings:

FIGURE 1 is an elevational view of a hose spray nozzle embodying the principles of the present invention, the outer nozzle member being shown in vertical section and the inner nozzle member being partly broken away, the nozzle members being illustrated in their fully closed position;

FIGURE 2 is an elevational view of the hose spray nozzle with the outer nozzle member shown in vertical section, the nozzle members being illustrated in their fully open position;

FIGURE 3 is a fragmentary elevational view of the nozzle in the position shown in FIGURE 2;

FIGURE 4 is a cross-sectional view taken along the line 4—4 of FIGURE 3;

FIGURE 5 is an enlarged fragmentary cross-sectional view taken along the line 5—5 of FIGURE 3;

FIGURE 6 is a view similar to FIGURE 1 of a shower spray nozzle embodying the principles of the present invention:

FIGURE 7 is a view similar to FIGURE 2 of the shower spray nozzle shown in FIGURE 6;

FIGURE 8 is a view similar to FIGURE 3 of the shower spray nozzle;

FIGURE 9 is a cross-sectional view taken along the line 9—9 of FIGURE 8; and

FIGURE 10 is an enlarged fragmentary cross-sectional view taken along the line 10—10 of FIGURE 8.

Referring now more particularly to the drawings, there is shown in FIGURES 1–5 thereof a hose spray nozzle, generally indicated at 10, which embodies the principles of the present invention. The spray nozzle 10 includes an outer nozzle member 12 of generally sleeve-shaped configuration having a cylindrical opening 14 extending longitudinally inwardly from one end thereof. Formed on the opposite end of the outer nozzle member 12 is an end wall 16 having an outlet orifice 18 of circular cross-section formed in the central portion thereof. As best shown in FIGURES 1 and 2, the exterior surface of the end wall is formed into an arcuately concave configuration, as indicated at 20.

Preferably, the exterior surface of the outer nozzle member 12 is of generally frusto-conical configuration diverging toward the end wall 16. A series of tapered grooves 24 are formed in the frusto-conical surface of the outer nozzle member so as to interrupt the smooth periphery thereof and thereby provide means which will prevent the hand of the user from slipping on the surface of the outer member during the operation of the spray nozzle.

The spray nozzle 10 also includes an inner nozzle member, generally indicated at 26, which includes a central hollow cylindrical barrel portion 28 of a size to be rotatably mounted within the cylindrical opening 14 of the outer nozzle member 12. The barrel portion 28 extends outwardly from the opening 14 and has an enlarged inlet socket portion 30 formed thereon which is provided with a series of circumferentially spaced, longitudinally extending, anti-slip grooves 32 in the exterior periphery thereof and is interiorly threaded, as indicated at 34, to receive a conduit having a liquid under pressure therein, such as a garden hose or the like (not shown). The inlet portion 30 may be provided with a conventional ring gasket 36 which serves to provide a seal between the inlet portion 30 and the male coupling element of the garden hose (not shown).

Extending from the opposite end of the barrel portion 28 is an intermediate cylindrical connecting portion 38 of a diameter less than the diameter of the barrel portion and a cylindrical orifice control portion 40 of a diameter less than the intermediate portion 38 extends longitudinally from the latter.

Formed in the exterior periphery of the barrel portion 28 is a helical groove 42 of approximately 180° extent. The term "helical" as herein used comprehends within its meaning a groove having a variable slope as well as a constant slope. That is, the helical groove 42 may be formed so as to effect a constant longitudinal movement for each increment of rotational movement or the groove may be contoured to effect a greater longitudinal movement for a given rotational incremental movement at its central portion than at its end portions, or vice versa. For example, as shown in FIGURE 1, the outer end portion of the groove 42 includes a short extent which is substantially straight, as indicated at 44.

Disposed within the helical groove 42 is a concavo-convex shoe element 46 which is preferably made of a hard metal or the like. For example, a preferred metal is a sintered powdered metal alloy such as bronze or the like. The concavo-convex configuration of the shoe element permits the same to engage between the lower convex surface of the groove and the concave surface of the opening 14. In order to prevent the shoe from cocking relative to the groove so as to bind therein and prevent easy movement, the shoe element is provided with

substantial areas of contact with the sides of the groove, as indicated at 48 and clearly shown in FIGURES 1 and 2. The central portion of the shoe element is apertured, as indicated at 50, to receive a pin-like projection 52 of a fastening element 54. As best shown in FIGURES 4 and 5 the fastening element includes a treated skirt 56 which surrounds the inner end of the projection 52 and engages within a cooperating threaded opening 58 extending radially through the outer nozzle member 12. The fastening and shoe elements provide a means for effecting a relative longitudinal movement between the nozzle members from the position shown in FIGURE 1 to the position shown in FIGURE 2 in response to a relative rotational movement between the members of approximately 180°.

In order to provide sufficient frictional resistance to the water pressure within the nozzle members so that the latter will be maintained in any position to which they are moved and at the same time permit easy manual movement of the members, a coil spring 60 is mounted in surrounding relation to the projection 52 of the fastening element 54. As best shown in FIGURE 5, the outer end of the spring 60 engages the shoe element 46 while the opposite end thereof engages the fastening element 54 adjacent the base of the skirt 56.

In order to communicate the inlet portion 30 with the outlet orifice 18 of the spray nozzle 10, there is provided in the intermediate connecting portion 38 of the inner nozzle member 26 opposed transversely extending parallel slots 62. The slots 62 are generally U-shaped in section and serve to communicate the hollow interior of the barrel portion 28 with the exterior of the inner nozzle member. Suitable sealing means is provided between the exterior peripheral surface of the barrel portion 28 and the cylindrical opening 14 in the outer nozzle member and, as shown, such sealing means includes an annular groove 64 formed in the exterior periphery of the barrel portion adjacent the intermediate portion 38. An O-ring seal 66 is mounted within the annular groove 64 and extends outwardly therefrom into engagement with the cylindrical opening 14 of the outer nozzle member 12. Preferably the O-ring seal 66 is of a relatively soft or pliable rubber so that it will expand rapidly into sealing engagement with the surface of the opening 14 on response to the application of fluid pressure thereto.

The orifice control portion 40 of the inner nozzle member 26 is preferably of generally cylindrical configuration, having a diameter slightly less than the diameter of the orifice 18. Formed in the exterior peripheral surface of the orifice control portion adjacent the outer extremity thereof is an annular flow control groove 68 of a width greater than the thickness of the end wall 16 defining the orifice 18. A sealing ring receiving annular groove 70 is formed in the exterior periphery of the orifice control portion 40 at a position spaced inwardly from the groove 68 and an O-ring seal 72 is disposed within the annular groove 62 and extends outwardly thereof. The outwardly extending portion of the O-ring seal 72 is of a diameter slightly greater than the diameter of the orifice 18 so that it will engage inwardly facing surface of the end wall 16 defining the orifice 18 to shut off the flow of liquid under pressure through the orifice 18.

In order to maintain the control portion 40 in axial alignment with respect to the orifice 18 at all times during the operation of the nozzle, there is provided suitable guide means between the nozzle members at a position adjacent the inner end of the outer nozzle member 12. As shown, such guide means includes an annular groove 74 formed in the outer periphery of the barrel portion 28 at a position spaced inwardly of the helical groove 42. An O-ring seal 76 is disposed within the annular groove 74 and extends outwardly therefrom for engagement with the interior peripheral surface of the opening 14. Preferably, the O-ring seal 76 is of a relatively hard or stiff rubber so that it will positively retain

the two nozzle members in axial alignment. It will also be noted that the O-ring seal **76** provides a seal against dust and other substances from reaching the annular groove **42** of the nozzle.

In operation it will be seen that by virtue of engagement of the shoe element **46** within the helical groove **42** and the connection of the shoe element with the outer nozzle member **12** through the fastening element **54**, the nozzle members will be moved longitudinally between the fully closed position shown in FIGURE 1 to the fully open position shown in FIGURE 2 in response to relative rotation of the nozzle members through approximately 180°. With the inlet portion **30** suitably connected to a conduit containing water under pressure, such as a garden hose or the like, the flow of water under pressure outwardly through the outlet orifice **18** can be controlled by the operator simply by gripping the grooved outer periphery of the inlet socket portion with one hand (and/or the hose adjacent thereto) and the grooved outer periphery of the outer nozzle member with the other hand and turning the latter relative to the inner nozzle member. The engagement of the O-rings **66** and **76** with the periphery of the cylindrical opening **14** and the engagement of the shoe element **46** with the groove under the action of spring **60** and with the sides of the groove along the areas **48**, provides sufficient frictional contact between the two nozzle members to prevent unwanted movement therebetween in response to the water pressure therein. The major portion of this frictional contact is provided by the spring **60** and thereby the amount of frictional contact provided can be accurately controlled. Preferably, the spring is adjusted so as to provide sufficient contact to resist movement of the parts as a result of maximum pressure conditions which will be encountered and at the same time permit easy manual movement between the two nozzle members. The provision of the straight portion **44** of the annular groove is desirable in that the fluid pressure tending to effect relative movement between the members will be the greatest when the nozzle is connected to a source of fluid under pressure and no flow is permitted. Thus, in the closed position shown in FIGURE 1, full fluid pressure will be applied to the nozzle parts and it will be noted that with a groove slope of zero the full force is resisted by abutting surfaces which are disposed effectively at right angles to the longitudinal direction.

With respect to the manner in which the flow of water is shut off, it will be noted that this is accomplished by the engagement of the outwardly extending portion of the O-ring seal **72** with the inwardly facing surface of the end wall **16** defining the orifice itself. The O-ring seal **72** may be of any suitable sealing material which will effectively seat against the end wall to prevent leakage of liquid therethrough. This arrangement is preferable to metal-to-metal contact, which is provided in certain of the prior art spray nozzles and the O-ring seal of the present invention may be readily replaced after an extended period of use.

It will also be noted that the shoe and fastening element construction of the present invention in addition to providing a means for effecting the relative longitudinal movement between the nozzle members from fully open to fully closed positions in response to relative rotation between the members of approximately 180° also provides a means for effectively securing the members together and permitting the same to be readily disassembled when, for example, it becomes necessary to replace the O-rings seals **66** and **76** and/or the O-ring seal **72**. Thus by merely removing the fastening element **54** from the opening **58**, the two members can be simply pulled apart to gain access to the O-ring seals **66**, **72** and **76**. When the fastening element is in operative position, the nozzle members are retained together by virtue of the engagement of the shoe element **46** with the ends of the helical groove **42**.

It will be noted that when the nozzle members are disposed in their fully open position, as shown in FIGURE 2, the extremity of the orifice control portion **40** is disposed inwardly of the orifice **18**, thus permitting a maximum flow through the orifice. This maximum flow is varied as the extremity of the orifice control portion moves through the orifice in response to the relative movement between the inner and outer nozzle members from their fully open position to their fully closed position, shown in FIGURE 1. During this movement, the groove **68** serves to distribute the water discharged through the orifice in various desirable spray patterns. Of course, just prior to the movement of the valve members into their fully closed position, a very fine spray through the outlet orifice is provided.

Referring now more particularly to FIGURES 6–10, there is shown therein a spray nozzle, generally indicated at **80**, embodying the principles of the present invention of the type adapted to be utilized in shower bath installations. The spray nozzle includes an outer nozzle member **82** of generally sleeve-shaped configuration having a substantially cylindrical opening **84** extending longitudinally inwardly from one end thereof. Formed in the opposite end of the outer nozzle member **82** is an end wall **86** having an outlet orifice **88** of circular cross-section formed in the central portion thereof. As best shown in FIGURES 5 and 6, the exterior surface of the end wall is formed into a slightly arcuate or frusto-conical configuration, as indicated at **90**. It will be noted that the concave surface **90** of the nozzle **80** is somewhat steeper than the concave surface **20** of the hose nozzle **10**.

As before, the exterior surface of the outer nozzle member **82** is preferably of generally frusto-conical configuration diverging outwardly toward the end wall **86**. An annular ridge **92** having suitable knurling provided on the outer periphery thereof is formed in the exterior periphery of the outer nozzle member at a position spaced inwardly from the rearward end thereof.

The spray nozzle **80** also includes an inner nozzle member, generally indicated at **94**, which includes a central hollow cylindrical barrel portion **96** of a size to be rotatably mounted within the cylindrical opening **84** of the outer opening **82**. The barrel portion **96** extends outwardly from the opening **84** and has an annular flange **98** formed thereon which is provided with suitable threads on the peripheral surface thereof. The interior of the flanged end of the inner nozzle member **94** is formed with a segmental spherical surface **100** for receiving a segmental spherical member **102**. The segmental spherical member **102** is centrally apertured to receive a projecting portion **104** of a fitting **106**, the end thereof opposite from the projection **104** being provided with an interiorly threaded socket **108** for connection with a shower pipe or the like (not shown). It will be understood that the segmental spherical member **102** and the cooperating surface **100** constitutes a ball and socket connection which permits the nozzle members **82** and **94** to have limited universal movement. The fitting **106** and ball element **102** carried thereby are retained in operative connection with the inner nozzle member **94** by means of a sleeve **110** which is interiorly threaded to engage the peripheral threads on the flange **98**. The rearward end of the sleeve **110** has a radially inwardly extending flange **112** formed thereon, the interior periphery of which is shaped to engage the periphery of the segmental spherical or ball member **102**. Preferably, a set screw **114** is provided in the sleeve **110** to lock the latter in operative position with respect to the flange **98**.

Extending from the opposite end of the barrel portion **96** of the inner nozzle member **94** is an intermediate cylindrical connecting portion **116** of a diameter less than the diameter of the barrel portion **96**. An orifice control portion **118** extends longitudinally from the connecting portion **116**.

Formed in the exterior periphery of the barrel portion **96** is a helical groove **120** of approximately 180°

extent. The grove 120, like the groove 42 previously described, may either have a constant slope or a variable slope and, as shown, the slope is constant throughout the 180° extent thereof. Disposed within the helical groove 120 is a concavo-convex shoe element 122 which is similar to the shoe element 46 previously described. The shoe element is provided with a central opening 124 which is arranged to receive a pin-like projection 126 extending from a fastening element 128. Preferably, the fastening element extends outwardly from the periphery of the annular ridge 92 a considerable extent so as to provide a handle portion through which the user may conveniently adjust the relative position of the nozzle members for the purposes previously described. The fastening element includes an exteriorly threaded skirt 130 which is engaged within suitable opening formed in the annular ridge 92 of the outer nozzle member and a coil spring 132 is mounted within the skirt in surrounding relation to the pin-like projection 126 so as to resiliently urge the shoe element into engagement with the annular groove 120.

In order to communicate the fitting 106 with the outlet orifice 88 of the spray nozzle 80, there is provided in the intermediate connecting portion 116 of the inner nozzle member 94, a plurality of circumferentially spaced openings 134 which extend from the hollow interior of the barrel portion 96 to the exterior of the inner nozzle member. Suitable sealing means is provided between the exterior peripheral surface of the barrel portion 96 and the cylindrical opening 84 in the outer nozzle member and, as shown, such sealing means includes an O-ring seal 136 similar to the O-ring seal 66 previously described, mounted in an appropriate annular groove formed in the exterior periphery of the barrel portion adjacent the connecting portion 116. The O-ring seal 136 extends outwardly from the peripheral surface of the barrel portion 96 into engagement with the interior peripheral surface of the opening 84.

The orifice control portion 118 of the inner nozzle member 96 is preferably of generally frusto-conical configuration, the slope of the cone being quite shallow and the major diameter thereof being disposed adjacent the connecting portion 116. The outer end of the connecting portion is provided with a rounded radially extending projection or flange 138.

As before, suitable guide means is provided for positively maintaining axial alignment between the two nozzle members and to this end an O-ring seal 140 is provided in an appropriate annular groove formed in the exterior periphery of the barrel portion at a position spaced rearwardly from the helical groove 120. The O-ring seal 140 like the O-ring seal 76 previously described, is of relatively hard rubber and extends outwardly of its groove into engagement with the interior periphery of the opening 84 in the outer nozzle member.

The operation of the shower spray nozzle 80 is similar to the hose spray nozzle 10 previously described. The configuration of the orifice control portion 118 and concave end surface 90 are modified so as to provide a range of spray patterns which are particularly desirable for shower bath installations. Moreover, since in shower bath installations, it is not necessary to shut off flow at the nozzle, the arrangement shown in FIGURES 5–10 does not provide a fully closed position similar to that shown in FIGURE 1. The limiting position shown in FIGURE 5 wherein a very fine spray would be obtained corresponds with the closed position shown in FIGURE 1.

It is significant to note, however, that the nozzle members 82 and 94 of the shower spray nozzle 80 are movable from the limiting position shown in FIGURE 6 to the fully open position shown in FIGURE 7 in response to relative rotation between the nozzle members of the order of 180°. This relative rotation is effected by manual actuation of the handle portion 128 of the fastening element. That is, it is contemplated that sufficient gripping pressure is applied by the sleeve 110 to prevent a turning movement between the ball and socket connection so that it is not essential to hold the inner member while the handle portion is moved. However, it will be noted that the sleeve is provided with knurling on its exterior periphery so that it can be gripped by the user if it is necessary to hold the inner nozzle member against rotation while the outer nozzle member is moved by the handle portion.

It thus will be seen that the objects of this invention have been fully and effectively accomplished. It will be realized, however, that the foregoing specific embodiment has been shown and described only for the purpose of illustrating the principles of this invention and is subject to extensive change without departure from such principles. Therefore, this invention includes all modifications encompassed within the spirit and scope of the following claims.

What is claimed is:

1. A spray nozzle comprising an outer nozzle member having a substantially cylindrical opening extending inwardly from one end thereof and an end wall on the opposite end thereof provided with a central nozzle outlet orifice communicating with said cylindrical opening, an inner nozzle member having a hollow substantially cylindrical barrel portion mounted within the cylindrical opening of said outer member, said barrel portion having a substantially helical groove of approximately 180° extent formed in the exterior periphery thereof, a shoe disposed in said groove and engageable with the sides thereof through a substantial area of contact, a fastening element connected with said shoe and extending outwardly through said outer member so as to effect relative longitudinal movement of said members between two limiting positions in response to relative rotational movement of said members of approximately 180° extent, annular sealing means between the inner portion of said cylindrical opening and the exterior of said barrel portion, said inner member having one end thereof extending outwardly of the cylindrical opening of said outer member and having inlet means thereon for connection with a conduit containing a liquid under pressure, the opposite end of said inner member having an orifice control portion extending therefrom, said inner member having opening means extending from the hollow interior thereof to the exterior thereof in a position between said annular seal means and said end wall, and annular guide means between the outer portion of said cylindrical opening and said barrel portion for maintaining said orifice control portion and said orifice in axial alignment in any position of movement of said members between said limiting positions.

2. A spray nozzle as defined in claim 1 including means between said orifice control portion and said end wall for shutting off flow of liquid under pressure through said orifice in response to the relative longitudinal movement of said members into one of said limiting positions in one direction as a result of relative rotation between said members in one direction.

3. A spray nozzle as defined in claim 2 wherein said flow shutting off means comprises an O-ring seal of resilient material, said orifice control portion having an annular groove receiving said O-ring seal so that the latter extends outwardly thereof to engage the annular surface of said end wall surrounding said orifice when said members are in said one limiting position.

4. A spray nozzle as defined in claim 1 wherein said annular sealing means comprises an O-ring seal of resilient material, said barrel portion having an annular groove formed in the exterior periphery thereof receiving said O-ring seal, said O-ring seal being of a relatively pliable resilient material so as to be readily deformable into pressure-tight engagement with the inner periphery of said cylindrical opening when subjected to fluid pressure.

5. A spray nozzle as defined in claim 1 wherein said annular guide means comprises an O-ring seal of re-

silient material, said barrel portion having an annular groove formed in the exterior periphery thereof receiving said O-ring seal, said O-ring seal being of a relatively stiff resilient material so as to engage the inner periphery of said cylindrical opening adjacent the outer end portion thereof and maintain said outer nozzle member in axial alignment with said inner nozzle member.

6. A spray nozzle as defined in claim 1 including spring means between said shoe and said fastening element resiliently urging said shoe into frictional engagement with said groove.

7. A spray nozzle as defined in claim 1 wherein said fastening element extends radially outwardly of the periphery of said outer nozzle member to provide a lever for effecting rotational movement of said outer nozzle member with respect to said inner nozzle member.

8. A spray nozzle as defined in claim 1 wherein said helical groove includes portions adjacent one end thereof corresponding with said one limiting position of said members which extends in a direction perpendicular to the longitudinal extent of said members.

9. A spray nozzle comprising an outer nozzle member having a substantially cylindrical opening extending inwardly from one end thereof and an end wall on the opposite end thereof provided with a central nozzle outlet orifice communicating with said cylindrical opening, an inner nozzle member having a hollow substantially cylindrical barrel portion mounted within the cylindrical opening of said outer member, said barrel portion having a substantially helical groove of approximately 180° extent formed in the exterior periphery thereof, a shoe disposed in said groove and engageable with the sides thereof throughout a substantial area of contact, a fastening element connected with said shoe and extending outwardly through said outer member so as to effect relative longitudinal movement of said members between two limiting positions in response to relative rotational movement of said members of approximately 180° extent, spring means between said shoe and said fastening element resiliently urging said shoe into frictional engagement with said groove, said inner nozzle member having inner and outer annular grooves formed in the outer periphery thereof in longitudinally spaced relation on opposite sides of said helical groove, an inner O-ring seal of a relatively pliable resilient material disposed in said inner annular groove and extending outwardly thereof for engagement with the inner periphery to be deformed into pressure-tight engagement with the inner periphery of said cylindrical opening when subjected to hydraulic fluid pressure, and an outer O-ring seal of a relatively stiff resilient material disposed in said outer annular groove and extending outwardly therefrom to engage the inner periphery of said cylindrical opening to maintain said inner and outer nozzle members in axial alignment, said inner member having one end thereof extending outwardly of the cylindrical opening of said outer member and having means thereon for connection with a conduit containing a liquid under pressure, the opposite end of said inner member having an orifice control portion extending therefrom, said inner member having opening means extending from the hollow interior thereof to the exterior thereof in a position between said first O-ring seal and said end wall.

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