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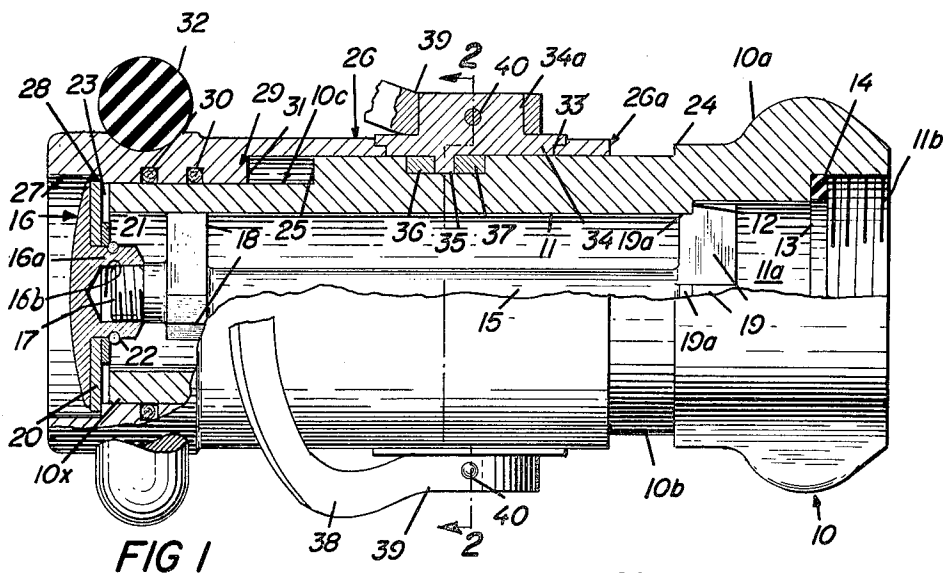
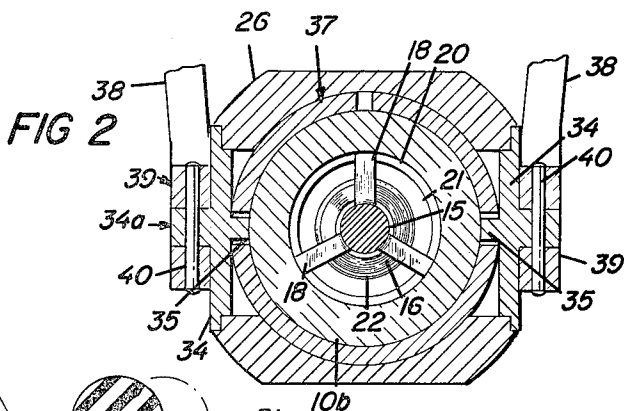
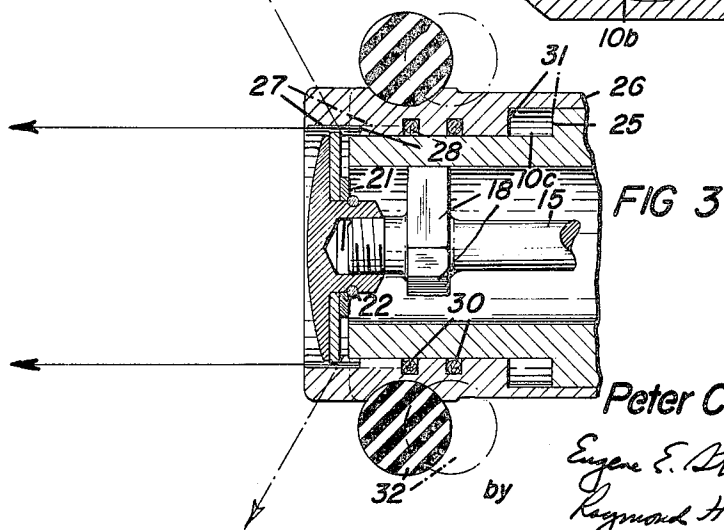
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3,210,012

SPRAY NOZZLE FOR FIRE HOSE AND THE LIKE

Filed Sept. 23, 1963

2 Sheets-Sheet 1



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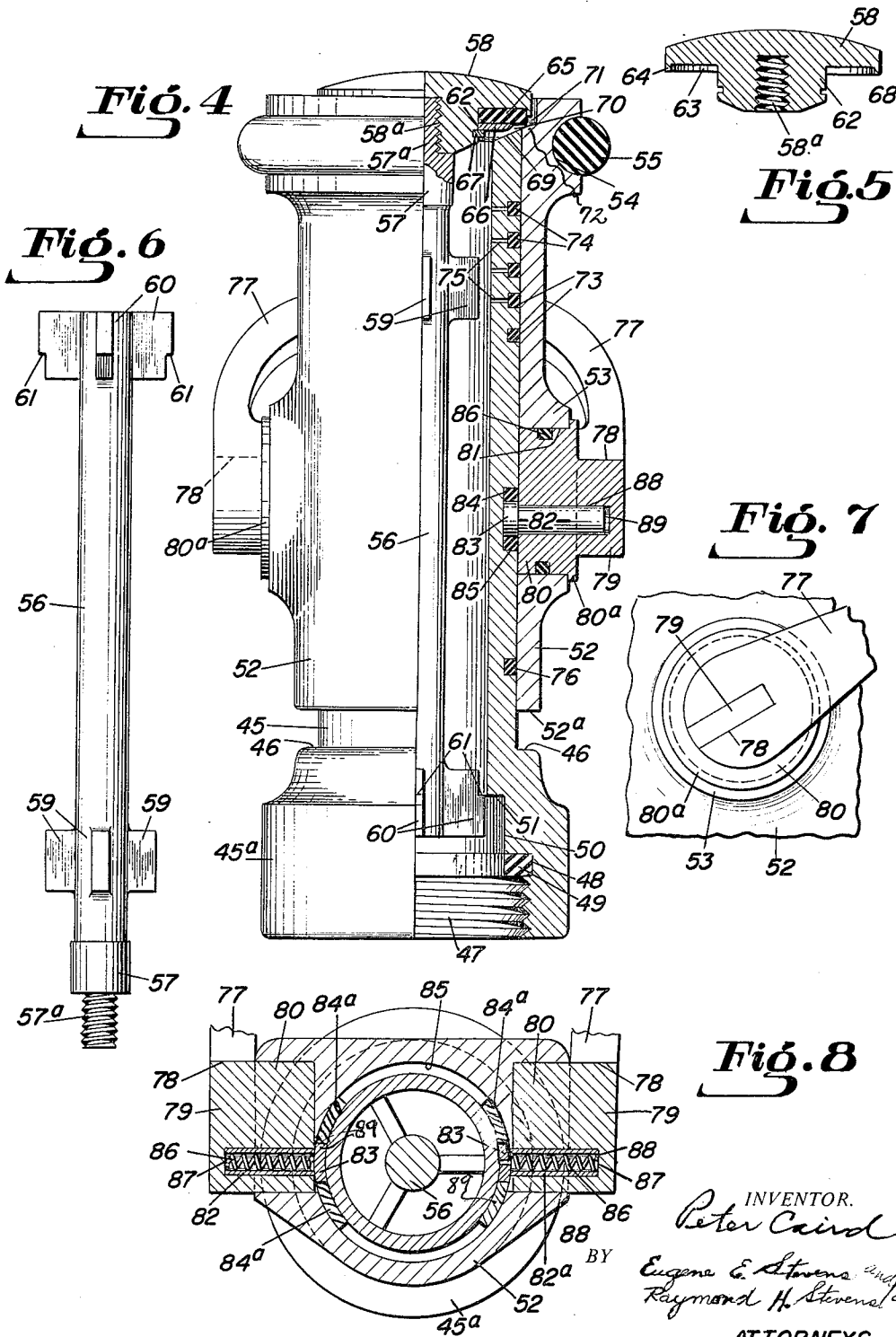
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SPRAY NOZZLE FOR FIRE HOSE AND THE LIKE

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2 Sheets-Sheet 2

Fig. 4



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SPRAY NOZZLE FOR FIRE HOSE AND THE LIKE
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3 Claims. (Cl. 239-456)

This application is a continuation-in-part of application Serial No. 128,349, filed July 28, 1961, now abandoned.

My invention relates to nozzles for fire hoses and the like and refers more particularly to nozzles of the type whereby water under pressure may be expelled from a hose either as a direct stream or as a finely dispersed spray or foam.

Briefly and generally stated, the invention contemplates an improved heavy duty nozzle, of the character indicated, which comprises a minimum number of inexpensively fabricatable and readily assembleable long lived parts, is easy to operate, and is highly efficient in practical use.

It is also an aim of the invention to provide a highly simplified fire hose nozzle of the general type shown in my Patent No. 2,733,962, dated February 7, 1956, but wherein the manually operable flow discharge control means does not automatically function to cut off fluid flow when released by the operator.

Invention also resides in certain novel features of construction, combination and arrangement of the various parts and in modes of operation thereof, as will be readily understood and appreciated by those versed in the art upon reference to the accompanying drawing in connection with the detailed description thereof to follow.

In accordance with patent statute requirements, I have disclosed herein two now preferred forms of the invention. However, the present drawing disclosures are to be taken as illustrative rather than limitative, since it will be obvious that my inventive concept is susceptible of other mechanical expressions within the spirit and scope of the subject matter claimed hereinafter.

In the drawing, wherein the same reference characters have been used to designate the same parts wherever they appear in the several views—

FIG. 1 is a combination side elevation and axial cross-section of a fire nozzle embodying my invention, and with the fluid flow control sleeve in cut off position;

FIG. 2 is a cross-sectional view taken on the line 2—2 of FIG. 1;

FIG. 3 is a detailed view showing different forms of fluid discharge;

FIG. 4 is a view generally similar to FIG. 1 showing a modified form of the invention, but with the control sleeve 52 positioned for cylindrical stream discharge;

FIG. 5 is a cross-sectional detail through the combined valve and baffle of FIG. 4;

FIG. 6 is an elevation of the valve stem;

FIG. 7 is a detail in side elevation showing one of the sleeve (52) operating cams and its operating means;

FIG. 8 is a section taken on the line 8—8 of FIG. 4, but showing segmental pin carried wear shoes 84a instead of rings 84 (FIG. 4); and

FIG. 9 is a perspective of one of the wear shoes of FIG. 8.

Referring to the FIGS. 1-3 of the drawings by reference characters, the tubular base member 10 of the nozzle, which provides the fluid passage 11 extending there-through, has its enlarged rear end portion 10a provided with the adjacent counterbores 11a, 11b which provide the circumferential shoulders 12, 13, respectively. The

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outermost counterbore 11b is threaded for connection with a hose terminal (not shown), and there is a hose terminal intercepting sealing gasket 14 in said counterbore 11b bearing against its shoulder 13.

Forwardly of its rear end enlargement 10a, the base member 10 is successively reduced in exterior diameter to provide the intermediate and forward cylindrical lengths 10c and 10b, the rear ends of which are defined by the circumferential shoulders 24, 25, respectively. The purpose of this exterior formation of base member 10 is to limit rearward movement of a fluid flow control and cut off sleeve 26, as will be presently apparent.

As shown in FIG. 1, a combination poppet valve and fluid baffle member 16 is carried by a rearwardly extending stem 15. This valve and baffle member 16 is disposed in opposition to the discharge end of the passage 11 and in spaced relationship to the related end 10x of body member 10, as indicated, the space being indicated at 23.

The stem 15 of the poppet valve and baffle member 16 is concentrically and slidably supported in the fluid passage 11, 11a by its functionally integral forward and rear spider arms 18, 19, respectively.

As shown in FIG. 1, the reduced forward end 17 of stem 15 is threaded into the bore 16b of the concentric rear face-provided boss 16a of the combined poppet valve and baffle 16. A rubber gasket 20 disposed about boss 16a provides a rear facing for valve 16; and it is secured in place by washer 21 and the overlying clamp ring 22 which latter seats in a circular boss-provided groove.

Still referring to FIG. 1, attention is called to the indicated maximum spacement 23 between the gasket-defined rear face of valve 16 and the forward end 10x of base member 10. This spacement 23, as will be presently understood, determines the rate of gallonage outflow, and such spacement 23 is established by engagement of the forward notch-provided shoulders 19a of the rear spider arms 19 with the circular passage shoulder 12 when there is fluid pressure in nozzle passage 11, 11a. As will be apparent, assembly of stem 15 with valve 16 can be readily effected by screwing the valve onto the threaded end 17 of stem 15 after the latter has been inserted into passage 11.

Cooperating, as shown in FIG. 1, with the baffle valve 16 to cut off fluid discharge from the nozzle is the seat 28 which is formed at the inner end of the discharge passage enlargement 27 that is provided at the forward end of a sleeve 26 which is slidable on the intermediate and forward portions 10b, 10c of base member 10. This sleeve passage end enlargement 27 which spacedly surrounds valve 16, also cooperates with the latter to determine the character of fluid discharge from the nozzle (viz. stream or divergent spray). The plane of valve seat 28 is substantially normal to the axis of sleeve enlargement 27 for a purpose which will be presently explained.

As illustrated in FIG. 1, the rear major portion of sleeve 26 slides on the intermediate portion 10b of base 10, there being provided the internal ring-form bearing portion 29 which rides on the forward base portion 10c. As shown, the sleeve-provided bearing portion 29 provides seating grooves for the base-engaging sealing gaskets 30.

In the flow cut off position of sleeve 26 which is shown in FIG. 1, it will be noted that the rear ends 31 and 26a of the bearing portion 29 and sleeve 26 are spaced the same distance forwardly of the respective base-provided shoulders 25, 24. Thus, said shoulders 25, 24 cooperate to limit the rearward or fluid flow-permitting movement of sleeve 26, forward movement of same being limited

by engagement of the forward seat 28 of sleeve 26 with valve 16.

The forward portion of the flow control sleeve 26 has an exterior seating groove for the usual rubber O-ring 32 as a buffer.

Flow control means (FIGS. 1-3)

As herein shown, the fluid control sleeve 26 is actuated to and from the flow cut off position of FIG. 1 by means of the two cams 34 which work in the two opposed circular recesses 33 of control sleeve 26. These cams 34 have the eccentrically positioned pins 35 engaging in the space between the replaceable wear rings 36 which are seated in the exterior sleeve-provided groove 37. Manual simultaneous operation of the cams 34 is effected by the usual nozzle carrying handle 38. The rectangularly recessed free ends 39 of handle 38 receive the respective similarly shaped outer bosses 34a of cams 34, as indicated; and pins 40 retain 39, 34a assembled.

When the sleeve 26 is retracted by the action of cams 34 to space valve seat 28 rearwardly of valve 16, it will be understood that so long as the baffle valve 16 remains well within the forward sleeve space 27 a fluid stream which is externally cylindrical in cross-section will be discharged from the nozzle as indicated in full lines in FIG. 3. However, as the sleeve 26 is further retracted, a progressively divergent spray discharge results. This continues until finally the forward sleeve (26) end passes the plane of the exposed surface of the gasket 20 at which time a fog-producing disk form fluid discharge results.

The FIG. 4-8 construction

Referring to the modified form of the invention shown in FIGS. 4-8, inclusive, the tubular base member 45 has the enlarged rear end 45a providing the exterior shoulder 46. Base 45 also has the threaded rear hose end-receiving socket 47 whose rear end has the circumferential groove 48 for a hose end abutting gasket 49. A counter-bore 50, communicating with socket 47 defines the circumferential inner end shoulder 51 to be referred to again later on.

A fluid flow control sleeve 52 is exteriorly slidable on base 45 and its inner end 52a engages the exterior base-provided shoulder 46 to limit its rearward movement. The enlarged forward sleeve end 52b is circumferentially grooved (54) to receive the usual O-ring 55; and intermediate its ends sleeve 52 provides the aligned cam-receiving bosses 53.

Concentrically disposed within the body portion 45 for limited longitudinal movement is the stem 56 of a combined poppet and baffle valve 58, there being radially extending spider portions 59, 60, respectively, engaging interior wall surfaces of body 45. Rearward movement of the valve 58 and stem 56 is limited by valve and seat 72 engagement; and forward movement of same is limited by engagement of the shoulders 61 of rear fins 60 with the internal body shoulder 51.

A threaded reduction 57a of forward stem enlargement 57 takes in the tapped bore of the concentric valve 58 provided boss 62 to connect stem and valve.

Surrounding valve boss 62 is the valve seat 72 engaging gasket 65 which is received in valve 58 provided groove 63 that is exteriorly bounded by flange 64.

A metal washer which is diametrically smaller than gasket 65 backs the inner portion of the latter; and both gasket and washer are secured in place by a spring ring 67 which seats in a valve boss-provided groove 68.

In the FIG. 4 position of the parts, wherein valve 58 is unseated with the rear fin 60 provided shoulders 61 engaging the internal base 52 provided shoulder 51, there will be a predetermined gallonage-per-minute output delivery space 70 between the inwardly and rearwardly slanted forward end 69 of base 45 and the proximate surfaces of washer 66 and gasket 65.

Also to be noted from FIG. 4 is the fact that a counter-bore in the forward end 52b of sleeve 52 provides an annular fluid output space about valve 58, 65 and with the inner end of said counterbore-provided space providing the circular inwardly and rearwardly inclined seat 72 for valve 58, 65.

Furthermore, the surfaces of body end 69 and valve seat 72 are aligned in the FIG. 4 adjustment of the parts when a cylindrical stream will be discharged; and spaces 70 and 71 communicate at all flow-permitting adjustments of sleeve 52 with respect to base 45—which is very important.

As shown, base 45 has exterior circumferential grooves 73 for sealing gaskets 74, 76 and that certain of these grooves at least forwardly of bosses 53 have ducts 75 communicating with the interior of the base member 45 so that fluid pressure from the base member provided passage will exert itself upon the gaskets, such as 74, to effect a better seal between same and the inner periphery of the sleeve 52; and also (especially after the gaskets are slightly worn) provide a lubricating action between 45, 52 as the result of slight seepage of water part related gaskets.

Handle 77 controls sleeve 52 shifting as usual, the handle ends having the open ended slots 78 detachably receiving the rectangular cam-carried projections 79. Cams 80 work in the boss (53) provided bearings 81; and the cams 80 of FIG. 8 omit the outer marginal boss-overlying flange 80a and the gaskets 86 of FIG. 4.

Bores 88 of cams 80 slidably carry the pins 82 having inner head ends 83 which are spring-urged as at 86 in FIG. 8 to bear against the back of the annular base-provided groove 85 and the inner peripheries of the laterally spaced wear rings 84 of FIG. 4. But in FIG. 8 pin heads 83 rotatably engage in holes 89 of arcuate wear shoes 84a working in groove 85 to reduce groove wear. As shown in FIG. 8 pin bores 82a receive coil springs 86 to bear against heads 83 and the rear ends 87 of cam bores 88.

As will be understood, when the handle 77 is rocked in one direction, the sleeve 52 will be retracted; and when it is rocked in the other direction the valve 58 carried sealing gasket 65 will engage the sleeve 52 provided valve seat 72.

As previously noted, when the sleeve is positioned as in FIG. 4, there will be a cylindrical stream discharge; but when the sleeve 52 is retracted so that its outer end is in line with the inner surface of washer 65 (or is inwardly of the plane thereof), there will be a disk form spray or mist discharged from the nozzle.

Several important features of the invention are to be noted as follows:

Firstly, as to the FIG. 1-3 form of the invention, the engagement of base and sleeve shoulders 24, 31 and the engagement of the rear sleeve end with base shoulder 25 provides a two point supporting stop for the sleeve 26 at the limit of its rearward movement. Also in both illustrated forms the rear base end-enlargement provides a sleeve stop.

Secondly, the replaceable wear rings (36, FIGS. 1-3; and 84, FIG. 4) absorb wear from cam pins (35, FIGS. 1 and 2; and 82, 83, FIG. 4) rather than the walls of an exterior base section-provided groove as in my aforementioned Patent #2,733,962, and such wear rings 36, 84 can be replaced when worn.

Thirdly, my present developments provide a much sturdier and simpler structure than does my aforementioned patent. This is so because fewer elements are used and also because the base (10, FIG. 1; and 45, FIG. 4), as shown herein, extends substantially the full length of the nozzle. Also, on the subject of simplicity, it is to be observed that in my instant developments both fluid cut off and fluid output character are under the control of the cam-operating lever, which is not the case

in my patented structure mentioned. On the subject of the structure of my said Patent #2,733,962, the automatic-flow-cut-off-upon-handle release has its advantages. However, many fire departments prefer a strictly manually operated flow cut-off and control means that will not require the nozzle handler to keep a constant hold on a flow control handle.

Fourthly, as to the FIG. 1-3 structure, and on the subject of a strictly manual flow and cut off control (as mentioned supra), the peculiar relative arrangement of forward body end 10x, combined baffle and valve 16, and the sleeve-provided valve seat 28 in connection with the close spacement of the valve head 16 and the wall of the sleeve end enlargement 27 prevents any "creeping" of the sleeve forwardly to the fluid cut off position of FIG. 1 when the handle 38 is not held by the nozzle handler's hand for a considerable period. By way of explanation of the foregoing, the slight back pressure of fluid against the valve seat 28 of sleeve 26 when the nozzle is "open," effectively counteracts the tendency of fluid out-put friction against sleeve wall 27 to actuate the sleeve forwardly to the fluid cut off position, wherein seat 28 engages the gasket covered face of the combined valve and baffle 16.

In the FIG. 4-8 form the same above described forward anti-sleeve (52) creeping tendency is counteracted by reason of the much greater width of valve seat 72, even though it slants inwardly and rearwardly.

Fifthly as to both illustrated forms of the invention, the permanent predetermined maximum spacement (see 23, FIGS. 1 and 2; and 70, FIG. 4) of the inner surfaces of the combination poppet valves and baffles from the related body ends, 10x, 69 respectively, constitutes 23, 70 as fluid output gallonage-determining spaces, regardless of the position of the respective valve seat-providing sleeves 26, 52.

Sixthly as to the FIGS. 4-8 form of the invention, there are several advantages over the FIG. 1-3 form, including—

(a) The shallower depth of forward sleeve end recess as compared to valve thickness making for quicker change from stream discharge to a disk or mist-form discharge;

(b) The alignability of the slanting valve seat 72 and slanting body (45) end 69 for cylindrical stream discharge so as to avoid fluid pressure discharge loss;

(c) The provision of ducts 75 communicating between the gasket receiving grooves 73 and the interior of body 45 whereby to subject gaskets 74 to fluid pressure;

(d) The use of pin (82) engaging wear shoes 84a (FIGS. 8 and 9), in lieu of the spaced rings (37, FIG. 1; and 84, FIG. 4). These shoes 84a distribute wear over an extended portion of the side walls of the circumferential cam pin-receiving groove of the nozzle base or body (36, FIG. 1; and 85, FIGS. 4 and 8).

From the foregoing it is believed that the structures disclosed will be fully understood and their advantages appreciated.

Having thus described my invention, what I claim is:

1. A hose nozzle comprising a longitudinally coextensive and tubular one piece base member providing an unobstructed fluid passage of substantially uniform diameter extending therethrough from a point adjacent its rear fluid entry end, said passage having a hose end-receiving enlargement at its rear end, a combined fluid baffle and cut off valve disposed in predeterminedly spaced opposition to both the forward end of said base member and its fluid passage, the space between the combined baffle and valve member and the forward end to the base member providing a nozzle gallonage output per minute determining space under predetermined fluid pressures, a single fluid flow character control sleeve exteriorly and non-rotatably slidable on said base member, said control sleeve having a forward end recess spacedly surrounding and closely spaced to said combined fluid baffle and cut

off valve, a circumferential inwardly extending valve seat provided by the rear end of said sleeve-provided recess, said sleeve being movable forwardly to engage its seat with the combined baffle and valve at a point beyond the plane of the forward base member end whereby to limit forward sleeve movement and cut off fluid outflow from the nozzle when the sleeve is actuated forwardly, manual sleeve-actuating means in part provided by the latter and in part by the base member, the sleeve being retractable rearwardly to variably space its seat from the seat-engaging face of the combined baffle and valve member, whereby to provide discharge of an exteriorly cylindrical stream for so long as the sleeve recess surrounds the valve and a fluid mist discharge after the sleeve end has been retracted beyond the plane of the rear face of said combined baffle and valve and the sleeve-provided valve seat being so constituted as to intercept the back pressure of fluid there-against when the valve is unseated and counteract any tendency of the control sleeve to creep forwardly due to fluid outflow friction against the walls of the exit recess of the control sleeve, and wherein the exterior surface of the intermediate portion of said base member has a circumferential groove, laterally spaced and removable wear rings in said groove, said manual sleeve-actuating means comprising cam means swingably carried by diametrically opposite exterior portions of said control sleeve and having pin means engaging in the space between said wear rings, and a common actuator operatively connected to said cam means.

2. The structure of claim 1 and wherein the base member is longer than said control sleeve and has adjoining diametrically reduced intermediate and forward portions on which the control sleeve slides, each of said diametrically reduced forward and intermediate portions providing a shoulder at its rear end, the shoulder of the intermediate portion being disposed in opposition to the rear end of said control sleeve whereby to limit rearward movement of the sleeve on the base, an inwardly extending ring-form bearing functionally integral with said control sleeve and slidable on said forward base portion, said ring-form bearing defining the rear end of said forward sleeve and recess while providing said valve seat, and the ring-form bearing providing a rear shoulder which is opposed to the exterior rear shoulder of the forward base portion and engages the latter when the rear sleeve end and intermediate portion shoulder engage, so that a dual stop means is provided to limit rearward movement of the control sleeve on said base member.

3. A hose nozzle comprising a longitudinally coextensive and tubular one piece base member providing an unobstructed fluid passage of substantially uniform diameter extending therethrough from a point adjacent its rear fluid entry end, said passage having a hose end-receiving enlargement at its rear end, a combined fluid baffle and cut off valve disposed in predeterminedly spaced opposition to both the forward end of said base member and its fluid passage, the space between the combined baffle and valve member and the forward end of the base member providing a nozzle gallonage output per minute determining space under predetermined fluid pressures, a single fluid flow character control sleeve exteriorly and non-rotatably slidable on said base member, said control sleeve having a forward end recess spacedly surrounding and closely spaced to said combined fluid baffle and cut off valve, a circumferential inwardly extending valve seat provided by the rear end of said sleeve-provided recess, said sleeve being movable forwardly to engage its seat with the combined baffle and valve at a point beyond the plane of the forward base member end whereby to limit forward sleeve movement and cut off fluid outflow from the nozzle when the sleeve is actuated forwardly, manual sleeve-actuating means in part provided by the latter and in part by the base member, the sleeve being retractable rearwardly to variably space its seat from the

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seat-engaging face of the combined baffle and valve member, whereby to provide discharge of an exteriorly cylindrical stream for so long as the sleeve recess surrounds the valve and a fluid mist discharge after the sleeve end has been retracted beyond the plane of the rear face of said combined baffle and valve and the sleeve-provided valve seat being so constructed as to intercept the back pressure of fluid thereagainst when the valve is unseated and counteract any tendency of the control sleeve to creep forwardly due to fluid outflow friction against the walls of exit recess of the control sleeve, and wherein the exterior surface of the intermediate portion of said base member has a circumferential groove, said manual sleeve-actuating means comprising cam means swingably carried by diametrically opposite exterior portions of said control sleeve and having pin means engaging in the space between said wear rings, spring means urging said pin means toward said base member-provided groove, elongated arcuate wear shoes in said groove and operatively connected to said pin means, and a common actuator operatively connected to said cam means.

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References Cited by the Examiner

UNITED STATES PATENTS

1,209,374	12/16	Andreolli	285—106
2,441,596	5/48	Reitter	74—57
2,552,445	5/51	Nielsen	239—456
2,565,457	8/51	Spender	239—456
2,678,847	5/54	Caird	239—456
2,711,929	6/55	Nielsen	239—456
2,733,962	2/56	Caird	239—499
2,747,939	5/56	Caird	239—456
2,806,741	9/57	Fishelson	239—456
2,955,766	10/60	Nielsen	239—456
3,010,454	11/61	Lucie et al.	239—455

FOREIGN PATENTS

566,227	1/58	Canada.
882,342	7/53	Germany.

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