

April 7, 1964

J. V. DENURE

3,128,048

FOG NOZZLE

Filed Nov. 13, 1962

2 Sheets-Sheet 1

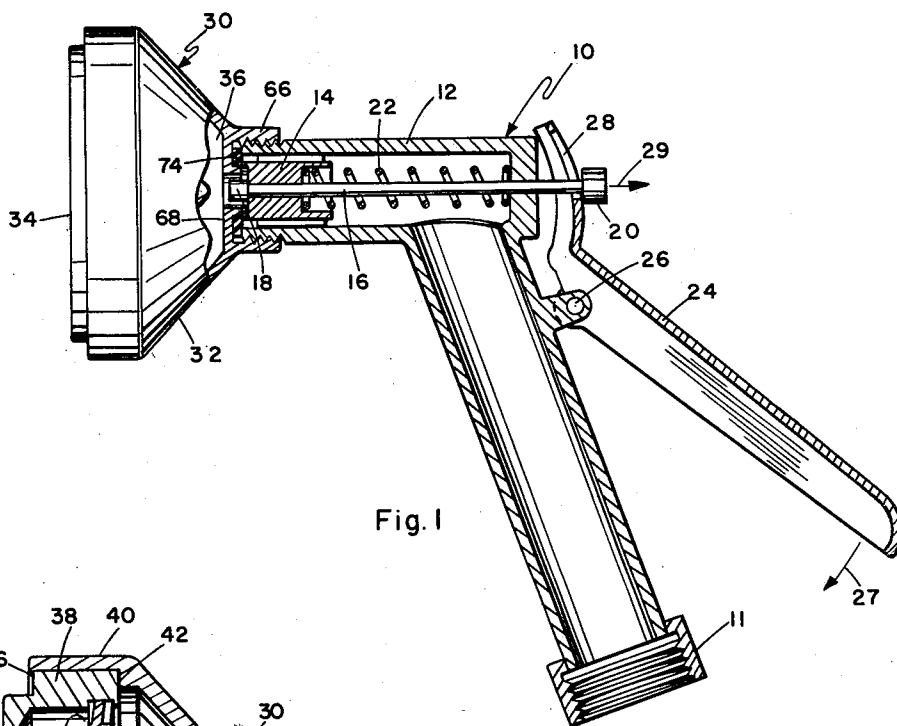


Fig. 1

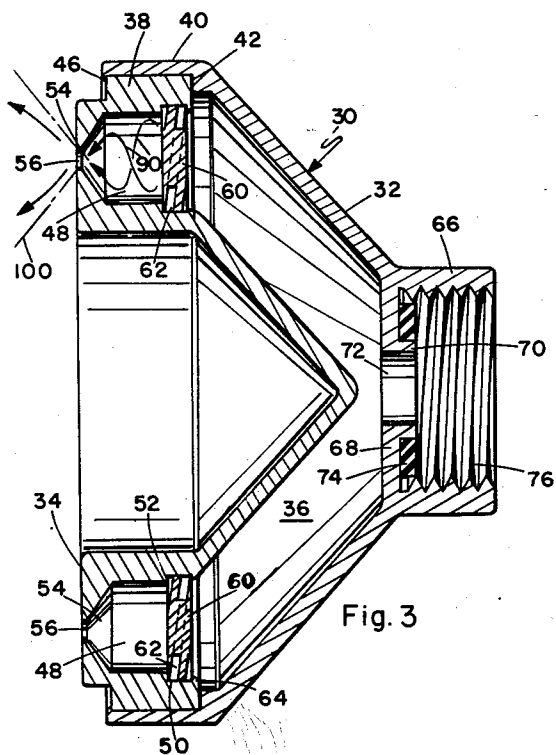


Fig. 3

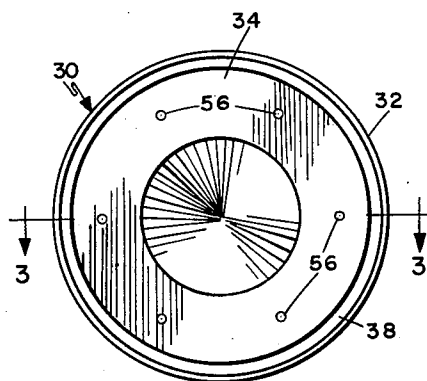


Fig. 2

INVENTOR.
JESSE V. DENURE
BY *Knox & Knox*

April 7, 1964

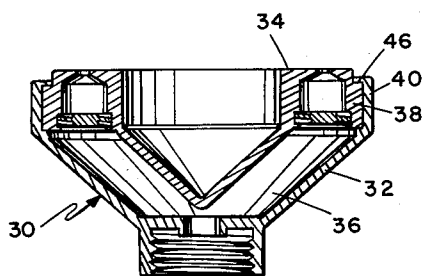
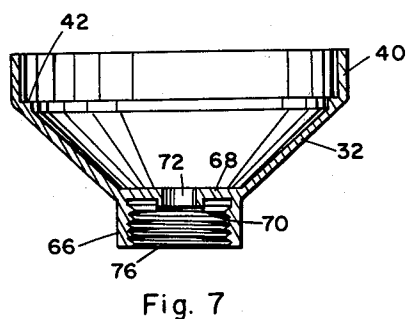
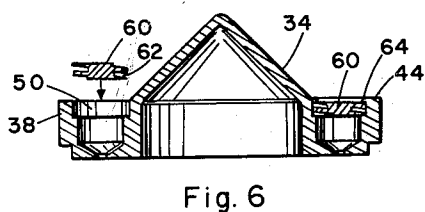
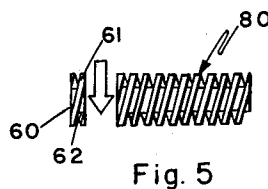
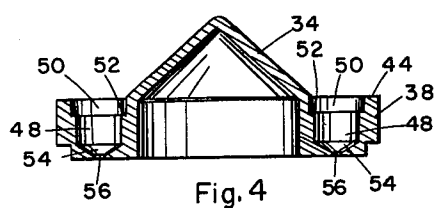
J. V. DENURE

3,128,048

FOG NOZZLE

Filed Nov. 13, 1962

2 Sheets-Sheet 2



INVENTOR.
JESSE V. DENURE
BY *Knox & Knox*

1

3,128,048

FOG NOZZLE

Jesse V. Denure, 2066 Parrot St., San Diego, Calif.,
assignor of one-third to Mary Ansara Nelson, San
Diego, Calif.

Filed Nov. 13, 1962, Ser. No. 236,935

1 Claim. (Cl. 239-488)

The present invention relates generally to fog nozzles and the method of making the same and more particularly to fog nozzles for creating an extremely dense fog which is particularly useful in fire-fighting but not limited thereto.

The primary object of this invention is to provide a fog nozzle which will produce an extremely dense protective curtain of fog.

A further object of this invention is to produce a fog nozzle that will throw a curtain of fog through an extremely wide arc of approximately 120 degrees.

Still another object of this invention is to provide a fog nozzle that can be quickly and easily attached to standard threaded valved fittings.

A further and important object of this invention is to provide a method of economically assembling fog nozzles, basic parts of which are cut from stock material.

Finally, it is an object to provide a fog nozzle which will give generally efficient and durable service.

With these and other objects definitely in view, this invention consists 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 claim, and illustrated in the drawings which form a material part of this disclosure, and in which:

FIGURE 1 shows a side view of my improved fog nozzle connected to a valved handle member with the handle member shown in section;

FIGURE 2 shows a view of my fog nozzle looking toward the outlet end thereof;

FIGURE 3 is a section taken on the line 3-3 of FIGURE 2;

FIGURE 4 is a sectional view of the inner member prior to assembly of the restrictor plugs;

FIGURE 5 is a view showing how the restrictor plugs are severed from a piece of threaded stock material;

FIGURE 6 is a view showing how the restrictor plugs are inserted in the inner member;

FIGURE 7 is a cross sectional view of the outer member before assembly with the inner member; and

FIGURE 8 is a view of the completed assembly.

Referring more specifically to the drawings there is shown by way of example only a preferred form of the invention.

In FIGURE 1 there is shown a fog nozzle 30 in accordance with the present invention connected to a valved handle which is representative only and forms no part of the present invention. The handle member 10 may conveniently take the form of a hollow housing or body 12 adapted to be connected to a source of fluid under pressure as by a threaded coupling 11. A valve head 14 is slidably mounted on a valve rod 16 which has headed ends 18 and 20. Valve head 14 is forced to the left or closed position by coil spring 22. A lever 24 is pivoted to body 12 at 26. This lever is provided with a slot 28, of a width substantially equal to the diameter of rod 16, engaging the head 20. It is readily apparent that movement of lever 24 about pivot 26 in a direction indicated by arrow 27 will cause movement of the valve rod 16 together with the valve 14 in a direction indicated by arrow 29.

Reference numeral 30 indicates generally the improved fog nozzle which is the subject matter of this invention.

2

This nozzle consists of an outer housing 32 of generally conical form and an inner housing 34 also of generally conical form spaced from the outer housing to form an annular chamber 36. At the base of the conical portion housing 34 is provided with a radially extending shoulder 38 having an inner radially extending shoulder 44. Outer housing member 32 has an axially extending flange 40 provided with a limiting shoulder 42 at its inner end which engages the radial face 44 of flange 38. The outer end of flange 40 is peened as at 46 over flange 38 to firmly secure the inner and outer housing members together.

Flange 38 is provided with a plurality of swirl chambers 48. Six of these chambers are shown, equally spaced circumferentially, around the flange by way of example only but it is obvious that any number could be used depending upon the size of the nozzle. These chambers are generally cylindrical with their axes extending parallel to the axis of inner conical housing 34. Since these chambers are all identical only one will be described. A counterbore 50 in the inner end of the chamber 48 provides a shoulder 52 which forms a locating means for disc-shaped restrictor plug 60. Outer periphery of plug 60 is formed with spiral threads which form a spiral channel communicating between chamber 36 and swirl chamber 48. Plug 60 is non-rotatably held in counterbore 50 by a shoulder or stop 64 which is formed by peening or staking a portion of flange 38 over the outer periphery thereof. Outlet end of chamber 48 is preferably conical in shape as shown at 54 with the angle of the cone being approximately 120 degrees. A restricted opening 56 is provided at the apex of the cone 54.

A combined coupling and valve member is provided on outer housing member 32. This may conveniently take the form of an axial flange 66 extending from housing 32 and a radial flange 68 at the junction of flange 66 with housing 32. Axially extending flange 70 defines an opening 72 which provides communication between the chamber 36 and the interior of valve housing 12. Valve washer 74 is seated in the recess formed by flanges 66 and 70. Flange 66 is provided with standard screw threads 76 for coupling the nozzle to correspondingly shaped threads on handle member 12.

The various steps by which the fog nozzle is assembled, as shown in FIGURES 4-8 of the drawing, will now be described.

The inner member 34 is cast or forged from a suitable material having the required strength characteristics. The chambers 48 together with counterbores 50 may be cast into the member 34 or alternatively, if forging is used a conventional multi-spindle boring machine would give satisfactory results.

The required number of restrictor plugs 60 are now severed from a bar 80 of stock material, as shown in FIGURE 5. This bar may be formed in a well known manner on a thread cutting lathe or similar metal working machine. With the inner member in the position shown in FIGURE 6, plugs 60 are inserted in the respective counterbores and the metal at the edges of the counterbores deformed, as shown at 64, to nonrotatably secure the plugs in operative position. Inner member 34 is now inverted and inserted into the outer member until the flange 44 abuts against the flange 42. Final assembly is accomplished by deforming a portion of flange 40 over the outer edge of flange 38, as shown by numeral 46 in FIGURE 8.

Operation

With the fog nozzle in position on the valved handle as shown in FIGURE 1, and the coupling 11 connected to a suitable source of fluid under pressure, movement of lever 24 downwardly as shown by arrow 27 will lift the valve member 14 off washer 74 and admit fluid to cham-

3

ber 36. From here the fluid passes through the spiral opening 62 in the restrictor plugs into the chambers 48. The fluid enters these chambers at a relatively high velocity due to the throttling action of the spiral openings 62 and travels with a generally swirling action, as indicated by arrows 90, toward the outlet 56. As this high velocity fluid enters opening 56 a further throttling action takes place, and the impinging of the stream on the edge of the opening causes atomization of the fluid so that it is emitted from the nozzle in the form of a dense fog. Since the included angle of the conical portion 54 is approximately 120 degrees the effective area covered by the fog will be within a similar arc as shown by the broken lines 100 in FIGURE 1. Although the operation of only one chamber 48 has been described it will be apparent that all chambers will function in the same manner. The improved fog nozzle will produce an extremely dense fog over a wide area which will be particularly effective in extinguishing fires. It can also be used as an effective protective curtain or shield for firemen when approaching burning buildings.

Having thus described the invention what is claimed and desired secured by Letters Patent is:

- A fog nozzle comprising:
- an outer generally conical body member having an axially extending flange at the base and a cylindrical internally threaded axial flange at the apex, said axial flange including a restricted opening at the apex center;
 - an inner generally conical body member having a radially extending flange at the base, said member being assembled concentrically with said outer body member and spaced therefrom with said axially extending flange overlapping said radially extending

4

flange, the apex of said inner body member being disposed adjacent said restricted opening to disperse a liquid stream divergently;

a plurality of cylindrical swirl chambers circumferentially spaced about said radially extending flange, the axes of said chambers being parallel with the axes of said body members, each of said chambers having a restricted opening in the outer end thereof, the wall of each chamber adjacent said restricted opening being divergent therefrom at an angle of substantially 120 degrees; and

a restrictor plug partially closing the inner end of each chamber, each plug having a spiral passage in the periphery thereof, said passage extending from the space between said inner and outer body members to said chamber so that said spiral passage imparts a swirling motion to liquid passing therethrough and the diverging wall of said chamber causes the swirling liquid to strike said restricted opening at a converging angle, thus creating a dense fog that is emitted in a substantially 120-degree cone.

References Cited in the file of this patent

UNITED STATES PATENTS

916,984	Bleymehl	Apr. 6, 1909
982,424	Goodwin et al.	Jan. 24, 1911
1,239,075	Bagnall et al.	Sept. 4, 1917
1,884,485	Yost	Oct. 25, 1932
2,458,876	Rehn	Jan. 11, 1949
2,651,547	Calhoun	Sept. 8, 1953
2,680,652	Koaistra	June 8, 1954
2,701,412	Wahlin	Feb. 8, 1955
2,971,250	Wahlin	Feb. 14, 1961