April 13, 1954 J. E. CLOUGHERTY ET AL 2,675,270

COMBINED FOG AND SOLID OR STRAIGHT STREAM NOZZLE

Filed Jan. 15, 1952

Fig. 1.

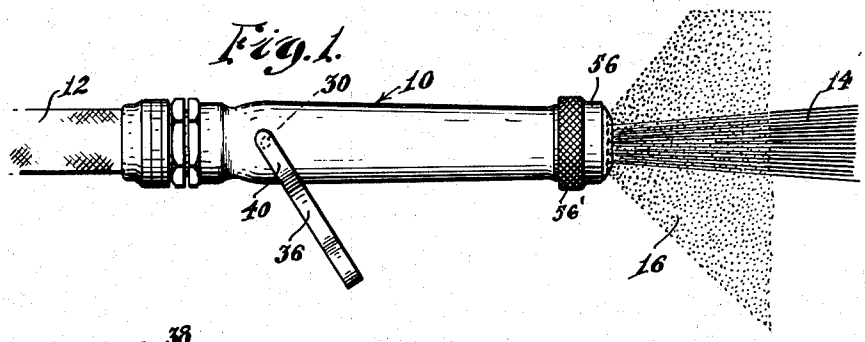


Fig. 2.

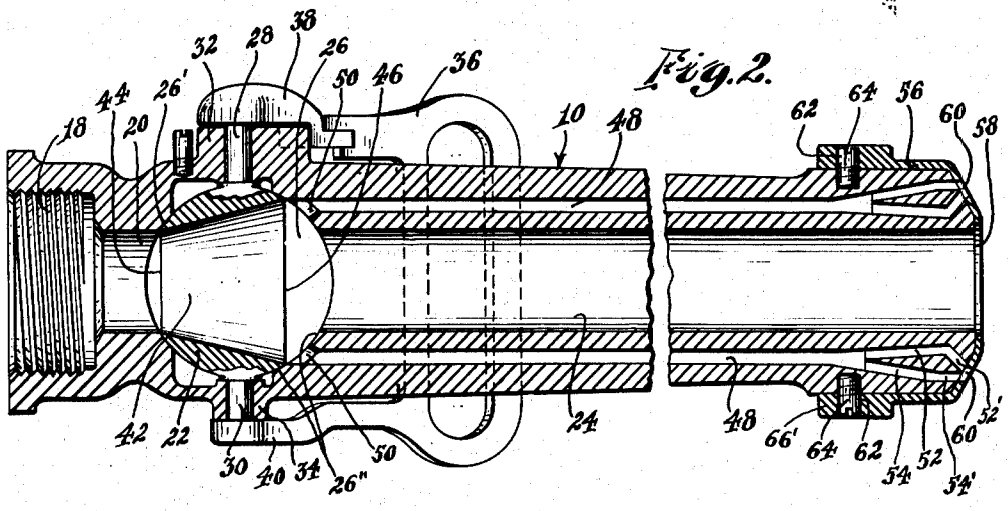


Fig. 3.

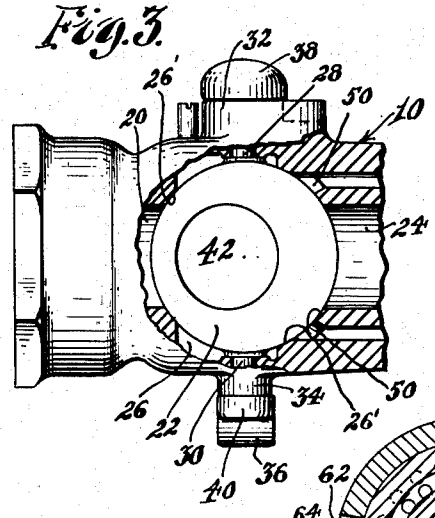


Fig. 4.

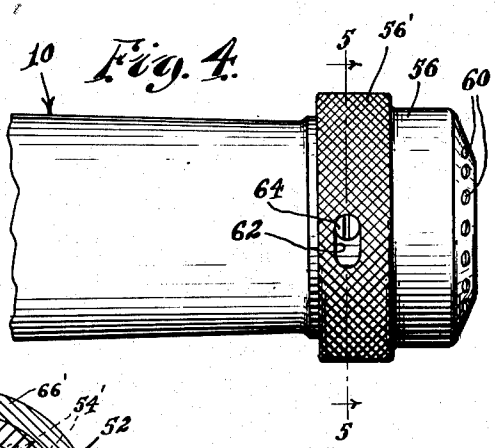
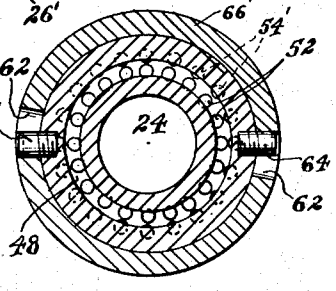


Fig. 5.



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COMBINED FOG AND SOLID OR STRAIGHT STREAM NOZZLE

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3 Claims. (Cl. 299—139)

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This invention relates to improvements in combined fog and solid or straight stream nozzles for the hose of fire-fighting equipment. More particularly it provides such a nozzle wherein two separate streams pass through the nozzle from a shut-off valve to the delivery end of the nozzle, with one stream extending axially through the nozzle for delivering a solid or straight stream of water therefrom and with the other stream annularly surrounding the axial stream within the nozzle and leading to fog-producing means at the discharge end of the nozzle at which fog is generated and dispensed forwardly and outwardly around the straight stream.

The fog-producing nozzle has become a generally accepted unit of fire-fighting equipment, having particular advantage over sprays and straight streams in repelling smoke and fumes, and absorbing heat, as firemen advance toward a fire through rooms and halls which may be filled with smoke and fumes. But, for actual extinguishment of a fire, a straight stream is essential and, so far as we are aware, two separate types of nozzles have been required heretofore, a fog-producing nozzle to protect the firemen advancing toward the flames, and a solid or straight stream nozzle for use in extinguishing the fire.

Various proposals heretofore have sought to combine in a single nozzle a straight stream and a forwardly and outwardly directed spray, but the sprays have not been effective because they have been supplied from the main stream through the nozzle and have lacked the pressure and volume for the intended results. More important, however, is the fact that atomized particles of water dispensed as a cloud of fog is definitely more efficient than any spray for repelling smoke and fumes.

Hence, it is an object of the present invention to provide a combined fog-producing and straight stream nozzle wherein a fog-generating means at the delivery end of the nozzle is supplied with its own pressure stream of water arranged annularly around the straight stream at the axis of the nozzle whereby the pressure stream which is converted into fog is driven through the fog-generating means unaffected by the adjacent straight stream. According to the invention, the supply stream of water coming to the nozzle is divided at the shut-off valve of the nozzle, with the major part of the supply stream passing axially for constituting the straight stream issuing from the nozzle, and with a substantial portion of the supply stream passing through an

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annular passage extending from said valve to the discharge end of the nozzle, at which location it is driven through atomizing means which discharges a spreading cloud of fog or vapor around the issuing straight stream of water.

Another object is to provide a combined fog-producing and straight stream nozzle wherein fog-generating means at the discharge end of the nozzle is supplied with its own pressure stream of water driven through the nozzle in general parallelism with a main straight stream of water passing axially through the nozzle, with manually operable means for stopping the issuance of fog from the nozzle at will without appreciably affecting the straight stream of water issuing axially from the nozzle.

It is, moreover, our purpose and object generally to improve the structure and effectiveness of fire-fighting hose nozzles and more particularly such nozzles capable of discharging a straight stream of water and, selectively, a simultaneous protective cloud of fog or vapor.

In the accompanying drawing:

Fig. 1 is a side elevation of a nozzle embodying features of the invention, it being shown connected to a hose and discharging both a straight stream of water and a protective cloud of fog;

Fig. 2 is a longitudinal cross-sectional view of the nozzle of Fig. 1, on a larger scale;

Fig. 3 is a view, partly in cross-section, of the right-hand end portion of the nozzle of Fig. 2 turned about its axis through ninety degrees, and showing the cut-off valve shifted to its closed position;

Fig. 4 is an elevational view of the left-hand portion of the nozzle of Fig. 2 turned about its axis through ninety degrees; and

Fig. 5 is a cross-sectional view on line 5—5 of Fig. 4.

Referring to the drawing, the nozzle 10 of Fig. 1 is shown connected to a hose 12 and is discharging both a straight stream 14 of water and a protective cloud 16 of fog or vapor.

The connected end of the nozzle has the interiorly threaded opening 18 for reception of the standard threaded end or nipple of the hose 12. A relatively short smaller diameter passage 20 leads axially of the nozzle from the opening 18 to a valve 22 which is rotatably mounted within the body of the nozzle a substantial distance from the delivery end of the nozzle, and a longer axial passage 24 extends from the opposite side of valve 22, or from a location adjacent the valve, to and through the delivery end of the nozzle, this latter passage 24 having suitable uniform or

gradually diminishing diameter, as may be preferred.

Valve 22 may be of a generally spherical type rotatably mounted for coaction with seating portions 26', 26'' of the walls of a chamber 26 within the body of the nozzle. As herein represented, the valve has axially aligned trunnions 28, 30 projecting at opposite sides and journalled in the bearings 32, 34 which are provided on the nozzle body. The trunnions project outward beyond their bearings, and a yoke type actuating handle 36 has its spread arms 38, 40 rigidly connected to the projecting ends of the trunnions 28, 30 respectively, whereby the valve may be actuated by handle 36 between its open and closed positions of Figs. 2 and 3. A passage 42 through the valve connects the axial passages 20 and 24 when the valve is open, as shown in Fig. 2.

According to the invention, valve 22 has opposite side portions of the sphere cut away in the parallel planes 44, 46 in Fig. 2, which are also parallel to the axis of the trunnions 28, 30. The plane 46 is closer to the parallel plane of the axis of the trunnions than is the plane 44, and the passage 42 through the valve has gradually increasing diameter from the annular edge of the valve in plane 44 to the annular edge of the valve in plane 46. Hence, the outlet end of the valve passage 42 is substantially greater in diameter than the diameter of the nozzle passage 24, whereby a substantial portion of the water coming through the valve delivers directly into an annular passage 48 which surrounds the axial passage 24. This water may enter the passage 48 through an annularly arranged series of openings 50.

Annular passage 48 extends from adjacent valve 22 to the discharge end portion of the nozzle 10 where it opens into a series of pairs of relatively small diameter passages 52, 54 which are annularly arranged around the axis of the nozzle. The passages 52 may have extent generally parallel to the nozzle axis and each has an angularly disposed discharge portion 52' disposed forwardly and outwardly relative to the nozzle axis. The passages 54 have discharge portions 54' disposed generally parallel to the nozzle axis so that the stream issuing from the discharge portions 52', 54' of each pair of passages 52, 54 intersect each other with a forceful atomizing effect which generates a cloud of fog 16 which is disseminated forwardly and outwardly around the straight stream 14 of water issuing from the axial passage 24, generally as illustrated in Fig. 1.

Preferably, a manually operable means is provided for closing the discharge end portions 52', 54' of the passages 52, 54 when it is desired to stop the generation and dissemination of fog without materially affecting the straight stream 14. As herein shown, a cap 56 fits nicely and rotatably over the discharge end portion of the nozzle 10, the cap having an axial opening 58 therein which leaves the axial passage 24 unobstructed in all positions of the cap. A series of perforations 60 are arranged annularly around a wall of the cap in positions to be in register with the discharge portions 52', 54' of passages 52, 54 when the cap is in its position of Fig. 2. A slight rotation of the cap brings solid portions of the cap wall opposite said discharge portions 52', 54' thereby to effectively close these discharge portions. The walls of two slots 62 in the knurled part 56' of cap 56 coact with two set screws 64 projecting at opposite sides of the nozzle to maintain the cap on the nozzle and to limit permissible rotational movements thereof between open and closed positions of the cap.

It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty exist in the invention disclosed.

We claim as our invention:

1. A hose nozzle comprising a rigid nozzle body having a discharge end and having walls defining an interior chamber spaced a substantial distance from said delivery end of the nozzle body, said nozzle body having an axial passage leading from one end of the body to said chamber, and a generally aligned axial passage leading from said chamber and opening through said delivery end of the body, means defining an annular passage surrounding said aligned passage and extending from said chamber to a location adjacent to the said delivery end of said body, atomizing means to which said annular passage delivers at said delivery end of the nozzle body for disseminating atomized water as a cloud of fog forwardly and outwardly around the region through which water discharges from said axial passage, said atomizing means comprising annularly arranged pairs of flow passages interiorly of said delivery end of said body of which the delivery end portions of each pair have their axes intersecting each other adjacent to the delivery ends of said passages whereby the impact of the intersecting streams from each said pair of flow passages effects atomization of the water, a member rotatably mounted on said delivery end of the nozzle body, exteriorly thereof, having an annular portion for closing the discharge ends of all of said atomizing flow passages, said annular portion of said member having an annular series of openings therein arranged to register with said discharge ends of the atomizing flow passages in response to a partial rotation of said member, and stop means for limiting the rotation of said member in each direction about the axis of said body thereby to stop rotation of said member in one direction with its said openings in register with the discharge ends of said atomizing flow passages, and to stop rotation of said member in the opposite direction with all of said discharge ends of the atomizing flow passages closed by the portions of said member which intervene between the said openings therein, said rotatable member in each position thereof, leaving the discharge end of said axial passage in said body free of any obstruction to discharge therefrom.

2. A hose nozzle comprising a nozzle body having an interior chamber with an inflow passage to said chamber and an outflow passage from said chamber which delivers axially through one end of said body, means defining an annular passage surrounding said outflow passage and extending from said chamber to said delivery end of said body, atomizing means in the path of flow through said annular passage at said delivery end of said body for disseminating atomized water as a cloud of vapor forwardly and outwardly around the region through which water discharges from said outflow passage, said atomizing means providing discharge openings in said body arranged in spaced annular relation around the axis of the body, a cap rotatably mounted on said delivery end of said body and having an annular portion for closing all of said discharge openings of the atomizing means, said annular portion of the cap having an annular series of openings therein arranged to register with said discharge openings of the atomizing means in response to a partial

rotation of said cap, and stop means for stopping rotation of said cap in one direction with said cap openings in register with said discharge openings of the atomizing means, and for stopping rotation of said cap in the opposite direction with all of said discharge openings of the atomizing means closed by the portions of said cap which intervene between said openings in the cap, said cap, in all of its positions, leaving the discharge end of said axial outflow passage free of obstruction.

3. In a hose nozzle of the type having a nozzle body with a straight axial discharge passage and with an annular flow passage surrounding the axial passage, means within said body at the discharge end portion thereof for atomizing the water delivering from said annular flow passage, said atomizing means providing an annular series of discharge openings at said discharge end portion of said body whereby the atomized water issues from said annular series of discharge openings, a cap rotatably mounted on said discharge end of said body, exteriorly thereof, said cap having an axial opening constantly in register with the discharge end of said axial discharge passage and having an annular portion for closing all of said annular series of discharge openings in said body, said annular portion of the cap having an

annular series of openings therein arranged to register with said discharge openings in said body in response to a partial rotation of the cap on said body, and means for securing said cap on said body and constituting also a stop means for limiting rotational movements of the cap on said body, said securing and stop means being adapted to stop rotation of said cap in one direction with the annular series of openings in said body and in said cap in register, and to stop rotation of said cap in the opposite direction with the portions of said cap which intervene between its said openings closing all of the annular series of discharge openings in said body.

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