Oct. 15, 1963 C. COURSEY, JR 3,107,060

FOG TIP

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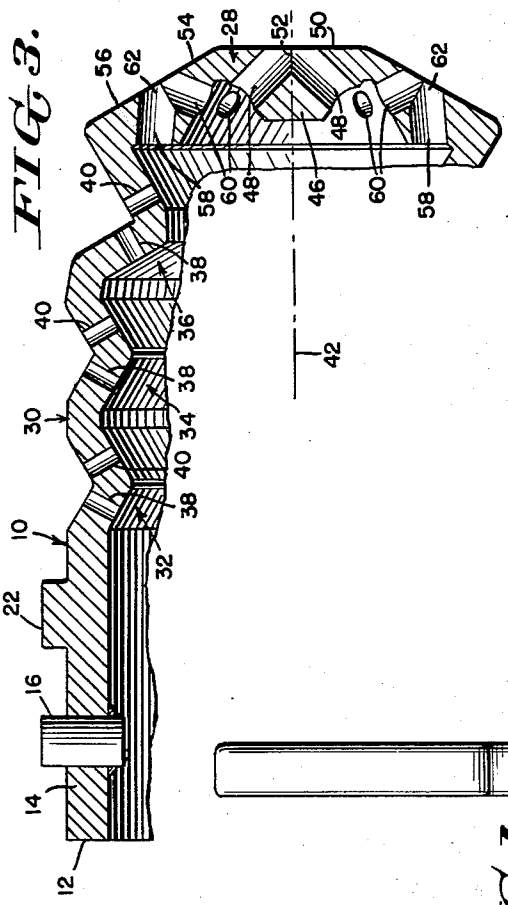


FIG. 3.

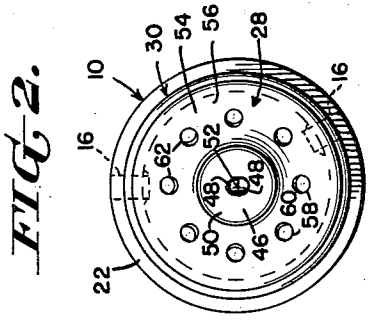


FIG. 2.

FIG. 1.

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FOG TIP

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The invention described herein may be manufactured and used by or for the Government of the United States of America for governmental purposes without the payment of any royalty thereon or therefor.

This invention relates to spray devices using the fog method of fire fighting, and is concerned more particularly with a fog head or tip for a hose nozzle.

It is an object of the invention to provide a nozzle tip which will produce a protective fog curtain for the entire front of the fireman as well as a fire-fighting fog stream.

A further object is to provide a fog nozzle tip of the character referred which has no moving parts.

It is also an object to provide a fog nozzle tip affording a transparent low velocity personnel protective fog curtain and a high velocity fire-fighting fog stream.

Further objects and advantages of the invention will appear as the description proceeds.

The invention will be better understood on reference to the following description and the accompanying drawing, in which:

FIG. 1 is an elevational view of a fog tip embodying features of the invention, shown mounted on a hose nozzle.

FIG. 2 is an end elevational view of the fog tip, taken as indicated at 2—2 in FIG. 1.

FIG. 3 is an enlarged view, partly in section and partly in elevation, of the fog tip, taken as indicated at 3—3 in FIG. 1.

Referring now more particularly to the drawing, there is shown a fog tip **10** embodying features of the invention and comprising a cup-like body whose rim **12** is at the rear thereof. The rear portion **14** or shank of the tip **10** is interrupted by a pair of lugs **16** to fit in bayonet slots **17** (one shown) in a nozzle **18** of a hose **20**. A circular outwardly projecting flange **22** forward of the lugs **16** and preferably knurled as at **23** is adapted to abut the front of the nozzle **18**, and a chain **24** adapted to be connected to the nozzle is brazed at one end to the flange.

Between the flange **22** and the base or front wall **28** of the tip **10** is a tubular portion or sleeve **30** having three circular V-shaped formations **32**, **34** and **36**, the wells being outermost. The several walls of the formations have circular series of discrete uniformly spaced ports of uniform bore. The two series of ports **38** and **40** in each formation constitute a set and are identical in number, the ports **38** being inclined forward away from the tip axis **42**, and the ports **40** being oppositely inclined. Each port **38** is paired with a port **40** longitudinally of the tip **10** in the same formation, the axes of each pair of ports **38**, **40** meeting each other adjacent the exits of the ports and being coplanar with the tip axis **42**. The pairs of ports in each formation or set are circumferentially staggered relative to the pairs of ports in the other two formations or sets (FIG. 1).

The tip base **28** is formed at its hub **46** with twin intersecting forwardly converging ports **48** whose axes are 45° to and coplanar with and meet at the tip axis **42** at the front face **50** of the hub, the confluence **52** of the ports having a diametrally elongated racetrack formation.

The tip base formation **54** beyond the hub **46** has a rearwardly diverging front face **56** and is formed with a set of two complemental circular series of ports **58** and **60**, each port **58** being paired with and intersecting a port **60**. The axes of the ports **58** converge forward and define a sharply acute-angled cone coaxial with the tip **10**, and the axes of the ports **60** diverge forward and define an obtuse-angled cone coaxial with the tip. The axes of each pair of ports **58** and **60** meet at the face **56** and are coplanar with the tip axis **42**. The confluence **62** of each pair of ports **58** and **60** has a racetrack formation elongated along an element of the frusto-conical face **56**.

The ports **38** and **40** are of relatively small bore, on the order of one-half the diameter of the ports **48**, **58** and **60**. The former are preferably on the order of 1/16" diameter, and the latter on the order of 1/8" diameter.

When two jets of equal size and equal and substantial force meet, the resulting pattern is a fan-like fog spray in a plane which is normal to that defined by the axes of the jets and bisects the angle between said axes. In a nozzle tip **10** in accordance with the invention the pairs of holes in each formation **32**, **34**, **36** and **54** are circumferentially spaced and arranged to provide a circumferential series of fan-like sprays which blend into a circumferentially continuous sheet or curtain of fog emanating adjacent the outer surface of the tip. The arrangement of ports **38**, **40** in the formations **32** and **34** results in two transparent fog curtains, indicated in part at **66** and **68** (FIG. 1), normal to the tip axis **42**. The arrangement of ports **38**, **40** in the formation **36** results in a transparent obtuse-angled forwardly-diverging conical fog curtain indicated in part at **70**. The arrangement of ports **58**, **60** in the base formation **54** results in an acute-angled forwardly diverging fog cone indicated in part at **72**.

The twin ports **48** provide a forwardly-directed fan-like fog sheet, indicated in part at **74**, containing the tip axis **42** and blending with diametrically opposite portions of the fog cone **72**.

The ports **38** and **40** being of substantially smaller bore than the ports **48**, **50**, **58** and **60**, the jets producing the fog curtains **66**, **68** and **70** are of low velocity and the jets producing the fog cone **72** and the fog sheet **76** are of high velocity and powerful. The several fog curtains protect the entire fronts of the persons behind them from the heat of the fire which is not directly in front of the fire-fighting fog streams **72** and **74**. If desired, one or two of the curtains may be omitted. The curtains, being transparent, do not obstruct the view of the nozzle wielder or operator.

With but one set of ports **38**, **40**, fairly satisfactory performance would be obtained if the water were maintained at a high pressure such as to cause the fog fan jets to meet without excessive force and thereby provide a scalloped peripherally continuously protective and transparent fog curtain. Relying on the one set, it is apparent that if the water pressure were to drop to such an extent that the fan jets did not meet at all, or insufficiently, the fireman wielding the nozzle would not be protected at the areas alternating with the fan jets. If the number of ports in the one set were increased to such an extent that the resulting jets were sufficiently numerous to insure obtaining a peripherally continuous curtain at low as well as high water pressures, the tip might be excessively weakened and the fan jets at the high water pressure might meet with such force as to produce so much turbulence at to render the meeting regions difficult or impossible to see through and thus povide a curtain which, though peripherally continuous, might have alternating regions of transparency and relative opacity, to the detriment of the fireman's view of the fire. To avoid weakening the tip, and to insure complete protection of the fireman from the heat of and a full view of the fire in the event of low water pressure, and, in the case of a high

water pressure, to avoid producing a curtain which, although fully protecting the fireman, interferes with his vision of portions of the fire, at least one additional set of ports 38, 40, spaced longitudinally of the tip relative to the other set, and staggered circumferentially relative to the other set, is provided. Should the water pressure drop to such an extent that the fan jets of each set do not meet, the fan jets of one set will block the heat which would otherwise pass between the fan jets of the other set, and thus the two sets of fan jets will cumulatively constitute in effect, i.e., from the standpoint for the fireman, a peripherally continuous and transparent fog curtain or barrier fully protecting the fireman from the fire heat and leaving him an unobstructed view of the fire. In the case of water pressure high enough to enable any one set of ports 38, 40, to provide a fog curtain which is circumferentially transparent and continuous, the curtain will have a scalloped appearance at its outer periphery. With the same water pressure, a second set of ports 38, 40, circumferentially staggered relative to the first set, as shown, will produce a similarly scalloped curtain, but the bulging portions of each curtain will block the heat which would otherwise pass through the V-like spaces alternating with the bulges of the other curtain. Thus, even when the water is at high pressure, there is an advantage in providing circumferentially staggered sets of ports.

Obviously many modifications and variations of the invention are possible in the light of the above teachings. It is therefore to be understood that within the scope of the appended claims the invention may be practiced otherwise than as specifically described.

I claim:

1. In a fire fighting water nozzle fog tip:

an integral body having a front end portion and a sleeve portion;

the sleeve having a series of laterally spaced circumferentially staggered pairs of ports arranged to convert a part of the incoming water into at least one, effectively continuous, transparent fog curtain substantially normal to the sleeve portion and rearwardly of the front end portion;

said front end portion defining a generally frustroconical shape including a base and a front face rearwardly diverging therefrom;

a pair of forwardly converging ports centrally confluent in said base adapted to convert a part of the incoming water into a high velocity fire-fighting fog stream;

a plurality of pairs of ports positioned in said front face and adapted to convert a part of the incoming water into a forwardly directed, fire-fighting, fog cone;

said front face ports being circumferentially staggered relative to the nearest adjacent series of pairs of ports in the sleeve portion;

the pairs of ports in the front face being radially spaced relative to the confluent pair of base ports; and

the pairs of ports in the front end portion having a diameter relative to the pairs of ports in the sleeve portion on the order of two to one.

2. The structure of claim 1 wherein each of the ports of the pairs of ports in the sleeve portion has a diameter on the order of 1/16 inch and each of the ports of the pairs of ports in the front end portion has a diameter on the order of 1/8 inch.

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