Nov. 19, 1957 F. C. ROBERTS 2,813,753

FOG NOZZLE

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FIG. 1.

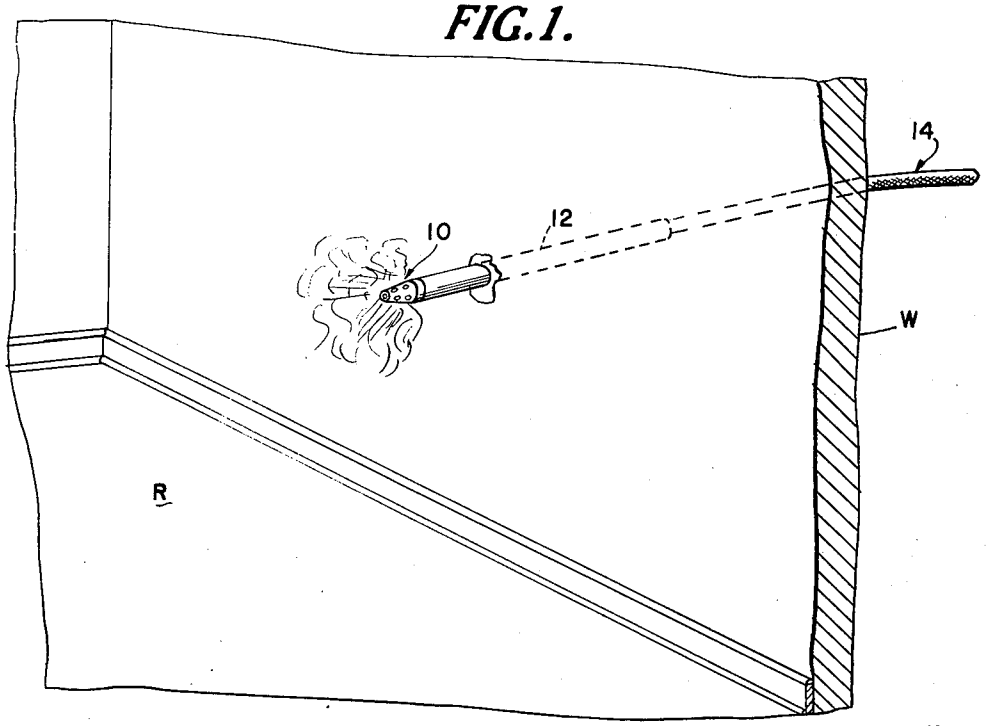


FIG. 3.

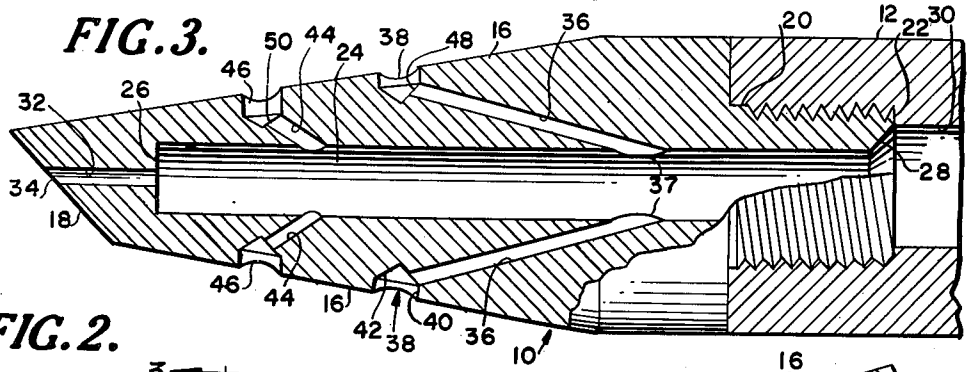


FIG. 2.

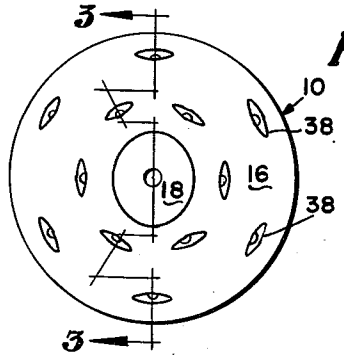
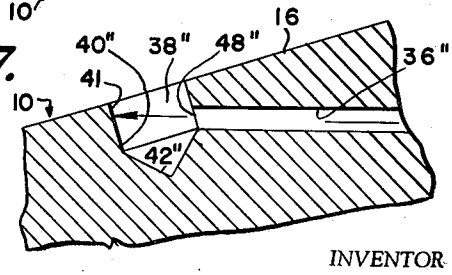


FIG. 7.



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FIG.4.

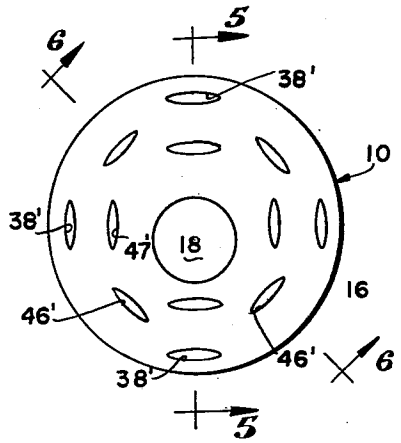


FIG.5.

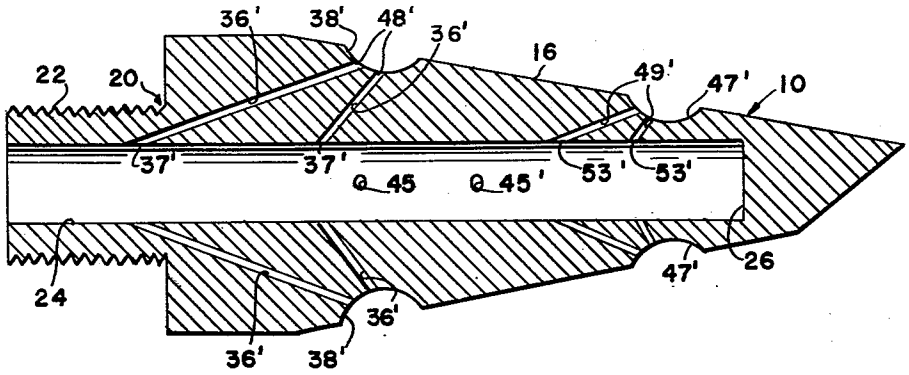
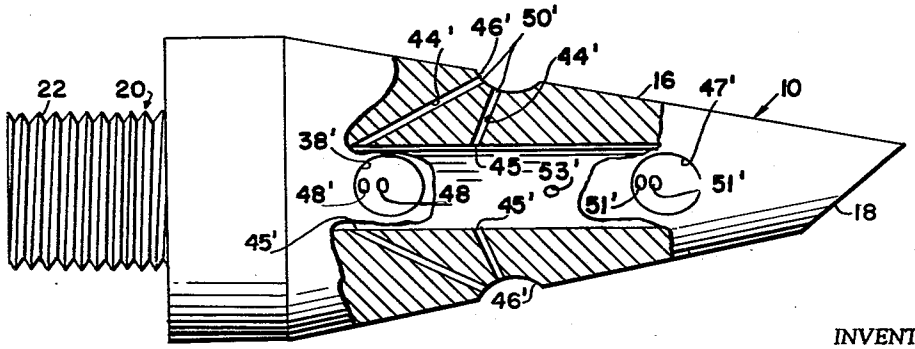


FIG.6.



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FOG NOZZLE

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10 Claims. (Cl. 299—110)

The present invention relates to a device for use in fighting fires, and, more particularly, to a fire fighting nozzle which is adapted to penetrate a wall or the like to extinguish an enclosed fire with a water mist, spray or fog.

In present-day fire fighting techniques it has been found that water in the form of fog, a fine spray or mist is much more efficient in fighting an enclosed fire than a straight stream of water. The reason water in the form of a fog or the like is more efficient in fighting an enclosed fire is that the water being broken up into small particles will absorb more heat and, thus, more quickly cool the area where the fire is located, extinguishing the same.

Many different types of nozzles have been developed for producing fog, but one of the primary difficulties of these nozzles is that they cannot be placed where the fog will most effectively cool the heated area. The smoke and heat from an enclosed fire oftentimes make it necessary for the firemen to remain at a substantial distance and, consequently, if the nozzle cannot be placed right close to the source of the fire, fighting such a fire is ineffectual. Attempts have been made to place fire nozzles on tubular support elements, the fire nozzle being supported adjacent the fire with the firemen at a remote distance. Where the fire is in an enclosed building or small portion of a building, it oftentimes necessitates that the nozzles be able to penetrate a wall, ceiling, floor, door or the like. A disadvantage of prior nozzles is that the water passageways become clogged with debris such as plaster, wood, or the like when they are rammed through a wall thereby reducing the efficiency of the nozzle once it is positioned adjacent the fire.

An object of the present invention is to provide a fire nozzle capable of efficiently cooling a fire by use of a spray or fog rather than a stream of direct water.

Still another object of the present invention is the provision of a fire nozzle capable of penetrating walls, ceilings, floors, doors, or the like, the fluid passageways being substantially clog-proof from debris caused by penetration.

Still another object of the present invention is the provision of a nozzle for developing a forward moving fog whereby the fog can be accurately directed in the direction which the nozzle is pointed.

A further object of the present invention is the provision of a fire fighting device whereby firemen can operate the same at a remote distance from the fire without encountering the danger of smoke and heat caused by the fire.

A still further object of the present invention is the provision of a nozzle for fighting fires with fog, spray, mist or the like, which can be easily manufactured at a minimum cost and which will be substantially rugged thereby permitting a rough usage.

These and other objects of the present invention will appear more clearly from the following specification, claims and drawings in which:

Figure 1 is a perspective view of the apparatus of the present invention being used through a wall of a building;

Figure 2 is a front elevational view of the nozzle of the present invention;

Figure 3 is a longitudinal sectional view of the nozzle taken on the line 3—3 of Figure 2;

Figure 4 is a front elevational view of a modified form of the nozzle of the present invention;

Figure 5 is a longitudinal sectional view taken on the line 5—5 of Figure 4; and

Figure 6 is a longitudinal sectional view partly in elevation and taken on the line 6—6 of Figure 4.

Figure 7 is a fragmentary sectional view of the nozzle showing a modified arrangement of water passage.

Referring to the drawings wherein like character and reference numerals represent like or similar parts, the device of the present invention includes a nozzle generally indicated by the numeral **10**, a rigid tubular support, pipe or ram **12** and a hose **14** connected to a source of water (not shown). As previously mentioned, the problem of fighting enclosed fires such as found in buildings, vehicles, aircraft and the like is getting to the source of fire and extinguishing the same by cooling. As illustrated in Figure 1, a fire within the room R may be fought from outside the room by using the pipe or ram **12** to drive the penetrating nozzle **10** through the wall W. The nozzle **10**, which emits a fog or mist, can then be directed at the fire or around the room by the firemen who are positioned on the outer side of the wall W. A nozzle of this type reduces the occupational hazard of the firemen and also requires less training of the firemen as they do not have to be taught to "eat smoke."

Referring now to Figures 2 and 3, the nozzle **10** is shaped like a truncated cone having a conical or lateral surface **16** and a forward end **18** which is inclined to the transverse and longitudinal axes through the body of the nozzle. The forward truncated end **18** of the nozzle **10** defines a chisel portion of the nozzle and is used to break the plaster, board, glass or the like when the nozzle is penetrated through a wall or the like. The rear or base end **20** of conical shaped nozzle **10** is provided with a longitudinally extending threaded shank **22** which is adapted to be threaded into tubular pipe **12**. Suitable valves (not shown) can be provided on the pipe **12** to control the flow of water to nozzle **10**.

Nozzle **10** is provided with an enlarged longitudinal central bore **24** extending from the rear end **20** through the body of the nozzle and terminating at **26** adjacent, but short of, the beveled or inclined end **18**. The open end **28** of bore **24** is adapted to communicate with the bore **30** in the rigid tubular pipe **12**. In axial alignment and communication with bore **24** is a passageway **32** which extends and opens through a port **34** on the inclined end **18** of nozzle **10**. Passageway **32** is preferably about 1/16" in diameter as compared to the relatively large diameter of 1/4" of bore **24**. The purpose of having passageway **32** so small in diameter will appear more fully later in the specification.

Communicating with bore **24** are a series of circumferentially spaced passageways **36**. Passageways **36** extend from their opening **37** in the bore **24** forwardly and outwardly through the body of nozzle **10**. Each of the passageways **36** terminates in an enlarged inwardly extending recess **38**. The recesses **38**, which are circumferentially spaced from each other on the conical surface **16** of the nozzle, are each provided with a wall which extends transversely of the longitudinal axis of the nozzle as shown at **40** and then terminates in a cone portion **42**.

Another series of circumferentially spaced passageways **44** are provided forward of the passageways **36** and

also extend from bore 24 forwardly and outwardly toward the conical surface 16 of nozzle 10. The conical surface of nozzle 10 is provided with the second series of inwardly extending recesses 46 having a wall similar to the wall of recess 38. It will be noted that the recesses in the second series are spaced longitudinally from and transversely of the recesses in the first series of recesses. Consequently, the fog dispersed by nozzle 10 will be evenly distributed in a forward direction by the forwardly extending passageways 36 and 44.

As shown in Figure 3, the passageways 36 extend forwardly at an angle of approximately 15° to the longitudinal axis of the nozzle whereas the passageways 44 extend forwardly at an angle approximately 22° to the longitudinal axis of the nozzle. However, the angle of these passageways may be increased or decreased so long as they are at an acute angle to the longitudinal axis of the nozzle. It will be noted that in Figure 3 the series of passageways 36 and 44 have their longitudinal axis extending into the recesses 38 and 46 respectively at such an angle that the water flow therethrough is directed straight into the air without impinging against the side walls of the recesses. When the passages 36 and 44 enter the recesses at an angle which permits the water to be dispersed directly into the air, the water pressure must be high so that the water will be broken up into small droplets to produce the desired fog.

Figure 7 shows a modified arrangement of the water passages entering the recesses. More specifically, a recess 38″ is provided in the conical surface 16 of the nozzle and includes a wall which extends transversely of the longitudinal axis of the nozzle at 40″ and then terminates in a cone portion 42″. A water passageway 36″ opens into the recess as indicated at 48″. The axis of the passageway 36″ is such that the stream of water flowing therethrough will impinge against the countersunk wall 40″ of the recess 38″ as indicated at 41, causing a slight deflection of the solid stream and the breaking of the stream of water into droplets of water forming a spray or fog. By having the passageway 36″ extending at such an angle that the water is deflected off the forward side of the wall of the recess, a low pressure water supply may be used and a satisfactory fog may still be obtained. The passageway 32 extending axially of the nozzle 10 may be omitted when the nozzle is utilized with openings such as disclosed in Figure 7.

By having passageways 36 and 44 open respectively at 48 and 50 on the conical portion of the walls of recesses 38 and 46 respectively, the openings of the passageways are protected from dirt, debris or the like when the device is used to penetrate a wall or the like. If particles are caught in the shallow, but enlarged recesses 38 and 46, the water pressure in the very small passages 36 and 44 will have more of a surface to act on and, thus, the dirt or debris will be blown clear of the nozzle.

Passageways 36 and 44 are preferably 1/16″ in diameter just as the passageway 32. By having very small passageways 36, 44 and 32, water entering the nozzle at 28 into the bore 24 will be dispersed as a very fine fog or mist and, thus, will have the advantage of cooling a fire rather than trying to soak the fire. It will now be obvious that by cooling a fire with fog, less water, and consequently less water damage, is done in extinguishing a fire.

Referring now to Figures 4, 5 and 6, a modified form of the truncated nozzle 10 is disclosed. The nozzle 10 of Figures 4, 5 and 6 is of exterior configuration similar to the previously described nozzle 10 in that it is shaped like a truncated cone and has a lateral surface 16 and a forward end 18 which is inclined to the transverse and longitudinal axis through the body of the nozzle. The forward truncated end 18 of the nozzle defines a chisel portion which may be used in the manner previously described in the specification. The rear or base end 20 of nozzle 10 is likewise provided with a threaded shank 22 which is adapted to be received in the tubular pipe or ram 12.

Nozzle 10 of the modified form of the invention is likewise provided with a longitudinal bore 24 of relatively large diameter, the bore 24 terminating in an end wall 26. A first series of circumferentially spaced spherical shaped recesses 38′ are provided in the conical surface 16 of the nozzle 10. A pair of passageways 36′ in the body of the nozzle 10 extend from their openings 37′ in the bore 24 forwardly and outwardly and terminate in openings 48′ in each of the recesses 38′. Each pair of passageways 36′ are at an angle with respect to each other so that their longitudinal axes intersect externally of the recesses 38′.

A second series of circumferentially spaced spherical shaped recesses 46′ are spaced longitudinally from and transversely of the recesses 38′ on the conical surface 16 of the nozzle. Each of the recesses 46′ has a pair of passageways 44′ opening therein at 50′, the passageways 44′ extending forwardly from their openings 45′ in the bore 24. Each pair of passageways 44′ which open into the recesses 46′ have their longitudinal axes intersecting at a point external of the recesses 46′.

A third series of circumferentially spaced spherical shaped recesses 47′ arep rovided in the conical surface 16 forward of the recesses 46′ and in longitudinal alignment with the recesses 38′. A pair of passageways 49′ in the body of nozzle 10 open into each of the recesses 47′ as indicated at 51′. The other ends of the passageways 49′ are open to the bore 24 at 53′. Each pair of passageways 49′ is similar to the pairs of passageways 44′ and 36′ in that they too have their longitudinal axes intersecting externally of the recesses into which they open.

By having the pairs of passageways opening into each of the recesses provided in the surface of the nozzle, the streams of water of each of the pairs of recesses will impinge externally of the nozzle, thus, creating a fog at lower pressures than required in the form of the invention disclosed in Figures 1 to 3. Although the recesses as disclosed in the modified form of the invention are spherical shaped, it is of course within the scope of the invention that the recesses may be similarly shaped to those disclosed in Figure 3. The shallow spherical shaped recesses of the modified form of the invention also prevent clogging of the passageways leading thereto because the water pressure of the relatively small passageways have more surface to act on and, thereby, blow dirt and debris from the recesses of the nozzle. Further, a small longitudinal passage may be provided in the forward end of the body of the nozzle communicating the chisel shaped end 18 with the bore 24 so as to provide a forward stream of water.

Although the truncated nozzle 10 with its chisel pointed end 18 is disclosed as used for extinguishing enclosed fires such as would be found in rooms, attics, in nacelles of aircraft, under engine hoods of vehicles or the like, it is obvious that the device could be used wherever it is necessary to extinguish a fire by cooling with a fog or mist.

The terminology used in the specification is for the purpose of description and not limitation, the scope of the invention being defined in the claims.

I claim:

1. A fire fighting nozzle comprising a truncated cone shaped body having its forward end lying in a plane inclined to a transverse axis of said body, means on the rear end of said body for connecting the same to a source of fire extinguishing fluid, said body having an enlarged central bore extending longitudinally from its rear end and terminating short of its forward end, a plurality of circumferentially spaced passageways in said body communicating with said bore and extending forwardly and outwardly therefrom and terminating in openings on the surface of said body, said passageways extending through said body at an acute angle to the longitudinal axis of said body and a small longitudinally extending passageway commu-

nicating with the forward end of said bore and terminating in an opening on the inclined end of said body.

2. A fire fighting nozzle comprising a truncated cone shaped body having its forward end lying in a plane inclined to a transverse axis of said body, means on the rear end of said body for connecting to a source of fire extinguishing fluid, said body having an enlarged bore extending from its rear end and terminating short of its forward end, a first series of circumferentially spaced passageways communicating with said bore and extending forwardly through and at an acute angle to the longitudinal axis of said body, each of said psasageways terminating on the conical surface of said body in openings spaced circumferentially from each other, a second series of circumferentially spaced passageways communicating with said bore forward of said first series of passageways and extending through and at an acute angle to the longitudinal axis of said body, said second series of passageways terminating on the conical surface of said body in circumferentially spaced openings forward of the openings of said first series of passageways and displaced circumferentially therefrom, and a small longitudinally extending passageway communicating with the forward end of said bore and terminating in an opening on the inclined end of said body.

3. A fire fighting nozzle comprising a truncated cone shaped body having its forward end lying in a plane inclined to a transverse axis of said body, means on the rear end of said body for connecting to a source of fire extinguishing fluid, the conical surface of said body having a plurality of circumferentially spaced inwardly directed recesses, said body having an enlarged central bore extending from its rear end and terminating short of its forward end, a plurality of circumferentially spaced passageways communicating with said bore and extending forwardly and outwardly through said body, at least one of said passageways terminating in an opening in each of said recesses, said passageways being relatively smaller than said recesses.

4. A fire fighting nozzle of the character described in claim 3 wherein at least two of said passageways terminate in separate openings in each of said recesses, the passageways terminating in each of said recesses having their longitudinal axes intersecting externally of said recesses whereby water flowing from said passages impinges externally of said nozzle.

5. A fire fighting nozzle comprising a truncated cone shaped body having its forward end lying in a plane inclined to a transverse axis of said body, means on the rear end of said body for connecting to a source of fire extinguishing fluid, the conical surface of said body having a plurality of circumferentially spaced inwardly directed shallow recesses, said recesses having a wall extending transversely of and from the conical surface of said body and terminating in a cone, said body having an enlarged bore extending longitudinally from its rear end and terminating short of its forward inclined end, a plurality of circumferentially spaced passageways communicating with said bore and extending forwardly and outwardly through said body at an acute angle to the longitudinal axis thereof, at least one of said passageways terminating in an opening in the cone portion of the wall of each of said recesses, said passageways being relatively smaller in diameter than the diameter of said recesses.

6. A fire fighting nozzle comprising a truncated cone shaped body having its forward end lying in a plane inclined to a transverse axis of said body, means on the rear end of said body for connecting to a source of fire extinguishing fluid, the conical surface of said body having a plurality of circumferentially spaced inwardly directed shallow recesses, said recesses having a wall extending transversely of and from the conical surface of said body and terminating in a cone portion, said body having an enlarged bore extending longitudinally from its rear end and terminating short of its forward inclined end, a plurality of circumferentially spaced passageways communicating with said bore and extending forwardly and outwardly through said body at an acute angle to the longitudinal axis thereof, at least one of said passageways terminating in an opening in the cone portion of the wall of each of said recesses, said passageways being relatively smaller in diameter than the diameter of said recesses, and a small longitudinally extending passageway communicating with the forward end of said bore and terminating in an opening on the inclined end of said body.

7. A fire fighting device of the character described for penetrating walls or the like comprising a truncated cone shaped nozzle having its forward end lying in a plane inclined to a transverse axis of the nozzle, the inclined forward end of the nozzle defining a chisel for penetration, a rigid tubular support connected to the rear end of said nozzle and adapted to be connected to a source of fire extinguishing fluid, said nozzle having an enlarged central bore extending longitudinally from its rear end and terminating short of its forward inclined end, the conical surface of said nozzle having a first series of circumferentially spaced inwardly directed shallow recesses, and a second series of circumferentially spaced inwardly directed shallow recesses, the recesses of said first series being forward of and laterally spaced from the recesses of said second series, the recesses of said first and second series each having a wall extending transversely of and from the conical surface of said body and terminating in a cone portion, a plurality of spaced passageways communicating with said bore and extending forwardly and outwardly through said nozzle at an acute angle to the longitudinal axis thereof, at least one of said passageways terminating in an opening in the cone portion of the wall of each of the recesses of said first and second series, said passageways being relatively smaller in diameter than the diameter of said recesses and said enlarged bore, and a smaller longitudinally extending passageway communicating with the forward end of said bore and terminating in an opening on the inclined end of said nozzle.

8. A fire fighting nozzle comprising a truncated cone-shaped body having its forward end lying in a plane inclined to the transverse axis of said body, means on the rear end of said body for connecting to a source of fire extinguishing fluid, the conical surface of said body having a plurality of circumferentially spaced inwardly directed shallow spherical shaped recesses, said body having an enlarged bore extending from its rear end and terminating short of its forward inclined end, a pair of passageways extending forwardly and outwardly through said body from said bore at an acute angle to the longitudinal axis thereof for each of said recesses, each of said pairs of passageways having separate openings in said recesses, the longitudinal axes of the passageways of each pair intersecting externally of said recesses whereby water flowing from each pair of passageways impinges externally of said nozzle.

9. A fire fighting nozzle of the character described in claim 8 wherein said plurality of recesses includes a first series of recesses circumferentially spaced from each other, a second series of recesses circumferentially spaced from each other and positioned forwardly and laterally from recesses of said first series and a third series of recesses circumferentially spaced from each other and positioned forwardly of said second series of recesses and in longitudinal alignment with said first series of recesses.

10. A fire-fighting nozzle comprising a truncated cone-shaped body having its forward end lying in a plane inclined to the transverse axis of said body, means on the rear end of said body for connecting to a source of fire-extinguishing fluid, the conical surface of said body having a plurality of circumferentially spaced in-

wardly directed recesses, said body having an enlarged central bore extending from its rear end and terminating short of its forward end, a plurality of circumferentially spaced passageways communicating with said bore and extending upwardly and outwardly through said body and terminating in an opening in said recesses, said passageways having a longitudinal axis intersecting the forward side of the wall of said recesses whereby water flowing through said passageways impinges against the forward side of the wall of said recesses.

References Cited in the file of this patent

UNITED STATES PATENTS

2,008,932	Siegmund	July 23, 1935
2,246,797	Geddes	June 24, 1941
2,413,083	Snowden et al.	Dec. 24, 1946

FOREIGN PATENTS

22,014	Great Britain	Nov. 4, 1914