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Todtenkopf

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[54] **MULTIPLE DEFLECTOR DISCHARGE HEAD FOR FIRE PROTECTION SYSTEMS**

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[52] **U.S. Cl.** **169/37,** 239/500, 239/504

[51] **Int. Cl.** **A62c 37/14**

[58] **Field of Search** 239/500, 504; 169/37

[56] **References Cited**

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[57] **ABSTRACT**

A discharge nozzle in which a hollow body member is adapted for receiving and discharging a fluid and supports a pair of deflectors which discharge the fluid in a substantially continuous uniform pattern of droplets.

2 Claims, 3 Drawing Figures

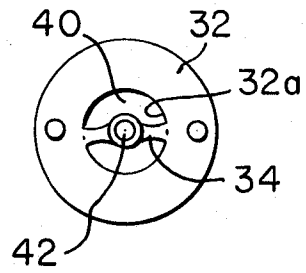


FIG. 1.

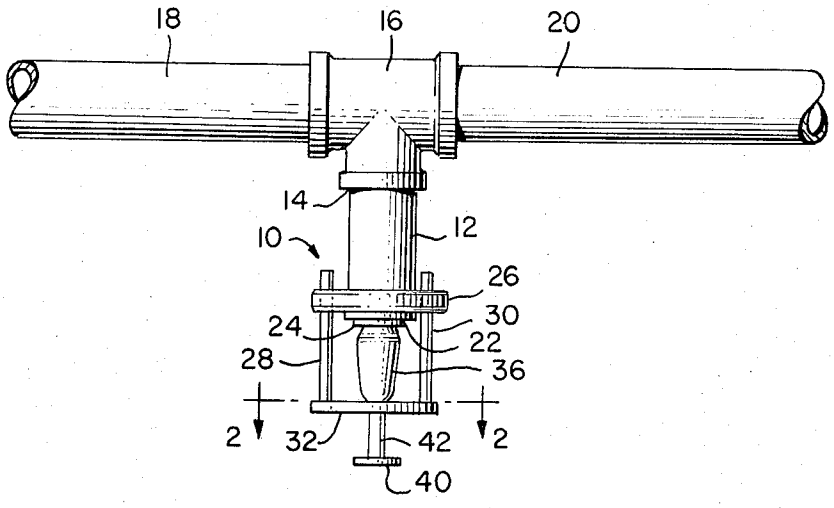


FIG. 2.

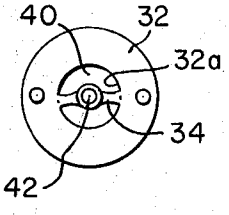
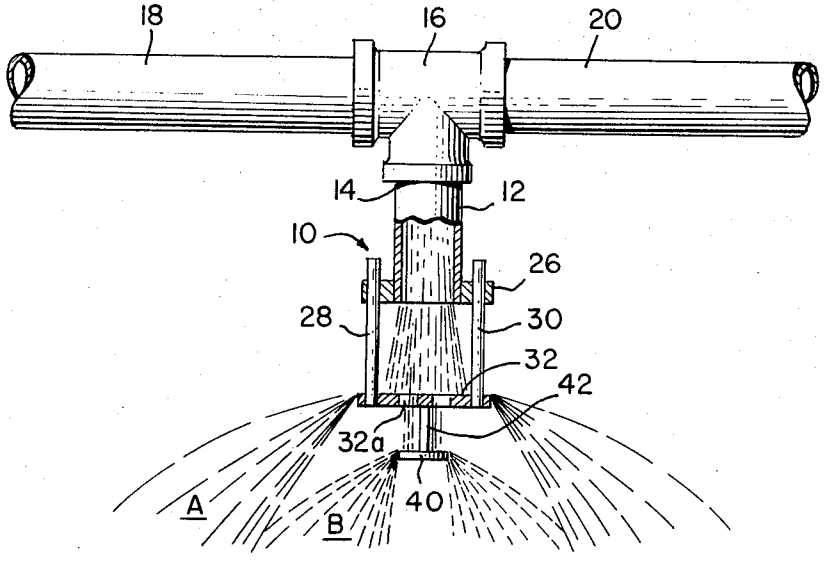


FIG. 3.



MULTIPLE DEFLECTOR DISCHARGE HEAD FOR FIRE PROTECTION SYSTEMS

BACKGROUND OF THE INVENTION

This invention relates to a discharge head for fire protection systems and, more particularly, to such a head incorporating a plurality of deflectors for discharging extinguishant in a relatively large, continuous pattern.

Fire protection systems for protecting industrial and commercial properties have traditionally employed thermal releasable sprinkler heads located in an elevated position with respect to the space to be protected. The sprinkler heads are supplied with a suitable extinguishant, such as water, by a pipe network of mains, risers, crossmains, and branch lines. The heads usually have relatively small discharge openings, and are spaced a relatively short distance apart, such as 10 feet. On actuation of each head by collapse of a thermal responsive linkage, the extinguishant stream issuing from its discharge opening impinges against a disc which is serrated to break up the droplets into a fine mist-like spray and which deflects same in a generally hemispherical pattern.

Although automatic sprinkler systems employing these type heads have been effective in protecting property against loss or damage by fire, the trend during recent years towards the use of high storage enclosures, coupled with the increased use of plastics and other highly flammable materials, has presented new challenges for such systems. For example, recent extensive studies with actual and synthetically produced fire plumes have shown that in enclosed spaces of twenty feet and higher, the updraft or chimney effect caused by convection alone is sufficient to prevent the free-falling spray produced by the sprinkler heads from penetrating the rising fire plume and reaching the burning fuel surfaces. Therefore, these heads with their above-mentioned low-capacity discharges, often are unable to effect a sufficient penetration of the rising fire plume to aid in effective prevention of the spread of same.

Although attempts have been made to compensate for the low capacities of these heads by increasing the number of heads and decreasing the spacing between the heads, several problems developed. First of all, such an increase in the number of heads is expensive. Secondly, a portion of the hemispherical discharge pattern from the heads has a radial component which, in the proper circumstances, would impinge against and inhibit the actuation of its adjacent head. Thus some heads located directly above the fire would often not be actuated until some more remotely located heads are actuated.

One of the most significant recent developments in an attempt to improve upon the sprinkler head in the above context is the direct discharge nozzle which incorporates a relatively large outlet orifice, and which discharges the extinguishant directly towards the fire in the form of relatively large droplets which easily penetrate the fire plume and provide an improved fire fighting capability.

However, the application of these direct discharge nozzles can be relatively expensive, especially when used in large systems, since they require relatively large extinguishant supplies and new piping systems and

therefore cannot be used to replace existing sprinkler heads.

SUMMARY OF THE INVENTION

It is, therefore, an object of the present invention to provide a nozzle for discharging fire extinguishant which incorporates all the advantages of the direct discharge nozzle mentioned above yet discharges the extinguishant in a relatively large uniform discharge pattern.

Toward the fulfillment of this and other objects, the nozzle of the present invention comprises a hollow body member having an inlet adapted for connection to a source of fluid and an outlet for discharging said fluid in a spray of droplets, and first and second deflectors supported by said body member for deflecting the fluid discharging from said outlet in a first and second spray pattern, respectively, each of said deflectors forming a flat continuous deflecting surface and being positioned relative to each other so that said first and second spray patterns form a substantially continuous uniform pattern of droplets of substantially the same size as when discharged from said outlet.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. **1** is an elevational view depicting the discharge nozzle of the present invention incorporated in a fire extinguishing system;

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

FIG. **3** is a view similar to FIG. **1**, but depicting the nozzle in a vertical cross-sectional view after actuation thereof.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring specifically to FIGS. **1** and **2** of the drawings, the discharge nozzle of the present invention is shown in general by the reference numeral **10** and comprises a hollow cylindrical body member **12**, one end portion of which is threaded as shown in **14** for connection to a tee connector **16** for supplying extinguishant, such as water, thereto. The connector **16** forms a portion of a piping network in a fixed fire extinguishing system that includes two pipes **18** and **20** also connected to the connector. It is understood that, in a typical installation, several nozzles **10** and their associated piping would be supported from the ceiling of the structure to be protected, in a conventional manner.

The other end portion of the nozzle **10** defines an outlet orifice **22** for discharging the extinguishant and is normally closed by means of a valve or plug member **24.**

A relatively large support nut **26** threadably engages the outer wall of the body member **12** near the outlet orifice **22** and supports two support rods **28** and **30** which, in turn, support a deflector **32** at a distance from the outlet orifice **22.** As better shown in FIG. **2,** the deflector **32** is in the form of a flat disc cut-out in a manner to define an opening **32***a* with a support strut **34** extending thereacross.

A release device **36** is supported between the strut **34** and the plug **24** to hold the latter in place and may be of a conventional design such as a glass container filled with alcohol, so that upon expansion of the alcohol in response to a predetermined elevated temperature in

its vicinity, the glass will break and release the plug from the outlet orifice **22.**

A second deflector **40** is attached, via a rod **42,** to the strut **34** of the deflector **30** and extends downwardly therefrom, as viewed in FIG. **1.** The deflector **40** is in the form of a continuous flat disc of approximately the same diameter as, and substantially aligned with, the opening **32***a* in the deflector **32.**

In operation, the release device **36** will break in response to a predetermined elevated temperature in its vicinity to cause the plug **24** to discharge from the outlet orifice **22** under the pressure of the extinguishant in the body portion **12.** This releases the extinguishant and causes same to discharge from the nozzle in the patterns shown in FIG. **3.** The reference letter A refers to the relatively wide pattern achieved by virtue of the droplets from the outlet orifice **22** being deflected directly by the deflector **30.** As shown, the portion of the extinguishant not deflected by the deflector **32** passes through the opening **32***a* and is deflected by the deflector **40** into the pattern shown by the reference letter B.

It is noted from FIG. **3** that the diameters of the deflectors **32** and **40** are slightly larger than the diameters of the patterns of the respective sprays striking them. This, plus the fact that the deflectors define flat continuous deflecting surfaces, minimizes a breaking up of the spray of extinguishant from the outlet orifice **22** and thus insures that droplets of a relatively large size will be formed which enables the extinguishant to better penetrate the fire plume and results in an increased fire fighting efficiency.

Also as a result of the foregoing, a substantially continuous discharge pattern of relatively large droplets of extinguishant is achieved over a relatively large area, thus eliminating the need for close spacing between nozzles and relatively large extinguishant supplies.

Although the nozzle of the present invention has been described in a pendent position relative to the pipes **18** and **20,** it is understood that it can easily be adapted to an upright position. In the latter case, the deflectors **32** and **40** would be arranged so that the deflector **40** would initially deflect the main flow of extinguishant into the fill-in pattern while the deflector **32** would deflect the flow from the outlet not deflected by the deflector **32** into the relatively wide pattern. Also, the plug **24** may be hinged, or otherwise connected, to the body **12** to prevent it from interfering with the discharge of the water from the outlet **22.**

Of course, other variations of the specific construction and arrangement of the nozzle disclosed above can be made by those skilled in the art without departing from the invention as defined in the appended claims.

I claim:

1. A discharge head comprising a hollow body member having an inlet adapted for connection to a source of fluid and an outlet for discharging said fluid, a first deflector supported by said body member in a spaced relation to said outlet, a plug for said outlet, thermal responsive means supported by said first deflector and engaging said plug for normally supporting said plug in said outlet, said means being responsive to a predetermined temperature in the vicinity of said head for releasing said engagement and permitting the discharge of said plug and therefore said fluid from said outlet, said first deflector adapted to deflect a portion of the fluid discharging from said outlet in an annular spray pattern and adapted to pass the remaining portion of said fluid through a central opening formed therethrough, and a second deflector supported by said first deflector in a spaced relation to said first deflector, the size of said second deflector being substantially equal to the size of said opening in said first deflector for deflecting said remaining portion of said fluid in a spray pattern extending within said annular spray pattern.

2. The head of claim **1** wherein said deflectors are in the form of flat discs so that the deflected fluid droplets are substantially the same size as when discharged from said outlet.

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