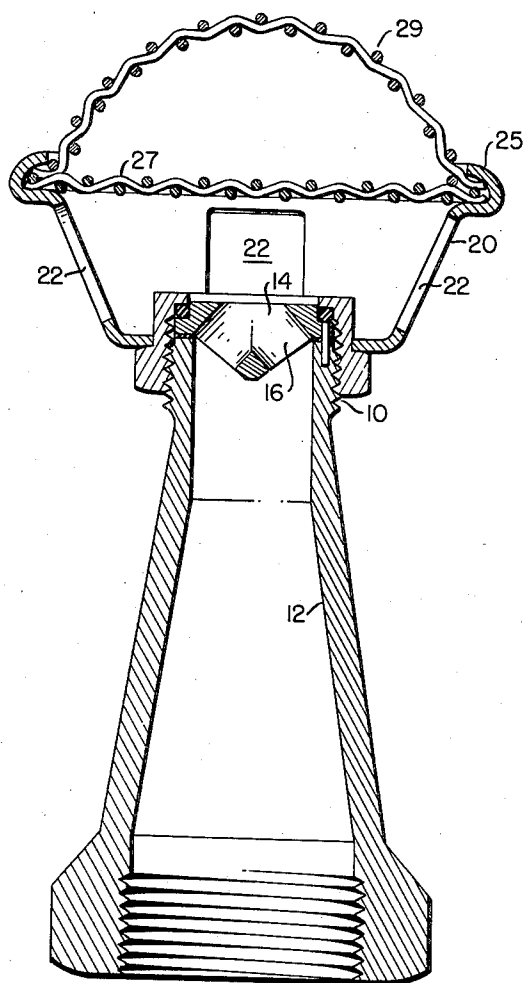


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FOAM GENERATING APPARATUS

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FOAM GENERATING APPARATUS

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3 Claims. (Cl. 261—76)

The present invention relates to the generation of fire fighting foam, and more particularly to a nozzle for producing a stream of finely divided foam.

The present invention constitutes an improvement in the foam generating apparatus shown in the Freeman and Hencinski Patent No. 2,492,037, issued December 20, 1949. As pointed out in that patent, it is necessary to use a nozzle having a number of characteristics in producing fire fighting foam for the purpose of smothering a fire through the exclusion of air. The foam is formed of water and a foaming agent, and should be of a very finely divided structure characterized by a multitude of fine bubbles and a relatively small water content. In view of the fact that foam is frequently used in fighting gasoline and oil fires, it is necessary that the stream of foam be projected well forwardly of the nozzle. The nozzle described in the above patent achieves the desired result by a combination of a high velocity water fog head with an aspirating hood and a screen which is placed in the front of this nozzle. Air is aspirated through the hood, and the screen acts to promote contact between the finely divided droplets and foam-forming agent.

It is the principal object of the present invention to provide improvements in the foam producing nozzle of my prior patent, particularly with a view to producing a fine and tenacious foam, with an adequate range and angle of dispersion.

With this object in view, the present invention comprises the foam-generating apparatus hereinafter described and defined in the appended claims, particularly in the combination of the nozzle and aspirating hood with a multiple screen assembly.

The single figure of the drawing is a section of an illustrative embodiment of this invention.

The nozzle head 10 by which the spray of droplets is generated is mounted within the nozzle body at the end of the inlet section 12. The inlet is threaded to permit attachment to a supply hose by which the previously mixed solution of foam-forming agent and water is supplied under pressure.

The nozzle head is provided with a pair of passages 16 inclined to the nozzle surface where they combine to form the spray generating orifice 14. The center lines of this pair of passages preferably intersect substantially in the nozzle surface, as described in my Patent No. 2,302,021, issued November 17, 1942. At liquid pressures greater than the order of 30 pounds per square inch, a fan shaped spray or fog of very fine droplets or mist is discharged from the orifice. For some purposes, a relatively wide discharge pattern is desirable, in which case the nozzle head may have a number of pairs of intersecting orifices arranged to provide diverging sprays. However, because of the diverging effect of the screen assembly which is attached at the end of the hood in this invention, a single pair of passages forming one orifice provides an adequately diverging foam spray pattern.

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The high velocity spray has, by reason of the large amount of effective area provided by the multitude of fine droplets, a very substantial aspirating effect. This causes an appreciable amount of air to be drawn into and swept along with the spray of mist. In general, for the greatest amount of foam without sacrifice of foam quality, the optimum ratio of volume of air to volume of liquid is somewhere between 5 to 1 and 8 to 1. Introduction of air in substantially the optimum ratio may be effectively accomplished by the provision of a hood 20 through which the spray is projected. This hood may be formed by an enlarged diverging funnel of such dimensions as not to restrict the spray pattern provided by the orifice arrangement in the nozzle head. To admit air to the hood, openings 22 are provided, through which air is drawn by the sweeping action of the droplets moving at high velocity toward the discharge.

The parts thus far described are in general similar to corresponding parts in the above-mentioned Freeman and Hencinski patent.

To complete the entrainment of air within the droplets of water and foam solution, the mixture of air and spray is caused to impinge on and be projected through two screens 27 and 29 arranged to form what may be termed a "screen lens," carried at the end of the aspirating hood. The spacing between the screens and the nozzle head such as to allow thorough intermingling of air and droplets before the mixture reaches the screen.

The screen lens preferably comprises a substantially flat screen 27 which first intersects the spray and a second screen in the form of a dome 29 which forms the outer face of the lens. The edges of these screens are carried in adjacent relationship in a hemispherical channel formed on the end of the aspirating hood. The mesh of these screens varies between 3 and 10 to the inch, and both are conveniently, but not necessarily, of the same mesh. The screens are contiguous at their margins and are secured within a lip 25 of the hood.

The effect of this screen lens is not only to produce a dense foam having a large number of finer bubbles, but also to spread the foam in a diverging stream. The flat screen tends to narrow the stream, but the convex screen causes some divergence of the pattern.

It has been found that the screen separation formed in this construction is preferably not less than 1/4" and not more than 1 1/2" in the region intersecting the droplet stream. This range of separation between the two screens is desirable for optimum performance both in creating foam and in maintaining a broad pattern of flow from the nozzle.

A nozzle embodying these features of construction and operation provides a broadly diverging discharge pattern which enables a substantial area to be blanketed with foam and which also affords substantial protection to the operator from the heat of the flames. Furthermore, the improved mixing action of the screen lens disclosed herein permits the nozzle to mix a maximum volume of air for each gallon of liquid discharged through the nozzle head. The large volume of high quality foam which is provided in this construction is particularly significant in the case of portable equipment where water capacity may be limited. In the case of a truck carrying 1000 gallons of water, for example, the use of this foam nozzle in conjunction with the addition of a relatively small quantity of foam-forming agent, makes available a supply of as much as 8,000 gallons of smothering foam.

Having thus described the invention, I claim:

1. A nozzle for generating a foam for fire fighting having in combination a body member having an inlet end, an outlet end, walls defining a converging fluid passage towards said outlet end, and said body member

having a threaded portion on the inlet end whereby said body member may be connected to a source of a solution of foam-forming agent and water under pressure, a head member mounted in the outlet end of said body having a plurality of separate fluid passages all converging at the outlet end of said body member, a hood member mounted on the outlet end of said body member having walls defining a first diverging fluid passage, said walls having a plurality of openings formed therein whereby air may be drawn into said first diverging fluid passage, a first screen member mounted in said hood member having a substantially planar configuration, and a second screen member mounted in said hood member having a substantially convex configuration, whereby said screen members define a second diverging fluid passage.

2. A nozzle for generating foam for fire fighting having in combination a body member having an inlet end, an outlet end, walls defining a converging fluid passage towards said outlet end, and said body member having a threaded portion on the inlet end whereby said body member may be connected to a source of a solution of foam-forming agent and water under pressure, a head member mounted in the outlet end of said body having a plurality of separate fluid passages all converging at the outlet end of said body member, a hood member mounted on the outlet end of said body member having walls defining a first diverging fluid passage of substantially greater cross-section than said converging fluid passages, said walls having a plurality of aspirating ports in said hood member walls formed therein whereby air may be drawn into said diverging fluid passage, an inner screen member and an outer screen member having contiguous edges carried by the end of said hood member, and spaced from the outlet end of said body member, said inner screen member having a substantially planar configuration, and said outer screen member having a substantially convex configuration, said screen members

having a substantial separation forming a lens-like assembly whereby a substantially diverging foam distribution pattern is produced.

3. A nozzle for generating foam for fire fighting having in combination a body member having an inlet end, an outlet end, walls defining a converging fluid passage towards said outlet end, and said body member having a threaded portion on the inlet end whereby said body member may be connected to a source of a solution of foam-forming agent and water under pressure, a head member mounted in the outlet end of said body having a plurality of separate fluid passages all converging at the outlet end of said body member, a hood member mounted on the outlet end of said body member having walls defining a first diverging fluid passage of substantially greater cross-section than said converging fluid passages, said walls having a plurality of aspirating ports in said hood member walls formed therein whereby air may be drawn into said diverging fluid passage, an inner screen member and an outer screen member having contiguous edges carried by the end of said hood member, and spaced from the outlet end of said body member, said inner screen member having a substantially planar configuration and said outer screen member having a substantially convex configuration, said screen members having a separation of between $\frac{1}{4}$ " and $1\frac{1}{2}$ " in the path of said first diverging fluid passage forming a lens-like assembly whereby a substantially diverging foam distribution pattern is produced.

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