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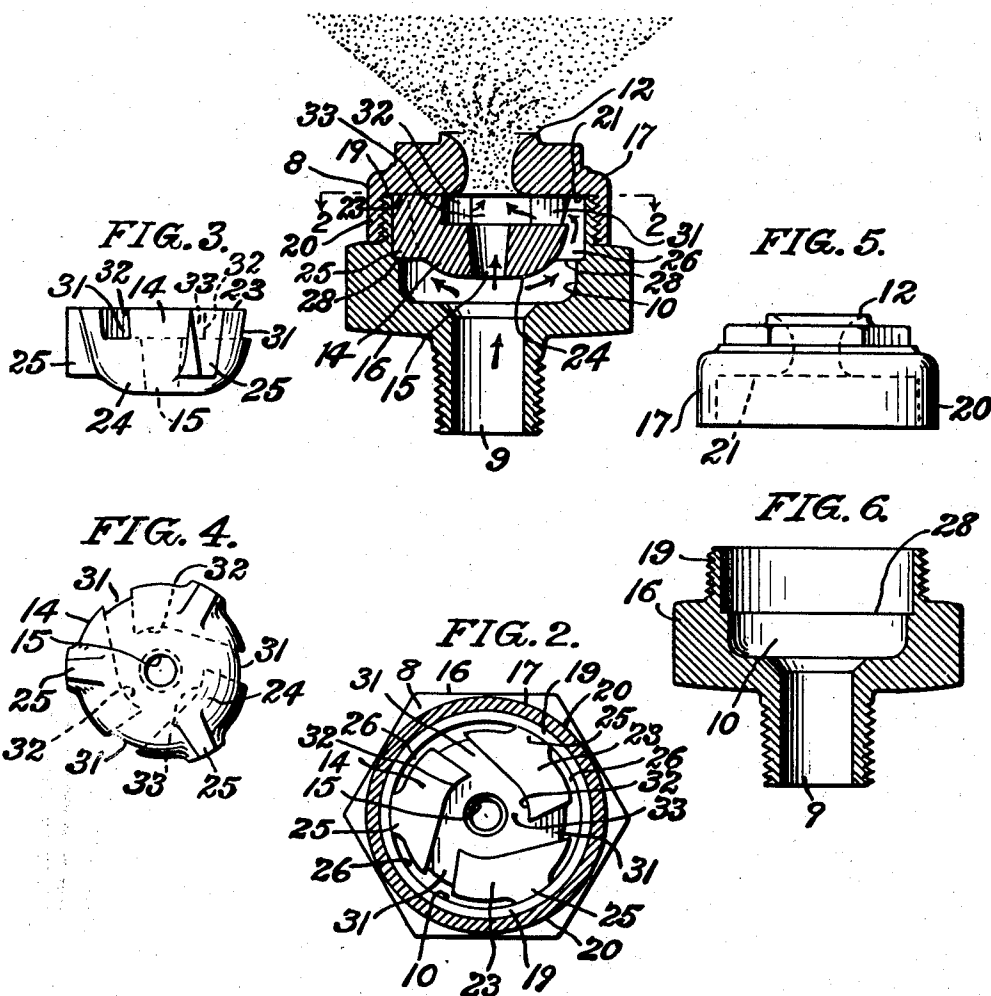
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NOZZLE

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FIG. 1.



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NOZZLE

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6 Claims. (Cl. 299—120)

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My invention relates to improvements in spray nozzles and particularly relates to nozzles for producing a fog-like spray for the prevention and the extinguishment of fires.

My invention particularly relates to improvements in nozzles having axial and peripheral passages for imparting a spiral or whirling motion to the liquid as it is discharged from the nozzle.

The object of my invention is to provide a nozzle of novel construction for producing a conical spray of uniform moisture consistency throughout the entire body of the conical spray formation.

A further object is to construct a nozzle which will produce a conical spray having a wider angle, for covering a greater surface area, than has heretofore been produced.

A further object is to provide a nozzle with a removable insert and novel means for mounting the insert within the nozzle, said insert including a rounded end portion presented toward the inlet connection of the nozzle adapted for directing the flow of liquid around the insert and through tangential passages formed in the insert.

A further object is to provide the insert with a conical axial passage, with its larger end located where the tangential and axial passages join, for reducing the rate of flow through the axial passage, whereby the liquid flowing through the tangential passages will impart a whirling motion to all of the liquid passing through the nozzle and completely atomize the liquid.

These together with various other novel features of construction and arrangement of the parts, which will be hereinafter more fully described and claimed, constitute my invention.

Referring to the accompanying drawing;

Fig. 1 is a central vertical sectional view of a nozzle embodying my invention.

Fig. 2 is a horizontal section on line 2—2, Fig. 1.

Fig. 3 is a side elevation of the insert, detached.

Fig. 4 is an inverted plan view of Fig. 3.

Fig. 5 is a side elevation of the cap, detached.

Fig. 6 is a central vertical section of the nozzle body, detached.

In the drawing, in which like reference characters refer to like parts, 8 represents a nozzle having an inlet connection 9, through which liquid is admitted to an enlarged cylindrical chamber 10, and an outlet aperture 12, located in alignment with the axis of the chamber 10, through which the liquid is discharged in the consistency of a fog-like spray, produced by a novel form of insert 14, mounted within the chamber 10. Said insert 14 is provided with an

axial passage 15, located in alignment with the outlet aperture 12.

A preferred form of my improved nozzle, as shown in the drawing, comprises a body 16 and a detachable cap 17. The body 16 has a threaded sleeve 18, adapted to receive a threaded flange 20, formed upon the cap 17. The body 16 has the chamber 10 formed therein and the cap 17 is provided with a wall 21, the inner surface of which wall extends at right angles to the axis of the chamber 10 and forms a transverse wall for said chamber. The cap 17 is provided with the axial outlet aperture 12.

The insert 14 is in the form of a frustum of a cone, having its apical portion rounded and its base forming an end surface 23, extending transversely to the axis of the insert and adapted to be positioned against the inner surface of the wall 21. The rounded, or spherical, surface 24 of the insert is presented toward the inlet end of the chamber 10. The chamber 10 is relatively longer than the insert 14 and the latter is positioned within said chamber in spaced relation to the inlet end of said chamber.

The insert 14 is provided with radial ribs 25, which extend longitudinally and parallel with the axis of the insert. Said ribs 25 are adapted to be positioned against the cylindrical surface of the chamber 10 to hold the insert upon the axis of said chamber, and to provide longitudinal spaces, or passages 26 around the insert between said ribs. The body 16 is provided with an annular shoulder 28, upon which the ribs 25 are supported with the end base surface 23, of the insert, in contact with the wall 21 of the cap 17.

The base surface 23 of the insert is provided with lateral channels 31, located between the ribs 25. Said channels 31, as shown in Fig. 2, extend tangent to a circular wall 32, which forms an axial recess 33, of larger diameter than the axial passage 15 formed through the insert 14. The tangential channels 31 direct the flow of liquid from the longitudinal passages 26, toward the axis of the insert 14. A whirling motion is given to the liquid as it passes through the channels 31, which sets up a whirling motion in the liquid passing through said axial passage 15 and said recess 33.

The base surface 23 of the insert is tightly held against the wall 21 of the cap. Said wall 21 confines the liquid within the channels 31 and prevents the liquid from flowing between said base surface 23 and the inner surface of the wall 21, where said surfaces are in contact.

The insert 14 is constructed with said axial pas-

sage 15 of conical formation, with the larger end of the passage 15 located adjacent to said recess 33, whereby the rate of flow of the axial stream of liquid, where it is impinged by the spiral motion of the liquid flowing through the tangential channels 31, is reduced and all of the liquid flowing through the passage 15 is given a whirling motion by the spiral flow of liquid from the channels 31.

It will be evident that the stream through axial passage 15 and outlet aperture 12 would not whirl at all but for the whirling contact with the outside of this stream by the water through the tangential channels 31; that this water from the tangential channels 31 not only flows tangentially but progressively inwardly toward the axis as seen in Figure 2 and is given—for each channel—a final swirl by the circular wall 32 and this swirling contact with the water passing otherwise straight through the nozzle takes place in close proximity to the rear face of the outlet 12. Not only does this swirling tangential flow thus crowd in against the outer part of the direct (central) flow from passage 15 but the contact is accentuated just where the rearward "flare" of the outlet aperture 12 acts as a feeder or a guide for the combined flow, so that with this flare as a guide the action of the outer swirling film of water upon the interior water is intensified.

By this means, moreover, this swirling outer film of water revolves about the interior stream of water which it drags with it in a circular direction, so that immediately outside of the forward flare of outlet aperture 12 it not only whirls the interior stream but spreads out by centrifugal force as it leaves the aperture. My method of securing the whirl of the outlet water not only gives all the water a maximum whirling movement but locates the highest speed of the whirl where it will be of the greatest advantage in spreading the outside of the spray circumferentially as it emerges from the outlet aperture 12.

My novel construction of the nozzle produces a conical spray of uniform density throughout the entire body of the spray. The entire volume of liquid is whirled and divided into minute particles in the form of a fog-like spray of uniform moisture and will not leave any dry spots upon the surface against which it is directed, thus making the nozzle particularly adaptable for cooling the surfaces of tanks used in the manufacture of highly inflammable substances. My improved nozzle produces a conical spray having an angle of spread of one hundred degrees, which is greater than any heretofore attained.

By making the insert 14 removable, the cost of manufacture is reduced and the insert may be formed of plastic, or other cheap material, thereby reducing the cost of manufacture.

Various changes in the construction and arrangement of the parts may be made without departing from my invention.

I claim:

1. In a nozzle having a body provided with a cylindrical chamber and an inlet connection, a transverse wall forming the end of said chamber opposite to said connection, said wall having an axial outlet aperture, a generally truncated conical insert located in said chamber with its base against said wall and its opposite portion presented toward said inlet connection, said insert having an axial passage in alignment with said outlet aperture, means mounting said insert in spaced relation to the cylindrical surface of said

chamber to provide passages around the periphery of said insert, and said insert having lateral tangential channels forming communications between said peripheral passages and said axial passage, and discharging into this passage adjacent the outlet of said aperture.

2. In a nozzle having a body provided with a cylindrical chamber and an inlet connection at one end of said chamber, a transverse wall closing the opposite end of said chamber, said wall having an axial outlet aperture, an insert in the general form of a frustum of a cone and having an axial passage, said insert having its base in front perpendicular to said passage, said insert having a rounded portion opposite to the base, said chamber having a greater length than said insert, means mounting said insert upon the axis of said chamber with said base positioned against said wall and said rounded portion extending rearwardly in spaced relation to said inlet, and said insert having lateral tangential channels forming communications between the periphery of the insert and said axial passage for imparting a spiral movement to liquid flowing toward said outlet aperture.

3. In a nozzle having a body provided with a cylindrical chamber and an inlet connection at one end of said chamber, a transverse wall closing the opposite end of said chamber, said wall having an axial outlet aperture, an insert of smaller diameter than said chamber and having an axial passage, said insert having a transverse surface at one end thereof and a rounded surface at the opposite end thereof, said chamber having a greater length than said insert, means mounting said insert within said chamber with said transverse surface positioned against said wall, longitudinal ribs upon said insert in engagement with the cylindrical surface of said chamber and defining longitudinal passages between the insert and said cylindrical surface, and said insert having lateral tangential channels forming communications between said longitudinal passages and said axial passage.

4. In a nozzle having a body provided with a cylindrical chamber and an inlet connection at one end of said chamber, a cap detachably mounted upon said body, a wall upon said cap having an inner surface extending at right angles to the axis of said chamber forming a closure for the opposite end of said chamber, said wall having an axial outlet aperture, a generally truncated conical insert having a transverse base surface, said base surface being positioned against said wall, said insert having an axial passage, said base surface having lateral channels communicating with said axial passage, longitudinal ribs upon said insert in engagement with the cylindrical surface of said chamber defining passages communicating with said channels, and said body having an annular shoulder adapted to be engaged by said ribs and hold said base surface against said wall.

5. In a nozzle having a body provided with a cylindrical chamber and an inlet connection, a cap detachably mounted upon said body, a transverse wall upon said cap forming a closure for the end of said chamber opposite to said connection, said wall having an axial outlet aperture, a generally truncated conical insert in the form of a frustum of a cone having a base surface of smaller diameter than said chamber, said insert having an axial passage and a relatively larger circular recess at the end of said passage adjacent to said base surface, said base surface

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having lateral channels extending tangentially to said circular recess, longitudinal ribs upon said insert adapted for mounting said insert upon the axis of said chamber, said ribs defining passages between said insert and the cylindrical surface of said chamber communicating with said lateral channels, and means upon said body engaged by said ribs for holding said base surface against said wall.

6. A nozzle having a body provided with inlet at the rear into an enlarged generally cylindrical chamber and an outlet aperture flared forwardly and rearwardly, in combination with an insert having an axial passage through the insert in line with the flared outlet and having a plurality of circumferentially extending passages between the insert and the chamber walls and leading within the insert toward the axis of the outlet as the passage extends forwardly, and terminating in guiding passage walls curving around said outlet aperture in immediate proximity to the rearward flare thereof, whereby the liquid passing out through the aperture in the insert

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is engaged circumferentially along its radially outer surface by liquid from the passage.

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