May 29, 1945. A. NIELSEN 2,376,881

HOSE NOZZLE

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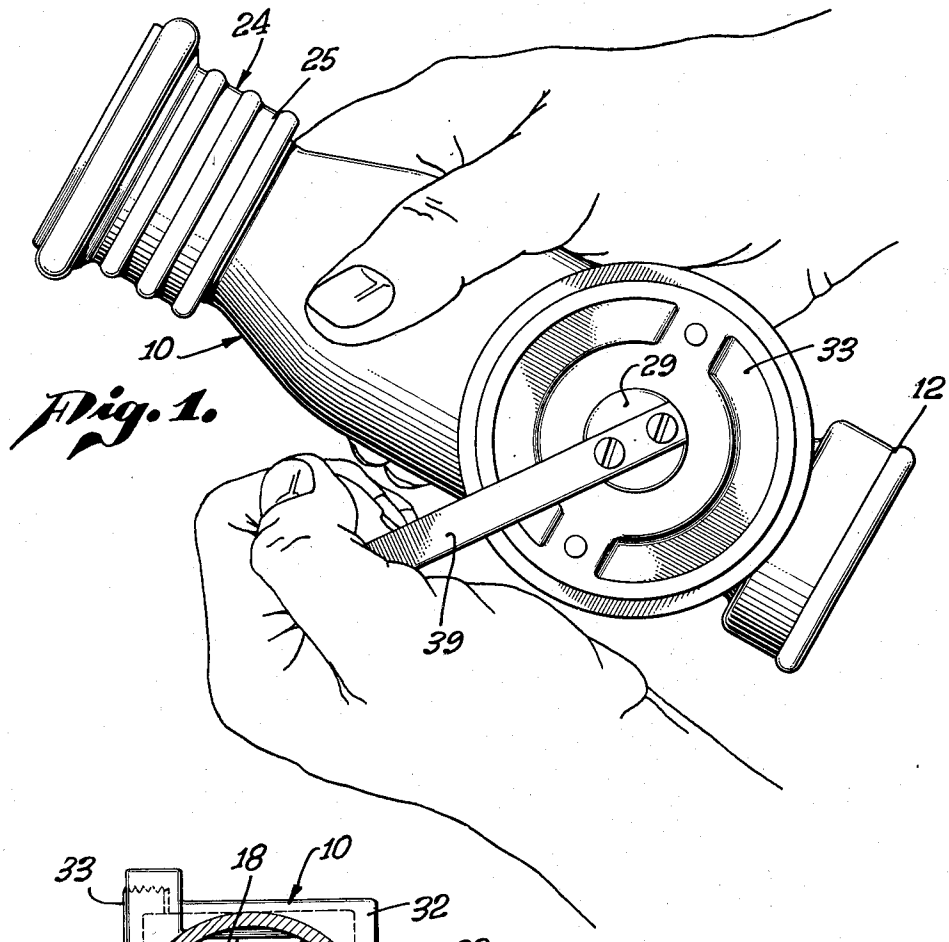


Fig. 1.

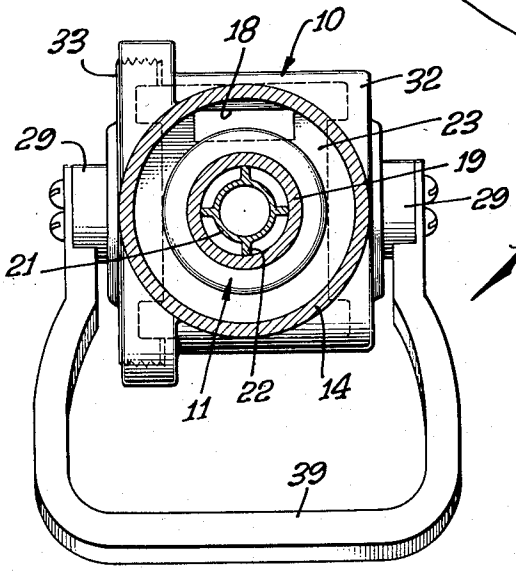


Fig. 4.

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Fig. 2.

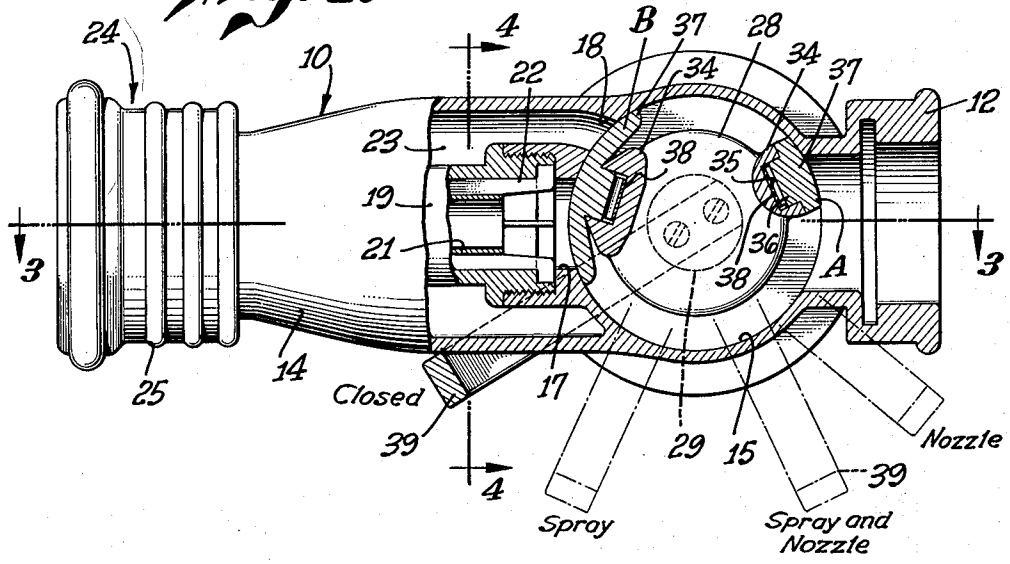


Fig. 3.

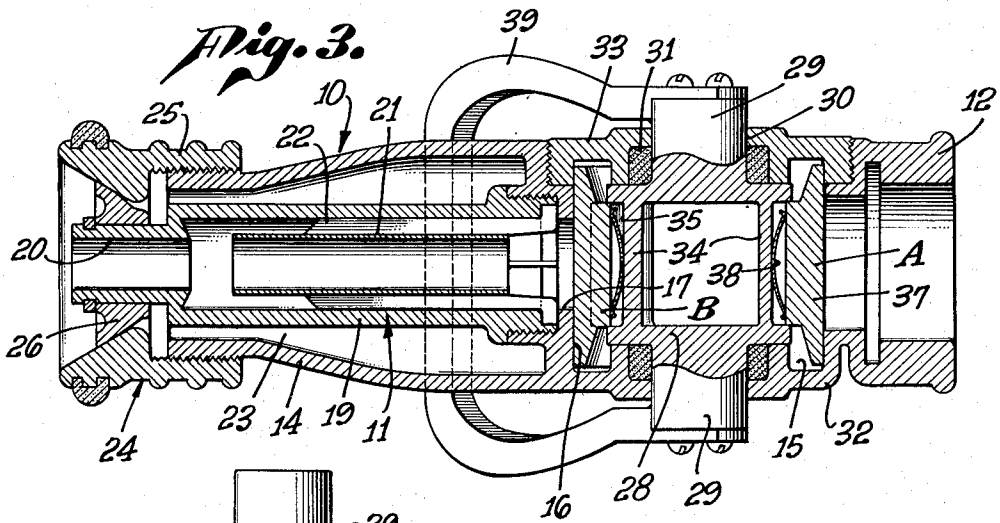
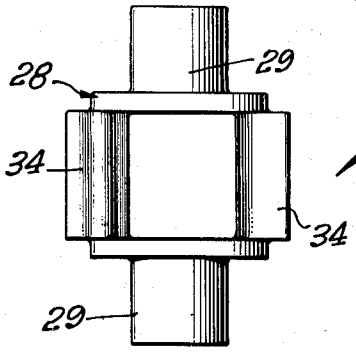


Fig. 5.



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HOSE NOZZLE

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Application August 30, 1943, Serial No. 500,727

2 Claims. (Cl. 299—147)

This invention relates to hose nozzles and particularly pertains to nozzles for use in connection with fire extinguishing apparatus.

It is the principal object of the present invention to provide a generally improved nozzle of the character referred to which may be easily and quickly operated to produce a conical spray and a solid stream, either separately or in unison.

In practicing my invention I provide a nozzle body having a spray discharge orifice and a solid stream discharge orifice. A simple valve arrangement is provided which is manipulated by a single operating member to direct fluid either to the conical spray orifice or the solid stream orifice, either separately or at the same time. The conical spray orifice is adjustable so that the character of the conical spray may be varied.

One form which the invention may assume is exemplified in the following description and illustrated by way of example in the accompanying drawings, in which:

Fig. 1 is a perspective view showing the exterior of my improved nozzle and the manner of its operation.

Fig. 2 is a longitudinal section through the nozzle showing certain features of construction.

Fig. 3 is likewise a longitudinal section through the nozzle taken at right angles to Fig. 2.

Fig. 4 is a transverse sectional view taken on line IV—IV of Fig. 2.

Fig. 5 is a separate view of the valve yoke.

Referring more particularly to the accompanying drawings, 10 indicates a fire hose nozzle embodying the preferred form of my invention. The nozzle 10 includes a nozzle body 11 formed with a female coupling connection 12 and a coaxial nozzle barrel 14. Intermediate the coupling connection 12 and the barrel 14 the body 11 is formed with a cylindrical valve chamber 15 disposed with its longitudinal axis perpendicularly to the axis of the connection 12 and the nozzle barrel 14 so as to intersect the same.

The wall 16 of the valve chamber 15 between the chamber 15 and the interior of the barrel 14 is formed with a primary port 17 disposed coaxially of the barrel 14 and the coupling connection 12. It is also formed with a secondary port 18 spaced a radial distance from the primary port 17. The primary port 17 constitutes a communicating passageway between the interior of the valve chamber 15 and a center nozzle tube 19. The innermost end of the center nozzle tube 19 is threaded into the wall 16 of the valve chamber 15 concentrically with respect to the primary port 17 and the nozzle barrel 14, so that fluid discharging through the port 17 may pass through the tube 19.

At its outermost or discharge end the nozzle tube 19 is formed with a discharge orifice 20 of a diameter less than the interior diameter of the tube 19. It should be pointed out that the inner diameter of the tube 19 tapers gradually from its inner end adjacent the primary port 17 to the point where it terminates at the inner end of the discharge orifice 20.

Mounted concentrically within the nozzle tube 19 is a Venturi nozzle 21, the interior diameter of which approximates the diameter of the orifice 20. The exterior diameter of the Venturi nozzle 21 is, as illustrated, considerably less than the interior diameter of the nozzle tube 19. The inner end of the Venturi nozzle is spaced from the primary port 18 and its outer end is spaced from the inner end of the discharge orifice 20. The Venturi nozzle 21 is maintained in the position shown by means of four radial ribs 22 which are complemental to the inner diameter of the nozzle tube 19 and which are latched at their inner ends between the inner end of the nozzle tube 19 and the wall 16, as shown.

By means of the peculiar construction of the nozzle tube 19 and its associated Venturi nozzle 21 and the relationship of the latter with the primary port 17 and the discharge orifice 20, water passing through the primary port 17 under pressure will discharge through the discharge orifice 20 in a solid stream with a minimum of back pressure on the nozzle. The effect of the Venturi construction just described is such that a cushion is provided for the fluid.

It will be noticed that the exterior diameter of the nozzle tube 19 is less than the interior diameter of the nozzle barrel 14, providing a tapered annular fluid passageway 23 therebetween. This passageway communicates with the secondary port 18 so that fluid passing from the valve chamber 15 through the port 18 will enter only the secondary annular passageway 23 and seek to discharge from the foremost end thereof. The cross-sectional area of the secondary annular passageway 23 decreases toward the discharge end of the nozzle, as illustrated.

At this end of the barrel 14 there is fitted a spray collar 24 which is annular and which has a sleeve portion 25 threaded on the end of the nozzle barrel 14. This threaded connection is such that by rotating the collar 24, it may be moved coaxially of the barrel and coaxial of a spray head 26 fixed at the outermost end of the nozzle tube 19. The spray head 26 is frusto-con-

ical, as illustrated, and is complemental to a frusto-conical bore 27 in the end of the spray collar 24. By adjusting the spray collar 24 coaxially of the spray head 26 by means of the threaded connection referred to, a circular orifice of a conical nature may be created between the complemental surfaces thereof. The radial dimension of such an orifice may likewise be adjusted in the same fashion.

It is obvious that by having a frusto-conical orifice of a minute radial dimension, that with sufficient pressure a conical curtain of water fog may be created. That is to say, the water will be finally atomized and will emerge through that orifice in a conical spray of a considerable angle. Such sprays are useful in defending a fireman against flame and smoke and for various fire extinguishing purposes.

In the present instance the nozzle 10 may be used to eject a solid central stream, a conical protective curtain such as just described, or a combination of the two. Of course, by adjusting the radial dimension of the spray orifice by adjusting the spray collar 24, the character of the conical water spray may be varied.

One of the principal features of my present nozzle is the fact that by manipulation of a single handle, the character of the streams ejected from the nozzle may be regulated; that is to say, a solid center stream, with or without a surrounding conical spray, or a conical spray with or without the center stream, the character of the conical spray being adjustable independently by adjustment of the spray collar 24.

To accomplish this I mount a valve yoke 28 coaxially within the valve chamber 15. This valve yoke has coaxial trunnions 29 at opposite ends thereof journalled in bearings 30 provided with suitable fluid-tight packing means 31. At one end of the valve chamber it is provided with a head member 32 in which one of the bearings 30 is formed, which valve head member 32 is integral with the nozzle body. At the other end of the chamber 15, however, the valve body is fitted with a removable head 33 threaded into the body, as illustrated. By removal of the head 33, the valve yoke 28 may be assembled in place and then the head member 33 fitted thereover and fixed in position. The ends of the valve yoke bear against the inner faces of the bearings 30 so as to prevent endwise movement of the valve yoke 28 after the latter is assembled in position. The annular packing means 31, of course, is interposed between the ends of the yoke and the bearings 30 so as to prevent fluid leakage through the bearings. Obviously, any other type of bearings and packing may be provided.

The valve yoke 28 carries two valve guides 34 which extend lengthwise of the yoke at a spaced radial distance from the axial center thereof. It should be pointed out, of course, that the axial center of the yoke 28 is the axial center of the chamber 15. The two valve guides 34 are spaced radially from this center at a distance less than the radial dimension of the valve chamber 15, and are each provided with a longitudinal guide slot 35 which receives the tongue 36 of a valve member 37. In this instance the two valve members are of different circumferential dimensions and I will designate one valve member as the secondary valve and indicate the same on the drawings as "A" and the other valve member as the primary valve indicated on the drawings as "B." The tongues 36 snugly but slidably fit the guide grooves 35, but permit radial movement of the valve members A and B. Springs 38 are provided between the bottoms of the guide grooves 35 and the adjacent surfaces of the tongues 36 which constantly urge the valve members A and B radially outward. The outer surfaces of the valve members A and B are complemental to the bore of the chamber 15.

I prefer that the valve members A and B be spaced 140° apart. However, this spacing may be varied depending upon the relative positions of the primary and secondary ports 17 and 18. The valve member B is of a circumferential dimension that it can cover both of these ports simultaneously, as illustrated. The valve member A is only sufficient in circumferential dimension to cover the secondary port 18.

To revolve the yoke and thus operate the valves with relation to the ports 17 and 18, I provide a bail type handle 39, the ends of which are fixed to the trunnions 29. When this handle is in its most forward position, the valve B is in a position covering both the primary and secondary ports 17 and 18. The fluid pressure entering the nozzle body will, of course, tightly hold this valve member seated and shutting off the fluid to these ports. When this bail handle 39 is moved rearwardly, say 33°, the valve yoke 28 is revolved to move the valve member B to a position uncovering the secondary port 18 but maintaining the primary port 17 closed. Thus, water will only be directed for the purpose of creating a spray. That is to say, the water will only discharge through the secondary port 18 into the secondary annular passageway 23 and thence through the spray orifice between the spray collar 24 and the spray head 26. However, by continuing to turn the valve yoke 28 by means of the bail handle 39, the valve B will be moved to also uncover the primary port 17, at which time there will be a conical spray as well as a solid spray discharged from the end of the nozzle. At the same time the character of the conical spray may be varied by adjustment of the spray collar 24 with respect to the spray head 26, as previously described.

If it is only desired to have a solid spray, the valve yoke 28 is revolved still further so as to position the valve A over the secondary port 18, at which time the primary port 17 will be uncovered. Thus, when the handle 39 is in its most forward position, no water will be discharged through the nozzle at all. During its intermediate positions, either a conical spray or a combination of a conical spray and center solid stream may be ejected. When it is in its most rearmost position, the valve A will cover the secondary port 18 and only a solid center spray will discharge from the nozzle. Thus, by movement of the operating handle 39 in one direction, either a conical spray or a combination of a conical spray with a solid center spray, or a solid center spray itself may be discharged from the nozzle.

Thus, the user of the nozzle may grasp the valve body in one hand and grasp the operating handle 39 in the other hand, and by very simple manipulation effect either character of spray or combination of both. If he desires, he may remove his hand from the handle 39 and adjust the spray collar 24 to change the character of the conical spray.

It is obvious that by the valve construction that the valves will automatically take up any wear due to the fact that they are constantly urged by spring pressure radially outward and are free to move in this direction because of their peculiar mounting. It is also obvious that when the valves

are in closed position, that they are assisted in maintaining a fluid-tight seat because of the pressure of the entrance water against them.

From the foregoing it is obvious that I have provided a very efficient nozzle, and although I have illustrated and described the same in detail it is to be understood that various changes may be made in its construction by those skilled in the art without departing from the spirit of the invention as defined in the appended claims.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. A nozzle of the character described comprising a nozzle body, a coupling connection at one end thereof, a nozzle barrel at the other end thereof in axial alignment with the connection, said body having a valve chamber formed therein intermediate the barrel and said connection with its axis at right angles to the axes of said barrel and connection, said barrel having a center passageway formed coaxially therethrough and an annular passageway concentrically of the center passageway, said barrel having a center discharge orifice at the end of the barrel communicating with the center passageway, and a spray orifice communicating with the annular passageway, said body having a primary port formed therein between the valve chamber and the center passageway and a secondary port between the valve chamber and the annular passageway, the primary port being of a diameter agreeing with the diameter of the center passageway, a Venturi nozzle in said center passageway which comprises an open ended tube of an exterior diameter less than the diameter of the center passageway, said tube being positioned concentrically of the center passageway with its ends terminating short of the primary port and the discharge orifice, the said discharge orifice being less in diameter than the interior diameter of the tube, a valve yoke rotatable in the valve chamber with its axis coaxial thereof, a pair of valve members carried by said yoke, said valve members being circumferentially spaced and engaging the wall of the chamber with the first valve member normally covering the primary and secondary ports but permitting constant communication between the connection and said chamber, the relative disposition of said ports and valve members rendering the valve members capable when the yoke is revolved in a single direction a portion of a revolution of successively uncovering the secondary port and primary port and then covering the secondary port.

2. A nozzle of the character described comprising a nozzle body, a coupling connection at one end thereof, a nozzle barrel at the other end thereof in axial alignment with the connection, said body having a valve chamber formed therein intermediate the barrel and said connection with its axis at right angles to the axes of said barrel and connection, said barrel having a center passageway formed coaxially therethrough and an annular passageway concentrically of the center passageway, said barrel having a center discharge orifice at the end of the barrel communicating with the center passageway, and a spray orifice communicating with the annular passageway, means for adjusting said spray orifice, said body having a primary port formed therein between the valve chamber and the center passageway and a secondary port between the valve chamber and the annular passageway, the primary port being of a diameter agreeing with the diameter of the center passageway, a Venturi nozzle in said center passageway which comprises an open ended tube of an exterior diameter less than the diameter of the center passageway, said tube being positioned concentrically of the center passageway with its ends terminating short of the primary port and the discharge orifice, the said discharge orifice being less in diameter than the interior diameter of the tube, and valve means for controlling the flow of fluid between the valve chamber and said primary and secondary ports.

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