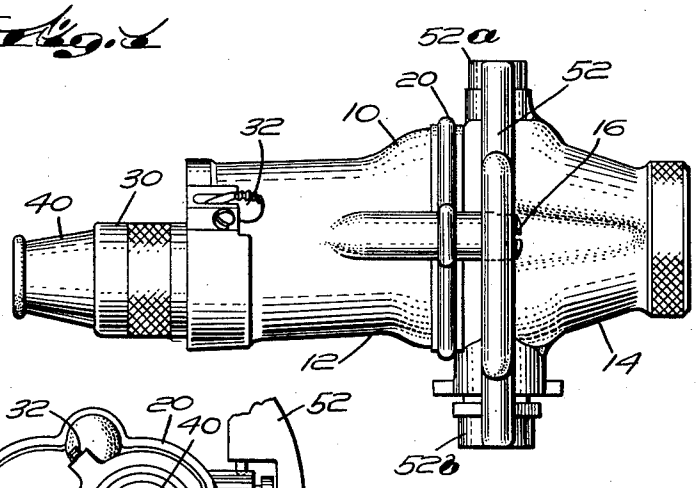
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Fig. 1



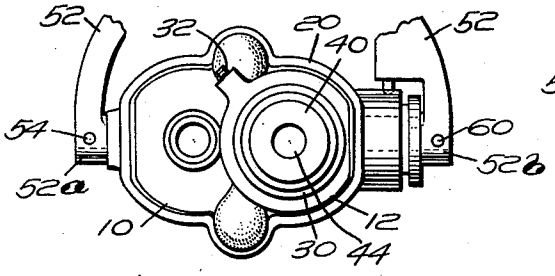


Fig. 2

Fig. 3

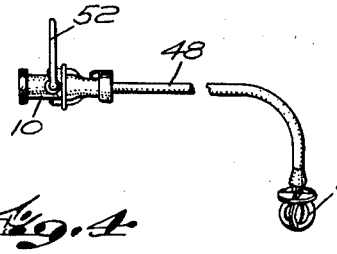


Fig. 4

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Fig. 5

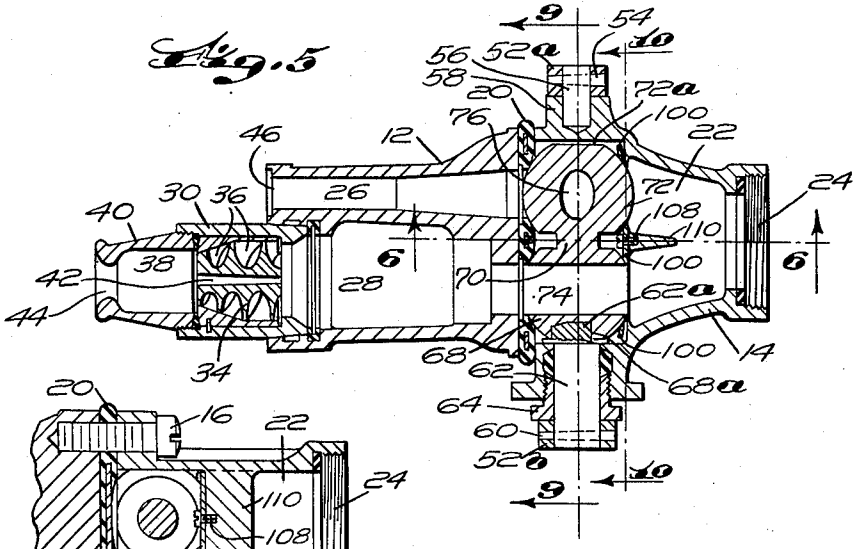


Fig. 6

Fig. 7

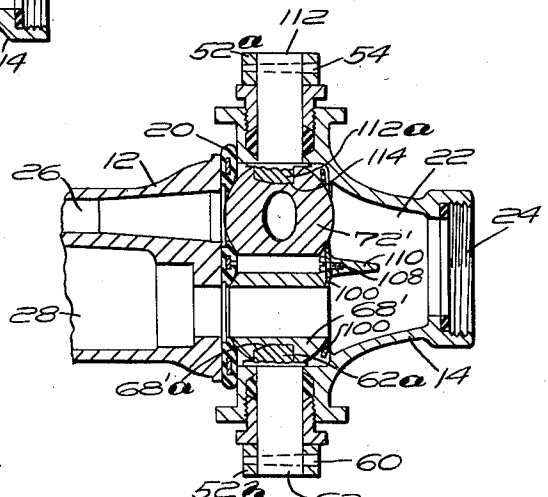
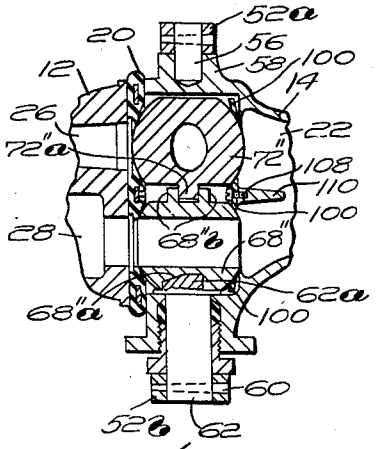


Fig. 8



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Fig. 9

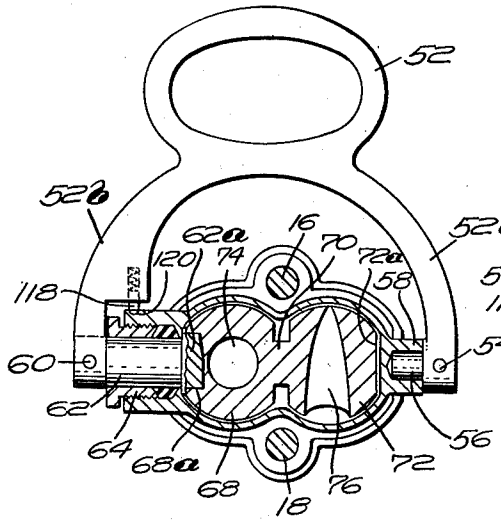


Fig. 10

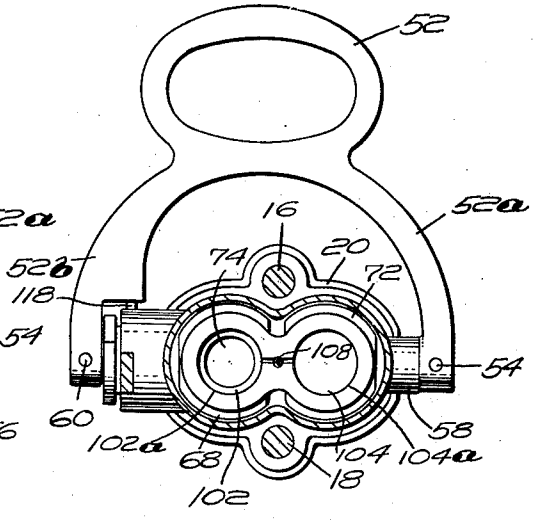


Fig. 11

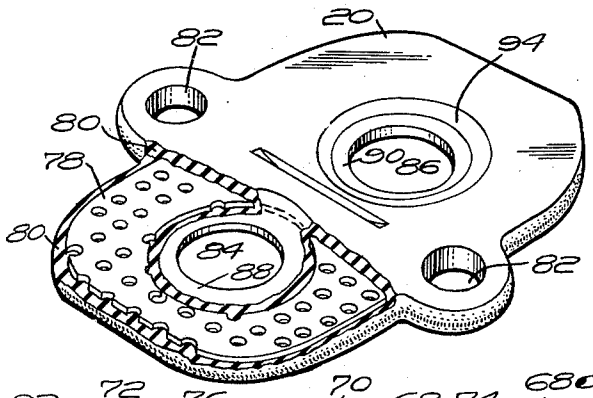


Fig. 13

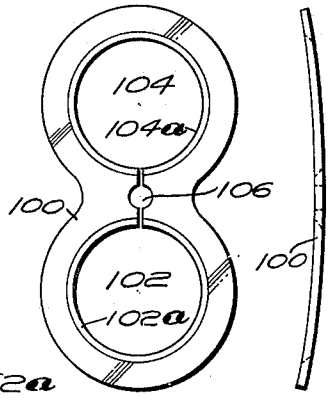
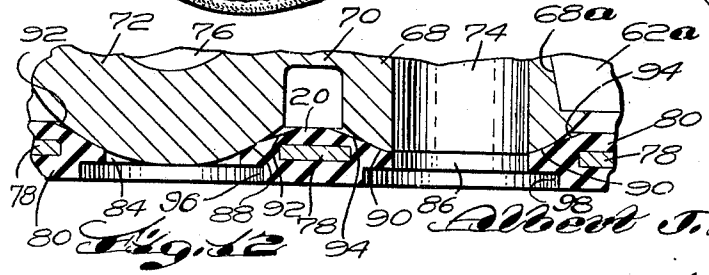


Fig. 14

Fig. 12



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NOZZLE

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Application May 25, 1946, Serial No. 672,178

1 Claim. (Cl. 299—144)

1

This invention relates to improvements in nozzles. More especially it has to do with a hose nozzle having means whereby the liquid can be discharged from the nozzle either in the form of a spray or as a solid stream, or can be shut off tightly.

It is among the objects of the present invention to provide a nozzle having unrestricted and substantially straightway passageways for flow of liquid to produce either a spray or a solid stream, having valve elements for selectively closing or opening either passageway or for shutting off flow altogether, and having resilient means permitting easy operation of the movable parts while insuring tight closure with no undesirable leakage. It is also an object to provide a rugged yet light nozzle having parts so designed and assembled that the nozzle may be readily and easily disassembled if necessary.

The best mode in which it has been contemplated to apply the principles of my invention are shown in the accompanying drawings but these are to be deemed illustrative for it is intended that the patent shall cover by suitable expression in the appended claim whatever features of patentable novelty exist in the invention disclosed.

In the appended drawings:

Fig. 1 is a top plan view of a nozzle embodying the present improvements and equipped with a spray projector;

Fig. 2 is a front view of the same;

Fig. 3 is a side view of the same;

Fig. 4 is a side view, at greatly reduced scale, of the nozzle with a pipe and spray applicator attached thereto in place of the projector;

Fig. 5 is a plan view in section taken as on line 5—5 of Fig. 3 showing integral valve elements;

Fig. 6 is an elevation in section, taken as on line 6—6 of Fig. 5, of a portion of the nozzle;

Fig. 7 is a section similar to Fig. 5 but showing unconnected separate valve elements;

Fig. 8 is a section similar to Fig. 5 but showing separate valve elements operatively connected together;

Fig. 9 is an elevation in section taken as on line 9—9 of Fig. 5;

Fig. 10 is a similar elevation in section taken as on line 10—10 of Fig. 5;

Fig. 11 is a perspective of the valve seat element, with parts broken away to show the construction;

Fig. 12 is an enlarged view of a portion of the section shown in Fig. 5;

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Fig. 13 is a front view of the spring backing plate; and

Fig. 14 is a side view of the same.

Referring to the drawings and particularly to Figs. 1 to 4 inclusive, the nozzle comprises a body 10 composed of only two parts 12 and 14 held together by two screws 16 and 18, which need only be removed by a screw driver to disassemble the body and give access to the internal parts. Clamped between the front and rear body parts is a seat element 20 which not only provides seats for the valve elements to be described but also serves as a gasket between the front and rear parts of the body. In the rear part 14 (see Fig. 5) is an inlet chamber 22 with a single inlet 24 having interior threads for attachment to a supply line, usually an ordinary fire hose. The forward part of the nozzle has two outlet passageways 26 and 28, one (26) for the discharge of a solid stream of liquid and the other (28) being adapted to receive and hold a device 30 which produces a spray discharge.

This device as shown in Figs. 1, 2, 3 and 5 is termed a projector and is used to produce a so-called high velocity spray. This is a relatively short device which can be slipped into the passageway 28 and then turned to effect engagement with a latch 32 which removably locks the projector to the nozzle. This projector (see Fig. 5) has a central element 34 forming with the interior wall of the projector casing several helical passageways 36 from which the liquid enters a mixing chamber 38 in a tip 40. The whirl given the liquid as it leaves the helical passageways, followed by the mixing in the chamber 38 of the whirling streams and a central stream issuing from a straight but slightly expanding central passageway 42 causes the discharge from the orifice 44 to be in the form of a rather heavy spray composed of fairly large droplets moving at high velocity. This form of spray is particularly effective for extinguishing fires of heavier oils and under reasonably favorable conditions is also effective on some of the lighter flammable liquids. It is also useful on wood and similar fires where the amount of combustible material is fairly small.

For ordinary fires or for mopping-up operations to put out fires started from the blaze of the flammable liquids but burning beyond the normal range of the spray, a solid stream from the other outlet orifice 46 is used. This outlet and the passageway 26 leading to it are of such size that when used for discharge the reaction

of the nozzle is not dangerously greater than that produced by the formation of the spray.

In Fig. 4 the nozzle is shown with the projector replaced by a pipe 48 having a so-called applicator 50 at its end. The latter is capable of breaking the liquid up into a fine spray whose droplets move at a slower velocity than those discharged from the projector 30. The low velocity spray, while effective on oil and quick burning fires of wood and other solids involving moderate amounts of material, is primarily intended for extinguishing fires of liquids having a relatively high degree of flammability, such as kerosene for example. The pipe 48, preferably curved as shown, is useful in getting at inaccessible places, as through doors, windows and other openings. It also enables the user of the nozzle to reach an intensely hot fire, as in a tank of highly flammable material, while standing at a distance therefrom in a safe position.

On the outside of the body of the nozzle is a handle 52 which (see Fig. 3) is movable from a forwardly inclined position indicated at 52', to a rearwardly inclined position, indicated at 52''. With the handle forward the nozzle is entirely closed. When at the central position (shown in full lines) midway between the forward and rearward positions, the nozzle is open for discharge flow through the spray passageway 28 but closed against flow through the solid stream passageway 26. When rearward the nozzle is open for discharge through the solid stream passageway but closed as respects the spray passageway. This order of control enables a fire fighter on approaching a fire to first discharge the fire extinguishing medium in the form of a spray as a measure of protection. That is to say, if the projector 30 is being used, the high velocity discharge spreads uniformly over an appreciable range and serves as a protection to the fire fighter, enabling him to move toward hot fires with safety and confidence. If the pipe 48 and applicator 50 are used, the spray also gives such protection but the length of the pipe avoids the necessity of the fire fighter getting quite so close to the blaze. After either form of spray has extinguished the immediate fire, the handle can be turned further rearward to discharge the solid stream for more distant remnants of the flames.

Looking at Figs. 5 and 9, the yoke arm 52*a* of the handle is pinned at 54 to an axle 56 journaled in a sleeve bearing 58 projecting outward from the rear part of the body. The other yoke arm 52*b* is likewise pinned at 60 to another axle 62 which extends through a suitable stuffing box assembly 64 and has a tongue 62*a* across its inner end. This tongue engages a groove or slot 68*a* at one end of a ball-like valve element 68 which is integrally joined at 70 to another ball-like valve element 72. The side of the latter, opposite the integral connection 70, has a flat face 72*a*. Upon movement of the handle 52 as heretofore described, the integral valve elements 68 and 72 are rotated about the common axis of the two axles 56 and 62, albeit the tongue (62*a*) and slot (68*a*) connection permits of some minor movement of the valve elements to adjust themselves nicely against their respective seats in the seat element 20, shown in detail in Figs. 11 and 12.

Each ball element has a large diametrical hole (74, 76) which, when aligned with the axis of its respective outlet passageway in the front part 12 of the body, enables the liquid to flow throughout the nozzle in an unrestricted substantially straightway course. The holes of the two balls are so disposed that when one hole is in position for flow therethrough the other hole is at an angle of approximately 60° with the axis of its respective outlet.

The seat element 20 (see Figs. 11 and 12) comprises a perforated metal plate 78 molded within a cover of rubber or like material 80. Holes 82 are provided at opposite edges to accommodate the screws 16 and 18 which hold the parts of the body of the nozzle together. Other holes 84 and 86 are provided for the flow of the fluid through the passageways of the nozzle. On the side of the plate toward the ball valves, the resilient material 80 immediately around the holes 84 and 86 is spherically-shaped to provide seats 88, 90 for the valves, the configuration of the seats conforming to the spherical surface of each ball-like element. Just outside of these spherical surfaces 88, 90 the resilient material has a conical surface 92, 94 which slopes from the edge of the spherical seat to the flat surface of the element. This particular arrangement of surfaces is clearly shown in Fig. 12. By thus providing a rather narrow seating ring 88, 90 less friction is encountered when a valve element is turned, and by providing the conical surface 92, 94 leading to the seating ring, there is no appreciable interference with the edge of the hole (74, 76) through the valve element. Despite the small extent of the actual seating surface in contact with a valve element, tight closure is effected and prevents any leakage when either or both valve elements are in their closed positions.

Looking at Fig. 12, it is to be noted that the under side of the seat element 20, that is the side remote from the valve elements 68, 72, is undercut at 96, 98 around each hole 84, 86. This undercutting enhances the resilience of the actual seating ring portions 88, 90 of the seat element and enables these ring portions to more readily yield as a valve element is turned and the edges of its central hole encounter the seating ring. Moreover, the resiliency of the ring portions 88, 90 is important when the solid surface of a valve element comes into contact therewith. It is to be noted that the undercut portion (96, 98) extends under the spherically-shaped seat (88, 90) so that the latter is in effect an unsupported flexible inner portion of the seat, while the portion under the conical surface (92, 94) is well supported and may be deemed to be relatively inflexible as compared to the spherically-shaped seat. This results in the valve being tight against leakage when closed because as the solid surface of the valve is pressed toward its seat the spherically-shaped seat or unsupported flexible inner portion yields slightly under both the force of the water pressure and a backing plate 100, presently to be described. After the spherically-shaped seat thus yields the valve then brings up against the conical surface or relatively inflexible outer portion of the seat and is thereby restrained, and the movement of the valve toward its seat is thereby limited. As before stated, this effects a tight closure and prevents any leakage past the valve.

The ball valves are urged toward their respective seats by a spring backing plate 100 (see Figs. 13 and 14) which is shaped like a nearly flat figure eight. This plate, viewed flatwise as in Fig. 13 has two holes 102, 104 with edges 102*a* and 104*a* faced off to fit portions of the spherical surfaces of the ball valves. At the center of the

plate is a third hole **106** for a screw **108** that clamps the plate to a partition **110** in the rear part **14** of the body (see Fig. 5). As shown edgewise in Fig. 14, the plate is appreciably bowed but when in place in the nozzle, it is somewhat unbowed by the valve balls **68** and **72** which are positioned between it and the valve seat element **20**. Consequently the resilient force of the backing plate continuously urges the ball valves toward the valve seat element and with the force of the water acting on the same side of the balls they are held tight against leakage when closed. Nevertheless because the back plate is yieldable the valve elements may be turned readily by the handle with a manual effort surprisingly small for a nozzle of this kind.

In Fig. 7 a modification is shown wherein the valve elements **68'** and **72'** are separately turned by the handle **52**. In this arrangement the yoke arm **52***a* is pinned to an axle **112** which is a duplicate of the axle **62** on the other side of the nozzle. There is also duplicated the same tongue (**112***a*) and slot (**114**) connection between this axle **112** and the ball valve **72'**. At the other side is the previously described axle **62** and tongue **62***a* engaging a slot **68'***a* in the ball valve **68'**. These ball valve elements are physically separate elements but are moved and positioned simultaneously by the handle.

In Fig. 8, the valve elements **68''** and **72''** are shown as separate units having an operative connection provided by a tongue and slot connection. The valve element **68''** has the same tongue (**62***a*) and slot (**68''***a*) connection with the axle **62** as has been described in connection with the structure shown in Figs. 5 and 7. On the opposite side of this valve element **68''** is a surface that is flat except for a spaced pair of ribs **68''***b* outstanding therefrom. These ribs provide a slot for a tongue **72''***a* outstanding from an otherwise flat surface on the second ball-like valve **72''**. This slot and tongue connection, like that between the first mentioned ball and the handle axle, causes simultaneous movement of the second ball with that of the first ball while still permitting some independent adjustment of the two balls to their seats on the element **20**.

At one side of the nozzle, protuberances **116** (see Fig. 3) are provided to serve as stops for the handle at the ends of its arc of movement. A spring actuated detent pin **118** (see Fig. 9), carried by the handle, cooperates with a suitable depression **120** in the valve body to yieldingly hold the handle in its central position.

I claim:

A nozzle comprising a two-part body having in one body part a common inlet chamber with separate flow passageways leading therefrom and

having in the other body part separate discharge passageways aligned with said flow passageways; a plate-like element constituting a gasket between said body parts and having holes therethrough at the entrance to each said discharge passageway; an integral valve element in the first said body part having ball-like portions in each flow passageway seating on said plate-like element with a diametrical hole through one portion in angular relation to a diametrical hole through the other portion; an external handle rotatably mounted on the first said body part for rotation about an axis extending diametrically through both said ball-like portions at right angles to the lines of flow through said flow passageways, said handle being operatively connected with said valve element whereby said valve element may be rotated to effect simultaneous closure of both said holes in the said plate-like element or closure of either of said holes selectively; said plate-like element immediately around each hole therethrough having a spherically-shaped annular surface for engagement by the spherical surface of its respective ball-like portion and having a contiguous conical annular surface diverging from said spherically-shaped annular surface for initial engagement with the edge of the diametrical hole through a ball-like portion as the latter is rotated to bring its diametrical hole into alignment with its respective hole in the plate-like element; and a spring backing plate mounted in the first said body part and engaging each said ball-like portion so as to exert a pressure thereon urging it toward said plate-like element.

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