Oct. 11, 1960 A. NIELSEN 2,955,766

HOSE NOZZLE

Filed Feb. 10, 1958 3 Sheets-Sheet 1

FIG-1

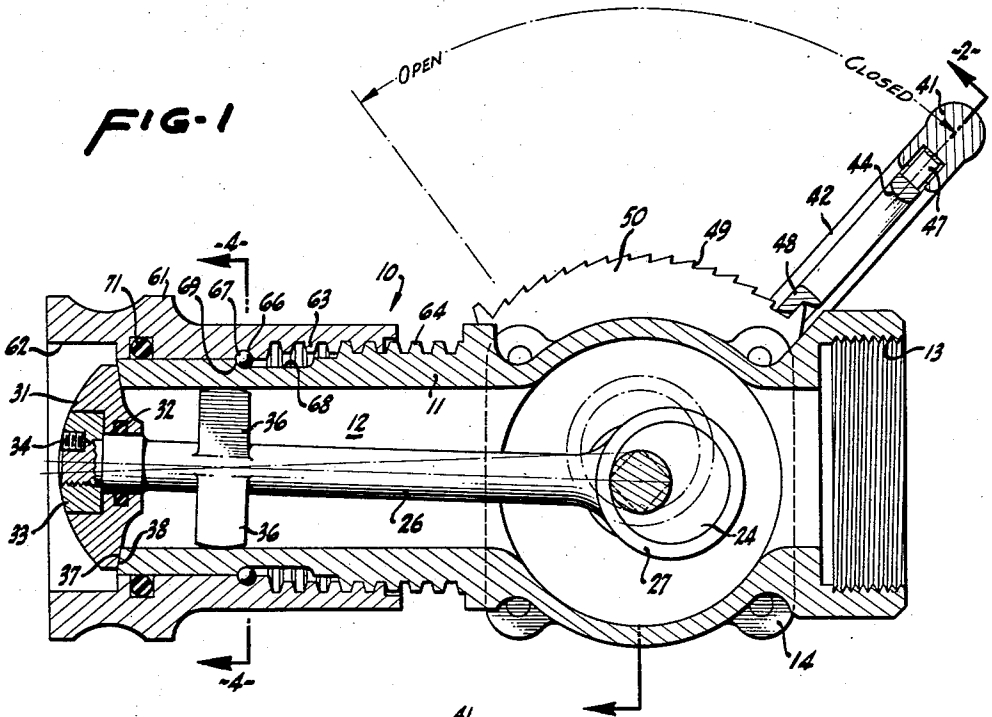
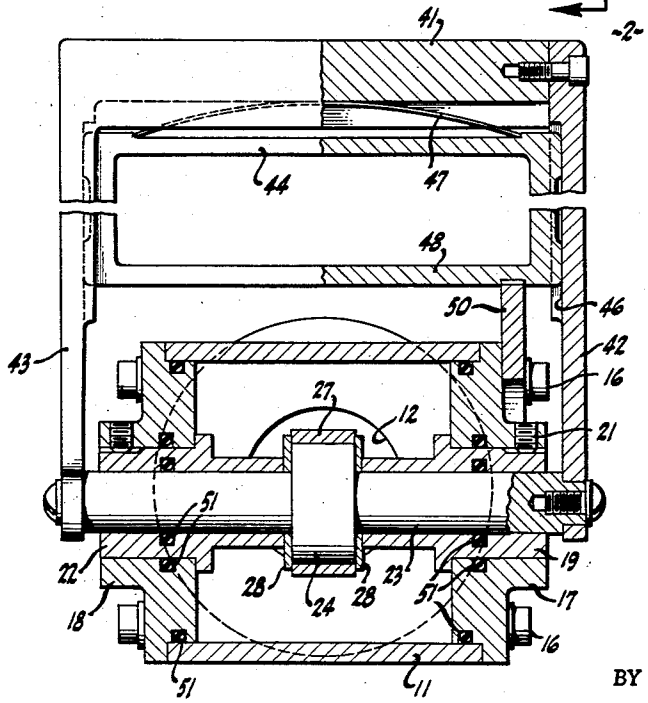


FIG-2



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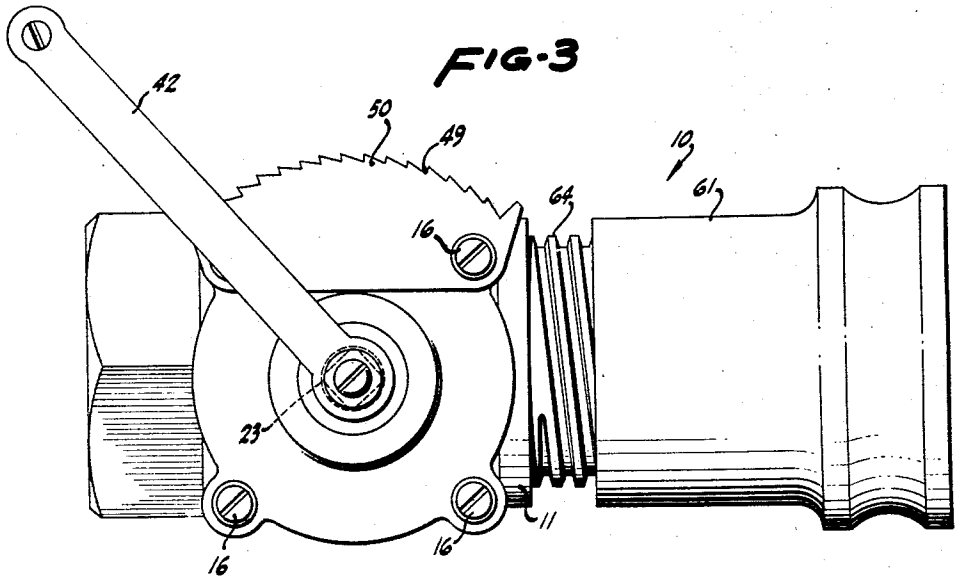
Meelin and Hanscom
Attorneys

Oct. 11, 1960 A. NIELSEN 2,955,766

HOSE NOZZLE

Filed Feb. 10, 1958 3 Sheets-Sheet 2

FIG-3



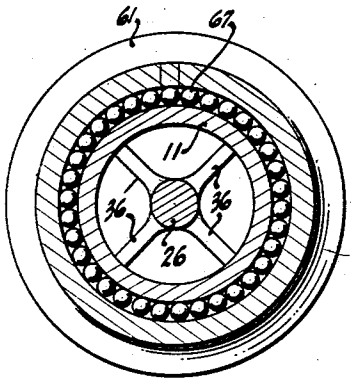


FIG-4

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Oct. 11, 1960 A. NIELSEN 2,955,766

HOSE NOZZLE

Filed Feb. 10, 1958 3 Sheets-Sheet 3

FIG-5

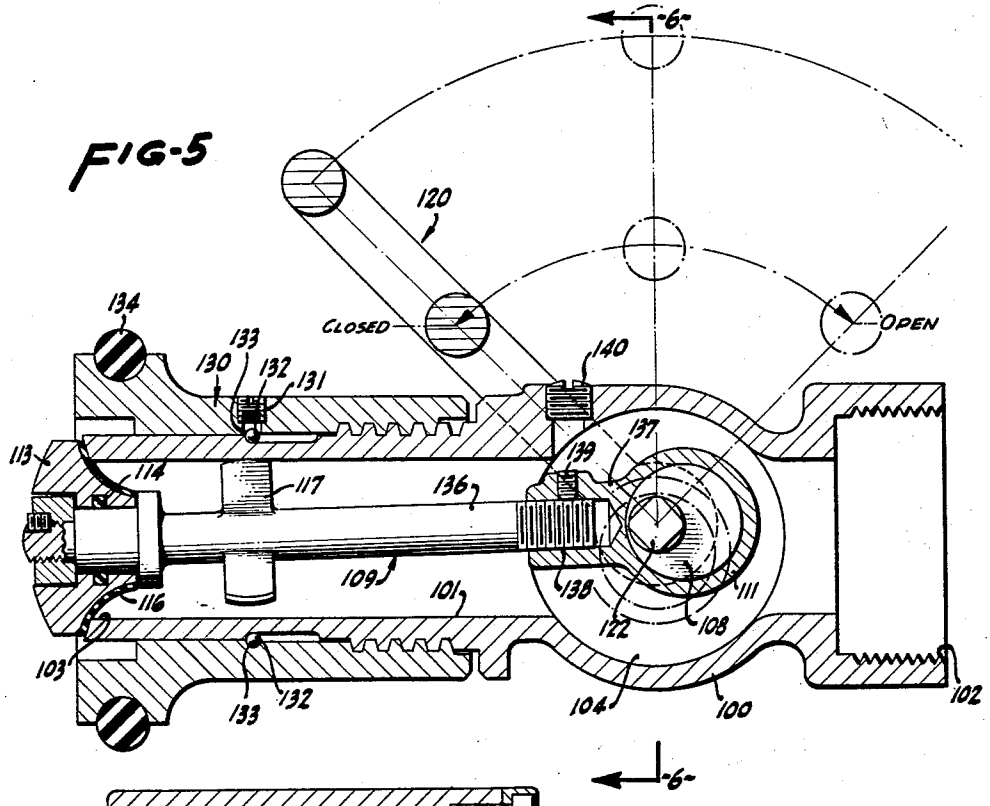
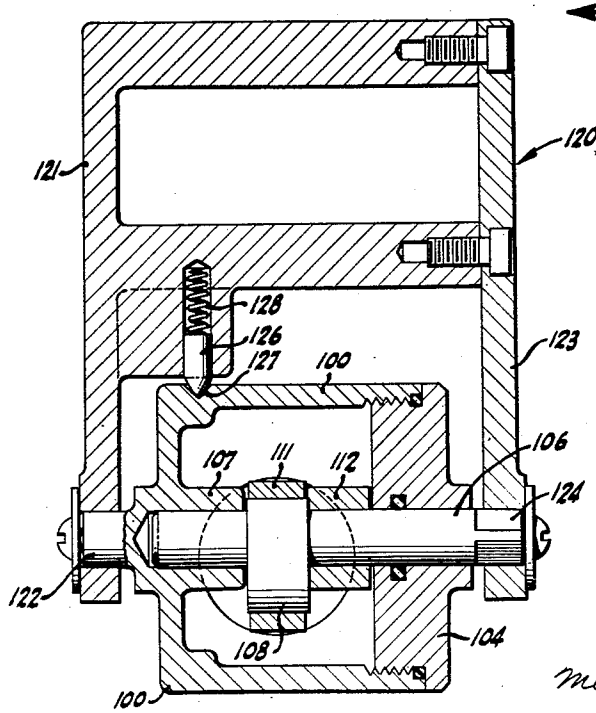


FIG-6



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2,955,766

HOSE NOZZLE

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11 Claims. (Cl. 239—456)

This invention relates to hose nozzles of the type employed to extinguish fires.

It is the principal object of this invention to provide an improved and simplified nozzle for fire extinguishing purposes in which the flow rate and spray pattern of the fluid discharge can be quickly and independently varied by the operator during use so as to obtain a fluid discharge of characteristics suitable to meet different conditions.

It is a further object to provide a nozzle as above in which the flow rate may be varied by a valve movable in response to a lever operated eccentric shaft and the spray pattern may be varied by a rotatable sleeve.

A yet further object of the invention is to provide a spray pattern sleeve with a novel limiting device to limit the amount of movement of said sleeve.

Other objects and advantages will become apparent in the course of the following detailed description.

In the drawings, forming a portion of this application, and in which like parts are designated by like reference numerals throughout the same,

Fig. 1 is a central axial sectional view of a nozzle constructed in accordance with the invention, and with parts shown in elevation.

Fig. 2 is a sectional view, taken on line 2—2 of Fig. 1.

Fig. 3 is a side elevational view of the nozzle.

Fig. 4 is a sectional view, taken on line 4—4 of Fig. 1.

Fig. 5 is a central axial sectional view of a modified nozzle, with parts shown in elevation.

Fig. 6 is a sectional view, taken on line 6—6 of Fig. 5.

Referring now to the drawings, and particularly to Figs. 1–4, the nozzle 10 comprises a generally tubular housing member 11 having a flow passage 12 therethrough, the passage being internally threaded at its inlet end 13 to receive a hose coupling therein. Suitable threaded ears 14 on the housing member receive bolts 16 to mount side cover plates 17 and 18 onto the housing member.

As best seein Fig. 2, cover plate 17 has a bearing bushing 19 extending therethrough and held in fixed relation thereto by setscrew 21. A similar bushing 22 is mounted in cover plate 18 in coaxial alignment with bushing 19. A shaft 23 extends transversely through the flow passage 12 and is rotatably mounted in bushings 19 and 22, the shaft being provided with a radially enlarged, eccentrically offset, circular midportion 24.

A valve stem member 26 is disposed longitudinally within the flow passage 12 and has an enlarged end 27 rotatably encompassing the eccentric midportion 24 of shaft 23. Washers 28, confined between the bushings 19 and 22 and the shaft midportion 24, retain the stem member in place on the shaft midportion.

A valve member 31 is loosely mounted on the other end of the valve stem 26, with an O-ring 32 providing a sealing engagement between the valve and stem, while allowing limited rocking movement therebetween. Nut 33 and setscrew 34 lock the valve member against outward movement thereof with respect to the valve stem. The stem 26 is provided with a plurality of radially extending centering supports 36 to maintain the valve member in substantially coaxial relation to the flow passage 12. As seen in Fig. 1, the valve member 31 has a valve seating face 37 seatable on valve seat 38 formed at the outer end of the housing member 11. Although the valve seating face 37 of valve 31 is shown as being made of metal, it is contemplated that this face may be of rubber vulcanized to the valve member, if desired.

A handle 41 has depending legs 42 and 43 non-rotatively secured to the square shanked ends of shaft 23, so that the shaft 23 may be rotated by swinging the handle through the position shown in Fig. 1. A square ring member 44 is slidably mounted in grooves 46 formed in the leg members 42 and 43, and is downwardly biased by bow spring 47 so that the lower rung 48 of the ring member acts as a pawl to normally engage the ratchet teeth 49 of the ratchet member 50. As shown in the drawings, the ratchet member is a separate element, bolted into place by bolts 16, although the member may be formed integrally with cover plate 17, if so desired, or may be formed integrally with and centrally of the housing member 11.

A plurality of O-rings, as at 51, seal between the housing member 11, cover plates 17 and 18, bushings 19 and 22 and shaft 23, to make the nozzle water-tight.

In the operation of the nozzle thus far described, the valve 31 may be unseated by squeezing the handle 41 and the upper rung of ring member 44 together to move the lower rung 48 out of engagement with the ratchet teeth. The handle may then be rotated to the open position, thus turning the shaft 23 so that the eccentric portion thereof moves to the dotted line position of Fig. 1, causing the valve stem 26 and valve member 31 to move to the left to a full open position (not illustrated). Any intermediate rotation of the handle 41 will cause the valve 31 to move to a partially open position, at which point the ring member may be released to engage the ratchet teeth so that further accidental opening of the valve will be avoided. To close the valve, it is necessary only to pull backwardly on the handle 41, as the lower rung of the ring member may ride up and over the ratchet teeth. It will be noted that the axis of shaft 23 is off center with respect to the axis of the flow passage when the valve is in a closed position. However, the loose mounting of the valve member 31 on the valve stem insures that the valve member will seat snugly on the valve seat when closed.

A deflector sleeve member 61 surrounds the discharge end of housing member 11, and has a portion 62 of internal diameter greater than the external diameter of the valve member 31. The rear end of sleeve 61 is internally threaded at 63 to cooperate with external threads 64 formed on housing member 11 so that as the sleeve is rotated with respect to the housing member, the sleeve will move longitudinally with respect thereto. The cooperating threads 63 and 64 are preferably multiple threads so that a relatively great longitudinal movement of the sleeve will result from a relatively small rotation of the sleeve.

The sleeve member 61 is provided with a hemispherically shaped internal annular groove 66 to receive a plurality of locking balls 67 therein, the locking balls projecting into a relatively wide annular groove 68 formed exteriorly of the housing member. As the sleeve is rotated to the forwardmost position illustrated in Fig. 1, the locking balls will engage the forward side 69 of groove 68 to prevent further outward movement of the sleeve. The shearing stress which would result from an attempted forcing of the sleeve beyond the limit position illustrated will then be shared equally by all of the lock-

ing balls **67** and any possible failure due to such forcing will be effectively eliminated. Similarly, the rearward movement of the sleeve will be limited by the engagement of the locking balls with the rear side of groove **68**.

Sleeve member **61** is internally grooved adjacent the portion **62** thereof to receive an O-ring **71** therein, providing a seal between the sleeve and housing member to prevent backflow of fluid therebetween.

With the sleeve **61** in the illustrated position, the water discharging from the nozzle will be substantially a cylinder of a size of the internal diameter of the portion **62** of the sleeve. With the sleeve moved to the right, by relative rotation thereof with respect to housing member **11** (as viewed in Fig. 1), the sleeve will cease to deflect the water issuing between the valve seating face **37** of the valve and the valve seat **38**, and the spray pattern will be essentially in the shape of a flat disk. Any intermediate spray pattern can be easily and quickly obtained by rotating the sleeve member **61** until the desired pattern is reached.

As is clear from the foregoing description, I have provided a hose nozzle in which the flow rate of the water discharged from the nozzle, and the spray pattern of such discharge, can be quickly and independently varied. Also, the particular form of the invention illustrated is peculiarly adapted for emergency use. The manually operable controls for the water flow and the spray pattern are quite different in operation such that little likelihood of confusion will occur as to which control to operate to meet changing operating requirements. The ratchet arrangement prevents accidental opening of the valve, and will hold the valve in any selected position against the force of the water on the valve tending to open it, while at the same time allowing the valve to be quickly closed by merely pulling back on the handle. In the use of the nozzle, the deflector sleeve **61** may be rotated very quickly when it is necessary to change spray patterns, and the use of the multiple locking balls will provide a very strong limit means to prevent over travel of the sleeve and possible failure thereof.

If desired, the hose nozzle described above may be constructed so that the open and closed positions of the handle **41** are reversed. That is, the forward position (left-hand position of Fig. 1) could be the closed position, and the rearward position could be the open position of valve **31**. In this form, the enlarged, eccentrically offset, circular midportion **24** of shaft **23** would be rotated in a clockwise direction to open valve **31**, instead of the counterclockwise direction as illustrated in Fig. 1.

Figs. 5 and 6 illustrate a modification of the hose nozzle previously described. The generally tubular housing member **100** has a flow passage **101** therethrough from the inlet end **102** to the discharge end **103**. A single side cover plate **104** is threaded into the housing member **100**.

A shaft **106** extends transversely through the flow passage **101** and is journaled in hub **107**, formed interiorly of housing member **100**, and in side cover plate **104**. The shaft **106** has a radially enlarged, eccentrically offset, circular midportion **108**.

A valve stem member **109** is disposed longitudinally within flow passage **101**, and has an enlarged end **111** rotatably encompassing the eccentric midportion **108** of shaft **106**. Hub **107** and a radially enlarged portion **112** of shaft **106** retain the stem member in place on the eccentric portion of the shaft.

A valve member **113** is loosely mounted on the other end of valve stem **109**, with an O-ring **114** providing a sealing engagement between the valve and stem, while allowing limited rocking movement therebetween, as previously explained. The valve seating face of valve **113** is surfaced with rubber **116** vulcanized to the valve member. A plurality of radially extending centering supports **117** on stem **109** maintain the valve member **113** in substantially coaxial relation to flow path **101**.

A handle **120** has a first member **121** journaled for rotation about an outwardly extending hub **122** formed integrally with housing member **100**, and a second member **123** fixed against rotation to the square shanked end portion **124** of shaft **106**. A spring-pressed detent **126** carried in handle member **121** is adapted to engage spaced depressions **127** in the path of movement of the detent as the handle is moved between the positions shown in Fig. 5. The force of spring **128**, when the detent **126** is in a depression, is sufficient to prevent water pressure from forcing the valve **113** open, while yet allowing the detent to be cammed out of a depression upon a manual force being applied to the handle.

A deflector sleeve member **130** threadedly engages the discharge end of the nozzle housing, in the same manner and for the same purposes as above described in connection with Figs. 1–4. A removable setscrew **131** enables the locking balls **132** to be entered into the sleeve groove **133**. A rubber bumper ring **134** may be disposed around the sleeve, if desired.

The overall length of the valve stem member **109** may be adjusted, by the following means, to insure that the valve member **113** will seat tightly on the discharge passage end **103** when the handle is in closed position. The valve stem **109** is comprised of two coaxial sections **136** and **137**, threadedly interconnected at **138** so that the portions **136** and **137** can be adjusted to produce a limited longitudinal movement therebetween, with a setscrew **139** being provided to lock the stem members together after such adjustment. Screw member **140**, in housing member **100**, may be removed to provide access to setscrew **139**.

The operation of this embodiment is essentially the same as previously described. A manual force applied to the handle to rotate it in a clockwise direction (as seen in Fig. 5) will cam the detent **126** out of the detent depression at the closed position. Clockwise rotation of the handle will then rotate the eccentric midportion of shaft **106** clockwise, thereby moving the valve stem to the left to open valve **113**. As may be seen from the drawing, the axis of shaft **106** is above the centerline of passage **101** so that the center of the enlarged end **111** of valve stem **109** is slightly above the axis of the passage **101** when valve **110** is closed and is slightly below the axis of the passage when the valve is full open. The loose mounting of the valve on the valve stem will insure that the valve seats tightly on the housing member when closed thereagainst. When the valve is full open, the force of the water will maintain the axis of the valve member coaxial with the discharge passage so that a uniform spray will be produced.

It is to be understood that the forms of the invention herewith shown and described are to be taken as preferred embodiments of the same, and that various changes may be made in the shape, size and arrangement of parts without departing from the spirit of the invention or the scope of the attached claims.

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

1. A hose nozzle comprising a generally tubular housing member having an inlet end, a discharge end and a flow passage therebetween, a rotatable shaft extending transversely through said nozzle and said flow passage, said shaft having an eccentrically offset, circular midportion within said flow passage, a valve stem having one end thereof encircling the eccentric midportion of said shaft, a valve member rockably but sealingly mounted on the other end of said valve stem and having a seating face engageable with the discharge end of said flow passage to seal off fluid flow therethrough, a handle member secured to said shaft, a ratchet toothed member mounted on said housing member, and a manually releasable pawl carried by said handle and normally engageable with said ratchet teeth to prevent opening move-

ment of said valve member while allowing closing of said valve member.

2. A hose nozzle comprising a generally tubular housing member having an inlet end, a discharge end and a flow passage therebetween, said discharge end having a coaxial discharge port and valve surface, a rotatable shaft extending transversely through said nozzle and said flow passage, said shaft having an eccentrically offset, circular midportion within said flow passage, a valve stem having one end thereof encircling the eccentric midportion of said shaft, a valve member rockably but sealingly mounted on the other end of said valve stem and having a seating face engageable with the valve surface of said flow passage to seal off fluid flow therethrough, a manually operable handle member secured to said shaft, and a deflector sleeve surrounding the discharge end of said housing member and threadedly engaged therewith, said sleeve being coaxial with said discharge port and having a portion thereof of internal diameter greater than the external diameter of said valve member, said sleeve portion being adapted to project beyond the discharge end of said housing member and said valve member and axially adjustable thereof.

3. A hose nozzle comprising a generally tubular housing member having an inlet end, a discharge end and a flow passage therebetween, a rotatable shaft extending transversely through said nozzle and said flow passage, said shaft having an eccentrically offset, circular midportion within said flow passage, a valve stem having one end thereof encircling the eccentric midportion of said shaft, a valve member rockably but sealingly mounted on the other end of said valve stem and having a seating face engageable with the discharge end of said flow passage to seal off fluid flow therethrough, a handle member secured to said shaft, a ratchet toothed member mounted on said housing member, a manually releasable pawl carried by said handle and normally engageable with said ratchet teeth to prevent opening movement of said valve member while allowing closing of said valve member, and a deflector sleeve surrounding the discharge end of said housing member and threadedly engaged therewith, said sleeve having a portion thereof of internal diameter greater than the external diameter of said valve member, said sleeve portion being adapted to project beyond the discharge end of said housing member and said valve member.

4. A hose nozzle comprising a generally tubular housing member having an inlet end, a discharge end and a flow passage therebetween, a valve member having a seating face engageable with the discharge end of said flow passage to seal off fluid flow therethrough and movable outwardly therefrom, a deflector sleeve surrounding the discharge end of said housing member and longitudinally movable with respect thereto, said sleeve having a portion thereof adapted to project beyond the discharge end of said housing member and said valve member, said housing member having a relatively wide annular groove formed exteriorly thereon, said sleeve having a relatively narrow groove formed internally therein, and a plurality of locking balls filling said sleeve groove and projecting into said housing member groove to limit longitudinal movement of said sleeve relative to said housing member.

5. A hose nozzle comprising a generally tubular housing member having an inlet end, a discharge end and a flow passage therebetween, a rotatable shaft extending transversely through said nozzle and said flow passage, said shaft having an eccentrically offset, circular midportion within said flow passage, a valve stem having one end thereof encircling the eccentric midportion of said shaft, a valve member rockably but sealingly mounted on the other end of said valve stem and having a seating face engageable with the discharge end of said flow passage to seal off fluid flow therethrough, a manually operable handle member secured to said shaft, a deflector sleeve surrounding the discharge end of said housing member and threadedly engaged therewith, said sleeve having a portion thereof of internal diameter greater than the external diameter of said valve member, said sleeve portion being adapted to project beyond the discharge end of said housing member and said valve member, said housing member having a relatively wide annular groove formed exteriorly thereon, said sleeve having a relatively narrow groove formed internally therein, and a plurality of locking balls filling said sleeve groove and projecting into said housing member groove to limit longitudinal movement of said sleeve relative to said housing member.

6. A hose nozzle comprising a generally tubular housing member having an inlet end, a discharge end and a flow passage therebetween, a rotatable shaft extending transversely through said nozzle and said flow passage, said shaft having an eccentrically offset, circular midportion within said flow passage, a valve stem having one end thereof encircling the eccentric midportion of said shaft, a valve member rockably but sealingly mounted on the other end of said valve stem and having a seating face engageable with the discharge end of said flow passage to seal off fluid flow therethrough, a handle member secured to said shaft, a ratchet toothed member mounted on said housing member, a manually releasable pawl carried by said handle and normally engageable with said ratchet teeth to prevent opening movement of said valve member while allowing closing of said valve member, a deflector sleeve surrounding the discharge end of said housing member and threadedly engaged therewith, said sleeve having a portion thereof of internal diameter greater than the external diameter of said valve member, said sleeve portion being adapted to project beyond the discharge end of said housing member and said valve member, said housing member having a relatively wide annular groove formed exteriorly thereon, said sleeve having a relatively narrow groove formed internally therein, and a plurality of locking balls filling said sleeve groove and projecting into said housing member groove to limit longitudinal movement of said sleeve relative to said housing member.

7. A hose nozzle comprising a generally tubular housing member having an inlet end, a discharge end and a flow passage therebetween, a rotatable shaft extending transversely through said nozzle and said flow passage, said shaft having a radially enlarged, eccentrically offset, circular midportion within said flow passage, said shaft having its axis offset from the axis of said flow passage, a valve stem having one end thereof encircling the eccentric midportion of said shaft, a valve member rockably but sealingly mounted on the other end of said valve stem and having a seating face engageable with the discharge end of said flow passage to seal off fluid flow therethrough, a plurality of support members radially projecting from said valve stem to center said valve stem in said flow passage, a handle member secured to said shaft, a ratchet toothed member mounted on said housing member, a manually releasable pawl carried by said handle and normally engageable with said ratchet teeth to prevent opening movement of said valve member while allowing closing of said valve member, a deflector sleeve surrounding the discharge end of said housing member and threadedly engaged therewith by multiple threads, said sleeve having a portion thereof of internal diameter greater than the external diameter of said valve member, said sleeve portion being adapted to project beyond the discharge end of said housing member and said valve member, said housing member having a relatively wide annular groove formed exteriorly thereon, said sleeve having a relatively narrow groove formed internally therein, and a plurality of locking balls filling said sleeve groove and projecting into said housing member groove

to limit longitudinal movement of said sleeve relative to said housing member.

8. A hose nozzle comprising a generally tubular housing member having an inlet end, a discharge end and a flow passage therebetween, a rotatable shaft extending transversely through said nozzle and said flow passage, said shaft having an eccentrically offset, circular midportion within said flow passage, a valve stem having one end thereof encircling the eccentric midportion of said shaft, a valve member rockably but sealingly mounted on the other end of said valve stem and having a seating face engageable with the discharge end of said flow passage to seal off fluid flow therethrough, a handle member secured to said shaft, and a manually releasable spring-pressed member carried by said handle and normally engageable with said housing member at preselected points thereon to restrain opening movement of said valve member.

9. In a hose nozzle as set forth in claim 8 wherein said valve stem comprises two coaxial portions interconnected for limited longitudinal movement therebetween, and means to lock said stem portions against such relative longitudinal movement.

10. A hose nozzle comprising a generally tubular housing member having an inlet end, a discharge end and a flow passage therebetween, a rotatable shaft extending transversely through said nozzle and said flow passage, said shaft having an eccentrically offset, circular midportion within said flow passage, a valve stem having one end thereof encircling the eccentric midportion of said shaft, a metallic valve member rockably but sealingly mounted on the other end of said valve stem and having a seating face engageable with the discharge end of said flow passage to seal off fluid flow therethrough, said valve seating face being comprised of rubber vulcanized to said metallic valve member, said valve stem member comprising two coaxial portions interconnected for limited relative longitudinal movement, means to lock said valve stem portions against said relative longitudinal movement, a manually operable handle member secured to said shaft, and a deflector sleeve surrounding the discharge end of said housing member and threadedly engaged therewith, said sleeve having a portion thereof of internal diameter greater than the external diameter of said valve member, said sleeve portion being adapted to project beyond the discharge end of said housing member and said valve member.

11. A hose nozzle comprising a generally tubular housing member having an inlet end, a discharge end and a flow passage therebetween, a rotatable shaft extending transversely through said nozzle and said flow passage, said shaft having a radially enlarged, eccentrically offset, circular midportion within said flow passage, said shaft having its axis offset from the axis of said flow passage, a valve stem having one end thereof encircling the eccentric midportion of said shaft, a valve member rockably but sealingly mounted on the other end of said valve stem and having a seating face engageable with the discharge end of said flow passage to seal off fluid flow therethrough, a plurality of support members radially projecting from said valve stem to center said valve stem in said flow passage, a handle member secured to said shaft, a manually releasable spring-pressed member carried by said handle and normally engageable with said housing member at preselected points thereon to restrain opening movement of said valve member, a deflector sleeve surrounding the discharge end of said housing member and threadedly engaged therewith, said sleeve having a portion thereof of internal diameter greater than the external diameter of said valve member, said sleeve portion being adapted to project beyond the discharge end of said housing member and said valve member, said housing member having a relatively wide annular groove formed exteriorly thereon, said sleeve having a relatively narrow groove formed internally therein, and a plurality of locking balls filling said sleeve groove and projecting into said housing member groove to limit longitudinal movement of said sleeve relative to said housing member.

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