

Nov. 4, 1952

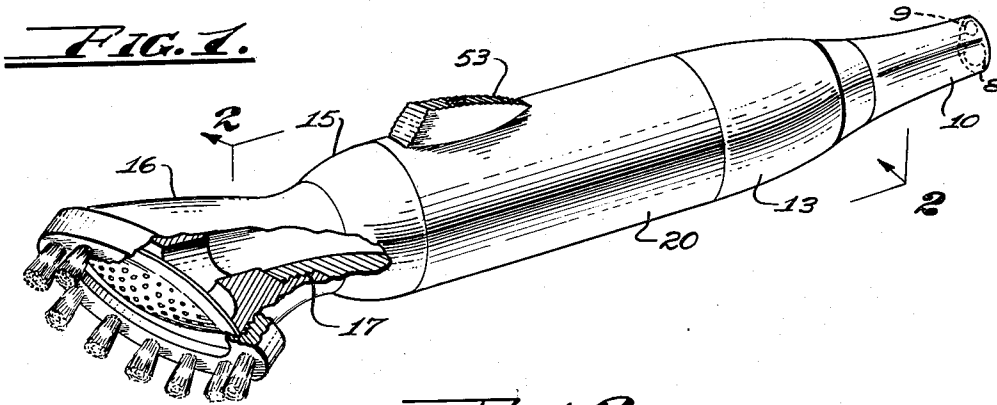
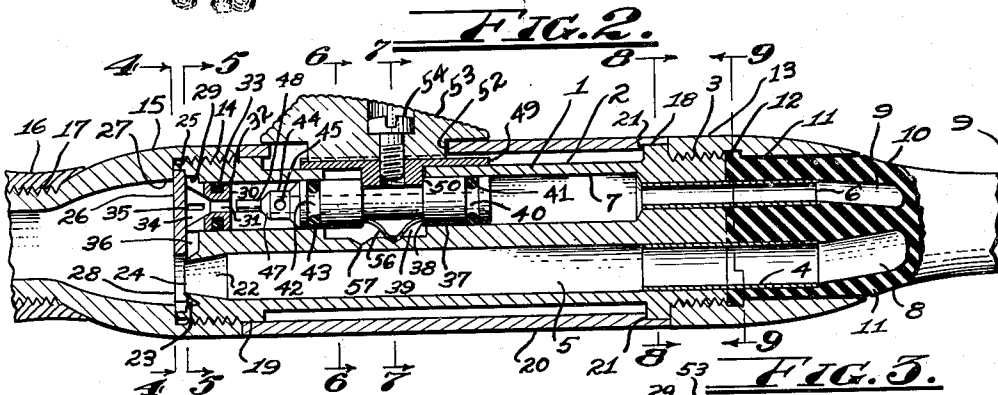
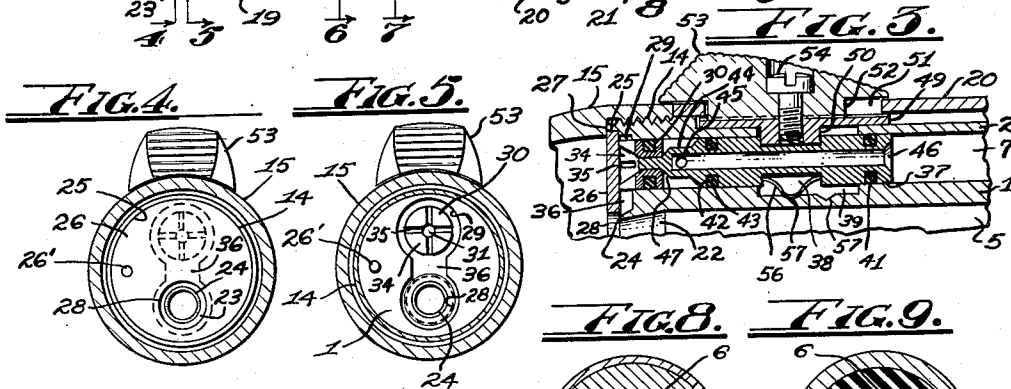
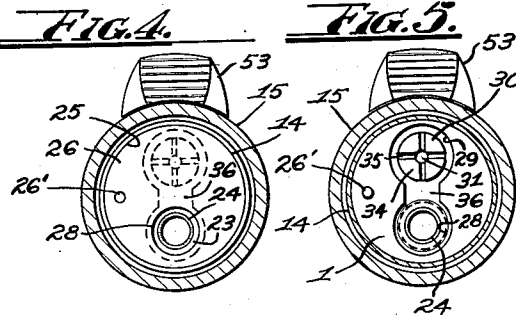
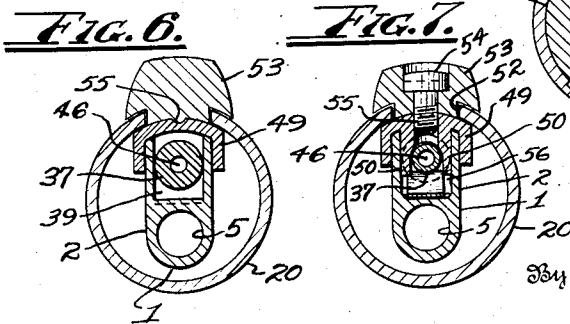
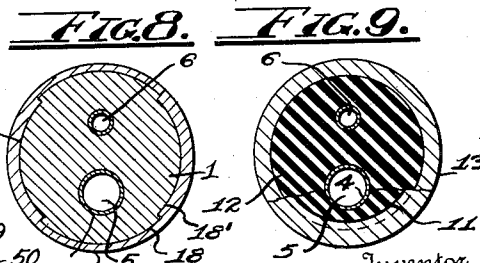
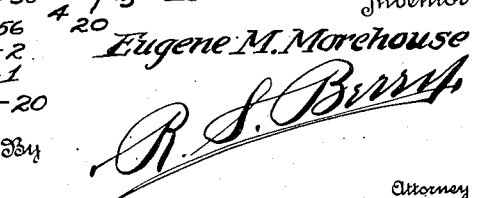
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2,616,660

VALVE FOR SPRAY CONTROLLING APPARATUS

Filed March 18, 1946

2 SHEETS—SHEET 1



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VALVE FOR SPRAY CONTROLLING APPARATUS

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2 SHEETS—SHEET 2

FIG. 10.

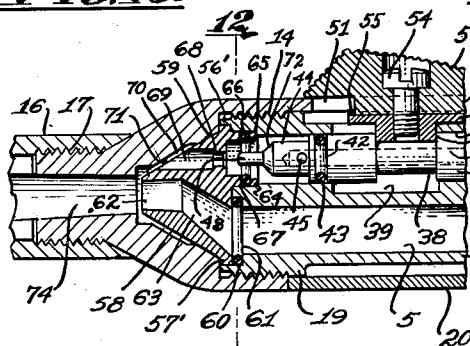


FIG. 11.

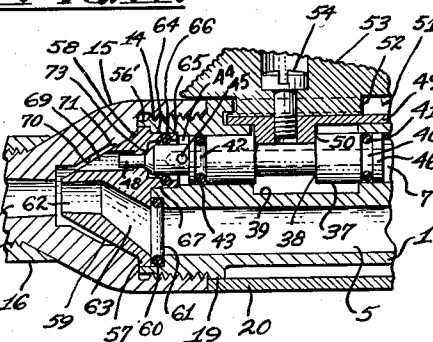


FIG. 12.

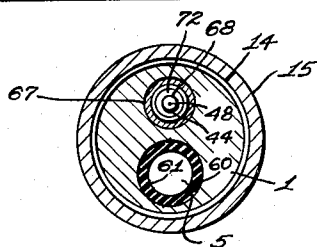
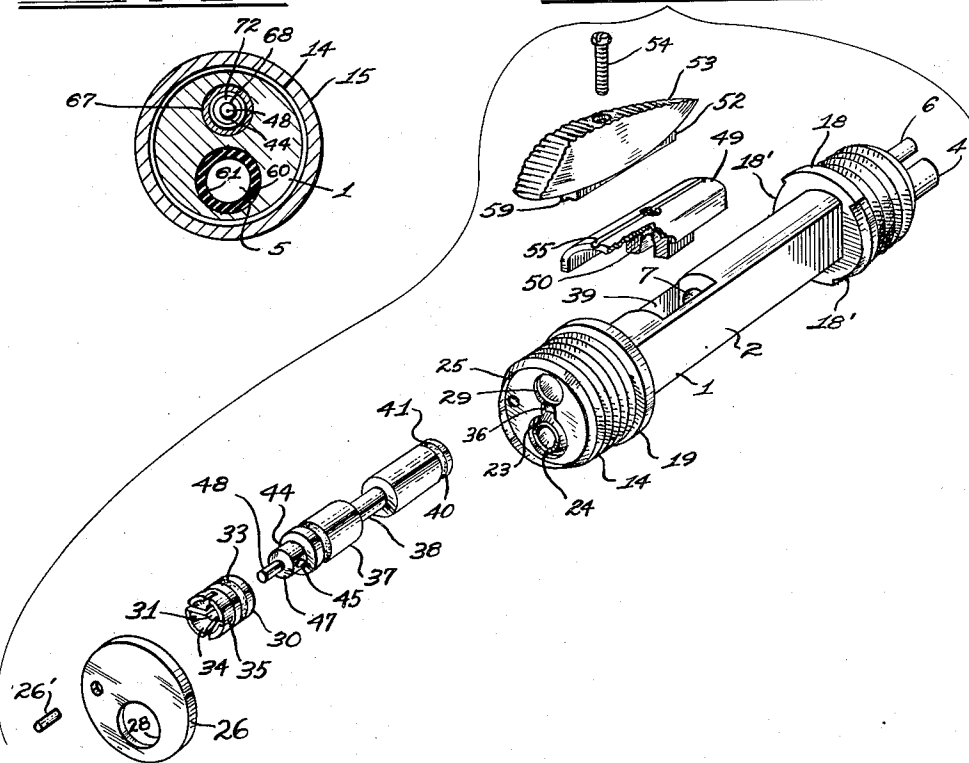


FIG. 13.



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2,616,660

VALVE FOR SPRAY CONTROLLING APPARATUS

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Application March 18, 1946, Serial No. 655,124

3 Claims. (Cl. 251-163)

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This invention relates to spray nozzles for dishwashing apparatus of the type having a manual control whereby the jet or spray ejected from the nozzle may be either detergent-containing or rinsing at the will of the user. An apparatus with which such a nozzle is particularly useful is disclosed by way of example in the co-pending application of Eugene M. Morehouse, the present applicant, and Harold J. LeVesconte, Serial No. 645,187 filed February 2, 1945, since abandoned.

The prior art contains numerous examples of device for dishwashing in which a soap container is in communication with a water supply and in which a hose extends from the water supply and soap container to a spray nozzle adapted to be held in the hand of the user. Generally such devices employ a three way valve mounted adjacent the water supply by manipulation of which either the entire stream of water may be diverted through the soap chamber and thence into the hose or it may be directed directly into the hose for rinsing purposes. This arrangement possesses the disadvantage that before perfect rinsing action is achieved, the entire hose must be flushed out with consequent waste of soap, water and time.

Another group of devices known in the art include a soap container in the spray nozzle with a manually operable valve to divert the stream either through the soap chamber for a washing action or past it for a rinsing action. Such devices are deficient in that if the soap chamber is made sufficiently large to make it unnecessary to recharge it during the average dishwashing operation it becomes unwieldy and if made small enough for ready handling, it must be recharged frequently.

With these deficiencies in mind, it is an object of the present invention to provide a spray nozzle for dishwashing aids, adapted to receive separate streams of detergent solution and clear water and in which nozzle, means is provided whereby either a detergent-containing jet or spray or a jet or spray of clear rinsing water is ejected at the will of the user.

Another object of the invention is to provide a spray nozzle apparatus for dishwashing devices which is so constructed and arranged that the stream of clear water induces a jet pump action upon the stream of detergent solution.

Still another object of the invention is to provide a spray nozzle of the above character in which the water-containing parts are so spaced from those portions contacted by the hand of the user as to be substantially insulated against the

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transmission of heat thereby permitting the use of water at temperatures above that which could be borne by the hand of the user with consequent better sterilization of the dishes thus washed by reason of such higher temperatures and because wiping of the dishes is thereby made unnecessary.

A still further object of the invention is to provide a spray nozzle of the above character which includes valve means constructed and arranged to be self cleaning whereby flow obstruction by reason of clots of undissolved detergent is avoided.

A still further object of the invention is to provide a spray nozzle of the above type in which the valve means is automatically closed by the pressure of the detergent-containing fluid unless purposely held open against such pressure and in which the valve means is so constructed and arranged that the effort required to overcome the fluid pressure is not so great as to be objectionable to the user.

Still another object of the invention is to provide a spray nozzle having the above desirable characteristics which is composed of few parts, which may be readily assembled and disassembled and in which the parts are so designed as to be susceptible of economical manufacture.

Still another object of the invention is to provide a spray nozzle of the above type which is small in size, light in weight and attractive in appearance and in which the controlling element is so disposed as to be convenient for manipulation.

With the foregoing objects in view, together with such other objects and advantages as may subsequently appear, the invention resides in the parts and in the combination, construction and arrangement of parts hereinafter described and claimed, and illustrated by way of example in the accompanying drawing, in which:

Fig. 1 is a perspective partly sectional view of a spray nozzle in which is incorporated an embodiment of the objectives of the invention;

Fig. 2 is an enlarged fragmentary longitudinal sectional view taken on the line 2-2 of Fig. 1 showing the valve means in open position;

Fig. 3 is a fragmentary view generally similar to Fig. 2 but showing the valve means in closed position;

Figs. 4, 5, 6, 7, 8 and 9 are transverse sectional views taken respectively on the lines 4-4, 5-5, 6-6, 7-7, 8-8 and 9-9 of Fig. 2;

Figs. 10 and 11 are fragmentary longitudinal sectional views generally similar to Fig. 2 but

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showing a modified construction of jet pump construction; the valve means being shown in open and closed positions respectively;

Fig. 12 is a sectional view taken on the line 12—12 of Fig. 10, and;

Fig. 13 is an exploded view of certain of the component parts of the form of the invention illustrated in Figs. 1 to 9 inclusive.

As here shown, the nozzle comprises an elongated body member 1 having a substantially rectangular mid-portion 2 as best shown in Figs. 6, 7 and 13 and which extends throughout the major portion of its length. At one end the body member 1 is provided with an externally threaded portion 3 of a diameter slightly larger than the major axis of the rectangular mid-section 2. Projecting from the end face of the threaded portion 3 is a tube 4 which within the body member 1 communicates with a bore 5 extending longitudinally of the body to the other end thereof. Also disposed parallel to the tube 4 and projecting from the end of threaded portion 3 of the body member 1 is a second tube 6 which within the body member 1 communicates with a longitudinal bore 7 spaced from and disposed parallel to the bore 5 and extending to the opposite end of the body member. The projecting ends of the tubes 4 and 6 are adapted to be engaged by the conduit portions 8 and 9 formed in a flexible hose 10 which channels at the other end of the hose are adapted to be connected respectively to the water and detergent discharge ports of an apparatus such as disclosed in the above mentioned co-pending application. So far as the present invention is concerned such attachment, while preferable, is not absolutely necessary since it will be apparent hereinafter that the detergent containing reservoir need not of necessity be in constant communication with the source of water supply so long as sufficient pressure exists. As here shown, the hose 10 is generally oval in cross section and at the point of engagement with the tubes 4 and 6 it is provided with an enlarged portion 11 of circular cross section which terminates in a radial flange portion 12. A nut 13 encircling the portion 11 and engaging the threaded portion 3, additionally engages the side face of the flange 12 and clamps the flange firmly against the end of the body member 1 thus forming a fluid tight joint between the adjacent end of the hose 10 and the body member 1.

At its other end, the body member 1 is provided with an externally threaded end portion 14 on which is threaded one end of a nipple 15 to the other end of which a spray head 16 is attached as by means of threads 17. Adjacent their junctures with the rectangular mid-portion, the end portions 3 and 14 of the body members are provided with radially extending peripheral flange portions 18 and 19 respectively, the diameter of the flange 18 being slightly greater than that of the flange 19 and being provided with notched portions 18', 19'. Mounted on and extending between the flange portions 18 and 19 is a tubular sleeve member 20 formed preferably from a suitable plastic or other material having a low rate of heat conductivity. The sleeve 20 is shaped at one end to accommodate the contour of the flange 18 to prevent relative rotation and is further provided with shoulders 21, 21 adapted to engage the inner end face of the flange 18. The other end of the sleeve 20 overhangs the outer end face of the flange 19 sufficiently to be engaged by the adjacent end of the nipple 15 and the sleeve is thus clamped against endwise movement. It

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is particularly to be noted that except for the contact with the flanges 18 and 19, the sleeve 20 is spaced from the body member 1 and hence very little heat will be transmitted from the body member to the sleeve and that because of this, extremely hot water (for example 140° F.) may be employed without causing discomfort to the user.

In the form of the invention shown in Figs. 1-9, the bore 5 terminates in a short reduced diameter, tapered orifice 22 the outer end of which is surrounded by an annular recess 23 the inner diameter of which is inclined towards the orifice 22 with consequent formation of a thin annular edge 24. The end face of the end portion 14 of the body member is provided with a shallow, centrally disposed, circular recess 25 in which a disc 26 is held seated by engagement with an annular shoulder 27 on the interior of the nipple 15. The disc 26 is provided with a longitudinal bore 28 which is slightly larger than, and is held in alignment with, the edge 24 of the tapered orifice 22 by a dowel pin 26' (see Fig. 13).

Formed in the bottom of the recess 25 is a smaller circular recess 29 from the bottom of which latter recess the bore 7 extends to its point of juncture with the tube 6. Mounted in the bore 7 and held therein by the disc 26 is a stationary valve seat member 30 having a centrally disposed bore 31 and a peripheral groove 32 in which is seated a resilient sealing ring 33 adapted to effect a fluid tight engagement with the wall of the bore 7. At the end adjacent the disc 26 the member 30 is provided with a conical counter-bore 34 in communication with the bore 31, which counterbore at its larger end adjacent the disc 26 is intersected by a series of transverse slots 35. Thus fluid flowing through the tube 6 will enter the bore 7 and after passing valve means hereinafter to be described, will enter the bore 31 and the counterbore 34 and thence will pass through the slots 35 into the recess 29 from whence it will be conducted through a cross channel 36 into the annular recess 23.

The valve means includes a valve member 37 slidably mounted in the bore 7, said member 37 being provided at its mid-portion with a wide, shallow, peripheral groove 38. The bore 7 intermediate its ends is intersected by a slot 39 extending from the edge face of the rectangular portion of the body member 1 remote from the bore 5 to a point beyond the remote side of the bore 7. One end of the valve member 37 reciprocates in that portion of the bore 7 between the slot 39 and the tube 6 and is provided with a peripheral groove 40 in which is seated a resilient sealing ring 41 arranged to provide a fluid tight seal with the wall of the bore 7. The other end of the valve member 37 reciprocates in that portion of the bore 7 between the slot 39 and the valve seat member 30 and is likewise provided with a peripheral groove 42 in which a resilient sealing ring 43 is mounted for provision of a fluid tight seal between the valve member and the wall of the bore 7.

The wall member 37 near the end thereof adjacent the valve seat member 30 is provided with a reduced diameter portion 44 across which a bore 45 extends, which bore intersects a bore 46 extending axially of the valve member to the other end thereof. Beyond the reduced diameter portion 44 the valve member is provided with a frusto-conical portion 47 adapted to engage the valve seat formed by the juncture of the bore 31 and the inner face of the valve seat member 30. Beyond the frusto-conical portion

the valve member 37 terminates in a second reduced diameter portion 48 adapted upon closure of the valve, to enter the bore 31 and dislodge any obstruction that may lodge there, such as undissolved detergent and the like. The bore 31 is the rate of flow controlling means, and in actual practice is much smaller in diameter than here shown. Experience has shown that a diameter of approximately .050" is generally satisfactory but for clearness of illustration it has seemed preferable to enlarge it somewhat. It will be seen that when the valve member is unseated, as shown in Fig. 2, fluid entering the bore 7 will flow through the bores 46 and 45 and thence will reach the annular recess 23 through the path hereinbefore recited.

Slidably mounted on the side walls of the rectangular midportion of the body member 1 in the region of the slot 39 is an inverted U-shaped member 49 having intermediate its leg portions a depending tongue portion 50 adapted to enter the slot 39, the free end of said tongue member being also of inverted U-shape configuration and engaging the reduced diameter portion of the valve member 37 formed by the groove 38 and having substantially the same width as the groove 38. The tongue member thus engages the valve member 37 and provides a means whereby the valve member may be shifted to and from its opened and closed positions. The sleeve member 20 is provided with a slot 51 through which a shank portion 52 of a hand piece 53 extends into engagement with the outer face of the member 49 and is held thereon by a screw 54 passing through the hand piece 53 and threaded into the member 49 and the member 49 is held seated upon the body member 1 by the engagement of its outer surface with the inner surface of the sleeve 20 as most clearly shown in Fig. 7. Preferably the adjacent faces of the hand piece 53 and member 49 are provided with an appropriate interlock to prevent relative rotary movement between them such as a groove 55 on the member 49 engageable with a corresponding tongue or rib in the face of the hand piece 53. The hand piece 53 is formed of plastic or other material having a low rate of heat conduction and preferably has a perimeter sufficiently large to cover the slot 51 in all positions incident to operation of the valve.

If desired, means may be provided to lock the valve in open or closed positions. Such a means by way of example may be formed by providing a spring detent 56 formed of sheet metal bent into a shallow V-shape with the ends engaging the side walls of the groove 38 in the valve member 37 and with the apex engaging one or more shallow transverse grooves 57 in the bottom of the slot 39.

When the device is in use there is a constant stream of hot water passing through the bore 5 and out through the spray head 16. When the valve member 37 is shifted to open position, the water passing through the restricted orifice at the discharge end of the bore 5 will exert a jet pump or so-called "venturi action" on the detergent containing fluid which enters the annular recess 23 through the passages described and will draw such fluid with it, thus causing a detergent solution to be discharged from the spray head against the dish, cooking utensil or other object which is being cleaned. When the valve member 37 is closed, the flow of detergent containing fluid is stopped at a point close to the point of

mixing and hence the stream or spray will be one of clear rinsing water almost immediately.

Referring now to the modified form of valve and jet pump means shown in Figs. 10, 11, and 12, all elements which are substantially identical with corresponding elements in Figs. 1-9 have been given the same identifying numbers.

In this form, the discharge end of the body member 1 is provided with a shallow counter-bore or recess 56' adapted to receive the flange 57' of a fluid channel member 58, the body portion of which is of substantially frusto-conical configuration and is engaged by the correspondingly shaped shoulder portion 59 of the nipple 15 which nipple is internally threaded to engage the threads on the body member 1. The bore 5 at its discharge end is provided with a shallow counterbore 60 in which a resilient sealing ring 61 is held by the adjacent end face of the member 58. The member 58 at its outer or free end is provided with an axial bore 62 which bore within the member is intersected by a bore 63 extending from a point in registry with the bore 5 to the axial line of the member 58.

The bore 7 terminates in a counterbore 64 at the bottom of which is seated a rigid ring 65 adapted to form a shoulder for a resilient sealing ring 66 and the end face of member 58 is provided with a laterally projecting annular flange portion 67 adapted to enter the counter-bore 64 and engage the other side of the sealing ring 66. Disposed axially of the flange 67 and extending outwardly through the member 58 is a fluid passage 68 which at its outer end is enlarged as at 69. This passage emerges from the outer face in a hollow frusto-conical chamber 70 formed by a clearance 71 in the inner surface of the nipple 15.

The reduced diameter portion of the valve member 37 at the end thereof adjacent the member 58 is of such size as to engage the interior of the sealing ring 66 when the valve is closed and the frusto-conical face 72 beyond the reduced diameter portion is adapted to engage a corresponding face 73 at the end of the bore 68 to limit the extent of movement of the valve member, the sealing being accomplished by the engagement with the ring 66. The valve member is likewise provided with a second reduced diameter portion 48 adapted, incident to closing the valve, to enter the bore 68 and remove any obstruction in the same manner as has been described in connection with the form of the invention shown in Figs. 1 to 9 inclusive.

The nipple 15 at its outer end is provided with an axially disposed bore 74 which is in registry with the adjacent axial bore 62 in the member 58. Consequently when water is flowing through the bore 5 it will be conducted through bores 63 and 62 into the bore 74 the adjacent end of which is spaced slightly from the end of the member 62 to afford communication with the chamber 70. When the valve member 37 is moved to permit fluid flow through the bore 68, the stream of water flowing through bores 62 and 74 will operate as a jet pump on the fluid entering the chamber 70 and thus will draw detergent solution into the stream delivered to the spray head 16. When the valve is shut, the stream of water will immediately become clear and the rinsing action can proceed without appreciable wait for the water to "clear up."

While in the foregoing description reference has been made to the term "dishwashing" and while this invention will find its principal utility for

that purpose, it will be appreciated that the invention will be equally useful for washing other articles with equal utility and efficiency, wherefore the term "dishwashing" wherever used is not intended as a term of limitation.

While I have shown and described a specific embodiment of my invention I do not limit myself to the exact details of construction set forth, and the invention embraces such changes, modifications and equivalents of the parts and their formation and arrangement as come within the purview of the appended claims.

I claim:

1. In a spray nozzle for dishwashing apparatus, a body member having a cylindrical passage extending longitudinally thereof, a slot extending transversely of said body and intersecting said passage and having a bottom portion, a valve member comprising a cylindrical member mounted for reciprocation in said passage and extending across said slot, a valve seat at one end of said passage adapted to be engaged by one end of said valve member, a passage extending longitudinally of said valve member and terminating in a cross bore adjacent the valve seat engaging portion thereof, detent engaging means disposed in the bottom of said slot and a spring detent movable with said valve engageable with said engaging means and operable to hold said valve member in open position.

2. In a spray nozzle for dishwashing apparatus, a body member having a cylindrical passage extending longitudinally thereof, a slot extending transversely of said body and intersecting said passage and having a bottom portion, a valve member comprising a cylindrical member mounted for reciprocation in said passage and extending across said slot a valve seat at one end of said passage adapted to be engaged by one end of said valve member, a passage extending longitudinally of said valve member and terminating in a cross bore adjacent the valve seat engaging portion, thereof, detent engaging means disposed in the bottom of said slot and a spring detent movable with said valve engageable with said engaging means and operable to hold said valve member in either open or closed position.

3. In a spray nozzle for dishwashing apparatus, a body member having a cylindrical passage extending longitudinally thereof, an insulating sleeve provided with a slot surrounding said body member, a slot extending transversely of said body and intersecting said passage, a valve member including a cylindrical valve stem mounted

for reciprocation in said passage and extending across said slot a valve seat at one end of said passage adapted to be engaged by one end of said valve member, a passage extending longitudinally of said valve member and terminating in a cross bore adjacent the valve seat engaging portion thereof and means extending into said slot and engaging said valve member constructed and arranged to effect movement of said valve member toward and away from said valve seat, said means comprising a yoke member slidably engaging the sides of the body member in the region of the slot and having a tongue member projecting into said slot and engaging the end walls of a recess formed in the periphery of said valve stem, said yoke member being held against displacement by engagement with the inner surface of said insulating sleeve, a hand piece disposed externally of said sleeve and having a tongue portion extending through the slot in said sleeve and engaging a groove in the yoke member whereby the yoke member and hand piece are held against relative rotation.

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