

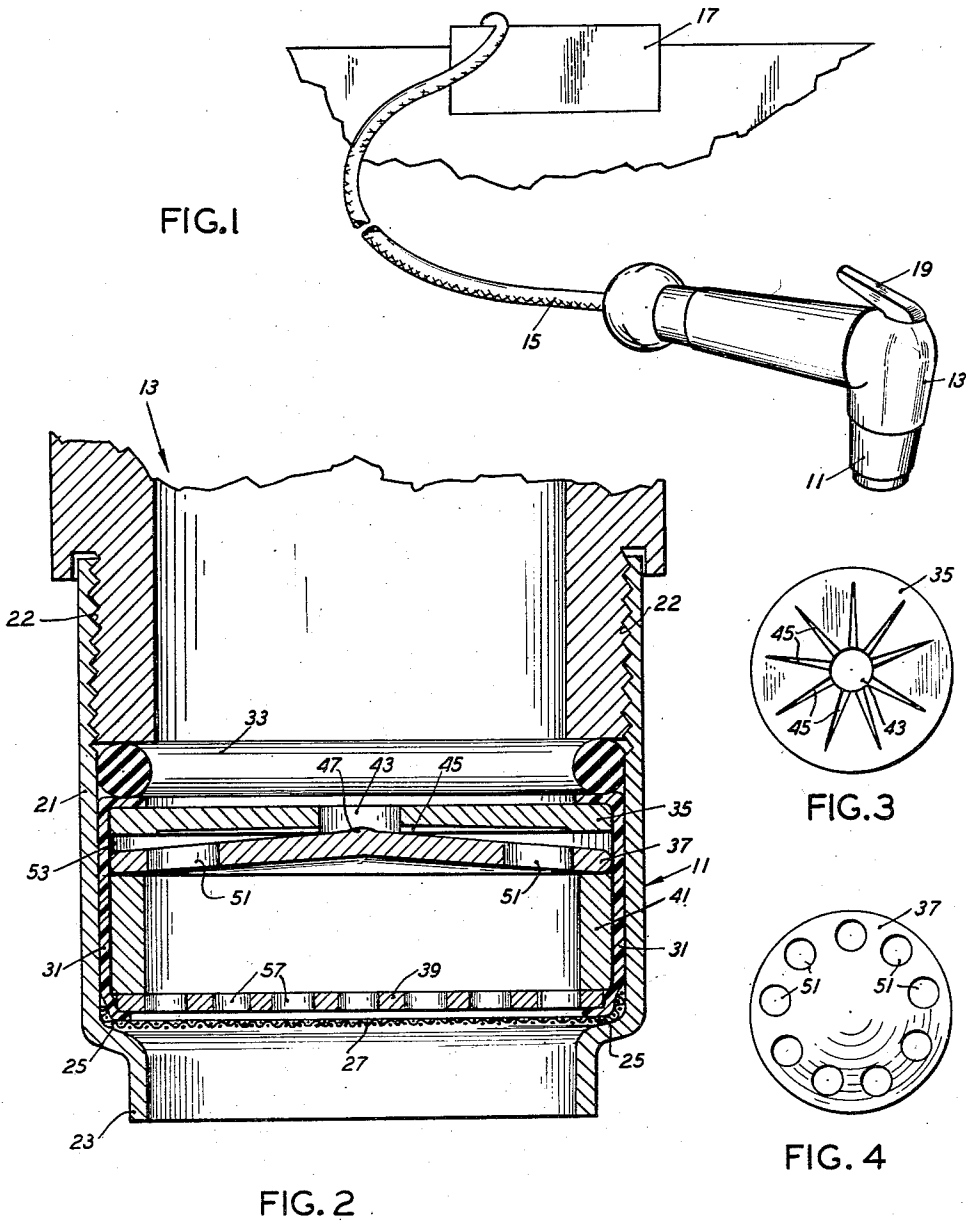
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NOZZLE CONSTRUCTION

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NOZZLE CONSTRUCTION

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This invention relates to nozzles and particularly to nozzles for use in dispensing carbonated water.

In nozzles of the type under consideration, very small passages must be provided in order properly to reduce the high pressure of the carbonated water passing through the nozzle. It has been a problem in nozzle design to provide these small passages and at the same time keeping the cost of the nozzle within reason. In fact, prior nozzles have in general been complicated, bulky and expensive.

It is the main object of the present invention to provide a simple, compact and inexpensive nozzle especially suited for use in dispensing carbonated water.

The nozzle of the present invention is characterized by including a pair of disks held in face to face contact. The upstream disk has formed therein a central flow opening which leads to grooves formed in the downstream face of this disk. The grooves radiate from the flow opening and the carbonated water is forced to flow through the grooves by the downstream disk. The downstream disk is formed with openings therethrough which are spaced from the flow opening of the upstream disk and communicate with the grooves and function to conduct the carbonated water from the grooves toward the outlet end of the nozzle.

Various other objects of the present invention will be apparent from the following description taken in connection with the accompanying drawings, wherein:

Fig. 1 is a view showing a dispensing unit having a head equipped with a nozzle of the present invention;

Fig. 2 is an enlarged midsectional view through the nozzle;

Fig. 3 is a view of the downstream face of the first disk of the nozzle, on a reduced scale from that of Fig. 2; and

Fig. 4 is a view of the upstream face of the second disk of the nozzle, on the same scale as Fig. 3.

Referring to the accompanying drawings, the nozzle 11 of the present invention is shown as being attached to a dispensing head 13 which receives carbonated water through a hose 15 from a receptacle or container 17. It is customary to provide wire braid reinforcement for hose 15, since the carbonated water frequently is under a pressure of around 125 pounds per square inch in commercial establishments. There is a valve (not shown) in the head 13 which may be opened by depressing the handle 19 to supply carbonated water to the nozzle 11.

The nozzle 11 includes a tubular housing 21 having internal threads 22 formed on its upper or upstream end for connection to external threads provided on the head 13. The housing 21 has a reduced lower portion 23 providing an outlet mouth, and the interior of the housing 21 is formed to provide a shoulder 25. Supported by the shoulder 25 is a disk-shaped foraminous member 27 which preferably is of greater diameter than the internal diameter of the housing and has its side edges slightly upturned, as shown, to have a generally cup shape. The foraminous member conveniently may be formed of fine mesh screen.

The margins of the foraminous member 27 are clamped against the shoulder 25 by an assembly including a casing 31 and parts disposed therein, and by an O-ring 33 which is clamped between the outlet end of the head 13 and the assembly. The O-ring 33 provides a seal preventing the passage of fluid between the exterior surface of the casing 31 and the interior surface of the housing 21.

The casing 31 preferably is formed of an elastomer

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material such as a pliable plastic. Disposed within the casing is a first or upstream disk 35, a cooperating second or downstream disk 37, and a perforated disk shaped element 39. A spacer ring 41 separates the second disk 37 from the element 39.

The disk 35 is flat on its upstream surface and is formed with a central hole 43. A plurality of grooves 45 (Figs. 2 and 3) are formed in the downstream or lower face of disk 35, as the parts are depicted in Fig. 2, the grooves being tapered and decreasing in size from the center of the disk outward therefrom and such lower face being otherwise flat. The second disk 37 is bent or formed to have a generally conical upper surface, as the parts are depicted in Fig. 2, which is arranged in engagement with the lower grooved face of disk 35. The conical upper surface of disk 37 has a central tip 47 which projects into hole 43. The second disk 37 is rather thin and may be flexed, for a purpose to presently appear, by threading the housing 21 further onto the head 13.

The second disk 37 has a plurality of holes 51 (Figs. 2 and 4) formed therethrough circumferentially therearound in spaced relation to hole 43. The holes 53 communicate with an annular space 53 formed between the upper surface of disk 37 and the lower surface of disk 35, and thus the holes 53 are in communication with the grooves 45.

The element 39, previously mentioned, has a plurality of holes 57 formed therethrough and distributed over the entire surface thereof.

The disks 35 and 37, the element 39 and the ring 41 have diameters in excess of that of the normal internal diameter of the tubular elastomer casing 31, so that when these members are forced into the casing by expanding the same, they are retained therein by the unexpanded end portions of the casing (Fig. 2). This construction enables ready assembling and disassembling of the parts of the nozzle. Further, the casing forms a seal against the peripheral surfaces of these members and prevents leakage of carbonated water at such places.

In use, carbonated water, supplied by the head 13, passes through the hole 43 and into the grooves 45. Disk 37 closes the open sides of the grooves at the inner ends thereof but is spaced from the outer ends. This provides narrow passages which greatly restrict the flow of the carbonated water. Thus high pressure carbonated water entering the hole 43 has the pressure thereof reduced nearly to atmospheric pressure by the time that it has reached the annular space 53 between the disk members 35 and 37. Thereafter, the pressure of the carbonated water is further reduced to atmospheric pressure by passage through the openings 51 in disk 37, by passage through the holes 57 in element 39 and by passage through the foraminous member 27.

If the amount of carbonated water issuing from the nozzle is somewhat greater than that desired, the nozzle may be threaded more tightly onto the head, this action serving to flex the disk 37 somewhat to bring the upper face or surface of the disk into closer disposition relative to the lower face of disk 35. This action decreases the size of the passage or space 53 between the diaphragm 35 and disk 37 to increase the resistance to the flow of carbonated water through the nozzle. Thus, the volume of carbonated water issuing from the nozzle will be decreased. On the other hand, if the amount of carbonated water issuing from the nozzle is not sufficient, the housing 21 may be unthreaded slightly to allow the marginal portions of the disk 37 to flex farther away from the disk 35.

Having described the invention in what is considered to be the preferred embodiment thereof, it is desired that it be understood that the invention is not to be limited other than by the provisions of the following claims.

I claim:

1. A pressure reducing nozzle, comprising a tubular housing having an inlet end and an outlet end, an upstream disk arranged coaxially within said housing, said upstream disk having a central hole formed therethrough and grooves radiating from said hole on the downstream face of said disk, a downstream disk arranged coaxially within said housing and having a conical upstream face in contact with the grooved face of said upstream disk to close the open sides of said grooves at least partially therealong to provide fine passages for reducing the pressure of fluid passing through the nozzle, said conical upstream face of said downstream disk and the downstream face of said upstream disk providing an annular space therebetween into which fluid may flow from said grooves, and means for conducting fluid from said annular space toward the outlet end of said housing.

2. A pressure reducing nozzle, comprising a tubular housing having an inlet end and an outlet end, an upstream disk arranged coaxially within said housing, said upstream disk having a central hole formed therethrough and grooves radiating from said hole on the downstream face of said disk, a downstream disk arranged coaxially within said housing and having a conical upstream face in contact with the grooved face of said upstream disk to close the open sides of said grooves at least partially therealong to provide fine passages for reducing the pressure of fluid passing through the nozzle, said conical upstream face of said downstream disk and the downstream face of said upstream disk providing an annular space therebetween into which fluid may flow from said grooves, and means for conducting fluid from said annular space toward the outlet end of said housing, said downstream disk being flexible to enable the size of said annular space to be varied to vary the pressure of fluid leaving the nozzle.

3. A pressure reducing nozzle, comprising a tubular housing having inlet and outlet ends, an upstream disk arranged coaxially within said housing and having a port therethrough and grooves on the downstream face of said disk extending away from said port, a downstream disk arranged coaxially within said housing in contact with the grooved face of said upstream disk to close the open sides of said grooves at least partially therealong to provide fine passages for reducing the pressure of fluid passing through the nozzle, and a tubular elastomer casing snugly fitting around said disks and forming a seal with the peripheral surfaces thereof.

4. A pressure reducing nozzle comprising a tubular housing having an inlet end and an outlet end, an upstream disk arranged coaxially within said housing, said upstream disk having a central hole formed therethrough and grooves radiating from said hole on the downstream face of said disk, a downstream disk arranged coaxially within said housing in contact with the grooved face of said upstream disk to close the open sides of said grooves at least partially therealong to provide fine passages for reducing the pressure of fluid passing through the nozzle, said downstream disk having openings formed therethrough in spaced relation to said hole for conducting fluid from said grooves toward the outlet end of said housing, a spacer ring arranged coaxially within said housing in contact with the downstream face of said downstream disk, a perforated disk-shaped element engaging the downstream end of said ring, a tubular elastomer casing snugly enclosing said disks and ring and element to form seals with the peripheral edges thereof and confine the flow of fluid through the parts instead of therearound.

5. A pressure reducing nozzle comprising a tubular housing having an inlet end and an outlet end, an upstream disk arranged coaxially within said housing, said upstream disk having a central hole formed therethrough and grooves radiating from said hole on the downstream face of said disk, a downstream disk arranged coaxially within said housing in contact with the grooved face of

said upstream disk to close the open sides of said grooves at least partially therealong to provide fine passages for reducing the pressure of fluid passing through the nozzle, said downstream disk having openings formed therethrough in spaced relation to said hole for conducting fluid from said grooves toward the outlet end of said housing, a spacer ring arranged coaxially within said housing in contact with the downstream face of said downstream disk, a perforated disk-shaped element engaging the downstream end of said ring, a tubular elastomer casing snugly enclosing said disks and ring and element to form seals with the peripheral edges thereof and confine the flow of fluid through the parts instead of around the parts, and a foraminous member arranged adjacent to the downstream face of said element, said housing having an internal shoulder supporting said member.

6. A pressure-reducing nozzle, comprising a tubular housing having an inlet end and an outlet end, an upstream disk arranged coaxially within said housing, said upstream disk having a central hole formed therethrough, a downstream disk arranged coaxially within said housing and having its upstream face in contact with the downstream face of said upstream disk, one of the just-mentioned faces being formed with grooves radiating away from said hole, the other of the just-mentioned faces serving to close the open sides of said grooves at least partially therealong to provide fine passages for reducing the pressure of fluid passing through the nozzle, said just-mentioned faces providing an annular space therebetween into which fluid may flow from said grooves, and means for conducting fluid from said annular space toward the outlet end of said housing.

7. A pressure-reducing nozzle, comprising a tubular housing having an inlet end and an outlet end, an upstream disk arranged coaxially within said housing, said upstream disk having a central hole formed therethrough, a downstream disk arranged coaxially within said housing next to said upstream disk, at least one of the opposed faces of said disks being conical, at least at the central portion thereof, at least one of said opposed faces being formed with grooves radiating away from said hole, the remaining opposed face serving to close the open sides of said grooves at least partially therealong to provide fine passages for reducing the pressure of fluid passing through the nozzle, the opposed faces of said disks providing an annular space therebetween into which fluid may flow from said grooves, and means for conducting fluid from said annular space toward the outlet end of said housing.

8. A pressure-reducing nozzle, comprising a tubular housing having an inlet end and an outlet end, an upstream disk arranged coaxially within said housing, said upstream disk having a central hole formed therethrough, a downstream disk arranged coaxially within said housing next to said upstream disk, at least one of the opposed faces of said disks having a conical configuration at least at the central portion thereof, at least one of said opposed faces being formed with an uneven surface in which at least some of the higher portions thereof contact the adjacent face of the adjacent disk to provide for the passage of fluid, which flows through said hole, radially outwardly between the disks, the opposed faces of said disks providing an annular space therebetween into which fluid may flow, and means for conducting fluid from said annular space toward the outlet end of said housing.

References Cited in the file of this patent

UNITED STATES PATENTS

2,075,589	Munz	Mar. 20, 1937
2,256,729	Thompson	Sept. 23, 1941

FOREIGN PATENTS

360,136	Germany	Sept. 29, 1922
441,757	Great Britain	Jan. 24, 1936