Jan. 6, 1953 R. W. HYDE 2,624,559

AERATING NOZZLE

Filed June 13, 1951

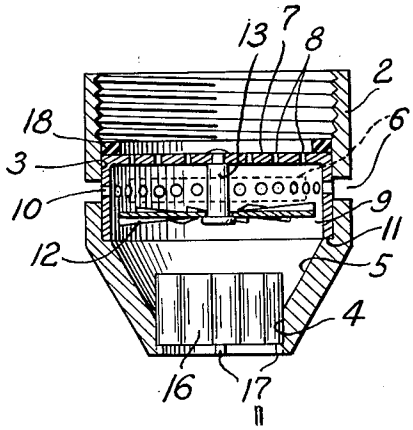

Fig. 1.

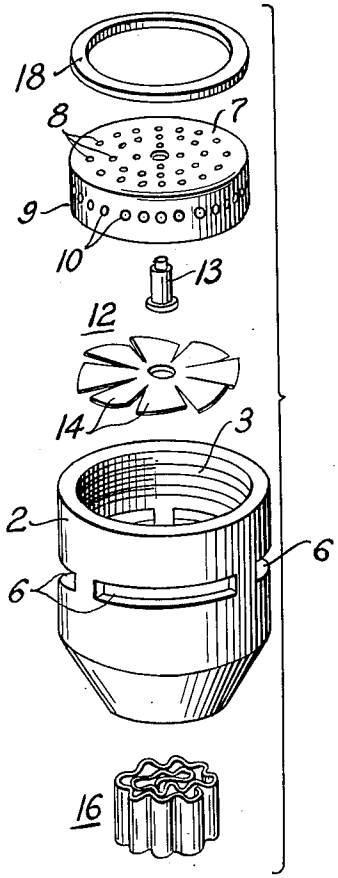

Fig. 2.

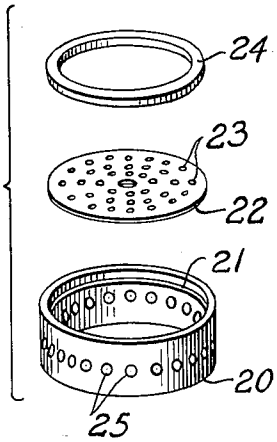

Fig. 3.

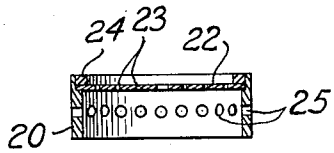

Fig. 4.

INVENTOR.
ROBERT W. HYDE
BY
Zugelter & Zugelter
Attys.

Patented Jan. 6, 1953 2,624,559

UNITED STATES PATENT OFFICE

2,624,559

AERATING NOZZLE

Robert W. Hyde, Cincinnati, Ohio, assignor to The Schaible Company, Cincinnati, Ohio, a corporation of Ohio

Application June 13, 1951, Serial No. 231,410

5 Claims. (Cl. 261—25)

1

This invention relates to improvements in aerating nozzles.

An object of this invention is to provide an aerating nozzle that is simple and construction and utilizes the velocity head of water flowing through it to drive an impeller arranged to draw air from the atmosphere into the nozzle, there to be mixed with the water to provide the so-called aerating effect.

Another object of this invention is to provide a nozzle of the character set forth above, having in its discharge end means for positively imparting substantially laminar flow to the aerated water.

The above and other objects and features of the invention will be apparent to those skilled in this art from the following description taken in conjunction with the accompanying drawings, in which:

Fig. 1 is an enlarged view in vertical section of an aerating nozzle arranged and constructed in accordance with an embodiment of the invention.

Fig. 2 is an exploded view in perspective, showing the component parts of the device of Fig. 1;

Fig. 3 is an exploded view in perspective of a modified form of perforated disk assembly for a nozzle such as illustrated in Fig. 1; and

Fig. 4 is a view in vertical section of an assembly of the parts shown in Fig. 3.

In Figs. 1 and 2 of the drawings is illustrated an aerating nozzle 1 comprising a nozzle body 2, the upper and lower portions of which have cylindrical bores 3 and 4. The diameter of the lower bore 4 is smaller than that of the upper bore 3 and the surfaces of these bores are joined by an inverted truncated frusto-conical surface 5. The wall of the body containing the larger bore is provided with air intake ports 6. The upper or larger bore may be internally threaded as shown, so that the nozzle may be screwed on a faucet.

The nozzle includes also a perforated disk 7 that extends transversely of the upper bore 3. The disk is provided with a plurality of relatively small apertures 8, preferably uniformly distributed over the area thereof. In practice, disk 7 may be formed as an integral part of a truncated cylinder 9 which is open at its lower end, and closed at its upper end by disk 7. The walls of the cylinder 9 are provided with a plurality of openings 10 disposed peripherally thereof at a location where they will register with the air intake ports 6 of the nozzle body. To facilitate assembly of the disk 7 and cylinder 9 in the nozzle body and to insure that the openings

2

10 will register with ports 6, the bottom of the larger bore 3 may be provided with a shoulder 11 upon which the open end of the cylinder 9 seats, as shown.

In order to utilize the velocity head of streams of water discharging through the apertures 8 of disk 7 to effect positive aeration of the water, an impeller 12 driven by these jets, is provided. The impeller is rotatably mounted at the lower end of a shaft 13 secured to the center of disk 7. As shown, the impeller is disposed below but adjacent to the intake openings 10. The impeller comprises a plurality of blades 14. The angle of these blades is such that when jets of water discharging through the apertures 8 strike them, the impeller is caused to rotate at relatively high speed. As the impeller rotates, the pressure within cylinder 9 in the region of openings 13 and ports 6 is so reduced that air from the atmosphere flows into the nozzle body and mixes with the water.

In order to provide substantially laminar flow of the water that discharges from the discharge end of the nozzle body a multi-channeled member 16 is mounted in the end of the nozzle, as shown. Member 16 may be made from a strip of metal such as brass or other suitable metal which is first corrugated or crimped and then rolled into the form of a spiral, as shown more particularly in Fig. 2. In that form, a plurality of parallel channels are formed. The axes of these channels are substantially parallel to the flow axis of the nozzle; therefore, water discharging from the nozzle will substantially completely fill the outlet of the nozzle and impart to the water the soft, aerated effect desired.

The multi-channeled member 16 may be supported in the cylindrical bore 4 by friction resulting from the natural spring of the member, or it may be supported on lugs 17 formed at the interior of the wall at the discharge end, as shown in Fig. 1.

In order that a seal may be effected between the periphery of disk 7 and the wall of bore 3, a flexible gasket such as a rubber gasket 18, may be provided. This gasket will be squeezed into sealing engagement at the joint when the nozzle is screwed onto a faucet or the like. The disk may also be soldered to the wall of the nozzle body.

In Figs. 3 and 4 a modified form of disk and truncated cylinder assembly is shown. As there illustrated, the assembly comprises a truncated cylinder 20 having a shoulder 21 on the interior thereof near its top, upon which a disk 22 is

seated. Disk 22 contains a plurality of uniformly distributed apertures 23. The disk 22 is locked in place by means of a lock ring 24. Cylinder 20 is provided in the side wall thereof with a plurality of apertures 25 that are so located that they would register with the air inlet ports 6 in the wall of the nozzle body as shown in Figs. 1 and 2.

While the perforated disks 7 and 22 have been shown in association with a truncated cylinder such as cylinders 9 and 20, it will be appreciated that the cylinder may be omitted. In that case, the perforated disk may be made as an integral part of the nozzle body or may be soldered or otherwise secured thereto in the location shown. In such event, the impeller 12 would be rotatably supported on shaft 13 from the center of the disk as in Fig. 1.

While there has been shown and described what now appears to be a preferred form of the invention, it will be apparent to those skilled in this art, that modifications and changes may be made in the illustrated embodiments without departing from either the spirit or the scope of the invention.

Therefore, what is claimed as new and desired to be secured by Letters Patent is:

1. An aerating nozzle for faucets, shower heads and the like comprising a body having a cylindrical bore in the upper portion thereof, a cylindrical bore in the lower end portion of smaller diameter than the upper portion and an inverted frusto-conic surface connecting said bores, the upper cylindrical bore portion having air intake openings in the wall thereof, a perforated disk within and extending across the upper cylindrical bore at a location above said intake openings, the joint between the periphery of said disk and the bore wall being sealed against leakage, a shaft secured to the center of said disk and extending downwardly therefrom, and a bladed impeller rotatably mounted on said shaft, the impeller being located below and adjacent the bottom of said intake openings, said impeller being driven by jets of water issuing from the perforations in the disk, thereby drawing air through said intake openings into said nozzle body, the air mixing with the water flowing through the nozzle.

2. An aerating nozzle comprising a hollow body adapted to be secured at its upper end to a faucet or the like, said body having air intake openings in the wall thereof at a location between the ends thereof, a perforated disk in said body above said intake openings, said disk extending transversely of the body, means sealing the space between the margin of said disk and the adjacent wall of the body, an impeller having a plurality of blades disposed below but adjacent said intake openings, and a vertical shaft secured to the center of said disk and extending downwardly therefrom for rotatably supporting said impeller, said impeller being driven by jets of water discharging through the perforations in the disk and causing air to be drawn through said intake openings into said streams of water.

3. A nozzle according to claim 2 characterized by the fact that the perforated disk is formed by a truncated cylinder having an open bottom and a closed top, said top being provided with a plurality of distributed apertures, that the interior of the body is provided with an annular shoulder on which the open end of the cylinder is seated, and that the walls of the truncated cylinder are perforated at a location where the same register with the intake openings in the body.

4. A nozzle according to claim 2 characterized by the fact that the perforated disk is formed by a truncated cylinder having an open bottom and a closed top, said top being provided with a plurality of distributed apertures, that the interior of the body is provided with an annular shoulder on which the open end of the cylinder is seated, that the walls of the cylinder are perforated at a location where the same register with the intake openings in the body, that the interior diameter of the body at its discharge end is smaller than the diameter of the body at said intake openings, that the walls of the interior of the body converge to said smaller diameter and that a multi-channeled member is mounted in the discharge end of said nozzle with the channels parallel to the flow axis of the nozzle so as to impart laminar flow to the water issuing therefrom.

5. An aerating nozzle adapted for attachment to a water outlet fixture comprising a hollow body member having a perforated disk within the body adjacent the inlet end thereof, means for sealing the joint between the periphery of the disk and the adjacent wall of the body, air intake ports in the wall of said body below said ports, a shaft secured to the center of said disk and extending downwardly therefrom, a bladed impeller rotatably mounted on the shaft at a location below said ports, said impeller being driven by jets of water issuing from the perforations in said disk thereby drawing air into said body, and means adjacent the outlet of said body for mixing the air and water passing through the nozzle body whereby the water issuing from the nozzle body is aerated.

ROBERT W. HYDE.

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