Jan. 18, 1966 E. P. AGHNIDES 3,229,916

AERATORS HAVING ENLARGED STREAM OUTLETS

Filed May 9, 1961

FIG. 2

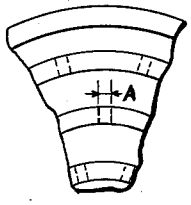
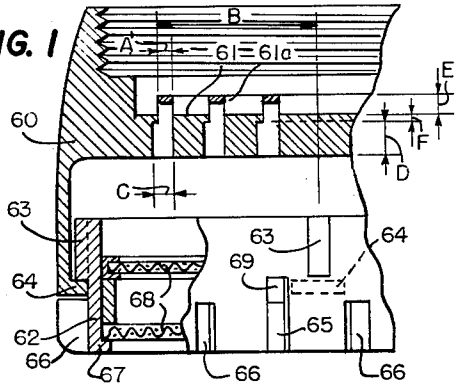


FIG. 1



INVENTOR

Elie P. Aghnides

Moore & Hall

ATTORNEYS

United States Patent Office 3,229,916 Patented Jan. 18, 1966

3,229,916

AERATORS HAVING ENLARGED STREAM OUTLETS

Elie P. Aghnides, 46 W. 54th St., New York, N.Y.

Filed May 9, 1961, Ser. No. 117,484
2 Claims. (Cl. 239—432)

This application is a continuation-in-part of application Serial No. 65,129, filed Oct. 26, 1960, now abandoned, and application Serial No. 639,648, filed Feb. 12, 1957, now Patent No. 2,998,923.

This invention relates to improvements in water aerators of the type that are ordinarily connected to the public and household water faucets or spout ends. These aerators in general comprise an upstream disc for producing a plurality of high velocity streamlets which impinge upon downstream screens which finely break up the water and mix it with air to form a coherent jet which is whitish and non-splash in characteristics. The jet has a large number of small bubbles entrained therein.

In my basic U.S. Patent No. 2,210,846, Fluid Mixing Device, issued Aug. 6, 1940, the general principles of the aforesaid aerator are disclosed, air being shown as entering through the side wall of the device. In my prior copending application Ser. No. 560,299, filed Jan. 20, 1956, entitled Fluid Mixing Device, now U.S. Patent No. 2,998,927 granted Sept. 15, 1961, which is a continuation-in-part of, and was copending with, my earlier application Ser. No. 135,645, now U.S. Patent No. 2,811,340, granted Oct. 29, 1957, for Fluid Mixing Devic, I have shown that air may enter the bottom of the device.

Insofar as the inventions shown in the aforesaid prior patents have been sold commercially, they have had standard dimensions. When they have had female threads for securing them to the faucet, the threads have defined an opening of about 21 mm. diameter, and when they have had a male thread for securing the same to the faucet, the outside diameter of the threads was about 23.7 mm. However, the area of the outlet from which water is discharged was about 17 mm. in diameter. As a result, the rate of water flow through said standard aerators is smaller than that of the faucet, producing a high back pressure which is often found to be objectionable. This standard aerator, with only thirty holes of 0.75 mm. diameter in the diaphragm, reduced the rate of water flow discharged. No way was known for either softening a given bubbly stream without decreasing the rate of flow or getting as much water as was desired, and at the same time retaining the desired degree of softness of the bubbly stream delivered.

In aerators having no slots in the side walls, but having instead an air inlet at the discharge end of the device, it has been difficult to get the desired screen area. In my aforesaid prior copending application Ser. No. 831,185, filed August 3, 1959, for Aerator with Improved Air Supply, now U.S. Patent No. 2,998,926 granted Sept. 5, 1961, I have shown that the screen area need not be lessened in order to bring air in through the bottom of the aerator if for example grooves are provided along the inner side wall of the casing to admit air or by providing means which permit to partially decrease the width of the ring framing or holding the screen.

The present invention is directed to the idea of securing, in an aerator of a given size resistance means in the path of the water from the diaphragm, a relatively large cross-section at least adjacent the outlet of the device. This permits, in an aerator of a given size, a larger rate of flow of water discharged, without sacrificing the desired softness of the stream. The invention permits enlarging the cross-section of the issuing jet to

increase the softness and/or aeration of the bubbly stream, or both, with little or no increase of the overall cross-section of the aerator; and this is true whether the air enters through slots on the side of the aerator or through the bottom of the aerator. Therefore, an important object of my invention is to embody the improvements above set forth in an aerator as small as heretofore in public use so that faucets already installed as well as new faucets may receive the improved aerator, thus sparing the housewife the expense of a new faucet and the industry the expense of retooling and redesigning the faucet, as would be the case in the event the industry marketed a prior art aerator larger in size capable of producing the same output stream obtained under my present invention.

Other objects and advantages will appear as this description proceeds.

The objects of my invention may also be carried out by making the upstream diaphragm an integral part of the casing and in this respect is a continuation-in-part of my prior copending application Ser. No. 65,129, filed Oct. 26, 1960, for Expendable Water Aerators. This enables the casing to be made thinner, without material loss of strength, and thus permits a larger outlet.

Faucets and their threading have become more or less standard throughout the industry, and my invention may be attached to standardized faucets.

In my invention, the casing has an internal cross-section near its lower end larger than near its upper end, and an insert fits in said enlarged portion and supports one or more screens as well as cooperates with the casing to define an air inlet.

FIGURE 1 is a cross-sectional view of the invention.

FIGURE 2 is a detail view of a portion of the upstream disc of FIGURE 1.

The casing **60** has an upstream diaphragm **61** which is integral with the casing **60**. There may be perforations in the disc **61** in circular rows of which 20 holes are near the periphery, 11 in the middle row and 5 in the center row. The outer row has a radius B of 7.95 millimeters. The middle row has a radius of 4.825 millimeters and the inner row has a radius of 2.70 millimeters. The radial width A^1 of individual holes in each row is 0.9 millimeter. The outlet radial width of the holes C is 1.05 millimeters. The thickness D of the disc **61** is two millimeters. The distance E is 1 millimeter above the disc of which 0.5 millimeter is the thickness of bridges **61***a*. The distance F of 0.25 millimeter is from the upstream opening in the disc to an enlargement of the chamber in the disc. The circumferential width A in FIGURE 2 is 0.9 millimeter for each hole.

The insert **62** has a series of spaced external projections **63** which rest on a series of inturned feet **64**. To place the insert **62** into the casing **60** the former is rotated at an angle to its present position so that the projections **63** can pass upwardly beween the inturned feet **64**, and once the insert has been injected far enough it is rotated to the angular position shown whereby the projections **63** rest on the inturned feet **64**. Rib **69** which projects outwardly from the outer surface of the cylindrical shell **62** engages feet **64** to limit the rotation of insert **62** and insure that it stops in the correct angular position. Ribs **65** and **66** make the surface of the indent so that it may be easily turned by hand; in other words, these ribs render the cylinder surface the equivalent of a knurled surface. The insert **62** has an inturned ledge **67** on which the lower screen **68** rests. Insert **62** may replace insert **51** of FIGURE 5 and in such case the legged disc **58** would be supported by a frame containing the upper screen **68**. Insert **62** may also replace frames **23** and **24** in FIGURE 2 containing screens **28** and **29**, and in such

case a diaphragm disc is positioned on ledge **22** and inturned feet are provided at the bottom of casing **20**.

I claim to have invented:

1. In an aerator, a one-piece tubular casing having threads adjacent its upstream end to attach the same to a faucet, a jet forming means across the upper part of the casing, the wall of the casing becoming thinner and of larger inside diameter below said jet forming means than above the same, a tubular partition inside the portion of enlarged inside diameter, a plurality of feet extending inwardly from the downstream end of the casing to support said partition, and mixing means within the partition and supported thereby for finely breaking up the water and mixing it with air to form a coherent stream laden with small bubbles, the mixing means being spaced downstream of the jet forming means, the outer wall of the partition and the inner wall of the casing defining an inlet air channel and the partition being limited so that said channel communicates with the space between the jet forming and the mixing means.

2. An aerator as defined in claim **1** in which the jet forming means is in one piece with the casing, so that

the only parts that the lower thin portion of the casing is required to support are the partition and mixing means.

References Cited by the Examiner

UNITED STATES PATENTS

2,316,832	4/1943	Aghnides.
2,664,278	12/1953	Aghnides.
2,799,487	7/1957	Aghnides.
2,849,217	8/1958	Bachli et al.
2,858,120	10/1958	Goddrie.
2,888,209	5/1959	Hjulian.
2,935,265	5/1960	Richter.
2,858,120	10/1958	Goddrie.
2,989,249	6/1961	Richter.
2,998,923	9/1961	Aghnides.
2,998,927	9/1961	Aghnides.
2,998,928	9/1961	Aghnides.
2,998,929	9/1961	Aghnides.
2,998,930	9/1961	Aghnides.
2,998,933	9/1961	Aghnides.

EVERETT W. KIRBY, *Primary Examiner.*

ROBERT A. O'LEARY, LOUIS J. DEMBO, *Examiners.*