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AERATOR WITH AIR INLET AT THE WATER OUTLET

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FIG. 1.

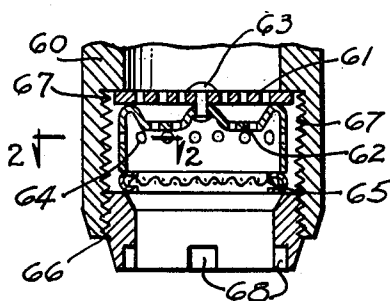
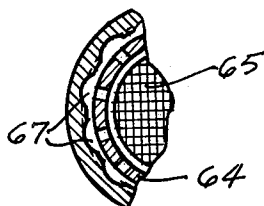


FIG. 2.



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3,067,951 AERATOR WITH AIR INLET AT THE WATER OUTLET

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This invention relates to aerators with air inlet at the water outlet.

The primary object of this invention is to provide an improved aerator which avoids the disadvantages inherent in the prior art aerators where air enters slots in the side wall of the aerator.

In the prior art (for example my U.S. Patents No. 2,210,846 entitled "Fluid Mixing Device" granted August 6, 1940, and No. 2,316,832 entitled "Fluid Mixing Device" granted April 20, 1943) it is customary to attach an aerator on the spout end of a faucet, the aerator extending below the faucet. According to the present invention in its preferred (although not its only) form the aerator is located in the faucet, and the invention has as an object to provide an effective way of locating an aerator in a faucet.

An object of the invention resides in the provision of a water aerator with separable parts that may be used in different ways to produce different results.

My earlier U.S. Patent No. 2,633,343 entitled "Gas and Liquid Mixing Device" granted March 31, 1953, shows an aerator located inside the faucet, and an object of the present invention is to provide certain improvements in such an aerator, particularly from the standpoint of ease of manufacture as well as the cleaning thereof by the housewife.

Another object of the invention is to provide an attachment for water faucets having parts that may be used to produce at will either an aerated stream or the long known non-aerated non-splash stream.

An additional object of the invention is to provide an attachment for water faucets that may be readily assembled in any of several ways to produce any of several types of output streams.

Still another object of the invention is to provide an aerator that may be readily assembled and disassembled, both at the factory and by the housewife.

A further object of the invention is to provide an aerator that is more foolproof in that it would be difficult for a housewife to assemble it other than in the intended manner.

A further object of the invention is to provide an aerator capable of being readily disassembled, cleaned, and reassembled by the housewife.

A further object of the invention is to provide an aerator in which means are employed to insure positive and accurate spacing of the several component parts.

An additional object of the invention resides in the provision of an aerator which is less likely to chip or damage dishes which accidentally strike it.

Yet another object of the invention resides in the provision of an aerator structure that obviates the use of washers.

An additional object is to provide an aerator which is less likely to be stolen from the faucet if used in a public building.

In carrying out the primary object of the invention I provide a conduit having an open end. Extending across the inside of the conduit I provide a diaphragm relievedly limited by way of at least one opening for directing high velocity flow in a downstream direction, and diffuser means, preferably although not necessarily, in the form of a screen, for mixing the water with air. The side wall of the conduit is imperforate to thus require air to enter at the outlet of the device.

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In carrying out an improvement feature of the invention I provide an aerator in two or more pieces. The upper piece when used alone produces a spray and the lower one of which converts the spray into an aerated stream. The arrangement is such that the upper piece can be used alone, or the lower one may be used alone, or both may be used together.

In the preferred form of the invention all of the parts of the aerator are located inside of the faucet itself and are held in place by an insert (or cylindrical plug) which fits into the end of the faucet. The mixing screen, and preferably also the upstream diaphragm, of the aerator are supported by said insert. The insert is removable and when removed enables either the diaphragm or the screen, or both, to be removed from the discharge end of the faucet. Other advantageous features of the invention will become apparent as this description proceeds.

This application is a continuation-in-part of my prior copending application S.N. 337,501 filed February 18, 1953, now abandoned entitled "Faucet Attachments" which application is in turn a continuation-in-part of application S.N. 63,110 filed December 2, 1948, entitled "Gas and Liquid Mixing Device" now U.S. Patent No. 2,633,343, granted March 31, 1953. This application is also a continuation-in-part of my prior copending applications S.N. 351,907, filed April 29, 1953, now abandoned, entitled "Fluid Mixing Device," and S.N. 560,299, filed January 20, 1956, now Patent No. 2,998,927, also entitled "Fluid Mixing Device."

All of these aforesaid prior applications are in turn continuations-in-part of my earlier application S.N. 135,645, filed December 29, 1949, entitled "Fluid Mixing Device." The latter application issued, with some of its original figures deleted, into U.S. Patent No. 2,811,340.

In the drawings:

FIGURE 1 is a cross-section of the invention.

FIGURE 2 is a sectional view taken along line 2-2 of FIGURE 1.

In FIGURE 1, the faucet 60 has internal threads through which grooves 67 pass in order to admit air to the aerating chamber. Holes 64 open into the grooves 67 and into the aerating chamber. An upper perforated disc 61 is attached by rivet 63 to a lower perforated inverted cup 62. One or more screens 65 are mounted in a peripheral rim as more fully described in FIGURE 9 of said prior copending application S.N. 63,110, now U.S. Patent No. 2,633,343, granted March 31, 1953. A lower cylindrical externally threaded insert 66 has slots 68 into which a coin may be inserted in order to rotate the insert 66 and clamp the screens 65 and cup 62 in place. The clamping takes place between the overhanging ledge on faucet 60 and the insert 66.

The device of FIGURE 1 acts as an aerator and produces the white coherent stream described in my said prior patents when completely assembled as shown. If assembled as shown except with screen 65 omitted and plug 66 screwed further up the device will produce a spray. On the other hand if it is assembled as shown except that the disc 61 and cup 62 are omitted, the device acts to produce a conventional non-splash non-aerated stream.

In FIGURE 1 the upper pieces may be made of plastic or other material softer than metal, for example polyethylene, in order to eliminate the necessity of using washers. The lower-most part 66 may be composed of polyethylene to reduce chipping of dishes that accidentally strike the lower-most part.

My aforesaid prior patents set forth preferred dimensions, screen meshes, etc., which are applicable to the present invention.

The invention is not limited to the details described

hereinabove, since I am defining the scope of the invention in the claims.

I claim:

1. In an aerating device, a tube adapted to be connected at one end to a source of fluid under pressure and to discharge fluid from its other end, a first unit comprising means adapted to fit in the tube for breaking up the water flowing therein into high velocity streamlets, a second unit downstream of the first one comprising means for finely breaking up the high velocity streamlets and mixing them with air to form a coherent jet containing bubbles, means for spacing the two units from each other, and removable means at the outlet end of the tube for holding the two units within the tube, said second unit providing an air passageway which receives air at the outlet end of the tube and feeds it inside of the tube and discharges the air adjacent the second-named means.

2. An aerator combination or the like comprising conduit means having an open end, means extending across the path of liquid flow through said conduit means, said extending means including a multiplicity of transversely disposed elements adapted to diffuse and break up liquid flowing therepast into fine particles whereby to draw in fluid such as air from exterior to said conduit means upstream through said open end thereof for admixture with the liquid and effecting the production of an aerated stream flowing from said conduit means, said extending means having openings between adjacent elements, said openings extending longitudinally, said conduit means being substantially imperforate to the terminus of said open end of the same, said transversely disposed elements being substantially upstream from said open end of the conduit means, said latter elements being fixed relative to the conduit means and having annular support means co-operating with the latter means, said extending means including a diaphragm relieved limitedly for the passage of the liquid therepast in jet streams of substantial velocity, said diaphragm being positioned upstream from said transversely disposed elements whereby to direct the jet streams against said elements for the diffusion and breaking up of the same.

3. An aerator as defined in claim 2 in which said conduit means is a faucet and the remainder of the parts of said aerator are located in the faucet.

4. An aerator combination or the like comprising conduit means having an open end, diffuser means supported within said conduit means having a plurality of elements projecting transversely therefrom, diaphragm means positioned in spaced relation above said projecting elements, said diaphragm means being relieved for the passage of liquid therepast in jet streams of substantial velocity, the elements of said diffuser means being disposed and adapted to intercept the jet streams and break up the same into fine particles for admixture with fluid such as air

drawn in through said open end of the conduit means for production of an aerated discharge stream therefrom, said diffuser means having openings between adjacent elements, said openings extending longitudinally, said elements extending from adjacent the inner periphery of the conduit means, the discharge open end of the conduit means being large enough with respect to the diffuser means having the elements, and remaining open up at least as far as those elements, to permit free introduction of air within said conduit means, said conduit means being substantially imperforate to the terminus of said open end of the same.

5. An aerator combination or the like comprising conduit means having an open end, means extending across the path of liquid flow through said conduit means, said extending means including screen means adapted to break up liquid flowing therepast into fine particles and thereafter unite said particles into a coherent jet laden with numerous small bubbles whereby to draw in fluid such as air from exterior to said conduit means upstream through said open end thereof for admixture with the liquid and effecting the production of said aerated bubbly stream flowing from said conduit means, said conduit means being substantially imperforate to the terminus of said open end of the same, the upstream side of said screen means being substantially upstream from said open end of the conduit means, said screen means being fixed relative to the conduit means, said extending means including a diaphragm relieved limitedly for the passage of the liquid therepast in jet streams of substantial velocity, said diaphragm being positioned upstream from said screen means whereby to direct the jet streams against said screen means for the breaking up and mixing of the same with air, said extending means directing the aerated bubbly water out of a limited continuous part of said open end leaving another part of said outlet end for entry of air.

6. An aerator as defined in claim 5 in which said conduit means is a faucet, said screen means and diaphragm being located inside said faucet.

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