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AERATOR

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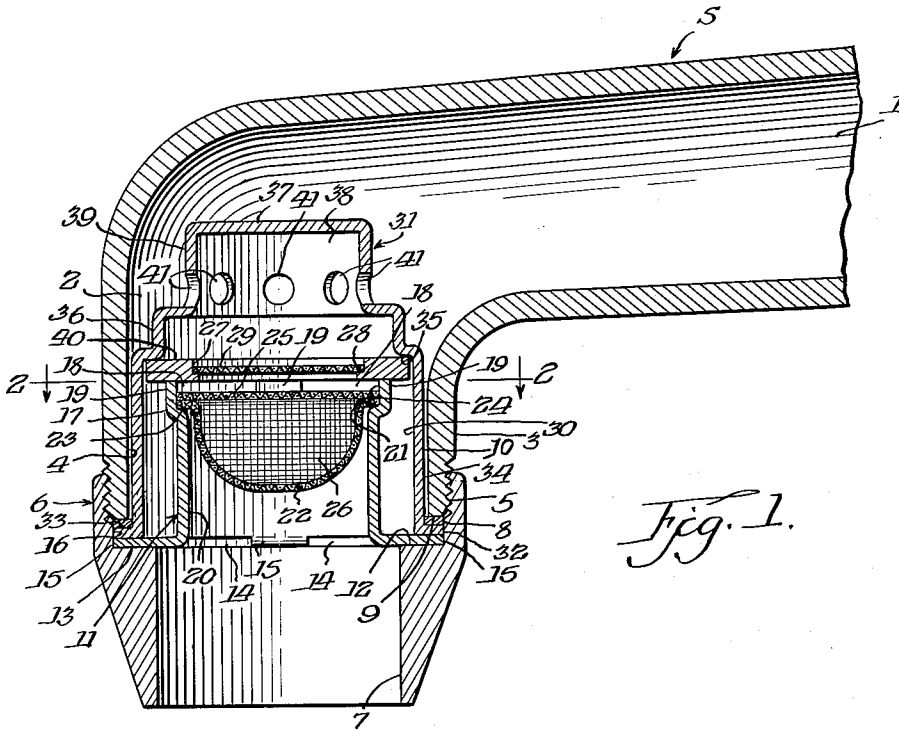


Fig. 1.

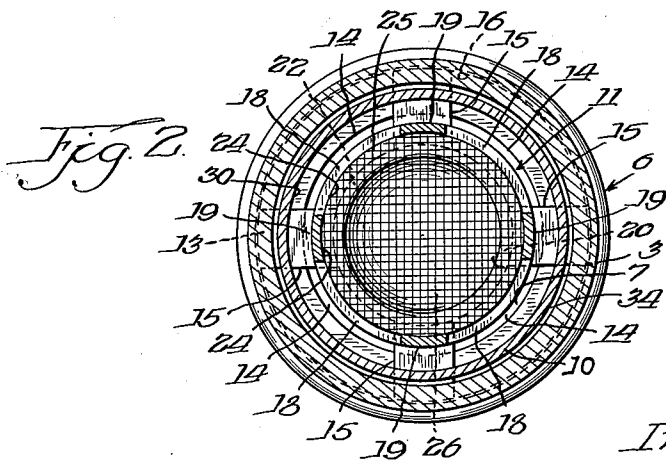


Fig. 2.

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2,993,653
AERATOR

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This invention relates generally to aerators or such devices employed for mixing atmospheric air or the like intimately with liquid, and more particularly it is specially suitable for application to a conventional domestic kitchen sink or lavatory faucet.

The present invention constitutes an improvement over the aerators disclosed in my prior Patents Nos. 2,744,738 issued May 8, 1956, and 2,888,209 issued May 26, 1959, both of which have been concerned with the production of a smooth and coherent pattern in the discharging fluid flow necessary for their success in such practical applications as above referred to.

At the outset, in order to acquire a better understanding and appreciation of the background of this particular contribution, it should be understood that the matter of obtaining a coherent and nicely aerated flow stream is unusually critical and yet in many cases it may be desirable to provide for a construction in which either a solid body of discharging water or an aerated stream can be easily obtained optionally.

It is therefore one of the more important objects of this invention to provide an aerator which possesses the novel functional advantage that aeration of the discharging stream can be conveniently and selectively controlled as desired with a very minimum of effort.

Further, it is an important object of this invention to provide for a construction in which a solid or non-aerated stream may be conveniently obtained without special or expensive equipment or structure being required.

Other objects and advantages will become more readily apparent upon proceeding with the specification read in light of the accompanying drawings, in which:

FIG. 1 is a fragmentary sectional assembly view of a preferred form of aerator device embodying the present invention; and

FIG. 2 is a sectional assembly view taken on the line 2-2 of FIG. 1.

Referring now to FIG. 1, the discharge end of a conduit such as a conventional faucet spout, generally designated S, is shown having the usual inlet supply chamber 1, the normally turned-down discharge portion 2, and with the end limit thereof defined by the annular wall 3, forming the discharge chamber 4 within which chamber the aerator of my invention is mounted. The end of the spout portion 3 is preferably threaded outwardly, as at 5, to receive the complementary internally threaded body or casing portion generally designated 6. The latter body, as indicated, is preferably of generally cylindrical or conduit form and has a flow passage extending therethrough designated 7 and is adapted to be attached as indicated directly to the faucet spout or else to a suitable adapter (not shown) in such cases where the faucet spout is not regularly threaded to receive the casing 6. It should be specially noted that the body 6 is made imperforate and it fits snugly against the end of the discharging spout 3 by means of the firm connection effected by the threads and the annular gasket 8 clamped against the end surface 9 of the spout portion. Before such attachment of the casing is made, an inner annular sleeve, generally designated 11, is mounted upon the annular ledge 12, the sleeve being supported on said ledge by means of its outwardly extending continuous annular flange portion 13. As more clearly indicated in FIG. 2, it should be noted that the flange 13 has the cut-away

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annularly disposed spaces or openings indicated at 14, thereby to form therebetween the spaced apart radially extending lugs 15, each of which extends substantially to the inner periphery of the bore 16, as illustrated. The spaces 14 thus communicate with the interposed annular chamber defined by the outer periphery of the sleeve 11 and the wall surface 30. Just below its upper end limit, the sleeve 11 is provided with a preferably outwardly flared or enlarged portion 17, the latter portion being interrupted on its end peripheral portion with spaced apart peripherally arranged relieved areas as indicated at 18 to provide in a similar manner the upwardly extending spaced-apart annular ribs 19, more clearly shown in FIG. 2 in their spacing arrangement. On the interior thereof and below the upper end limits of the lugs 19 of the sleeve 11, an annular shoulder 21 is provided thereon and upon which the cup-shaped screen 22 or similar foraminous element is received to project within the chamber defined by the annular wall 20. The screen 22 has the annular outer flange portion 23 for effecting such support in cooperation with the said shoulder 21. Within the portion defined by the annular surface 24, and preferably of the same diameter as the flange 23 of the screen, foraminous means such as a flat sheet-like form of screen member 25 is superposed as a cover, thereby forming a substantially closed chamber 26 within the cup-shaped screen 22.

Supported upon the said vertically extending spaced-apart lugs 19 an imperforate plate member 40 is mounted, having a central flow passage therethrough as shown, it is preferably recessed therearound as at 27 for a portion of its thickness thereby to form an annular shoulder as at 28 to receive the third and additional foraminous member such as the flat plate-like screen 29. Superposed over the imperforate plate member 40 an outer shell, generally designated 31, is provided of inverted cup configuration preferably with stepped annular portions, and having at its lower end an outwardly flanged portion 32 fitted within the annular bore 16 of the member 6 and having its upper annular surface portion as at 33 bearing against the gasket 8 so that when the casing 6 is tightened on the threads 5, the gasket 8 and the flange members 13 and 32 are firmly clamped between the end annular surface 9 of the faucet spout and the inner annular ledge 12 of the casing 6. The inner peripheral limits of the flange 32 are defined by the inner wall surface 30.

It should be noted that the periphery 10 of the outer shell 31 above the flange 32 is preferably of such proportions to provide the annular clearance 34 of relatively small dimensions between the spout inner surface 4 and the shell surface 10. This small clearance may account for the unusual and unexpected performance of the device as hereinafter referred to. The imperforate plate member 40 for purpose of effecting secure positioning is preferably shouldered on the inner annular ledge 35, the gasket 8 having sufficient flexibility and resiliency to allow for annular shouldered connections being established at 35 and 9 respectively substantially together.

The outer shell 31 is preferably recessed or stepped annularly as at 36 to allow for having an improved annular flow around the surface 36 between the inner walls of the chamber 2 of the spout and the said surface 36 of the outer shell. At its upper end limit, the shell 31 is provided with a flat transverse wall or diaphragm 37 to close off the top chamber 38. The latter chamber has its outer limits defined by the perforate wall portion 39 having a plurality of spaced-apart annularly disposed ports 41, as shown for entry of water into the outer shell 31, past the screens 29, 25 and 26, in the order named,

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and thence through the chamber defined by the walls 20 and 7, respectively.

It is desirable to maintain a positive annular fluid tight seal at the faucet spout end surface. This is done by means of the gasket 8 contacting the end surface 9 to provide the unique performance hereinafter described, but also preventing the occurrence of an unsanitary condition at the threaded joint at 5.

The aerator construction has been found to possess the advantage that when the faucet flow is turned on by the usual means (not shown) a coherent, smooth, aerated stream emanates from the discharge outlet defined by the annular wall surface 7 of the body 6. It has further been discovered that with the construction illustrated a solid and non-aerated stream may be easily and quickly obtained by placing a slight obstruction such as a hand or finger, depending upon the flow volume, in the path of such aerated stream flow close to the location of its emergence from the passage 7. Apparently due to creating a back pressure condition within the aerator flow chambers and apertures, the air intake area within the end of the spout becomes at least quite extensively logged with water, thus closing off the air passages at 14 and their communication with the discharge passage 7 to atmosphere. This phenomena changes the aerated stream to a non-aerated and solid but smooth flow substantially extending in transverse section over the entire inside area of the body 6, as defined by the wall surface 7.

It should be understood that this unusual and unobvious functional result also presents a strikingly new and substantial advantage over previous aerators in that the desired type of flow from the kitchen sink or lavatory faucet can actually be controlled to such extent that either an aerated or a non-aerated solid body of water can be drawn selectively at will and without the intervention of extra equipment or parts.

It has also been discovered that when the water is tightly shut off so that none discharges through the spout 1 and into the chamber 2, the previously flooded air passages will apparently drain and clear probably traceable to the influence of capillary attraction, discharging through the chamber 7 and thus removing the water in the previously logged annular chamber 34. When the faucet is again turned on and flow is again resumed, a smooth coherent aerated flow emerges from the aerator discharge outlet 7 until it is either interrupted by the creation of back pressure by the obstruction as hereinabove explained or else by actually shutting off the faucet in the usual or conventional manner.

It is accordingly submitted that an unusual performance has been obtained from a device in a concededly well developed field insofar as aerators are concerned. Yet the construction is one possessing all the advantages of easy inspection, repair or replacement whenever necessary by its possession of the additional advantage of selective aeration.

While only a single embodiment has been shown and described, it will, of course, be appreciated that this is for purpose of illustration only, and the scope of the invention should therefore be measured by the appended claims.

I claim:

1. An aerator combination comprising conduit means having liquid inlet means and a communicating open end leading therefrom, said conduit means being substantially imperforate to gaseous intake between said inlet means and said open end and being provided with an interior upstream facing annular support ledge, an outer shell within said conduit means located substantially upstream from the said open end for breaking up the liquid flow within the said conduit means, a sleeve positioned within said conduit means, said sleeve being opened through the open center portion thereof for the flow of liquid therethrough and mounted in abutting contact with said annular support ledge, the said sleeve being mounted

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upstream a substantial distance from the said conduit open end, foraminous means including a cup-shaped screen extending within the said sleeve and a second screen positioned upstream of the said cup-shaped screen spanning an upper open position of said sleeve, said latter screen having an outer annular portion extending at least to the inner peripheral wall of said sleeve and being supported by the said latter member, the said outer shell overlying said assembly of said sleeve and screens and having ports annularly disposed transversely in an upper wall portion thereof, said foraminous means including a third screen member extending substantially across an upper open portion of the said sleeve, the latter sleeve being upstream of said second screen, a plate-like annular support means for said last named screen, the ports of said outer shell being upstream of each of said screens, the said sleeve and the outer shell having an annular chamber disposed between them, the said sleeve at a downstream annular portion thereof having annularly disposed ports for effecting communication between a lower portion of said annular chamber between the sleeve and outer shell and said open end of the conduit means, the said sleeve at an upper rim portion thereof being relieved annularly to form substantially transverse ports between a downstream transverse surface of said plate-like support means and the said sleeve, the said ports communicating with said annular chamber and the interior of the said sleeve, the said outer shell being supported on the said conduit support ledge to provide a relatively slight annular clearance between the periphery of the said outer shell and an inner wall surface of the said conduit means in a plane substantially below the ports of the said outer shell, and body means for joining the said outer shell and the sleeve to the said conduit means.

2. An aerator of the character described comprising conduit means of a faucet or the like having a liquid inlet passage and an open end leading therefrom, the said conduit means being substantially imperforate to gaseous intake between the said inlet means and the said open end and being provided on an interior transverse surface with support means for the aerator mechanism, a body attached to the conduit means providing for said transverse support means, a transversely ported outer shell within said conduit means positioned upstream from the said conduit open end for breaking up the liquid flow within the conduit means, a sleeve with an offset upper annular end portion within said conduit means, said sleeve being open through the center portion thereof for providing flow of liquid therethrough from the outer shell and being mounted on said conduit support interior surface means, the said sleeve being cylindrical and substantially smaller in diameter than the said outer shell and being wholly contained therewithin to provide an annular chamber therebetween for substantially the full height of the said sleeve, the said outer shell and sleeve providing for end disposed passage means communicating with the said annular chamber between the sleeve and outer shell, foraminous means comprising a plurality of superposed screens spanning the open center portion of the sleeve, one of the said screens being cup-shaped and having an outer rim portion mounted upon an offset inside wall portion of the said sleeve, the cup portion of the screen diverging from an interior wall surface of the said sleeve for an appreciable distance in a downstream direction and thereafter extending towards the center portion of the sleeve in a gradual curving configuration, said latter curved portion extending at least a substantial distance toward the central axis of the said sleeve to form said cup-shaped configuration, a second screen spanning the upper open end portion of the sleeve upstream of the rim of the cup-shaped screen member, a third screen positioned upstream of the second screen in superposed spaced relation thereto, said latter screen being mounted on an upper end portion of the said sleeve, the ports of

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the said outer shell being upstream of the said third screen, the said body being attached to the said conduit means joining said outer shell and sleeve to the said conduit means, the said third screen being mounted axially upstream of an upper end limit of said sleeve and being positioned in spaced-apart relation thereto, said ports of the outer shell being annularly spaced apart and extending radially transversely through a wall portion in an annular reduced end thereof, said sleeve being provided with outwardly extending annularly arranged lugs for effecting attachment of the said sleeve to the said conduit means, the arrangement of said lugs providing for passages therebetween communicating with said annular chamber between the sleeve and said outer shell, the latter passages communicating with said open end leading from the conduit means to provide for the fluid discharge from said annular chamber.

3. In an aerator for a plumbing faucet or the like, the combination comprising conduit means such as a faucet spout having liquid inlet means and an open end thereof, said conduit means being substantially imperforate to gaseous intake between the liquid inlet means and the open end, a body connected to the conduit means at the said open end, the latter member being provided with an interior upstream facing annular ledge, an inverted outer shell within said conduit means positioned upstream from the conduit open end for breaking up the liquid flow within the said conduit means, a substantially cylindrical sleeve within said outer shell in spaced-apart annular relation thereto and open through the center portion thereof for the flow of liquid therethrough, the said sleeve being mounted on said ledge and being located upstream from the conduit open end, the said body connecting the said outer shell and sleeve to the said conduit means, the said sleeve having an annular relieved upper end portion and having a lower flanged ported portion projecting radially outward for support of the said sleeve on the said body ledge, the said sleeve also having spaced-apart annularly disposed ports at an upper end portion thereof communicating with said annular space between the said sleeve and outer shell, a plurality

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of superposed foraminous means comprising screens extending substantially transversely across the said sleeve and being supported by said latter member, said foraminous means including a lower cup-shaped screen having an outer portion thereof in proximity to the inside peripheral wall surface of said sleeve and then gradually diverging therefrom for an appreciable distance within said sleeve in a downstream direction, a second screen of flat plate-like form extending substantially across the open upper portion of said cup-shaped screen and having its outer periphery defined by the cup-shaped screen and the interior wall surface of the said sleeve, a third screen of plate-like configuration upstream of said second screen and mounted between an upper end limit of the said sleeve and an inner annular shoulder portion of the said inverted outer shell, a support for the third screen, said outer shell being closely fitted within the conduit means upstream of said annular ledge, said outer shell having transverse ports through an upper reduced wall portion thereof upstream of said third screen to communicate with the said liquid inlet means, the said sleeve upper relieved portion forming ports with said support for said third screen, the latter ports communicating with the interior of the said outer shell.

4. The subject matter of claim 1, the said annular clearance between the periphery of said outer shell and the inner wall surface of the said conduit means being substantially of the order of capillary proportions.

5. The subject matter of claim 1, the said downstream annular portion of the sleeve being outwardly flanged and with substantially transversely apertured radially extending ports to form said ported means for effecting said communication between said annular chamber and said open end of the conduit means.

References Cited in the file of this patent

UNITED STATES PATENTS

2,744,738	Hjulian	May 8, 1956
2,754,097	Hjulian	July 10, 1956
2,888,209	Hjulian	May 26, 1959