Oct. 24, 1967 J. A. HJULIAN 3,348,777

AERATOR CONVERTER

Filed May 28, 1965

Fig. 1.

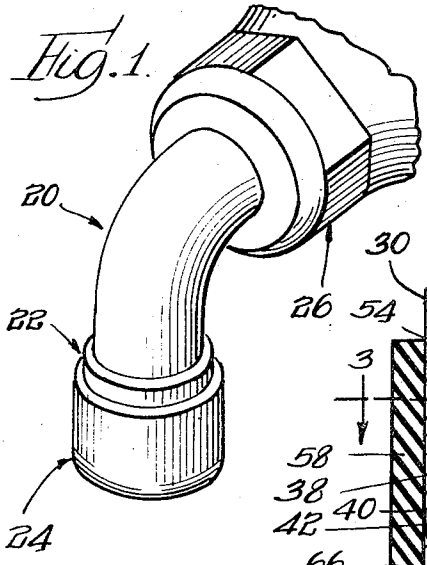


Fig. 2.

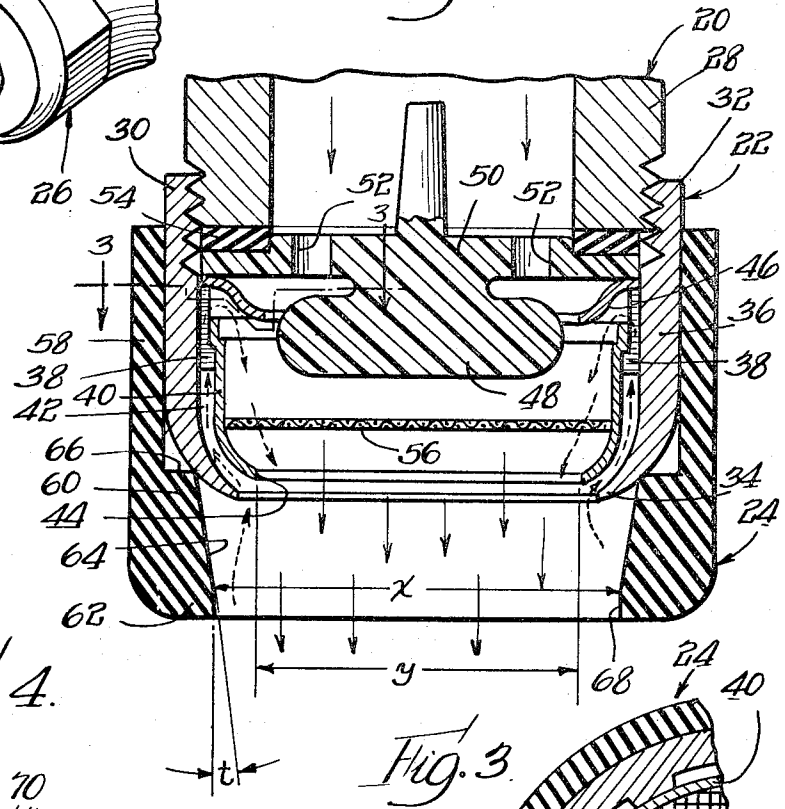


Fig. 4.

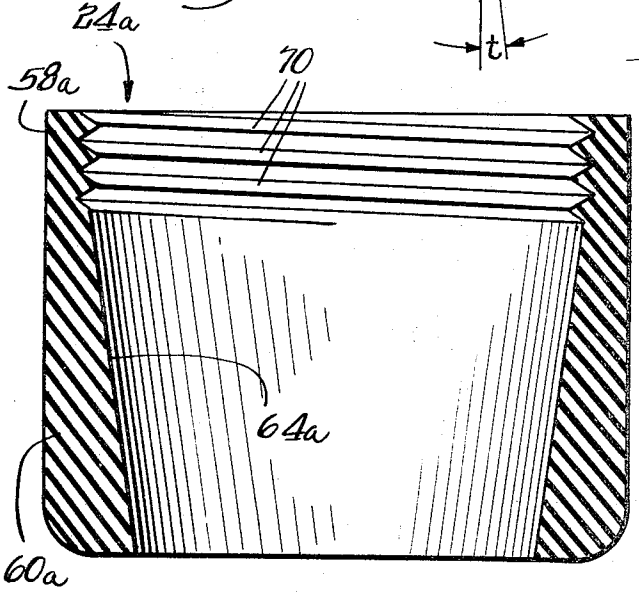
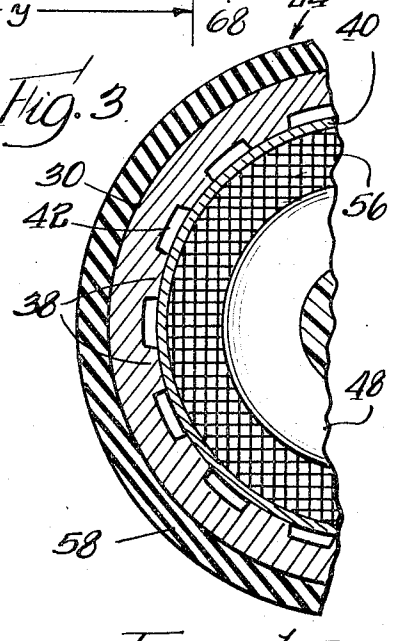


Fig. 3.



Inventor

Julius A. Hjulian

By: Olson, Trexler, Wolters & Bushnell

Attys.

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AERATOR CONVERTER

Julius A. Hjulian, 12646 S. Harlem Ave.,
Palos Heights, Ill. 60463

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This invention relates generally to faucet aerators and more particularly to a device for selectively converting a faucet discharge from aerated to coherent or non-aerated flow.

Aerators are very commonly employed in conjunction with the water faucets in domestic kitchen, bathroom and laundry facilities; and the vast majority of these aerators are arranged to become a substantially permanent part of the installation. Moreover, the prior art commercial aerators are incapable of permitting coherent or non-aerated discharge from the associated faucet. Hence, the conveniences of a coherent flow have been heretofore unavailable in installations that have been arranged for aeration.

An important object of the present invention is therefore to provide an attachment for use on domestic faucet aerators which permits selecting either aerated or coherent flow.

A more general object of the invention is to provide a new and improved aerator arrangement.

Another object of the invention is to provide a device which is used in selectively converting from aerated to coherent flow and which is easily and quickly assembled to various types of faucet aerators.

Still another object of the invention is to provide an aerator converter which acts as a faucet bumper.

These and other objects and features of the invention will become more apparent from a consideration of the following descriptions.

An aerator arrangement in accord with the invention includes a converter attachment comprising a tubular member that is stretchably assemblable to a faucet aerator. The converter attachment also comprises a flow control member joined to the downstream end of the stretchable tubular member, and the flow controlling member includes an outwardly narrowing, conical throat, this conical throat being arranged for selectively cutting off the normal, upward flow of aerating air by means of a temporary flood of water adjacent its major dimension.

The invention, both as to its construction and its mode of operation, will be better understood by reference to the following disclosure and drawing forming a part thereof, wherein:

FIG. 1 is a perspective view of a water faucet arranged with an aerator and provided with a converter attachment constructed in compliance with the present invention;

FIG. 2 is an enlarged, central cross-sectional view of the aerator and converter attachment of FIG. 1;

FIG. 3 is a fragmentary plan view taken substantially along the line 3—3 of FIG. 2; and

FIG. 4 is an enlarged central sectional view of a modified converter attachment.

Referring now in detail to the drawing, specifically to FIGS. 1–3 and first to FIG. 1, a domestic water faucet **20** is seen provided with an aerator **22** and a converter attachment **24**. The faucet **20** is connected to a source of water, not shown, by means of a fitting **26**.

Continuing with particular reference to FIG. 2, the faucet **20** includes an externally threaded discharge end **28**, and the aerator device **22** comprises a generally cylindrical casing **30** that has an internally threaded upper portion **32**, portion **32** cooperatively engaging the threaded discharge end **28**. The lower end of casing **30** is defined by an inturned lip **34**; and between the threaded upper

portion **32** and the lip **34**, the casing **30** includes a cylindrical wall portion **36**. Vertical ribs **38** are raised from the inner surface of casing **30** for use in mounting a skirt member **40** within the casing. The ribs **38** are spaced apart angularly as is shown in FIG. 3, and the skirt member **40** is arranged to take a shape similar to that of casing **30** but of lesser height and diameter. Thus, the ribs **38** cooperate with the skirt member **40** in defining an annular air-inlet passageway **42** leading upwardly from the lip **34** and surrounding a discharge edge **44** which comprises the lower terminus of skirt **40**.

The aerator device **22** additionally incorporates a baffle cup **46** which is supported by the upper ends of the ribs **38** and which is centrally perforated to direct the flow of water over a mixing element **48**. The mixing element **48** depends from and is supported by an integral breaker plate **50**, and breaker plate **50** is provided with a series of angularly spaced ports **52** which direct the flow from faucet **20** over the surface of mixing element **48**, the centers of ports **52** being located on a circle that is concentric with breaker plate **50**. The peripheral margin of breaker plate **50** rests on the supported edge of baffle cup **46**; and desirably, a washer **54** of rubber or other suitable material is situated between the lower end of faucet **20** and the breaker plate **50**. Furthermore, the aerator device **22** may, if desired, incorporate a screen **56** or other mesh element within the skirt **40** and beneath the mixing element **48** for promoting aeration of the flow of water passing through the interior of the skirt and toward its discharge edge **44**.

In use of the aerator device **22**, water flows through the ports **52** and over the lateral edges of the mixing element **48**, the edges of the central aperture in baffle cup **46** controlling this flow. The water which cascades from the edges of the mixing element **48** aspirates air through the passageway **42**, between the ribs **38** and between the upper edges of skirt member **40** and the lower surface of baffle cup **46**. The air thus drawn into the interior of skirt member **40** mixes with the water cascading from the element **48** to produce an aerated discharge. This aspirating of air and mixing action is illustrated in FIG. 2 where solid line arrows indicate the flow of water and broken line arrows indicate the flow of air.

In accord with the present invention, the converter attachment **24** is assembled to the aerator device **22** for use in selectively developing a coherent or non-aerated discharge. Structurally, the converter attachment **24** comprises a tubular member **58**, a flow controlling member **60** and a flow directing member **62**. In compliance with the features of the invention, the members **58**, **60** and **62** are fabricated to be integral and are made from a comparatively soft, resilient polymeric material, rubber compositions having a Short "A" durometer of about 50 in the vulcanized state having proved useful in this regard. So fabricated, the tubular member **58** may be made to take a first inside dimension for stretchable assembly to the cylindrical outer wall **36** of aerator casing **30**; and as will be recognized, the stretchable character of tubular member **58** permits the converter attachment **24** to accommodate aerator casings having certain differences in outside dimension.

Continuing with reference to FIG. 2, the flow controlling member **60** of converter attachment **24** is joined to the downstream end of the tubular member **58**; and in compliance with an important feature of the invention, the flow controlling member **60** is provided with an outwardly narrowing, conical throat **64**. The conical throat **64** is selected to have a major dimension that is smaller than the inside dimension of tubular member **58** in order that an annular stop shoulder **66** may be situated at the juncture of members **58** and **60**, shoulder **66** projecting radially inwardly from the inner wall of tubular member

58 for engagement with the abutment defined by the outer surface of lip 34, thus locating the conical throat 64 with respect to the discharge edge 44. Both the discharge edge 44 and the throat 64 are substantially circular in cross-section; and in compliance with the present invention, the minor inside dimension of the throat 64 is arranged to be only sufficiently greater than the inside dimension of the discharge edge 44 to cause a persisting flood adjacent the major diameter of the throat when a momentary backup is developed in the aerated flow through the throat. This flood acts to cut off the normal, upward flow of aerating air so as to create a non-aerated discharge. More particularly, the minor inside dimension of throat 64 is indicated by the reference letter *x*, and the inside dimension of the discharge edge 44 is indicated by the reference letter *y*, it being apparent from an inspection of FIG. 2 that the dimension *x* is somewhat greater than the dimension *y*. In specific embodiments of the invention, units in which the difference between dimension *x* and dimension *y* has ranged from about 0.30 inch to about 0.80 inch have performed successfully. Moreover, the distance from the discharge edge 44 to the lower edge of member 62 as established by shoulder 66 should be at least about 6 to 7/32 of an inch.

The flow directing member 62 is joined to the downstream end of flow controlling member 60, and the flow directing member 62 is specifically arranged to include a cylindrical throat 68 which has an inside dimension that is substantially the same as the minor dimension *x* of the conical throat 64. The cylindrical throat 68 acts to promote a cylindrical flow during non-aerated discharge whereby to prevent undesirable flaring or constriction in the flow upon non-aerated discharge.

With respect to the degree of taper or angulation of the conical throat 64, a seven degree flare to the throat has proved to be particularly useful in that it provides a suitably conical throat while permitting of a location of the cylindrical throat 68 at a suitable distance radially outwardly from the vertical projection of discharge edge 44. The taper or angulation of throat 64 is indicated in FIG. 2 by the angle *t* which is shown as the similar angle for convenience of illustration. Angulations of as much as thirty degrees may be employed in certain instances.

In use, the converter attachment 24 is assembled to the aerator device 22 with the stop shoulder 66 engaging the abutment defined by the outer surface of lip 34. Initiation of flow through the faucet 20 creates an aerated discharge in the usual manner with air being drawn upward through the passageway 42 to mix with the water flowing downwardly through the skirt 40. However, when a coherent or non-aerated flow is desired, a momentary backup in this flow is caused by passing a knife blade, a finger or some other solid object horizontally through the flow closely adjacent the lower end of the converter attachment 24. The momentary backup thus caused in the flow causes a flood in the area generally between lip 34 and conical throat 64 and between discharge edge 44 and the inner edge of lip 34. This flood persists after the object causing it has been removed, and this flood prevents air from entering the passageway 42, thus developing a coherent or non-aerated discharge. To convert once again to aerated flow, it is only necessary to turn off the flow of water from faucet 20, permitting the temporary flood to drain and re-open the passageway 42 to the flow of air.

From the foregoing descriptions, it will be apparent that the present invention provides a converter attachment for aerator devices which easily and conveniently permits selecting between aerated and coherent flow. In addition, the converter attachment of the invention, being of soft polymeric material, acts as a bumper in preventing accidental contact with the tip of the faucet from breaking or damaging glasses, dishes and the like. It will also be recognized that the converter attachment of the invention is easily and quickly assembled to various types of faucet aerators.

While a particular embodiment of the invention has been thus far shown and described, it should be understood, of course, that the invention is not limited thereto since many modifications may be made. Therefore, and in order to enhance the understanding of the invention, a modified converter attachment is shown in FIG. 4, being there illustrated generally by the reference numeral 24*a*. Since the converter attachment 24*a* is similar in many respects to the converter attachment 24, like numerals have been used to designate like parts with the suffix letter *a* being employed to distinguish those elements associated with the converter attachment 24*a*.

Converter attachment 24*a* is particularly characterized by the elimination of the stop shoulder between tubular member 58*a* and flow controlling member 60*a* and by the elimination of the flow directing member. The converter attachment 24*a* is fashioned with internal threads 70 in the tubular member 58*a* and, accordingly, is adapted for assembly to an aerator device having an externally threaded portion. It is to be recognized that the threads 70 serve as axial locating elements whereby to permit the elimination of the stop shoulder between the flow controlling member 60*a* and the tubular member 58*a*. Additionally, the threads 70 could be located on the external surface of member 58*a*. In other respects, the converter attachment 24*a* is fabricated and functions similarly to the converter attachment 24.

The specific examples herein shown and described are to be considered as being primarily illustrative. Various changes beyond those described will, no doubt, occur to those skilled in the art; and such changes are to be understood as forming a part of this invention insofar as they fall within the spirit and scope of the appended claims.

The invention is claimed as follows:

1. An aerator assembly for providing an aerated flow of fluid from a liquid discharge member, said aerator assembly comprising: a skirt member supported by the liquid discharge member with an annular fluid discharge edge at a lower end of the skirt member; a wall member supported by the liquid discharge member and positioned radially outwardly of said skirt member and terminating with a lip positioned adjacent to said discharge edge to at least partially define air inlet passage means between said skirt member and said wall member through which air passes to be aspirated into liquid flowing from the liquid discharge member; a tubular member supported by the liquid discharge member and located radially outwardly of said wall member; and a flow controlling member joined to a lower end portion of said tubular member and extending downstream from said wall member, said flow controlling member including a downstream narrowing conical throat to enable a persisting flood of liquid to be formed in said air inlet passage means when a momentary backup is developed in the aerated flow through said conical throat whereby to cut off a normal flow of air through said air inlet passage means to develop a non-aerated discharge of liquid, wherein said downstream narrowing conical throat has a major inside dimension that is smaller than an inside dimension of said tubular member and wherein said flow controlling member includes a shoulder at a juncture of said flow controlling member with said tubular member, said shoulder bridging between said major inside dimension of said conical throat and said inside dimension of said tubular member to locate said conical throat with respect to said fluid discharge edge by engagement with said wall member.

2. In an aerator arrangement, the combination according to claim 1 wherein said conical throat has a taper of about seven degrees.

3. An aerator assembly for providing an aerated flow of fluid from a liquid discharge member, said aerator assembly comprising: a skirt member supported by the liquid discharge member with an annular fluid discharge edge at a lower end of the skirt member; a wall member

supported by the liquid discharge member and positioned radially outwardly of said skirt member and terminating with a lip positioned adjacent to said discharge edge to at least partially define air inlet passage means between said skirt member and said wall member through which air passes to be aspirated into liquid flowing from the liquid discharge member; a tubular member supported by the liquid discharge member and located radially outwardly of said wall member; a flow controlling member joined to a lower end portion of said tubular member and extending downstream from said wall member, said flow controlling member including a downstream narrowing conical throat to enable a persisting flood of liquid to be formed in said air inlet passage means when a momentary backup is developed in the aerated flow through said conical throat whereby to cut off a normal flow of air through said air inlet passage means to develop a non-aerated discharge of liquid; and a flow directing member joined to a downstream end of said flow controlling member, said flow directing member including a cylindrical

throat having an inside dimension which is substantially the same as a minor inside dimension of said flow controlling member.

4. In an aerator arrangement according to claim 3, the combination wherein said tubular member, said flow directing member and said flow controlling member are integrally fabricated from a comparatively soft, resilient polymeric material.

5. The combination according to claim 4 wherein said polymeric material is rubber.

References Cited

UNITED STATES PATENTS

2,849,217	8/1958	Bachli et al.	239—428.5
2,954,936	10/1960	Shames et al.	239—428.5
3,261,555	7/1966	Hjulian	239—432

EVERETT W. KIRBY, *Primary Examiner.*