Nov. 5, 1957 D. F. KUMPMAN 2,812,168

FLUID MIXER

Filed Jan. 4, 1956

Fig. 1.

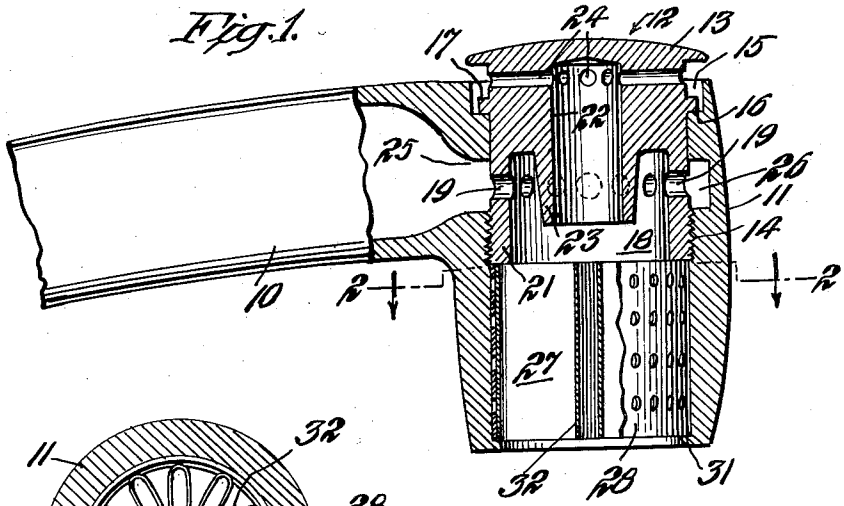


Fig. 2.

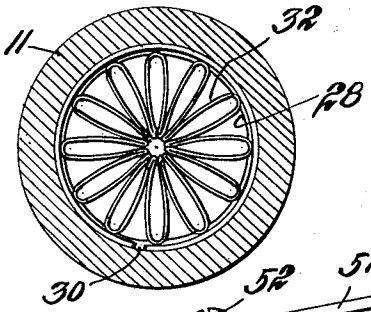


Fig. 3.

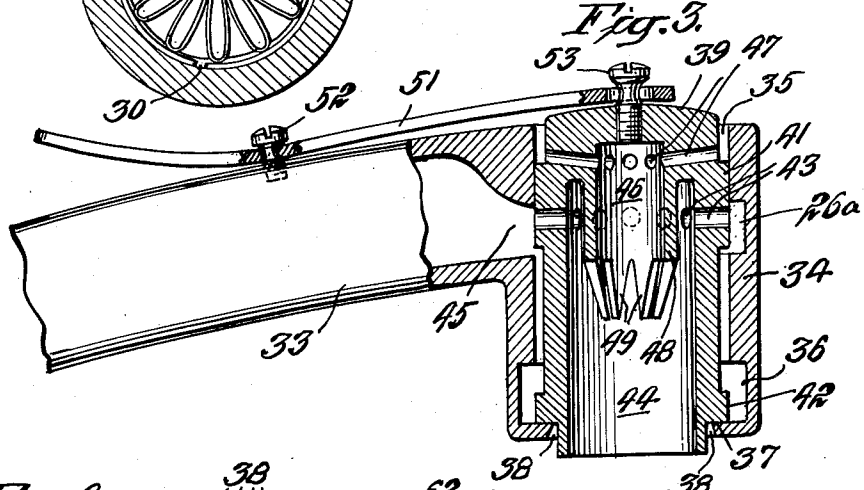
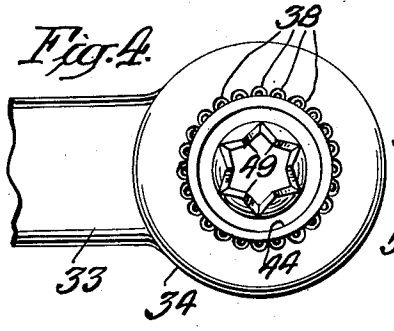


Fig. 4.



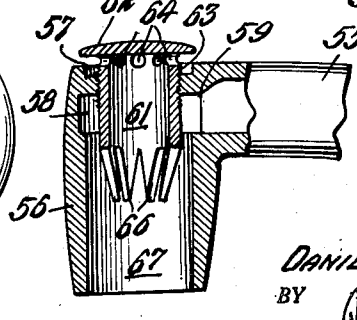


Fig. 5.

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FLUID MIXER

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4 Claims. (Cl. 261—71)

The invention herein disclosed relates to a novel faucet construction and more particularly to a faucet having a device for mixing air with the stream of water.

The advantages of aerating water as it flows from a sink or laundry faucet are well known. There are various aerating devices on the market at the present time which attempt to perform this function. However, those devices have certain drawbacks and disadvantages which the device of the present invention overcomes. One such disadvantage is that it is customary to employ a screen or wire mesh in the aerator which becomes clogged after extended use. This necessitates disassembling of the device to clean the wire mesh. Another disadvantage of the aerators heretofore devised is that the air is drawn into the stream of water from around the edge or circumference thereof, thus resulting in an inefficient mixture of the fluids. The present invention provides an aerator or fluid mixer which overcomes these and other disadvantages of prior aerators.

Objects of the present invention therefore are to provide an aerator of simple construction which will operate to mix air and water effectively and efficiently.

Another object of the present invention is to provide an aerator especially adapted for use with a sink faucet in which the air is drawn into the stream of water from the center thereof whereby a complete and thorough mixing of air and water is obtained.

Other desirable objects and the novel features through which the purposes of the invention are attained are set forth or will appear in the course of the following specification.

The drawing accompanying and forming part of the specification illustrates present approved forms of the invention. Structure, however, may be further modified and changed as regards the immediate illustration, all within the true intent and scope of the invention as hereinafter defined and claimed.

Fig. 1 is a side view partially broken away, of a faucet construction of the present invention;

Fig. 2 is a cross-sectional view taken on line 2—2 of Fig. 1;

Fig. 3 is a side view broken away, of a modification of the embodiment shown in Fig. 1;

Fig. 4 is a bottom view of the embodiment shown in Fig. 3;

Fig. 5 is a broken sectional detail of a still further modification of the faucet and aerator of the present invention.

Referring first to Figs. 1 and 2, numeral **10** represents a faucet having a depending head portion or casing **11** which has a generally cylindrical, hollowed out center within which the aerator elements are located. The aerator, generally indicated by numeral **12**, includes a core **13** which is cylindrical and threaded as at **14**. The core is conveniently inserted in the upper opening of head **11** and screwed into place as shown in Fig. **1**. The faucet head or casing **11** has a recess **15** which provides a shoulder **16** against which an annular lip **17** of the core rests. The core lip and shoulder **16** cooperate to limit and determine the position of the core within the casing **11**. The bottom portion of core **13** has a cylindrical bore **18** which defines the cylindrical side **21**. A series of radially extending ports **19** pass through the core wall **21**. A second cylindrical bore **22** is formed within the center of the core, as clearly seen in Fig. 1. The two core bores overlap somewhat to form a deflector ring **23**. It should be noted that the outer surface of the deflector ring is frustro-conical, for a purpose to be hereinafter described. A second series of radial ports **24** extend from the bore **22** outward to the outside surface of core **13**.

The faucet **10** is tapered to form a neck as at **25** which terminates in an annular groove **26** extending around the inner surface of the casing **11**. It is seen that the openings of ports **19** are aligned with the neck **25** and groove **26**. Thus as the stream of water passes through the faucet **10** it flows around groove **26** and then passes through the ports **19**. As the water enters the hollowed out portion of the core **13** it strikes against the conical surface of deflector ring **23** and is directed downward. The water thus passing the bottom of cylindrical bore **22** aspirates or draws the air through ports **24** and downward through the bore **22**. The air and water is mixed within the bottom portion of bore **18** which thus serves as a mixing chamber. It is seen, therefore, that the novel construction of the present aerator provides a stream of air which is drawn down into the center of the stream of water. This is an important feature in that it results in a thorough and efficient mixing of the two fluids.

After the air and water are mixed the mixture passes downward through a chamber **27** which is especially designed and constructed to prevent splashing and to confine the aerated water to a well defined stream as it passes out of the faucet. The chamber **27** is located in the bottom portion of the hollow casing **11**. The perforated cylindrical member **28** which may be made of sheet metal, is located around the inner surface of the chamber **27**. As seen in Fig. 2, member **28** is split, as at **30**, so that it may be readily inserted upwardly through the bottom opening of casing **11**. With the cylindrical member **28** in position, its bottom edge rests against a shoulder **31** formed at the bottom opening of the faucet head. A single piece of sheet material is bent to form a flower petal formation which is more clearly seen in Fig. 2. The petal shaped member **32** is inserted upwardly through the mouth of the faucet and fits in place with the outer ends of each petal abutting against the inner surface of sleeve member **28**. The shoulder **31** maintains the petal shaped member **32** in its proper position.

It is readily seen then that the aerated water passes downward from the mixing chamber **18** through the petal network and passes out through the mouth of the faucet.

Referring now to Figs. 3 and 4, there is shown an embodiment of the present invention wherein the aerating mechanism may be selectively turned off or rendered inoperative, in which case the water will emanate from the faucet in a circular spray. Numeral **33** represents a faucet having a depending head portion or casing **34** which has a hollowed out, generally cylindrical center portion **35**. An annular groove **36** is formed in the side of cylinder **35** near the bottom thereof, providing a shoulder **37**. The circular mouth at the bottom of casing **34** has a series of semi-circular notches **38** around the edge thereof. An aerator **39** which may be a core of generally cylindrical construction fits within cylinder **35**, as shown in Fig. 3. The core has two circular flanges **41** and **42** which are of slightly less diameter than cylinder

35. In this manner flange **41** and cylinder wall **35** cooperate in a snug sliding fit. Flange **42** is of a greater diameter than the mouth of head **34** so that shoulder **37** will determine the lower position of the aerator core **39**. A series of radial ports **43** are formed through the flange **41** and extend from annular water groove **26***a* in the casing into a cylindrical mixing chamber **44** within the core **39**. These ports are aligned with the narrowed neck **45** of the faucet when the aerator is in its lower position with flange **42** abutting shoulder **37**. A bore **46** formed in the center of the core connects with a series of radial air inlet ports **47** which extend outwardly to the outside surface of the aerator. It will be seen then that as the stream of water from the faucet passes through ports **43** it will strike against deflector ring **48** and flow downward into the mixing chamber **44**. The lower portion of deflector ring **48** is serrated to provide a circular series of teeth **49** which extend downwardly and slightly inwardly. Thus as the water passes radially inwardly into the mixing chamber **44** air is aspirated or drawn through ports **47**, down through bore **46** to mix centrally with the water in the chamber **44**. This fluid mixture then passes out through the mouth at the bottom of the aerator core **39**.

A lever **51**, Fig. 3, is shown pivotally mounted on top of the faucet by means of screw **52**. The end of lever **51** is shown connected to the top of the sliding core **39** by means of a screw **53** so that as the handle end of the lever is depressed the aerator core **39** will be raised to a position wherein ports **43** are above the narrowed neck **45** and annular groove **26***a* and thus closed off. With the ports closed, the water from the faucet will pass down between the inner surface of cylinder **35** and the outer surface of the core into the annular groove **36** and then out through the semi-circular notches **38** in the mouth of the faucet head in the form of a spray.

If it is desired to have an aerated stream of water, the aerator core will be positioned as shown and the water will pass into the periphery of the mixing chamber **44** and the air be drawn down through the center of the water stream and the fluid mixture will discharge from the mouth at the bottom of the aerator. If a spray of water is desired, the lever handle **51** is depressed to raise the aerator core **39** to close off ports **43**. In this position the water will pass down between the sides of the aerator and the casing **34** and be formed into spray by notched openings **38**.

Referring now to Fig. 5, there is shown a further modification of the present invention wherein faucet **55** terminates in a casing **56**. The hollow cylindrical center of the casing is screw-threaded as at **57** and has an annular groove **58** near the top portion thereof aligned with the narrowed neck portion **59** of the faucet. An aerator element **61** of hollow construction has a cap **62** and is screw-threaded as at **63**. The aerator is screwed into place as shown in Fig. 5, and has a series of radially

extending ports **64**. The bottom portion of the aerator has V notches **66** which extend downwardly and inwardly. With the aerator in position the stream of water will pass into the annular groove **58** and downward through the mixing chamber **67**, thus drawing or aspirating air through ports **64** and downward through bore **61** into the mixing chamber. At this point the air and water are effectively mixed and pass out through the mouth of the faucet head **56**.

It is seen that this invention provides a fluid mixer wherein the stream of air is drawn in through the center of the water stream to insure a thorough and complete mixture of the two fluids, and this without the use of fine screens or other clogging medium.

What is claimed is:

1. Aerating faucet comprising an upright tubular faucet body having an annular water groove in the inner wall of the same, a water inlet in the side of the same opening into said water groove and a discharge nozzle at the lower end of the same, a closure plug seated in the upper end of said faucet body, having a dependent outer annular wall extending down past said annular water groove and having water inlet ports extending therethrough in line with said annular water groove, said plug having an inner annular wall spaced from said outer annular wall and extending downwardly past said water inlet ports and said plug having a central air inlet chamber within said inner annular wall and air inlet ports opening through the upper portion of the plug into the top of said air inlet chamber, whereby streams of water passing through the water inlet ports from the annular water groove and deflected downwardly by said inner annular wall, will inspirate flow of air from the air inlet ports and air inlet chamber down through the center of the hollow water column deflected downwardly by said inner annular wall.

2. The invention according to claim 1 with a petal-shaped anti-splash member seated in the discharge nozzle of said faucet.

3. The invention according to claim 1 in which said plug member is vertically adjustable in the faucet body and in which said water inlet ports are disposed to be cut off by the wall at one edge of the annular water groove when said plug is shifted in one direction.

4. The invention according to claim 3 with spray discharge means at the lower end of the faucet body cooperative with the lower end of said plug, to release a spray discharge of water from the annular water groove when the plug is shifted as described.

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