Sept. 13, 1955 G. N. PALIVOS 2,717,614

FLUID MIXER

Filed April 15, 1953

Fig. 1

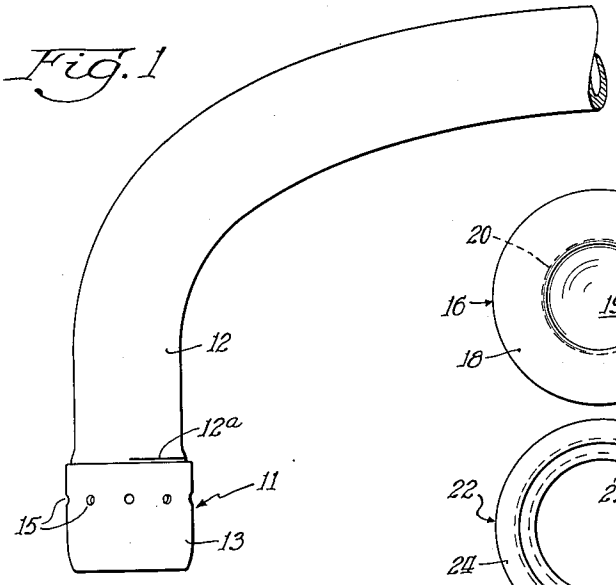


Fig. 2

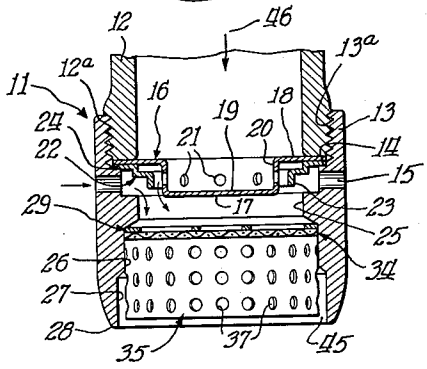


Fig. 4

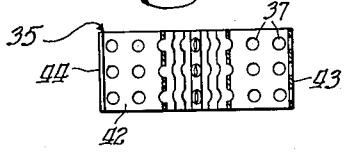


Fig. 5

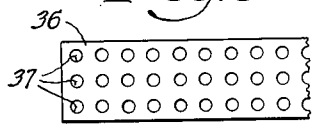
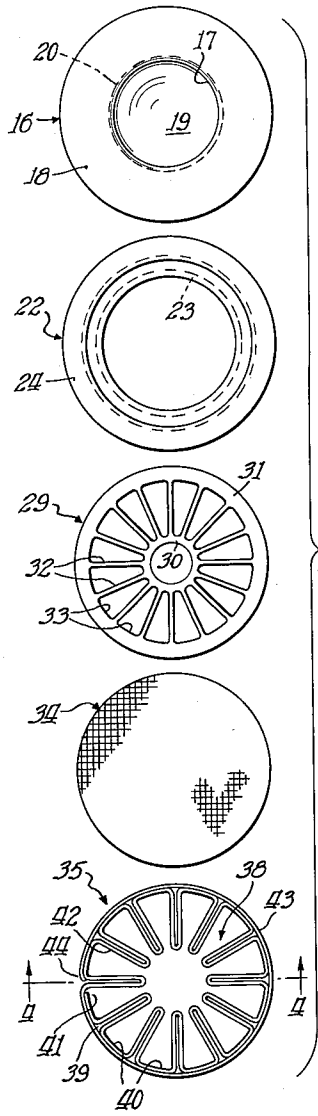


Fig. 3



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FLUID MIXER

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Application April 15, 1953, Serial No. 349,010

4 Claims. (Cl. 138—37)

This invention relates to a fluid mixer such as, for example, a device frequently known as a faucet aerator normally used in kitchens, laundries and the like for producing a jet of water containing air bubbles disseminated throughout so as to cause the jet to become whitish in appearance and soft and light to the touch.

See also my pending application Serial Number 321,977 filed November 22, 1952.

The present invention aims to provide an improved device of this character, and, in some respects, an improvement upon the device of my pending application above referred to.

The invention will be understood by reference to the following description, taken together with the accompanying drawing, of an illustrative embodiment thereof, and in which drawing—

Figure 1 is a view of a faucet or the like having the invention of the present application applied thereto;

Figure 2 is an axial sectional view of the device of the present invention, parts being shown in elevation;

Figure 3 is a composite view of the internal parts of the device, in separated relation and in the order of their occurrence in the complete assembly;

Figure 4 is a section taken on the line 4—4 of Fig. 3; and

Figure 5 is a plan view, in development form, of a perforated strip from which is formed one of the parts of the device shown in Fig. 3.

Referring in detail to the illustrative construction shown in the drawing, numeral **11** refers in general to the fluid mixer device of the present invention, associated, for exemplification, with the faucet **12** which may be a faucet such as is commonly found in household kitchen sinks, laundry tubs, and the like, and having at its outlet end a male thread **12***a*. The device **11** comprises a casing **13** which may be of any suitable material such as metal or plastic, and is here indicated to be of metal. The casing **13** at its upper end is internally threaded as at **13***a* to mate with the thread **12***a* of the faucet, which extends into the casing approximately down to a shoulder **14** therein. Disposed along the sides of the casing **13** are ports **15** for the entry of a fluid such as gas or air, and in this instance air, into the interior of the casing.

Following the disclosure of my said pending application I show in the casing **13** a break-up or dispersal element, for a fluid such as water, formed in the shape of a cup-like member **16** having a cup portion **17** and an annular flared rim or flange **18**. The cup portion **17** is formed by a central dished portion of reduced diameter providing a wall **19** spaced from but parallel with the flange **18** and joined thereto by an annular or cylindrical wall **20**, the annular wall **20** having perforations **21** therein spaced about or around its periphery.

The flange **18** is of a diameter just sufficient to be received within the thread **13***a* of the casing and to rest upon the shoulder **14** to which it may be clamped to hold the dispersal member **16** in position in the casing by the faucet **12** when the device **11** is screwed thereon.

As here shown and further following the device of my pending application, the dispersal member **16** is disposed with its cup portion **17** extending downwardly in the casing or toward the outlet or downstream end thereof and with its cup portion **17** spaced from the wall **13** of the casing opposite the ports **15**. Disposed between the cup portion **17** of the dispersal member and the wall of the casing, and spaced from both, is a deflector ring **22** having a cylindrical wall **23** and an annular dished flange **24**, the deflector **22** being shown located in the casing between the dispersal member **16** and the annular shoulder **14** in the casing and held thereto by the clamping of the parts together as already described, the deflector annular wall **23** thereby being disposed between the ports **15** and the perforations **21** of the dispersal member but spaced from both.

Turning now to the improvement of the present invention, I have shown the passageway **25** of the casing widened intermediately as at **26** from adjacent its proximal end **25** and further additionally widened as at **27** adjacent its distal end **28**. The casing **13** and particularly the intermediate bore portion **26** is adapted to receive from its distal end **28** the auxiliary and finial dispersal elements of the device next described.

Turning now to a description of the elements just referred to and taking them in the order of their occurrence from the region of the proximal end of the casing toward its distal end, I first dispose in the casing reduced bore portion **26** a wheel-like member **29**, this member being wheel-like in the sense that it has a hub **30**, felly **31**, and radial spokes **32**. Preferably there are sixteen of the radial spokes **32** in the wheel member **29**, equally spaced apart circumferentially of the hub and felly, and forming between them sixteen segmental slots **33**, as in wheel fashion. The felly **31** of the wheel-like member **29** is of a diameter to fit snugly in the intermediate reduced bore portion **26** of the passageway **25** of the casing.

Next in order toward the downstream end of the casing, is the wire screen **34**, which is preferably disposed between the wheel-like member **29** and the part next described.

Lastly, I place in the passageway, the auxiliary finial break-up or dispersal member **35** which I have referred to herein for convenience and facility of description as a honeycomb member. The unique honeycomb member **35** is, as seen from Fig. 5, advantageously formed from a strip of soft metal, such, for example, as copper, a fragment of which is shown at **36** and having therein uniformly spaced rows of perforations **37** arranged longitudinally and transversely of the strip. The strip **36** is of a sufficient length so that it may be bent around upon itself into the rosette form best shown in Fig. 3 at **38**, this being a rosette form in the sense that the strip or ribbon **36** is bent sinuously to form the bows or foliations **39** and in the form of an annulus about the imaginary center of the member, these foliations forming sectors of the device and each providing a segmental slot **40** of which there are desirably twelve in the complete annulus or rosette which the member describes. The strip **36** may have one free end as at **41** and the radial element or barrier **42** of each foliation laps the adjacent radial element of the adjacent foliation so that they are of laminated form in the return-bend or sinuous winding of the ribbon **36**. When the complete annulus has been formed, the remainder of the strip or ribbon is bent around the outside of the segmental foliation or bow sectors, as at **43**, and the free end of this, as at **44**, may terminate adjacent the initial end **41** of the strip but on the outside or opposite side of the foliation.

As best seen in Fig. 4, the member **35** has its perforations **37** spaced and arranged both radially of the member and axially thereof, thus providing a honeycomb effect, the axial extent of the member being such as in this case

to provide for three axially aligned perforations in each. Furthermore, the peripheral loop 43 of the member 35 has perforations 37 therein which are arranged and spaced apart both axially of the member and peripherally thereof.

The honeycomb member 35 is arranged to have an overall diameter such that it fits snugly into the intermediate reduced part 26 of the passageway 25 of the casing, and, as so constructed and arranged, the honeycomb member 35 is of a resilient or springy character so that it may be slightly compressed to be inserted into the bore 26 and whereby after insertion it will expand slightly and grip the walls of this bore section of the passageway, thus not only retaining itself within the bore but also retaining therein the wheel-like member 29 and the screen 34.

By reason of the counterbore or further enlarged portion 27 of the passageway 25, the casing 13 at its distal end 28 is spaced from the honeycomb member so as to provide an annular space 45 between the distal end of the casing and the honeycomb member.

So constructed and arranged, a stream of water passing through the faucet 12 in the direction of the arrow 46 toward the downstream end of the casing, will be broken up into dispersed or discrete streams of water into which air is entrained through the ports 15 of the casing, thus forming a stream constituting a mixture of water and air. Thereupon, in accordance with the present invention, this already mixed stream of air and water strikes the wheel-like plate 29 which acts upon it to disintegrate the stream somewhat into sixteen parallel axially moving currents. The force of these currents is somewhat reduced by the screen 34. Next, the sixteen discrete currents of water strike the honeycomb member 35, and, since the latter has only twelve segmental slots therein, the sixteen discrete streams or currents of mixed water and air are now reduced to twelve.

This reduction in the number of streams of mixed water and air causes a further breaking up or mixture of the air and water, and this is finally completed by the passage of the mixed air and water through the perforations 37 of the honeycomb member 35, the stream passing back and forth through these perforations so that it is completely broken up and dispersed and a jet of water and air issues from the distal end 28 of the casing containing a maximized amount of air bubbles thoroughly disseminated throughout so as to cause the jet to be lightish in appearance and soft and light to the touch, and preventing splashing when the stream hits an impinged surface, as well as contributing to economy of use of soap or the like, and of hot water, the use of which by the present invention is minimized while attaining a high degree of efficiency thereof.

The invention is not intended to be limited to details of construction shown for purposes of exemplification,

and furthermore, it may not be essential at all times that all features of the invention be used conjointly, various combinations and sub-combinations being at times advantageously employed.

Such changes may be made as fall within the scope of the appended claims without departing from the invention.

What is here claimed is:

1. In a water and air mixer or the like, the combination with a casing having a through passageway therein, said passageway having a reduced bore and an enlarged bore, of a cylindrical honeycomb member held in said reduced bore and extending into the larger bore spaced therefrom, said member having a perforated axially extending outer wall and a plurality of radially disposed perforated axially extending elements extending inwardly from said outer wall, spaces between said radially disposed elements communicating one with another through said perforations in the radially disposed elements and communicating with the interior of said enlarged bore through the perforations in said outer wall.

2. The structure of claim 1 where the member is held by a friction fit in said reduced bore.

3. In a water and air mixer or the like, the combination with a casing having a through passageway therein, of a cylindrical honeycomb member held in said passageway, said member having an axially extending outer wall and a plurality of radially disposed perforated axially extending elements extending inwardly from said outer wall, said radially disposed elements terminating at their inner ends short of the center of said member and being spaced apart at said inner ends whereby to provide a central axially extending uninterrupted passageway through said member, said central passageway communicating with the spaces between said radially disposed elements between said terminations and said spaces communicating one with another through said perforations in the radially disposed elements.

4. The structure of claim 3 wherein the member is formed from a continuous generally perforated strip of somewhat soft metal, the radially disposed elements being formed as a sinuous return-bend formation of the strip and the outer wall by a final circular formation thereof.

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