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(54) Title: A NOZZLE ASSEMBLY FOR A FAUCET OR TAP

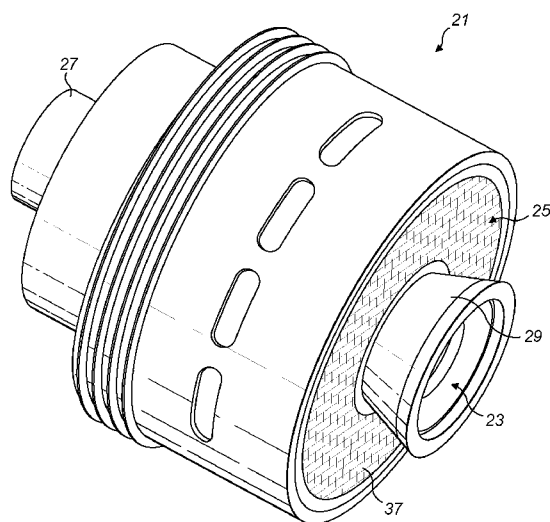


FIG. 3

(57) Abstract: The invention relates to a nozzle assembly for a tap, or faucet. The assembly includes a first nozzle and a second nozzle arranged side by side. The second nozzle having a flared discharge end which flares outwardly in front of the discharge end of the first nozzle so that the two discharge ends overlap. The nozzle assembly may be incorporated as a self-contained nozzle unit for fitting to a faucet. The nozzle assembly is particularly suitable for faucets designed to dispense water and foam soap separately over the basin of a sink.

A Nozzle Assembly for a Faucet or Tap

The present invention is concerned with a nozzle assembly for a faucet, in particular a
5 faucet which separately dispenses water and foam soap.

‘Combined’ faucets are sometimes installed in commercial washrooms, designed so that
they are able separately to dispense water and soap over the basin of a sink, as required
by the user. This avoids the need for separate stand-alone soap dispensers to be
10 provided in the washroom.

US2007/0152082A1 describes one of these combined faucets. Here, the soap is aerated
upstream of the nozzle and dispensed as a foam, rather than in liquid form. This reduces
soap usage per use cycle.

15 The object of the present invention is to try to provide an improved nozzle assembly for
a tap, or faucet. The nozzle assembly is intended primarily for dispensing foam soap and
water, although the invention is not limited as such.

20 According to the present invention, there is provided a nozzle assembly for a tap, or
faucet, the assembly comprising a first nozzle and a second nozzle arranged side by
side, the second nozzle having a flared discharge end which flares outwardly in front of
the discharge end of the first nozzle so that the two discharge ends overlap.

25 The invention provides a relatively compact nozzle assembly, effectively by arranging
the second nozzle so that it overlaps in front of the discharge end of the first nozzle.
This differs from the conventional twin-nozzle arrangement in US2007/0152082A1, in
which the discharge ends of the water nozzle and the foam soap nozzle are arranged
side-by-side, but do not overlap one another. The invention thus allows a larger total
30 discharge area to be packaged within a comparable-sized nozzle assembly.

The discharge end of the second nozzle may be conical (including frusto-conical), but this is not essential.

- 5 The flared discharge end of the second nozzle may be a separate part which fits onto the end of a supply duct forming part of the second nozzle. Thus the discharge end may be interchangeable with other discharge ends to vary the overlap between the discharge ends of the nozzles, according to specification. The discharge end may engage the duct section in a simple push-fit.

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- The first nozzle may at least partly surround the second nozzle. For example, the first nozzle may comprise two or more branches extending along opposite sides of the second nozzle: the discharge end of the first nozzle being formed by the respective discharge ends of the different branches. Alternatively, the first nozzle may have an
- 15 annular discharge end surrounding the second nozzle and the second may project out beyond an outer wall of the annular discharge end of the first nozzle. In any event, the second nozzle may be arranged so that it overlaps in front of the discharge end of the first nozzle on both sides of the second nozzle. This is a particularly compact arrangement. The second nozzle may be arranged so that the flared discharge end of the
- 20 second nozzle overlaps with the discharge end of the first nozzle around the entire perimeter of the second nozzle. This may conveniently be achieved by providing the second nozzle with a conical discharge end, for example.

- The first and second nozzle may share a common partition wall, which may divide the
- 25 discharge ends of the two nozzles, or at least divide a section of the nozzles. If the first nozzle has an annular discharge end, then this common partition wall may form the inner wall of the annular discharge end and at the same time constitute an outer wall of the second nozzle. The partition wall may project out beyond the end of an outer wall of the annular discharge end of the first nozzle, in which case the projecting end of the
- 30 common wall may define the flared discharge end of the second nozzle. Alternatively, the common wall may define a supply duct forming part of the second nozzle, and the

discharge end of the second nozzle may be provided as a separate part which fits onto the end of the supply duct.

5 The nozzle assembly may be incorporated as part of a self-contained nozzle unit for fitting to a faucet.

In another aspect of the invention, there is provided a faucet which comprises the nozzle assembly.

10 The faucet may be arranged for separately discharging foam and water. Thus, an arrangement may be provided comprising the faucet, the faucet being arranged for connecting an intake end of the first nozzle to a water supply and for connecting an intake end of the second nozzle to a supply of foam. The faucet may be installed next to the basin of a sink e.g. in a commercial washroom, with the first nozzle connected to a
15 water supply and the second nozzle connected to a supply of foam. The supply of foam may be a supply of foam soap, specifically.

A relatively large discharge area is particularly beneficial when dispensing foam from a faucet, because users often perceive a voluminous-looking foam product as being rich
20 and luxurious. This is particularly the case for foam soap, and this may be specified in hotels, health clubs etc. At the same time, utilising the invention to provide a relatively compact nozzle assembly allows for incorporation of the nozzle assembly in a more minimalist design of faucet.

25 The flared discharge end of the second nozzle advantageously decelerates the foam prior to discharge. A mesh screen may be provided over the discharge end of the second nozzle to act as a turbulator for aerating the decelerating foam immediately prior to discharge. This may improve foam consistency.

30 Embodiments of the invention will now be described with reference to the accompanying drawings, in which:

Figure 1 is a two-dimensional representation illustrating the concept of nozzles having overlapping discharge ends in accordance with the invention;

- 5 Figure 2 is a two-dimensional representation further illustrating the concept of nozzles having overlapping discharge ends;

Figure 3 is a perspective view of a nozzle unit incorporating a nozzle assembly in accordance with the invention;

10

Figure 4 is a part-sectional view through the nozzle unit shown in Figure 3;

Figure 5 is an exploded view of the main parts of the nozzle unit shown in Figure 3;

- 15 Figure 6 is a sectional view showing the nozzle unit fitted to the spout of a faucet, intended to dispense both foam soap and water over the basin of a sink;

Figure 7 is a sectional corresponding o Figure 6, illustrating discharge of foam through the nozzle assembly; and

20

Figure 8 is a sectional view corresponding to Figure 6, illustrating discharge of water through the nozzle assembly.

- Figure 1 is a two-dimensional representation intended to illustrate the basic concept of the invention. It depicts two nozzles arranged side-by-side. The first nozzle 1 has an open intake end 3 and an open discharge end 5. The second nozzle 7 likewise has an open intake end 9 and an open discharge end 11. The discharge end 11 of the second nozzle is a flared discharge end, which extends outwardly in front of the discharge end 5 of the first nozzle 1. The degree of overlap is given as ΔD . The outside diameter, D , of the two nozzles 1, 7 is thus the sum of their individual diameters ($d_1 + d_2$) minus the overlap ΔD – a more compact arrangement than if the discharge ends 5, 11 of the two
- 25
- 30

nozzles 1, 7 did not overlap ($\Delta D = 0$). The flared discharge end 11 is in this example asymmetric.

Figure 2 illustrates an arrangement in which the first nozzle 15 surrounds the second nozzle 13. The first nozzle 15 comprises two separate branches 15a, 15b which extend along opposites sides of second nozzle 13. Each branch has a respective discharge end 19a, 19b which together form the discharge end of the first nozzle 15. The second nozzle 13 is provided with a symmetric, flared discharge end 17, which extends outwardly in front of the respective discharge ends 19a, 19b of both of the branches 15a, 15b, so that the total overlap is $2 \Delta D$. This is a particularly compact scheme.

Figure 3 illustrates a nozzle 21 unit which incorporates a nozzle assembly according to the present invention.

The nozzle assembly comprises two nozzles: a foam nozzle 23 for dispensing foam soap and a water nozzle 25 for separately dispensing water.

The foam nozzle 23 comprises a cylindrical foam supply duct 27 and a flared discharge end 29 which push-fits onto the lower end of the supply duct 27 (see also Figure 4).

The water nozzle comprises an annular intake manifold 31 (Figure 4) which extends around the central foam supply duct 27 and a basket 33, the open upper end of which clips onto a mounting flange 35 immediately above the intake manifold 31.

The lower end of the basket 33 forms the discharge end of the water nozzle. It comprises an annular, self-supporting grille or screen 37, which extends between the outer wall 39 of the basket 33 and a central boss 41.

The foam supply duct 27 extends down through the inside of the basket 33 and projects out through the bottom of the basket 33 via a reverse counter-bore 43 in the central boss

41. The wall of the foam supply duct 27 thus acts as a common partition wall between the two nozzles 23, 25.

The reverse counter bore 43 forms an annular channel around the lower end of the foam supply duct which allows push-fitting of the discharge end 29 onto the lower end of the foam supply duct 27.

For ease of assembly, the nozzle unit 21 comprises four separate parts – shown in Figure 5 – which are then clipped together to form the nozzle unit 21. The first part 45 comprises the intake manifold 31, the central foam supply duct 27 and a flow regulator for the water (optional), which is housed inside an annular valve-housing 47 immediately above the intake manifold 31. The basket 33 constitutes a second part, the third part is a cylindrical external housing 49 which fits around the basket 33 and clips onto the mounting flange 35 above the intake manifold 31, and the fourth part is the discharge end 29, which push fits onto the end of the foam supply duct 27.

The upper end of the housing 49 is externally threaded for fitting to a faucet. Figure 6 shows the nozzle unit 21 screw-fitted to the spout 51 of a faucet designed for separately dispensing foam soap and water over the basin of a sink (sink not shown).

The foam soap may be generated using a conventional scheme in which liquid soap is aerated in a mixing chamber upstream of the foam nozzle 23. The mixing chamber (not shown) is preferably located close to the intake end of the foam supply duct 27 and is connected to the intake end of the foam supply duct 27 by a flexible pipe 53, which push-fits on to the end of the foam supply duct 27. The foam soap thus enters the nozzle unit 21 through the upper end of the foam supply duct 27, passes down through the duct 27 and then exits through the flared discharge end 29 of the foam nozzle 23 (see Figure 7). The foam is expanded as it passes through the flared discharge end 29, advantageously producing a relatively broad, slow jet of foam soap (represented by the dotted lines in Figure 7).

The water is supplied to the water nozzle 25 by a conventional mains water supply. The water enters the nozzle unit 21 through a series of inlet ports (not visible) on top of the flow regulator and passes via the flow regulator to the interior of the intake manifold 31. From here, the water is supplied to the inside of the basket 33 via a series of exit ports
5 55 running around the outside of the intake manifold 31 and is then discharged through the annular grille 37 at the lower end of the basket 33 to form an annular stream which passes around the discharge end 29 of the foam nozzle 23 (see Figure 8).

The water is aerated inside the basket 33 before it is discharged through the grille 37.

10 This is not essential, but is common practice generally for water nozzles on faucets. The air is introduced into the basket 33 in this case through a series of air intakes in the wall of the external housing, which communicate with a ring of air inlet ports 59 running around the perimeter of the basket 33 via an annular plenum chamber 61 formed between the basket 33 and the external housing 49.

15 The flared discharge end 29 of the foam nozzle 23 extends outwardly in front of the annular discharge end of the water nozzle 25, such that the two discharge ends overlap. This overlap is illustrated in Figure 5. This keeps the nozzle unit 21 relatively compact in size.

20 The nozzle unit 21 may be used in other applications, primarily where it is required to dispense foam and an aerated liquid separately.

25 The flared discharge end need not be frusto-conical. It may frusto-pyramidal, bell-shaped, stepped, fluted etc. The flare does not need to be symmetric (see Figure 2).

The flared discharge end of the foam nozzle may be provided with a mesh screen or grille across its outlet – intended to act as an auxiliary turbulator for the foam immediately prior to discharge.

CLAIMS

1. A nozzle assembly for a tap, or faucet, the assembly comprising a first nozzle and a second nozzle arranged side by side, the second nozzle having a flared discharge end which flares outwardly in front of the discharge end of the first nozzle so that the two discharge ends overlap.
2. A nozzle assembly according to claim 1, in which the flared discharge end is conical
3. A nozzle assembly according to claim 1 or 2, in which the first nozzle at least partly surrounds the second nozzle.
4. A nozzle assembly according to claim 3, in which the first nozzle has an annular discharge end surrounding the second nozzle, and the second nozzle projects out beyond the annular discharge end of the first nozzle.
5. A nozzle assembly according to any preceding claim, in which the two nozzles are divided by a partition wall.
6. A nozzle assembly according to claim 5, in which the partition wall forms the inner wall of the annular discharge end.
7. A nozzle assembly according to claim 6, in which the partition wall projects out beyond an outer wall of the annular discharge end.
8. A nozzle assembly according to claim 7, in which the projecting part of the partition wall is flared to form the discharge end of the second nozzle.

9. A nozzle assembly according to any of claims 1 to 7, in which the flared discharge end is formed as a separate part which push fits onto the end of a supply duct forming part of the second nozzle.

5 10. A nozzle assembly according to any preceding claim, in which the discharge end of the second nozzle is provided with a mesh screen or grille for introducing turbulence to a fluid passing through the discharge end.

11. A faucet provided with a nozzle assembly according to any preceding claim.

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12. An arrangement comprising a faucet according to claim 11, the second nozzle being connected to a supply of foam soap for discharging foam soap through the second nozzle as required, the first nozzle being connected to a water supply for discharging water through the first nozzle as required.

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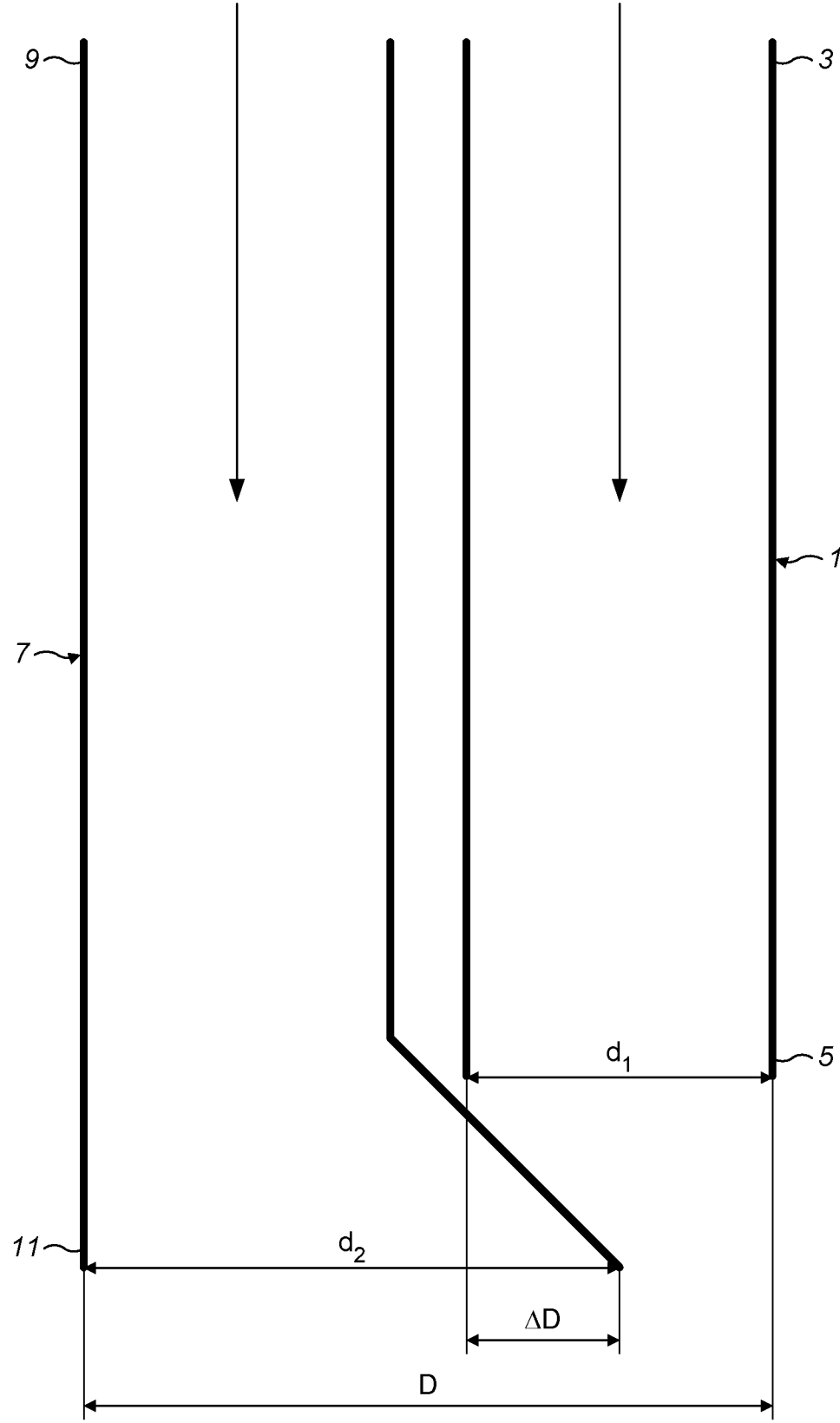


FIG. 1

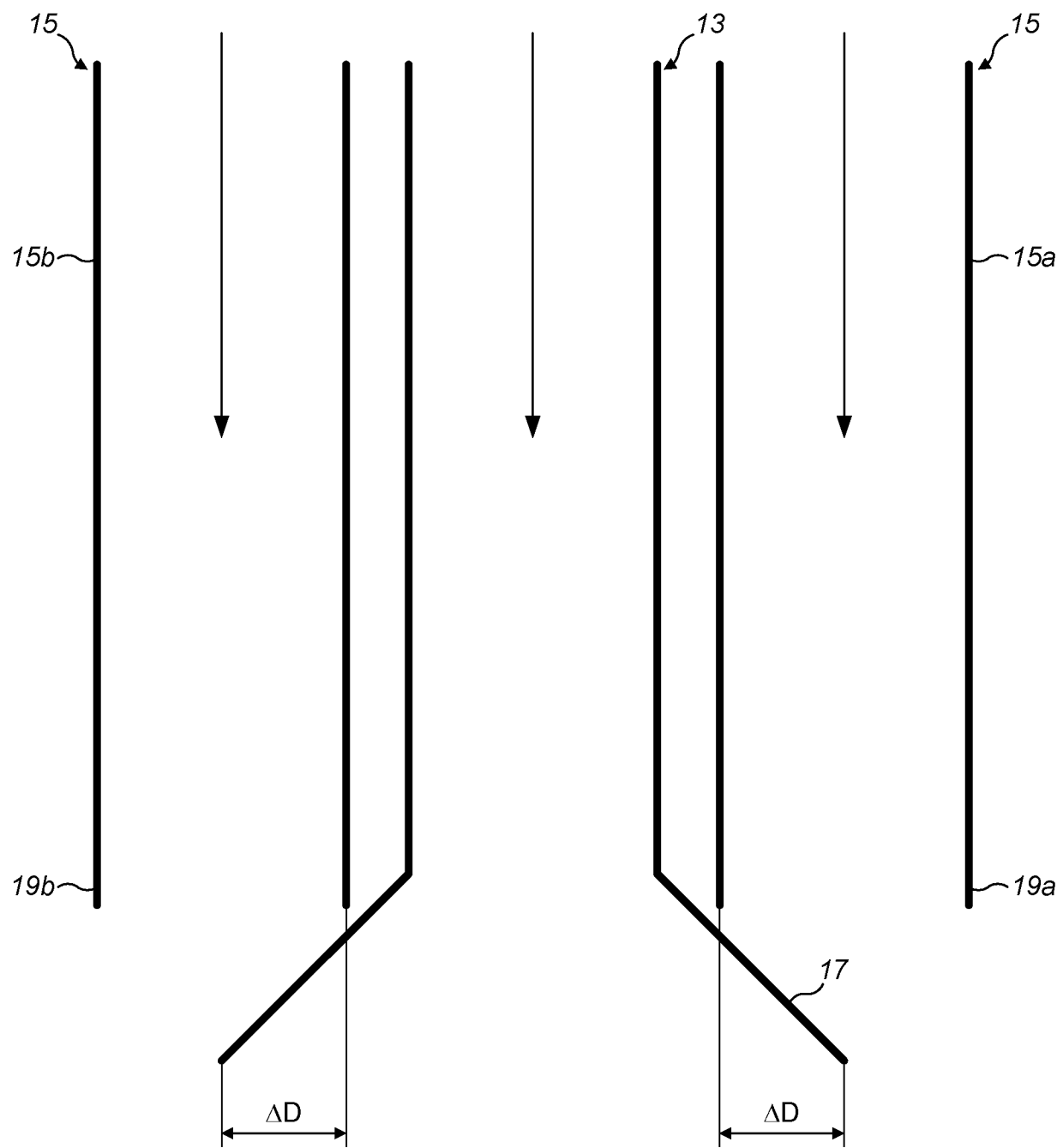


FIG. 2

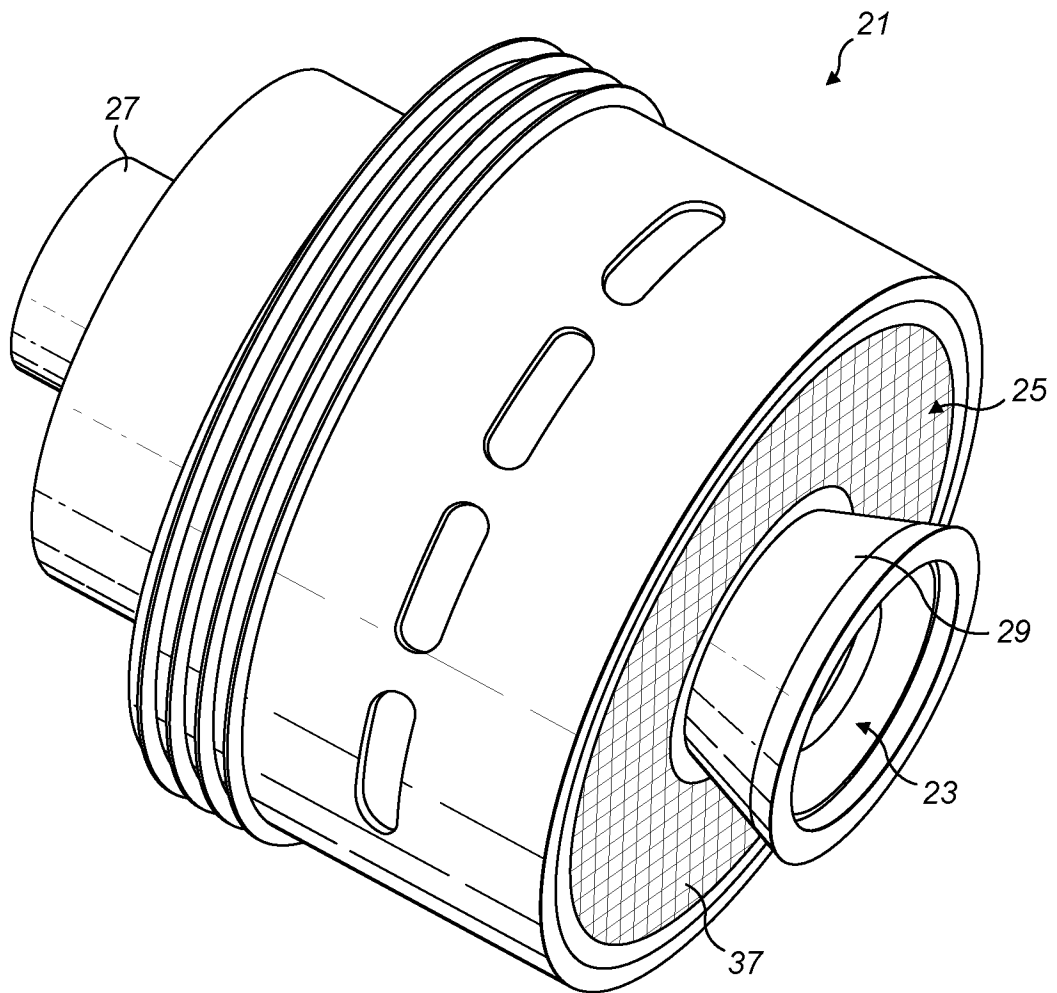


FIG. 3

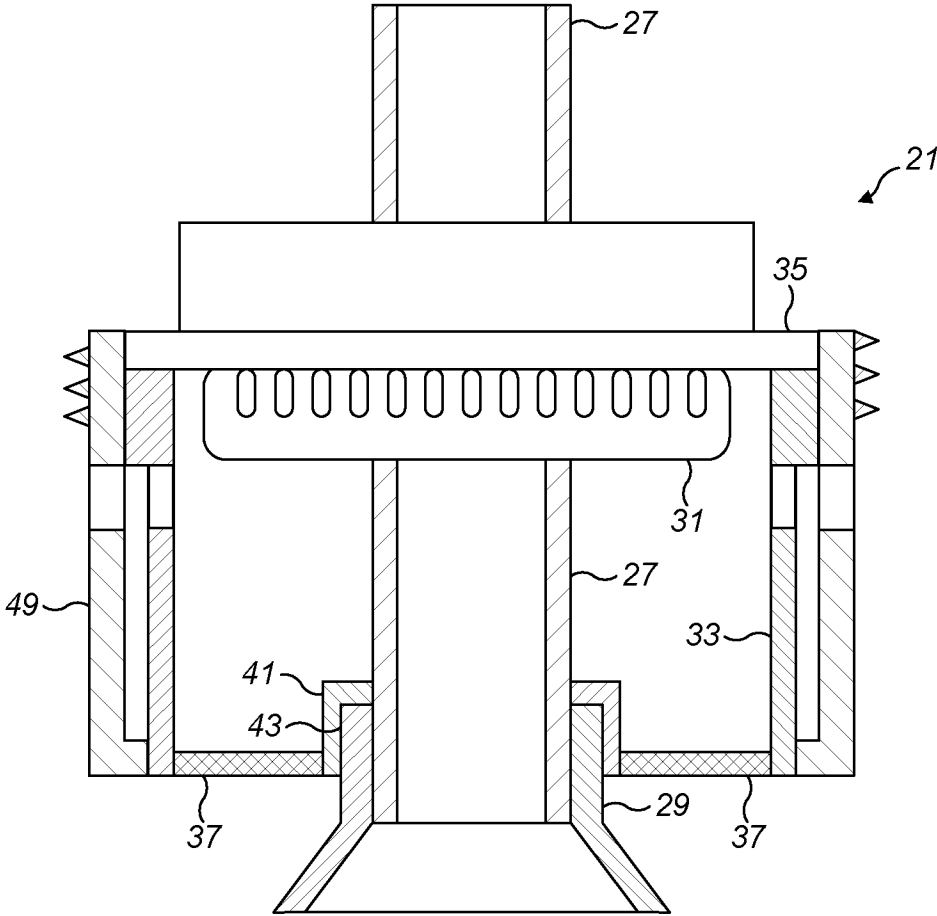


FIG. 4

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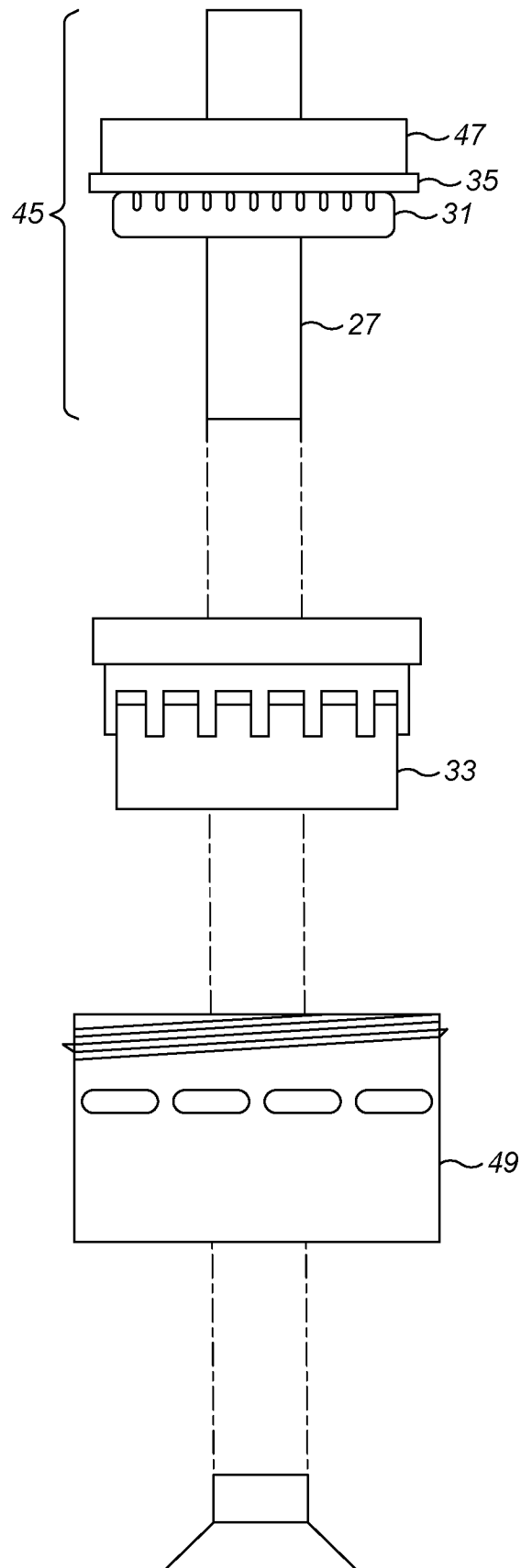


FIG. 5

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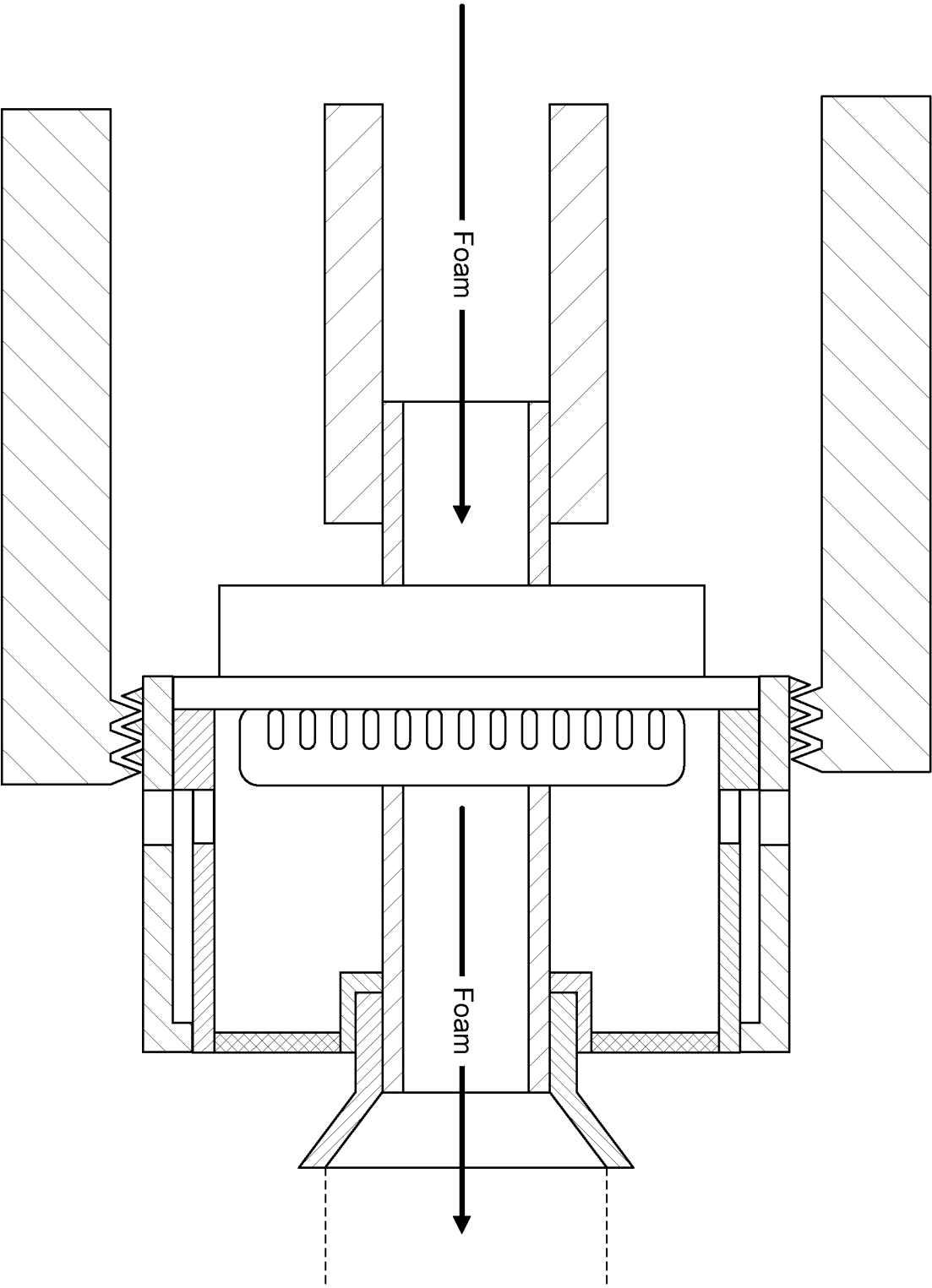


FIG. 7

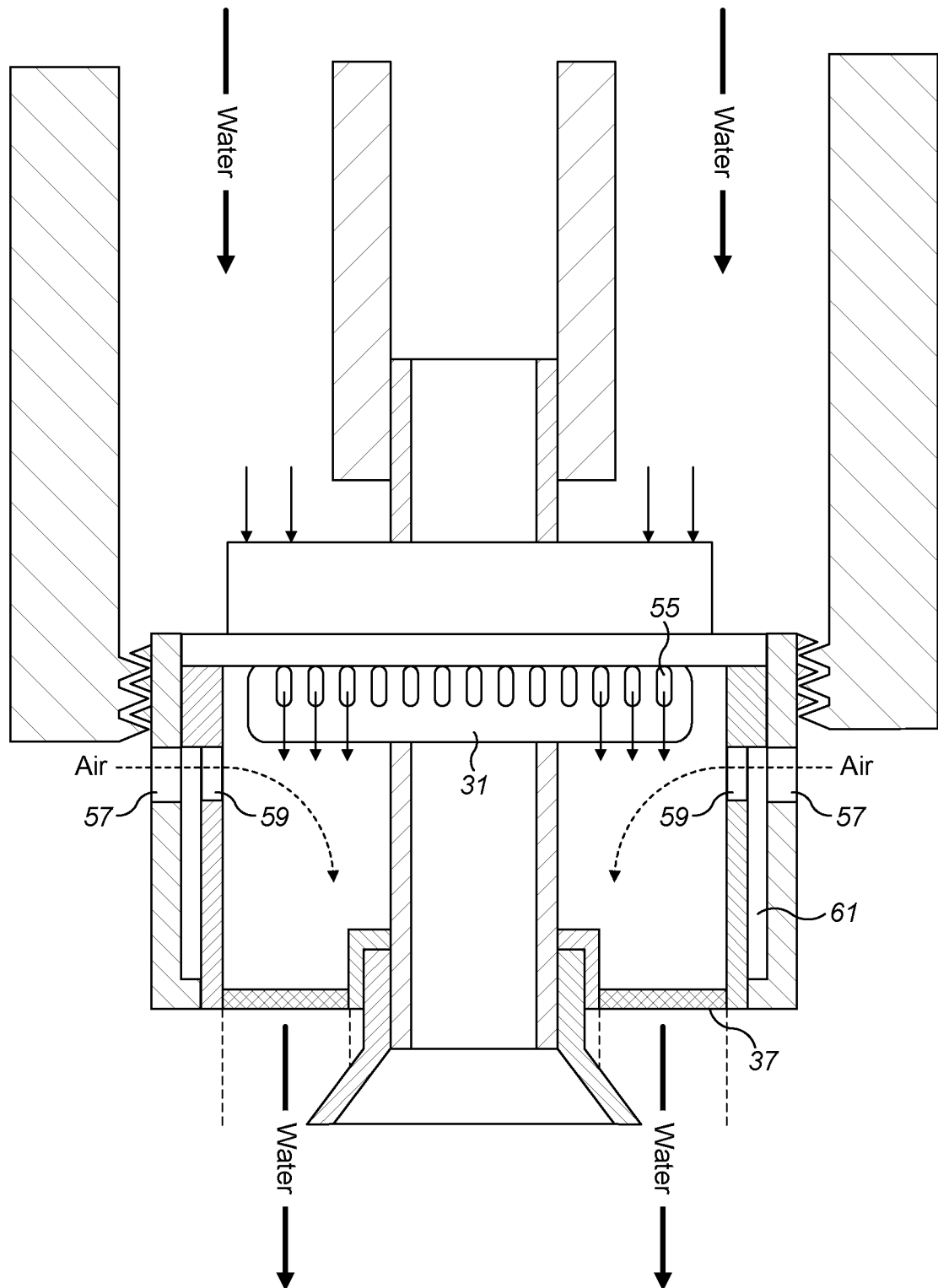


FIG. 8

INTERNATIONAL SEARCH REPORT

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A. CLASSIFICATION OF SUBJECT MATTER

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ADD. E03C1/04 A47K5/12 B05B7/08

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E03C B05B A47K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 462 752 A (KOTCHES FRANK A) 22 February 1949 (1949-02-22) the whole document	1-12
X	US 2002/033424 A1 (RIVERA SANTAGIO [US] ET AL) 21 March 2002 (2002-03-21) paragraphs [0002], [0069]; figures 2A,7	1,5,9, 11,12 8



Further documents are listed in the continuation of Box C.



See patent family annex.

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

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Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2462752	A	22-02-1949	NONE	

US 2002033424	A1	21-03-2002	AU 8099001 A	13-02-2002
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