(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization
International Bureau

(43) International Publication Date
2 August 2007 (02.08.2007)

PCT

(10) International Publication Number
WO 2007/086732 A1

(51) International Patent Classification:
B05B 11/04 (2006.01) *B05B 7/00* (2006.01)

(21) International Application Number:
PCT/NL2007/000024

(22) International Filing Date: 23 January 2007 (23.01.2007)

(25) Filing Language: Dutch

(26) Publication Language: English

(30) Priority Data:
1030993 24 January 2006 (24.01.2006) NL

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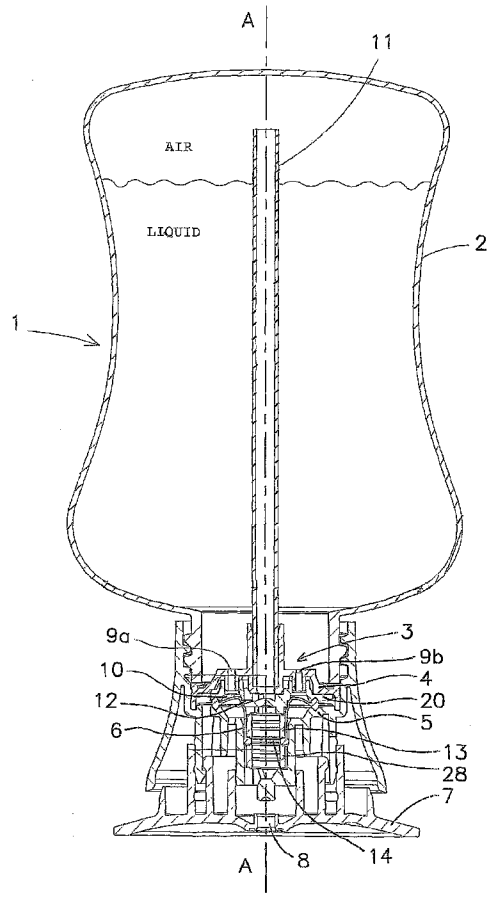
(81) Designated States *(unless otherwise indicated, for every kind of national protection available)*: AE, AG, AL, AM, AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LV, LY, MA, MD, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, SV, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States *(unless otherwise indicated, for every kind of regional protection available)*: ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, LV, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:
— *with international search report*

[Continued on next page]

(54) Title: SQUEEZE FOAMER



(57) Abstract: The invention relates to a dispensing device for dispensing a foam, comprising a manually compressible container (2) for storing a liquid and air, which container comprises an opening (3), a rigid housing to be fitted in or on the opening, the housing comprising an air passage (11) and a liquid passage (9) and a valve body (6) which, in a rest position, covers a mouth of the liquid passage and a mouth of the air passage in a sealing manner (4a, 4c) and which, during dispensing, opens the mouth of the liquid passage and the mouth of the air passage in order to allow mixing of air and liquid to take place in the dispensing passage (13). The invention is characterized in that the housing comprises a first housing part (4) and a second housing part (20), the first and the second housing parts being mountable in several position with respect to each other, the ratio between the amounts of liquid and air to be dispensed upon compressing the container being dependent on the position in which the first and second housing parts are mounted with respect to each other.

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SQUEEZE FOAMER

The present invention relates to a dispensing device for dispensing a foam and a foam-forming assembly for forming a foam. More in particular, the present invention relates to a pumpless squeeze foamer.

US 5,037,006 discloses a dispensing device for dispensing a foam. This known dispensing device comprises a manually compressible container for storing a liquid and air. The container comprises an opening in which a housing is fitted. In this housing, a liquid passage and an air passage are arranged which, during dispensing, are in communication with a dispensing passage which ends in a dispensing opening. The dispensing device furthermore comprises a valve body which, in a rest position, seals a mouth of the liquid passage and a mouth of the air passage. The valve body is a disc-shaped flexible element which is held at the circumference and is pressed against the mouths of the liquid passage and the air passage by means of a spring.

By compressing/squeezing the container, the pressure in the container is increased and thus the pressure in the liquid passage and the air passage. As a result of this elevated pressure, the valve body on the mouths of the air passage and the liquid passage gives way, and a stream of air from the air passage and a stream of liquid from the liquid passage come together in the dispensing passage. In the dispensing passage, the mixture of liquid and air is passed through a number of sieves in order to create a foam which is dispensed by the dispensing opening.

After the container has been squeezed, the container will essentially return to its original state, either by the elasticity of the container itself or by restoring means which are provided in order to return the container to its original state.

A drawback of the known dispensing device is the fact that the mixture of air and liquid is not optimum, as a result of which the

quality of the foam is not satisfactory. In addition, the structure of the known dispensing device is complex and comprises many components, which makes production complicated. In addition, the air passage and the liquid passage are bendy, as a result of which the speed of the liquid and air stream decreases, which consequently also leads to a reduction in the quality of the foam.

Another drawback of the known dispensing device is that the ratio air/liquid between the quantities of air and liquid, which are dispensed by squeezing of the container, respectively, is fixed. For each desired air/liquid ratio a separate dispensing device has to be designed which is especially adapted for this ratio.

It is an object of the present invention to provide a dispensing device for dispensing a foam which solves one or more of the abovementioned drawbacks.

The present invention provides a dispensing device which is characterized in that the housing comprises a first housing part and a second housing part, the first and the second housing parts being mountable in several position with respect to each other, the ratio between the amounts of liquid and air to be dispensed upon compressing the container being dependent on the position in which the first and second housing parts are mounted with respect to each other.

By providing a first housing part and a second housing part which can be mounted in different positions with respect to each other, it is possible to use the same parts to obtain different ratios between the amounts of air and liquid being dispensed when squeezing the container. This has the advantage that without the requirement of additional parts, the dispensing device can be made suitable for foaming foamable liquids with a desired quality, for instance a certain homogeneity and/or fineness of the foam. The ratio air/liquid required for a certain foam quality can also depend on the type of foamable liquid which is to be formed into a foam.

The air/liquid ratio, i.e. the ratio between the amount of air and the amount of liquid which is dispensed upon depressing/squeezing

the container, may be influenced by making the amount of air, the amount of liquid or a combination thereof, which is dispensed upon operating the dispenser, dependent on the position in which the first housing part is arranged with respect to the second housing part.

In one embodiment, the first housing part comprises a plurality of openings, the openings being a part of the liquid passage, the second housing part, dependent on its position with respect to the first housing part blocks one or more of the plurality of openings. In this way a easily adaptable assembly of first and second housing part is provided with which different ratios between air and liquid can be set.

In one embodiment, the first housing part comprises a plurality of openings arranged substantially equidistantly on a circle, and in which the second housing part comprises one or more openings and one or more blockages, the one or more openings and one or more blockages after assembly being aligned with the plurality of openings of the first housing part. In such embodiment the ratio between air and liquid to be dispensed upon operation of the dispenser, may be set by the angle with which the first housing part and the second housing part are mounted with respect to each other.

In one embodiment, after assembly, the plurality of openings of the first housing part are sealingly fitted in the one or more openings and blockages of the second housing part, respectively. In such embodiment no liquid can flow between the first housing part and teh second housing part. As a consequence, it is possible to use the space between the first housing part and the second housing part to aerate the container without it being required that the air flows through the liquid in the container.

In one embodiment, the first housing part comprises a plurality of openings, of which at least two have a different size. By varying the size of the openings in the first housing, for instance by providing three large and three small openings, the quantity of liquid dispensed by depressing the container can be set. This may be carried out by blocking one or more of the plurality of openings.

For instance, it is possible to block all three large openings or all three small openings. Also, it is possible to block, or not block, combinations of large and small openings.

In one embodiment, the mouth of the air passage and the mouth of the liquid passage are substantially annular and are arranged substantially concentrically with respect to one another.

By making the mouth of the air passage and the liquid passage of annular design, the amount of liquid to be dispensed and air to be mixed with the latter is distributed over as large a surface area as possible. As the two annular mouths are arranged substantially concentrically with respect to one another, an improved mixture between the liquid and the air stream is obtained.

In this respect it is remarked that the annular mouth of the liquid passage and/or air passage may be formed by one substantially annular mouth or by a number of openings which are arranged in a circle.

In one embodiment, the diameter of the annular mouth of the liquid passage is greater than the diameter of the annular mouth of the air passage. As a result thereof, the liquid which flows from the annular mouth of the liquid passage will flow past the annular mouth of the air passage when the container is being squeezed and a good mixture will be achieved.

In one embodiment, the valve body is substantially conical. The term conical is understood to mean that the valve body is of substantially circular-symmetrical design and that, in the direction of the centre axis of symmetry, the diameter is greater at one end of the valve body than at the other end of the valve body. The diameter may become increasingly smaller over the entire length, but may also increase or remain constant over part of the length of the conical shape.

In one embodiment, the valve body is at least partly made from a flexible, preferably elastic, material, for example silicone. By manufacturing the valve body from a flexible material, there is no

need to install any further moving components in the dispensing device in order to provide the valve function of the valve body. By using an elastic material, the valve body will return to its rest position after a foam has been dispensed as a result of the container having been squeezed. However, this return movement may also be effected in any other suitable way, for example by using a spring element or by pretensioning the valve body.

In one embodiment, the housing is substantially circular-symmetrical about a centre axis and/or the liquid to be dispensed, during dispensing, moves in a direction relative to the longitudinal direction of the housing. In such an embodiment, the liquid does not have to follow complicated flow paths in which the main direction of the liquid is reversed two times or more. This also allows a relatively simple construction of the dispensing device.

The invention further relates to a method for manufacturing a a squeeze foamer as claimed in claim 14.

The foam-forming assembly according to the invention may advantageously be applied in a squeeze foamer comprising a manually compressible container for storing a liquid and air, the foam-forming assembly mountable on or in an opening of said container.

In alternative embodiments of dispensing devices for dispensing a foam, a foam-forming assembly according to the invention may be arranged in or on a container holding a liquid and gas under pressure, for instance on a container with a foamable liquid and a propellant. Also, the foam-forming assembly may be combined with any other device which can provide a foamable liquid and gas under pressure, for instance a device having a liquid pump and a air pump or a device having a liquid supply and air supply which are continuously under pressure.

The invention will be explained in more detail below by means of an exemplary embodiment in which reference will be made to the attached drawing, in which:

Fig. 1a shows a cross section of an embodiment of a dispensing

device according to the invention;

Fig. 1b shows a cross section of the housing of Fig. 1a;

Fig. 1c shows a part of Fig. 1b in more detail;

Fig. 2 shows a top view of the first housing part of the embodiment from Fig. 1; and

Fig. 3 shows a top view of the third housing part of the embodiment from Fig. 1.

Fig. 1 (i.e. Figs. 1a, 1b and 1c) show a first embodiment of a dispensing device according to the invention. The dispensing device is denoted overall by reference numeral 1. The dispensing device 1 is of the squeeze foamer type. Such a squeeze foamer dispenses a foam through a dispensing opening as a result of a container being squeezed. After it has been squeezed, the container will return to the original state, either by the elasticity of the container itself or by restoring means which are provided in order to return the container to its original state.

The foam which can be formed using the dispensing device 1 may be suitable for various different uses, such as, for example, as soap, shampoo, shaving foam, washing-up liquid, sun-tan lotion, after-sun lotion, washing liquid, skincare products and the like.

The dispensing device is shown in the rest position, that is to say that the container is not being squeezed. Such a squeeze foamer can be operated by hand. However, it is also possible to push the container in using a device intended for the purpose.

The illustrated squeeze foamer can be held in a hand during delivery. It is also possible to install it or a similar dispensing device into a holder which is to be attached, for example, to the wall, similar to holder which can, for example, be found in public toilets.

The dispensing device 1 comprises a manually compressible container 2 containing a liquid and air. The container has an opening 3 in which a foam-forming assembly is fitted. The container 2 may have any suitable shape, for example a shape having an elliptical or a circular cross section.

The foam-forming assembly is substantially circular-symmetrical around a centre axis of symmetry A-A. The foam-forming assembly comprises a housing with a first housing part 4, a second housing part 20 and a third housing part 5. The third housing part 5 is attached to the container 2 by means of a threaded connection, the first housing part 4 and the second housing part 20 being clamped in a sealing manner between the container 2 and the third housing part 5. Alternatively, the third housing part 5 may be attached by means of a snap connection, a welded connection, an airtight seal or another suitable connection on or in the container 2. Furthermore, the foam-forming assembly comprises a substantially conical valve body 6 which is clamped near clamping section 6a between the second housing part 20 and the third housing part 5. The valve body 6 is made from a flexible, preferably elastic material. Silicone has proved to be a particularly suitable material for the valve body 6.

Relative to the liquid, the air is situated at the top of the container 2. This liquid and this air can be turned into a foam by means of the dispensing device 1, which foam is dispensed through a dispensing opening 8 in the sealing cap 7. In order to make mixing of the liquid and the air possible, a liquid passage is provided which runs from the liquid in the container via a plurality of openings 9a and 9b (see also Fig. 2) in the first housing part 4 to an annular mouth 10 (between the circular edges 4a and 4b) of the liquid passage.

For the air, an air passage is provided which runs from the air at the top of the container 2 via the tube 11 to an annular mouth 12 (between the circular edges 4a and 4c) of the air passage. In the rest position shown, both the annular mouth 10 and the annular mouth 12 are sealed by the valve body 6. When the two annular mouths 10, 12 are opened, that is to say not sealed by the valve body 6, the liquid passage and air passage are in communication with a dispensing passage. The dispensing passage runs through the central part of the valve body 6, in which a first sieve element 13 with two sieves 13a is arranged, through a central opening 14 of the valve body 6, through the third housing part 5 and the sealing cap 7 to the dispensing opening 8.

Generally, the air passage contains one or more air ducts which bring the air in the container in fluid communication with a mouth of the air passage which, in the rest position, is covered by the valve body. The liquid passage correspondingly contains one or more liquid ducts which bring the liquid in the container in fluid communication with the mouth of the liquid passage which, in the rest position, is covered by the valve body.

The annular mouth 10 of the liquid passage, the annular mouth 12 of the air passage and the dispensing passage are arranged substantially concentrically with respect to one another. The diameter of the annular mouth 10 is in this case larger than the annular mouth 12. Furthermore, the inner diameter of the central passage 14 in the valve body 6 is smaller than the diameter of each of the annular mouths 10 and 12.

Now, the valve body 6 will be discussed in more detail. At the point 6a, the valve body 6 is sealingly clamped between the second housing part 20 and the third housing part 5. Furthermore, the valve body is retained by the annular edges 4a and 4c against the conical surface 5a. In order, in the rest position, to achieve a better sealing along the circular edges 4a and 4c, the valve body 6 is fitted with some axial pretension between the second housing part 20 and the third housing part 5.

The valve body 6 has an arcuate section 6c which is located, at least partly, in the annular mouth 10 of the liquid passage. This arcuate section 6c has the advantage that, as a result of the liquid column in the container and the liquid passage which, in the rest position, presses on the valve body, an improved sealing is obtained at point 4a. This is due to the fact that the arcuate section 6c is pushed in, as a result of which the sides of the arch are pushed sideways. As a result, the outside of the arcuate section 6c is pushed towards the clamp 6a, and the inside of the arcuate section 6c is pushed against the circular edge 4a as well as against the circular edge 4c, which increases the sealing action.

In this case, it is particularly advantageous that the cross section

of the arcuate section 6c which extends inside the annular mouth 10 is not of a symmetrical design, but that a top of the arcuate section 6c is situated relatively close to the edge 4a, i.e. that the top of the arcuate section 6c is closer to the edge 4a than to the edge 4b. As a result of this shape, the arcuate section 6c will, under the pressure of the liquid column, in particular press against the edge 4c, resulting in a good sealing here. As the annular mouth 10 is sealed on the other side by the clamp at section 6a, the mouth is efficiently sealed off by the valve body without a great clamping force being required.

In an alternative embodiment in which the valve body 6 is not clamped to one of the sides of the mouth, a top can be provided near both edges of the mouth in order to achieve the advantageous very strong clamping effect of the arcuate section of the valve body on both edges. The cross section of the arcuate section of the valve body then resembles the back of a 2-humped camel, the two tops of the valve body representing the humps of the camel.

On the side situated on the outside of the clamping section 6a, the valve body 6 has a sealing lip 6b which serves as a valve for an air inlet valve which allows air into the container 2 when a certain reduced pressure is created in the container 2 as a result of the liquid in the container 2 being dispensed. The sealing lip 6b normally seals the passage of the container 2 towards the outside, but will allow a flow of air from outside into the container 2 through the opening 15 when there is a reduced pressure in the container 2.

The dispensing device 1 furthermore comprises a sealing cap 7. Relative to the third housing part 5, this sealing cap 7 can be moved at least between an open position, as shown in Figs. 1 and 2, and a closed position (towards the top in the drawing, relative to the housing). In the closed position, a projecting section 5b of the third housing part 5 is moved into the dispensing opening 8 so that no foam can be dispensed through the dispensing opening 8. The air inlet passage which, via the valve body 6b and the opening 15, leads to the interior of the container 2, is sealed when the sealing cap is placed in the closed position. The sealing cap 7 still has a

number of upwardly pointing fingers which engage with complementary fingers on the third housing part 5. These intermating fingers form further sealings in the closed position.

Near its outer periphery, the first housing part 4 has a free projecting lip which extends obliquely in the direction of the container 2 and inwards (towards the centre line A-A). This lip 29 serves as a sealing element for sealing the connection between the first housing part 4 and the container 2. Such a sealing is also known as a crab claw, but has not yet been used in a foam-dispensing device, in particular not in a squeeze foamer.

When the container 2 is squeezed in the open position of the sealing cap, the pressure in the container 2 will increase. Initially, the increasing pressure will ensure that the arcuate section 6c of the valve body 6 is pressed more strongly against the annular edge 4a, resulting in an improved sealing between the valve body 6 and the annular edge 4a. When the pressure in the container 2 is increased further by squeezing the latter, the arcuate section 6c will at some point move down, as a result of which it will detach from the annular edge 4a. This will lead to a stream of liquid flowing through the gap between the annular edge 4a and the valve body 6. As a result of the increasing pressure in the container 2, the valve body 6 will subsequently also become detached from the annular edge 4c, making it possible for air and the stream of liquid to flow between the annular edge 4c and the valve body 6. Here, the liquid will thus be mixed with the air. Since both the liquid and the air will flow through a narrow circular gap, a good mixture between the air and the liquid will result. This mixture of air and liquid will then flow through the small sieves 13a, 28a, which will produce a(n improved) foam. This foam will flow down through the dispensing passage towards the dispensing opening, where it will be dispensed.

The valve body 6 thus as it were successively rolls over the annular edges 4a and 4c during dispensing as a result of which the liquid and air can flow via the dispensing passage to the dispensing opening, creating a foam in the dispensing passage. It has been found that this rolling effect is advantageous for forming a foam.

Fig. 2 shows a top view of the first housing part 4. This first housing part 4 is substantially disc shaped and comprises a central opening 23 surrounded by six openings, three openings 9a having a larger diameter than the other three openings 9b. While foam is being dispensed and also during aeration of the container 2, air will flow through the central opening 23. Depending on the desired air/liquid ratio, one or more of the openings 9a and 9b are provided in order to allow liquid to flow through them while the squeeze foamer is being operated.

Fig. 3 shows a top view of the second housing part 20. This second housing part 20 comprises three openings 24 which can be brought in line with either the large openings 9a or the small openings 9b of the first housing part 4, depending on the position of rotation in which the second housing part 20 is placed on the first housing part 4. The second housing part 20 furthermore comprises three blind holes 25 which, depending on the position of the first housing part 4 relative to the second housing part 20, will either seal the large openings 9a or the small openings 9b.

Fig. 1 clearly shows, on the left-hand side, that the sleeve 4e of the first housing part 4, in which the opening 9a is provided, is positioned in the sleeve, in which the opening 24 is provided, while the sleeve 4f, shown on the right-hand side in the figure, in which the opening 9b is provided, is sealed by the blind hole 25. During operation of the squeeze foamer 1, the liquid will therefore only flow through the three large openings 9a.

If the first housing part 4 and the second housing part 20 were now to be rotated 60 degrees with respect to one another, the openings 24 would be lined up with the small openings 9b, while the large openings 9a would be sealed by the blind holes 25. This would result in less liquid flowing from the openings 9b during operation of the squeeze foamer, whereas the amount of air which flows through the riser 11 as a result of the container 2 being squeezed would remain virtually the same. Thus, the air/liquid ratio will change depending on the position of rotation of the first housing part 4 relative to the second housing part 20.

It will be clear to the person skilled in the art that this construction offers many possibilities for changing the air/liquid ratio by varying the number of openings in the first housing part which are optionally sealed by a blind hole as well as by varying the size of the respective openings.

A further possibility to influence the air/liquid ratio is through the adjustment of the smallest diameter of the air passage, for example by adjusting the inner diameter of the riser 11 or by adjusting the diameter of the central opening 23 in the first housing part 4. The options which have been given for adjusting the air/liquid ratio can also be used to affect the total amount of foam which is formed when the container 2 is squeezed.

In the present embodiment of Fig. 1, only two positions are possible: one as shown in Fig. 1, where the liquid is dispensed through the three large openings 9a, and a position in which the first housing part 4 is rotated by 60 degrees relative to the second housing part 20 and in which the liquid is thus dispensed through the three small openings 9b. When fitting the various components of the squeeze foamer 1 onto the container 2, a choice will be made regarding the position in which the first housing part 4 would be fitted with respect to the second housing part 20, for example depending on the liquid.

The second housing part 20 is clamped between the clamping section 6a on the valve body 6 and the first housing part 4. In this embodiment, the valve body 6 is thus clamped between the second housing part 20 and the third housing part 5. The first housing part 4 comprises sleeves 4e/4f, in which the openings 9a and 9b, respectively, are provided. These sleeves 4e/4f are placed in an opening 24 of the second housing part 20 in a sealing manner.

The liquid which flows through the opening 9a to the annular mouth 10 is thus not able to reach a space 21 which is situated between the first housing part 4 and the second housing part 20. This space 21 connects the space 22 just above the air inlet valve 6b to the interior of the riser 11. As a result, the air which enters through the air inlet valve 6b during aeration of the container 2 following

the dispensing of a certain amount of liquid, will successively flow through the spaces 22 and 21 and through the riser 11 into the top section of the container 2. Herewith, the air is prevented from passing through the liquid in the container 2 prior to the aeration of the container 2 to avoid that a foam may already be formed in the container 2 as the air required for aerating the bottle flows through the liquid.

By forming a space 21 using the second housing part 20, the production of foam in the container 2 during aeration is thus prevented in a constructionally simple manner.

Fig. 3 furthermore shows that the central section and the outer section of the second housing part 20 are connected to one another by bridge parts 26. These bridge parts 26 result in the mouth 12 being formed by three openings, which openings are arranged in a ring shape. Such an embodiment of the mouth 12 with several openings is deemed to be a substantially annular mouth as referred to in the context of the present patent application.

In the embodiments from Fig. 1 a second sieve element 28 comprising two small sieves 28a is provided. Depending on the foam to be formed and the liquid which is used for this purpose, this second sieve element 28 may be used to further affect the quality of the foam to be dispensed. In general, the provision of additional sieve elements will result in the foam becoming more refined and also more homogeneous. Depending on the application, it is thus possible to choose one of the sieve elements 13, 28 or the combination thereof, it also being possible to modify the type of small sieve which is used in the respective sieve elements 13, 28 to suit the application. In an alternative embodiment, the sieve elements 13, 28 can also be designed as a single sieve element, half of this single sieve element extending into the valve body.

In one possible embodiment, one of the small sieves is replaced by a small plate having one or more relatively small holes, giving the sieve element the function of an expansion space.

A further advantage of the embodiment of the dispensing device 1 is

that the annular mouths of the liquid passage and the air passage distribute the liquid and the air over a relatively large surface area, resulting in a relatively good mixing. This advantage may also achieved when one or both of the annular mouths extend over less than 360 degrees or are subdivided into several openings which together form an interrupted annular opening. Such embodiments are considered to fall within the scope of protection of the invention.

In an alternative embodiment, it is possible to design the valve body to be stiff and to press or pull it against the second housing part 20 using a spring element. When the pressure in the container is increased, the spring will then be compressed or extended, respectively, creating a gap between the valve body 6 and the second housing part 20. As a result, it will be possible to form and to dispense a foam. However, in such an embodiment the advantageous rolling effect described above will not occur.

Another advantage of the embodiment of the dispensing device 1 is that as a result of the central opening 14 which is provided in the valve body, the stream of liquid and/or the stream of air does not have to turn corners of 90 degrees or more. By providing this opening 14, the stream of liquid and the stream of air can maintain their speed, thus resulting in a better mixture of the liquid and the air. In this case, it is furthermore advantageous that the valve body 6 is designed to be substantially conical as a result of which the speed of the stream of liquid and the stream of air is maintained even more effectively. In addition, the conical shape has the advantage that a sieve element assisting the production of foam can be fitted in the cone. By fitting it in the conical shape, the total height of the housing is reduced, Generally, the illustrated embodiment of the dispensing device has the advantage that the liquid to be dispensed moves in a direction relative to the direction of the centre axis of symmetry while it is being dispensed. This is made possible by the specific construction of the dispensing device and aids the production of a foam of the desired quality.

Yet another advantage of the embodiment of the dispensing device 1 is that the arcuate section 6c of the valve body 6 supports the

sealing between the second housing part 20 and the valve body 6. As a result, a better sealing is achieved in the rest position, i.e. when the container 2 is not being squeezed, thus reducing the risk of liquid leaking from the dispensing device. In addition, the arcuate section 6c creates a pressure threshold value, at which the valve body becomes detached from the second housing part 20, ensuring an improved foam of constant quality.

The above-described embodiments of a squeeze foamer have been described in a position where the cap points downwards. All references to above and/or below are made relative to this position. The dispensing device is designed to be used in this position. In this case, the sealing cap 7 is designed such that the dispensing device can stand on this sealing cap 7, whereas the container 2, due to its convex top, is not suitable to stand on this top. However, it is possible to provide an embodiment in which the dispensing device can indeed be turned upside down (inverted with respect to the position shown) in order to dispense foam and/or rest. Such embodiments are deemed to fall within the scope of protection of this invention.

It will be clear to the person skilled in the art that all individual features which have been mentioned with respect to one of the aspects can also be applied in an embodiment according to one of the other aspects of the invention. Such embodiments are thus deemed to fall within the scope of protection of the invention.

CLAIMS

1. Dispensing device for dispensing a foam, comprising a manually compressible container for storing a liquid and air, and a foam-forming assembly to be attached in or on an opening in the container for forming a foam, the foam-forming assembly comprising a housing having an air passage and a liquid passage, each of which ending in a mouth and being in communication with a dispensing passage which ends in a dispensing opening, and a valve body which, in a rest position, covers the mouth of the liquid passage and the mouth of the air passage in a sealing manner in order to prevent a flow from the liquid passage and the air passage to the dispensing passage, and which, during dispensing, opens the mouth of the liquid passage and the mouth of the air passage in order to allow mixing of air and liquid to take place in the dispensing passage,
characterized in that the housing comprises a first housing part and a second housing part, the first and the second housing parts being mountable in several positions with respect to each other, the ratio between the amounts of liquid and air to be dispensed upon compressing the container being dependent on the position in which the first and second housing parts are mounted with respect to each other.

2. Dispensing device according to claim 1, in which the first housing part comprises a plurality of openings, the openings being a part of the liquid passage, and in which the second housing part, dependent on its position with respect to the first housing part blocks one or more of the plurality of openings.

3. Dispensing device according to claim 1, in which the first and second housing parts are substantially disc-shaped, and are mountable with respect to each other in a number of rotational positions.

4. Dispensing device according to claim 1, in which the first housing part comprises a plurality of openings arranged substantially equidistantly on a circle, and in which the second housing part comprises one or more openings and one or more blockages, the one or more openings and one or more blockages after

assembly being aligned with the plurality of openings of the first housing part.

5. Dispensing device according to claim 4, in which after assembly the plurality of openings of the first housing part are sealingly fitted in the one or more openings and blockages of the second housing part, respectively.

6. Dispensing device according to claim 2, in which the first housing part comprises a number of tube-shaped portions in each of which one of the plurality of openings is arranged, the tube shaped portions being fitted during assembly on tube-shaped portions of the second housing part.

7. Dispensing device according to claim 1, in which the first housing part comprises plurality of openings, of which at least two have a different size.

8. Dispensing device according to claim 1, in which the first housing part comprises a plurality of openings, and in which after assembly, dependent on the position of the first housing part with respect to the second housing part, one or more of the plurality of openings are blocked.

9. Dispensing device according to claim 1, in which after assembly there is a space between the first housing part and the second housing part, the space being in communication with an air inlet for aeration of the container and with the air passage.

10. Dispensing device according to claim 1, in which the mouth of the air passage and the mouth of the liquid passage are substantially annular and are arranged substantially concentrically with respect to one another.

11. Dispensing device according to claim 10, in which the diameter of the annular mouth of the liquid passage is greater than the diameter of the annular mouth of the air passage.

12. Dispensing device according to claim 10, in which the

dispensing passage is arranged concentrically with respect to the annular mouth of the liquid passage and the air passage.

13. Dispensing device according to claim 1, in which the dispensing device is substantially circular-symmetrical about a centre axis of symmetry and the liquid to be dispensed, during dispensing, moves in a direction relative to the direction of the centre axis of symmetry.

14. Method for providing a squeeze foamer for forming a foam, the squeeze foamer comprising a first housing part and a second housing part being mountable in several positions with respect to each other, the method comprising the step of determining a position in which the second housing part has to be mounted with respect to the first housing part dependent on the ratio air/liquid which has to be obtained upon actuation of the squeeze foamer.

15. Method according to claim 14, in which the method comprises determining the position on the basis of the type of foamable liquid which is used in a container of the squeeze foamer.

16. Foam-forming assembly for forming a foam, comprising a housing having an air passage and a liquid passage, each of which ending in a mouth and being in communication with a dispensing passage which ends in a dispensing opening, and a valve body which, in a rest position, covers the mouth of the liquid passage and the mouth of the air passage in a sealing manner in order to prevent a flow from the liquid passage and the air passage to the dispensing passage, and which, during dispensing, opens the mouth of the liquid passage and the mouth of the air passage in order to allow mixing of air and liquid to take place in the dispensing passage,
characterized in that characterized in that the housing comprises a first housing part and a second housing part, the first and the second housing parts being mountable in several position with respect to each other, the ratio between the amounts of liquid and air to be dispensed upon compressing the container being dependent on the position in which the first and second housing parts are mounted with respect to each other.

17. Dispensing device for dispensing a foam comprising a foam-forming assembly according to claim 16, in which the liquid passage and air passage are connected with a liquid source comprising a liquid under pressure and a gas source comprising a gas under pressure, respectively.

18. Dispensing device for dispensing a foam comprising a foam - forming assembly according to claim 16, in which the liquid passage and the air passage are in fluid communication with a container comprising a foamable liquid and a gas, in particular air, wherein the foamable liquid and gas are pressurized or can be pressurized.

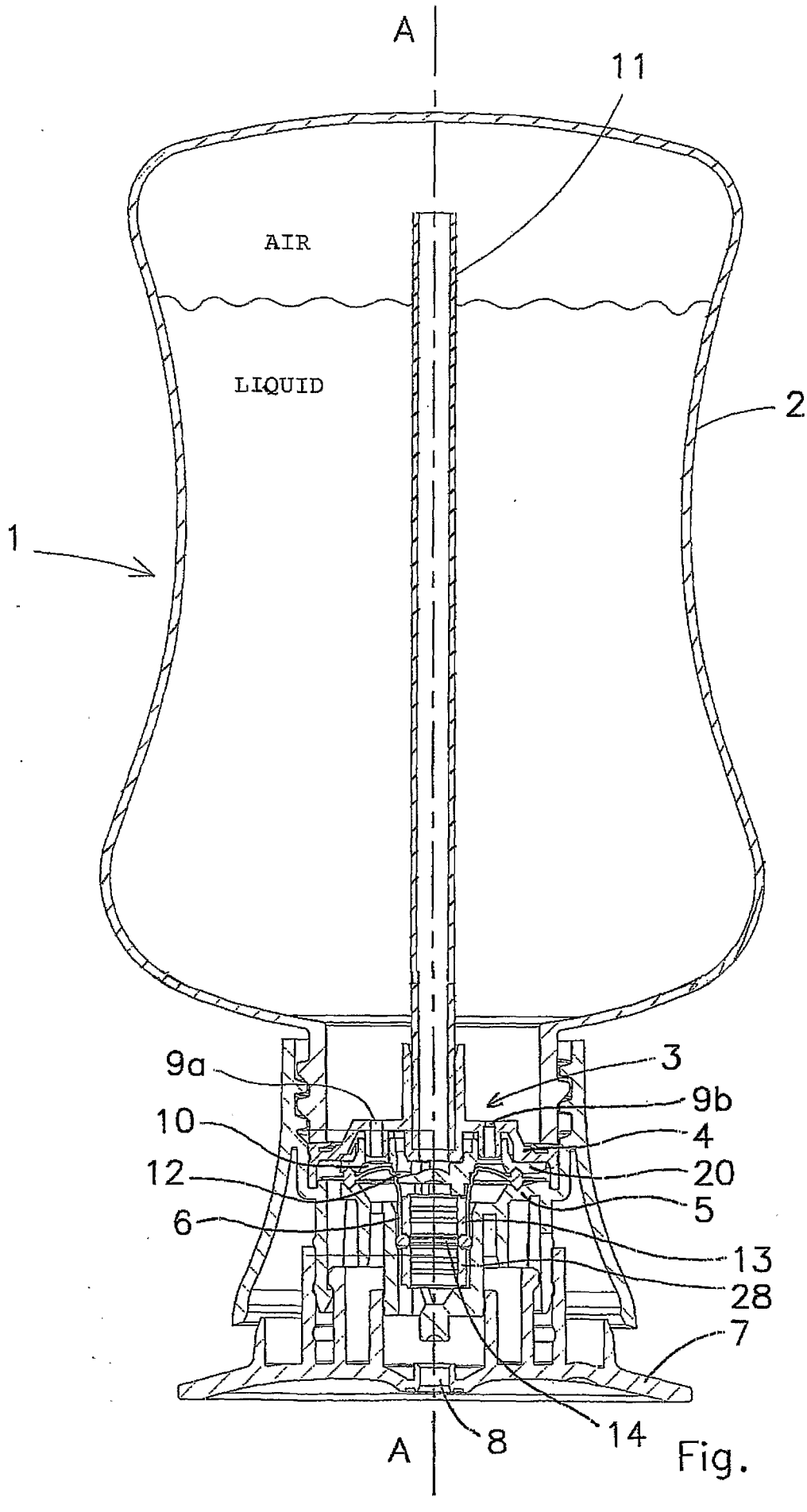


Fig. 1a

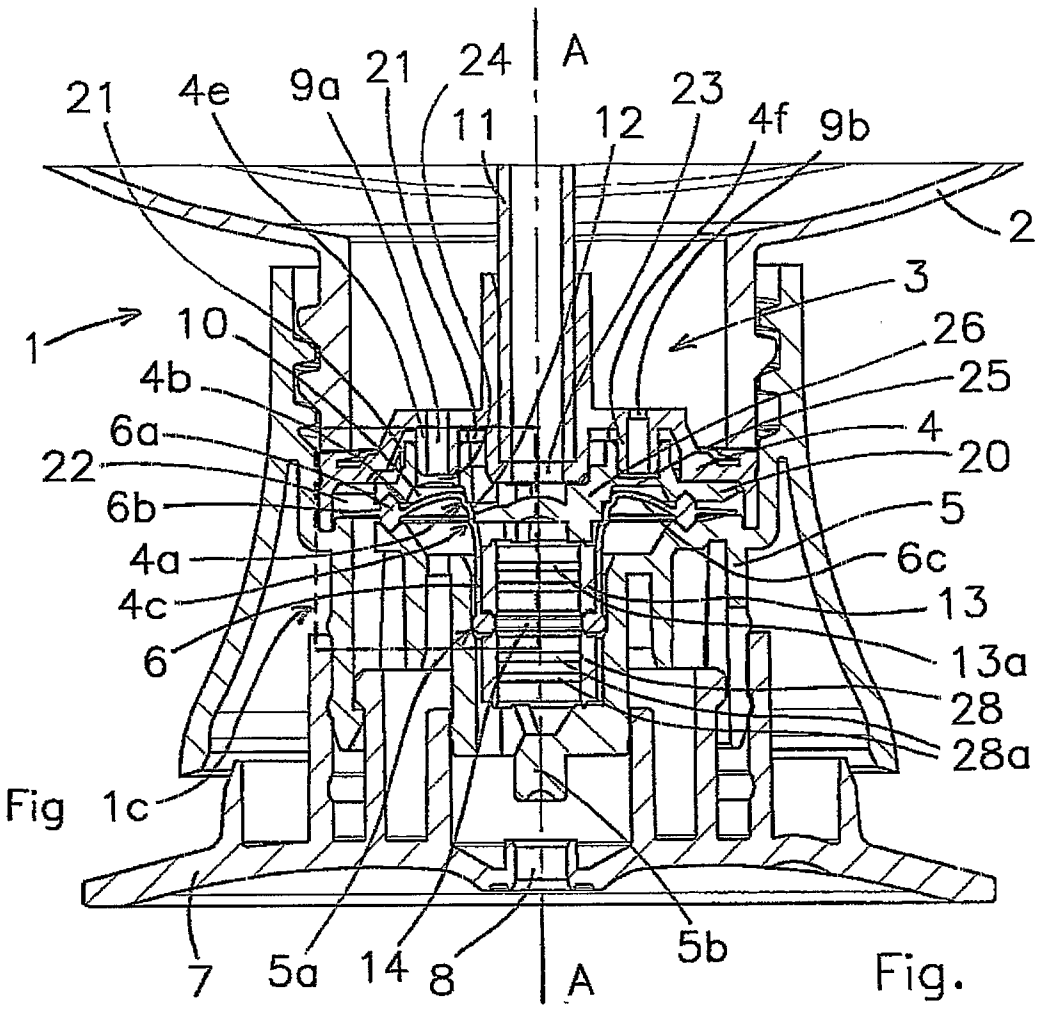


Fig 1c

Fig. 1b

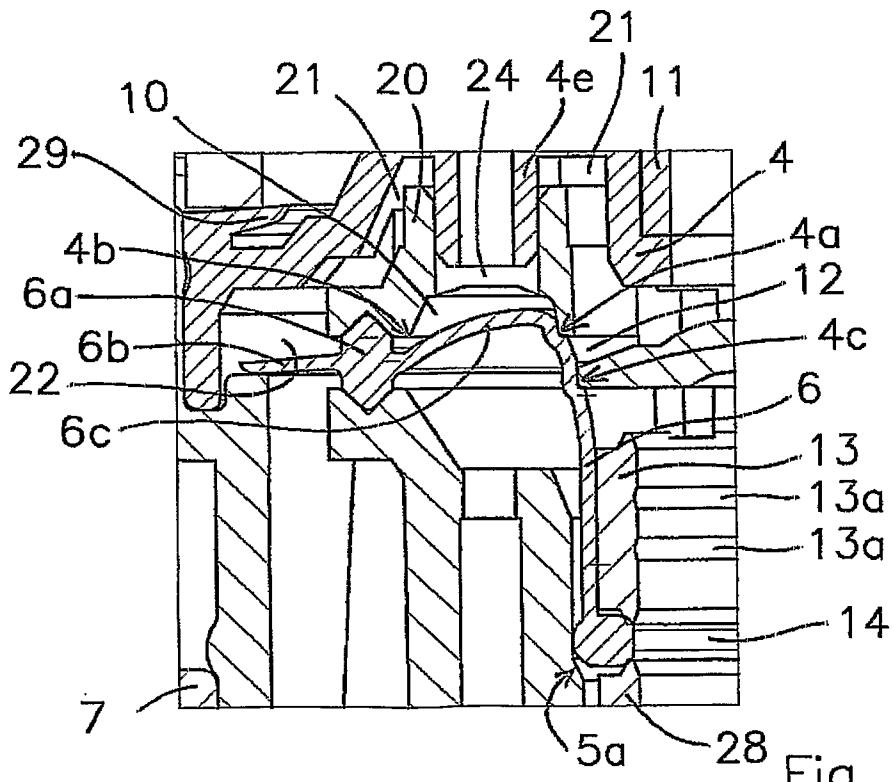


Fig. 1c

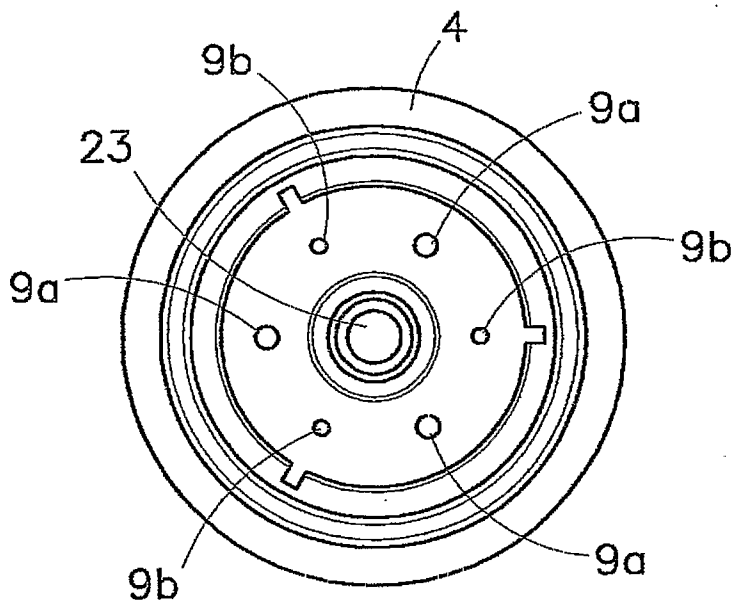


Fig. 2

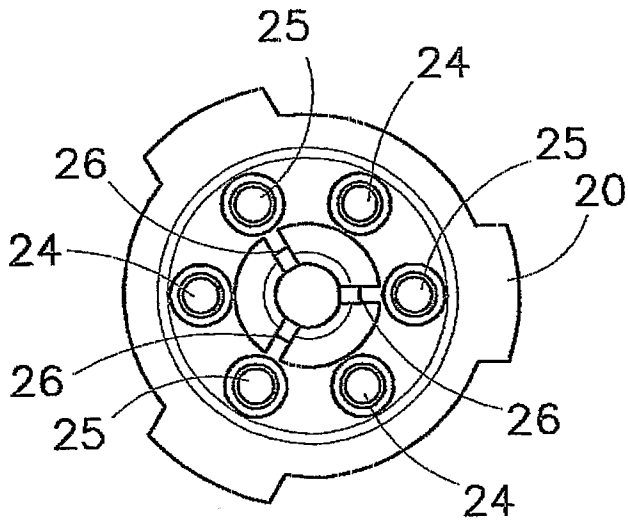


Fig. 3

INTERNATIONAL SEARCH REPORT

International application No
PCT/NL2007/000024

A. CLASSIFICATION OF SUBJECT MATTER
INV. B05B11/04 B05B7/00

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
B05B

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 practical, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 4 773 570 A (WORKUM ET AL) 27 September 1988 (1988-09-27) column 9, line 67 - column 10, line 15	14,15
A		1,16
A	US 2002/153389 A1 (CREAGHAN DAVID MICHAEL ROSS ET AL) 24 October 2002 (2002-10-24) paragraph [0031]	1,14,15

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

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"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
3 April 2007	17/04/2007

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Barré, Vincent

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/NL2007/000024

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 4773570 A	27-09-1988	NONE	
US 2002153389 A1	24-10-2002	NONE	