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(54) **Cleaning implement with detergent reservoir**

(57) A cleaning implement such as a brush has a main body (4) with a plurality of bristles (10) depending from an underside thereof, and a fluid-containing reservoir (6), with an opening provided in a lower region of the body in communication with the reservoir (6) and closed by a valve (22, 122), with a depressible valve ac-

tuating button located on the body (4) such that its axis of movement makes an angle of less than about 10° to a lateral direction, and controlling opening of the valve by a pressure response or by an actuating member.

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Description

Background of the Invention

[0001] The present invention relates to a cleaning implement, particularly but not exclusively a brush, of a type having a detergent reservoir from which detergent can be dispensed.

[0002] A wide variety of types of domestic brushware are available for cleaning items such as pots and pans tableware, crockery etc. One particular type of brush which has enjoyed considerable popularity in recent years has a main bristle-carrying body and an upper reservoir for containing a detergent, with a valve arrangement provided to allow dispensing of the detergent. Typically, these brushes are dimensioned to fit comfortably in the palm of the hand, and are commonly referred to as "pump palm brushes". One such brush is disclosed in European Patent Publication No. EP-A-0198389. Other designs are disclosed in applicant's US Patent Nos. 6287037 and 6224283. difficult to operate whilst the user is gripping the brush in a manner appropriate for cleaning. There is therefore a need for a brush of this general type which has a more ergonomic design.

[0003] The prior designs include actuating rods or similar which extend from the actuating button on the top of the brush to a lower dispensing opening. The invention also seeks to provide a more efficient or effective valve arrangement.

Summary of the Invention

[0004] According to a first aspect of the present invention there is provided a cleaning implement comprising a body with cleaning means on an underside of thereof, and a fluid-containing reservoir, with an opening provided in a lower region of the body in communication with the reservoir and closed by valve means, with a depressible valve actuating button located on the body such that its axis of movement makes an angle of less than about 10° to the lateral direction.

[0005] This arrangement allows the implement to be grasped with the dispensing button conveniently disposed at a position corresponding to the natural position of the fingers or thumb. In the most preferred arrangement the valve actuating button is arranged on a side region of the body so that a substantially lateral depression of the button controls the opening of said valve means.

[0006] The implement is typically a brush provided with bristles, but might equally have some other abrasive or cleaning means disposed on the underside.

[0007] Preferably, an interior of the actuating button is in fluid communication with said valve means, and wherein the valve means comprise a valve body which overlies a main valve seat and is adapted such that increased pressure on depression of said actuating button moves the valve body out of the valve seat. More spe-

cifically, the valve body may have a portion in fluid communication with the actuating button and an opposite portion in fluid communication with the fluid-containing reservoir whereby a pressure differential exists across the valve body on depression of the actuating button.

[0008] The button comprise a resilient diaphragm formed for example of an elastomer. It may be formed in a band of resilient material which is stretched to surround the body.

[0009] The valve body may have a lower portion which sits in said valve seat, and a portion of relatively enlarged lateral dimension spaced from the valve seat, a lower surface being in fluid communication with the actuating button, and an upper surface in fluid communication with the reservoir. An upper valve seat may be provided against which the valve body bears an upward movement, making a fluid tight seal therewith, a small clearance being provided therebetween when the valve body is in the main valve seat.

[0010] The valve body may also have an opening therethrough closed by a ball valve which opens in response to reduced internal pressure on release of the button after fluid dispensing. Valve retaining means may be provided having a resilient element against which a portion of the valve body bears and which is deformed on opening of the valve thereby providing a valve return force, for example this may be in the form of a ring with resilient fingers against which the valve body bears.

[0011] The interior of the actuating button may communicate with the valve through a laterally extending passage defined in the body. The body of the implement may define an internal well within which the valve body is disposed and with the valve seat disposed at a bottom of the well, and the reservoir communicating with an upper region of the well, and the lateral passageway communicating with a lower region of the well. The upper valve seat may be defined by a lower region of the ring disposed part way up the well.

[0012] In an alternative embodiment a passage is defined in the body extending between the reservoir and the dispensing opening, the valve means comprising a valve body which obscures said passage and which is displaceable on depression of the button. The valve body comprises a slide-like member provided with an opening therein near the inner end of the member which in the open position is aligned with the dispensing passage, the outer end of the member being acted on by the button. A return spring may be provided to urge the valve body to a closed position. The button here may also comprise a resilient depressible diaphragm, with an end of the slide-like member disposed adjacent an inner side of the diaphragm, and the interior of the resilient diaphragm in fluid communication with the interior of the reservoir, whereby depression thereof increases the internal reservoir pressure.

[0013] In a further aspect the invention resides in a cleaning implement comprising a body with cleaning means on an underside thereof and a fluid-containing

reservoir, with an opening provided in a lower region of the body in communication with the reservoir and closed by valve means, wherein a depressible actuating button is provided an interior of which is in fluid communication with the valve means, the valve means being adapted to open in response to increased internal pressure on depression of the actuating button.

[0014] Here the valve means comprises a valve body which overlies a valve seat, the valve body having a lower portion which sits in said valve seat and on pressure-receiving portion of relatively enlarged lateral dimension spaced from the seat.

[0015] In a still further aspect the invention resides in a brush comprising a body with a fluid containing reservoir having a substantially cylindrical sidewall and an upper region in which the reservoir is located of domed form and with a plurality of bristles depending from a lower region of the body, wherein an opening is defined in a lower region of the body in communication with the reservoir and closed by valve means, a depressible valve actuating button being located on the sidewall for depression in a lateral direction.

Brief Description of the Drawings

[0016] Embodiments of the invention are now described by way of example only with reference to the following drawings in which:

Figure 1 shows a brush in accordance with a first embodiment of the invention;
 Figure 2 shows the brush of Figure 1 in an exploded condition;
 Figure 3 is a cross-sectional view along the line C-C in Figure 1 with the valve in a closed position;
 Figure 3A is an inset showing the valve of Figure 3 in the closed valve position;
 Figure 4 is a cross-sectional view of the brush when dispensing fluid;
 Figure 4A is an inset showing the valve of Figure 4 when open;
 Figure 5 is a cross-sectional view immediately after fluid dispensing;
 Figure 5A is an inset showing the valve of Figure 5;
 Figure 6 is a cross-sectional view of an alternative embodiment with its valve in a closed position;
 Figure 7 is a cross-sectional view of the embodiment of Figure 6 with the valve in an open position; and
 Figure 8 is an exploded view of this alternative embodiment.

Detailed Description of the Preferred Embodiments

[0017] Turning to Figure 1, this shows a cleaning implement in the form of a brush generally indicated 2 having a main body 4. The main body 4 comprises a main housing part 5 and a detergent-containing reservoir 6

which may be unitarily formed or more preferably formed as separate parts as illustrated. Although the invention is primarily illustrated in relation to a brush, it is equally applicable to other utensils where the bristles are replaced by some other appropriate abrasive or cleaning medium, such as an abrasive pad or sponge-like member.

[0018] The main housing 5 has a lower block region 8 which is provided with a large number of bristles 10 protruding from blind openings in the block region 8, as is conventional. The main housing 5 is provided with a pair of upstanding annular walls (Figure 3) including an outer wall 12 constituting a side wall of the main body 4 and an inner wall 14. The inner wall 14 defines a central well 15 in which a valve assembly is arranged as discussed further below. The reservoir 6 has the form of a hollow upwardly domed body with a lower tubular portion 16 with an axial opening which extends into the well. It may be arranged that the exterior of the tubular portion 16 has a male screw thread cooperating with a female screw thread in the interior of the inner wall 14 to form a fluid-tight releasable connection therewith. This allows the reservoir 6 to be removed from the main body 4 for refilling purposes. Other connection mechanisms such as a simple push fit can equally be utilised.

[0019] Extending downwardly from the central well is a dispensing passageway 18 which opens out on the lower surface of the block 8 amongst the bristles 10. The upper end of the passageway has a short portion of widened diameter 20 constituting a main valve seat. A valve body 22 sits within the base of the central well 15. The valve body has a disc-like portion 23 with a lower narrow tubular region 24 depending therefrom and a short upper tubular portion 26 upstanding therefrom. The lower tubular region 24 has a domed lower end which sits in the main valve seat 20 with the enlarged disc-like portion 23 spaced from the well bottom. This disc-like portion 23 constitutes a pressure-receiving surface, as is discussed further below. An outer edge of the disc-like portion is spaced from the side of the well by a small pre-defined clearance. An air vent 27 is formed in the domed lower end. A metal ball 29 sits within the lower tubular region 24 closing the air vent 27 in the manner of a check valve and is constrained within the tubular region by an upper inwardly extending ridge 31 which forms an opening which is smaller than the ball diameter.

[0020] The inner wall 14 of the main housing 5 further defines internally a step 28 within which is seated a valve return ring 30. This has a ring-like form with a number of resilient fingers 32 extending radially towards the ring centre. As can be seen for example in Figure 3 the upper edge of the tubular portion 26 of the valve body abuts the fingers 32. The upper surface of the disc-like portion 23 of the valve body is spaced from the underside edge of the ring 30 by a small clearance.

[0021] The main housing 5 also defines an internal radial passage 34 extending from a lower region of the central well at a position below the disc-like portion 23

of the valve body 22 to the exterior. Around the outer surface of the outer wall 12 there is disposed a band or collar 36 of resilient material, typically a material such as an elastomer. This collar 36 has upper and lower inwardly directed flanges 38, 40. The collar 36 is stretched around the outer wall 12 with the flanges 38, 40 sitting in respective grooves 42, 44 in the wall 12 forming a fluid-tight seal therewith. In the region opposite the passageway 34 the collar 36 is formed with a domed region serving as a diaphragm button 46.

[0022] The operation of the brush 2 is now described. With the reservoir 6 removed, the reservoir 6 is filled with the fluid to be dispensed, usually a cleansing fluid such as detergent. The reservoir 6 is then fitted into the main housing by a screw fit as described above. Figure 3 shows the brush 2 with the valve in the closed position. More particularly, the lower end of the tubular part 24 of the valve 22 sits in the valve seat 20, preventing fluid from exiting through the passage 18. The ball 29 blocks the opening 27 in the valve body. In this position fluid is able to pass over the upper side of the valve 22 through the small clearance between the ring 30 and the edge of disc-like portion and the opposed inner surface of the inner wall 14 of the well, reaching the bottom of the well, as indicated by the arrows in Figures 3 and 3A.

[0023] To dispense fluid the button 46 is depressed in the lateral direction, as indicated in Figure 4. This increases the pressure within the passageway 34 and well 15, creating a pressure differential across the valve 22 and urging this upwards, as the air in the reservoir above the detergent is compressed. In this respect the clearance between the disc edge 23 and the well is important. The clearance is arranged so that a significant frictional effect occurs between the cleansing fluid and the wall of the well whereby little if any fluid passes up through this clearance. The exact clearance is dependent on the fluid viscosity but for a common detergent might be in the region of 0.5mm. This pressure differential is enhanced by the large surface area of the underside of the disc-like portion 23 subjected to the pressure increase. This upward movement opens the main valve seat 20, so that further depression of the button 46 forces detergent in the bottom of the well to drain out of the passage 18 onto the base of the block 8 and the bristles 10 where it can come into contact with the object to be cleaned. After a small amount of upward movement the upper edge of the disc-like portion 23 engages the ring 30 forming a seal therewith. Preferably, it is arranged that this occurs only part way through the depression of the button 46 whereby continued depression forces more detergent from the well, until the internal pressure within the passageway 34 is equal to the external pressure. At the same time the upper edge of the tubular portion 26 of the valve has moved up against the fingers 32 of the valve retaining ring 30 deforming the fingers upwardly, one such deformed finger being visible in Figure 4 and 4A. With the internal pressure equalised after dispensing of detergent the valve body 22 falls under the com-

bined action of its own weight and the return force of the fingers 32 to engage in the main valve seat 20.

[0024] After the dispensing of the detergent, the button 46 is released, returning through its own resilience to its original shape, as indicated in Figure 5. This creates a region of low pressure within the passage 34 and lower region of the well below the valve 22. As the valve seat 20 is sealed by the end of the tubular portion 24 the metal ball 29 is forced out of the lower opening due to the pressure differential across it, whereby air from the exterior passes through the centre of the valve 22 and into the reservoir, thereby equalising pressure.

[0025] The described and illustrated arrangement requiring lateral depression of the button located on the sidewall 12 is preferred, as this allows the brush to be held in a very natural manner, with the button 46 conveniently disposed exactly where the fingers or thumb would naturally lie. However, it will be appreciated that the button could equally be disposed at a somewhat higher or lower position on the body of the brush, with appropriate modification of the position of the passage 34. It is found that locating the button 46 at any position whereby its axis of movement is up to about 10° from the horizontal or lateral direction, either up or down from horizontal, is possible whilst still yielding the ergonomic benefits described.

[0026] A second embodiment is illustrated in Figures 6, 7 and 8. Many of components are identical to those described above and will not be described in detail here, with like reference numerals indicating the same parts. The brush indicated generally as 102 has a main body 104 including housing 105 with a lower block 108 supporting bristles 10. An upper fluid reservoir 6 is joined to the main housing 105 for example through a screw fit. Here, the main body 104 is shown as a separate part to the block 108, but equally the two could be unitarily formed. An axial fluid-dispensing passage 18 extends through the block 108 and main body 104.

[0027] The valve arrangement of this embodiment is rather different. Instead of using a pressure response to control the valve member, the valve is mechanically controlled. A flat elongate blade-like member 122 is arranged to slide within a radially extending opening in the main housing 105. The inner end region of the member 122 constitutes a valve body having an elongate opening 123 which when aligned with the top of the passage 18 allows fluid to leave the reservoir, and otherwise sealing the passage 18. The outer end region of the member 122 constitutes an actuator and is provided with an enlarged head 125 which lies immediately inside the resilient button 46 of the collar. A locating lug 127 upstands from the top of the member 122 fitting into a corresponding guide groove in the main housing 105. A helical return spring 129 overlies the member 122 sitting between the head 125 and a spring seat on the main housing 105 serving to urge the valve body to the closed position of Figure 6. A retaining clip 131 upstands from the inner end of the member 122, preventing the member 122

from moving radially out of the main body.

[0028] Figure 6 shows the closed position, with the passage 18 closed by the end of the valve body. To dispense fluid the diaphragm button 46 is depressed in the lateral direction. As the diaphragm button 46 is inwardly deformed this increases the pressure internally, compressing the air above the detergent in the reservoir. As the opening 123 in the valve body becomes aligned with the passage 18 this forces an amount of detergent to exit the passage 18. Note that if the user's finger is held on the button 46 fluid will not simply drain from the reservoir, as there is no air return passage. It is only once the button 46 is released, and the passage 18 partly obscured by the valve body that air is able to flow back up the passage 18 into the reservoir, equalising the internal pressure.

[0029] In this respect the exact position of the opening 123 relative to the outer end of valve body is important, with the requirement that there is just a small degree of alignment between the opening 123 and passage 18 as the button nears the end of its return travel, this being the point at which air is able to enter the reservoir without the detergent from draining out.

[0030] Again, although a laterally extending member 122 is shown, with appropriate modification this could be disposed above or below the horizontal by about 10° without compromising the ergonomic benefits.

Claims

1. A cleaning implement comprising a body with a cleaning means on an underside thereof, and a fluid-containing reservoir, with an opening provided in a lower region of the body in communication with the reservoir and closed by valve means, with a depressible valve actuating button located on the body such that its axis of movement makes an angle of less than about 10° to a lateral direction.
2. A cleaning implement according to claim 1 wherein the valve actuating button is arranged on a side region of the body so that a substantially lateral depression of the button controls the opening of said valve means.
3. A cleaning implement according to claim 2 wherein an interior of the actuating button is in fluid communication with said valve means, and wherein the valve means comprises a valve body which overlies a main valve seat and is adapted such that increased pressure on depression of said actuating button moves the valve body out of the valve seat.
4. A cleaning implement according to claim 3 wherein the valve body has a portion in fluid communication with the actuating button and an opposite portion in fluid communication with the fluid-containing reservoir whereby a pressure differential exists across the valve body on depression of the actuating button.
5. A cleaning implement according to claim 4 wherein the valve body has a lower portion which sits in said valve seat, and a portion of relatively enlarged lateral dimension spaced from the valve seat, a lower surface being in fluid communication with the actuating button, and an upper surface thereof being in fluid communication with the reservoir.
6. A cleaning implement according to claim 3 wherein the actuating button comprises a resilient diaphragm.
7. A cleaning implement according to claim 5 wherein an upper valve seat is provided against which the valve body bears an upward movement, making a fluid tight seal therewith, a small clearance being provided therebetween when the valve body is in the main valve seat.
8. A cleaning implement according to claim 3 wherein the valve body is provided with an opening therethrough closed by a ball valve which opens in response to reduced internal pressure on release of the actuating button after fluid dispensing.
9. A cleaning implement according to claim 3 wherein valve retaining means are provided having a resilient element against which a portion of the valve body bears and which is deformed on opening of the valve thereby providing a valve return force.
10. A cleaning implement according to claim 9 wherein the valve retaining means comprise a ring-like member having inwardly directed resilient fingers against which the valve body bears.
11. A cleaning implement according to claim 7 wherein the interior of the actuating button communicates with the valve through a laterally extending passage defined in the body.
12. A cleaning implement according to claim 11 wherein the body defines an internal well within which the valve body is disposed with the main valve seat disposed at a bottom of the well, the reservoir communicating with an upper region of the well, and the lateral passageway communicating with a lower region of the well.
13. A cleaning implement according to claim 12 wherein the upper valve seat is defined by a lower region of the ring disposed part way up the well.
14. A cleaning implement according to claim 1 wherein

the reservoir is defined in a separate enclosure releasably connected to the body.

15. A cleaning implement according to claim 4 wherein the resilient diaphragm is formed in a band of resilient material which is stretched to surround the body.
16. A cleaning implement according to claim 1 wherein a passage is defined in the body extending between the reservoir and the dispensing opening, the valve means comprising a valve body which obscures said passage and which is displaceable on depression of the button.
17. A cleaning implement according to claim 16 wherein the valve body comprises a slide-like member provided with an opening therein near the inner end of the member which in the open position is aligned with the dispensing passage, the outer end of said member being acted on by the button.
18. A cleaning implement according to claim 16 wherein a return spring is provided to urge the valve body to a closed position.
19. A cleaning implement according to claim 17 wherein the button comprises a resilient depressible diaphragm, with an end of the slide-like member disposed adjacent an inner side of the diaphragm.
20. A cleaning implement according to claim 19 wherein the interior of the resilient diaphragm is in fluid communication with the interior of the reservoir, whereby depression of the diaphragm increases the internal reservoir pressure.
21. A cleaning implement comprising a body with cleaning means on an underside thereof and a fluid-containing reservoir, with an opening provided in a lower region of the body in communication with the reservoir and closed by valve means, wherein a depressible actuating button is provided an interior of which is in fluid communication with the valve means, the valve means being adapted to open in response to increased internal pressure on depression of the actuating button.
22. A cleaning implement according to claim 21 wherein the valve means comprises a valve body and a valve seat communicating with said opening, the valve body having a lower portion which sits in said valve seat, a lower surface in fluid communication with the actuating button and an upper surface in fluid communication with the reservoir.
23. A cleaning implement according to claim 22 wherein an upper valve seat is provided against which the

valve body bears an upward movement, making a fluid tight seal therewith, a small clearance being provided therebetween when the valve body is in the main valve seat.

24. A cleaning implement according to claim 21 wherein the valve body is provided with an opening there-through closed by a ball valve which opens in response to reduced internal pressure on release of the actuating button after fluid dispensing.
25. A cleaning implement according to claim 21 wherein valve retaining means are provided having a resilient element against which a portion of the valve body bears and which is deformed an opening of the valve thereby providing a valve return force.
26. A cleaning implement according to claim 25 wherein the valve retaining means comprise a ring-like member having inwardly directed resilient fingers against which the valve body bears.
27. A cleaning implement according to claim 21 wherein the interior of the actuating button communicates with the valve through a laterally extending passage defined in the body.
28. A cleaning implement according to claim 21 wherein the actuating button comprises a resilient diaphragm.
29. A cleaning implement according to claim 27 wherein the body defines an internal well within which the valve body is disposed with the valve seat disposed at a bottom of the well, the reservoir communicating with an upper region of the well, and the lateral passageway communicating with a lower region of the well.
30. A cleaning implement according to claim 29 wherein the upper valve seat is defined by a lower region of the ring disposed part way up the well.
31. A cleaning implement according to claim 21 wherein the reservoir is defined in a separate enclosure releasably connected to the body.
32. A cleaning implement according to claim 28 wherein the resilient diaphragm is formed in a band of resilient material which is stretched to surround the body.
33. A cleaning implement according to claim 21 being a brush with a plurality of bristles disposed on the underside thereof.
34. A brush comprising a body with a fluid containing reservoir having a substantially cylindrical sidewall

and an upper region in which the reservoir is located of domed form and with a plurality of bristles depending from a lower region of the body, wherein an opening is defined in a lower region of the body in communication with the reservoir and closed by valve means, a depressible valve actuating button being located on the sidewall for depression in a lateral direction.

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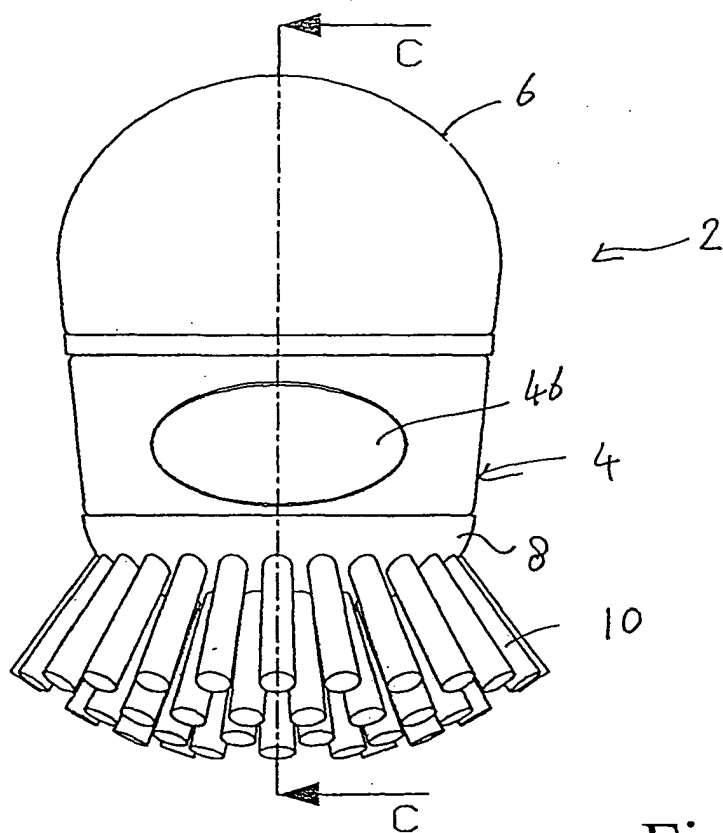


Fig.1

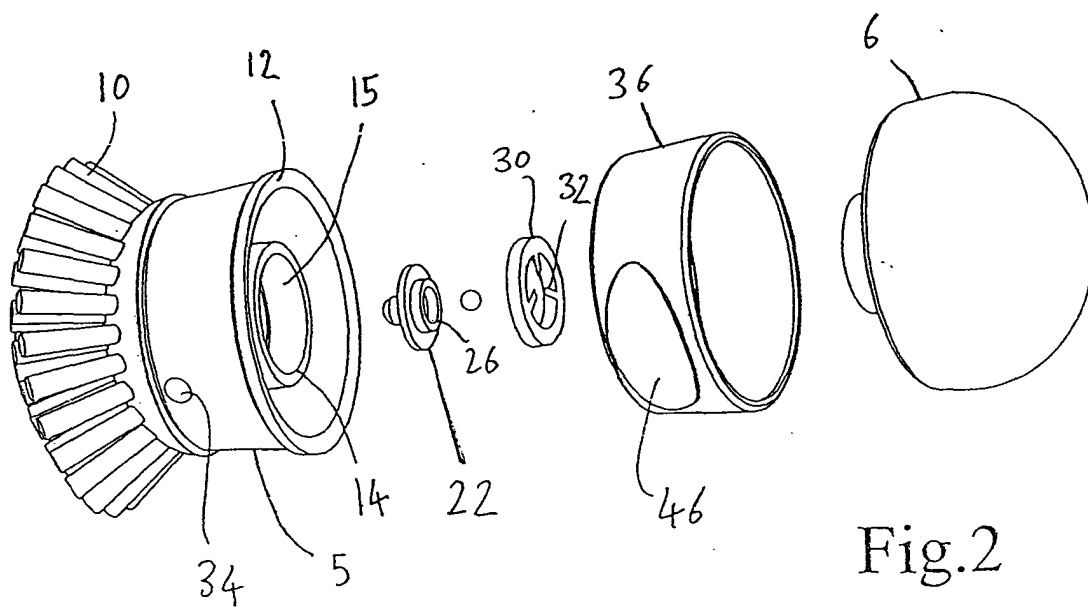


Fig.2

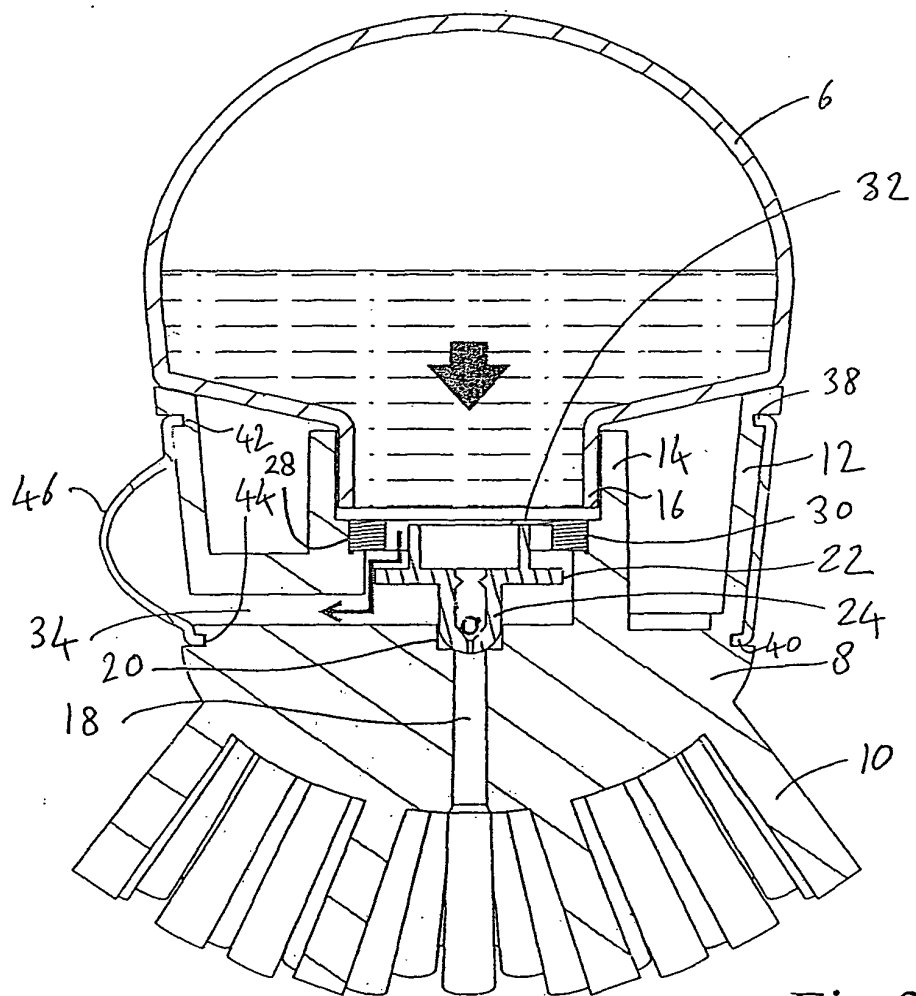


Fig.3

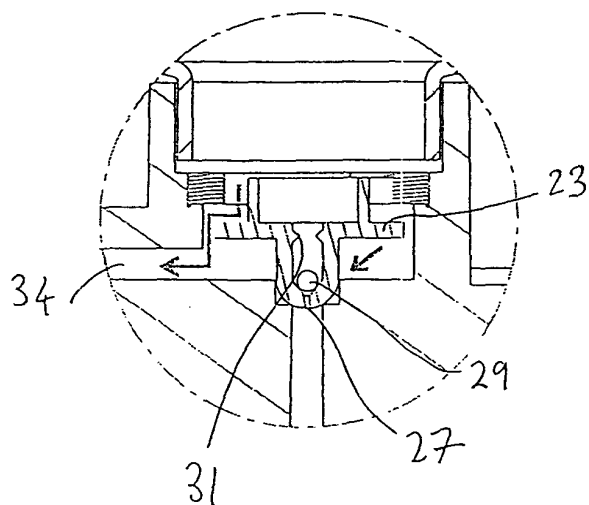


Fig.3A

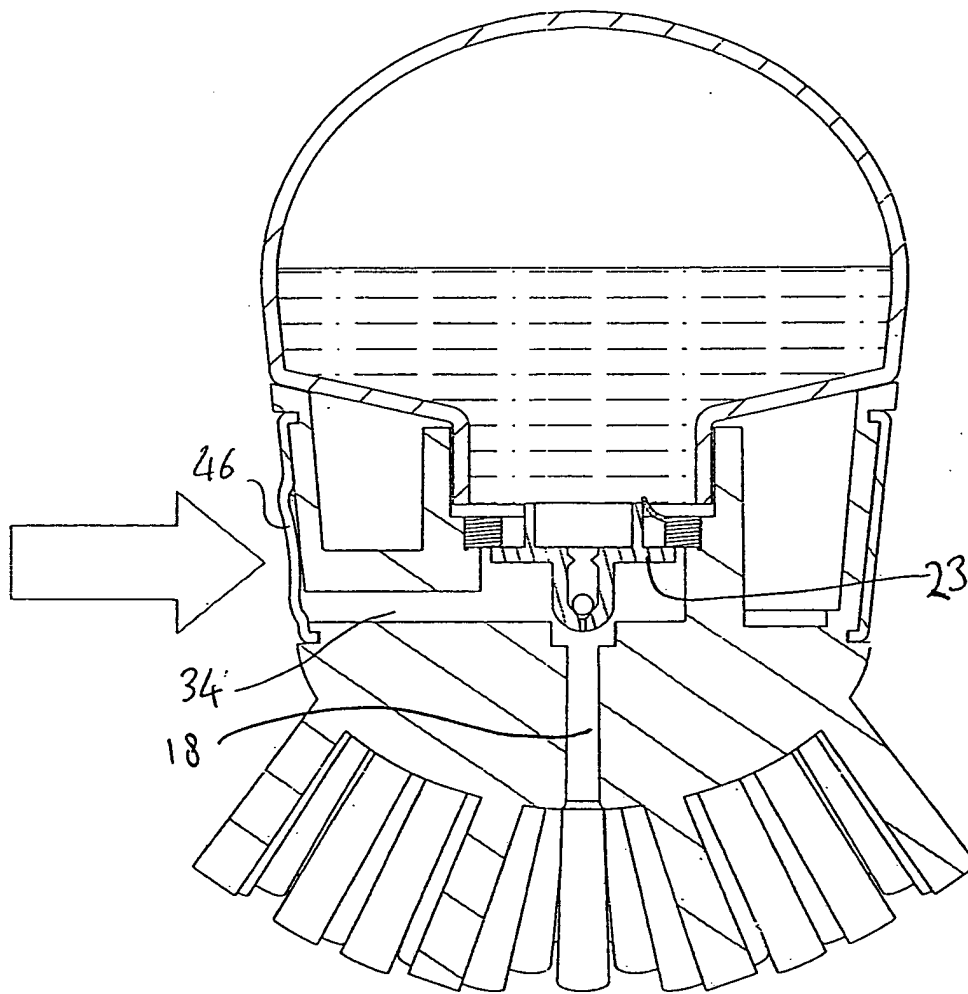


Fig.4

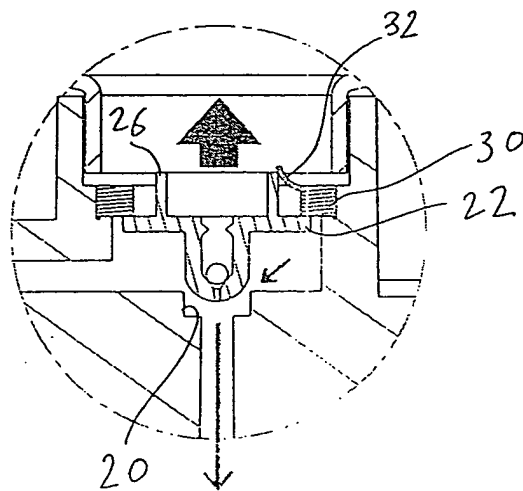
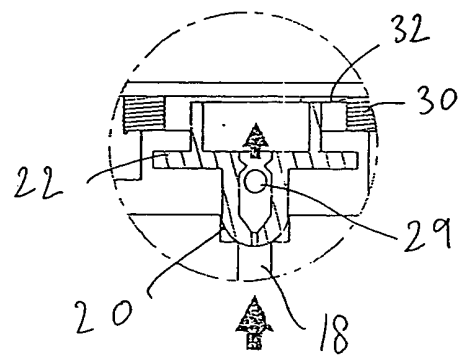
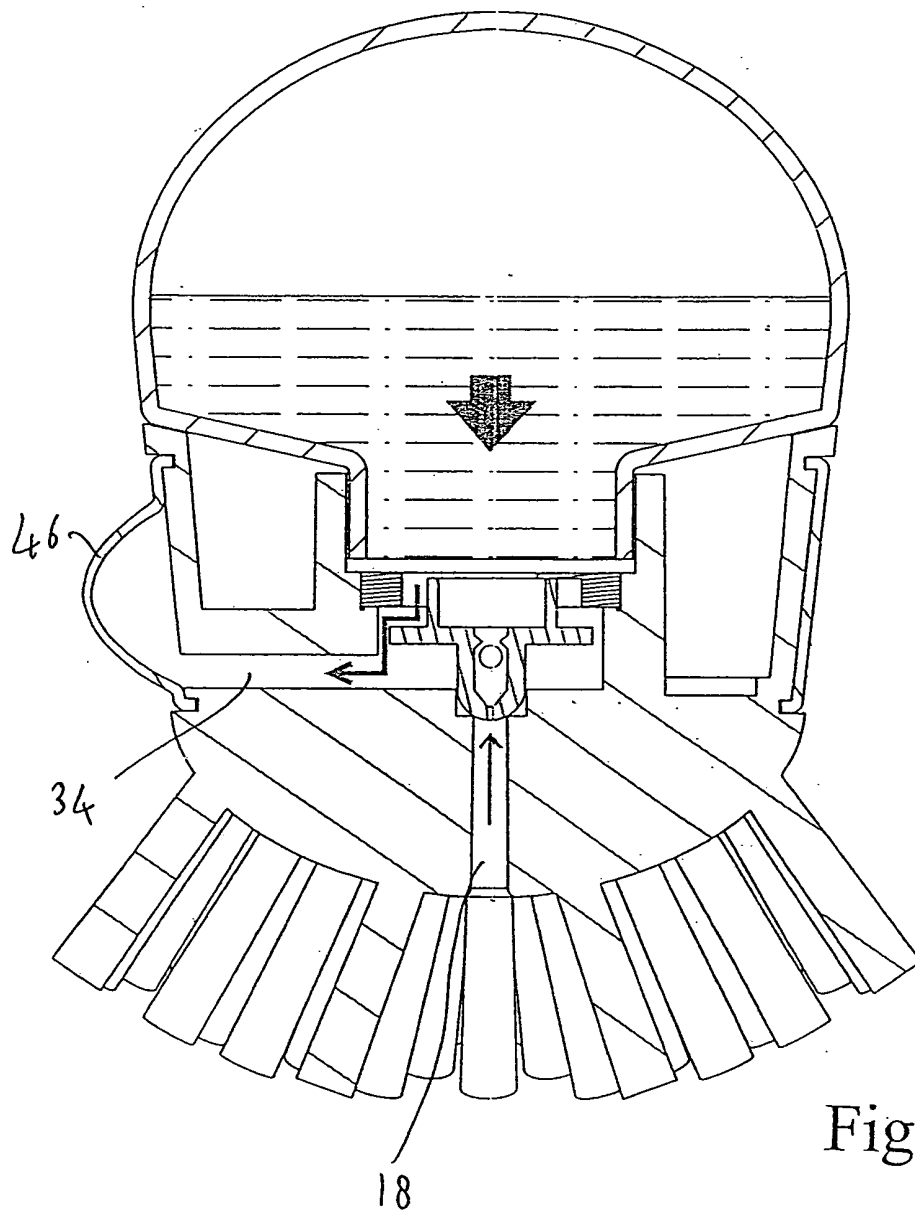


Fig.4A



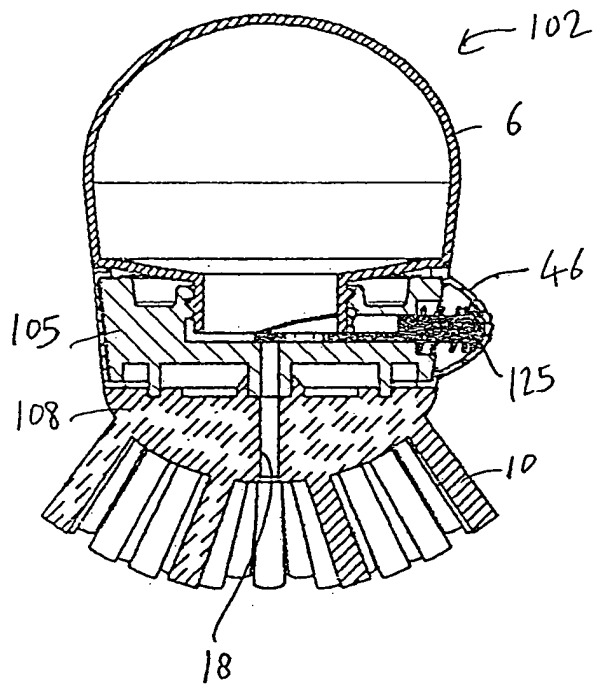


Fig. 6

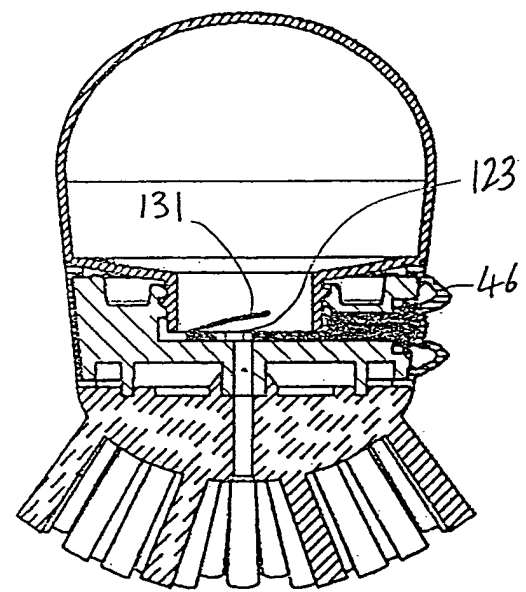


Fig. 7

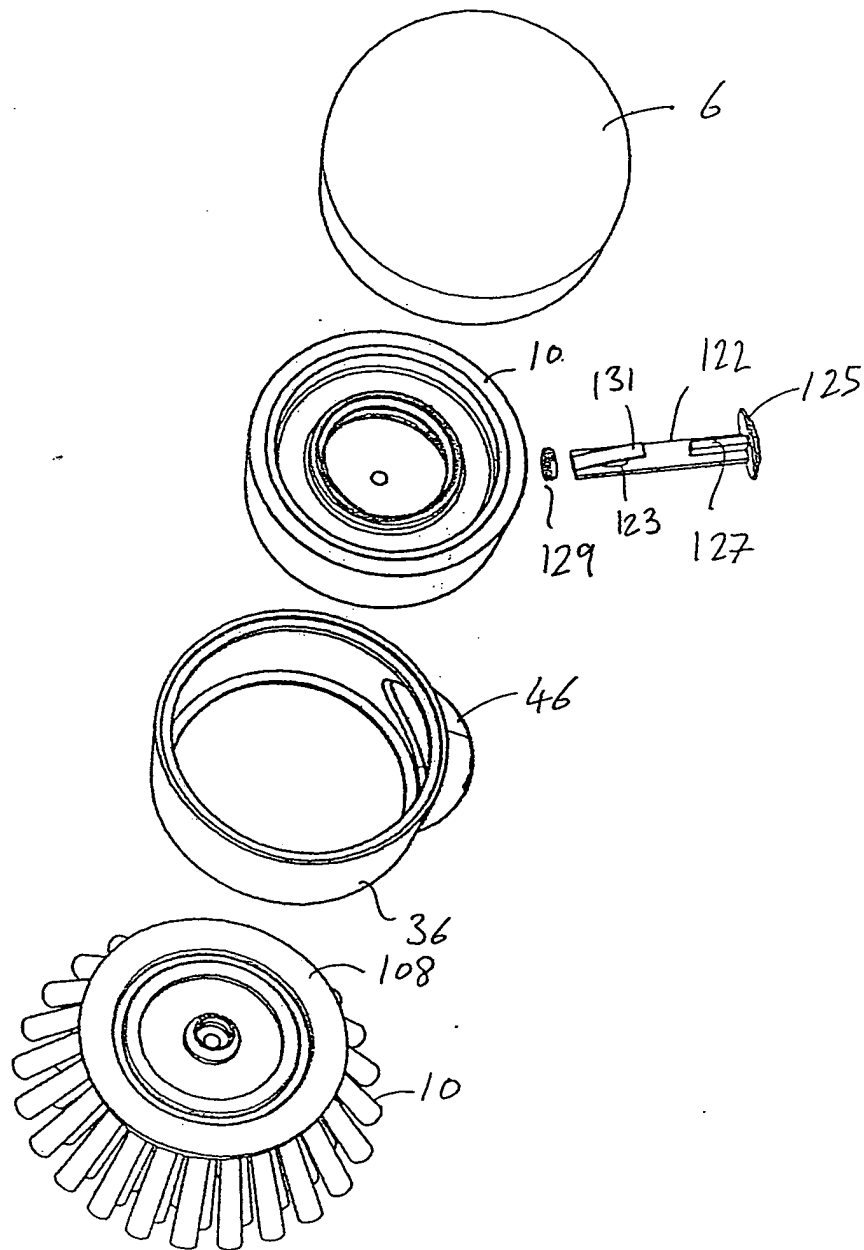


Fig.8



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 25 4655

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Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 11 November 2004	Examiner Cardan, C
<p>CATEGORY OF CITED DOCUMENTS</p> <p>X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document</p> <p>T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document</p>			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 25 4655

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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11-11-2004

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82