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(54) Water dispensing component of a household appliance

(57) An anti-calc and "easy-clean" water dispensing component (1) of a household appliance, in particular of a washing machine, a dishwasher or a refrigerator with a water dispenser, has a body (2) made of plastic material and having an external surface (3) provided with at least one nozzle (4) or outlet placed on the surface (3) and connectable to a water feed conduit (5); the surface (3) is made of a microbe-resistant and fungicide elastomer or rubber material having anti-calc and "easy-clean" properties; in particular, a thermoplastic elastomer is used, preferably selected in the group of styrene block copolymers and preferably in the group of styrene-olefine block copolymers such as SBS, SEBS, SEPS, etc.

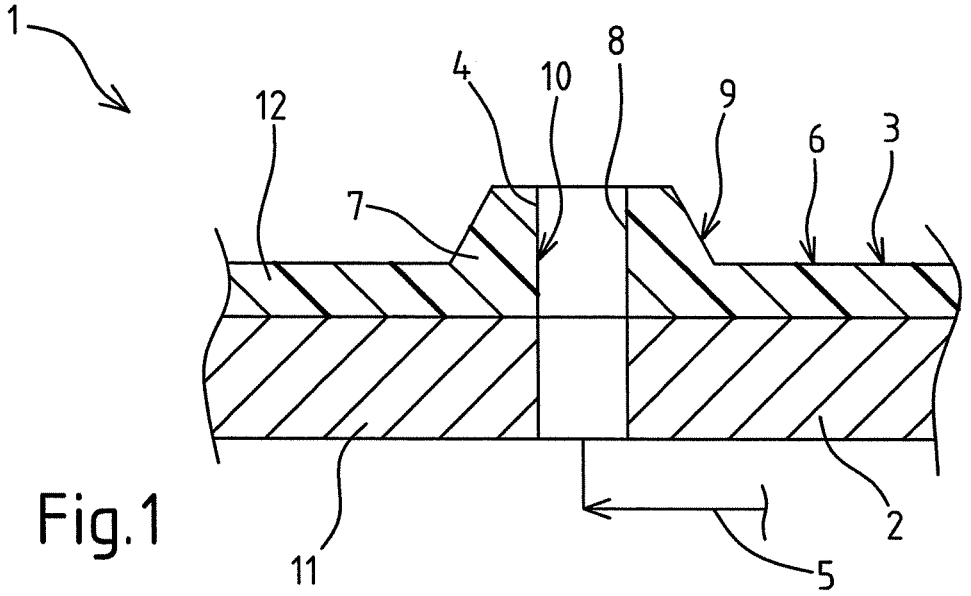

Fig.1

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Description

[0001] The present invention relates to an anti-calc and "easy-clean" water dispensing component of a household appliance, and specifically to the use of an elastomer or rubber material for the manufacture of a water dispensing component of a household appliance, in particular a water inlet or water injection component of a washing machine, a dishwasher or a refrigerator with water dispenser.

[0002] It is known the large use of plastic materials for the manufacture of many components in household appliances. Components which usually operates in water environments, such as a wash chamber of a washing machine or a dishwasher, are clearly exposed to water contact.

[0003] A common problem with plastic surfaces in water environments is the deposition and accumulation of salts and minerals, in particular calc, which are usually contained in the water and also in many detergents. After some time in wet service conditions, the surfaces of plastic components are covered with white minerals. This is particularly true for elastomer surfaces and reduces the aesthetical perception, i.e. the material gives an impression of ageing (although this is not the case). Moreover, in the case of water nozzles, calc accumulation may hinder/block proper water flow through the nozzles. Removal of these mineral deposits is then very difficult, so that it is also very difficult to clean the plastic surface below.

[0004] It is an object of the present invention to provide a household appliance with water dispensing components designed to eliminate the aforementioned drawbacks.

[0005] Broadly speaking, the present invention relates to the use of an elastomer or rubber material for the manufacture of a water dispensing component of a household appliance, in particular a water inlet or water injection component of a washing machine, a dishwasher or a refrigerator.

[0006] Specifically, according to the present invention, there is provided an anti-calc and "easy-clean" water dispensing component of a household appliance as claimed in Claim 1, and a method of manufacture of the water dispensing component as claimed in Claim 18.

[0007] According to the invention, there is also provided a water inlet/injection system of a household appliance, as well as a household appliance, in particular a washing machine, a dishwasher or a refrigerator with a water dispenser, comprising the water dispensing component, as claimed in Claims 19 and 20 respectively.

[0008] Non-limiting embodiments of the present invention will be described by way of example with reference to the accompanying drawings, in which:

- Figure 1 is a schematic sectional view of a water dispensing component according to a first embodiment of the invention;
- Figure 2 is a schematic sectional view of a water dispensing component according to a second embodiment of the invention;
- Figure 3 is a schematic sectional view of a water dispensing component according to a third embodiment of the invention;
- Figure 4 is a schematic partial perspective view of a dishwasher provided with a water dispensing component, specifically a bottom spray arm, according to the invention;
- Figure 5 is a plan view of another water dispensing component according to the invention, specifically a dishwasher top spray arm;
- Figure 6 is a perspective schematic view of another water dispensing component according to the invention, specifically a drum lifter of a washing machine.

[0009] With reference to Figure 1, a water dispensing component 1 of a household appliance (generally known and therefore not shown) comprises a body 2 having an external surface 3 provided with at least one nozzle or outlet 4 connected to a water feed conduit 5; surface 3 includes a surface portion 6 which surrounds nozzle 4.

[0010] In the non limiting embodiment of Figure 1, nozzle 4 comprises a projection element 7 which projects from body 2 and has a hole 8 connected to conduit 5; projection element 7 has an outer surface 9 (including a lateral portion and a top end portion) surrounding hole 8 and which is part of surface portion 6; hole 8 is delimited inside by an inner lateral surface 10. However, according to a variation not shown, nozzle 4 and hole 8 are flush with surface 3.

[0011] Nozzle 4 and/or surface 3 or at least surface portion 6, and specifically at least outer surface 9 and inner lateral surface 10, are made of an elastomer or rubber material, in particular selected in the group of thermoplastic elastomers, crosslinked elastomers and silicone rubbers, possibly suitable for contact with drinkable water and possibly also exhibiting microbe-resistance and fungicide properties.

[0012] According to a preferred embodiment, the elastomer or rubber material is a thermoplastic elastomer, preferably selected in the group of thermoplastic styrenic elastomers, thermoplastic olefinic elastomers, thermoplastic silicone elastomers; in particular, the thermoplastic elastomer is selected in the group of styrene block copolymers.

[0013] Preferably, the thermoplastic elastomer is selected in the group of styrene-olefine block copolymers such as SBS (styrene-butadiene-styrene copolymers), SEBS (styrene-ethylene-butadiene-styrene copolymers), SEPS (styrene-ethylene-propylene-styrene copolymers), etc.

[0014] According to a preferred embodiment, the thermoplastic elastomer is a SEBS copolymer.

[0015] According to another preferred embodiment, the elastomer or rubber material is a silicone rubber.

[0016] According to the preferred but non-limitative

embodiment of Figure 1, body 2 comprises a base hard part 11, made of a substantially hard (rigid) polymer material or of a metal material, and a covering soft part 12, which is made of elastomer or rubber material and includes nozzle 4 and surface 3 surrounding nozzle 4 (i.e. surface portion 6).

[0017] According to the embodiment of Figure 1, base hard part 11 is defined by an inner hard core of body 2, and covering soft part 12 is defined by a soft outer layer of elastomer or rubber material which includes surface 3 and nozzle 4. Projection element 7 which defines nozzle 4 is also made of elastomer or rubber material.

[0018] For example, hard part 11 is made of a substantially hard (rigid) thermoplastic polymer commonly used in household appliance manufacturing, preferably selected in the group consisting of PC, ABS, PET, PBT, PETG, PS, PP, PE, PA, SAN, PMMA, POM, CAP. Advantageously, the polymer material is a polypropylene or a PP-based material. In a variation, hard part 11 is made of metal material.

[0019] In the variation of Figure 2, base hard part 11 is defined by an inner hard core of body 2 which extends to surface 3, and covering soft part 12 does not completely cover body 2; in other words, surface 3 comprises soft zones 13 which are made of elastomer or rubber material (and includes surface portion 6) and hard zones 14 which are made of substantially hard polymer material or metal material. Nozzle 4 and surface 3 surrounding nozzle 4 (i.e. surface portion 6) are however made of elastomer or rubber material.

[0020] Also in the variation of Figure 3, covering soft part 12 does not completely cover body 2, and nozzle 4 and surface 3 surrounding nozzle 4 (i.e. surface portion 6) are made of elastomer or rubber material; in this variation, the elastomer or rubber material completely covers inner lateral surface 10 of hole 8 and extends to an inner surface of body 2, opposite to external surface 3.

[0021] According to a further variation not shown, body 2 (i.e. component 1 as a whole) is completely made of elastomer or rubber material.

[0022] Component 1 is realized by a manufacturing method which is substantially a known moulding process of plastic materials; unlike known methods, however, according to the invention an elastomer or rubber material is selected for realizing either component 1 as a whole, or some parts of component 1.

[0023] If body 2, as previously described, comprises a base hard part 11 (in particular, made of substantially hard polymer material), and a covering soft part 12 (made of elastomer or rubber material), i.e. soft zones 13 and hard zones 14, the method advantageously comprises a step of co-injection moulding or a step of over-injection moulding of soft part 12 and hard part 11; i.e. soft part 12 are advantageously co-injection moulded or over-injection moulded with hard part 11. Otherwise, hard part 11 and soft part 12 are separately formed, for example injection moulded, and then assembled with each other in any known way.

[0024] It has been recognized that thermoplastic elastomer (and specifically SEBS copolymers) can be easily processed and show good adhesion with the thermoplastics materials commonly used for water dispensing components in household appliances, for example PP-based materials.

[0025] Examples of household appliances 19 provided with water dispensing components 1 according to the invention are shown in Figures 4 to 6.

[0026] Figure 4 partially shows a home dishwasher 20, which is generally known and therefore not described nor shown in details for the sake of simplicity. Dishwasher 20 comprises a casing 21 which encloses a wash chamber 22 and a water injection system 23 for feeding water into chamber 22; system 23 includes at least a water dispensing component 1 which is positioned in chamber 22.

[0027] In particular, component 1 is defined by a bottom rotating spray arm 25 of dishwasher 20; spray arm 25 is carried by a hub 26 projecting from the bottom of chamber 22 and is supplied with pressurized water by the dishwasher hydraulic circuit (not shown); as described with reference to Figures 1 to 3, component 1 (i.e. spray arm 25) comprises a body 2 having an external surface 3 exposed in use to water contact and provided with a number of spray nozzles 4 designed to feed pressurized-water jets inside chamber 22 and specifically towards a movable bottom basket (not shown). Nozzles 4 are defined by respective projection elements 7 protruding from surface 3.

[0028] As most dishwasher, dishwasher 20 comprises also a rotating top spray arm 27, which is partially shown in Figure 5 and defines a further water dispensing component 1 realized according to the invention; also top spray arm 27 (which is for example supported by a hub carried by a top basket, not shown) is provided with a number of nozzles 4 which are differently shaped and designed to direct pressurized-water jets inside chamber 22.

[0029] Figure 6 partially shows another household appliance 19, specifically a washing machine 30, which is generally known and therefore not described nor shown in details for the sake of simplicity. Washing machine 30 has a casing 21 which encloses a wash chamber 22, a water inlet system 23 for feeding water into chamber 22, and a rotating drum 32 housed in chamber 22 and provided with drum lifters 35 (only one of which shown in Figure 6); water inlet system 23 is of any known type and includes several and differently shaped dispensing component 1 having nozzles 4 and holes 8; nozzle 4 and holes 8 are formed, for example, on the walls of chamber 22, on drum 32, on drum lifters 35, on separate and specifically designed components in chamber 22, etc.

[0030] Each or some of dispensing components 1, however shaped, are realized according to the invention. In the non-limiting embodiment of Figure 6, a dispensing component according to the invention is defined by drum lifter 35 which projects radially from an inner lateral sur-

face of drum 32 and is provided with a number of nozzles 4; clearly, other dispensing components 1 of system 23 may be realized in the same way.

[0031] Though particularly advantageous for use in a dishwasher (and specifically for realizing the spray arms of the dishwasher) and in a washing machine (or other laundry machines, such as driers or a washer-driers), the invention may be advantageously applied to any other kind of electric household appliance having a water inlet or injection system.

[0032] For example, another preferred application of the invention is for house refrigerators provided with a water dispenser (for providing refrigerated water to users), wherein the water dispensing component of the refrigerator is advantageously made in accordance to the invention.

[0033] Advantages of the invention are clear from the above description.

[0034] Water dispensing components according to the invention exhibit anti-adsorptive properties with regard to minerals commonly present in drinkable water (salts/calc), and self-clean properties; in fact, surfaces of a component made of elastomer or rubber material, and specifically made of one of the materials previously described, are hardly be covered with white water mineral residuals (calc), and even if some calc accumulates anyway on the surface, it could be easily removed by simply rubbing the surface (e.g. by hand, by a dedicated integrated system or, in case of use in washing machine and tumble drier applications inside the drums, by the machine operation itself, due to frequent contacts with laundry).

[0035] Moreover, components according to the invention are easy and relatively cheap to manufacture, in particular because the materials of the invention can be processed by the same common methods (extrusion, injection moulding, compression molding) used for traditional materials; thermoplastic elastomers can also be easily co-processed with traditional materials such as PP to achieve components with two-material features.

[0036] Finally, components made according to the invention also feature attractive soft-touch surface properties.

[0037] Clearly, further changes may be made to the water dispensing component as described and illustrated herein without, however, departing from the scope of the present invention as defined by the enclosed Claims.

Claims

1. An anti-calc and "easy-clean" water dispensing component (1) of a household appliance, in particular of a washing machine, a dishwasher or a refrigerator with a water dispenser, comprising a body (2), made of plastic material and provided with at least one nozzle (4) or outlet connectable to a water feed conduit (5); the component being **characterized in that** said nozzle (4) is made of an elastomer or rubber material.

2. A component as claimed in Claim 1, **characterized in that** the elastomer or rubber material is selected in the group of thermoplastic elastomers, crosslinked elastomers and silicone rubbers.

3. A component as claimed in Claim 1 or 2, **characterized in that** said nozzle (4) is made of a thermoplastic elastomer.

4. A component as claimed in Claim 3, **characterized in that** the thermoplastic elastomer is selected in the group of thermoplastic styrenic elastomers, thermoplastic olefinic elastomers, thermoplastic silicone elastomers.

5. A component as claimed in Claim 3 or 4, **characterized in that** the thermoplastic elastomer is selected in the group of styrene block copolymers.

6. A component as claimed in one of Claims 3 to 5, **characterized in that** the thermoplastic elastomer is selected in the group of styrene-olefine block copolymers such as SBS, SEBS, SEPS, etc.

7. A component as claimed in one of the foregoing Claims, **characterized in that** the thermoplastic elastomer is a SEBS copolymer.

8. A component as claimed in Claim 1, **characterized in that** the elastomer or rubber material is a silicone rubber.

9. A component as claimed in one of the foregoing Claims, **characterized in that** the elastomer or rubber material has microbe-resistant and fungicide properties.

10. A component as claimed in one of the foregoing Claims, **characterized in that** said body (2) comprises a hard part (11), made of a substantially hard polymer or metal material, and a soft part (12), which is made of elastomer or rubber material and includes said nozzle (4).

11. A component as claimed in Claim 10, **characterized in that** said body (2) comprises a hard core (11) made of substantially hard polymer or metal material, and a soft outer surface (3) made of elastomer o rubber material.

12. A component as claimed in Claim 10 or 11, **characterized in that** said body (2) has an external surface (3) surrounding the nozzle (4) and comprising soft zones (13) which are made of elastomer or rubber material and hard zones (14) which are made of sub-

stantially hard polymer or metal material.

13. A component as claimed in one of Claims 10 to 12, **characterized in that** said soft part (12) has been co-injection moulded, or over-injection moulded, or separately injection moulded or otherwise separately formed and then assembled with said hard part (11).

14. A component as claimed in one of Claims 10 to 13, **characterized in that** the hard part (11) is made of a substantially hard thermoplastic polymer.

15. A component as claimed in one of Claims 10 to 14, **characterized in that** the hard part (11) is made of a substantially hard polymer material selected in the group consisting of PC, ABS, PET, PBT, PETG, PS, PP, PE, PA, SAN, PMMA, POM, CAP.

16. A component as claimed in one of Claims 10 to 15, **characterized in that** the hard part (11) is made of a substantially hard PP-based material.

17. Use of an elastomer or rubber material, in particular a thermoplastic elastomer, a crosslinked elastomer or a silicone rubber, for the manufacture of a water dispensing component (1) of a household appliance (19), in particular a water inlet or water injection component of a washing machine, a dishwasher or a refrigerator.

18. A method of manufacture of a water dispensing component (1) of a household appliance, in particular of a washing machine, a dishwasher or a refrigerator with a water dispenser, the component comprising a body (2) made of plastic material and provided with at least one nozzle (4) or outlet connectable to a water feed conduit (5); the method being **characterized by** a step of realizing said nozzle (4) with an elastomer or rubber material, in particular with a thermoplastic elastomer, a crosslinked elastomer or a silicone rubber.

19. A water inlet/injection system (23) of a household appliance, in particular of a washing machine, a dishwasher or a refrigerator with a water dispenser, **characterized by** comprising a component (1) according to one of Claims 1 to 16.

20. A household appliance (19), in particular a washing machine, a dishwasher or a refrigerator with a water dispenser, **characterized by** comprising a water dispensing component (1) according to one of Claims 1 to 16.

21. A household appliance as claimed in Claim 20, and comprising a casing (21) which encloses a wash chamber (22) and a water inlet/injection system (23) for feeding water into the chamber; **characterized in that** said water dispensing component (1) is positioned in the wash chamber (22).

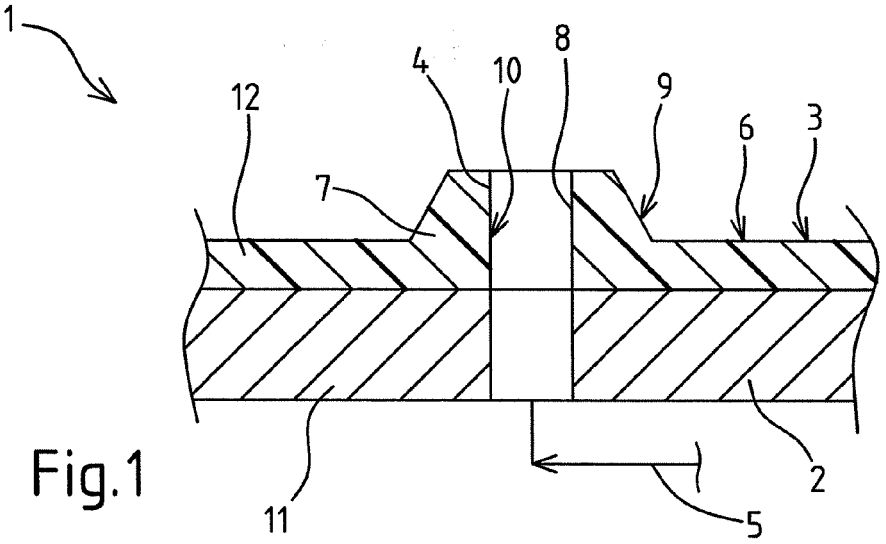

Fig.1

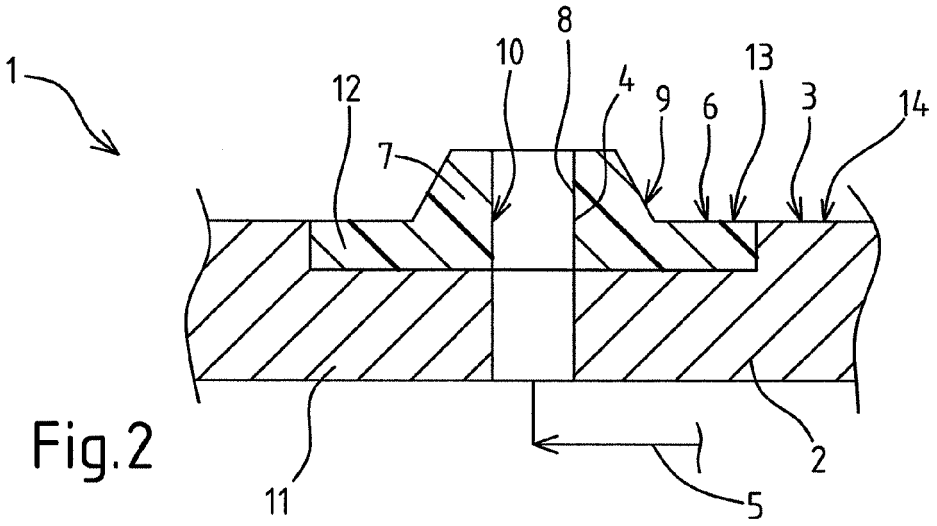

Fig.2

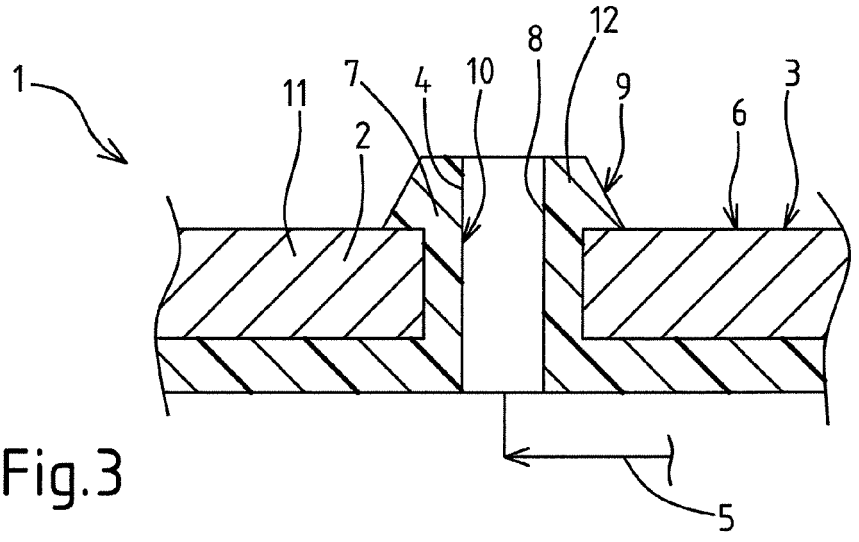

Fig.3

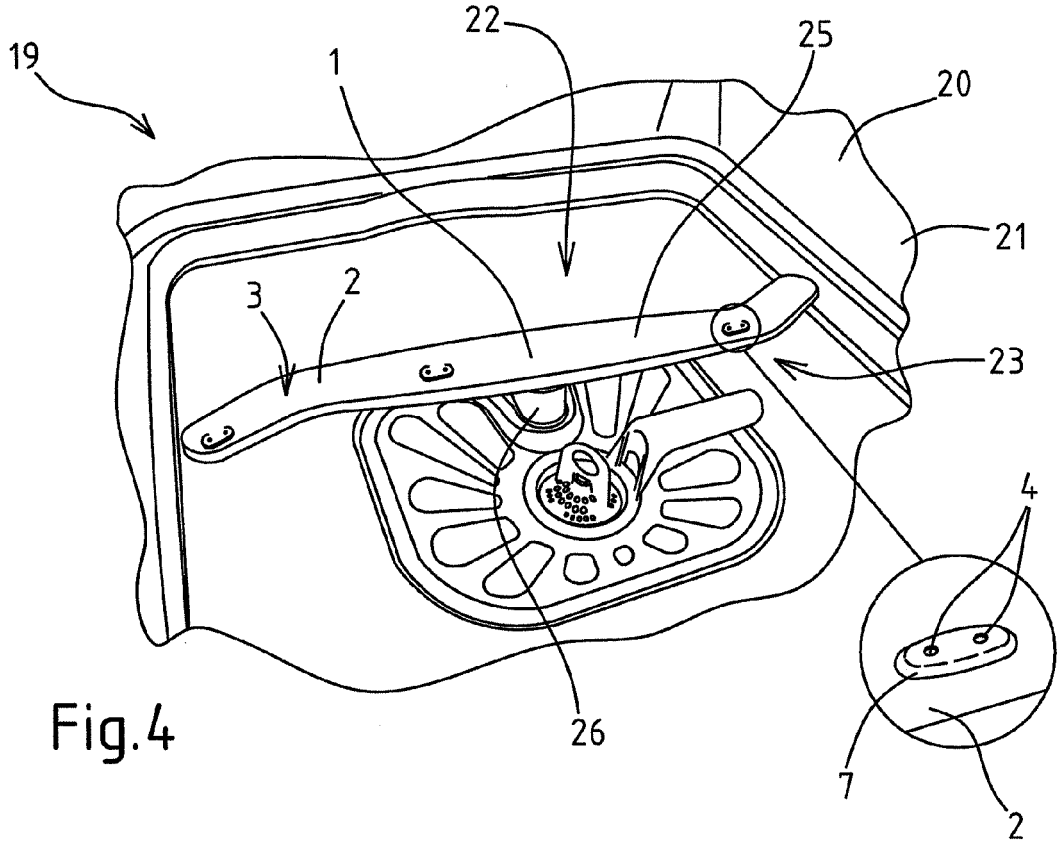

Fig.4

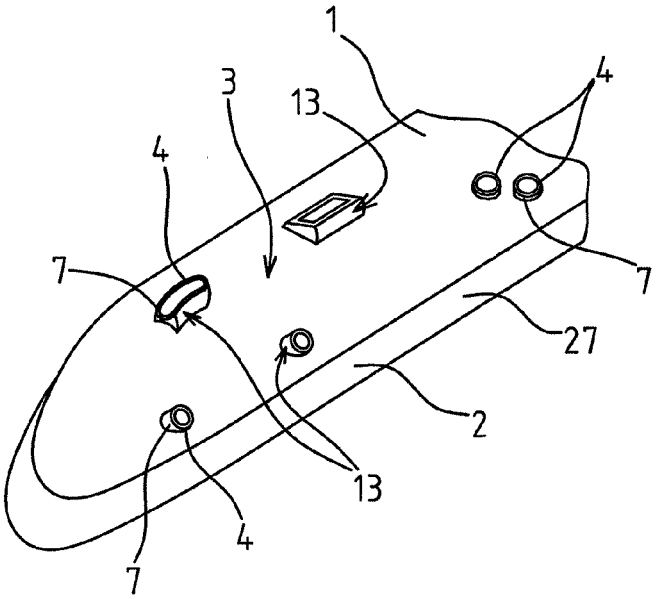

Fig.5

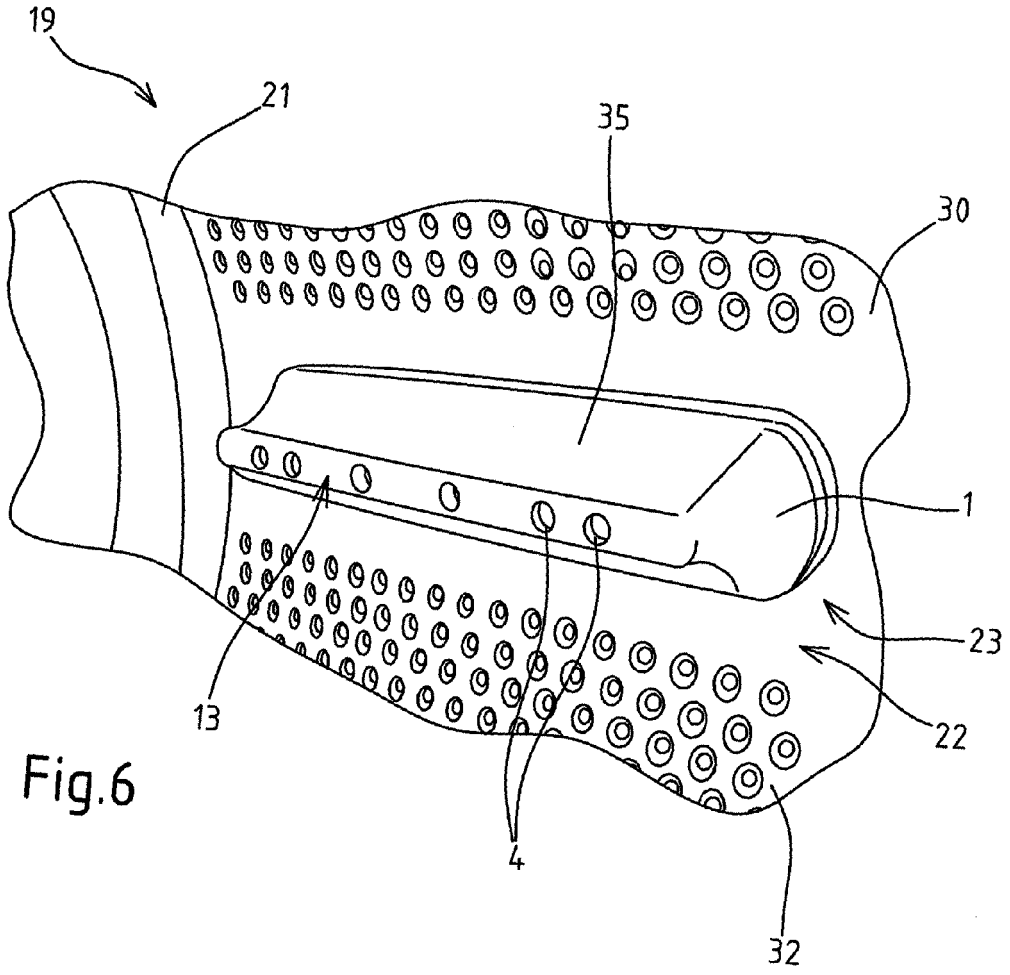

Fig.6

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 12 4788

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 5 560 381 A (EDWARDS JAMES M [US]) 1 October 1996 (1996-10-01)	1,17-20	INV. A47L15/23
A	* abstract; figure 1 * * column 2, line 16 - line 27 * -----	2-16,21	D06F39/00
X	US 4 416 300 A (JORDAN LAWRENCE J [US]) 22 November 1983 (1983-11-22)	1,17-20	
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A	* claims 8,9; figures 1,2 * -----	2-16,21	

TECHNICAL FIELDS SEARCHED (IPC)

A47L
D06F

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	22 June 2007	FAYMANN, L

CATEGORY OF CITED DOCUMENTS

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22-06-2007

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