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(54) **DISHWASHER**

(57) A dishwasher (1) comprising:
-a washing compartment (3);
-a lower rack (4) and an upper rack (5) intended to house dishes, said upper rack (5) being positioned above the lower rack (4) within the washing compartment (3);
-first bottom spraying means (6) arranged below the lower rack (4) so as to spray it with washing liquid;
-second bottom spraying means (7) arranged below the upper rack (5) so as to spray it with washing liquid;
-conveying means (9) suitable to connect the washing compartment (3) to said first and second spraying means (6, 7);
-a motorised pump (10) operatively active on the conveying means (9) to take the washing liquid from the washing compartment (3) and send it to said first and second spraying means (6, 7),
-top spraying means (8) pertaining to said conveying means (9) and positioned above the upper rack (5) so as to spray it with the washing liquid for durations shorter by an order of magnitude than the spraying durations from said first and second spraying means (6, 7), said racks (4, 5) being the only racks present in the dishwasher (1).

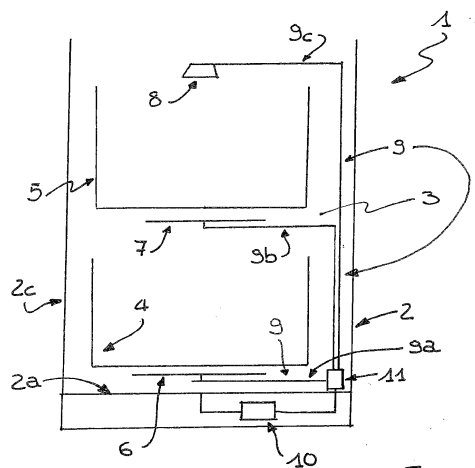


Fig. 1

Description

[0001] The present invention relates to a dishwasher.

[0002] It is known a dishwasher according to the preamble of claim 1.

[0003] In particular, it is an object of the present invention to make available a dishwasher which is capable of solving the problem of the build-up of dirt in the dishwasher.

[0004] The object set forth above, and yet others, are fully achieved by the dishwasher according to the present invention, which is characterised by what is contained in the claims set forth below.

[0005] The technical characteristics of the invention, according to the aforementioned object, can be clearly seen from the contents of the claims set forth below, and the advantages thereof will more fully emerge from the detailed description which follows, made with reference to the accompanying drawings, which represent a purely exemplary and non-limiting embodiment, wherein:

- figure 1 shows an open dishwasher (i.e. in which the door has been removed), according to the present invention, in a side view;
- figure 2 shows several components (spraying means) of the dishwasher of figure 1, in a side view;
- figure 3 shows several components (top spraying means) of the dishwasher of figure 1, in perspective view;
- figure 4 shows several components (sprinkler) of the dishwasher of figure 1, in an exploded perspective view;
- figure 5 shows the qualitative progress of the temperature as a function of time (along the horizontal axis) relating to the ECO programme of the dishwasher of figure 1.

[0006] With reference to the drawings, no. 1 indicates a dishwasher comprising a box-shaped casing 2, substantially in the shape of a parallelepiped, defining a washing compartment 3. Inside the washing compartment 3 are two racks 4, 5 destined for housing the dishes to be washed.

[0007] In particular, the following can be distinguished:

- a lower rack 4 slidable on a pair of rails (not shown) positioned in proximity to the bottom 2a of the box-shaped casing 2;
- an upper rack 5 positioned above the lower rack 4 and slidable on a pair of rails (not shown) positioned on lateral walls 2b, 2c of the box-shaped casing 2.

[0008] These racks 4, 5 are the only racks present in the dishwasher 1. In particular the expression 'racks' in the course of this treatment is intended to mean support means for the dishes to be washed which slide along guides formed along the box-shaped casing 2. Oppositely these racks are perforated, being obtained by in-

tersection of filiform elements. They have overall dimensions which almost completely occupy a horizontal level of the box-shaped casing 2. Any accessories applicable to said racks to increase their load capacity or make them suitable for housing particular types of dishes (for example tiltable flaps or cutlery containers) are to be considered an integral part of said racks and are not to be considered distinct racks.

[0009] The dishwasher 1 comprises spraying means 6, 7, 8 arranged inside the washing compartment 3 and capable of spraying washing liquid on the dishes contained in the two racks 4, 5. In particular, the washing liquid comprises water and detergents (cleaning agents, finisher etc.). After coming into contact with the dishes to be washed, the washing liquid also comprises the dirt removed from the dishes to be washed (for example residues of food or condiments).

[0010] The dishwasher 1 comprises furthermore conveying means 9 suitable for connecting the washing compartment 3 to the spraying means 6, 7, 8. Preferably, the conveying means 9 connect the bottom 2a of the box-shaped casing 2 to the spraying means 6, 7, 8. The dishwasher 1 comprises a motorised pump 10 operatively active on the conveying means 9 to take the washing liquid from the washing compartment 3 and send it to the spraying means 6, 7, 8.

[0011] The washing liquid sprayed by the spraying means 6, 7, 8 builds up by gravity on the bottom 2a of the box-shaped casing 2, where it is picked up by the motorised pump 10 and sent again to the spraying means 6, 7, 8 via the conveying means.

[0012] The spraying means 6, 7, 8 comprise first bottom spraying means 6, second bottom spraying means 7 and top spraying means 8. The first bottom spraying means 6 are situated below the lower rack 4. The first bottom spraying means 7 are situated below the upper rack 5. The top spraying means 8 are positioned above the upper rack 5.

[0013] Preferably, the top spraying means 8 consist of a sprinkler comprising an impeller 12, a ring nut 13 and a cage 14 attachable to the ring 13 in such a way as to form a housing receptacle 15 for the impeller 12.

[0014] The cage 14 has a pin 16 having an end 16a of conical shape. The impeller 12 has a through hole 17 in such a way as to be able to be rotatably mounted on the pin 16 of the cage 14.

[0015] During the rotation of the impeller 12 around the pin 16, the flow of washing liquid diverges ("umbrella" opening).

[0016] Preferably, the sprinkler 8 is attached to the conveying means 9 by rotation of the ring nut 13 through a quarter of a turn.

[0017] The dishwasher 1 comprises a selector 11 operatively active over the conveying means 9 to selectively open a first route 9a towards the first bottom spraying means 6 or a second route 9b towards the second bottom spraying means 7 or a third route 9c towards the top spraying means 8 in such a way that the washing liquid

is sprayed from the selected sprayer.

[0018] In the event of opening of the first route 9a or the second route 9b, the motorised pump 10 operates at a rotation speed comprised between 2300 and 2600 revolutions per minute.

[0019] In the event of opening of the third route 9c, the motorised pump 10 operates at between 1500 and 2500 revolutions per minute.

[0020] As will be better explained below, the selector 11 is formed of a fixed disc and a rotating disc superimposed.

[0021] The procedure for washing dishes placed in a washing compartment housing only two racks is described below.

[0022] This method is used both in ECO washing programmes (or cycles) and in normal programmes (i.e. non-ECO). Preferably, the proposed procedure is used for washing dishes positioned in the racks 4, 5 in such a way as to have the concavity facing downwards.

[0023] This procedure provides for the following steps:

- setting a bottom spraying of the lower rack 4 through the first bottom spraying means 6;
- setting a bottom spraying of the upper rack 5 via the second bottom spraying means 7;
- acting on the selector 11 to switch the supply of the washing liquid at least between a first conduit 9a which supplies the first spraying means 6 and a second conduit 9b which supplies the second spraying means 7.

[0024] Opportunely the method comprises a first step of setting a top spraying of said upper rack 5 via the top spraying means 8 positioned above said upper rack 5 and supplied via the third conduit 9c. The third conduit 9c connects the spraying means 8 to said selector 11. The step of setting a top spraying of said upper rack 5 comprises a step of removing the dirt built up in said third conduit 9c during the change from spraying the lower rack 4 to spraying the upper rack 5 or vice versa. In fact the selector 11 comprises a fixed disc comprising at least one hole and a movable disc comprising a plurality of holes. Depending on which hole in the movable disc is superimposed on the hole in the fixed disc, the first or second or third conduit 9a, 9b, 9c is supplied. To switch the flow from the first to the second conduit 9a, 9b or vice versa, the movable disc rotates and during this rotation the hole in the fixed disc is superimposed for a brief space of time on the hole which supplies the third conduit 9c, causing the introduction of a small quantity of water (often dirty) which stagnates in the third conduit 9c.

[0025] Bottom spraying of the lower rack 4 and bottom spraying of the upper rack 5 are carried out alternately several consecutive times in such a way as to form a step of bottom spraying.

[0026] The step of removing the dirt built up in the third conduit 9c is performed before and/or after this step of bottom washing. In particular it is performed at the end

of a ramping up of the heating of the washing liquid. It can also be performed after a long step (for example greater than 30 minutes) in which said step of bottom washing is performed.

[0027] The duration of the step of bottom washing is greater by an order of magnitude than the duration of the step of removing the dirt built up in the third conduit 9c.

[0028] Preferably, both the bottom spraying of the lower rack 4 and the bottom spraying of the upper rack 5 have a duration comprised between about one minute and about five minutes, while the bottom washing (which is given by the multiple alternation of these sprayings) has a duration comprised between about twelve minutes and fifty-six minutes.

[0029] The step of removing the dirt built up in the third conduit 9c has a duration comprised between about one minute and about five minutes.

[0030] The embodiment here described and illustrated refers to a programme or cycle of ECO type thus composed.

[0031] The washing liquid is loaded into the washing compartment 3 during a first loading step.

[0032] Subsequently, the step of bottom washing is actuated for a duration comprised between 25 and 40 minutes during which the temperature of the washing liquid is kept constant between 20 and 25 °C for a first interval comprised between 10 and 20 minutes (see reference "a" in figure 5) and is heated up to a temperature comprised between 45° and 55°C in a second interval of duration comprised between 10 and 20 minutes (see reference "b" in figure 5).

[0033] There follows the step of removing the dirt built up in the third conduit 9c, having a duration comprised between 1 and 5 minutes (see reference "c" in figure 5).

[0034] Subsequently, the step of bottom washing is performed again for a total duration comprised between 50 and 60 minutes during which the temperature of the washing liquid is kept constant (see reference "d" in figure 5). There follows the step of removing the dirt built up in the third conduit 9c, having a duration comprised between 1 and 5 minutes (see reference "e" in figure 5).

[0035] The succession of steps of bottom washing for the first time, removing the dirt from the third conduit for the first time, bottom washing for the second time and removing the dirt from the third conduit for the second time constitute the so-called ECO cycle "wash".

[0036] The ECO cycle comprises furthermore the so-called "cold rinsing" (see reference "f") and the so-called "hot rinsing" (see reference "g"), which are not explained in detail because they do not constitute the subject of the patent.

[0037] In alternative embodiments, the step of removing the dirt from the main conduit can be performed even during the "cold rinsing" or during the "hot rinsing".

[0038] From the description given the characteristics are clear of the dishwasher and of the method for washing dishes placed in a washing compartment housing only two racks, according to the present invention, and the

advantages are also clear.

[0039] In particular, the problem of the build-up of dirt, due to momentary undesired selections of the holes by the selector, is resolved thanks to the activation of the top spraying means (sprinkler).

[0040] Furthermore, activating the sprinkler at the end of the ramping-up of the heating exploits the descaling power of heat.

[0041] Furthermore, good cleaning of the main conduit is achieved by activating the sprinkler even after the last step of bottom washing, which is very long and therefore entails a considerable build-up of dirt in the conduit itself. Since the activation of the sprinkler occurs for brief periods compared with the activation of the bottom spraying means (there is a difference of an order of magnitude), the dirt introduced by the activation of the sprinkler is negligible.

[0042] Furthermore, being positioned above the upper rack, the sprinkler makes it possible to complete the washing of the dishes by spraying from above (the other sprayers are positioned below the relative racks).

(6) or a second conduit (9b) towards said second bottom spraying means (7) or a third conduit (9c) towards said top spraying means (8), said motorised pump (10) operating at between 1500 and 2500 revolutions per minute in the event that said third conduit (9c) opens.

3. The dishwasher (1) according to claim 1 or 2, wherein said top spraying means (8) consist of a sprinkler comprising an impeller (12), a ring nut (13) and a cage (14) to be coupled to said ring nut (13) so as to define a housing receptacle (15) for said impeller (12).

4. The dishwasher (1) according to claim 3, wherein the cage (14) has a pin (16) having an end (16a) of conical shape; the impeller (12) having a through hole (17) in such a way as to be able to be rotatably mounted on the pin (16) of the cage (14).

Claims

1. A dishwasher (1) comprising:

a washing compartment (3);
a lower rack (4) and an upper rack (5) intended to house dishes, said upper rack (5) being positioned above the lower rack (4) within the washing compartment (3);
first bottom spraying means (6) arranged below the lower rack (4) so as to spray it with washing liquid;
second bottom spraying means (7) arranged below the upper rack (5) so as to spray it with washing liquid;
conveying means (9) suitable to connect the washing compartment (3) to said first and second spraying means (6, 7);
a motorised pump (10) operatively active on the conveying means (9) to take the washing liquid from the washing compartment (3) and send it to said first and second spraying means (6, 7),
characterised in that it comprises top spraying means (8) pertaining to said conveying means (9) and positioned above the upper rack (5) so as to spray it with the washing liquid for durations shorter by an order of magnitude than the spraying durations from said first and second spraying means (6, 7), said racks (4, 5) being the only racks present in the dishwasher (1).

2. The dishwasher (1) according to claim 1, further comprising a selector (11) operatively active on the conveying means (9) to selectively open a first conduit (9a) towards said first bottom spraying means

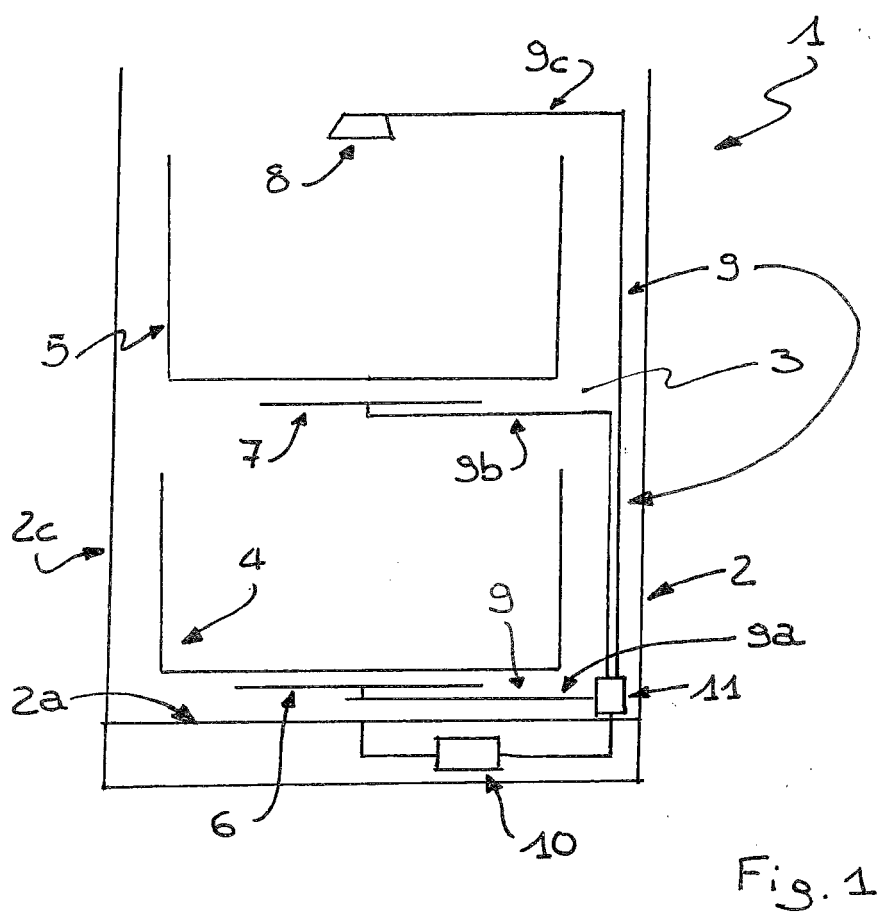


Fig. 1

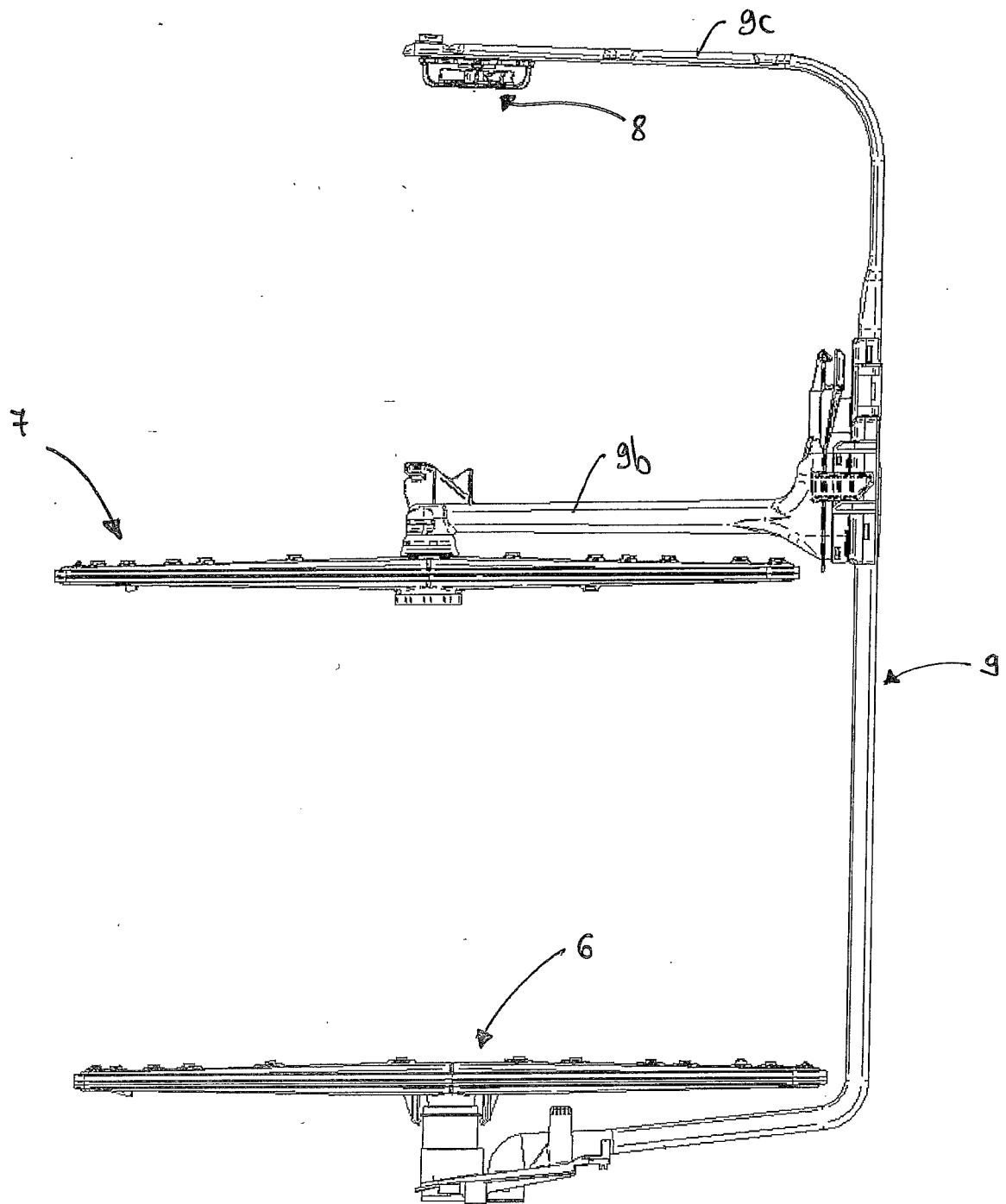
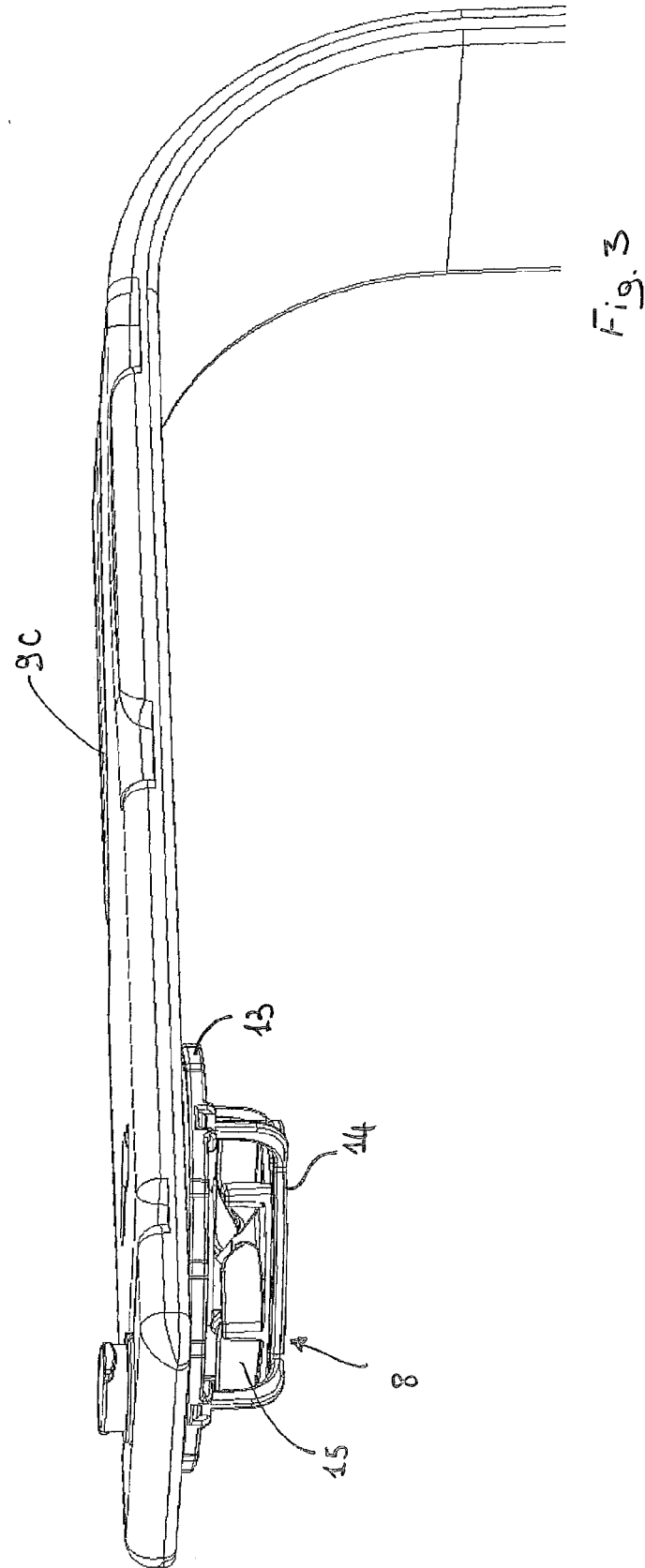


Fig.2



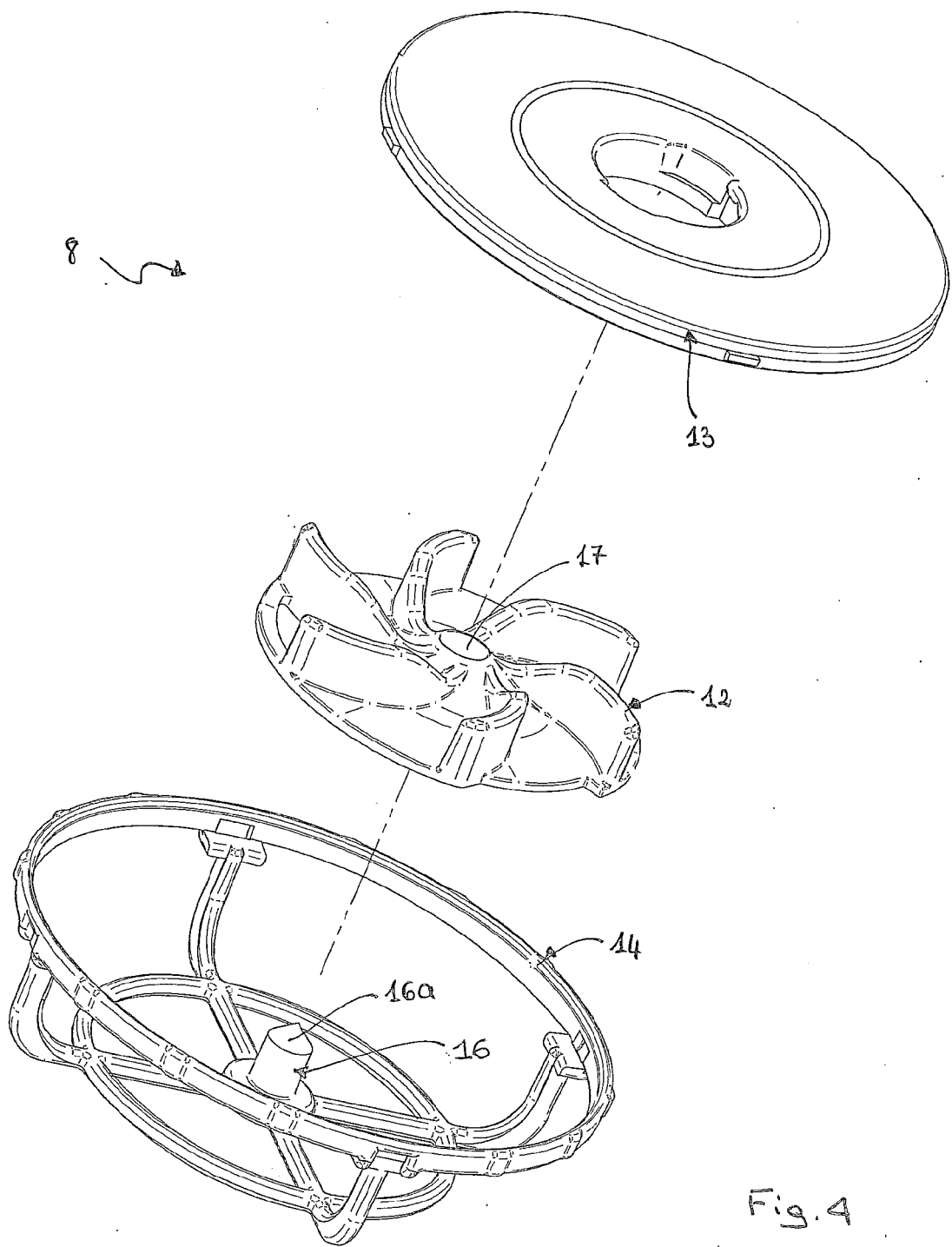


Fig. 4

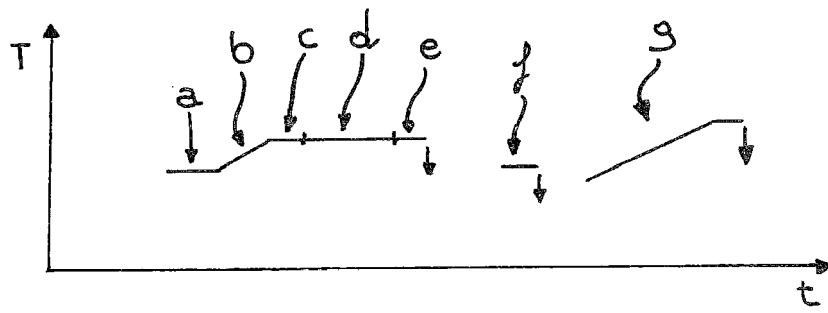


Fig. 5



EUROPEAN SEARCH REPORT

Application Number
EP 15 16 4728

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Place of search Munich		Date of completion of the search 29 September 2015	Examiner Lopez Vega, Javier
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**ANNEX TO THE EUROPEAN SEARCH REPORT
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