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(54) **SPRINKLER DEVICE FOR A LIQUID, PARTICULARLY FOR DISHWASHING MACHINE**

SPRINKLERVORRICHTUNG FÜR EINE FLÜSSIGKEIT, INSBESONDERE FÜR EINE
GESCHIRRSPÜLMASCHINE

DISPOSITIF D'ARROSEUR POUR UN LIQUIDE, EN PARTICULIER POUR UN LAVE-VAISSELLE

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EP 3 019 065 B1

Description

[FIELD OF ART]

[0001] The present invention relates to a sprinkler device for a liquid, usable in a household washing appliance, particularly in a dishwashing machine.

[PRIOR ART]

[0002] Dishwashing machines equipped with sprinkler devices for a liquid are currently known, i.e. devices which typically distribute liquid within the washing cavity of a dishwashing machine. In case of the dishwashing machine, such a liquid is used for washing dishes, and it comprises a mixture of water and detergent.

[0003] Known sprinkler devices for a liquid can be assimilated to the following two types:

- sprinkler devices for a liquid with rotating arm, equipped with sprinkling holes along the entire length of the arm, particularly suitable for example to be arranged below a corresponding rack in a dishwashing machine; or
- palette impeller-shaped sprinkler devices for a liquid, rotating about a vertical axis and adapted to receive a liquid flow from the hydraulic circuit of the dishwashing machine and to provide a radial flow which determines sprinkling rain by gravity on a underlying basket.

[0004] Known types of sprinkler devices for a liquid have complex structures which comprise several parts which must be made separately and assembled later, with appropriate fasteners and seals to prevent unintended leaks in critical points of the hydraulic circuit. Known types of sprinkler devices for a liquid are therefore complex and money consuming, as it regards both manufacturing and installation.

[0005] Known types of sprinkler devices for a liquid are also delicate, as they include rotating components that are prone to blockages, wear, and malfunctioning due to obstructions, excessive or incorrect use.

Document WO2008/029222A2 discloses a sprinkler device joined to a rotating arm, comprising an annular element fixed to a hydraulic conduit, a conical element distributing the liquid flow coming from the hydraulic conduit and a plurality of holding arms structurally connecting the annular element to the conical element.

[PURPOSES AND SUMMARY OF THE INVENTION]

[0006] Purpose of the present invention is to present a sprinkler device for a liquid, particularly for a dishwashing machine, which overcomes some of the drawbacks of known art, being an alternative to sprinkler devices for a liquid of prior art.

[0007] In particular, it is an object of the present inven-

tion to present a cheaper and more reliable sprinkler device for a liquid of simplified construction, cheaper and reliable.

[0008] It is a further purpose of the present invention to present a sprinkler device for a liquid in which fluid-tight seal in connection areas of a dishwashing machine hydraulic circuit is improved.

[0009] It is a further purpose of the present invention to present a sprinkler device for a liquid in which assembly and disassembly of the same is simplified for maintenance.

[0010] It is also a purpose of the present invention to present a sprinkler device for a liquid which presents an excellent fluid dynamic behaviour.

[0011] These and other purposes are achieved by means of a sprinkler device for a liquid according to the appended claims which form an integral part of the present description.

[0012] A basic idea underlying the present invention is to provide a sprinkler device for a liquid, as defined by the features of claim 1.

[0013] In this way, an effective device having geometric and functional characteristics is achieved so as to ensure more than satisfactory performances, even presenting a simple structure that involves cost savings for manufacturing and installation of the device itself.

[0014] According to the invention, the sprinkler device further comprises a plurality of distribution passing apertures, positioned on the surface of the conical distribution element. Such distribution apertures contribute to further distribute fluid flow to areas behind distribution element, improving performances.

[0015] Preferably, distribution apertures are different from each other according to two types: a first one with substantially tangential aperture and a second one with substantially radial aperture, preferably positioned on different meridian areas. These apertures improve washing liquid distribution in the whole washing cavity.

[0016] Preferably, the conical distribution element comprises a first conical distribution portion having a first "sharper" conicity angle, and further including a second distribution frusto-conical portion of said distribution element and having a conicity angle greater than the first angle, or "less sharp"; the two conicity angles are preferably joined to each other, in order to avoid turbulences restricted to the washing liquid which invests the distribution element, resulting in a greater effectiveness of washing.

[0017] Preferably, apertures are precisely positioned on the surface of the second frusto-conical distribution portion.

[0018] Preferably, the annular fixing element comprises bayonet fastener means, which cooperate with retaining elements on the hydraulic duct output. In this way, easy assembly and disassembly of device on the dishwashing machine is allowed.

[0019] Preferably, also for reasons of cost savings, the sprinkler device for a liquid is enbloc made, preferably in

talc filled polypropylene.

[0020] The present invention also relates to a washing appliance, particularly to a dishwashing machine, comprising at least one hydraulic duct and a sprinkler device for a liquid according to the present invention.

[0021] Other details and advantageous aspects will be more apparent from the detailed description which follows, and from the dependent claims.

[BRIEF DESCRIPTION OF THE DRAWINGS]

[0022] Some examples of preferred and advantageous embodiments are described by way of example and they are not limiting, with reference to accompanying drawings, wherein:

- Figure 1 depicts a schematic side view of a hydraulic circuit in a dishwasher comprising a sprinkler device for a liquid according to the present invention;
- Figure 2 depicts a rear view of circuit of Figure 1;
- Figure 3 depicts the assembly step of the sprinkler device for a liquid according to the invention on the hydraulic circuit of Figure 1;
- Figure 4 depicts the sprinkler device for a liquid of Figure 3 when assembly is completed;
- Figure 5 depicts a perspective view of one embodiment of the sprinkler device for a liquid according to the present invention;
- Figure 6 depicts a bottom view of sprinkler device for a liquid of Figure 5;
- Figure 7 depicts a first meridian section of the sprinkler device for a liquid of Figure 5 and Figure 6;
- Figure 8 depicts a second meridian section of the sprinkler device for a liquid of Figure 5 and Figure 6;
- Figure 9 depicts a mould first section adapted to provide a sprinkler device for a liquid according to the present invention;
- Figure 10 depicts a mould second section of Figure 9.

[0023] Drawings depict different aspects and embodiments of the present invention and, where appropriate, structures, components, materials and/or similar elements in different drawings are indicated by the same reference numerals.

[DETAILED DESCRIPTION OF THE INVENTION]

[0024] Among the most common appliances for cleaning devices which include sprinkler devices for a liquid, there are dishwashing machines for domestic or industrial use; the following description will refer to such equipment, without any intention to limit the present invention in this sense.

[0025] Figures 1 and 2 depict schematically a hydraulic circuit 100 in a dishwasher (not shown in the drawing for clarity) comprising a sprinkler device for a liquid 1 according to the present invention.

[0026] Hydraulic circuit 100 is suitable for a washing

liquid circulation, which may simply be water or a detergent solution in water.

[0027] Hydraulic circuit 100 comprises a conveying duct 101 adapted to convey a washing liquid into the dishwasher washing chamber, particularly from the base of the cleaning chamber up to its top.

[0028] Conveying duct 101 has one of its ends in an upper hydraulic duct 103, whose final part is substantially horizontal. In the preferred embodiment, conveying duct 101 comprises a hydraulic duct 103 which feeds sprinkler device 1 and to which it is hydraulically connected.

[0029] Additionally, conveying duct 101 comprises a second hydraulic duct 102.

[0030] Furthermore, the conveying duct 101, particularly the second hydraulic duct 102, is associated with a third horizontal hydraulic duct 104, which feeds a corresponding rotating sprinkler device 106; preferably conveying duct 101, particularly the second hydraulic duct 102, is associated with hydraulic duct 104 as described in patent application WO2008/029222A2.

[0031] Rotating sprinkler device 105 positioned at the bottom of washing cavity is preferably powered by a separate duct.

[0032] Rotating sprinkler devices 105 and 106, according to prior art, are of rotating arm hinged at the centre line type and comprise a plurality of nozzles aligned along the arm. Washing liquid dispensed from the nozzles of each rotating sprinkler device 105 and 106 is directed in a direction substantially parallel to the rotation arm axis, for washing dishes in racks arranged above and/or below sprinkler devices.

hydraulic duct segment 103 has an outlet aperture, which will be described below in greater detail, suitable for dispensing a flow of the washing liquid to be sprinkled within the washing chamber of the dishwashing machine. Exactly at that outlet aperture sprinkler device for a liquid 1 is applied according to the present invention.

[0033] Sprinkler device for a liquid 1 receives via hydraulic duct 103 the flow of washing liquid, to be sprinkled within the washing chamber and particularly above a rack, or more preferably a basket containing cutlery to be washed. Indeed, the sprinkler device 1 according to the present invention is preferred and advantageous in dishwashing machines comprising a "third upper rack", located just under the washing cavity ceiling, adapted to increase the dishwashing machine capacity to contain dishes.

[0034] In a preferred embodiment, the "third basket" is supported by the tub structure of the dishwashing machine itself, and it is supported on the walls of the tank by means of proper sliding guides.

[0035] In another preferred embodiment, the "third basket" is a tray type basket, applied to the dishwashing machine upper basket by means of proper sliding guides which support the same; in this case tray is an upper basket accessory, adapted to add a further level of load.

[0036] The sprinkler device for a liquid thus provides a further upper sprinkling of washing liquid, to improve

dishwashing, particularly for washing a basket or upper tray, and for a further contribution for washing other baskets underneath.

[0037] Furthermore, as it will be explained more in detail below, sprinkler device for a liquid 1 contributes to the realization of a dishwashing machine cleaning step.

[0038] Figures 3 and 4 depict the sprinkler device for a liquid 1 assembly to connect to the hydraulic duct 103. Sprinkler device 1 comprises an annular fixing element 2 adapted to be connected in a reversible manner to the hydraulic duct 103, particularly to appropriate fixing elements 107 placed in correspondence of liquid outlet aperture of the hydraulic duct 103.

[0039] Preferably, this liquid outlet aperture of hydraulic duct 103, particularly visible in Figure 3, comprises a reduction of section, particularly a "bottleneck" obtained by locally crushing the hydraulic duct 103, located immediately upstream the output section, which contributes to improve assembly fluid dynamic performances comprising sprinkler device for a liquid 1 and the hydraulic duct 103.

[0040] In a preferred embodiment, annular fixing element 2 cooperates with fastening element 107 by means of a reversible bayonet fastener.

[0041] In particular, fastening elements 107 comprise a bayonet linking seat manufactured on the side walls of a protrusion in correspondence of the hydraulic duct outlet 103. The bayonet linking seat preferably comprises a pair of projections angularly offset from each other, which achieve the above-mentioned bayonet fastener.

[0042] In a complementary manner, the inner surface of the annular fixing element 2 has relative recesses or shaped cavities, which allow insertion and subsequent housing of above mentioned projections, when sprinkler device 1 is in the assembled configuration.

[0043] The cooperation between projections and recesses formed in the annular fixing element 2 inner portion is exploited to create a reversible graft; in Figure 3 arrows indicate the procedure for mounting sprinkler device 1, which must be approached to the hydraulic duct 103 with a vertical movement from the bottom upwards so that projections engage with recesses, and then rotated clockwise (viewed from below) for fixing projections in relative slots, preferably with a rotation of a quarter-turn.

[0044] Sprinkler device 1 in the assembled configuration is illustrated in Figure 4; this assembly is easily reversible, for example for maintenance operations, by simply operating in reverse order from what said above.

[0045] Advantageously, bayonet fastener between the annular fixing element 2 and the hydraulic duct 103 involves a stable attachment and at a distance and predetermined position of sprinkler device 1.

[0046] Other solutions for fixing could provide suitable retaining means such as springs, or a threaded coupling.

[0047] Figure 5 illustrates a perspective view of a preferred embodiment of sprinkler device 1.

[0048] As already described above, sprinkler device 1

comprises an annular fixing element 2, and a conical distribution element 3 placed below the annular fixing element 2. A plurality of connecting arms 4, preferably in a number of three or four and angularly equidistant from each other, structurally connect the annular fixing element 2 to the distribution element 3, keeping them at a predetermined distance in such a way as to allow optimal distribution of liquid from the hydraulic duct 103. Connecting arms 4 are preferably grafted to annular fixing element 2, ending on outer circumferential positions of the conical distribution element 3, thus leaving a preponderant portion of the conical distribution element 3 free for liquid passage.

[0049] The conical distribution element 3 is "substantially" tapered, this means that its shape is conical, taking into account more complex shapes such as a different conicity in various portions of conical distribution element 3, and of course taking into account manufacturing dimensional tolerances.

[0050] The conical distribution element 3 preferably comprises a plurality of passing apertures on its surface, which further distribute liquid from hydraulic duct 103 to areas behind the distribution element 3, for a better dishes washing in the dishwashing machine.

[0051] Preferably, on peripheral edge of conical distribution element 3, sprinkler device 1 comprises appropriate external gripping means, or shaped portions with projections which facilitate gripping by the user of sprinkler device 1, to assemble and/or disassemble the same to bayonet fastener 107 with greater simplicity, as also described with reference to Figure 3.

[0052] Figure 6 depicts a bottom view of the sprinkler device 1, in which said passing apertures are better visible. Distribution element 3 preferably comprises apertures positioned in different meridian sectors for a best liquid distribution.

[0053] In a preferred and advantageous embodiment, distribution element 3 comprises a first type of tangential apertures 5, and a second type of radial apertures 6.

[0054] Tangential apertures 5 have a substantially rectangular section, with two larger sides slightly curved, and the main direction of development is substantially tangential relative to a circumference lying on the surface of distribution element 3, or a circumference concentric to sprinkler device 1 in Figure 6.

[0055] Radial apertures 6 have instead substantially trapezoidal section, with the larger base towards the inside of distribution element 3 and the smaller base towards the outside of distribution element 3, having the main direction of development that is substantially radial relative to a circumference lying on the surface of distribution element 3, or a circumference concentric to sprinkler device 1 in Figure 6.

[0056] Different conformation of apertures 5 and 6 contributes to a better diffusion of washing liquid in the areas behind sprinkler device 1. As shown in Figure 6, apertures 5 and 6 are preferably alternated from each other on different meridian sectors of distribution element 3

surface.

[0057] Apertures are in number of four, but other configurations, for example with six apertures, would be possible. Preferably, the four apertures 5 and 6 are on meridian sectors spaced from each other at 90 degrees, and preferably in correspondence of the four holding arms 4 described above.

[0058] In a preferred and advantageous embodiment, each of the apertures is specially sized to allow passage of liquid which involves optimal distribution of washing liquid flow to different areas in the washing cavity of the washing machine.

[0059] The surface of each of the two tangential apertures 5 is preferably between 0.5% and 15%, and more preferably between 1,5 and 7%, and even more preferably equal to 2.5%, of the total area of distribution element 3.

[0060] The surface of each of the two radial apertures 6 is preferably between 0.5% and 12%, and more preferably between 1 and 5%, and even more preferably equal to 2%, of the total area of distribution element 3.

[0061] Figure 7 depicts a first section of distribution element 3, along a plane indicated as VII-VII in Figure 6. In this sectional view, it is possible to appreciate radial size of the predominant radial apertures 6.

[0062] Figure 8 depicts a second section of distribution element 3, along a plane indicated as VIII-VIII in Figure 6. In this sectional view, it is possible to appreciate a smaller radial dimension of tangential apertures 5.

[0063] Radial tangential apertures 5 and 6 are suitably countersunk at the lower wall trailing edge of the distribution element 3, for improved fluid dynamics and a constructive simplification.

[0064] In sections referred to in Figures 7 and 8 it is possible to visualize the shape of distribution element 3 effectively, such as "substantially" conical.

[0065] Such distribution element 3 comprises in fact a first distribution conical portion 7, having a first conicity angle smaller than the second conicity angle of the frusto-conical peripheral portion 8 of the distribution element 3, on which apertures 5 and 6 are positioned. In other words, angle between side surface of first conical portion 7 and the vertical one, i.e. distribution element 3 cone height, is less than the angle between side surface of second frusto-conical portion 8 and the vertical one.

In other words, first conical portion 7 is sharper than second frusto-conical portion 8; conical portion 7 is facing towards annular element 2 and therefore directly invested by liquid flow from hydraulic duct 103, and it therefore mainly contributes to separate liquid jet which is then effectively distributed by frusto-conical surface 8, and by relative apertures 5 and 6 which are positioned precisely on said frusto-conical surface 8.

[0066] "Substantially" conical conformation of distribution element 3 of sprinkler device 1 itself develops an optimized shape which provides a conical section to incidence surface of water flow exiting from hydraulic duct 103. By means of this solution, liquid flow is forced to

smash and deflect in all radial directions from sprinkler device 1 centre point.

[0067] In this way water is not blocked by the surface, but it easily follows conical profile, maintaining a high kinetic component and thereby creating a "water umbrella" with regular and uniform sprinkling.

[0068] Washing liquid fall within washing cavity has a circumference proportional to liquid jet flow and pressure, and thus directly adjustable through the amount of driving pump motor revolutions: as motor speed increases, circumference of water jet fall increases.

It should also be noted that the sprinkled liquid, slipping on a large surface comprising a first conical curved zone and a second conical zone with greater conicity, is more uniform and less turbulent, to advantage washing effectiveness.

[0069] The four holding arms which anchor the distribution element 3 to the annular fixing element 2, which is attached to the hydraulic duct 103, do not significantly interfere with water jet and create minimum grey areas thanks to their reduced thickness. In a preferred and advantageous embodiment, designed for maximum water flows of 25 l/min (assuming a tolerance of plus or minus 0.5 l/min in respect to said nominal value), dimensions of sprinkler device for a liquid 1 various elements were determined as it follows.

[0070] Preferably, conical distribution element 3 outer diameter is between 35 mm and 45 mm, more preferably equal to 40 mm.

Preferably, annular fixing element 2 inner diameter is between 12 and 20 mm, more preferably equal to 16 mm.

[0071] Preferably, conical distribution element height is between 10 mm and 15 mm, more preferably equal to 12.7 mm.

[0072] Preferably, sprinkler device 1 overall height does not exceed 20 mm, and is preferably equal to 17 mm.

Preferably, first conical portion 7 height is between 4 mm and 7 mm, preferably equal to 5.8 mm.

[0073] Preferably, first conical portion 7 diameter is between 8 mm and 14 mm, more preferably equal to 12.7 mm.

[0074] Preferably, second frusto-conical portion 8 height is between 2 and 4 mm, more preferably equal to 3 mm.

[0075] Preferably, angle relative to first conical portion 7 vertical is between 40° and 52°, more preferably between 44° and 48°, more preferably equal to 46°.

[0076] Preferably, angle relative to second frusto-conical portion 7 vertical is greater, that is, has greater conicity, and is between 72° and 84°, more preferably between 76° and 80°, more preferably equal to 78°.

[0077] Preferably, holding arms 3 thickness is less than 3 mm, more preferably equal to 1.5 mm.

[0078] Preferably, radial apertures 6 length is between 6 mm and 10 mm, more preferably equal to 8.7 mm.

[0079] Preferably, tangential apertures 5 length is between 5 and 9 mm, more preferably equal to 7 mm.

[0080] Preferably, hydraulic duct 103 outlet diameter which sprinkler device is associated to, is comprised between 10 mm and 14 mm, more preferably equal to 11.4 mm.

[0081] As already mentioned earlier, a sprinkler device for a liquid further contributes to a cleaning step.

[0082] According to the present invention, it comprises a cleaning step at the beginning and/or end of a washing step. This cleaning step is particularly optimized in combination with a sprinkler device for a liquid according to the present invention.

[0083] It is expected to vary periodically, particularly in a substantially continuous way, range of water jet diffused by sprinkler device, preferably between radius range values of about 40 mm to approximately 240 mm, more preferably between radius range values of about 100 mm to approximately 140 mm, and vice versa. As already said, washing liquid fall within washing cavity has a circumference proportional to liquid jet flow and pressure, and then directly adjustable through the amount of driving pump motor revolutions: as motor speed increases, water jet fall circumference increases.

[0084] In particular, according to a preferred embodiment of dishwashing machine, 1400 RPM (or revolutions per minute) of pump correspond to a radius of about 40 mm of water jet diffused by a device; preferably 1700 RPM of pump correspond to a radius of about 100 mm; preferably 2000 RPM correspond to a radius of about 140 mm; preferably 2500 rpm correspond to a radius of about 240 mm.

[0085] The method for controlling according to the present invention provides control said flow according to increasing and decreasing ramps, acting precisely on pump motor revolutions.

[0086] In a preferred embodiment, it is expected for a cleaning step at the beginning of a washing step, to vary the amount of motor revolutions from a first value, preferably 1700 RPM, to a second value, preferably 2000 RPM, in a time preferably between 20 and 60 seconds, and more preferably equal to 40 seconds.

[0087] It is also expected to maintain the second value, preferably 2000 rpm, for a further time, preferably less than 5 seconds, more preferably equal to 1 second.

[0088] It is therefore expected to vary the amount of motor revolutions from the second value, preferably 2000 RPM, back to a value similar to the first value, preferably 1700 RPM, in a time preferably between 20 and 60 seconds, and more preferably equal to 40 seconds. It is expected, therefore, to maintain the first value, preferably 1700 rpm, for a further time, preferably less than 5 seconds, more preferably equal to 1 second.

It is therefore one more time expected to vary the amount of motor revolutions from the second value, preferably 1700 RPM, to a second value, preferably 2000 RPM, again in a time preferably between 20 and 60 seconds, and more preferably equal to 40 seconds.

It is expected, finally, to maintain the second value, preferably 2000 rpm, for a further time, preferably less than

5 seconds, more preferably equal to 1 second, accomplishing the first cleaning step.

[0089] In a further preferred embodiment, in combination or in alternative to the one described above, for a cleaning step at the end of a washing step it is expected to vary the amount of motor revolutions from a second value, preferably 2000 RPM, to a first value, preferably 1700 RPM, in a time preferably between 20 and 60 seconds, and more preferably equal to 40 seconds.

[0090] It is therefore expected to maintain the first value, preferably 1700 rpm, for a further time, preferably less than 5 seconds, more preferably equal to 1 second.

[0091] It is therefore expected to vary the amount of motor revolutions from a first value, preferably 1700 RPM, again to a value similar to the second value, preferably 2000 RPM, in a time preferably between 20 and 60 seconds, and more preferably equal to 40 seconds.

[0092] It is expected, therefore, to maintain the second value, preferably 2000 RPM, for a further time, preferably less than 5 seconds, more preferably equal to 1 second.

[0093] It is therefore one more time expected to vary the amount of motor revolutions from the second value, preferably 2000 RPM, to the first value, preferably 1700 RPM, again in a time preferably between 20 and 60 seconds, and more preferably equal to 40 seconds.

[0094] It is therefore expected to maintain the first value, preferably 1700 RPM, for a further time, preferably less than 5 seconds, more preferably equal to 1 second, accomplishing the second cleaning step.

[0095] As already mentioned, an obvious advantage of the sprinkler device 1 according to the present invention is the possibility to be manufactured in a more simple way, making the manufacturing procedure enbloc, thus more advantageous.

[0096] Manufacturing method according to the present invention allows manufacturing each sprinkling device 1 by moulding, through a single moulding operation and enbloc, without further machining.

Figure 9 and Figure 10 depict moulding of sprinkling device 1, in a multipieces mould which realises the complete component, thus reducing raw material costs and eliminating costs of further assembly and components manufacturing operations.

[0097] Preferably, sprinkler device 1 is made in talc filled polypropylene with concentration 20%.

[0098] Such manufacturing process for moulding furthermore allows achieving a sprinkling device 1 having an improved surface finishing, hence improved fluid dynamic performances, in combination with liquid jet to supply.

[0099] As depicted in Figure 9, mould comprises a first upper matrix tile 201, a second lower punch tile 202, and a couple of side carriages 203 e 204.

[0100] When put near one another, they cooperate to manufacture sprinkling device 1 conformation, visible in section in Figure 9, corresponding to section VII-VII of Figure 7, turned upside down, and further visible in section in Figure 10, corresponding to section VIII-VIII of

Figure 8, turned upside down.

[0101] Particularly, first upper mould tile 201 and second lower punch tile 202 contribute to define structure of the annular fixing element, the conical distribution element and the holding arms, i.e. they define sprinkling device 1 structural elements.

[0102] On the other hand, carriages 203 and 204 and appropriate blades visible in mould tile 201 lower part in Figure 10, contribute to define detail elements such as recesses and apertures described above.

[0103] In this way it is possible to manufacture a sprinkling device according to the present invention, in a single moulding step, with significant advantages for manufacturing procedure, achieving a reliable, effective and low cost component. For example, it is evident that material used for manufacturing sprinkler device for a liquid will be selected by those skilled in the art according to usual design parameters.

It is also obvious that a household washing appliance could comprise even more than one sprinkler device for a liquid according to the present invention.

Claims

1. A sprinkler device for a liquid (1), comprising:

- i) an annular fixing element (2) adapted to be connected to a hydraulic conduit (103),
- ii) a substantially conical distribution element (3) comprising a conical vertex facing towards said annular fixing element (2) and adapted to distribute a liquid flow coming from said hydraulic conduit (103) and
- iii) a plurality of holding arms (4) structurally connecting said annular fixing element (2) to said distribution element (3) at a predetermined distance,

characterised in that the sprinkler device further comprising a plurality of distribution apertures (5, 6) arranged on the surface of said conical distribution element (3), said plurality of distribution apertures (5, 6) being through apertures for further distributing said liquid flow to areas behind said distribution element (3).

2. A sprinkler device according to claim 1, wherein said plurality of distribution apertures (5, 6) comprises at least one first tangential aperture (5) having a first main direction of development which is tangential to a circumference lying on the surface of said distribution element (3), and further comprises at least one second radial aperture (6) having a second main direction of development which is radial to said circumference.

3. A sprinkler device according to claim 2, wherein said

first tangential aperture (5) and said second radial aperture (6) are positioned, respectively, on different meridian sectors of the surface of said conical distribution element (3).

4. A sprinkler device according to claim 3, comprising two of said first tangential aperture (5) and two of said second radial aperture (6), alternated with one another on said different meridian sectors, preferably aligned to one another on meridian sectors spaced by 90 degrees.

5. A sprinkler device according to any one of claims 1 to 4, wherein said conical distribution element (3) comprises a first conical distribution portion (7) having a first conicity angle, and further comprises a second truncated cone-shaped distribution portion (8) of said distribution element (3) in a distal position relative to said annular fixing element (2) and having a second conicity angle which is greater than said first conicity angle.

6. A sprinkler device according to claim 5, wherein said plurality of apertures (5, 6) are positioned on the surface of said second truncated cone-shaped distribution portion (8).

7. A sprinkler device according to any one of claims 1 to 6, wherein said annular fixing element (2) comprises bayonet fastener means adapted to cooperate with respective elements (107) at the outlet of said hydraulic conduit.

8. A sprinkler device according to any one of claims 1 to 7, wherein said liquid sprinkler device for a liquid (1) is made in one piece, preferably from talc filled polypropylene.

9. A household washing appliance, in particular a dishwasher, comprising at least one hydraulic conduit (103) and a sprinkler device for a liquid (1) according to any one of claims 1 to 8.

Patentansprüche

1. Sprinklervorrichtung für eine Flüssigkeit (1), die umfasst:

- i) ein ringförmiges Befestigungselement (2), das angepasst ist, um mit einer hydraulischen Leitung (103) verbunden zu sein,
- ii) ein im Wesentlichen kegelförmiges Verteilungselement (3), das eine kegelförmige Spitze umfasst, die dem ringförmigen Befestigungselement (2) zugewandt und dazu angepasst ist, einen Flüssigkeitsstrom, der aus der hydraulischen Leitung (103) kommt, zu verteilen, und

iii) eine Vielzahl von Haltearmen (4) die strukturmäßig das ringförmige Befestigungselement (2) mit dem Verteilungselement (3) in einem vorbestimmten Abstand verbinden,

dadurch gekennzeichnet, dass die Sprinklervorrichtung weiter eine Vielzahl von Verteilungsöffnungen (5, 6) umfasst, die auf der Oberfläche des kegelförmigen Verteilungselements (3) verteilt sind, wobei die Vielzahl von Verteilungsöffnungen (5, 6) durchgehende Öffnungen zum weiteren Verteilen des Flüssigkeitsstroms zu Bereichen hinter dem Verteilungselement (3) sind.

2. Sprinklervorrichtung nach Anspruch 1, wobei die Vielzahl von Verteilungsöffnungen (5, 6) mindestens eine tangentiale Öffnung (5) umfasst, die eine erste Ausdehnungshaupttrichtung, die zu einem Umfang tangential ist, der auf der Oberfläche des Verteilungselements (3) liegt, und weiter mindestens eine zweite radiale Öffnung (6) umfasst, die eine zweite Ausdehnungshaupttrichtung, die zu dem Umfang radial ist, aufweist.
3. Sprinklervorrichtung nach Anspruch 2, wobei die erste tangentiale Öffnung (5) und die zweite radiale Öffnung (6) jeweils auf unterschiedlichen Meridiansektoren der Oberfläche des kegelförmigen Verteilungselements (3) positioniert sind.
4. Sprinklervorrichtung nach Anspruch 3, die zwei der ersten tangentialen Öffnung (5) und zwei der zweiten radialen Öffnung (6) miteinander abwechselnd auf den unterschiedlichen Meridiansektoren umfasst, vorzugsweise zueinander auf Meridiansektoren, die um 90° beabstandet sind, ausgerichtet.
5. Sprinklervorrichtung nach einem der Ansprüche 1 bis 4, wobei das kegelförmige Verteilungselement (3) einen ersten kegelförmigen Verteilungsabschnitt (7) umfasst, der einen ersten Konizitätswinkel aufweist, und weiter einen stumpfen kegelförmigen Verteilungsabschnitt (8) des Verteilungselements (3) in einer distalen Position bezüglich des ringförmigen Befestigungselements (2) umfasst, und einen zweiten Konizitätswinkel aufweist, der größer ist als der erste Konizitätswinkel.
6. Sprinklervorrichtung nach Anspruch 5, wobei die Vielzahl von Öffnungen (5, 6) auf der Oberfläche des zweiten stumpfen kegelförmigen Verteilungsabschnitts (8) positioniert ist.
7. Sprinklervorrichtung nach einem der Ansprüche 1 bis 6, wobei das ringförmige Befestigungselement (2) Bajonettverschluss-Befestigungsmittel umfasst, die angepasst sind, um mit jeweiligen Elementen (107) an dem Auslass der hydraulischen Leitung zu-

sammenzuwirken.

8. Sprinklervorrichtung nach einem der Ansprüche 1 bis 7, wobei die Flüssigkeitssprinklervorrichtung für eine Flüssigkeit (1) aus einem Teil, vorzugsweise aus mit Polypropylen gefülltem Talk hergestellt ist.
9. Haushaltswaschgerät, insbesondere ein Geschirrspüler, der mindestens eine hydraulische Leitung (103) und eine Sprinklervorrichtung für eine Flüssigkeit (1) nach einem der Ansprüche 1 bis 8 umfasst.

Revendications

1. Dispositif asperseur pour un liquide (1), comprenant :

- i) un élément de fixation annulaire (2) apte à être raccordé à un conduit hydraulique (103),
- ii) un élément de distribution sensiblement conique (3) comprenant un sommet conique faisant face vers ledit élément de fixation annulaire (2) et apte à distribuer un écoulement de liquide provenant dudit conduit hydraulique (103), et
- iii) une pluralité de bras de maintien (4) raccordant structurellement ledit élément de fixation annulaire (2) audit élément de distribution (3) à une distance prédéterminée,

caractérisé en ce que le dispositif asperseur comprend en outre une pluralité d'ouvertures de distribution (5, 6) agencées sur la surface dudit élément de distribution conique (3), ladite pluralité d'ouvertures de distribution (5, 6) étant des ouvertures traversantes pour distribuer en outre ledit écoulement de liquide à des zones derrière ledit élément de distribution (3).

2. Dispositif asperseur selon la revendication 1, dans lequel ladite pluralité d'ouvertures de distribution (5, 6) comprend au moins une première ouverture tangentielle (5) ayant une première direction principale de développement qui est tangentielle à une circonférence se trouvant sur la surface dudit élément de distribution (3), et comprend en outre au moins une seconde ouverture radiale (6) ayant une seconde direction principale de développement qui est radiale à ladite circonférence.
3. Dispositif asperseur selon la revendication 2, dans lequel ladite première ouverture tangentielle (5) et ladite seconde ouverture radiale (6) sont positionnées respectivement sur différents secteurs méridiens de la surface dudit élément de distribution conique (3).
4. Dispositif asperseur selon la revendication 3, com-

prenant deux de ladite première ouverture tangentielle (5) et deux de ladite seconde ouverture radiale (6), en alternance l'une avec l'autre sur lesdits différents secteurs méridiens, de préférence alignées l'une avec l'autre sur des secteurs méridiens espacés de 90 degrés. 5

5. Dispositif asperseur selon l'une quelconque des revendications 1 à 4, dans lequel ledit élément de distribution conique (3) comprend une première portion de distribution conique (7) ayant un premier angle de conicité, et comprend en outre une seconde portion de distribution en forme de cône tronqué (8) dudit élément de distribution (3) à une position distale par rapport audit élément de fixation annulaire (2) et ayant un second angle de conicité supérieur au premier angle de conicité. 10 15
6. Dispositif asperseur selon la revendication 5, dans lequel ladite pluralité d'ouvertures (5, 6) sont positionnées sur la surface de ladite seconde portion de distribution en forme de cône tronqué (8). 20
7. Dispositif asperseur selon l'une quelconque des revendications 1 à 6, dans lequel ledit élément de fixation annulaire (2) comprend un moyen de verrouillage à baïonnette apte à coopérer avec des éléments respectifs (107) à la sortie dudit conduit hydraulique. 25
8. Dispositif asperseur selon l'une quelconque des revendications 1 à 7, dans lequel ledit dispositif asperseur de liquide pour un liquide (1) est constitué d'une seule pièce, de préférence en propylène rempli de talc. 30 35
9. Appareil de lavage domestique, en particulier un lave-vaisselle, comprenant au moins un conduit hydraulique (103) et un dispositif asperseur pour un liquide (1) selon l'une quelconque des revendications 1 à 8. 40

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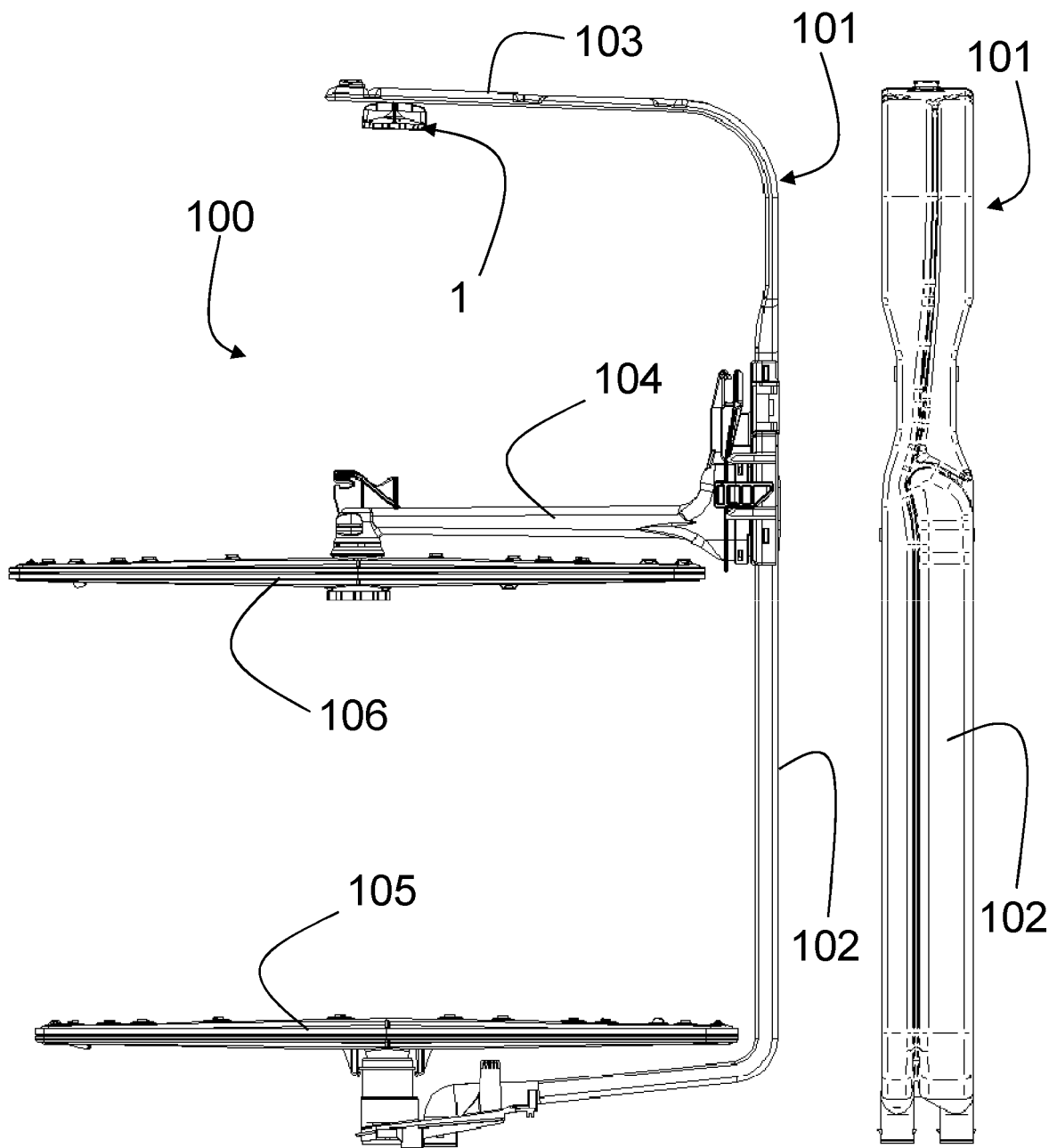


FIG. 1

FIG. 2

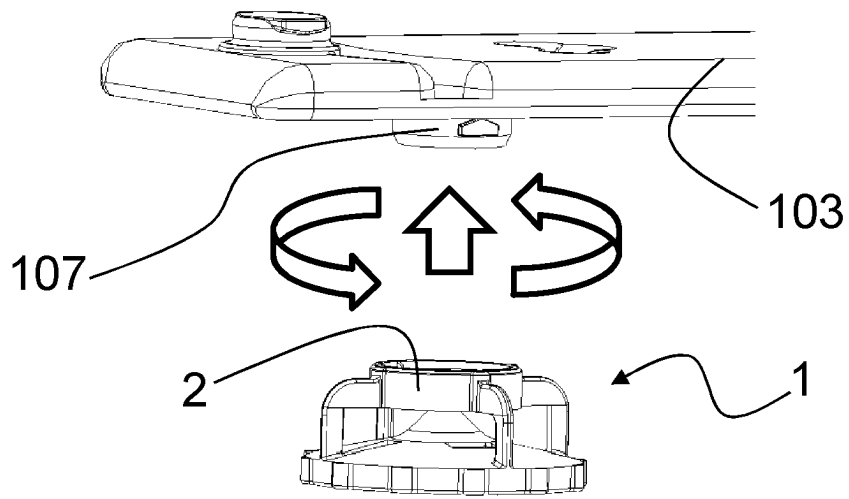


FIG. 3

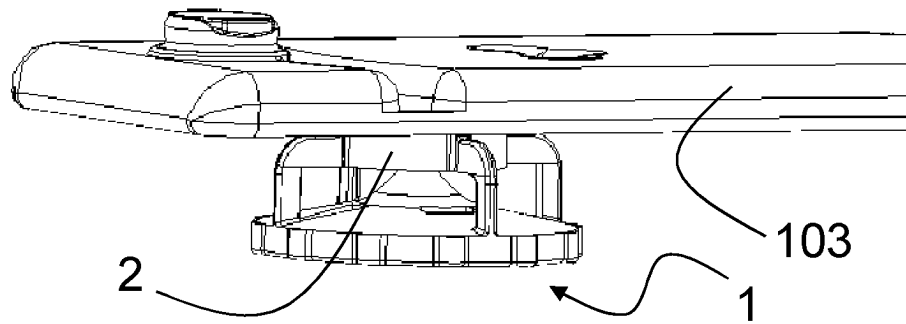


FIG. 4

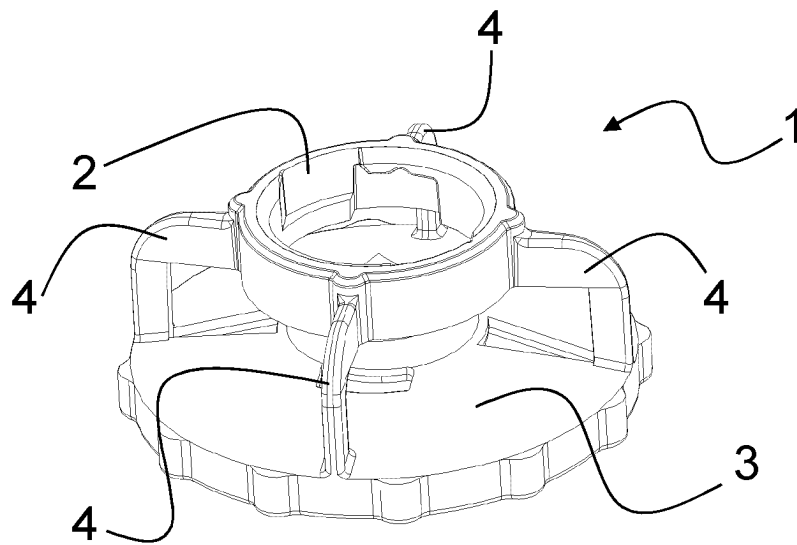


FIG. 5

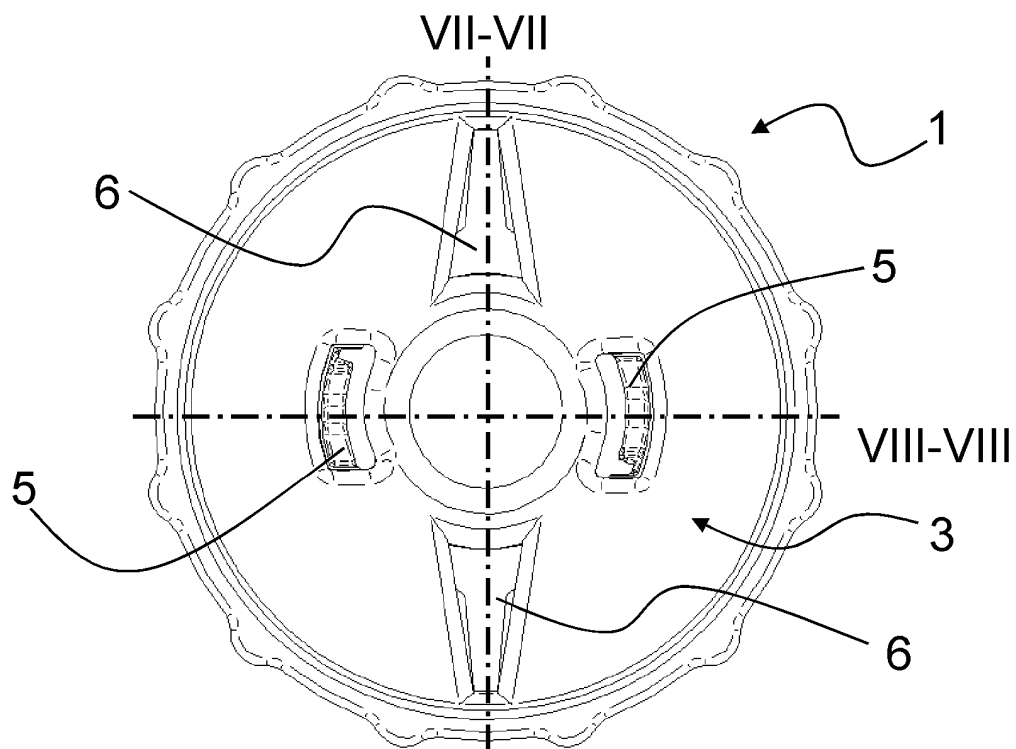


FIG. 6

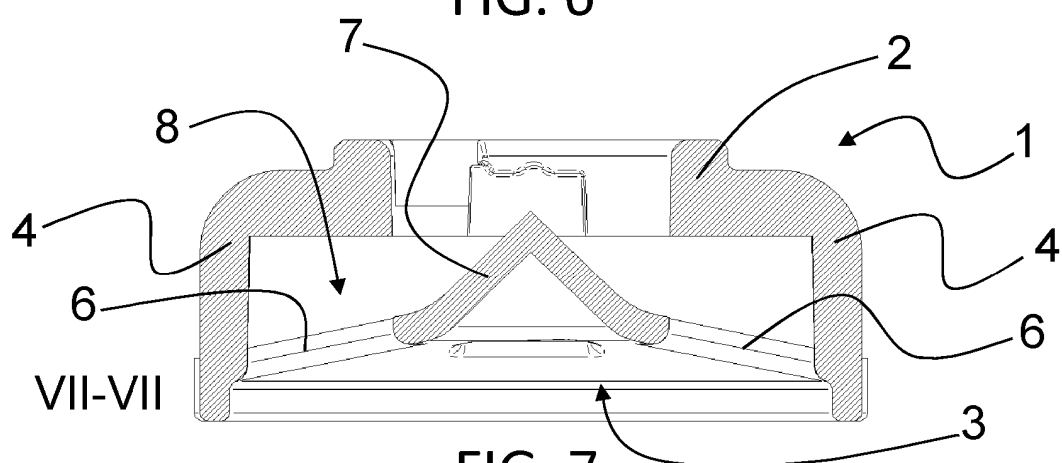


FIG. 7

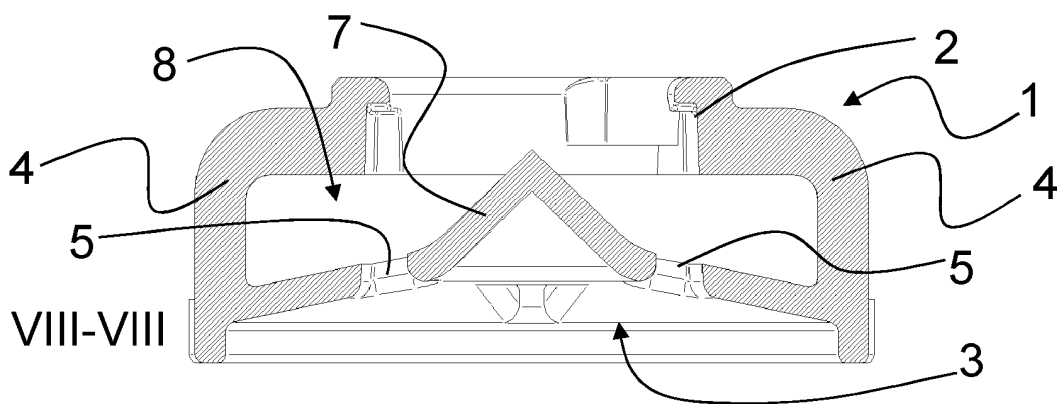
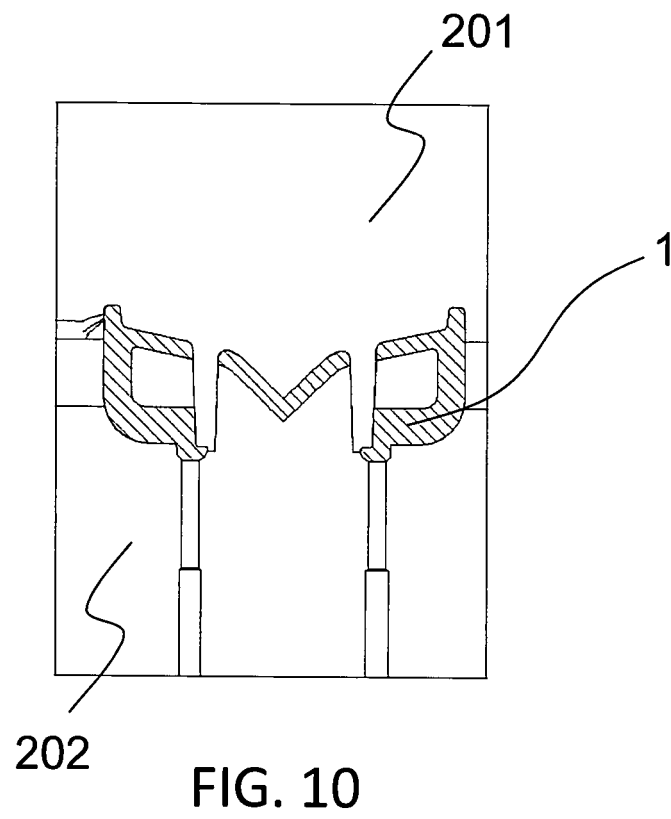
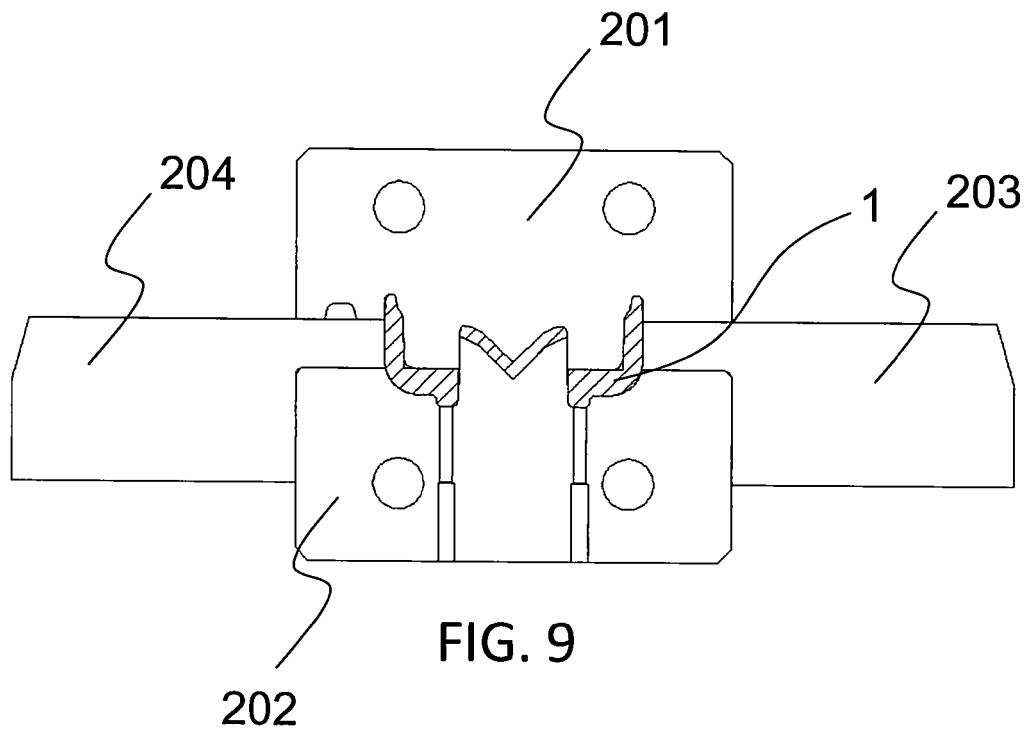


FIG. 8



REFERENCES CITED IN THE DESCRIPTION

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