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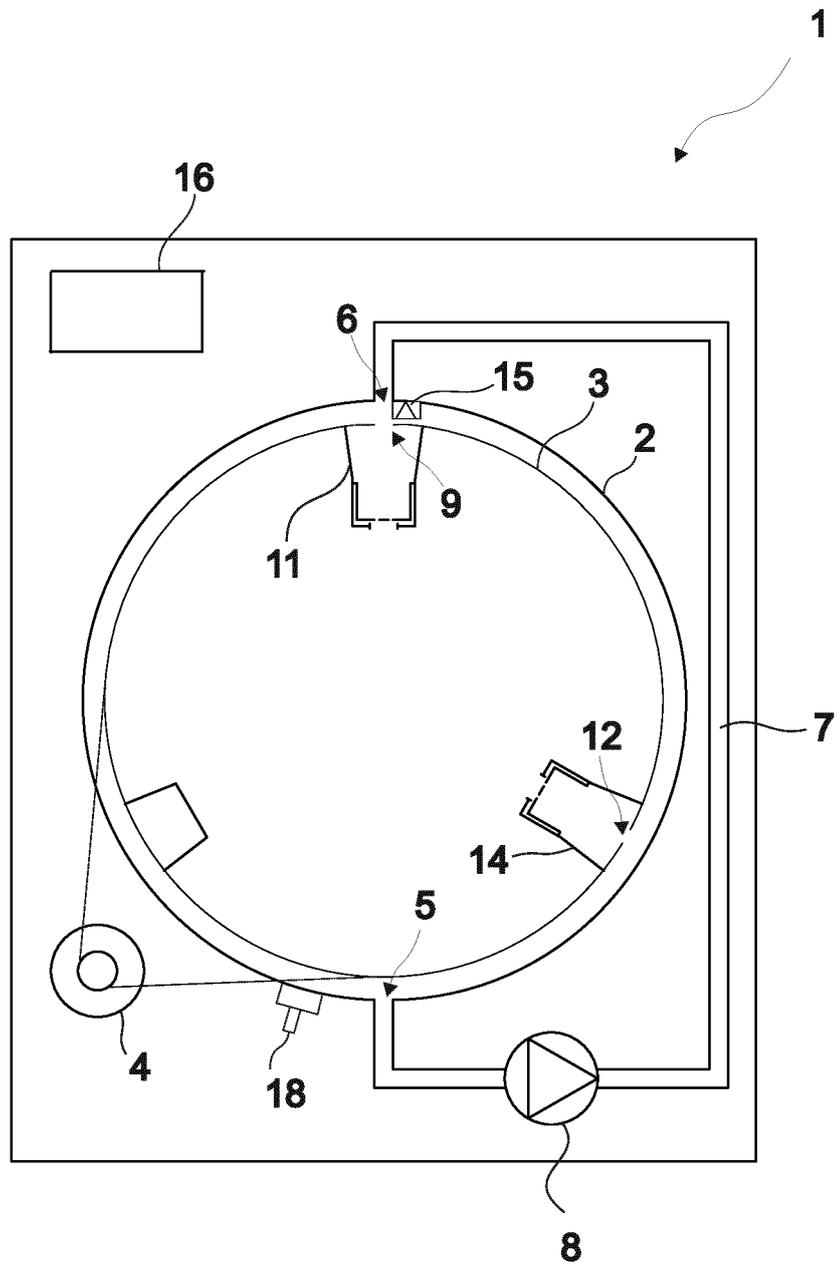
(54) **A WASHING MACHINE WITH IMPROVED WASHING EFFICIENCY**

(57) The present invention relates to a washing machine (1) comprising a tub (2); a drum (3) which is disposed in the tub (2); a motor (4) which rotates the drum (3) in the tub (2); a tub outlet (5) which is provided at the lower side of the tub (2); a tub inlet (6) which is provided at the upper side of the tub (2); a circulation line (7) which extends between the tub inlet (6) and the tub outlet (5); a pump (8) which is provided on the circulation line (7) and which enables the water taken through the tub outlet (5) to be sent to the tub inlet (6); a first baffle (11) which is provided on the drum (3) and which has a first port (9) suitable for taking the water coming through the tub inlet (6) and at least one first nozzle (10) which enables the water filled therein through the first port (9) to be sent into the drum (3); a second baffle (14) which is provided on the drum (3) and which has a second port (12) suitable for taking the water coming through the tub inlet (6) and at least one second nozzle (13) which enables the water filled therein through the second port (12) to be sent into the drum (3); at least one sensor unit (15) which is suitable for sensing the position of the first baffle (11) and the second baffle (14) with respect to the tub inlet (6); a control unit (16) which is suitable for controlling the motor (4) so as to align the first port (9) or the second port (12) with the tub inlet (6) by means of data provided by the sensor unit (15); and a control panel (17) which allows the selection of the washing program. The first nozzle (10) has a cross-sectional area larger than the cross-sectional ar-

ea of the second nozzle (13) and the control unit (16) is configured to control the motor (4) and the pump (8) so as to ensure that the amount of water predetermined by the manufacturer according to the selected program is sent from the first baffle (11) and/or the second baffle (14) into the drum (3).

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Figure 2



Description

[0001] The present invention relates to a washing machine wherein the flow of water delivered onto the laundry is optimized.

[0002] In general, washing machines have a fixed tub and a drum rotating in the tub. In order to increase the washing performance, there are a pump and a circulation line which ensure that the washing water taken from the lower part of the tub is sent back into the drum via the upper part of the tub. In general, water is sprayed on the laundry by means of nozzles on the bellows. As an alternative to this solution, the water coming through the circulation line is fed onto the laundry through the baffles in the drum. In this embodiment, the washing water coming from the circulation line first fills into the baffle and then is sprayed onto the laundry through the nozzles on the baffle. The position of the baffles relative to the inlet to the tub is provided by the communication between the sensor unit and the control unit. It is determined that the washing performance is increased by means of the extra water circulation provided in the washing machines wherein water is delivered onto the laundry through the baffles. However, since a single type of baffle is used in products having this system, the sprayed water always reaches the laundry with a constant flow form and pressure. Therefore, the baffles are always designed to provide optimum mechanical movement for the purpose of maximum cleaning. Therefore, more mechanical damage occurs during the washing of delicate fabrics, while a lower washing performance is obtained in the washing of fabrics with heavy stains. Since the water sent back into the drum with the drum baffle in the existing systems has a constant pressure and flow pattern, it is insufficient to provide high washing performance and prevent mechanical damage.

[0003] The state of the art Korean Patent Application No. KR20100055009A discloses that the drum baffle has a plurality of watering ports with different diameters to deliver the stored washing water onto the laundry.

[0004] The aim of the present invention is the realization of a washing machine wherein laundry of different types and/or with different characteristics are efficiently washed.

[0005] The washing machine realized in order to attain the aim of the present invention, explicated in the first claim and the respective claims thereof, comprises a tub; a drum which is disposed in the tub; a motor which rotates the drum in the tub; a tub outlet which is provided at the lower side of the tub; a circulation line which extends between the tub outlet and a tub inlet provided at the upper side of the tub; a pump which is provided on the circulation line and which enables the water taken through the tub outlet to be sent to the tub inlet; a first baffle which is provided on the drum and which has a first port suitable for taking the water coming through the tub inlet and at least one first nozzle which enables the water filled therein through the first port to be sent into

the drum; a second baffle which is provided on the drum and which has a second port suitable for taking the water coming through the tub inlet and at least one second nozzle which enables the water filled therein through the second port to be sent into the drum; at least one sensor unit which is suitable for sensing the position of the first baffle and the second baffle with respect to the tub inlet; a control unit which is suitable for controlling the motor so as to align the first port or the second port with the tub inlet by means of data provided by the sensor unit; and a control panel which allows the selection of the washing program; and the second nozzle is configured to have a smaller width than the first nozzle, and the control unit is suitable to control the motor and pump in order to ensure that the first port or the second port is aligned with the tub inlet and that the water taken through the tub outlet is fed to the tub inlet such that the amount of water predetermined by the manufacturer according to the selected washing program is fed into the drum through the first baffle or the second baffle. Thus, the sprayed water is fed onto the laundry with a variable flow form and pressure, thereby effectively meeting the needs of different programs.

[0006] In an embodiment of the present invention, there is a turbidity sensor in the tub which detects the turbidity of the water in the drum, and the control unit controls the motor and pump so as to ensure that when the turbidity value detected by the turbidity sensor is higher than a threshold turbidity value determined by the manufacturer, the first port on the first baffle is aligned with the tub inlet in order to spray water into the drum by means of the first baffle suitable for removing heavy stains and that when the turbidity value detected by the turbidity sensor is lower than the threshold turbidity value, the second port on the second baffle suitable for washing delicate fabrics is aligned with the tub inlet. Thus, the washing performance of the washing machine is increased by ensuring that laundry with heavy stains is exposed to more mechanical action.

[0007] In another embodiment of the present invention, the number of second nozzles provided on the second baffle is greater than the number of first nozzles provided on the first baffle. Thus, the second drum baffle is configured to transfer water not only to a specific area, but to almost the entire drum. Consequently, mechanical damage to the laundry is prevented and the washing process is performed effectively by increasing the surface area in contact with water.

[0008] In another embodiment of the present invention, a plurality of first nozzles are positioned at the center of the surface of the first baffle facing the inside of the drum so as to form an almost circular area without being scattered over the entire surface. Thus, the water transferred during the washing process is concentrated and transferred to a certain area such that dirt-focused or stained laundry is effectively washed.

[0009] In another embodiment of the present invention, the second baffle comprises a nozzle surface having a

plurality of second nozzles, and there are a plurality of second nozzles on the nozzle surface, which are homogeneously positioned so as to spread over almost the entire nozzle surface. Thus, it is ensured that the water flow pattern of the second baffle is configured to be thin and non-damaging to the textile, thereby preventing mechanical damage during the washing of delicate laundry.

[0010] In another embodiment of the present invention, when a delicate program suitable for washing delicate laundry is selected via the control panel by the user, the laundry is washed only with the water transferred from the second baffle via the second nozzle. It is ensured that water is sprayed in the form of light sprinkling on delicate textiles (for example, silk). Thus, the economic life of the fabrics is extended by preventing the delicate laundry from being damaged.

[0011] In another embodiment of the present invention, when an intensive washing program suitable for washing non-delicate or heavily stained laundry is selected by the user, the laundry is washed only with the water transferred from the first baffle via the first nozzle. When the first baffle is used during the washing of non-delicate fabrics such as synthetic, cotton, etc. or stained laundry, the water is enabled to reach the laundry in a focused manner such that the laundry is washed effectively.

[0012] By means of the present invention, the washing water is prevented from being delivered into the drum with a constant pressure and flow pattern, and thus the laundry is washed effectively and without causing any mechanical damage.

[0013] The washing machine realized in order to attain the aim of the present invention is illustrated in the attached figures, where:

Figure 1 - is the perspective view of the washing machine related to an embodiment of the present invention.

Figure 2 - is the schematic view of the washing machine related to an embodiment of the present invention.

Figure 3 - is the top view of the first baffle related to an embodiment of the present invention.

Figure 4 - is the top view of the second baffle related to an embodiment of the present invention.

[0014] The elements illustrated in the figures are numbered as follows:

1. Washing machine
2. Tub
3. Drum
4. Motor

5. Tub outlet

6. Tub inlet

5 7. Circulation line

8. Pump

10 9. First port

10. First nozzle

11. First baffle

15 12. Second port

13. Second nozzle

20 14. Second baffle

15. Sensor unit

16. Control unit

25 17. Control panel

18. Turbidity sensor

30 19. Nozzle surface

Threshold turbidity value (B)

Sensitive program (S)

35 Intensive program (I)

[0015] The washing machine (1) comprises a tub (2); a drum (3) which is disposed in the tub (2); a motor (4) which rotates the drum (3) in the tub (2); a tub outlet (5) which is provided at the lower side of the tub (2); a tub inlet (6) which is provided at the upper side of the tub (2); a circulation line (7) which extends between the tub inlet (6) and the tub outlet (5); a pump (8) which is provided on the circulation line (7) and which enables the water taken through the tub outlet (5) to be sent to the tub inlet (6); a first baffle (11) which is provided on the drum (3) and which has a first port (9) suitable for taking the water coming through the tub inlet (6) and at least one first nozzle (10) which enables the water filled therein through the first port (9) to be sent into the drum (3); a second baffle (14) which is provided on the drum (3) and which has a second port (12) suitable for taking the water coming through the tub inlet (6) and at least one second nozzle (13) which enables the water filled therein through the second port (12) to be sent into the drum (3); at least one sensor unit (15) which is suitable for sensing the position of the first baffle (11) and the second baffle (14) with respect to the tub inlet (6); a control unit (16) which

is suitable for controlling the motor (4) so as to align the first port (9) or the second port (12) with the tub inlet (6) by means of data provided by the sensor unit (15); and a control panel (17) which allows the selection of the washing program.

[0016] The washing machine (1) of the present invention comprises the first nozzle (10) which has a cross-sectional area larger than the cross-sectional area of the second nozzle (13), and the control unit (16) which is configured to control the motor (4) and pump (8) so as to ensure that the amount of water predetermined by the manufacturer according to the selected washing program is sent from the first baffle (11) and/or the second baffle (14) into the drum (3). The wide cross-sectional area of the first baffle (11) ensures that the water flow pattern of the first baffle (11) is more focused and removes stains while the narrow cross-sectional area of the second baffle (14) ensures that the water flow pattern of the second baffle (14) is thin and does not damage the textile. The control unit (16) controls the motor (4) such that by means of the data received from the sensor unit (15), the first port (9) on the first baffle (11) or the second port (12) on the second baffle (14) as predetermined by the manufacturer according to the program selected for the washing is aligned with the tub inlet (6), and also controls the pump (8) such that the water taken through the tub outlet (5) is fed to the tub inlet (6) via the circulation line (7) after the first port (9) or the second port (12) is aligned with the tub inlet (6). Thus, during the selected washing program, the amount of water predetermined by the manufacturer is transferred from the first baffle (11) and/or the second baffle (14) onto the laundry in the drum (3) as predetermined by the manufacturer according to the selected program. Thereby, the flow of water fed onto the laundry is optimized in line with the selected laundry program. Consequently, user satisfaction is increased by meeting the needs of different washing programs with different types of baffles.

[0017] In an embodiment of the present invention, the washing machine (1) comprises a turbidity sensor (18) which is suitable for detecting the turbidity of the water in the drum (3), and the control unit (16) which ensures that if the turbidity value detected by the turbidity sensor (18) is higher than a threshold turbidity value (B) determined by the manufacturer (18), the amount of water predetermined by the manufacturer is sent from the first baffle (11) into the drum (3) and that if the turbidity value detected by the turbidity sensor (18) is lower than the threshold turbidity value (B), said water is sent from the second baffle (14) into the drum (3). Thus, in addition to the program requirements, it is ensured that water is sent to the laundry at the appropriate flow rate from the first baffle (11) or the second baffle (14), depending on the turbidity value of the washing water. Thus, the effectiveness of the washing process is increased.

[0018] In an embodiment of the present invention, the number of first nozzles (10) provided on the first baffle (11) is less than the number of second nozzles (13) pro-

vided on the second baffle (14). Thus, while regional cleaning is ensured at high flow rate with the water fed from the first baffle (11), the second baffle (14) is enabled to transfer water at a lower flow rate to almost the entire surface of the laundry.

[0019] In another embodiment of the present invention, there are a plurality of first nozzles (10) positioned so as to form an almost circular form on the first baffle (11). Thus, it is ensured that the water is delivered onto stains in a focused manner in the laundry with a high amount of stains, achieving a more effective stain removal performance.

[0020] In another embodiment of the present invention, the second baffle (14) has a nozzle surface (19) whereon the second nozzle (13) is provided, and a plurality of second nozzles (13) are positioned so as to be equidistant from each other along the nozzle surface (19). Thus, mechanical damage to the laundry is prevented and the washing process is performed effectively and the economic life of laundry is increased by increasing the surface area in contact with water.

[0021] In another embodiment of the present invention, the control unit (16) is configured to ensure that the amount of water predetermined by the manufacturer is sent only from the second baffle (14) into the drum (3) when a delicate program (S) suitable for washing delicate laundry is selected via the control panel (17) by the user. Thus, the user is offered the opportunity to choose the second baffle (14) suitable for the requirements of the delicate washing program (S) and the user's delicate laundry is washed effectively without causing any mechanical damage.

[0022] In another embodiment of the present invention, the control unit (16) is configured to ensure that the amount of water predetermined by the manufacturer is sent only from the first baffle (11) into the drum (3) when an intensive washing program (I) suitable for washing heavily stained laundry or non-delicate laundry is selected by the user via the control panel (17). During the washing process, the water transferred from the first baffle (11) is transferred by concentrating on a certain area such that heavily stained or non-delicate laundry such as synthetic and cotton are effectively washed.

[0023] By means of the present invention, the circulation water is enabled to be delivered into the drum (3) at different flow rates, pressures and flow patterns. Thus, the washing performance is increased and damage to textiles is prevented.

Claims

1. A washing machine (1) comprising a tub (2); a drum (3) which is disposed in the tub (2); a motor (4) which rotates the drum (3) in the tub (2); a tub outlet (5) which is provided at the lower side of the tub (2); a tub inlet (6) which is provided at the upper side of the tub (2); a circulation line (7) which extends be-

tween the tub inlet (6) and the tub outlet (5); a pump (8) which is provided on the circulation line (7) and which enables the water taken through the tub outlet (5) to be sent to the tub inlet (6); a first baffle (11) which is provided on the drum (3) and which has a first port (9) suitable for taking the water coming through the tub inlet (6) and at least one first nozzle (10) which enables the water filled therein through the first port (9) to be sent into the drum (3); a second baffle (14) which is provided on the drum (3) and which has a second port (12) suitable for taking the water coming through the tub inlet (6) and at least one second nozzle (13) which enables the water filled therein through the second port (12) to be sent into the drum (3); at least one sensor unit (15) which is suitable for sensing the position of the first baffle (11) and the second baffle (14) with respect to the tub inlet (6); a control unit (16) which is suitable for controlling the motor (4) so as to align the first port (9) or the second port (12) with the tub inlet (6) by means of data provided by the sensor unit (15); and a control panel (17) which allows the selection of the washing program, **characterized by** the first nozzle (10) which has a cross-sectional area larger than the cross-sectional area of the second nozzle (13), and the control unit (16) which is configured to control the motor (4) and pump (8) so as to ensure that the amount of water predetermined by the manufacturer according to the selected washing program is sent from the first baffle (11) and/or the second baffle (14) into the drum (3).

2. A washing machine (1) as in Claim 1, **characterized by** a turbidity sensor (18) which is suitable for detecting the turbidity of the water in the drum (3), and the control unit (16) which ensures that if the turbidity value detected by the turbidity sensor (18) is higher than a threshold turbidity value (B) determined by the manufacturer (18), water is sent from the first baffle (11) into the drum (3) and that if the turbidity value detected by the turbidity sensor (18) is lower than the threshold turbidity value (B), water is sent from the second baffle (14) into the drum (3).
3. A washing machine (1) as in Claim 1 or 2, **characterized in that** the number of first nozzles (10) provided on the first baffle (11) is less than the number of second nozzles (13) provided on the second baffle (14).
4. A washing machine (1) as in any one of the above claims, **characterized by** a plurality of first nozzles (10) positioned so as to form an almost circular form on the first baffle (11).
5. A washing machine (1) as in any one of the above claims, **characterized by** a nozzle surface (19) whereon the second nozzle (13) is provided, and a

plurality of second nozzles (13) which are positioned so as to be equidistant from each other along the nozzle surface (19).

6. A washing machine (1) as in any one of the above claims, **characterized by** the control unit (16) which is configured to ensure that the amount of water predetermined by the manufacturer is sent only from the second baffle (14) into the drum (3) when a delicate program (S) suitable for washing delicate laundry is selected via the control panel (17) by the user.
7. A washing machine (1) as in any one of the above claims, **characterized by** the control unit (16) which is configured to ensure that the amount of water predetermined by the manufacturer is sent only from the first baffle (11) into the drum (3) when an intensive washing program (I) suitable for washing non-delicate laundry is selected by the user via the control panel (17).

Figure 1

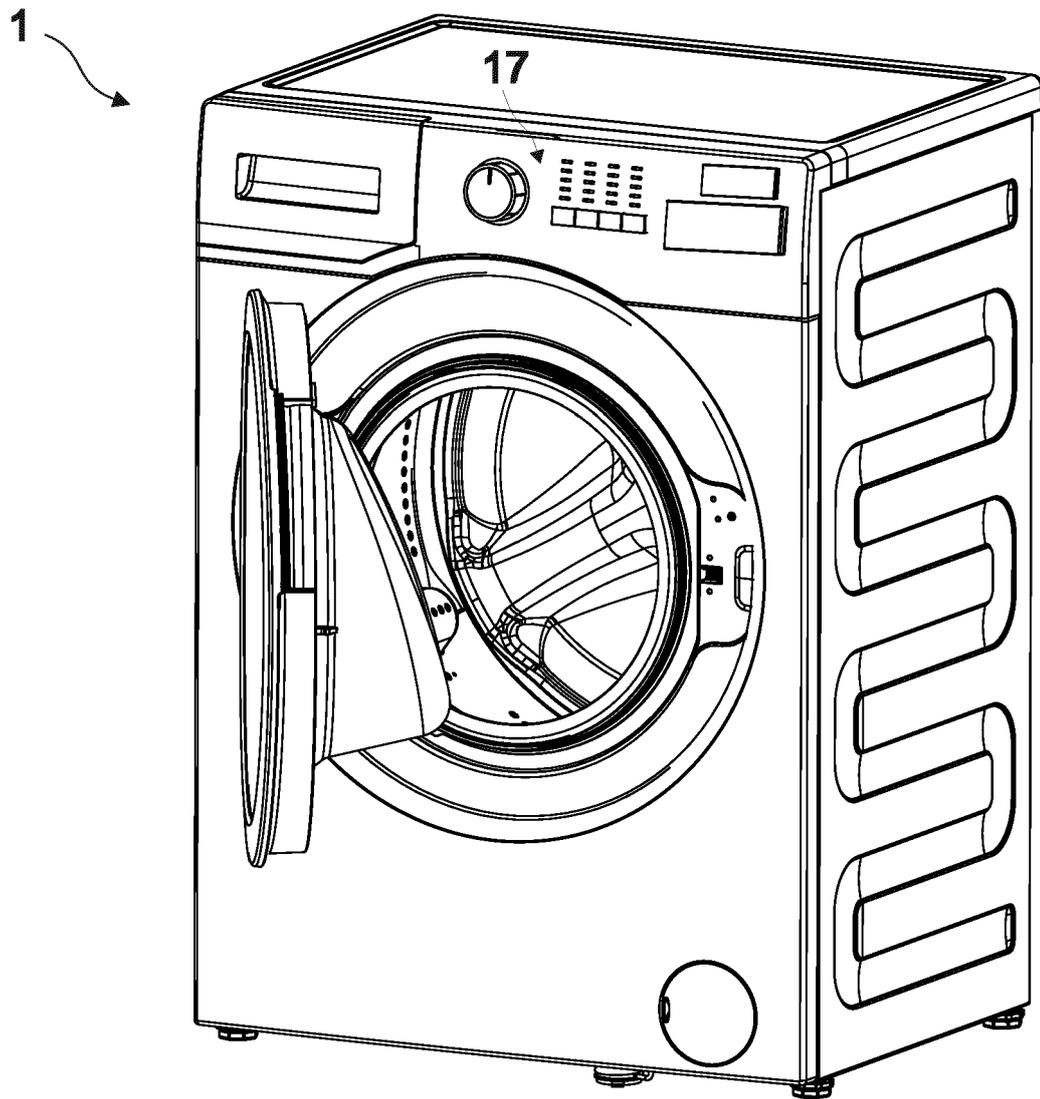


Figure 2

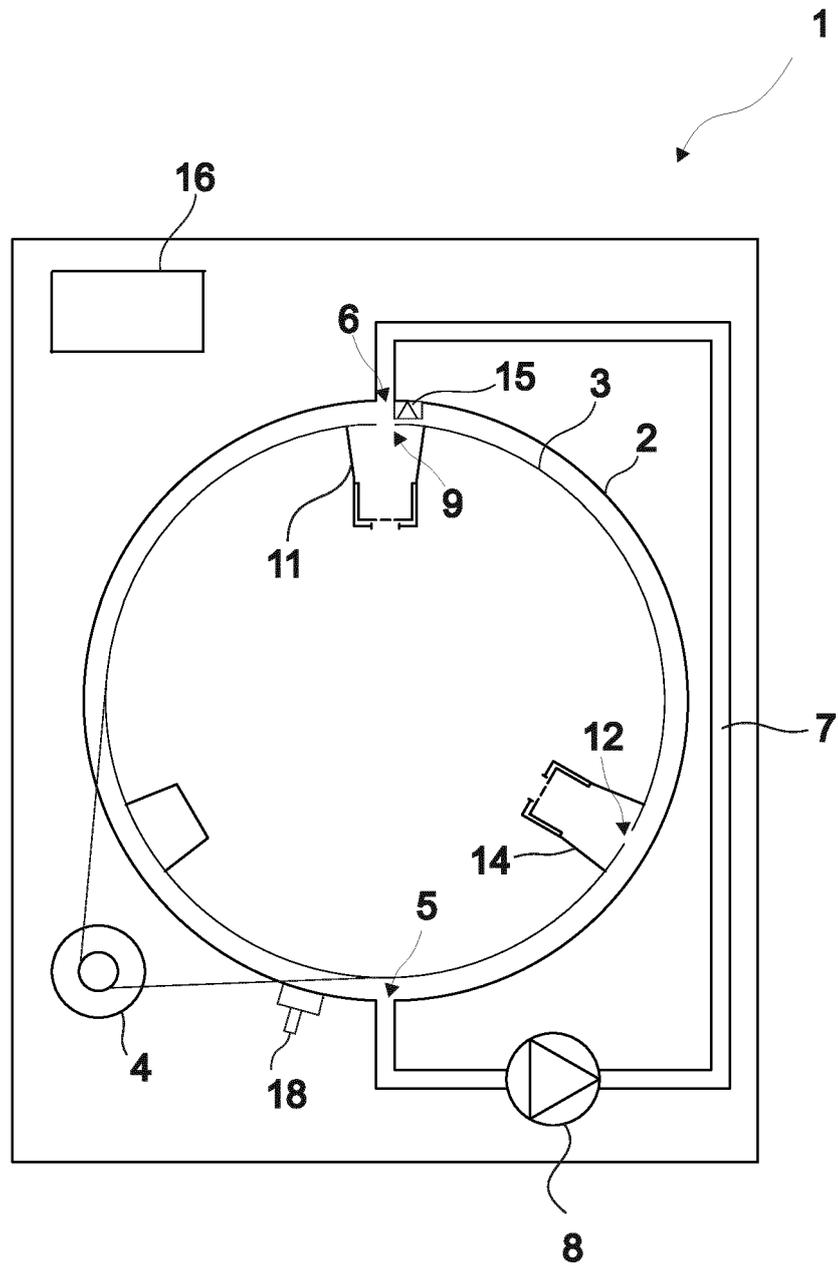


Figure 3

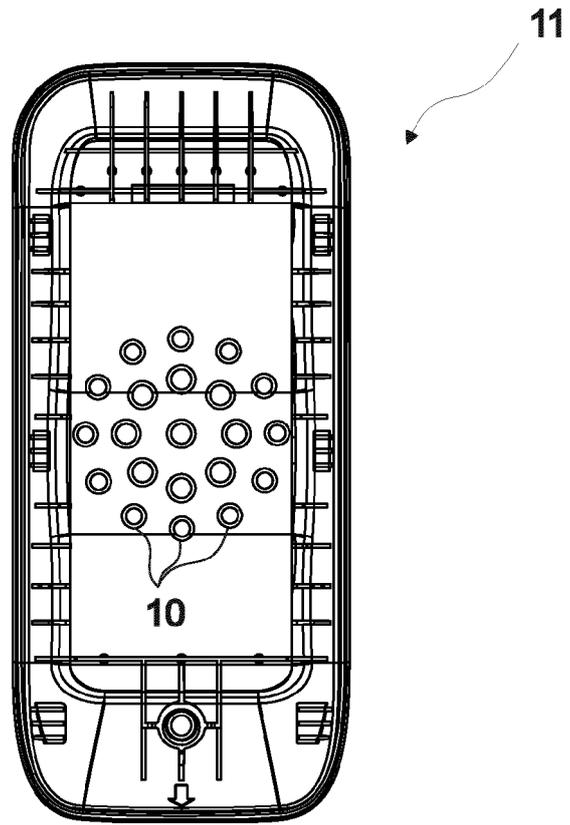
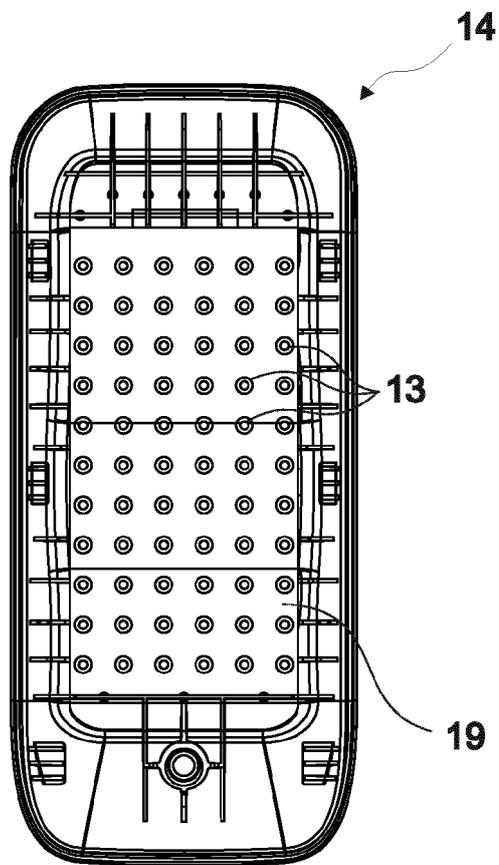


Figure 4





EUROPEAN SEARCH REPORT

Application Number

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			D06F

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The present search report has been drawn up for all claims

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Place of search Munich	Date of completion of the search 25 January 2024	Examiner Sabatucci, Arianna
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