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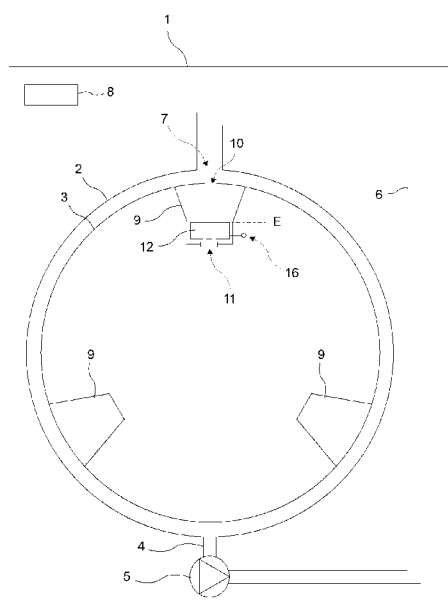
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- (81) Designated States** (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY, BZ,

- (54) Title:** WASHING MACHINE COMPRISING A SPRINKLING DRUM LIFTER

Figure 1



- (57) Abstract:** The present invention relates to a washing machine (1) comprising a tub (2); a drum (3); a tub outlet (4) which is arranged at the lower side of the tub (2); a jet system which enables the washing water taken from the tub outlet (4) during the washing process to be delivered back into the tub (2) by means of a circulation pump (5) and a water supply line (6); at least one lifter (9) which is mounted onto the inner surface of the drum (3); and at least one flow port (11) which is provided on the lower surface, facing inside the drum (3), of the lifter (9) and which enables the washing water filling into the lifter (9) to be delivered onto the laundry in the drum (3), whereby a flow adjustment apparatus (12) in the form of a cylinder segment is mounted above the flow port (11) at the inner region of the lifter (9) so as to rotate around a horizontal axis (E), which extends transversely in the lifter (9).

Description**WASHING MACHINE COMPRISING A SPRINKLING DRUM LIFTER**

[0001] The present invention relates to a washing machine wherein water is sprinkled from the drum lifter onto the laundry.

[0002] In washing machines, especially in programs where delicate laundry is washed with low mechanical movement defined with drum rotational speed, time, etc., the washing performance decreases. The washing machines comprise an immobile tub and a drum rotating inside the tub, and as the washing water is sent via the tub, it takes time to reach the interior volume of the drum, failing to uniformly wetting the laundry. In order to solve the problem of inconsistent wetting, the washing machine comprises a circulation pump and a circulation line, called "jet system", which enables the laundry to be sprinkled by spraying water from above and which enables the washing water taken from the lower side of the tub to be sent back into the drum from the upper side of the tub. The jet system activated during the main washing step improves the water circulation as well as the washing process with an additional hydrodynamic force. In some embodiments, the drum lifters are used to guide the washing water coming from the jet system directly into the drum. In the jet system, the washing water coming from the circulation line first fills into the lifter and then is sprayed onto the laundry through the holes on the lifter. In order to take water into the lifter in the embodiment of sprinkling water from the lifter, the drum must be stopped, which decreases the amount of mechanical movement and hence the washing performance.

[0003] The Patent No. US2005097927 (A1) relates to a lifter structure developed for a washing machine with an inclined tub.

[0004] The Patent No. EP1190135 (B1) relates to a curled lifter structure developed for a washing machine with an inclined tub.

[0005] The Patent No. EP2053152 (B1) relates to a washing machine comprising a drum lifter with immobile lower side and movable upper side.

[0006] In the Patent Application No. EP1602770 (A2), a structure is disclosed wherein the water is delivered into the drum via the lifter in a washing machine with an inclined tub.

- [0007] The aim of the present invention is the realization of a washing machine wherein the washing performance is increased by increasing/decreasing the dynamic pressure of the washing water delivered into the washing environment through the drum lifter in washing programs where the washing water is circulated by a jet system.
- [0008] The washing machine realized in order to attain the aim of the present invention comprises at least one lifter which is positioned at the uppermost section of the drum by the control unit when the relevant washing program is selected and which receives the washing water coming from the circulation (jet) system. The washing water with detergent filling into the lifter is sprayed onto the laundry through the flow port under the lifter. At the inner region of the drum lifter, above the flow port, at least one cylindrical flow adjustment apparatus is mounted, which extends transversely in the lifter and which enables the washing water to be sent onto the laundry directly or by being sprinkled at different angular positions whereto the flow adjustment apparatus is changed by being rotated.
- [0009] The flow adjustment apparatus comprises circular sprinkling holes which are arranged on the movable curved section just above the flow port of the lifter and which enable the washing water to be sent onto the laundry by being sprinkled through the flow port, and at least one direct flow duct which is rectangular or oblong and which provides the direct delivery of the washing waster. By means of an adjustment arm provided on the lifter, the flow adjustment apparatus is rotated around the horizontal axis, and thus the washing water is enabled to be sent into the drum from the lifter by being sprinkled - at high dynamic pressure - or directly - at low dynamic pressure.
- [0010] The washing machine realized in order to attain the aim of the present invention is illustrated in the attached figures, where:
- [0011] Figure 1 - is the schematic view of the washing machine of the present invention.
- [0012] Figure 2 - is the perspective view of the drum lifter.
- [0013] Figure 3 - is the front view of the drum lifter.
- [0014] Figure 4 - is the front exploded view of the drum lifter and the flow

adjustment apparatuses.

- [0015] Figure 5 - is the exploded perspective view of the drum lifter and the flow adjustment apparatuses.
- [0016] Figure 6 - is the exploded perspective view of the drum lifter and the flow adjustment apparatuses from another angle.
- [0017] Figure 7 - is the top view of the drum lifter and the flow adjustment apparatuses which are in the sprinkling position.
- [0018] Figure 8 - is the view of the cross section A-A in Figure 7.
- [0019] Figure 9 - is the top view of the drum lifter and the flow adjustment apparatuses which are in the direct flow position.
- [0020] Figure 10 - is the view of the cross section B-B in Figure 9.
- [0021] Figure 11 - is the perspective view of the drum lifter with two nozzles thereof in the sprinkling position.
- [0022] Figure 12 - is the perspective view of the drum lifter with two nozzles thereof in the direct flow position.
- [0023] Figure 13 - is the perspective view of the drum lifter with one nozzle in the sprinkling position and the other nozzle in the direct flow position.
- [0024] Figure 14 - is the exploded view of the nozzles comprising circular flow ports and the drum lifter.
- [0025] Figure 15 - is the perspective view of the nozzles comprising circular flow ports and the drum lifter in the assembled form.
- [0026] Figure 16 - is the perspective view of the nozzles comprising oblong flow ports and the drum lifter.
- [0027] Figure 17 - is the perspective view of the nozzles comprising curled flow ports and the drum lifter.
- [0028] The elements illustrated in the figures are numbered as follows:
1. Washing machine
 2. Tub
 3. Drum
 4. Tub outlet
 5. Circulation pump
 6. Water supply line
 7. Tub inlet opening

8. Control unit
9. Lifter
10. Drum inlet opening
11. Flow port
12. Flow adjustment apparatus
13. Curved section
14. Sprinkling hole
15. Direct flow duct
16. Adjustment arm
17. Indicator
18. Support plate
19. Sealing gasket
20. Housing
21. Nozzle

[0029] E: Horizontal axis

[0030] The washing machine (1) comprises a body; a tub (2) wherein the laundry are washed/dried; a drum (3) which moves inside the tub (2) and wherein the laundry is loaded; a tub outlet (4) which is arranged at the lower side of the tub (2); a jet system which enables the washing water taken from the tub outlet (4) during the washing process to be delivered back into the tub (2) by means of a circulation pump (5) and a water supply line (6), thus improving the washing performance; at least one tub inlet opening (7) which is arranged at the upper side of the tub (2) and where the water supply line (6) is connected to the tub (2); at least one hollow lifter (9) which is mounted onto the inner surface of the drum (3), which tumbles the laundry, which is positioned at the uppermost section of the drum (3) as the drum (3) is stopped by a control unit (8) when the relevant washing program is selected and wherein the washing water coming from the water delivery line (6) and the tub inlet opening (7) is filled; at least one drum inlet opening (10) which is arranged on the drum (3) so as to be aligned with the lifter (9) and which enables the washing water coming through the tub inlet opening (7) to enter the lifter (9); and at least one flow port (11) which is provided on the lower surface, facing inside the drum (3), of the

lifter (9) at the uppermost position and which enables the washing water filling into the lifter (9) to be delivered onto the laundry in the drum (3).

- [0031] The washing machine (1) of the present invention comprises at least one flow adjustment apparatus (12)
- [0032] - which is in the form of a cylinder segment, which is mounted above the flow port (11) so as to rotate around the horizontal axis (E) inside the lifter (9) and which extends transversely inside the lifter (9), and
- [0033] - which enables the washing water to be delivered into the drum (3) directly or by being sprinkled from the flow port (11) at different angular positions whereto the flow adjustment apparatus (12) is changed by being rotated in the lifter (9).
- [0034] In the washing machine (1), when the jet system circulation pump (5) is activated by the control unit (8) depending on the washing program selected, the drum (3) is stopped and the lifter (9) is positioned at the uppermost point. The washing water taken from the tub outlet (4) by means of the circulation pump (5) and the water delivery line (6) is taken into the lifter (9) through the tub inlet openings (7) and the drum inlet openings (10). The lifter (9) is positioned at the uppermost point while the jet system pumps water. The washing water filling into the lifter (9) is delivered onto the laundry inside the drum (3) via the flow port (11). The user can change the way the water delivered into the drum (3) from the lifter (9) flows by means of the flow adjustment apparatus (12), thus enabling the water to be sprayed onto the laundry by being sprinkled or directly onto the laundry without being sprinkled.
- [0035] The flow adjustment apparatus (12) comprises
- [0036] - a curved section (13) which can move just above the flow port (11),
- [0037] - a plurality of circular sprinkling holes (14) which are arranged on the curved section (13) and which enable the washing water to be delivered into the drum (3) through the flow port (11) of the lifter (9) by being sprinkled, and
- [0038] - at least one direct flow duct (15) which is rectangular or oblong and which enables the washing water to be directly delivered into the drum (3) through the flow port (11) of the lifter (9).

- [0039] In an embodiment of the present invention, the washing machine (1) comprises at least one adjustment arm (16) which is provided on the lifter (9), which is connected to the flow adjustment apparatus (12) and which enables the flow adjustment apparatus (12) to be rotated around the horizontal axis (E) so as to enable the washing water to be delivered into the drum (3) from the lifter (9) directly or by being sprinkled.
- [0040] At an angular position whereto the flow adjustment apparatus (12) is brought by being rotated around the horizontal axis (E) by means of the adjustment arm (16), the sprinkling holes (14) align with the flow port (11) and the washing water is delivered into the drum (3) by being sprinkled. At another angular position whereto the flow adjustment apparatus (12) is brought by being rotated around the horizontal axis (E) by means of the adjustment arm (16), the direct flow duct (15) aligns with the flow port (11) and the washing water is delivered into the drum (3) directly.
- [0041] In another embodiment of the present invention, the washing machine (1) comprises at least one indicator (17) which is provided on the outer surface of the lifter (9) and which shows the sprinkling and direct flow positions whereto the flow adjustment apparatus (12) is brought by being rotated by means of the adjustment arm (16).
- [0042] In another embodiment of the present invention, the washing machine (1) comprises at least one support plate (18) which is provided in the lifter (9) and which enables the flow adjustment apparatus (12) to be borne so as to be rotate in the lifter (9) around the horizontal axis (E) by means of the adjustment arm (16).
- [0043] In another embodiment of the present invention, the washing machine (1) comprises at least one sealing gasket (19) which is provided in the lifter (9), which surrounds the flow adjustment apparatus (12) and which prevents the washing water guided into the lifter (9) from overflowing from the flow adjustment apparatus (12), hence from the flow port (11) region.
- [0044] In an embodiment of the present invention, the washing machine (1) comprises at least one nozzle (21) which is detachably mounted to the housings (20) formed on the lifter (9) and which accommodates the flow ports (11) on the lower surface thereof facing inside the drum (3).

- [0045] In another embodiment of the present invention, the flow ports (11) on the nozzle (21) are circular.
- [0046] In another embodiment of the present invention, the flow ports (11) on the nozzle (21) are rectangular or oblong.
- [0047] In another embodiment of the present invention, at least one flow port (11) on the nozzle (21) is curled.
- [0048] In the washing machine (1) of the present invention, by means of the special lifter (9) structure and the flow adjustment apparatus (12), the direction of the water delivered into the drum (3) from the lifter (9) can be changed, and the flow rate and/or the dynamic pressure of the water can be increased/decreased. By utilizing the different hydrodynamic movements of the water, the water is enabled to contact the laundry more efficiently and the detergent is enabled to be dissolved better in the washing water. Particularly in delicate laundry, the performance of washing and removing stains is improved. Since the mechanical movements of the water are increased, the amount of mechanical movement of the drum (3) such as rotational speed, time, etc. can be decreased, thus reducing damages in textiles.

Claims

1. A washing machine (1) **comprising** a tub (2); a drum (3) wherein the laundry is loaded; a tub outlet (4) which is arranged at the lower side of the tub (2); a jet system which enables the washing water taken from the tub outlet (4) to be delivered back into the tub (2) by means of a circulation pump (5) and a water supply line (6); at least one tub inlet opening (7) where the water supply line (6) is connected to the tub (2); at least one lifter (9) which is mounted onto the inner surface of the drum (3) and wherein the washing water coming from the water delivery line (6) and the tub inlet opening (7) is filled; at least one drum inlet opening (10) which is arranged on the drum (3) so as to be aligned with the lifter (9) and which enables the washing water to enter the lifter (9); and at least one flow port (11) which is provided on the lower surface, facing inside the drum (3), of the lifter (9) and which enables the washing water filling into the lifter (9) to be delivered onto the laundry in the drum (3),
- **characterized by** at least one flow adjustment apparatus (12) in the form of a cylinder segment, which is mounted above the flow port (11) at the inner region of the lifter (9) so as to rotate around the horizontal axis (E), which extends transversely in the lifter (9) and which enables the washing water to be sent into the drum (3) through the flow port (11) directly or by being sprinkled at different angular positions in the lifter (9) whereto the flow adjustment apparatus (12) is changed by being rotated.
2. A washing machine (1) as in Claim 1, **characterized by** the flow adjustment apparatus (12) comprising a curved section (13) which can move just above the flow port (11), a plurality of circular sprinkling holes (14) which are arranged on the curved section (13) and which enable the washing water to be delivered into the drum (3) through the flow port (11) of the lifter (9) by being sprinkled, and at least one direct flow duct (15) which is rectangular and which enables the washing water to be directly delivered into the drum (3) through the flow port (11) of the lifter (9).
3. A washing machine (1) as in Claim 1 or 2, **characterized by** at least one adjustment arm (16) which is provided on the lifter (9), which is connected to the flow adjustment apparatus (12) and which enables the flow adjustment apparatus (12) to be rotated around the horizontal axis (E) so as to enable the

washing water to be delivered into the drum (3) from the lifter (9) directly or by being sprinkled.

4. A washing machine (1) as in Claim 1 or 2, **characterized by** at least one indicator (17) which is provided on the outer surface of the lifter (9) and which shows the sprinkling and direct flow positions whereto the flow adjustment apparatus (12) is brought by being rotated by means of the adjustment arm (16).
5. A washing machine (1) as in Claim 1 or 2, **characterized by** at least one support plate (18) which is provided in the lifter (9) and which enables the flow adjustment apparatus (12) to be borne so as to be rotate in the lifter (9) around the horizontal axis (E) by means of the adjustment arm (16).
6. A washing machine (1) as in Claim 1 or 2, **characterized by** at least one sealing gasket (19) which is provided in the lifter (9) and which surrounds the flow adjustment apparatus (12).
7. A washing machine (1) as in Claim 1 or 2, **characterized by** at least one nozzle (21) which is detachably mounted to the housings (20) formed on the lifter (9) and which accommodates the flow ports (11) on the lower surface thereof facing inside the drum (3).
8. A washing machine (1) as in Claim 7, **characterized by** the circular flow ports (11) which are provided on the nozzle (21).
9. A washing machine (1) as in Claim 7, **characterized by** the rectangular or oblong flow ports (11) which are provided on the nozzle (21).
10. A washing machine (1) as in Claim 7, **characterized by** at least one curled flow port (11) which is provided on the nozzle (21).

Figure 1

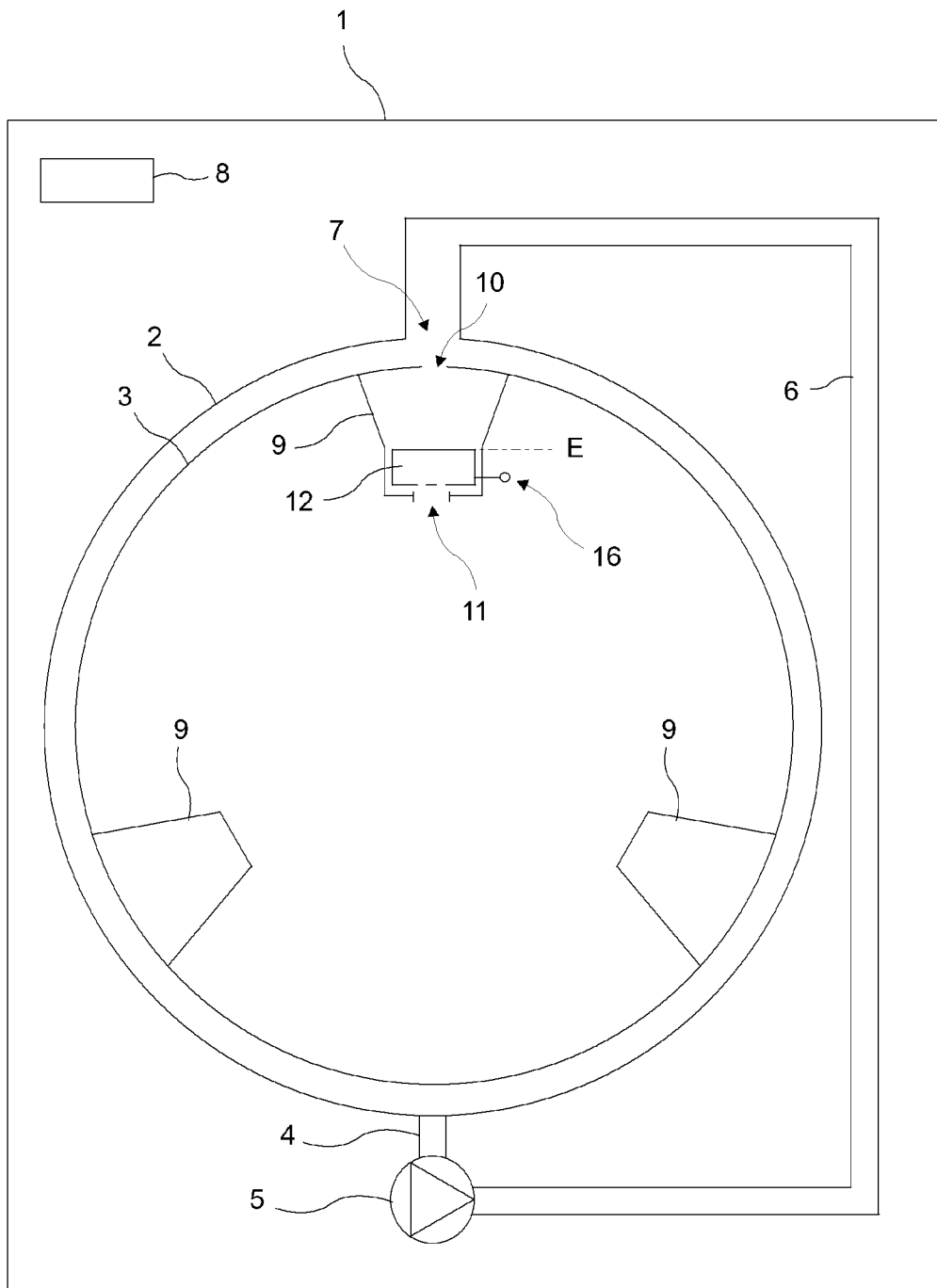


Figure 2

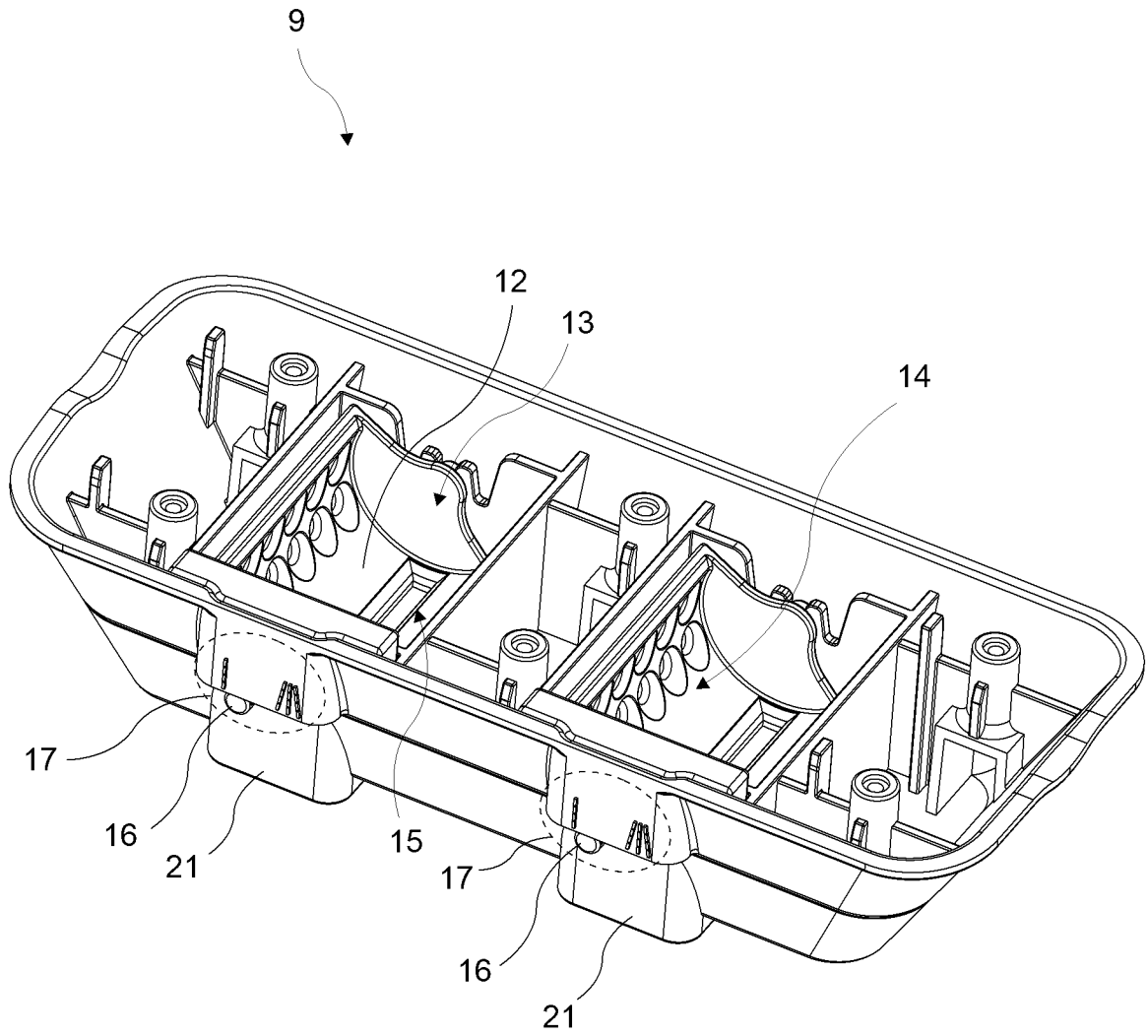


Figure 3

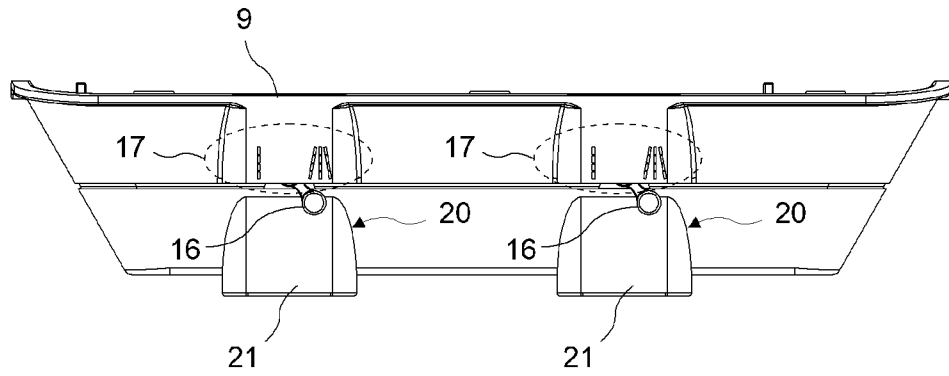


Figure 4

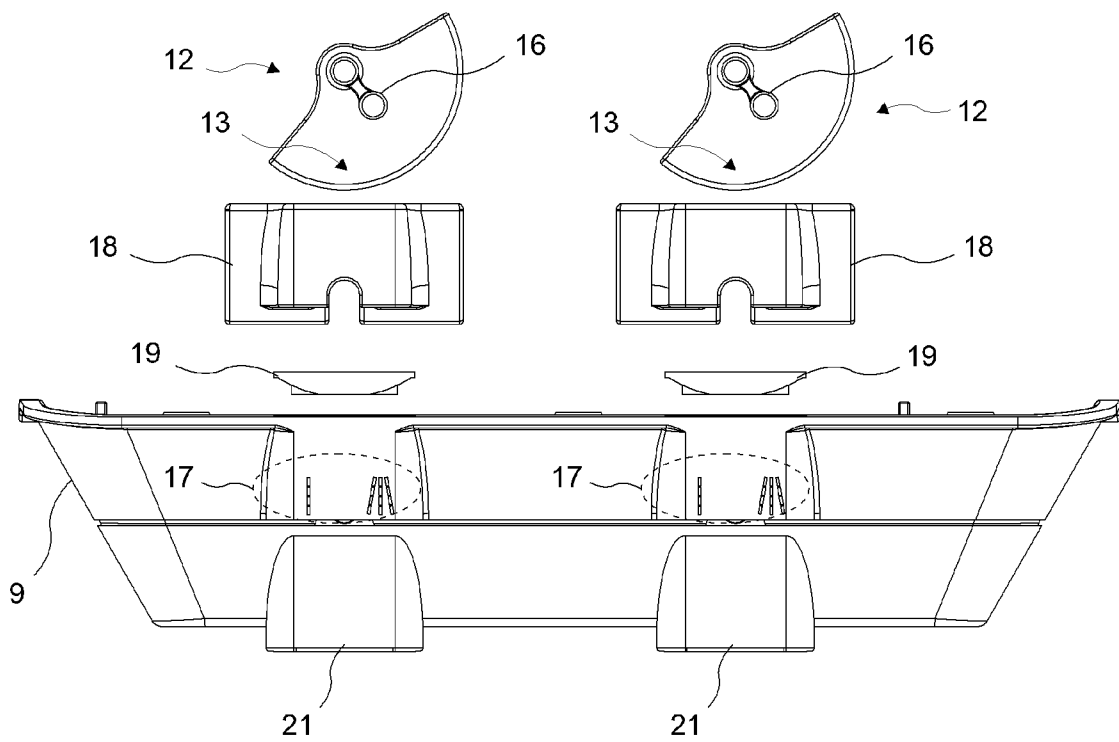


Figure 5

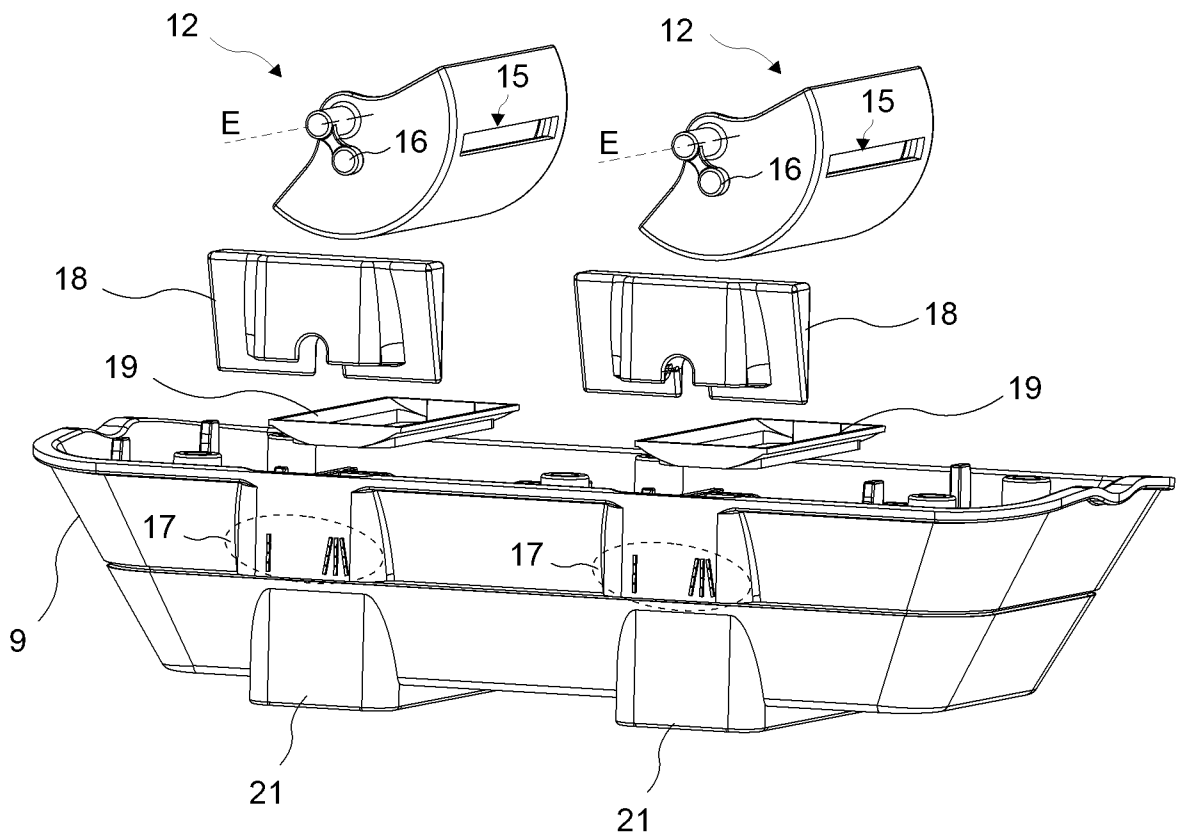


Figure 6

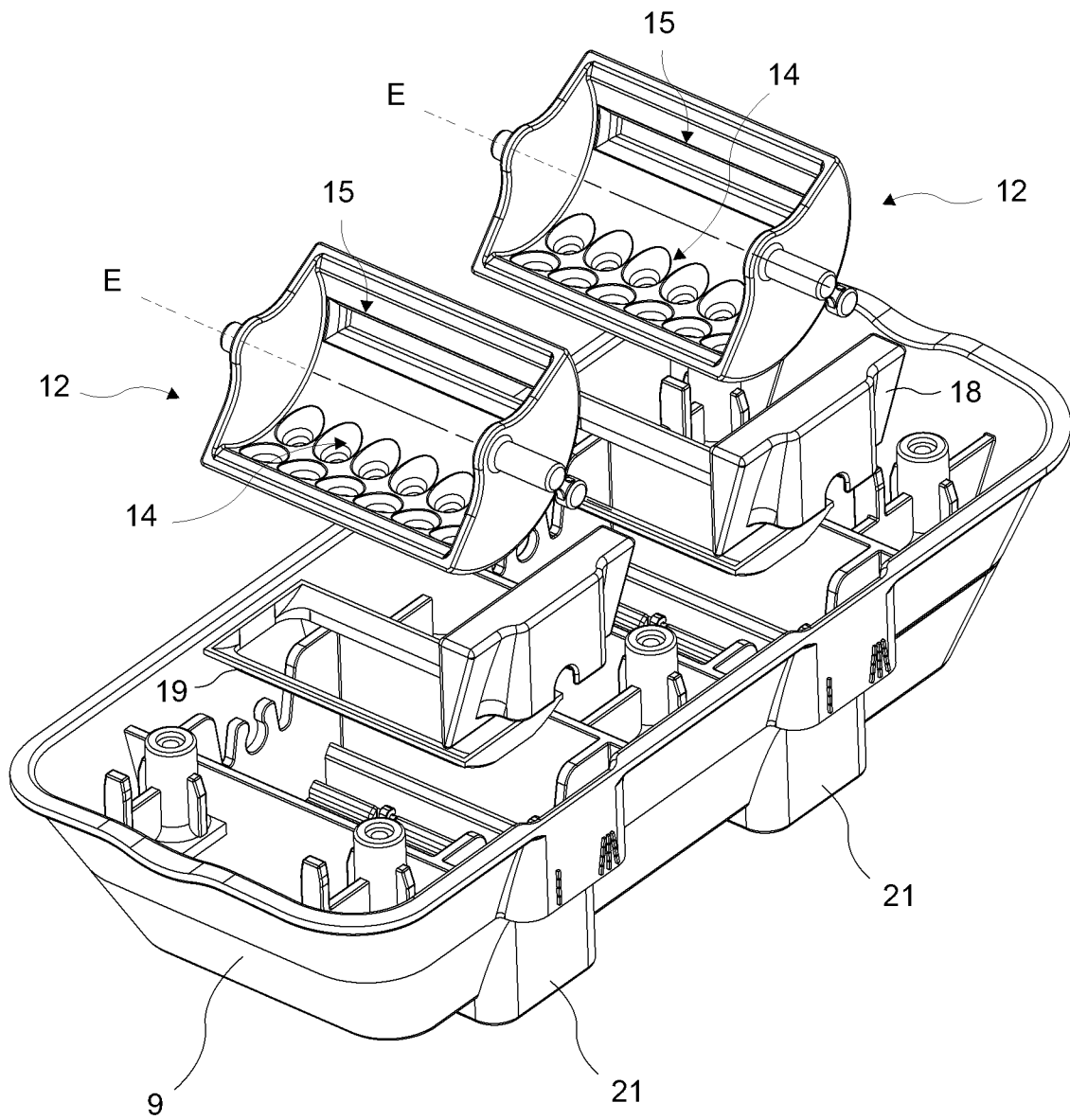


Figure 7

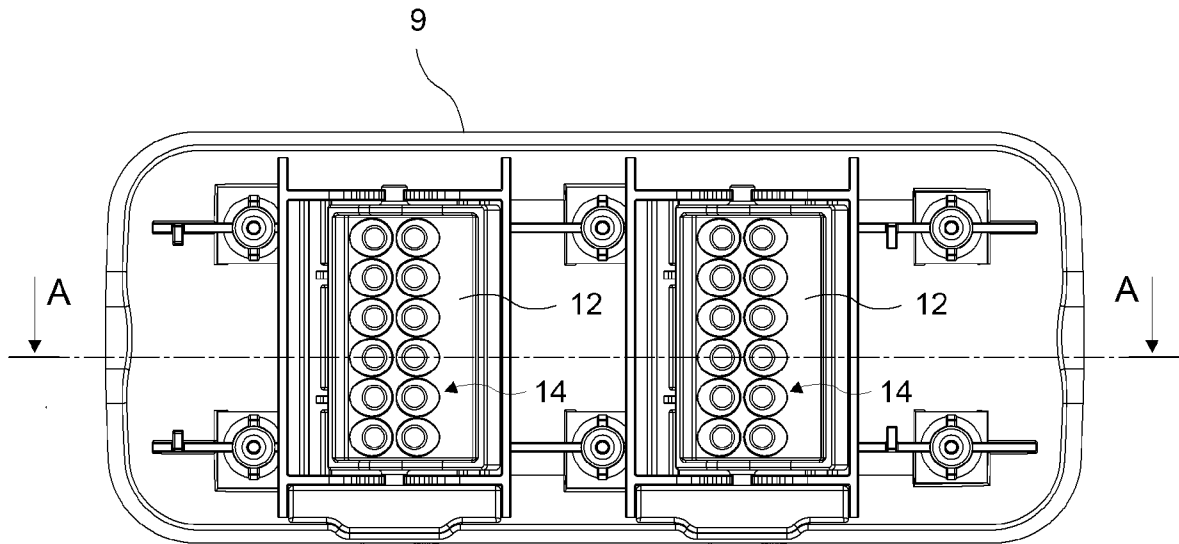


Figure 8

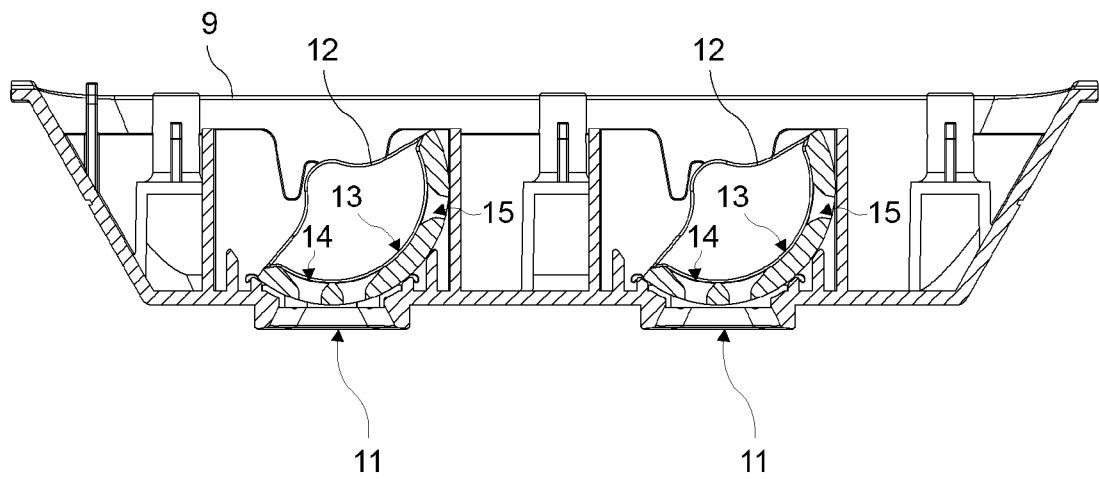


Figure 9

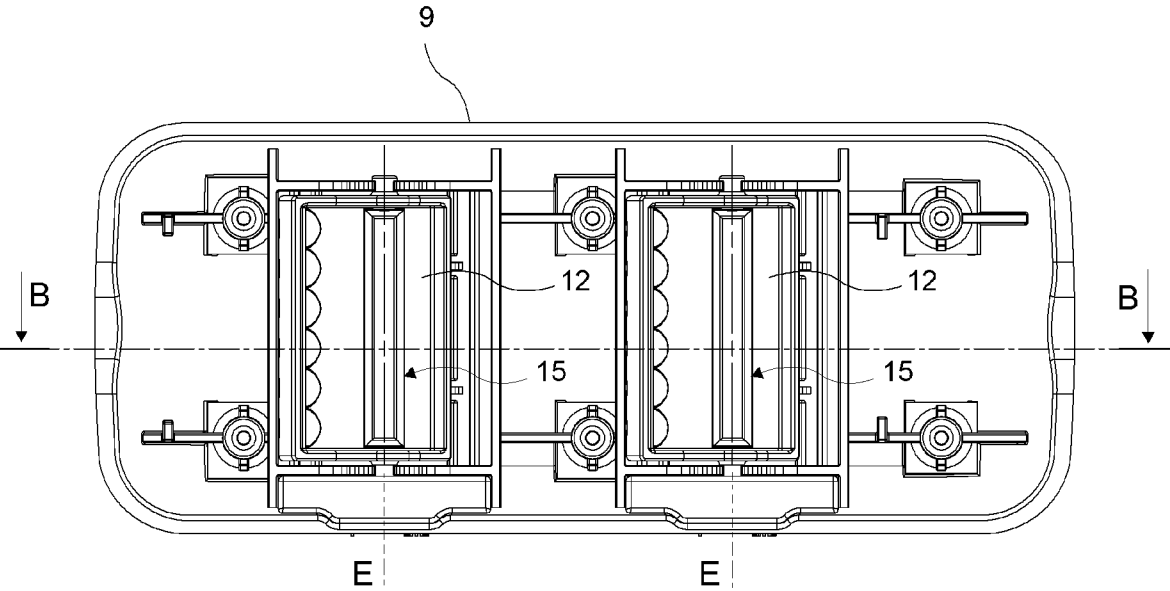


Figure 10

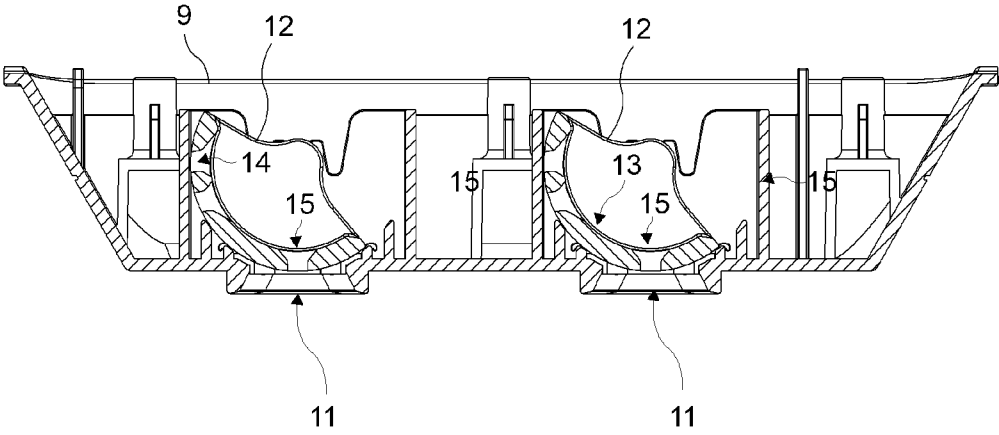


Figure 11

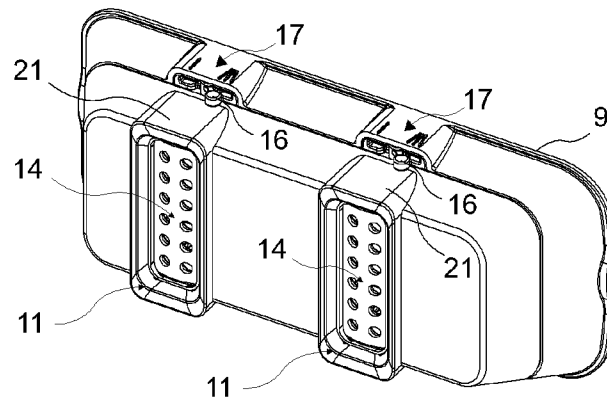


Figure 12

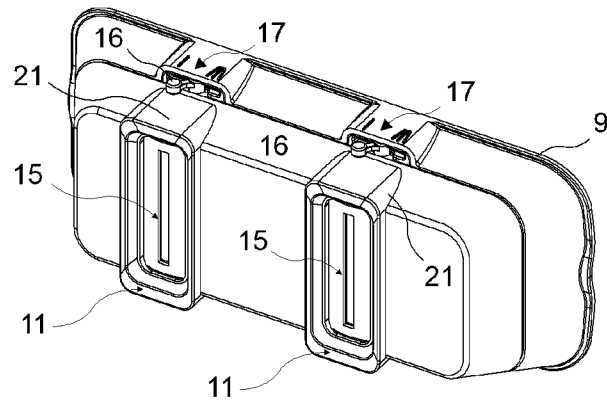


Figure 13

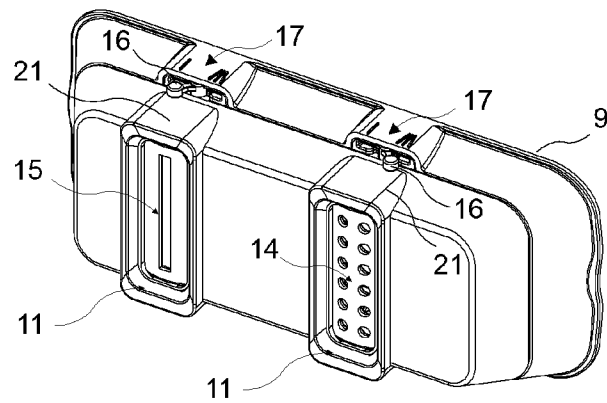


Figure 14

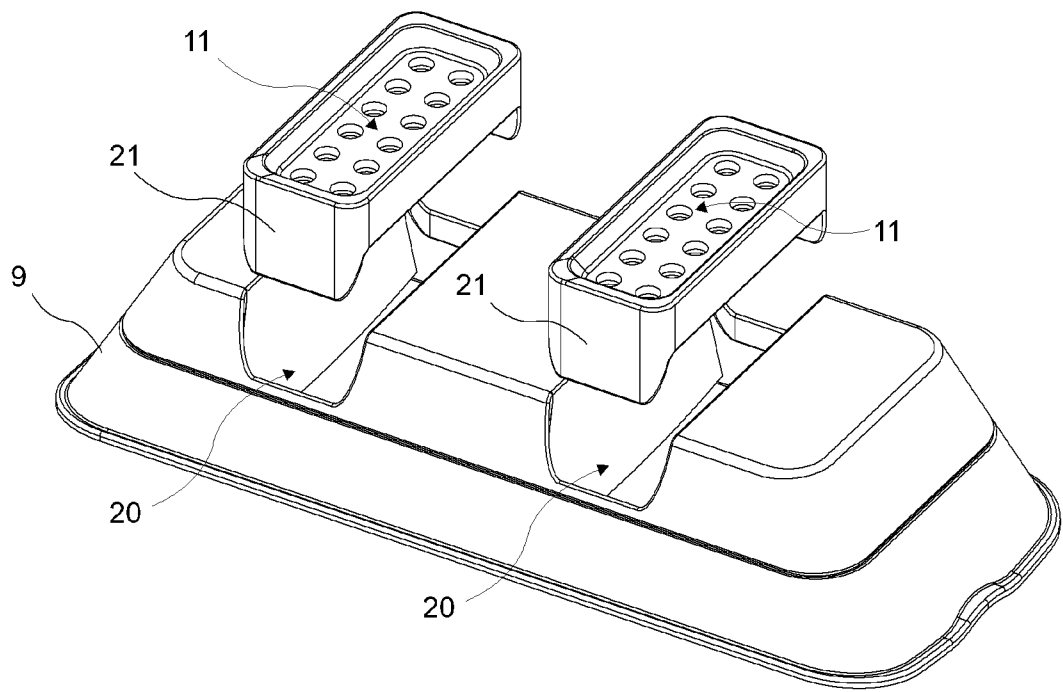


Figure 15

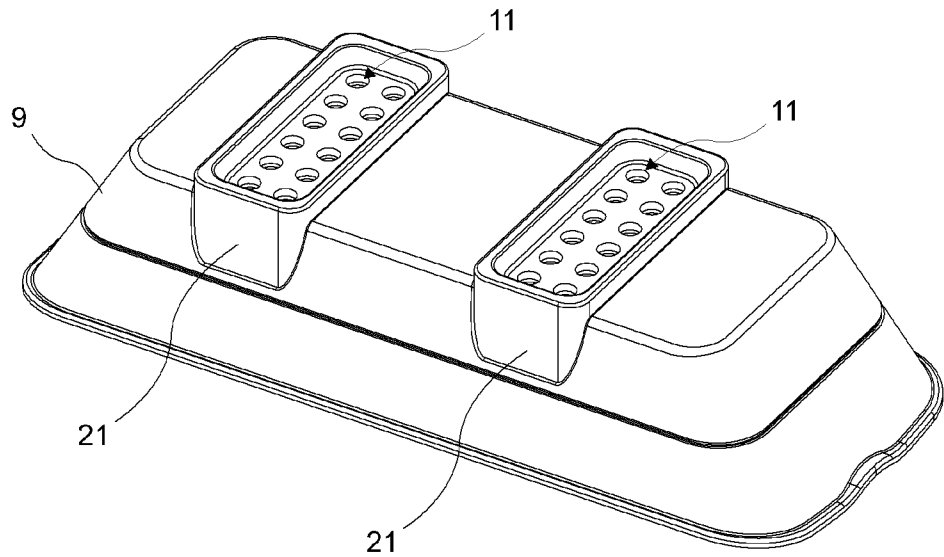


Figure 16

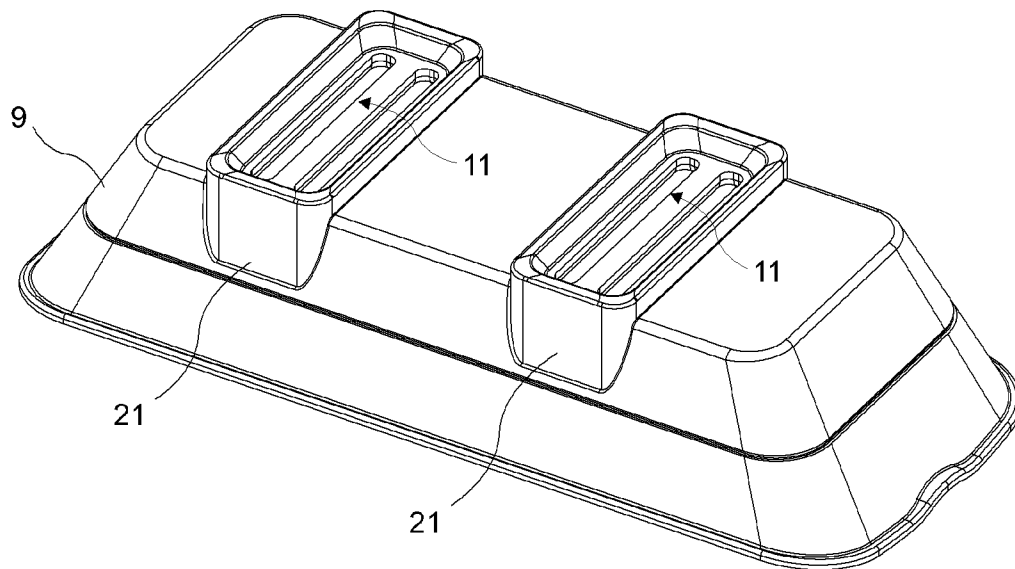
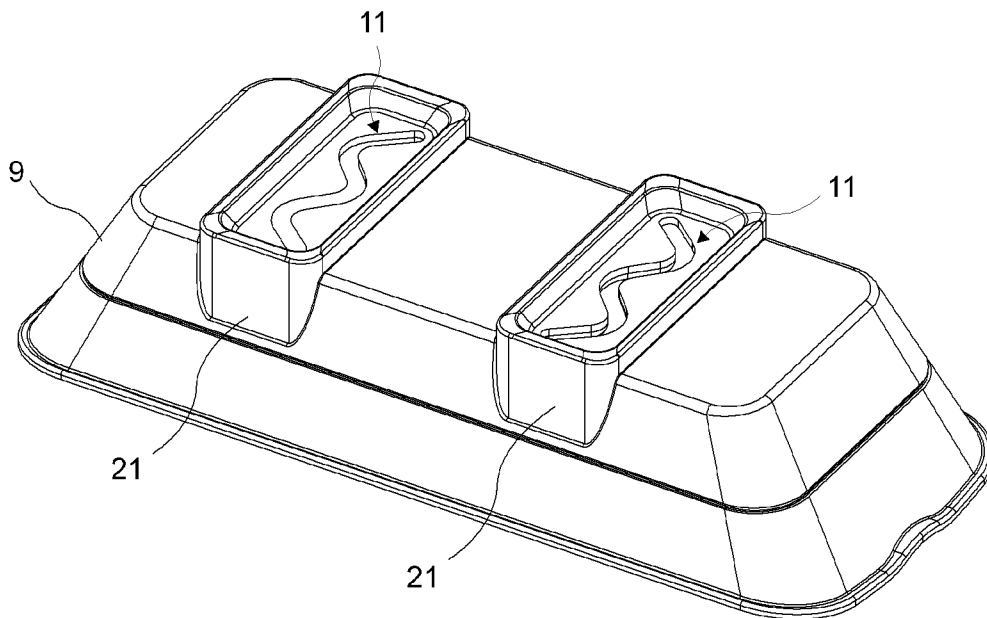


Figure 17



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/083451

A. CLASSIFICATION OF SUBJECT MATTER
INV. D06F37/06
ADD. D06F39/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
D06F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2014/208810 A1 (ZATTIN ANDREA [IT] ET AL) 31 July 2014 (2014-07-31) abstract paragraphs [0073] - [0140], [0168] - [0174], [0179] - [0191]; figures -----	1-10
A	EP 2 138 626 A1 (CANDY SPA [IT]) 30 December 2009 (2009-12-30) the whole document -----	1
A	DE 43 42 626 A1 (BOSCH SIEMENS HAUSGERAETE [DE]) 22 June 1995 (1995-06-22) abstract column 2, lines 25-66; figures ----- -/--	1



Further documents are listed in the continuation of Box C.



See patent family annex.

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

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Date of the actual completion of the international search

5 February 2020

Date of mailing of the international search report

13/02/2020

Name and mailing address of the ISA/

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Fax: (+31-70) 340-3016

Authorized officer

Prosig, Christina

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2019/083451

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 2005/097927 A1 (KIM HYUN S [KR] ET AL) 12 May 2005 (2005-05-12) cited in the application abstract paragraphs [0057] - [0092]; figures -----	1
A	KR 101 003 357 B1 (SAMSUNG ELECTRONICS CO LTD [KR]) 23 December 2010 (2010-12-23) abstract; figures -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2019/083451

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