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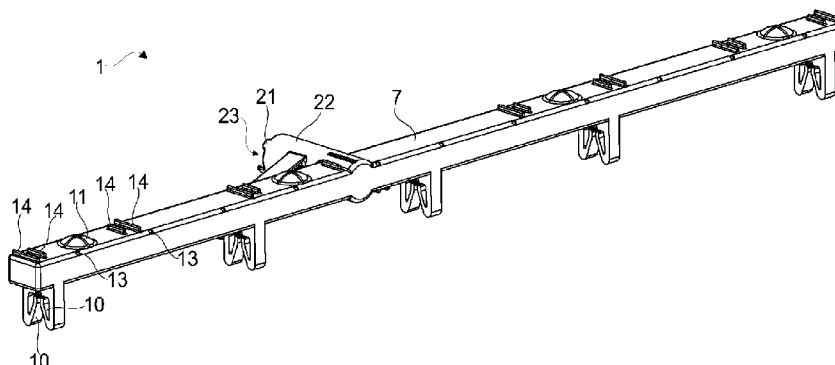
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(54) Title: BOTTLE WASHING APPARATUS FOR USE ON THE DISHWASHER RACK

Fig. 1



(57) Abstract: The present invention provides a bottle washing apparatus (1) for use in a dishwasher (2). The dishwasher (2) of the present invention comprises a first docking port (5) which opens into tub (3) and exclusively docks with or undocks from the apparatus (1) and exclusively supplies the apparatus (1), in the docked state, with the washing/rinsing liquid. The hydraulic circuit (6) circulates the liquid via the first docking port (5).

Description**BOTTLE WASHING APPARATUS FOR USE ON THE DISHWASHER RACK**

- [0001] The present invention relates to the treatment of hollow articles, in particular to hollow articles with relatively narrow openings such as bottles, feeding bottles and jars in a domestic dishwasher.
- [0002] Domestic dishwashers are commonly known in the art. A domestic dishwasher generally includes two article racks which are extendably disposed into the washing tub one above the other. The article racks are commonly made from a wire mesh which holds the kitchenware to be cleaned and dried. The user can load up the article racks with various kitchenware such as pots, pans, trays, dishes, bowls, cups, bottles and jars. In particular, kitchenware such as cutlery is generally placed into the cutlery basket which has a relatively finer mesh. The articles which are loaded into the upper rack and the lower rack are generally washed and rinsed by means of two rotating spray arms that upwardly spray the washing/rinsing liquid towards the racks respectively. In general, the dishwasher includes a hydraulic circuit for circulating the washing/rinsing liquid via the rotating spray arms. The hydraulic circuit is generally controlled by the control unit in accordance with user-selectable washing programs. During the operation of the dishwasher, the pressurized washing/rinsing liquid hits the articles, removes the dirt, marks or stain from the articles and drains down together with the dissolved dirt into the sump which is located on the bottom of the tub.
- [0003] A common problem with the prior art domestic dishwashers is that the hollow articles, in particular the hollow articles with relatively narrow openings such as drinking containers, bottles, feeding bottles and jars may not sufficiently receive the washing/rinsing liquid and remain dirty after the completion of the selected washing program. In such incidents, the user needs to wash the unclean articles again. In general, the poor washing results decrease the user satisfaction.
- [0004] WO 2010133674 (A1) discloses a prior art domestic dishwasher.
- [0005] An objective of the present invention is to provide a bottle washing apparatus for use in a dishwasher which solves the aforementioned

problems of the prior art in a cost effective way and which enables an improved cleaning performance of the hollow articles.

- [0006] This objective has been achieved by the bottle washing apparatus as defined in claim 1 and the dishwasher as defined in claim 11. Additional achievements have been attained by the the subject-matters as defined in the dependent claims respectively.
- [0007] The dishwasher of the present invention comprises a first docking port which opens into the tub and exclusively docks with or undocks from the bottle washing apparatus and exclusively supplies the same, in the docked state, with the washing/rinsing liquid. The hydraulic circuit of the dishwasher is further configured and controlled so as to circulate the washing/rinsing liquid via the first docking port to the bottle washing apparatus. The inner bottom of at least one of the extendable article racks is configured for releasable installation of the bottle washing apparatus.
- [0008] The bottle washing apparatus of the present invention comprises a separate non-rotating spray unit which can be detachably attached onto the inner bottom of at least one of the extendable article racks. The spray unit directly docks with or undocks from the first docking port when the respective rack is pushed in or pulled out of the tub respectively. The spray unit washes/rinses a hollow article that is to be placed thereover upside down onto the respective rack.
- [0009] A major advantageous effect of the present invention is that the interior of the hollow articles can be intensively cleaned by the spray unit. Thereby, the risk of having poor washing results has been eliminated or reduced as much as possible. Another major advantageous effect of the present invention is that the user is enabled to easily detach the spray unit from the inner bottom of the article rack when it is not needed. Alternatively, the user may detach the spray unit for maintenance or upgrade. Another major advantageous effect of the present invention is that the circulation of the washing/rinsing liquid through the spray unit can be flexibly controlled in accordance with the actual user requirements and thus the energy efficiency and the water use efficiency of the dishwasher can be further improved.

- [0010] In an embodiment, the spray unit is detachably attachable to the lower article rack. This embodiment is particularly advantageous as the relatively large gap above the lower rack allows the tall hollow articles to be easily placed over the spray unit. Thereby the consumer satisfaction can be increased. In an alternative embodiment, the spray unit is detachably attachable to the upper rack.
- [0011] In another embodiment, the spray unit is detachably attachable onto the rearmost area of the lower article rack. This embodiment is particularly advantageous as the hollow articles can be orderly and securely placed along the rear wall of the lower article rack over the spray unit. Thereby, the space inside the lower rack can be more efficiently utilized.
- [0012] In another embodiment, the first docking port includes a safety valve which becomes closed when the spray unit is undocked or detached. This embodiment is particularly advantageous as the hydraulic circuit cannot circulate the water through the first docking port when the user has detached the spray unit.
- [0013] In alternative embodiments, the spray unit may be detachably attached to the wires of the rack by various types of releasable connections. For instance, a snap connection, an interlocking connection, a clamping connection or a screw connection may be used. In another embodiment, the spray unit is detachably attached to the rack by one or more resilient claws. This embodiment is particularly advantageous as the claws are easy to handle. In a version of this embodiment, the resilient claws releasably catch the wires when the spray unit is pressed downwardly onto the inner bottom of the rack. This embodiment is particularly advantageous as the user can perform the attachment/detachment easily and quickly from above.
- [0014] In another embodiment, the spray unit has primary nozzles for washing/rinsing the interior of the hollow articles respectively. This embodiment is particularly advantageous as the user can allocate the hollow articles to the primary nozzles respectively. In a version of this embodiment, the primary nozzles form an array so as to effectively match the respective hollow articles which are aligned upside down over the

spray unit. The primary nozzles spray the liquid upwards and may have various spray patterns. The primary nozzles may be static or alternatively rotate about their own axis.

- [0015] In another embodiment, the spray unit has also secondary nozzles for washing/rinsing the neighboring dishes which are placed between the tines of the rack. This embodiment is particularly advantageous as the washing/rinsing performance of the dishwasher can be further improved. In a version of this embodiment, the secondary nozzles also form an array so to effectively match the dishes which are aligned close to the spray unit. The secondary nozzles spray slantwise and may have various spray patterns. The primary nozzles may be static or alternatively rotate about their own axis.
- [0016] In another embodiment, the spray unit has a size which occupies a relatively small space on the inner bottom of the rack. This embodiment is particularly advantageous as the spray unit does not inhibit loading of the rack with the usual articles even when the user does not intend to use the bottle washing apparatus and leaves it attached to the rack.
- [0017] In another embodiment, the spray unit is a single piece. This embodiment is particularly advantageous as the number of parts can be decreased and the productions cost can be reduced. The spray unit may be molded from a durable plastic material. Alternatively, the spray unit may be manufactured from a light metal or metal alloy.
- [0018] In another embodiment, the washing/rinsing liquid can be individually circulated via the first docking port to the bottle washing apparatus. This embodiment is particularly advantageous as the hollow articles can be intensively washed and rinsed with a comparatively high flowrate. For instance, the bottle washing apparatus may be taken into operation i.e., supplied with the washing/rinsing liquid at a moment when the rotating spray arms are standing idle, i.e., not supplied with the washing/rinsing liquid. Thereby, the water-use efficiency, the energy efficiency and also the cleaning performance of the dishwasher can be improved. Thereby, also the noise emission of the dishwasher can be reduced. In a version of this embodiment, a multiway valve, in particular a three-way valve is used in

the hydraulic circuit in order to selectively and individually circulate the washing/rinsing liquid by means of a circulation pump via three separate lines to the lower rotating spray arm, to the upper rotating spray arm and to the spray unit of the bottle washing apparatus respectively. In another version of this embodiment, a ceiling-mounted spray means of the cutlery tray is also joined to the separate line of the the upper rotating spray arm so as to be operated in common. In another version of this embodiment, the multiway valve is also used to feed additional separate lines which for instance lead to the microfilter cleaning unit, a reservoir unit and an intensive cleaning zone which is located on the bottom of the tub respectively. Thereby, the dishwasher can be more flexibly controlled.

[0019] In another embodiment, the user is allowed to select via the control panel the bottle washing function. In this embodiment, the control unit causes the hydraulic circuit to circulate the washing/rinsing liquid to the bottle washing apparatus only if the function has been selected by the user. This embodiment is particularly advantageous as the bottle washing apparatus is operated only when needed and thus the dishwasher can save energy and water. The bottle washing function is combinable with the other user-selectable washing programs.

[0020] In another embodiment, the hollow articles are secured in place by a wire retainer which can be releasably or retractably attached to the rack. This embodiment is particularly advantageous as the tall hollow articles such stemware or feeding bottles can be prevented from tilting or falling.

[0021] Additional features and additional advantageous effects of the bottle washing apparatus and the dishwasher according to the present invention will become more apparent with the detailed description of the embodiments with reference to the accompanying drawings in which:

[0022] Figure 1 – is a schematic perspective view of a bottle washing apparatus according to an embodiment of the present invention;

[0023] Figure 2 – is a schematic top view of the bottle washing apparatus of Fig. 1;

[0024] Figure 3 – is a schematic front view of the bottle washing apparatus of Fig. 1;

- [0025] Figure 4 – is a schematic enlarged top view of the detail A of Fig. 2;
- [0026] Figure 5 – is a schematic enlarged partial perspective view of the bottle washing apparatus of Fig. 1;
- [0027] Figure 6 – is a schematic enlarged perspective view of the detail B of Fig. 5;
- [0028] Figure 7 – is a schematic enlarged partial perspective rear view of the bottle washing apparatus of Fig. 1;
- [0029] Figure 8 – is a schematic enlarged partial perspective side view of the bottle washing apparatus of Fig. 1;
- [0030] Figure 9 – is a schematic perspective view of a dishwasher which has the bottle washing apparatus according to an embodiment of the present invention;
- [0031] Figure 10 – is a schematic partial perspective inner view of the dishwasher of Fig. 9;
- [0032] Figure 11 – is another schematic partial perspective inner view of the dishwasher of Fig.9;
- [0033] Figure 12 – is a schematic enlarged partial perspective inner view of the dishwasher of Fig.9;
- [0034] Figure 13 – is a schematic partial top inner view of the dishwasher of Fig. 9;
- [0035] Figure 14 – is a another schematic partial perspective view of the dishwasher of Fig. 9, when the bottle washing apparatus has been docked with the first docking port;
- [0036] Figure 15 – is a schematic exploded partial perspective view of the first docking port of Fig. 14;
- [0037] Figure 16 – is a schematic partial perspective front view of the first docking port of Fig. 14, when the hinged flap is closed;
- [0038] Figure 17 – is a schematic partial perspective front view of the first docking port of Fig.14, when the hinged flap is open;
- [0039] Figure 18 – is a schematic partial perspective rear view of the first docking port of Fig.14, when the hinged flap is closed;
- [0040] Figure 19 – is a schematic partial perspective rear view of the first docking port of Fig.14, when the hinged flap is open;

- [0041] Figure 20 – is a schematic partial top inner view of the dishwasher of Fig. 9, when the bottle washing apparatus has been docked with the first docking port;
- [0042] Figure 21 – is a schematic sectional view of the bottle washing apparatus and the first docking port, taken along the line C-C of Fig. 20;
- [0043] Figure 22 – is a schematic perspective view of the lower article rack of the dishwasher of Fig. 9, wherein the bottle washing apparatus is detachably attached to the rearmost area on the inner bottom of the lower article rack;
- [0044] Figure 23 – is another schematic perspective view of the lower article rack and the bottle washing apparatus of Fig. 22;
- [0045] Figure 24 – is a schematic enlarged partial perspective view of the lower article rack and the bottle washing apparatus of Fig. 22;
- [0046] Figure 25 – is a schematic enlarged partial perspective view of the lower article rack and the bottle washing apparatus of Fig. 23;
- [0047] Figure 26 – is a schematic enlarged perspective view of the detail D of Fig. 25;
- [0048] Figure 27 – is a schematic enlarged perspective view of the detail E of Fig. 25;
- [0049] Figure 28 – is a schematic rear view of the lower article rack and the bottle washing apparatus of Fig. 22;
- [0050] Figure 29 – is a schematic enlarged perspective view of the detail F of Fig. 28.
- [0051] The reference signs appearing on the drawings relate to the following technical features.
1. Apparatus
 2. Dishwasher
 3. Tub
 4. Rack
 5. First docking port
 6. Hydraulic circuit
 7. Spray unit
 8. Valve (flap)
 9. Wire

- 10. Claw
- 11. Nozzle
- 12. Tine
- 13. Nozzle
- 14. Projection
- 15. Sump
- 16. Spray arm
- 17. First individual line
- 18. Second individual line
- 19. Second docking port
- 20. Third individual line
- 21. Protrusion
- 22. Inlet
- 23. Duct

[0052] The bottle washing apparatus (1) of the present invention is suitable for use in a dishwasher (2). The dishwasher (2) comprises a tub (3), a sump (15) which is located on the bottom of the tub (3), one or more extendable article racks (4) which are disposed into the tub (3) one above the other, one or more rotating spray arms (16) for spraying the washing/rinsing liquid towards the respective article racks (4), a hydraulic circuit (6) for circulating the liquid via the rotating spray arms (16) and a control unit (not shown) for controlling the hydraulic circuit (6). The control unit comprises one or more user selectable washing programs.

[0053] The dishwasher (2) of the present invention further comprises a first docking port (5) which is configured to open into tub (3) and to exclusively dock with or undock from the bottle washing apparatus (1) and to exclusively supply the bottle washing apparatus (1), in the docked state, with the washing/rinsing liquid. The hydraulic circuit (6) is further configured to circulate the washing/rinsing liquid via the first docking port (5). The inner bottom of at least one of the racks (4) is configured for releasable installation of the bottle washing apparatus (1).

[0054] The bottle washing apparatus (1) of the present invention comprises: a separate non-rotating spray unit (7) which is configured for detachable

attachment onto the inner bottom of at least one of the racks (4), to directly dock with or undock from the first docking port (5) when the respective rack (4) is pushed in or pulled out of the tub (3) respectively and to wash/rinse a hollow article (not shown) that is to be placed thereover upside down onto the respective rack (4).

- [0055] In an embodiment, the spray unit (7) is configured for detachable attachment onto the inner bottom of the lower article rack (4).
- [0056] In another embodiment, the spray unit (7) is further configured for detachable attachment exclusively onto the rearmost area on the inner bottom of the lower article rack (4) and to wash/rinse the hollow articles that are to be placed thereover upside down onto the rearmost area of the lower article rack (4).
- [0057] In another embodiment, the first docking port (5) includes a safety valve (8) which is configured to cooperate with the spray unit (7) and to open when the spray unit (7) is docked and to close when the spray unit (7) is undocked.
- [0058] In another embodiment, the safety valve (8) includes a hinged flap (8) which is pushed inwardly by a protrusion (21) of the spray unit (7) in the docked state.
- [0059] In another embodiment, the protrusion (21) is disposed onto the inlet (22) of the spray unit (7).
- [0060] In another embodiment, the racks comprise wires (9). In this embodiment, the spray unit (7) comprises one or more resilient claws (10) which are configured to releasably catch the counterpart wires (9).
- [0061] In another embodiment, the resilient claws (10) are disposed onto the bottom of the spray unit (7) and extend downwardly so as to releasably catch the counterpart wires (9) when the spray unit (7) is pressed downwardly onto the inner bottom of the respective rack (4).
- [0062] In another embodiment, the spray unit (7) comprises one or more primary nozzles (11) which are configured to spray the washing/rinsing fluid upwardly and directly into the hollow article.
- [0063] In another embodiment, the primary nozzles (11) are arrayed onto the body of the spray unit (7). The primary nozzles (11) are fluidly connected

with the inlet (22) through a duct (23) which is formed into the body of the spray unit (7).

- [0064] In another embodiment, the article racks (4) each comprises one or more sets of tines (12) for respectively supporting dishes. In this embodiment, the spray unit (7) comprises one or more secondary nozzles (13) which are configured to spray the washing/rinsing fluid slantwise and directly towards the dishes to be placed onto the respective rack (4) between the tines (12).
- [0065] In another embodiment, the secondary nozzles (13) are also arrayed onto the body of the spray unit (7). The secondary nozzles (11) are fluidly connected with the inlet (22) through the duct (23).
- [0066] In another embodiment, the spray unit (7) has an elongated shape which extends along the entire width of the respective rack (4) and a relatively low height such that it does not interfere, in the attached state, with the dishes to be placed onto the respective rack (4) between the tines (12).
- [0067] In another embodiment, the duct (23) of the spray unit (7) has a rectangular cross section whereas the inlet (22) has a cylindrical cross section.
- [0068] In another embodiment, that the spray unit (7) has one or more barrier-like projections (14) configured to inhibit dislocation of the hollow articles that are to be placed thereover upside down onto the respective rack (4).
- [0069] In another embodiment, the spray unit (7), including the claws (10), the primary nozzles (11), the secondary nozzles (13), the projections (14), the inlet (22) and the duct (23) are integrally moulded as a single piece. In this embodiment, the spray unit (7) has static primary and secondary nozzles (11, 13).
- [0070] In another embodiment, the hydraulic circuit (6) has an individual first line which is configured to allow individual circulation of the washing/rinsing liquid via the first docking port (5) to the bottle washing apparatus (1).
- [0071] In another embodiment, the hydraulic circuit (6) comprises a multiway valve unit (not shown) which includes: an inlet port (not shown) which is configured to receive the liquid from the sump (15), a first outlet port (not shown) which is configured to allow individual circulation of the liquid via

the first individual line (17) and the first docking port (5) to the bottle washing apparatus (1), a second outlet port (not shown) which is configured to allow individual circulation of the liquid via a second individual line (18) and a second docking port (19) to the upper rotating spray arm, a third outlet port (not shown) which is configured to allow individual circulation of the liquid via a third individual line (20) to the lower rotating spray arm (16).

- [0072] In another embodiment, the control unit further comprises a user selectable bottle washing function. In this embodiment, the control unit is further programmed to circulate the washing/rinsing liquid via the first docking port (5) in combination with a selected washing program if the bottle washing function has also been selected by the user.
- [0073] In another embodiment, the dishwasher (2) further comprises a wire retainer (not shown) which is configured for releasable or retractable attachment to the respective rack (4) and to secure the hollow articles including bottles and stemware that are to be placed over the spray unit (7) upside down onto the respective rack (4).
- [0074] A major advantageous effect of the present invention is that the interior of the hollow articles can be intensively cleaned by the spray unit (7). Thereby, the risk of having poor washing results has been eliminated or reduced as much as possible. Another major advantageous effect of the present invention is that the user is enabled to easily detach the spray unit (7) from the inner bottom of article rack (4) when it is not needed. Alternatively, the user may detach the spray unit (7) for maintenance or upgrade. Another major advantageous effect of the present invention is that the circulation of the washing/rinsing liquid through the spray unit (7) can be flexibly controlled and thus the energy efficiency and the water use efficiency of the dishwasher (2) can be further improved. Other advantageous effects of the present invention can be taken from the aforementioned particular embodiments.

Claims

1. A bottle washing apparatus (1) for use in a dishwasher (2) comprising a tub (3), one or more extendable article racks (4) which are disposed into the tub (3), a first docking port (5) which is configured to open into the tub (3) and to exclusively dock with or undock from the bottle washing apparatus (1) and to exclusively supply the bottle washing apparatus (1), in the docked state, with the washing/rinsing liquid, a hydraulic circuit (6) which is configured to circulate the washing/rinsing liquid via the first docking port (5) and a control unit for controlling the hydraulic circuit (6), the bottle washing apparatus (1) being **characterized in that** a separate non-rotating spray unit (7) which is configured for detachable attachment onto the inner bottom of at least one of the racks (4), to directly dock with or undock from the first docking port (5) when the respective rack (4) is pushed in or pulled out of the tub (3) respectively and to wash/rinse a hollow article that is to be placed thereover upside down onto the respective rack (4).
2. The bottle washing apparatus (1) according to claim 1, **characterized in that** the spray unit (7) is configured for detachable attachment onto the inner bottom of the lower article rack (4).
3. The bottle washing apparatus (1) according to claim 2, **characterized in that** the spray unit (7) is further configured for detachable attachment exclusively onto the rearmost area on the inner bottom of the lower article rack (4) and to wash/rinse the hollow articles that are to be placed thereover upside down onto the rearmost area of the lower article rack (4).
4. The bottle washing apparatus (1) according to any one claims 1 to 3, **characterized in that** the first docking port (5) includes a safety valve (8) which is configured to cooperate with the spray unit (7) and to open when the spray unit (7) is docked and to close when the spray unit (7) is undocked.
5. The bottle washing apparatus (1) according to claim 4, wherein the racks comprise wires (9), the bottle washing apparatus (1) being **characterized in that** the spray unit (7) comprises one or more resilient claws (10) which are configured to releasably catch the counterpart wires (9).
6. The bottle washing apparatus (1) according to claim 5, **characterized in that** the resilient claws (10) are disposed onto the bottom of the spray unit (7) and

extend downwardly so as to releasably catch the counterpart wires (9) when the spray unit (7) is pressed downwardly onto the inner bottom of the respective rack (4).

7. The bottle washing apparatus (1) according to claim 6, **characterized in that** the spray unit (7) comprises one or more primary nozzles (11) which are configured to spray the washing/rinsing fluid upwardly and directly into the respective hollow article.
8. The bottle washing apparatus (1) according to claim 7, wherein the article racks (4) each comprises one or more sets of tines (12) for respectively supporting dishes, the bottle washing apparatus (1) being **characterized in that** the spray unit (7) comprises one or more secondary nozzles (13) which are configured to spray the washing/rinsing fluid slantwise and directly towards the dishes to be placed onto the respective rack (4) between the tines (12).
9. The bottle washing apparatus according to claim 8, wherein the article racks (4) each comprises one or more sets of tines (12) for respectively supporting dishes, the bottle washing apparatus (1) being **characterized in that** the spray unit (7) has an elongated shape which extends along the entire width of the respective rack (4) and a relatively low height such that it does not interfere, in the attached state, with the dishes to be placed onto the respective rack (4) between the tines (12).
10. The bottle washing apparatus (1) according to any one of claims 1 to 3, **characterized in that** the spray unit (7) has one or more barrier-like projections (14) configured to inhibit dislocation of the hollow articles that are to be placed thereover upside down onto the respective rack (4).
11. A dishwasher (2) comprising a tub (3), a sump (15) which is located on the bottom of the tub (3), one or more extendable article racks (4) which are disposed into the tub (3) one above the other, one or more rotating spray arms (16) which are configured to spray the washing/rinsing liquid towards the respective article racks (4), a hydraulic circuit (6) which is configured to circulate the liquid via the rotating spray arms (16), a control unit which is configured to control the hydraulic circuit (6), wherein the control unit further comprises one or more user selectable washing programs, **characterized in that** a first docking port (5) which is configured to open into tub (3) and to

exclusively dock with or undock from the bottle washing apparatus (1) as defined in claim 1 and to exclusively supply the bottle washing apparatus (1), in the docked state, with the washing/rinsing liquid, wherein the hydraulic circuit (6) is further configured to circulate the washing/rinsing liquid via the first docking port (5) and wherein the inner bottom of at least one of the racks (4) is configured for releasable installation of the bottle washing apparatus (1).

12. The dishwasher (2) according to claim 11, **characterized in that** the hydraulic circuit (6) has a first individual line (17) which is configured to allow individual circulation of the washing/rinsing liquid via the first docking port (5) to the bottle washing apparatus (1).
13. The dishwasher (2) according to claim 12, **characterized in that** the hydraulic circuit (6) comprises a multiway valve unit which includes: an inlet port which is configured to receive the liquid from the sump (15), a first outlet port which is configured to allow individual circulation of the liquid via the first individual line (17) and the first docking port (5) to the bottle washing apparatus (1), a second outlet port which is configured to allow individual circulation of the liquid via a second individual line (18) and a second docking port (19) to the upper rotating spray arm, a third outlet port which is configured to allow individual circulation of the liquid via a third individual line (20) to the lower rotating spray arm (16).
14. The dishwasher (2) according to claim 11, **characterized in that** the control unit further comprises a user selectable bottle washing function, wherein the control unit is further programmed to circulate the washing/rinsing liquid via the first docking port (5) in combination with a selected washing program if the bottle washing function has also been selected by the user.
15. The dishwasher (2) according to any one of claims 11 to 14, **characterized in that** a wire retainer which is configured for releasable or retractable attachment to the respective rack (4) and to secure the hollow articles including bottles and stemware that are to be placed over the spray unit (7) upside down onto the respective rack (4).

Fig. 1

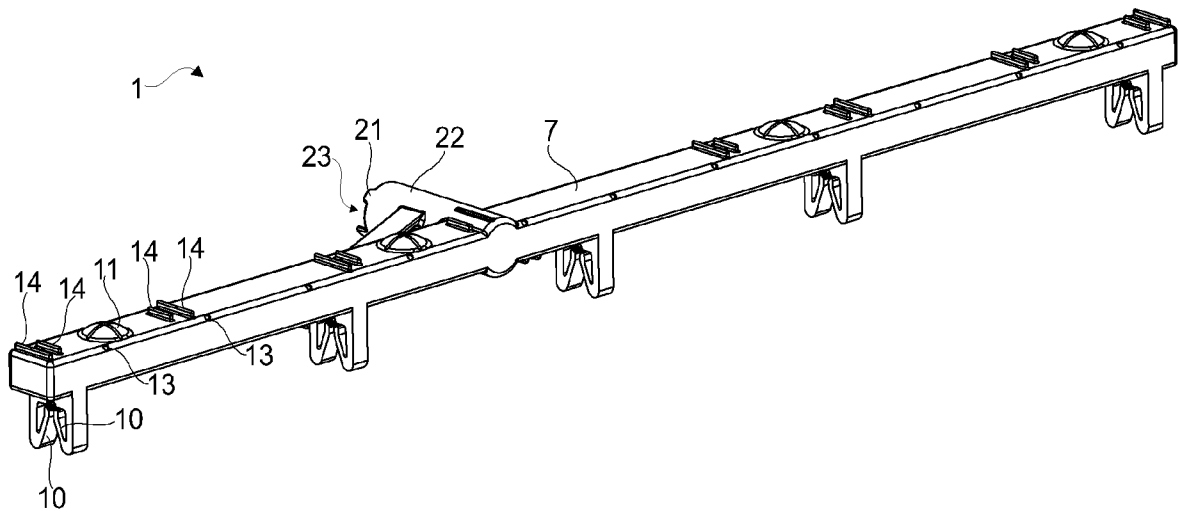


Fig. 2

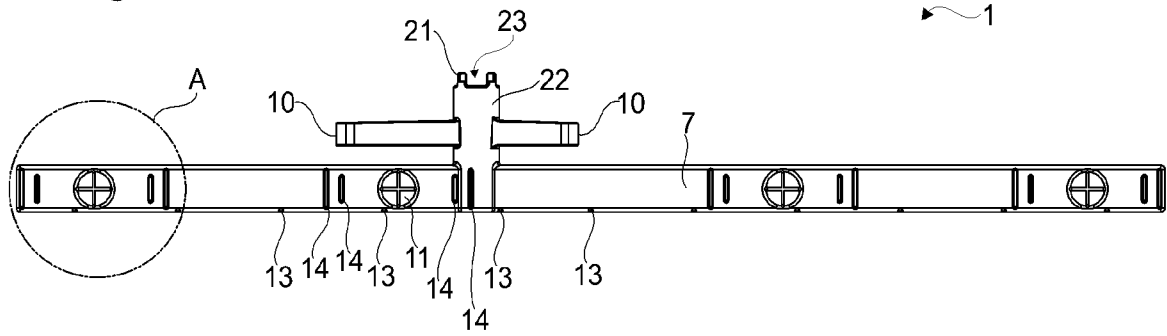


Fig. 3

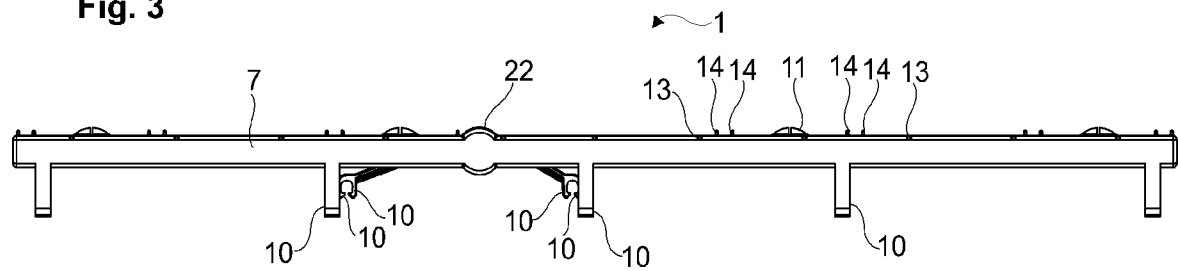


Fig. 4

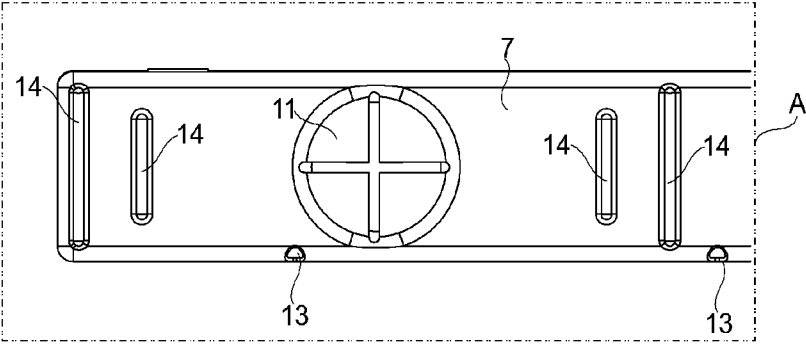


Fig. 5

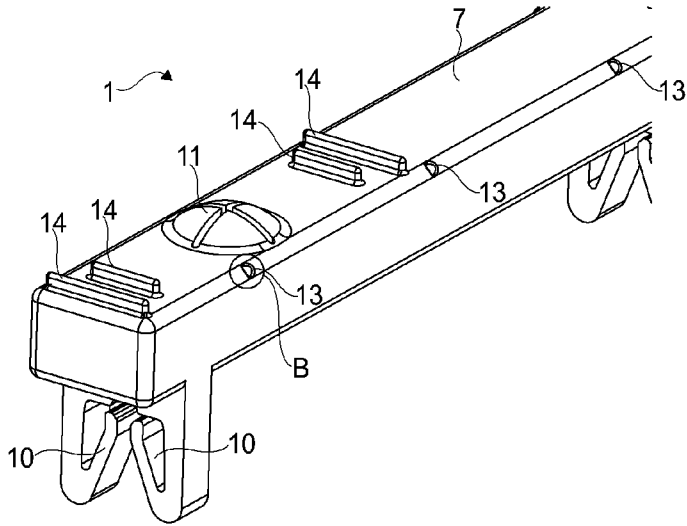


Fig. 6

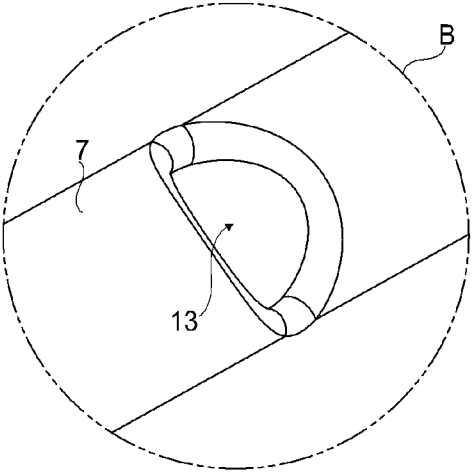


Fig. 7

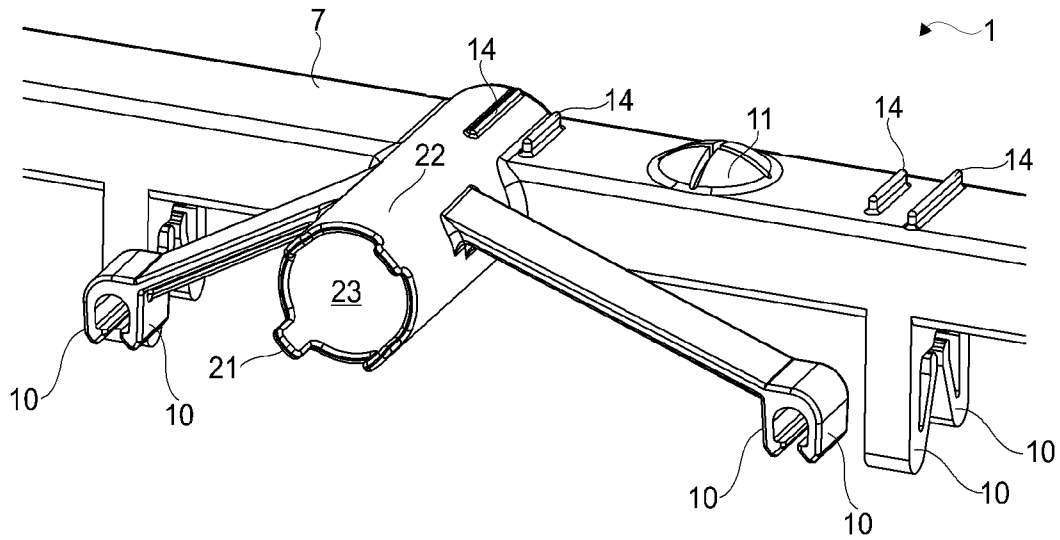


Fig. 8

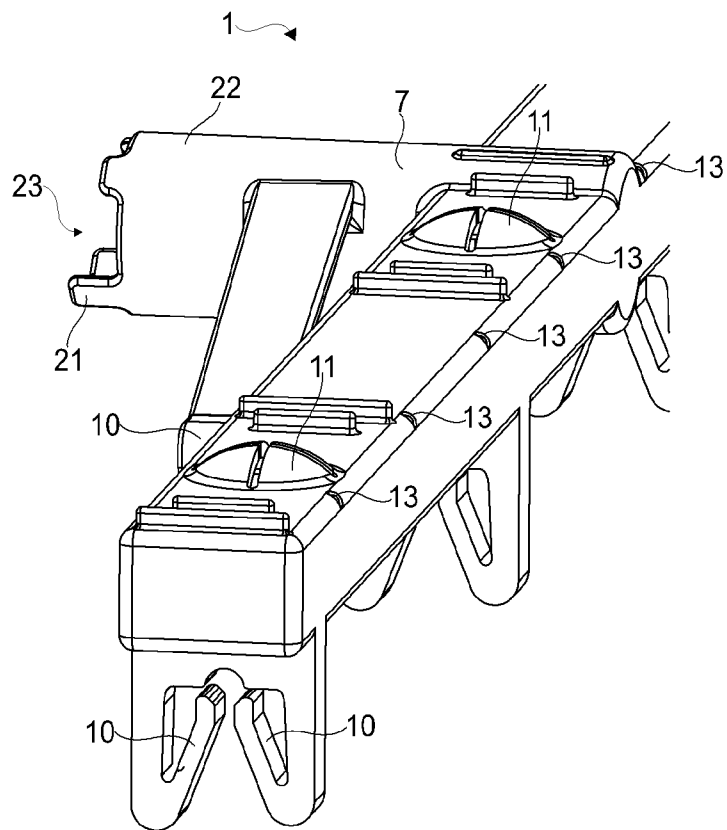


Fig. 9

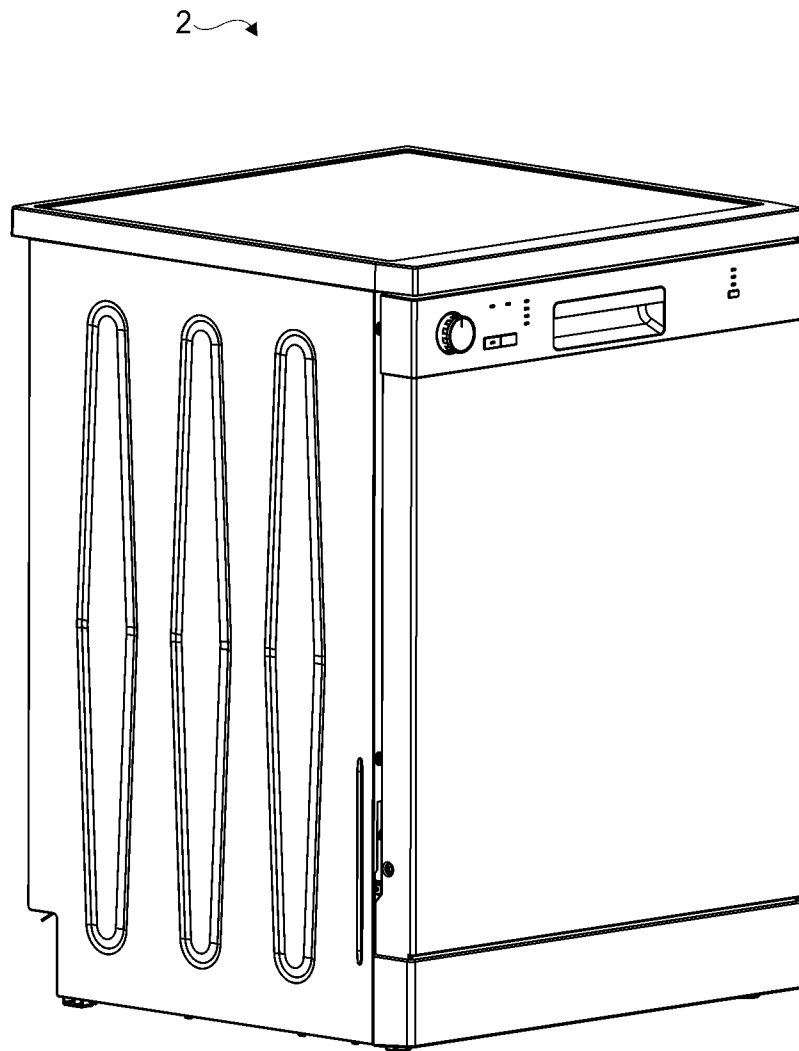


Fig. 10

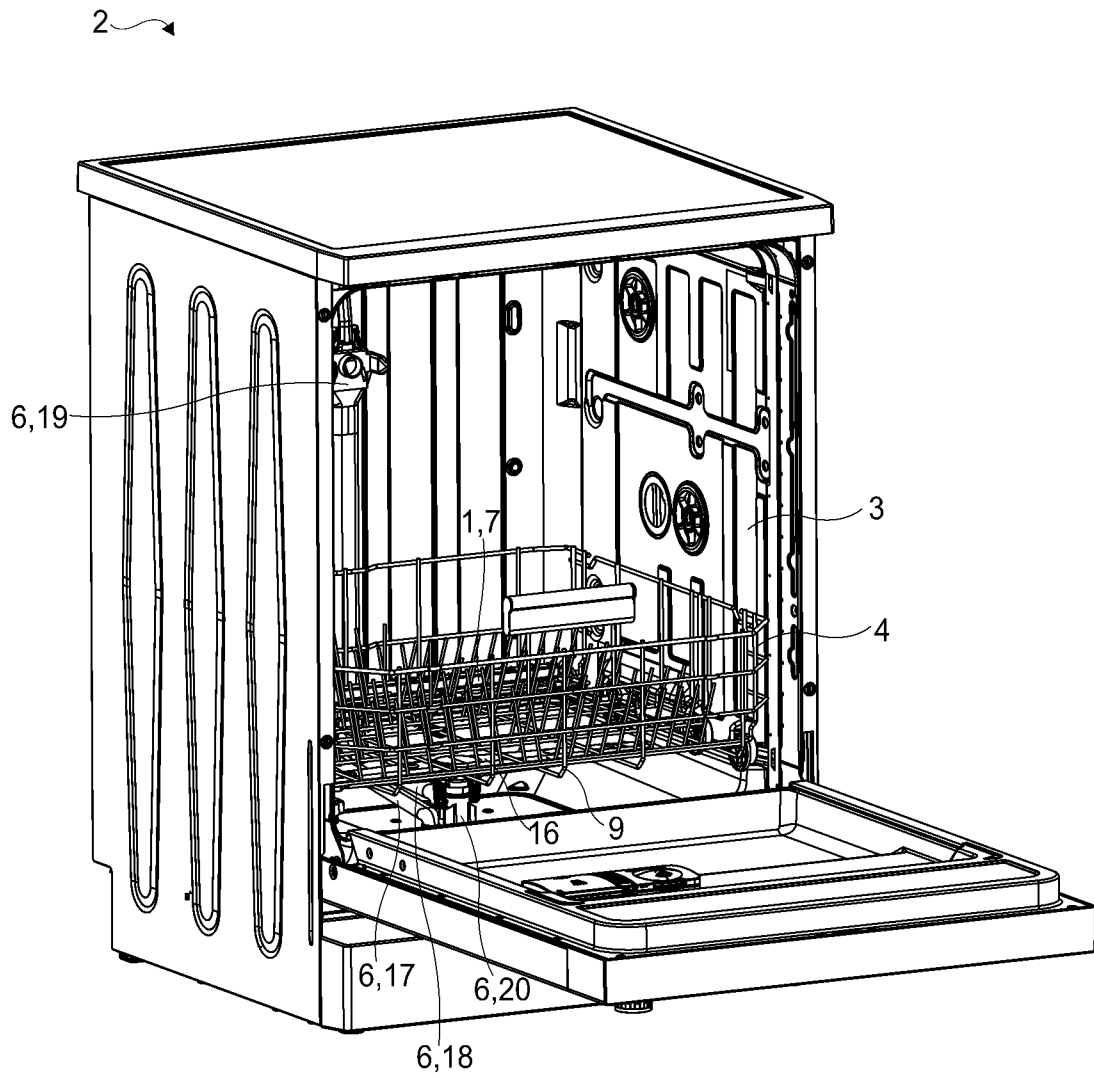


Fig. 11

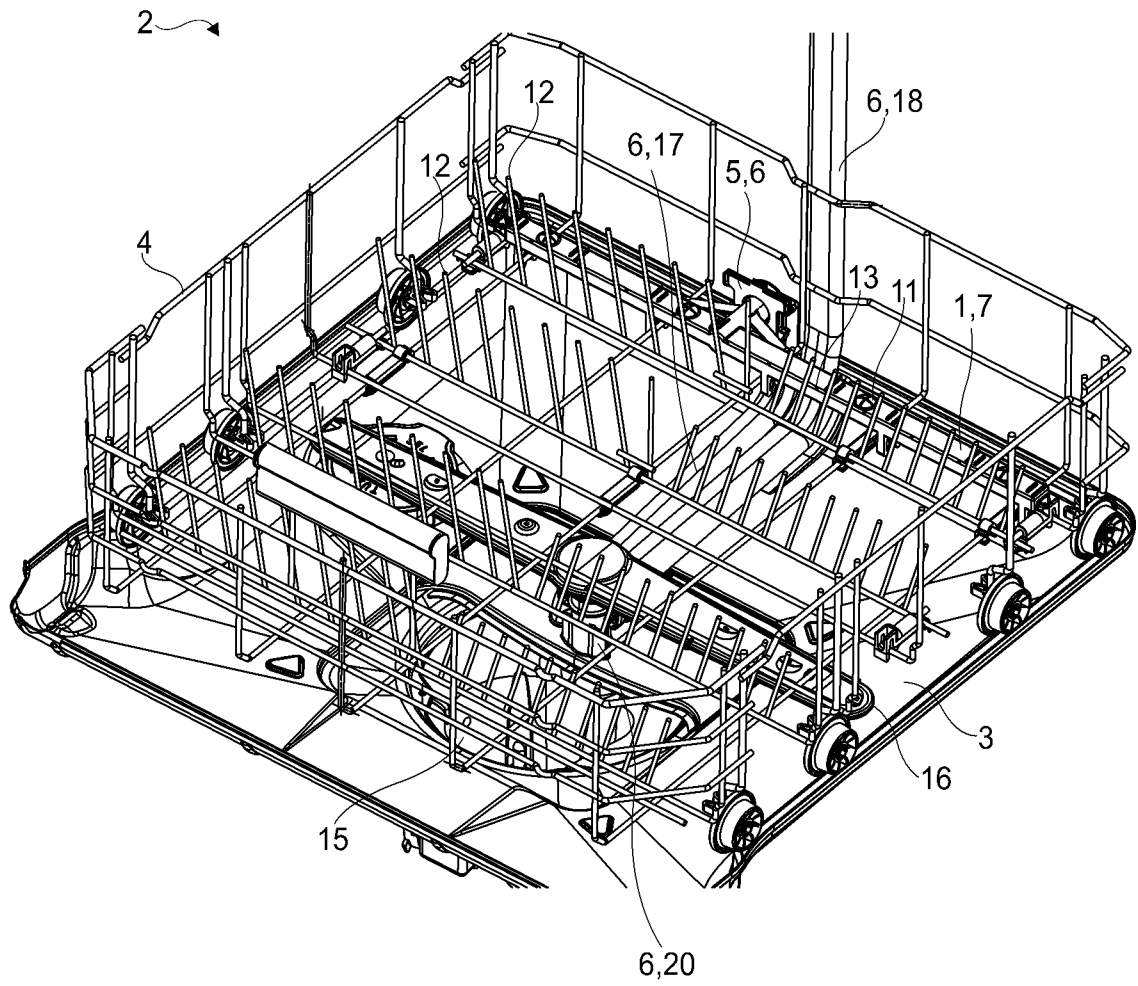


Fig. 12

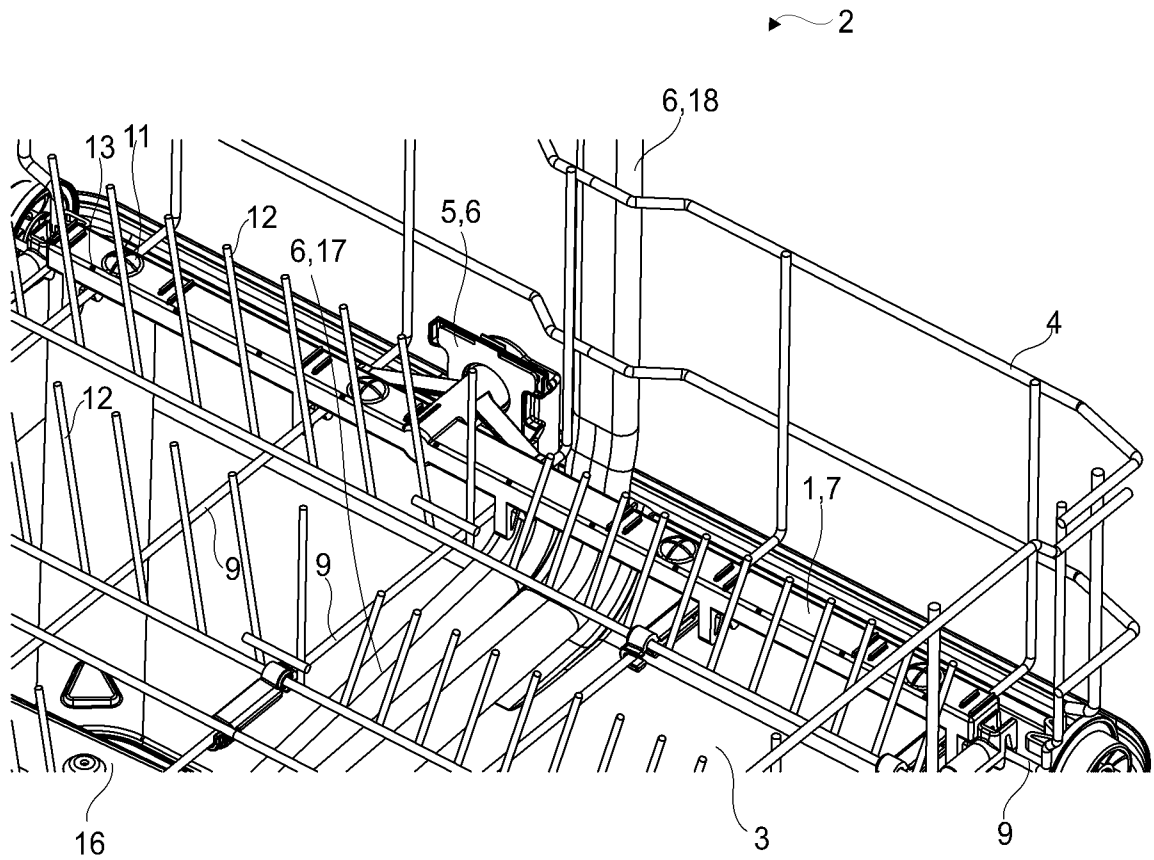


Fig. 13

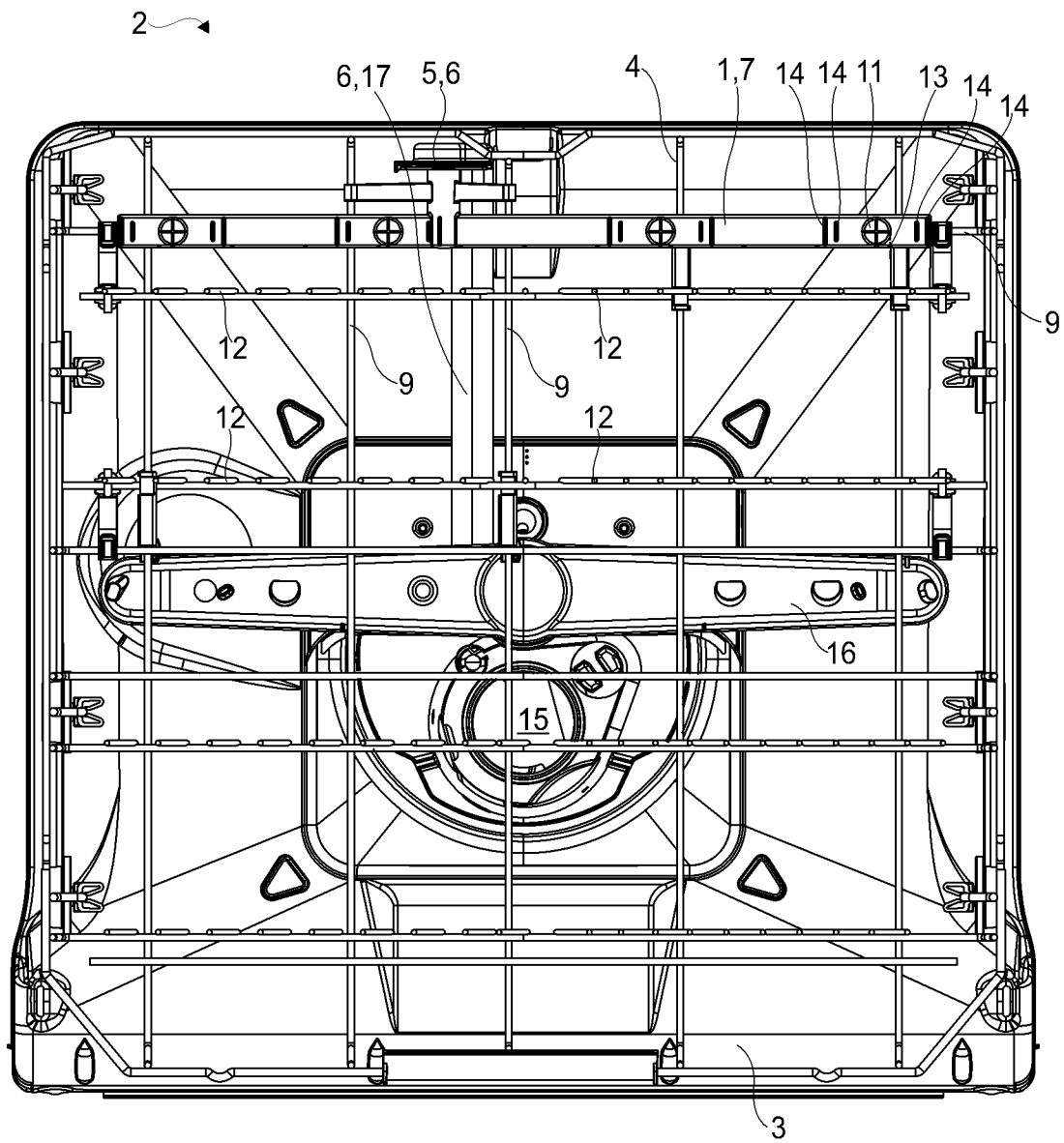


Fig. 14

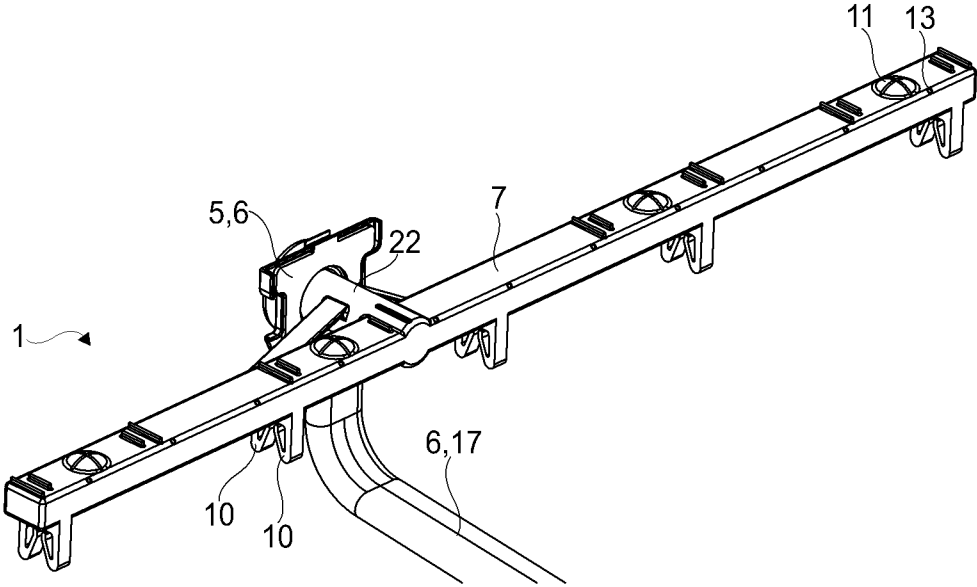


Fig. 15

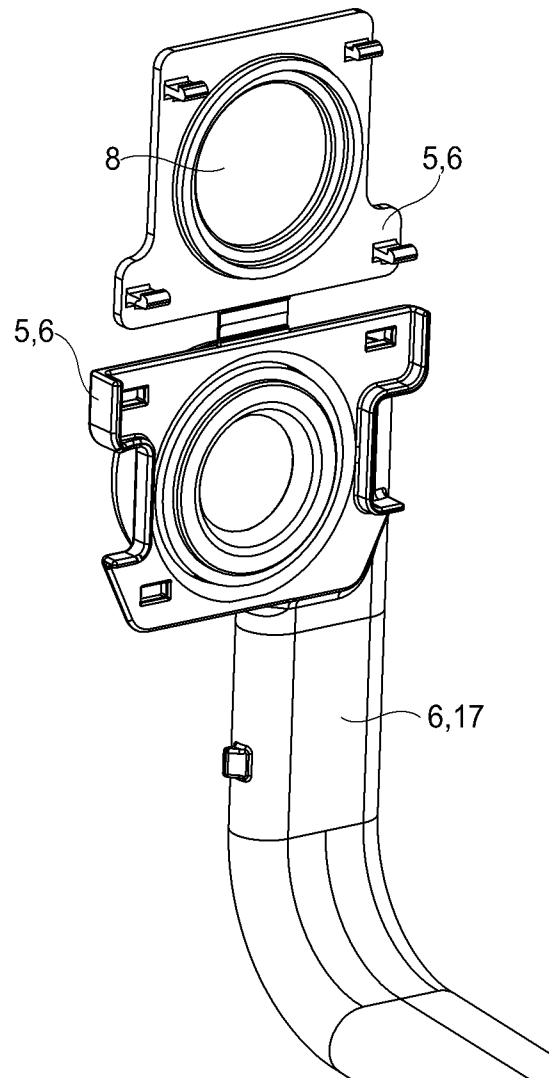


Fig. 16

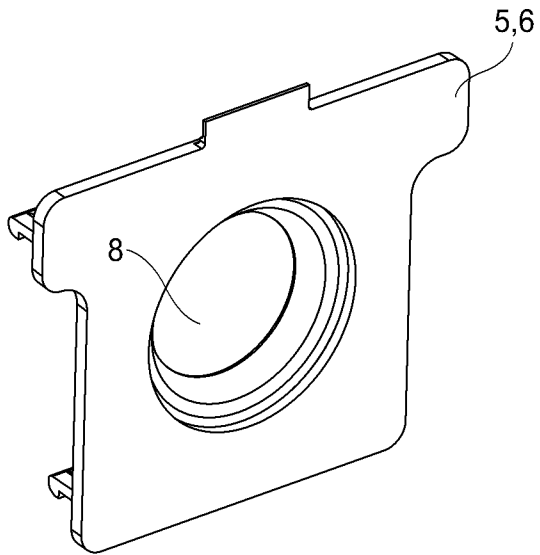


Fig. 17

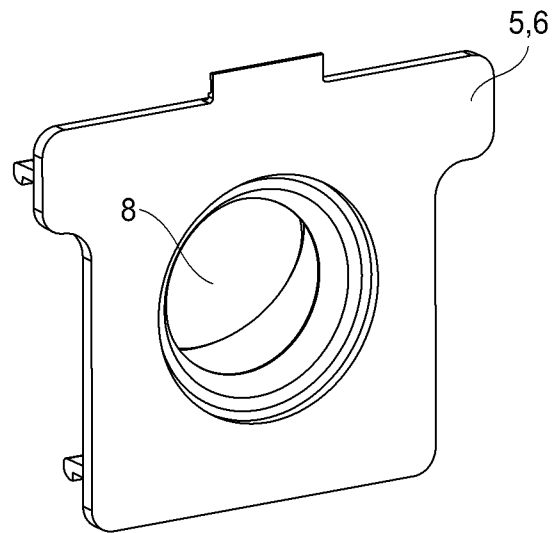


Fig. 18

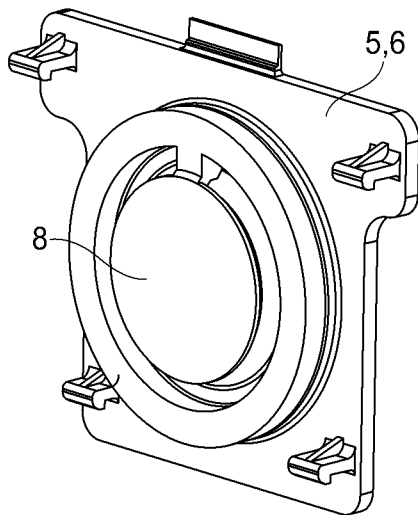


Fig. 19

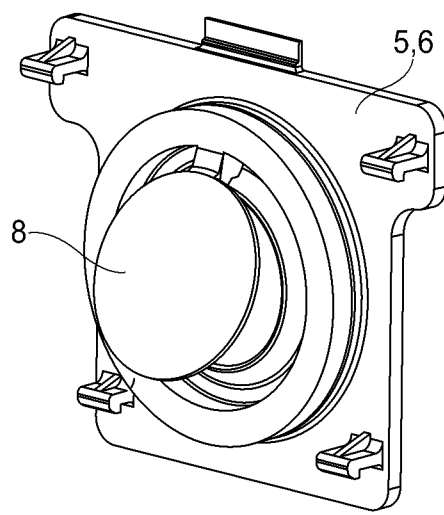


Fig. 20

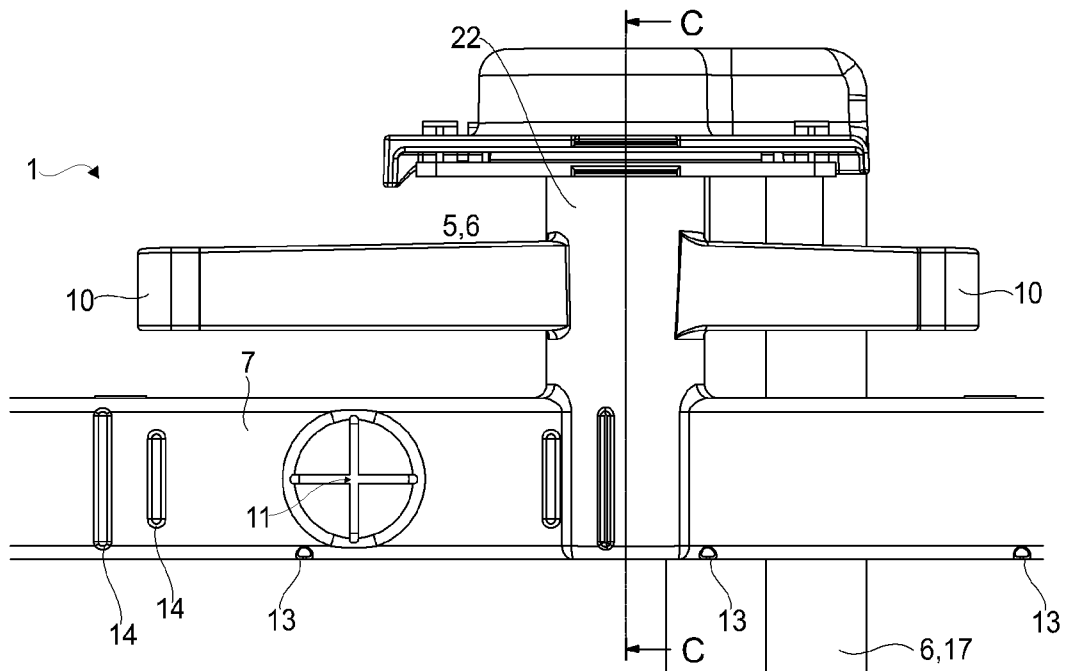


Fig. 21

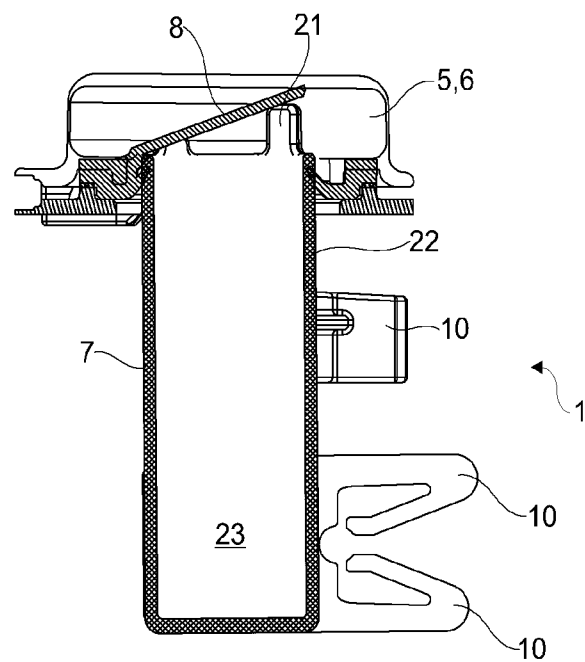


Fig. 22

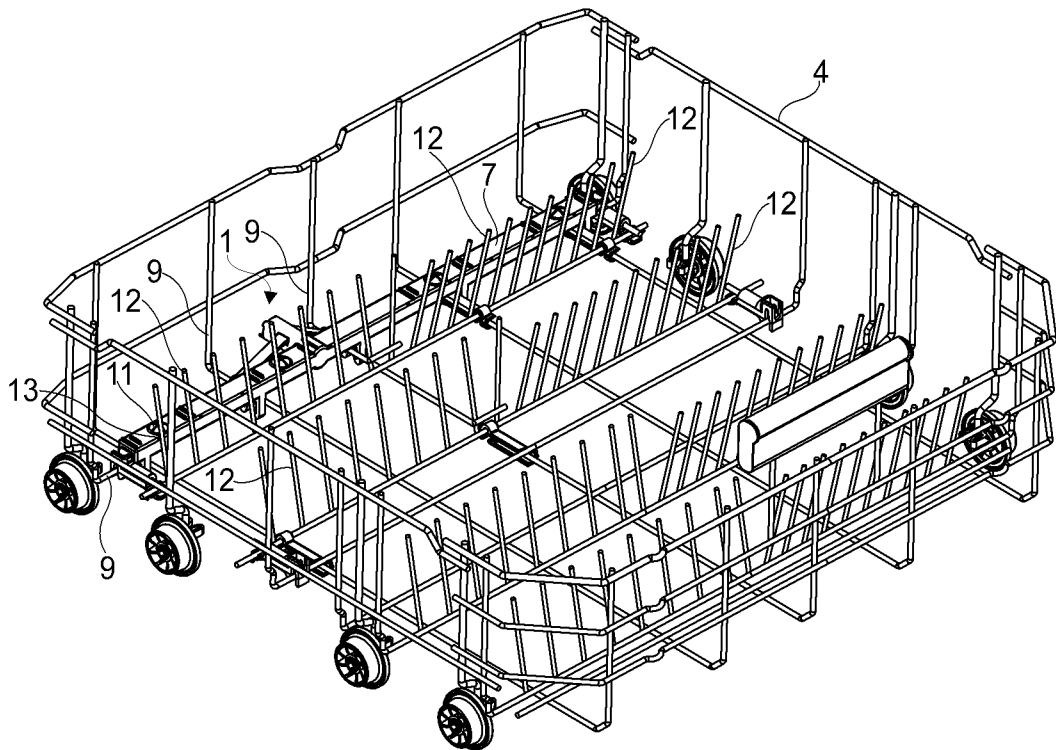


Fig. 23

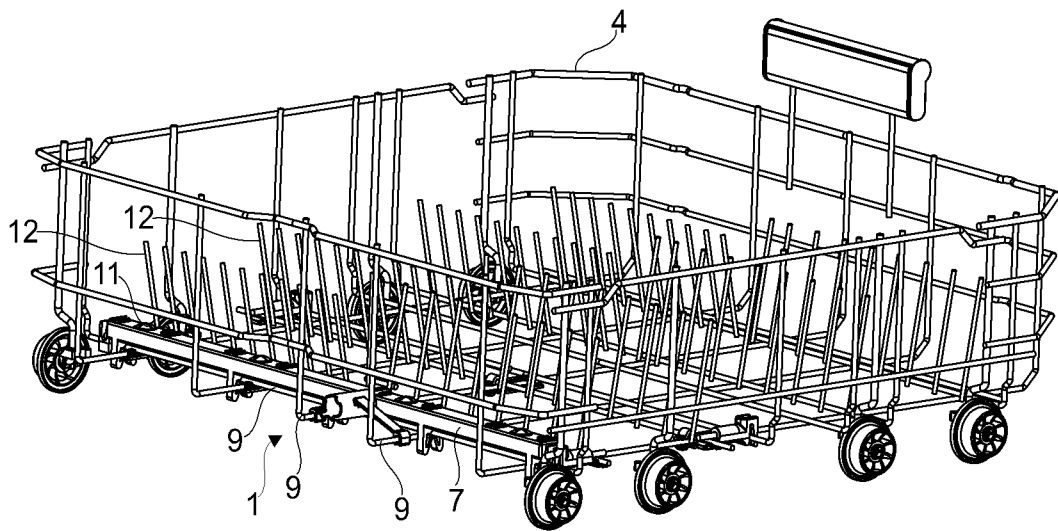


Fig. 24

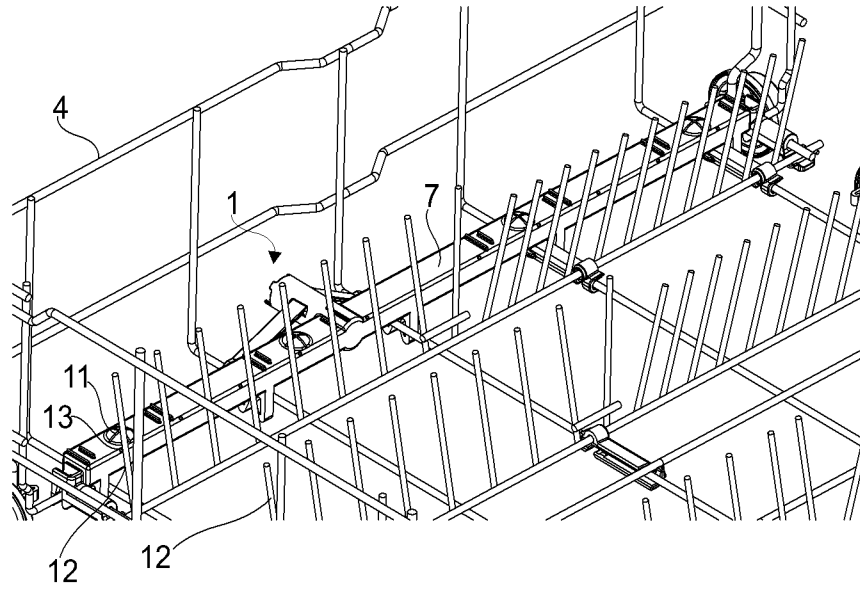
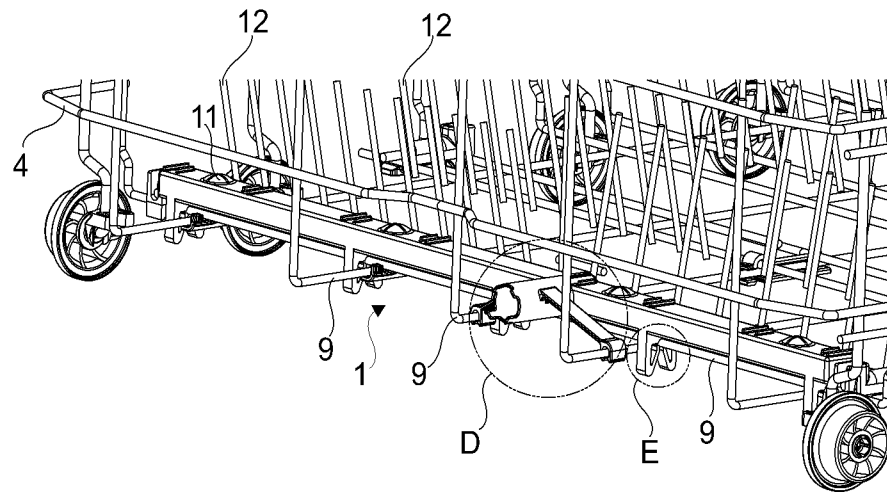


Fig. 25



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Fig. 26

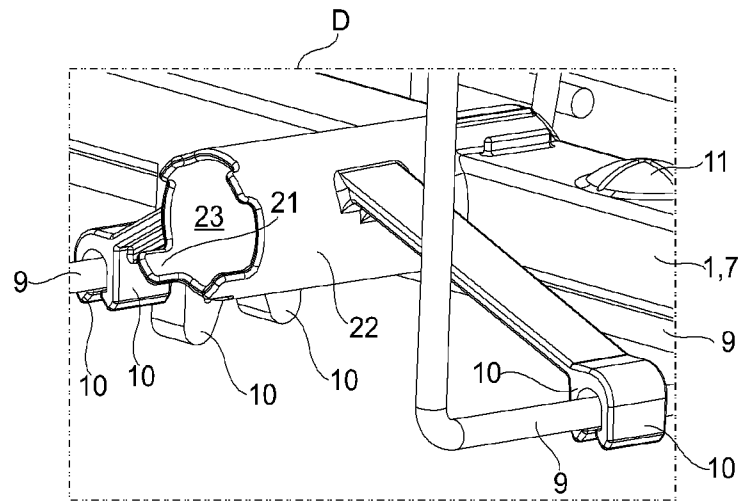


Fig. 27

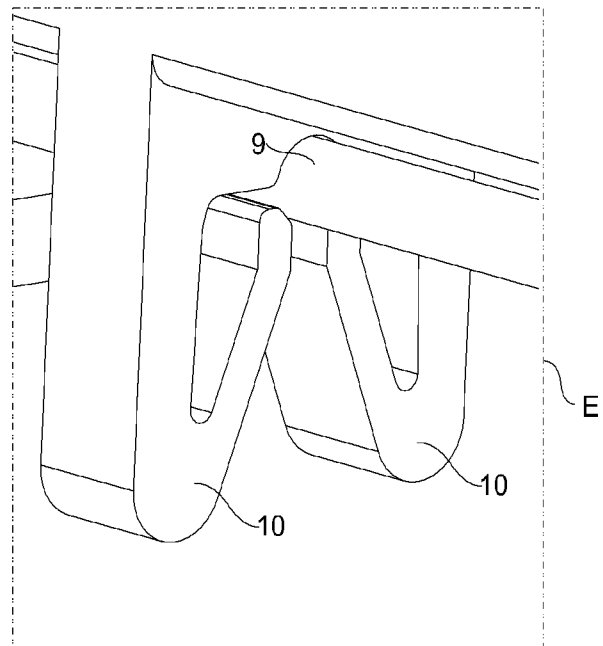


Fig. 28

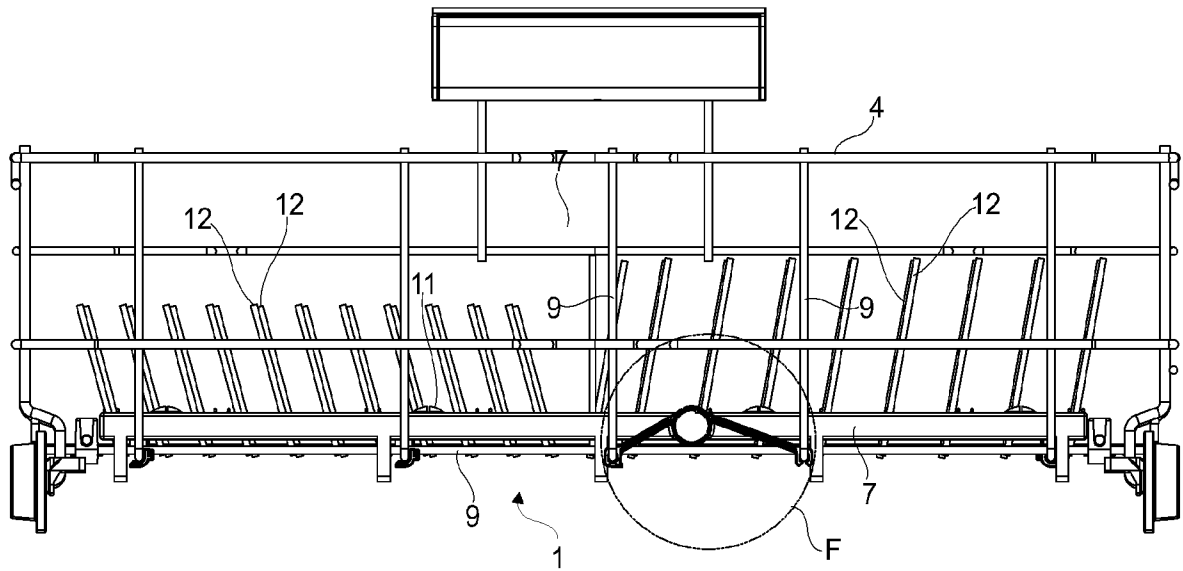
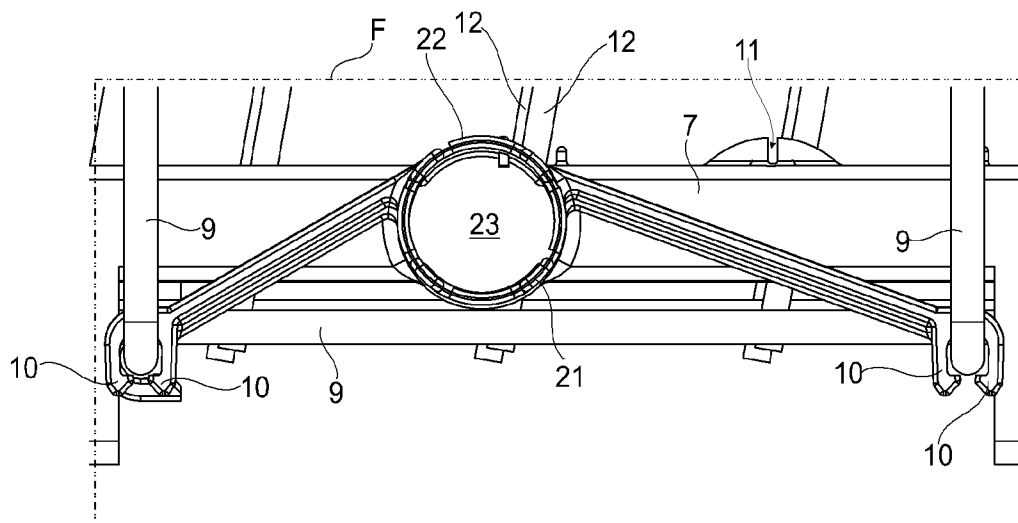


Fig. 29



INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2015/065496

A. CLASSIFICATION OF SUBJECT MATTER
INV. A47L15/16 A47L15/50 A47L15/00
ADD.

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)
A47L

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

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X A A A A	EP 0 997 100 A1 (AEG HAUSGERAETE GMBH [DE]) 3 May 2000 (2000-05-03) the whole document ----- DE 103 32 149 B3 (MIELE & CIE [DE]) 4 May 2005 (2005-05-04) the whole document ----- US 2012/285491 A1 (BLANCHARD WALTER T [US] ET AL) 15 November 2012 (2012-11-15) the whole document ----- EP 2 335 548 A1 (MIELE & CIE [DE]) 22 June 2011 (2011-06-22) the whole document -----	1-7, 11-13,15 8-10,14 1-15 1-15 15



Further documents are listed in the continuation of Box C.



See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"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

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Date of the actual completion of the international search

28 October 2015

Date of mailing of the international search report

04/11/2015

Name and mailing address of the ISA/

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Jezierski, Krzysztof

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2015/065496

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