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(54) **Detergent dispenser**

(57) The invention relates to a detergent dispenser and a washing machine having a detergent dispenser, wherein the detergent dispenser (2) comprises a dispenser housing (4), an extractable drawer (6) arranged in the dispenser housing (4), and a guiding arrangement provided between the drawer (6) and the housing (4) for slidable guiding the drawer (6) in the housing (4) along an inserting/withdrawal direction (A), wherein the guiding arrangement comprises at least one drawer guiding device (8a) and at least one housing guiding device (10a) adapted to engage with each other, wherein the at least one housing guiding device (10a) at least partially surrounds the drawer guiding device (8a) or wherein the at least one drawer guiding device (8a) at least partially

surrounds the housing guiding device (10a), wherein the at least one drawer guiding device (8a) and the at least one housing guiding device (10a) are engaged such that a surface portion (12a) of the at least one drawer guiding device (8a-b) is contacting a surface portion of the at least one housing guiding device (10a) and both surface portions are adapted to slide along each other, and wherein the cross-section of the at least partially surrounded (drawer or housing) guiding device and the mating cross-section of the at least partially surrounding (housing or drawer) guiding device is selected from a partially circular cross-section or a partially ellipse cross-section.

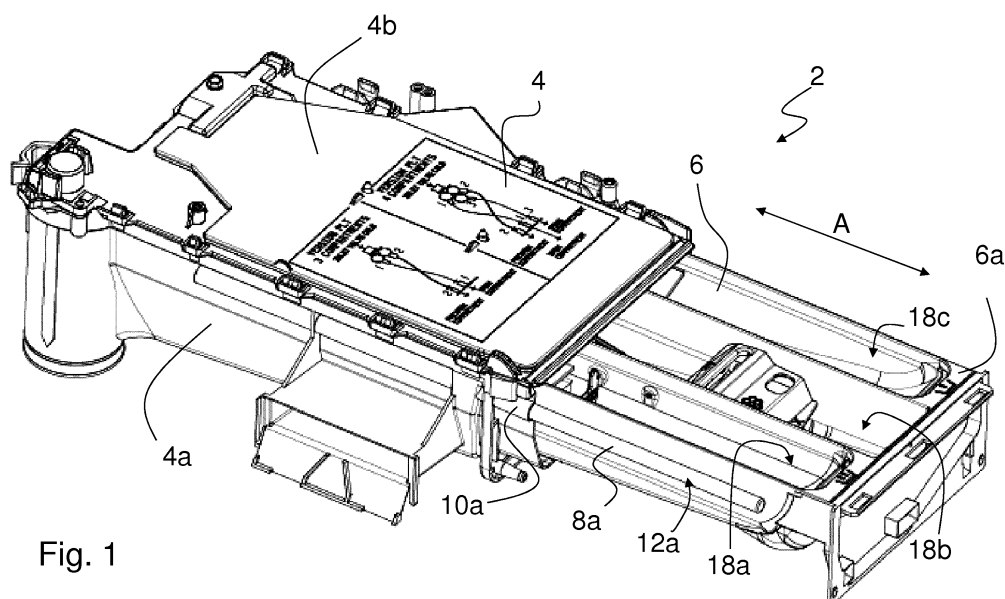


Fig. 1

Description

[0001] The invention relates to a detergent dispenser for a washing machine and a washing machine comprising such a detergent dispenser.

[0002] EP 1 449 951 B2 discloses a washing machine having a detergent dispenser. The detergent dispenser comprises a dispenser housing and an extractable drawer arranged in the housing. According to an embodiment the drawer comprises slidebars adapted to slide along inner rails of the housing to slide the drawer in and out of the housing. Two lateral slidebars guide the drawer horizontally and two additional slidebars support and guide the drawer vertically.

[0003] It is an object of the invention to provide a detergent dispenser and a washing machine having a detergent dispenser which is easy to manufacture and reliable in use.

[0004] The invention is defined in claim 1 and 13, respectively. Particular embodiments are set out in the dependent claims.

[0005] According to claim 1, a detergent dispenser comprises a dispenser housing, an extractable drawer arranged in the dispenser housing and a guiding arrangement provided between the drawer and the housing for slidably guiding the drawer in the housing along a pull-out/push-in (inserting/withdrawal) direction. The guiding arrangement comprises at least one drawer guiding device and at least one housing guiding device adapted to engage with each other, wherein the at least one housing guiding device at least partially surrounds the drawer guiding device or vice versa. The at least one drawer guiding device partially surrounds the housing guiding device. In particular the guiding arrangement comprises at least one guiding device pair, wherein one of the (housing or drawer) guiding devices partially surrounds, encompasses or grips around the other (drawer or housing) guiding device. For example the drawer (or housing) guiding device may be a protruding device or element which is partially surrounded by the housing (or drawer) guiding device.

[0006] The at least one drawer guiding device and the at least one housing guiding device (the at least one guiding device pair) are engaged such that a surface portion of the at least one drawer guiding device is contacting a surface portion of the corresponding one of the at least one housing guiding device and both surface portions are adapted to slide along each other. In particular no bearing (for example no ball or roller bearing) is used and/or no auxiliary or additional element inserted between the mating guiding devices (except the below mentioned friction-reducing layer or coating). The partially surrounded (housing or drawer) guiding device in combination with the contacting surface portions results in 'smooth' and safe mating of the guiding devices. In particular the interacting and/or contacting and/or overlapping surface portions of the mating guiding devices have no edges or sharp angles. The cross-section of the at

least partially surrounded (drawer or housing) guiding device and the mating cross-section of the at least partially surrounding (housing or drawer) guiding device is selected from a partially circular cross-section, or a partially ellipse cross-section. As one guiding device partially surrounds the other, a reliable connection between the guiding devices is provided and additionally the (surrounded) guiding device is protected from external 'pollutants' like e.g. detergent (liquid/powder), water etc. By means of the above described guiding arrangement a cost-efficient and easy to produce guiding of the drawer in the housing is achieved which is reliable and fail-safe in use.

[0007] Preferably the surface portion of the at least one drawer guiding device, the surface portion of the at least one housing guiding device or both surface portions are formed by Teflon or a plastic material having a low coefficient of friction. Thus a user may easily and comfortably slide the drawer in and out of the housing. In particular no gap or a minimal tolerance gap or clearance is provided between the at least one drawer guiding device and the at least one housing guiding device at the regions where the sliding surfaces are in contact during the sliding movement. For example in a cross-section perpendicular to the movement direction A the hollow profile of the receiving one of the guiding devices and the outer profile of the guiding device that is received in the hollow profile are mating with no or only a minimum clearance between each other. Thus it is prevented that dirt or debris attaches to the surface of the surrounded guiding device, as described above.

[0008] According to a preferred embodiment the surface portion of the at least one drawer guiding device, the surface portion of the at least one housing guiding device or both surface portions are formed by Teflon using one or more of: (i) a Teflon surface coating, (ii) a bi-injection forming by providing a plastic material for the bulk of the at least one drawer and/or housing guiding device and a Teflon material for the surface portion, or (iii) forming the at least one drawer and/or housing guiding device by Teflon material. All embodiments provide an easy and comfortable inserting/withdrawing of the drawer as described above.

[0009] Preferably the sliding direction is linear such that the at least one drawer guiding device is adapted to move along a linear direction with respect to the housing, and wherein the at least one drawer guiding device and the at least one housing guiding device are engaged such that they provide a mutual form fit acting in a direction perpendicular to the linear direction. The at least one guiding device pair is engaged with each other, holds on to each other or is fixed to each other such that they cannot be separated perpendicular to the (linear) guiding axis or inserting/withdrawal direction. In particular a one-sided guiding arrangement of the drawer is possible, i.e. one or more drawer/housing guiding device pair(s) may be provided on one side of the drawer.

[0010] Alternatively or additionally one or more draw-

er/housing guiding device pair(s) as described above may be provided between a bottom portion of the drawer and the housing. I.e. a guiding arrangement may be provided between the base of the drawer and the housing.

[0011] Preferably the partially circular cross section is at least 300°, 250°, 200°, 190° of a full circle or of a full ellipse, such that the respective surrounded guiding device is reliably encompassed and a reliable hold structure is provided.

[0012] According to a preferred embodiment the guiding arrangement comprises at least two drawer guiding devices arranged on opposing sides of the drawer and at least two corresponding housing guiding devices arranged at the housing. Thus a reliable lateral support is provided for the drawer, such that tilting of the drawer is reliably prevented during sliding-in/-out, even when the drawer is pushed /pulled off-center.

[0013] Preferred the guiding arrangement comprises at least two drawer guiding devices arranged on one side of the drawer and at least two corresponding housing guiding devices. I.e. only two lateral drawer/housing guiding device pairs may be provided on one side of the detergent dispenser. Alternatively two lateral housing/drawer guiding device pairs may be provided on each side of the detergent dispenser, e.g. four drawer/housing guiding device pairs.

[0014] According to an embodiment the at least one drawer guiding device is formed in one-piece with the drawer or alternatively the at least one housing guiding device is formed in one piece with the housing. In particular the material of the respective guiding device and the drawer/housing are the same, such that they may be manufactured in one step, e.g. by injection molding. While one guiding device may be provided in one-piece with the drawer or housing, the other guiding device may be attached or fixed to the housing or drawer in a separate step. Alternatively both guiding devices, i.e. the at least one drawer guiding device and the at least one housing guiding device, are formed in one-piece with the drawer and housing, respectively.

[0015] Preferred the at least one drawer guiding device is fixed to the drawer or the at least one housing guiding device is fixed to the housing. The material of the drawer/housing and the respective guiding device may be different, e.g. the material of the housing/drawer and guiding device(s) may be adapted individually to the specific requirements of the detergent dispenser. For example the material of the guiding devices may have a low friction coefficient and the drawer material may be resilient against detergent or other chemicals. Alternatively the at least one drawer guiding device is fixed to the drawer and the at least one housing guiding device is fixed to the housing.

[0016] According to an embodiment a clearance is provided between a front edge of the partially surrounded guiding device and (the rear side of) a front panel of the drawer or a front opening of the housing when the drawer is fully inserted in the housing. For example when filling

in detergent into the drawer some of the detergent may fall on the exposed guiding device (e.g. of the drawer). When the drawer is pushed into the housing, the detergent on the exposed guiding device is pushed along the guiding device until it falls off at its end (which is at the front edge of the guiding device), for example into the gap. Thus it is provided that no debris (detergent) accumulates on the respective guiding device.

[0017] Preferably the guiding arrangement is not biased, in particular not biased in vertical direction. I.e. (sidewise or lateral) contact pressure, e.g. due to spring-biased guiding devices, is prevented. Thus less strain is exerted on the drawer/housing and less abrasion on the guiding devices.

[0018] According to an embodiment, the dispenser housing and/or the extractable drawer is formed as a single-piece or monolithic component. Preferably in form of a single-injection molded component, wherein in case of surface coating with reduced friction preferably co-injection is used. Alternatively the dispenser housing and/or the extractable drawer are formed from two or three shell elements which are connected together to form a combined component.

[0019] A washing machine is provided having a detergent dispenser according to any of the above and below described embodiments.

[0020] Reference is made in detail to a preferred embodiment of the invention, an example of which is illustrated in the accompanying figures, which show:

- Fig. 1a a perspective view of the washing machine with a partially pulled-out detergent drawer,
- Fig. 1 a perspective side view of a detergent dispenser of the washing machine shown in Fig. 1a with the detergent drawer of Fig. 1a partially pulled-out of the housing of the detergent dispenser,
- Fig. 2 a perspective side view of the housing of the detergent dispenser shown in Fig. 1,
- Fig. 3 a perspective side view of the drawer of the detergent dispenser of Fig. 1,
- Fig. 4 a sectional front view of the detergent dispenser of Fig. 1,
- Fig. 4a-c details of a guiding arrangement of Fig. 4, and
- Fig. 5 a top view of the detergent dispenser of Fig. 1.

[0021] An exemplary washing machine 1 is shown in Fig. 1a in perspective view. The washing machine 1 has an outer housing or cabinet 30. A loading opening 34 is arranged at the front side of the cabinet 30 for loading/un-

loading laundry into/out of a drum when a front door 32 of the machine is opened. At the upper front side of the cabinet a control panel 36 is arranged having program control elements for receiving a user selection for the washing program and for indicating to the user the selected program and/or current program states of the machine. In this embodiment an exemplary detergent dispenser 2 is arranged at the upper left front side which receives and temporarily stores washing agents filled in by the user. Fig. 1a shows the detergent dispenser 2 opened such that a detergent drawer 6 is partially extracted from a housing 4 (see Fig. 1) in which the drawer is received when the user has fully pushed-in the drawer 6.

[0022] Fig. 1 shows a perspective side view of the detergent dispenser 2 for the washing machine shown in Fig. 1a. The detergent dispenser 2 comprises the housing 4 and the drawer 6 which - as shown in Figs. 1a and 1 - is partially extracted or pulled-out from the housing 4 along a push/pull direction A. Three detergent compartments 18a-c are provided in the drawer 6, e.g. adapted to receive a detergent and softener for a washing operation. A guiding arrangement is provided between the drawer 6 and the housing 4 to slidably support the drawer 6 in the housing 4 (for sliding the drawer 6 in and out relative to the housing 4). The guiding arrangement comprises a drawer guiding device 8a, 8b on each side of the drawer and a corresponding housing guiding device 10a, 10b at the housing 4. I.e. one pair of lateral guiding devices 8a, 10a and 8b, 10b is provided on each side of the detergent dispenser 2 (Fig. 5).

[0023] The drawer guiding devices 8a-b are protruding from the drawer body and are shaped in form of a cylinder having an axis parallel to direction A. Correspondingly the housing guiding devices 10a-b are formed in form of a hollow partial-cylinder which is adapted to at least partially surround or encompass the respective drawer guiding device 8a-b.

[0024] Figs. 2 and 3 show perspective side views of the housing 4 and the drawer 6. The drawer 6 is inserted into the housing 4 via the housing opening 16. As shown in Fig. 3, the drawer guiding devices 8a-b do not extend along the complete length of the drawer 6. In this embodiment a clearance or gap 20a-b (Fig. 5) is provided between a front 22 of the drawer 6 and the guiding device 8a-b in direction A. The clearance provides a predefined extension in direction A from the front region of the drawer where no guiding devices 8a, 8b are formed.

[0025] As can be seen from Fig. 2, the dispenser or drawer housing 4 is formed of two parts. This is a body shell 4a which - besides the liquid openings - is open to the front side to receive the drawer 6 and is open at the top side. The open top side is covered by a substantially flat cover shell 4b which prevents leakage of washing detergents and water to the outside of the housing 4. Alternatively, the housing may be formed of a single-piece or monolithic body formed for example by blow molding. The drawer is formed of two shell elements,

which are a drawer base body 6a (shown in Figs. 1 and 3) in which or by which the washing agent chambers and the drawer front 22 are formed and a handle panel 6b which is mounted to the basic body at the drawer front 22. The handle panel 6b is shown in Fig. 1a and is removed for illustrative purposes in Figs. 1 and 3.

[0026] Fig. 1 shows the detergent dispenser 2 in a partially extracted position (the normal filling position) when detergent is filled into at least one of the compartments 18a-c. It may occur that some detergent is spilled, such that it settles on the (protruding) drawer guiding device 8a-b. When the drawer 6 is pushed into the housing 4, the spilled detergent is pushed along the drawer guiding device 8a-b and wiped away into and downward through the clearance 20a-b. According to the shown embodiment the spilled detergent (or any other debris) is removed from the guiding device 8a-b by simply sliding the drawer 6 into the housing 4. Thus an aggregation of debris or detergent on the guiding arrangement is prevented which may affect adversely its function.

[0027] Fig. 4 shows a sectional front view of the detergent dispenser 2 of Fig. 1. Figs. 4a-c show details of the guiding arrangement of the detergent dispenser 2, in particular the arrangement of a pair of a housing/drawer guiding device 8a, 10a. The drawer guiding device 8a comprises a circular or substantially circular cross-section with a guiding surface 12a which may comprise Teflon or other low-friction coating to minimize friction during inserting (pushing)/withdrawing (pulling). The housing guiding device 10a comprises a corresponding circular guiding surface 14a which is adapted to receive the drawer guiding device 8a as shown in Fig. 4c.

[0028] As shown in the Figures, the drawer guiding devices 8a-b are formed in one-piece with the drawer 6 and the housing guiding devices 10a-b are formed in one-piece with the housing 4, preferably by injection molding.

[0029] As shown in Fig. 4c the drawer/housing guiding devices 8a, 10a are fitted or mate to each other such that a minimum gap or no gap is provided between the respective guiding surfaces 12a, 14a. Thus the guiding arrangement is free or substantially free of play.

[0030] The housing guiding device 10a surrounds about 250° of (the circular cross-section of) the drawer guiding device 8a, in particular surrounds more than 180° of the drawer guiding device 8a. Thus the guiding arrangement provides a form-fit in horizontal direction, i.e. perpendicular to slide-in/slide-out direction A.

[0031] Fig. 5 shows a top view of the detergent dispenser 2 of Fig. 1 with a partially withdrawn drawer 6. By providing a guiding device pair 8a, 10a and 8b, 10b on each side of the detergent dispenser 2 or drawer 6, which provide a horizontal form-fit, the drawer can be easily and comfortably withdrawn from (and inserted into) the housing without horizontal or vertical tilting relative to the housing 4, even when the drawer 6 is pulled (or pushed) off-center.

Reference Numeral List

[0032]

1	washing machine
2	detergent dispenser
4	housing
4a	body shell
4b	cover shell
6	drawer
6a	base body
6b	handle panel
8a-b	drawer guiding device
10a-b	housing guiding device
12a-b	guiding surface (drawer)
14a-b	guiding surface (housing)
16	housing opening
18a-c	detergent compartment
20a-b	clearance/gap
22	drawer front
30	cabinet
32	front door
34	loading opening
36	control panel
A	inserting/withdrawing direction

Claims

1. Detergent dispenser (2) comprising:

a dispenser housing (4),
 an extractable drawer (6) arranged in the dispenser housing (4), and
 a guiding arrangement provided between the drawer (6) and the housing (4) for slidable guiding the drawer (6) in the housing (4) along an inserting/withdrawal direction (A),
 wherein the guiding arrangement comprises at least one drawer guiding device (8a-b) and at least one housing guiding device (10a-b) adapted to engage with each other,
 wherein the at least one housing guiding device (10a-b) at least partially surrounds the drawer guiding device (8a-b) or wherein the at least one drawer guiding device (8a-b) at least partially surrounds the housing guiding device (10a-b),
 wherein the at least one drawer guiding device (8a-b) and the at least one housing guiding device (10a-b) are engaged such that a surface portion (12a-b) of the at least one drawer guiding device (8a-b) is contacting a surface portion (14a-b) of the at least one housing guiding device (10a-b) and both surface portions are adapted to slide along each other, and
 wherein the cross-section of the at least partially surrounded (drawer or housing) guiding device and the mating cross-section of the at least par-

tially surrounding (housing or drawer) guiding device is selected from a partially circular cross-section or a partially ellipse cross-section.

2. Detergent dispenser according to claim 1, wherein the surface portion (12a-b) of the at least one drawer guiding device (8a-b), the surface portion (14a-b) of the at least one housing guiding device (10a-b) or both surface portions are formed by Teflon or a plastic material having a low coefficient of friction.
3. Detergent dispenser according to claim 1 or 2, wherein the surface portion (12a-b) of the at least one drawer guiding device (8a-b), the surface portion (14a-b) of the at least one housing guiding device (10a-b) or both surface portions are formed by Teflon using one or more of:
 - a Teflon surface coating,
 - a bi-injection forming by providing a plastic material for the bulk of the at least one drawer and/or housing guiding device and a Teflon material for the surface portion, or
 - forming the at least one drawer and/or housing guiding device by Teflon material.
4. Detergent dispenser according to claim 1, 2 or 3, wherein the inserting/withdrawal direction (A) is linear such that the at least one drawer guiding device (8a-b) is moved along a linear direction with respect to the housing (4), and
 wherein the at least one drawer guiding device (8a-b) and the at least one housing guiding device (10a-b) are engaged such that they provide a mutual form fit acting in a direction perpendicular to the linear direction (A).
5. Detergent dispenser according to any of the previous claims, wherein the partially circular cross section is at least 300°, 250°, 200°, 190° of a full circle.
6. Detergent dispenser according to any of the previous claims, wherein the guiding arrangement comprises at least two drawer guiding devices (8a-b) arranged on opposing sides of the drawer (6) and at least two corresponding housing guiding devices (10a-b) arranged at the housing (4).
7. Detergent dispenser according to any of the previous claims, wherein the guiding arrangement comprises at least two drawer guiding devices arranged on one side of the drawer and at least two corresponding housing guiding devices.
8. Detergent dispenser according to any of the previous claims,
 wherein the at least one drawer guiding device (8a-b) is formed in one-piece with the drawer,

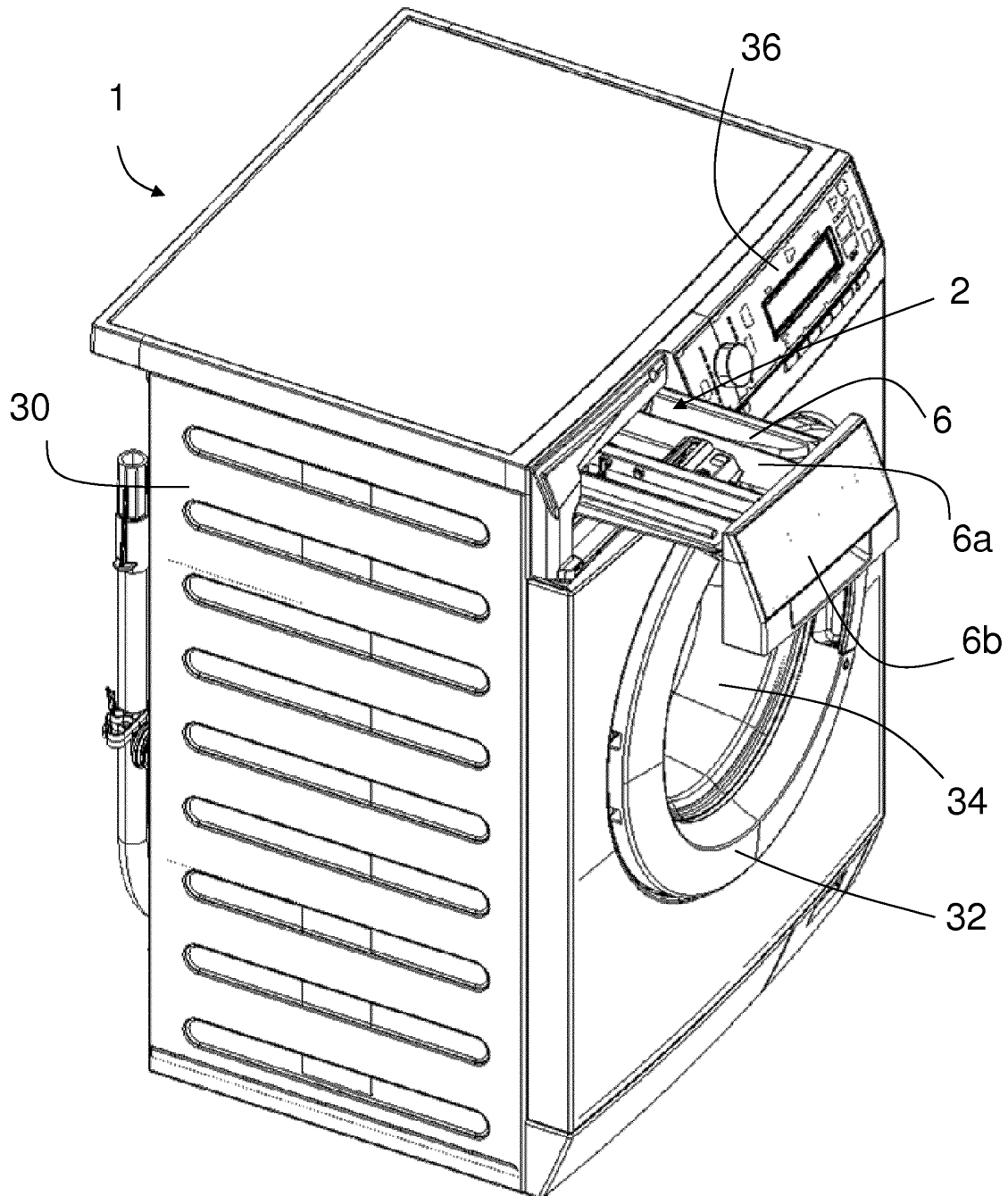
wherein the at least one housing guiding device (10a-b) is formed in one piece with the housing, or wherein the at least one drawer guiding devices (8a-b) are formed in one-piece with the drawer and the at least one housing guiding device (10a-b) is formed in one piece with the housing. 5

9. Detergent dispenser according to any of claims 1 to 7, wherein the at least one drawer guiding device is fixed to the drawer, 10
wherein the at least one housing guiding device is fixed to the housing, or
wherein the at least one drawer guiding device is fixed to the drawer and the at least one housing guiding device is fixed to the housing. 15
10. Detergent dispenser according to any of the previous claims, wherein a clearance (20a-b) is provided between the at least partially surrounded guiding device and a front (22) of the drawer or a front opening (16) of the housing when the drawer (6) is fully inserted in the housing (4). 20
11. Detergent dispenser according to any of the previous claims, wherein the guiding arrangement is not biased, in particular not biased in vertical direction. 25
12. Detergent dispenser according to any of the claims 1 to 7 and 9 to 11, wherein the dispenser housing (4), the extractable drawer (6), or the dispenser housing (4) and the extractable drawer (6) are formed as a single-piece or monolithic component or are formed as a two-part or two-shell joint component (4a, 4b; 6a, 6b). 30
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13. Detergent dispenser according to any of the previous claims, wherein no bearing, ball bearing or roller bearing is arranged between the mating guiding devices or wherein no auxiliary element or additional element is inserted between the mating guiding devices. 40
14. Washing machine (1) having a detergent dispenser (2) according to any of the previous claims. 45

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Fig. 1A



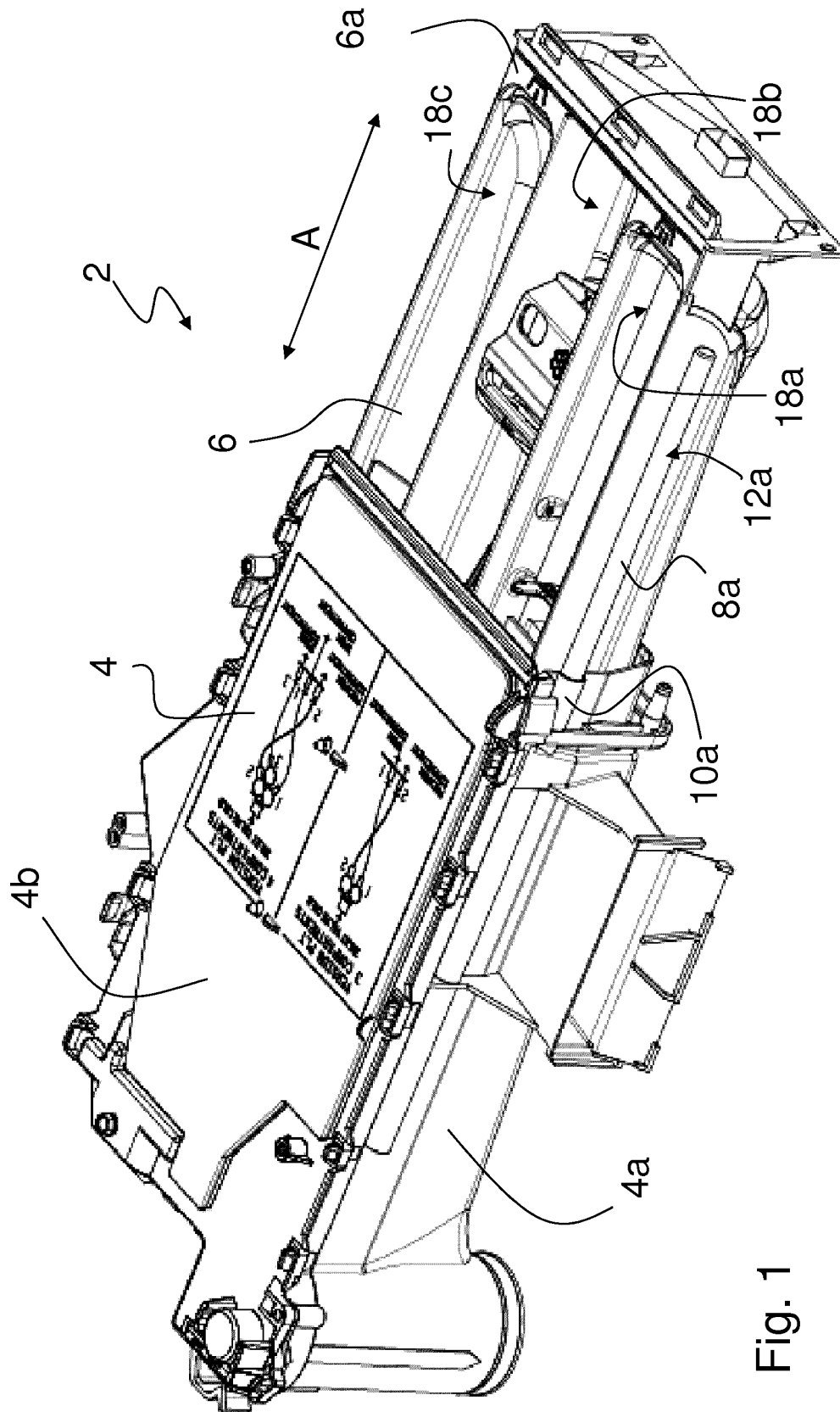
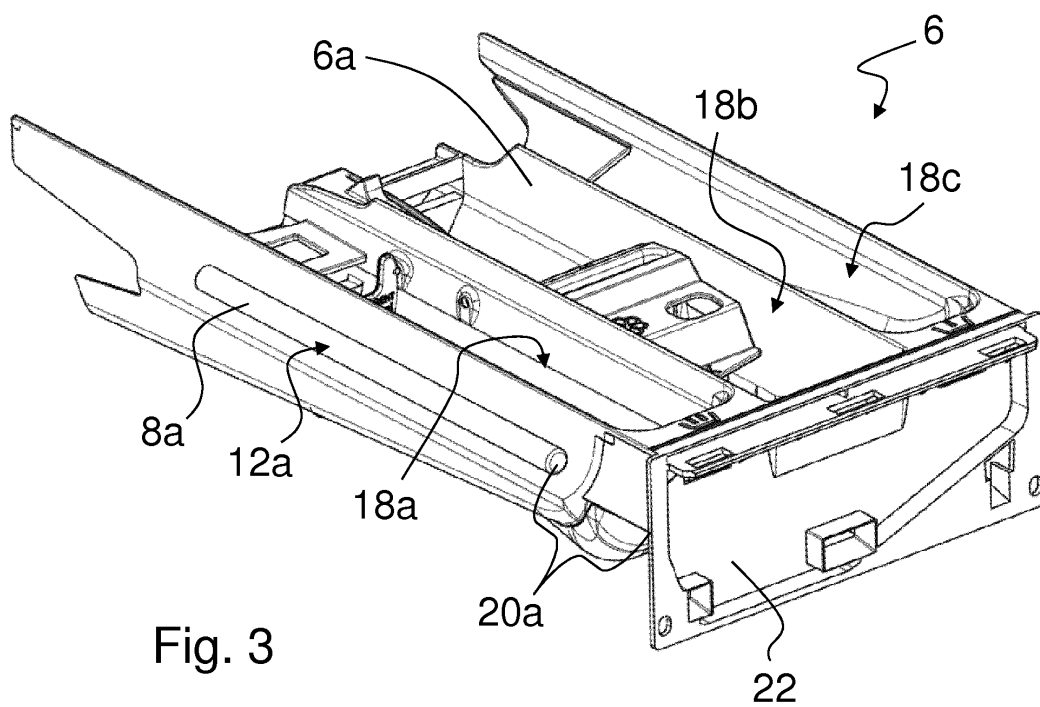
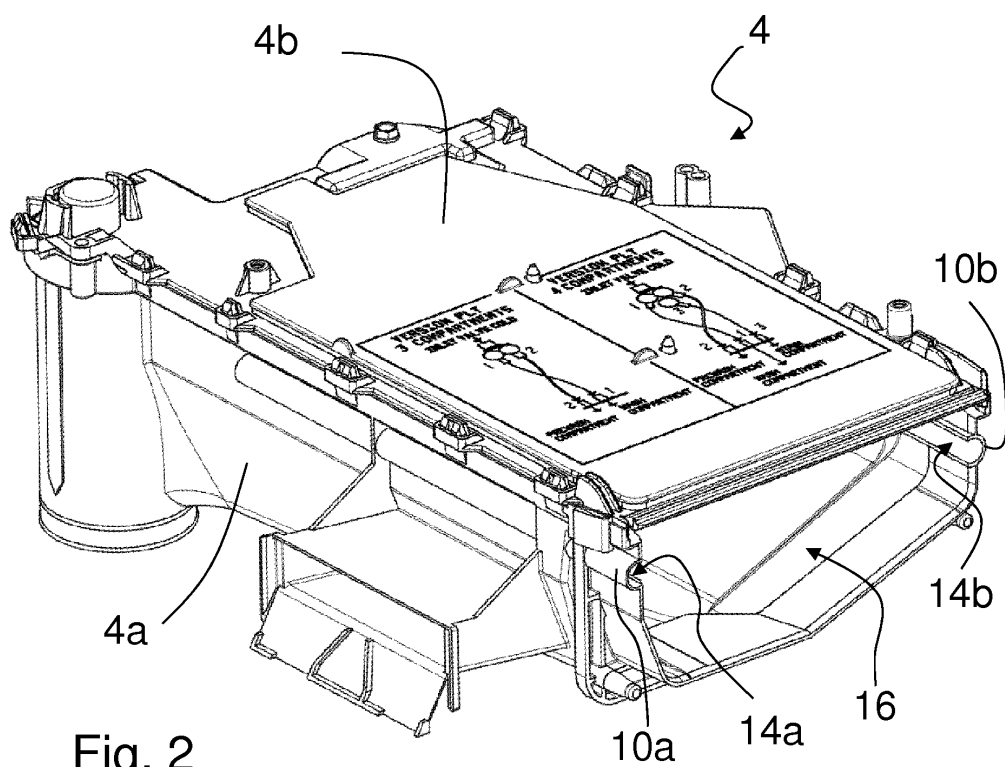
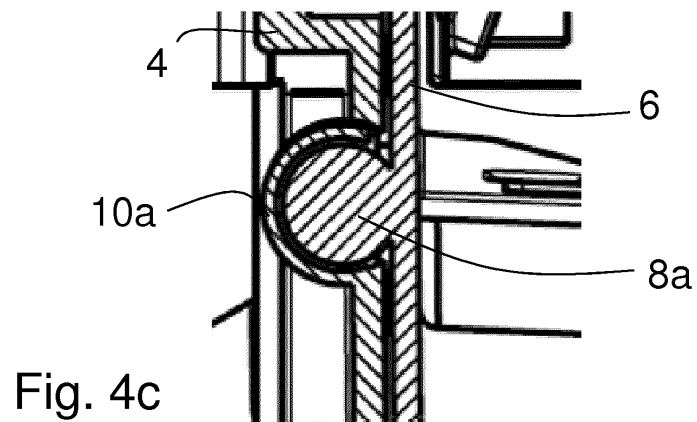
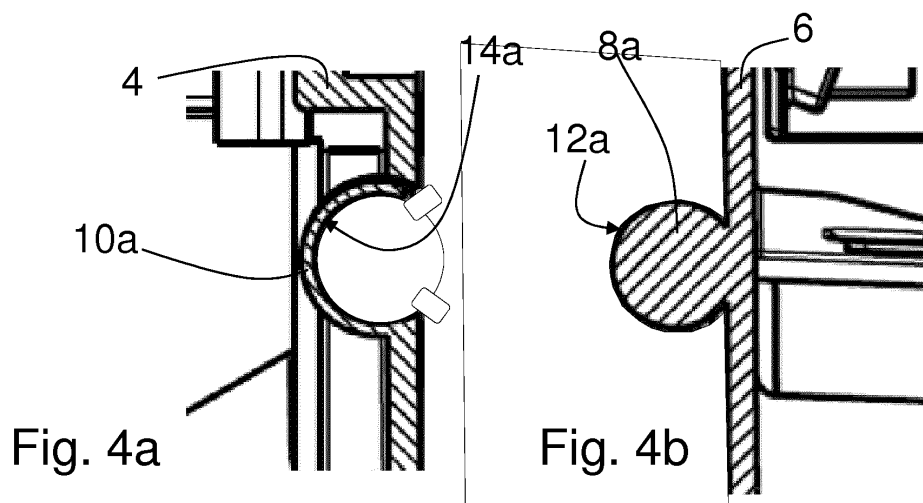
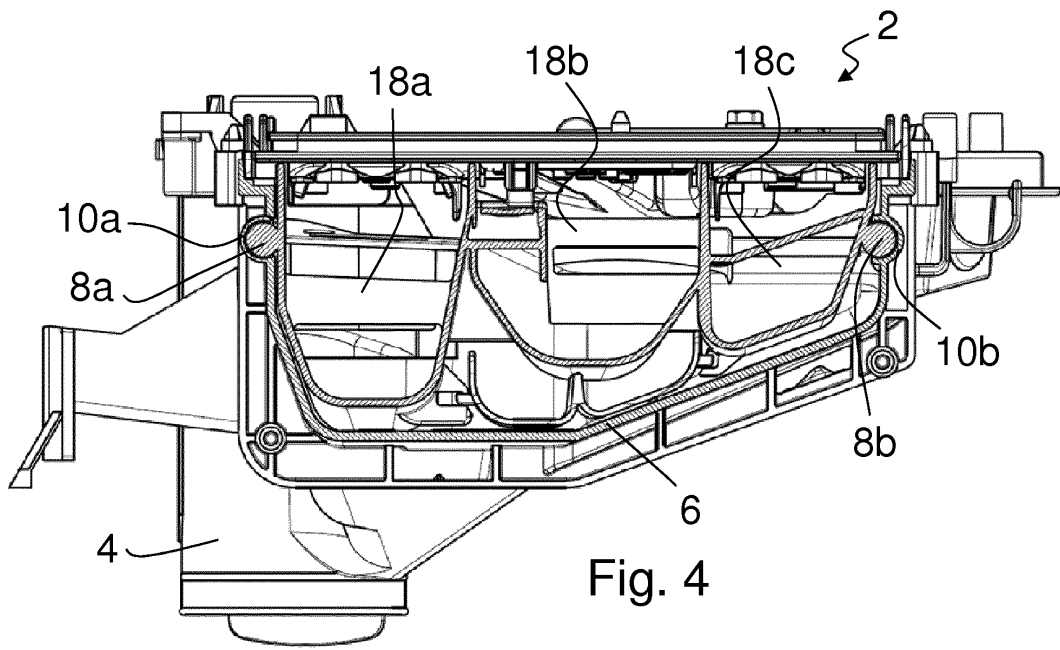


Fig. 1





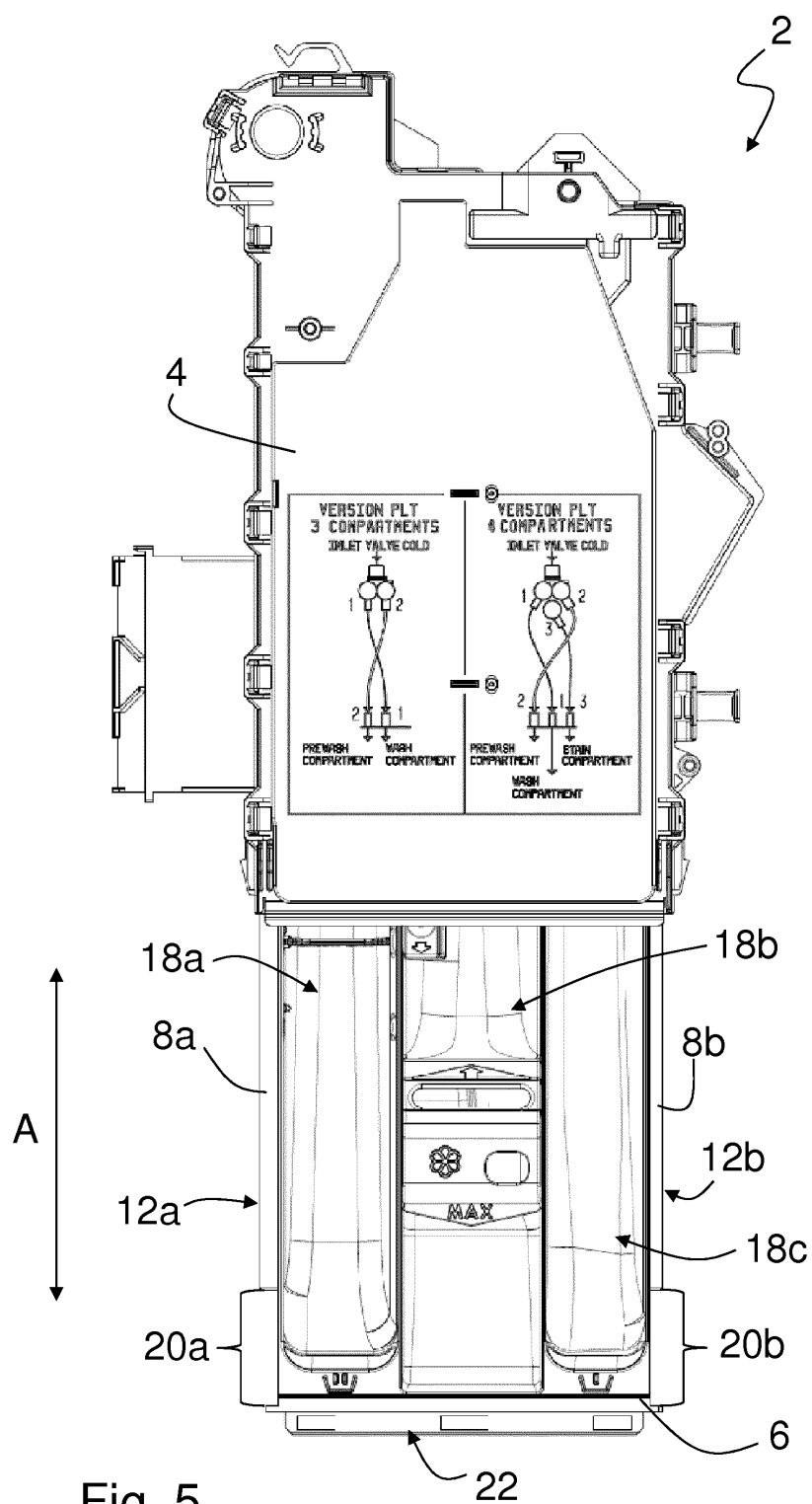


Fig. 5



EUROPEAN SEARCH REPORT

 Application Number
 EP 13 15 4815

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Place of search Munich		Date of completion of the search 1 August 2013	Examiner Engelhardt, Helmut
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

EPO FORM 1503 03.82 (P04C01)



EUROPEAN SEARCH REPORT

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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