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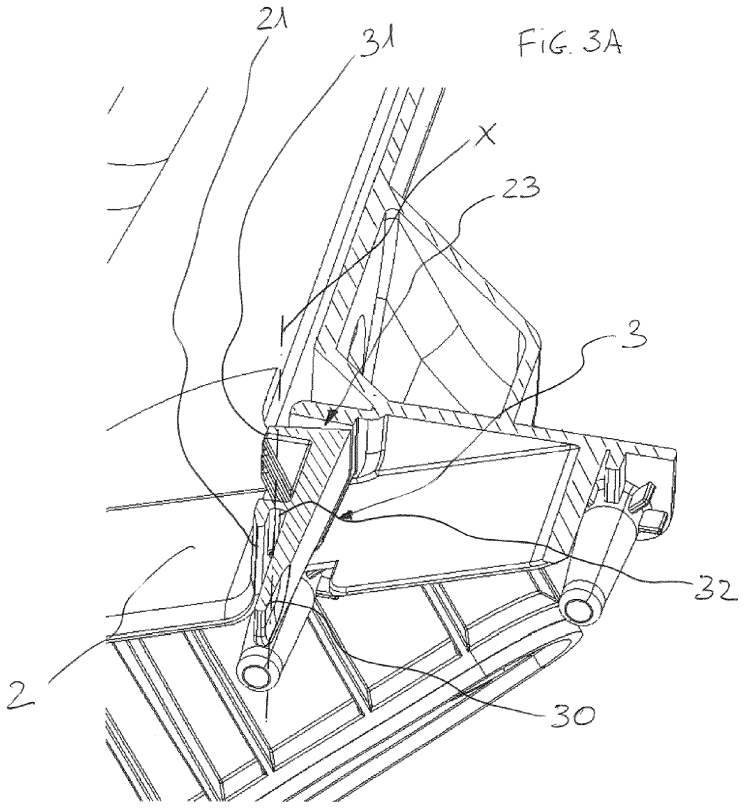
(54) **Washing machine with drawer assembly**

(57) A washing machine (100) comprises a drawer (1) comprising at least one compartment (10a, 10b, 10c) for receiving an agent for treating laundry, a supporting structure (2) on which the drawer can slide and comprising a releasable retaining device (3) delimiting a movement of the drawer, wherein the retaining device comprises a catch portion (31) adapted to engage with a stopping element (13) of the drawer and an operative portion (30) operable in order to disengage the catch portion and projecting from the supporting structure. The releasable retaining device is formed as a single body with the supporting structure.



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Description

Field of the invention

[0001] The invention relates to a washing machine, or a washing machine having dryer function, having a drawer for receiving a laundry treating agent, a supporting structure on which the drawer can slide and a releasable retaining device adapted to delimit a movement of the drawer with respect to the supporting structure.

Background of the invention

[0002] Conventionally, laundry washing machines include a drawer for receiving a detergent agent or other agents for treating the laundry, such as softener or bleach, to be used during the washing cycles.

[0003] During the use of the washing machines, residual of such agents for treating the laundry may remain in the drawer and, for this reason, it is advisable to periodically rinse out with water the drawer.

[0004] For this purpose, the drawer of conventional laundry machines can be fully extracted and removed from its respective seat.

[0005] In order to avoid accidental removal of the drawer, GB 758,944 discloses a drawer assembly comprising a spring-biased safety catch arm, pivotally mounted on the front of a supporting structure of the drawer assembly and adapted, when the drawer is pulled out from its housing nearly to the full extent, to engage a slot in a flange of the drawer under the action of a biasing spring so as to obstruct complete withdrawal of the drawer.

[0006] The safety catch is provided with a forwardly extending operating arm which is accessible when the drawer is partially withdrawn so that the safety catch may be held manually in the disengaged position to permit complete withdrawal of the drawer.

[0007] This solution is quite complex since it is formed by several components, that require to be assembled during manufacturing of the washing machine. In particular, the catch is fixed to the support structure by a bolt and nut connection, which requires a relatively complex assembly in particular since it is located in a position not easily reachable.

[0008] Furthermore, the presence of springs and of other metal parts represents a drawback since these components are easily subjected to contact drops of washing agents or water.

Summary of the invention

[0009] An object of the invention is to provide a laundry washing machine that overcomes the drawbacks of known laundry appliances provided with retaining devices for delimiting the movement of the drawer for the detergent agent or for other agents.

[0010] Another object of the invention is to provide an improved washing machine comprising a retaining device in which the assembly time is reduced.

[0011] A further object is to provide a washing machine comprising a retaining device that does not require metal parts in order to work properly.

[0012] According to the invention it is provided a washing machine comprising:

a drawer comprising at least one compartment for receiving an agent for treating laundry;

a supporting structure, on which the drawer can slide, comprising a releasable retaining device delimiting a movement of the drawer with respect to the supporting structure; wherein the releasable retaining device comprises a catch portion adapted to engage with a stopping element of the drawer and an operative portion operable in order to disengage the catch portion, the operative portion projecting from the supporting structure;

wherein the releasable retaining device is formed as a single body with the supporting structure.

[0013] It is to be understood that the in the laundry washing machine according to the invention the releasable retaining device does not require to be fixed to the supporting structure when the washing machine is assembled since it is formed as single body therewith.

[0014] For the same reason, no metal part is required in order to fixed or operate the retaining device.

[0015] According to a preferred embodiment, the releasable retaining device is located at a side wall of the supporting structure. In this manner the operative portion can be easily reached by the hand of a user when the drawer is to be removed.

[0016] Preferably, the retaining device comprises an attachment portion pivotably connecting the catch portion and the operative portion to the rest of the supporting structure.

[0017] More preferably, the catch portion and the operative portion extend from opposite sides of the attachment portion. This allows operating the retaining device in a particularly simple manner, since the catch portion can be displaced and disengaged accordingly by pushing the operative portion.

[0018] According to a further aspect of the invention, the catch portion and the operative portion are rotatable about an axis perpendicular to a withdrawal direction of the drawer. In this manner the catch portion can be operated from the engaged to the disengaged position or vice versa by moving the operative portion close to or away from the drawer.

[0019] Preferably, the attachment portion is resilient, thus allowing the retaining element to be urged in the engaged position without requiring springs or other similar components.

[0020] According to a further preferred embodiment, the supporting structure defines a housing into which the drawer can be accommodated. Preferably, the attachment portion is located externally to the housing, and an

opening is defined in the supporting structure through which the catch portion passes in order to engage the drawer. According to this aspect, the retaining device is positioned almost entirely outside the housing for the drawer thus allowing a simpler structure and reducing the risk that the retaining device impairs the sliding of the drawer in the supporting structure.

[0021] According to a further aspect of the invention, the catch portion has an L-shaped cross section and comprises ribs extending from opposite ends of the L-shaped cross section. In this manner the structure of the catch portion is particularly rigid and it can be easily manufactured by plastic molding.

[0022] Always according to a preferred embodiment, the drawer comprises a stopping element projecting from a shell of the drawer and adapted to engage with the catch portion in order to delimit movement of the drawer with respect to the supporting structure. This feature allows avoiding a direct contact between the shell of the drawer and the catch portion, and reduces the risk that the latter obstructs the free sliding of the drawer.

[0023] Preferably, the stopping element comprises a leading surface adapted to abut with a respective leading surface of the catch portion when the drawer is housed in the supporting structure such that the catch portion is resiliently displaced in a disengaged position during the insertion of the drawer. This offers the possibility to insert easily the drawer without requiring any operation on the retaining device, since it is automatically displaced in the disengaged position when the drawer is moved along the insertion direction into the supporting structure.

[0024] According to a preferred embodiment, the previous feature is obtained by providing that the leading surface of the stopping element and/or the leading surface of the catch portion are tilted of an angle lower than 90° with respect to an inserting direction of the drawer in the supporting structure. In this manner, the automatic displacement of the retaining device is obtained with a simple and robust solution, barely subjected to any wear.

[0025] According to a further aspect of the invention, the stopping element comprises a trailing surface adapted to abut with a respective trailing surface of the catch portion in order to delimit the movement of the drawer. Accordingly, the movement of the drawer can be limited in a very precise and stable manner as the stroke of the drawer is blocked by the abutment of such surfaces.

[0026] Preferably, the trailing surface of the stopping element and the trailing surface of the catch portion are tilted of an angle equal to or greater than 90° with respect to an inserting direction of the drawer in the supporting structure. In this manner, the catch portion is not resiliently displaced by the abutment of the trailing surfaces, thus blocking effectively the movement of the drawer.

[0027] Always according to a preferred embodiment, the trailing surface of the catch portion is defined by the ribs of the catch portion, thus providing a particularly optimized solution.

[0028] According to a further aspect of the invention, the supporting structure comprises a front edge onto which a lip of the drawer abuts when the drawer is fully housed in the supporting structure. In this manner movements of the drawer are limited not only in the withdrawal direction but also in the insertion one, thus avoiding excessive stresses on the structure of the drawer, in particular on the front panel defining the handle thereof. According to a further embodiment, the attachment portion projects from the front edge of the supporting structure, thus allowing the positioning of the retaining device in an easily reachable position.

Brief description of the drawings

[0029] These and other features and advantages of the invention will be better apparent from the following description of some exemplary and non-limitative embodiments, to be read with reference to the attached drawings, wherein:

- Figs. 1 and 1A are a front perspective view of the washing machine of the present invention, in which a drawer is partially withdrawn from a respective supporting structure, and a detail thereof, respectively;
- Figs. 2 and 2A are a front perspective view of the washing machine of Fig. 1, in which the drawer is removed from the supporting surface, and a detail thereof, respectively;
- Figs. 3 and 3A are a front perspective view of a supporting structure of the drawer of the washing machine of Fig. 1 and a detail thereof; and
- Figs. 4A-C are partial plan views, in section, of the supporting structure and of the respective drawer in a fully inserted position, a partially withdrawn position and a fully withdrawn position, respectively.

Detailed description of the invention

[0030] With reference initially to Fig. 1, a laundry washing machine realized according to the present invention is globally indicated with the reference number 100.

[0031] It should be noted that in the context of the present invention with the expression "washing machine" is referred both to a "standard" washing machine, adapted only for washing and rinsing the laundry, and to a washer-drier, which is adapted for washing, rinsing, and also for drying the laundry.

[0032] The washing machine 100 comprises an outer casing 101, preferably but not necessarily parallelepiped-shaped, and a treatment chamber for receiving the laundry and in general the clothes and garments to be washed and/or dried.

[0033] An aperture is defined in a front bulkhead of the casing, facing the treatment chamber and thus allowing loading and unloading the laundry in the machine. The washing machine 100 further comprises a door assembly 102, preferably pivotally supported on the casing 101 and displaceable between a closed position, shown in Figs.

1 and 2 and in which the aperture is closed or preferably sealed, and an open position in which access to the drum is granted.

[0034] According to the present embodiment, in the front face of the casing 101 are also located a control panel 103 of the machine 100 and a drawer 1 suitable for containing detergents and other agents for treating the laundry, such as softener or bleach.

[0035] In other words, the device 100 according to present embodiment is a front-load device. Nevertheless it will be appreciated that the present invention could also apply to different type of washing laundry machines, such as top-loading ones.

[0036] The drawer 1 is slidably associated to a supporting structure 2, preferably formed by a receptacle in which the drawer 1 can be housed. As it will be better understood in the following, according to a preferred embodiment, the supporting structure 2 defines a housing 20, better shown in Figs. 2 and 2A, capable of receiving therein the drawer 1 such that when the drawer is fully inserted in the housing, a front panel 15 of the drawer is flush with the front bulkhead of the casing. Preferably, the front panel 15, or more in general the drawer 1, comprises a handle 16, by means of which the drawer 1 can be pulled and extracted from the housing.

[0037] Figs. 1 and 1A depict the drawer 1 in a partially withdrawn position, in which compartments 10a, 10b and 10c, adapted for receiving the detergents and other agents, are at least partially extracted from the receptacle 2. It can be easily appreciated that, in this position, the detergents and the other agents can be poured inside the compartments 10a, 10b and 10c.

[0038] The movement of the drawer 1 along a withdrawal direction, shown by arrow W in the Figures, is limited by a releasable retaining device 3. The releasable retaining device 3 engages with a stopping element 13, preferably projecting longitudinally from a shell of the drawer 1, defining the compartments 10a,b,c, and shown in Fig. 4C, in order to delimit the movement of the drawer 1 with respect to the supporting structure 2, such that full removal of the drawer 1 is prevented, as will be better explained in the following.

[0039] In this position, which is depicted in Figs. 1 and 1A, the drawer 1 is still associated to the supporting structure 2, such that the drawer 1 does not tilt or fall due to the gravity.

[0040] With reference to Figs. 2 and 2A, when the retaining device 3 is disengaged, the drawer is freely slidable on the supporting structure 2 along a sliding direction, corresponding to both the withdrawal direction W and an insertion direction I, and it can be pulled further in order to remove it from the housing defined by the supporting structure.

[0041] Preferably, in order to allow sliding of the drawer 1 on the supporting structure 2, the former comprises a laterally projecting sliding surface, not shown in the drawings, adapted to slide on a respective guide member 22 of the supporting structure 2, shown in Fig. 3. Both the sliding surface of the drawer 1 and the guide member 22 develop along the sliding direction.

[0042] According to a preferred embodiment, guide member 22 comprises a sloping end 22' facing the entrance of the housing 20 and allowing an easier insertion of the drawer 1 therein.

[0043] As previously explained, sliding of the drawer 1 on the guide members 22 along a sliding direction is delimited by the retaining device 3. As shown in Fig. 4B, the movement of the drawer is delimited by the engagement of the stopping element 13 with a catch portion 31 formed in the removable retaining device 3.

[0044] The stopping element 13 and the catch portion 31 are shaped and positioned such that, when the drawer 1 is extracted from the housing 20 defined in the supporting structure 2 for a certain extent, they engage the one with other, thus preventing further withdrawal of the drawer 1 and delimiting the movement of the drawer 1 with respect to the supporting structure 2.

[0045] According to a preferred embodiment, the stopping element 13 comprises a trailing surface 132 adapted to abut with a respective trailing surface 312 of the catch portion 31 in order to delimit the movement of the drawer 1. Preferably, the trailing surface 132 of the stopping element 13 and the trailing surface 312 of the catch portion 31 are tilted of an angle equal to or greater than 90° with respect to the insertion direction I of the drawer 1 in the supporting structure 2. In this manner, the abutment of surfaces 132 and 312 does not produce any force urging the catch portion 31 towards the disengaged position. This is particularly advantageous since only a limited resiliency is required in order to maintain the retaining device 3 in the engaged position when it engages the drawer 1.

[0046] As it will be described in further detail in the following, the catch portion 31 can be displaced in order to be disengaged from the stopping element 13, thus disengaging the retaining device 3 and allowing a complete withdrawal of the drawer 1, as shown in Fig 4C.

[0047] With reference to Figs. 3 and 3A, the releasable retaining device 3 is formed as a single body with the supporting structure, preferably fixed to a side wall 24 thereof.

[0048] To this end, both the supporting structure 2 and the releasable retaining device 3 are preferably made of plastic (e.g. Polypropylene or Polypropylene added with Calcium Carbonate), preferably by molding.

[0049] As shown in Fig. 3A, showing the removable retaining device 3 in detail, according to a preferred embodiment the catch portion 31 is connected to the supporting structure 2 by means of an attachment portion 32. Preferably, the attachment portion 32 is resilient and it is located at an edge of the catch portion 32. Accordingly, the attachment portion 32 allows the catch portion 31 to rotate with respect to the attachment portion 32 about an axis X parallel to the attachment portion 32 and, preferably, perpendicular to the withdrawal direction W. As it can be seen from Figs. 4A-4C, the rotation of the

catch portion 41 allows displacing it from the engaged position, in which movement of the drawer 1 is delimited, to the disengaged one, in which the drawer 1 can be fully extracted as previously explained.

[0050] It will be appreciated that, since the retaining device 3 is formed as a single body with the supporting structure 2, the movement of the catch portion 31 can differ from a perfect rotation about the axis X, and it can be e.g. formed by a translational movement composed of a rotation and a linear translation or a rotation about a non-fixed axis.

[0051] According to a preferred embodiment, in order to operate the catch portion 31, the retaining element 3 comprises an operative portion 30, projecting from the supporting structure 2 and, accordingly, being reachable by a thumb or a finger of a user at least when the drawer 1 is partially withdrawn. Preferably, the operative portion 30 is positioned beneath the front panel 15 of the drawer 1 when the latter is fully inserted in the supporting structure 2, while it is not covered by the panel 15 at least when the drawer 1 is in the partially withdrawn position defined by the engagement between the catch portion 31 and the stopping element 13.

[0052] According to a preferred embodiment, the operative portion 30 and the catch portion 31 extends from opposite sides of the attachment portion 32. Accordingly, the rotation, or more in general, the displacement, of the catch portion 31 can be obtained by a corresponding rotation/displacement of the operative portion 30. It will be therefore appreciated that according to the above embodiment a displacement of the catch portion 31 away from the drawer 1 can be obtained by moving the operative portion 30 towards the drawer 1.

[0053] Always according to a preferred embodiment, the attachment portion 32 is located externally to the housing 20 and an opening 23 is defined in the supporting structure 2, in order to allow the catch portion 31 to pass through and engage the stopping element 13 of the drawer 1.

[0054] Preferably, the catch portion 31 has an L-shaped cross section, which is particularly advantageous when the retaining device 3 is located as explained above, in order to easily reach the stopping element 13. Preferably, the catch portion 31 further comprises ribs 33 extending from opposite ends of said L-shaped cross section, improving the sturdiness of the retaining device 3. It will be also appreciated that the above arrangement allows defining the leading surface 311 of the catch portion 31 as a surface of the ribs 33.

[0055] It will be therefore noticed that, according to the present embodiment, when the operative portion 30 is pushed by the thumb or the finger of the user in a disengaging direction P, i.e. towards the drawer 1, the catch portion 31 is displaced from the engaged position to the disengaged one, as shown in Fig. 4C.

[0056] According to a preferred embodiment, it is required to operate the retaining device 3 only for the complete removal of the drawer 1, while the retaining device 3 is automatically displaced in the disengaged position and returned to the engaged one when the drawer 1 is inserted in the supporting structure 2.

[0057] To this end, the stopping element 13 comprises a leading surface 131 adapted to abut with a respective leading surface 311 of the catch portion 31 when the drawer 1 is housed in the supporting structure 2. Accordingly, the catch portion 31 is displaced in a disengaged position during the insertion of said drawer 1 when the leading surfaces 131, 311 abut and then moved back in the engaged position when the catch portion 31 passes the stopping element 13, as the attachment portion 32 is resilient.

[0058] Preferably, this is achieved by providing the leading surface 131 of the stopping element 13 and/or the leading surface 311 of the catch portion 31 are tilted of an angle lower than 90° with respect to the inserting direction I of said drawer 1 in the supporting structure 2. Also, according to a further aspect of the invention, the attachment portion 32 projects from a front edge 21, with the opening 23 preferably formed adjacent to such front edge 21. As shown in Fig. 4A, the drawer 1 comprises a lip 12 abutting on the front edge 21 when the drawer 1 is fully housed in the supporting structure 2, thus also limiting the movement of the drawer 1 along the inserting direction.

Claims

1. A washing machine (100) comprising:

- a drawer (1) comprising at least one compartment (10a, 10b, 10c) for receiving an agent for treating laundry;
- a supporting structure (2), on which said drawer (1) can slide, comprising a releasable retaining device (3) delimiting a movement of said drawer (1) with respect to said supporting structure (2);

wherein said releasable retaining device (3) comprises a catch portion (31) adapted to engage with a stopping element (11) of said drawer (1), and an operative portion (30) operable in order to disengage said catch portion (31), said operative portion (30) projecting from said supporting structure (2);
characterized in that
said releasable retaining device (3) is formed as a single body with said supporting structure (2).

2. The washing machine (100) according to claim 1, wherein said releasable retaining device (3) is located at a side wall (24) of said supporting structure (2).

3. The washing machine (100) according to claim 1 or 2, wherein said releasable retaining device (3) comprises an attachment portion (32) pivotably connecting said catch portion (31) and said operative portion

(30) to the rest of said supporting structure (2).

4. The washing machine (100) according to claim 3, wherein said catch portion (31) and said operative portion (30) extend from opposite sides of said attachment portion (32).

5. The washing machine (100) according to claim 3 or 4, wherein said catch portion (31) and said operative portion (30) are rotatable about a rotation axis (X) perpendicular to a withdrawal direction (W) of said drawer (1).

6. The washing machine (100) according to claim 3 or 4 or 5, wherein said attachment portion (32) is resilient.

7. The washing machine (100) according to any of claims 3 to 6, wherein said supporting structure (2) defines an housing (20) into which said drawer (1) can be accommodated, said attachment portion (32) being located externally to said housing (20), an opening (23) being defined in said supporting structure (2) through which said catch portion (31) passes in order to engage said drawer (1).

8. The washing machine (100) according to any of the preceding claims, wherein said catch portion (31) has an L-shaped cross section and comprises ribs (33) extending from opposite ends of said L-shaped cross section.

9. The washing machine (100) according to any of the preceding claims, wherein said drawer (1) comprises a stopping element (13) projecting from a shell of said drawer (1) and adapted to engage with said catch portion (31) in order to delimit said movement of said drawer (1) with respect to said supporting structure (2).

10. The washing machine (100) according to any of the preceding claims, wherein said stopping element (13) comprises a leading surface (131) adapted to abut with a respective leading surface (311) of said catch portion (31) when said drawer (1) is housed in said supporting structure (2) such that said catch portion (31) is resiliently displaced in a disengaged position during the insertion of said drawer (1).

11. The washing machine (100) according to claim 10, wherein said leading surface (131) of said stopping element (13) and/or said leading surface (311) of said catch portion (31) are tilted of an angle lower than 90° with respect to an inserting direction (I) of said drawer (1) in said supporting structure (2).

12. The washing machine (100) according to any of the preceding claims, wherein said stopping element (13) comprises a trailing surface (132) adapted to abut with a respective trailing surface (312) of said catch portion (31) in order to delimit the movement of said drawer (1).

13. The washing machine (100) according to claim 12, wherein said trailing surface (132) of said stopping element (13) and said trailing surface (312) of said catch portion (31) are tilted of an angle equal to or greater than 90° with respect to an inserting direction (I) of said drawer (1) in said supporting structure (2).

14. The washing machine (100) according to any of the preceding claims, wherein said supporting structure (2) comprises a front edge (21) onto which a lip (12) of said drawer (1) abuts when said drawer (1) is fully housed in said supporting structure (2).

15. The washing machine (100) according to claim 14 when depending on claim 3, wherein said attachment portion (32) projects from said front edge (21).

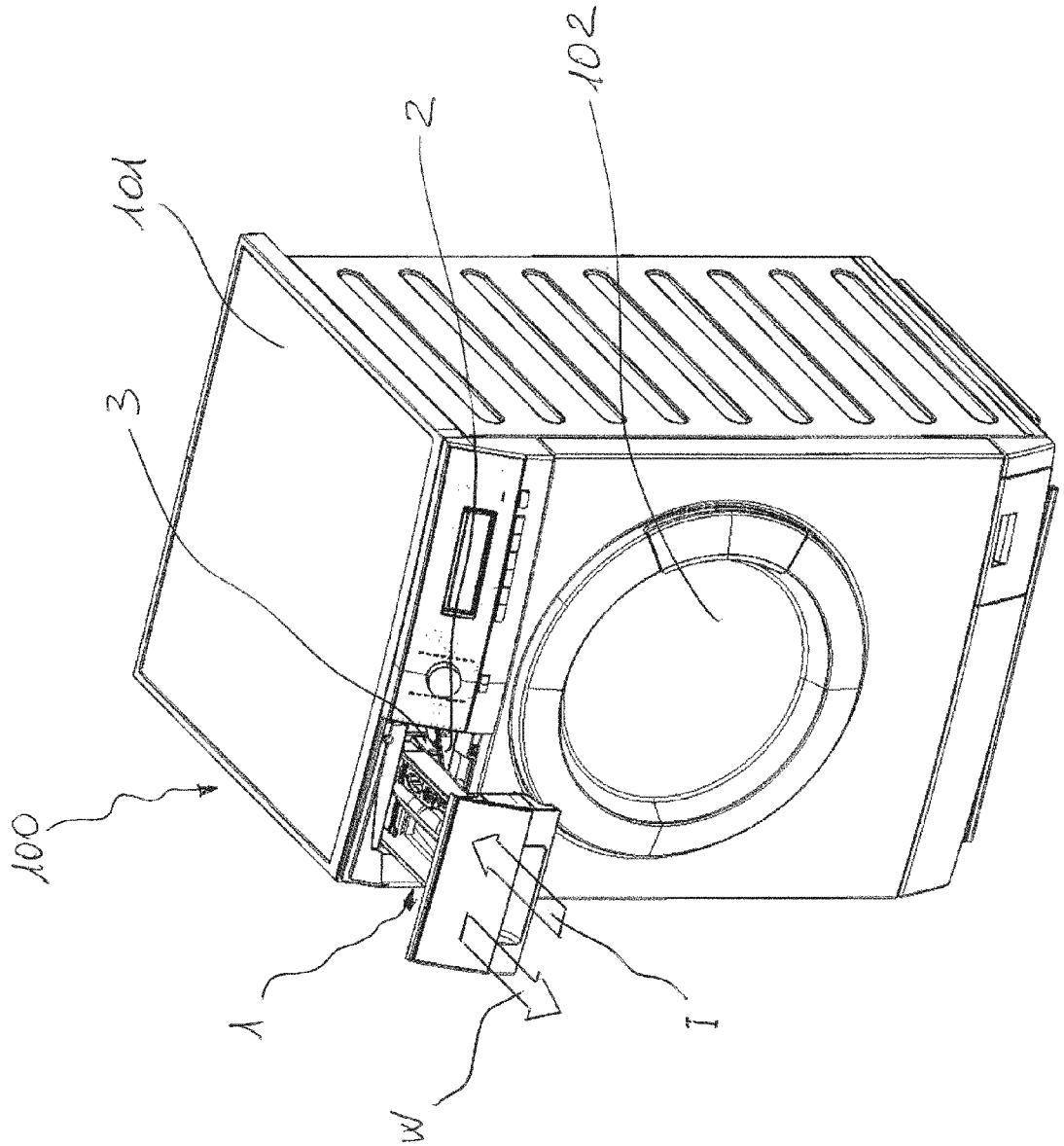

FIG. 1

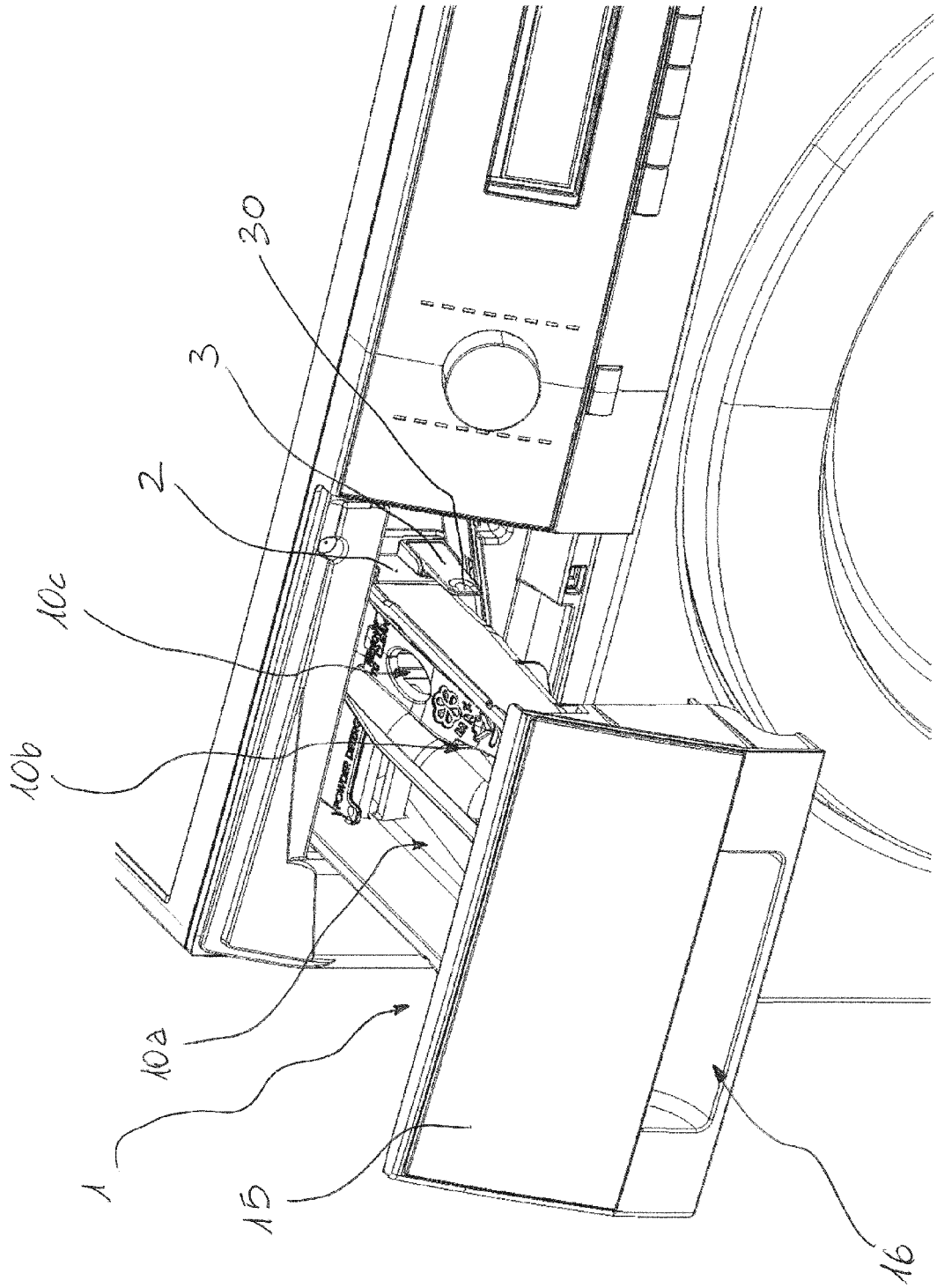

FIG. 1A

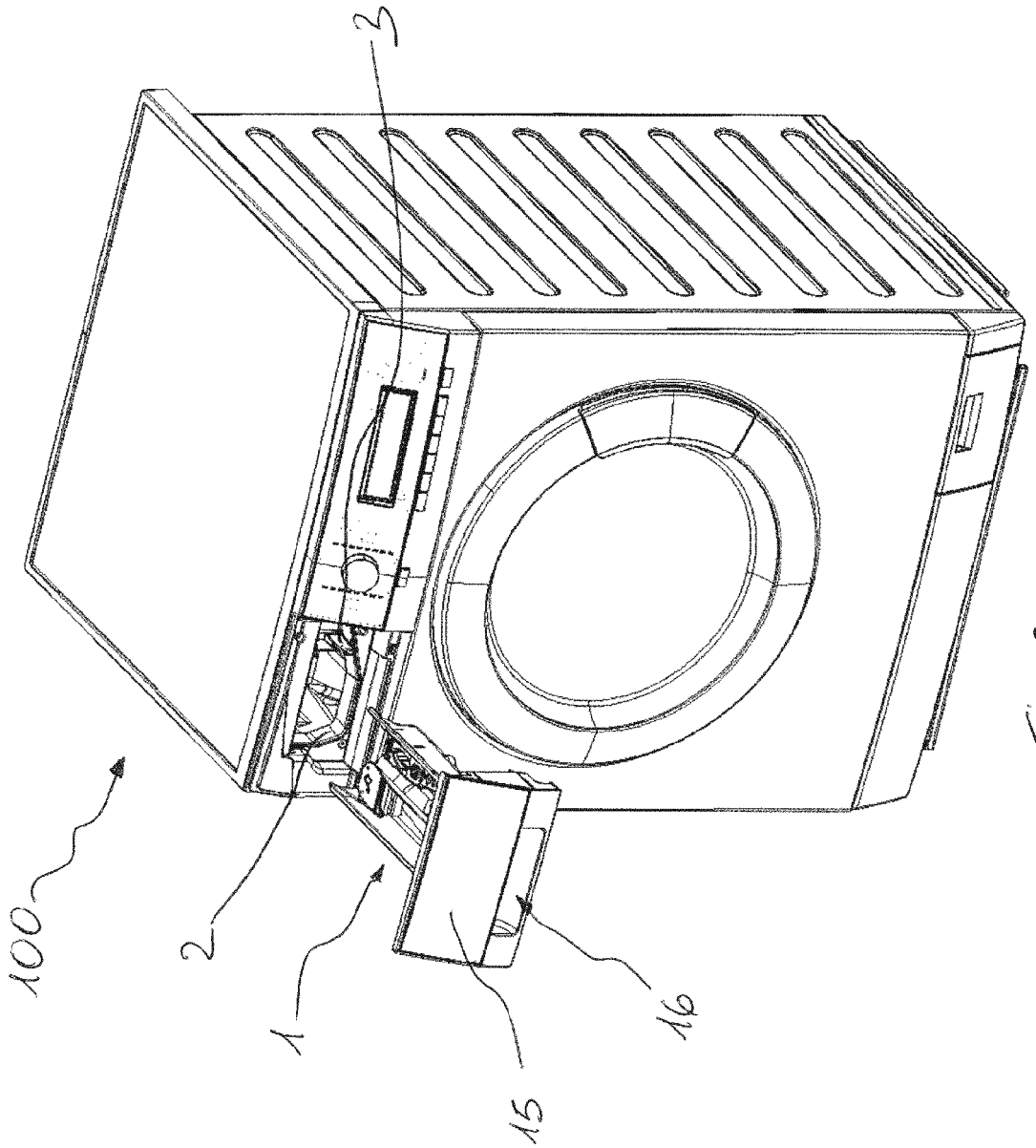

FIG. 2

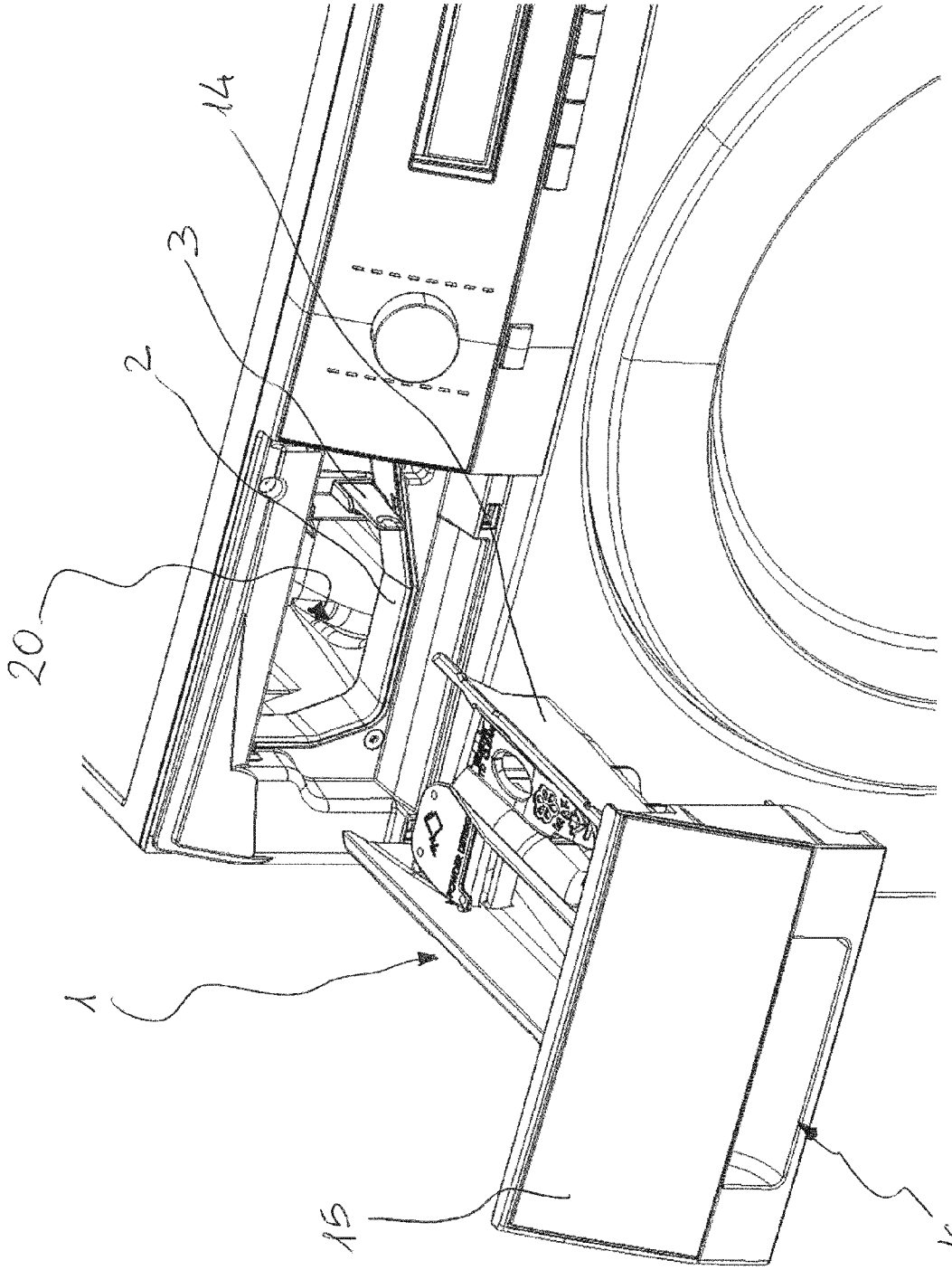

FIG. 2A

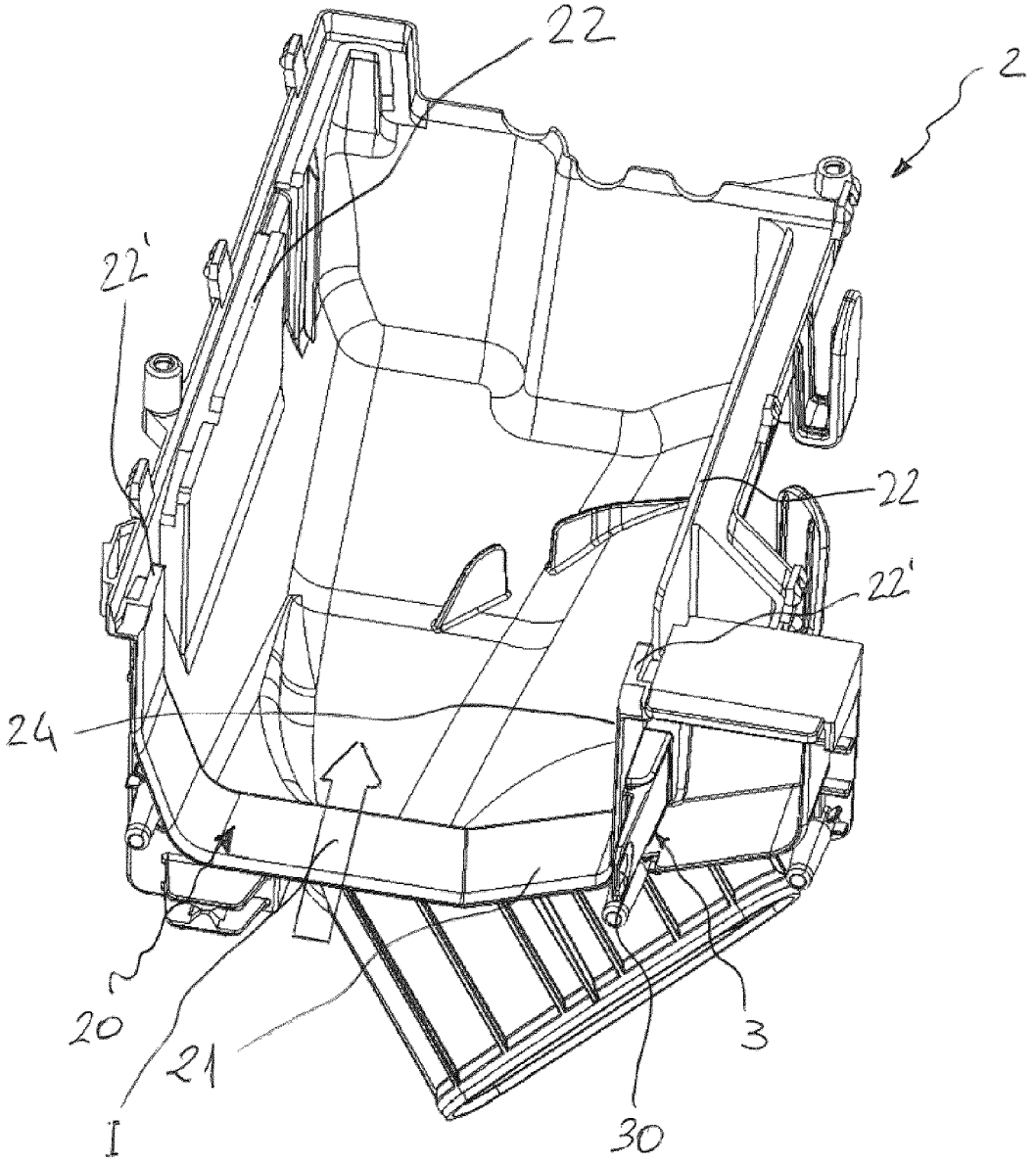

FIG. 3

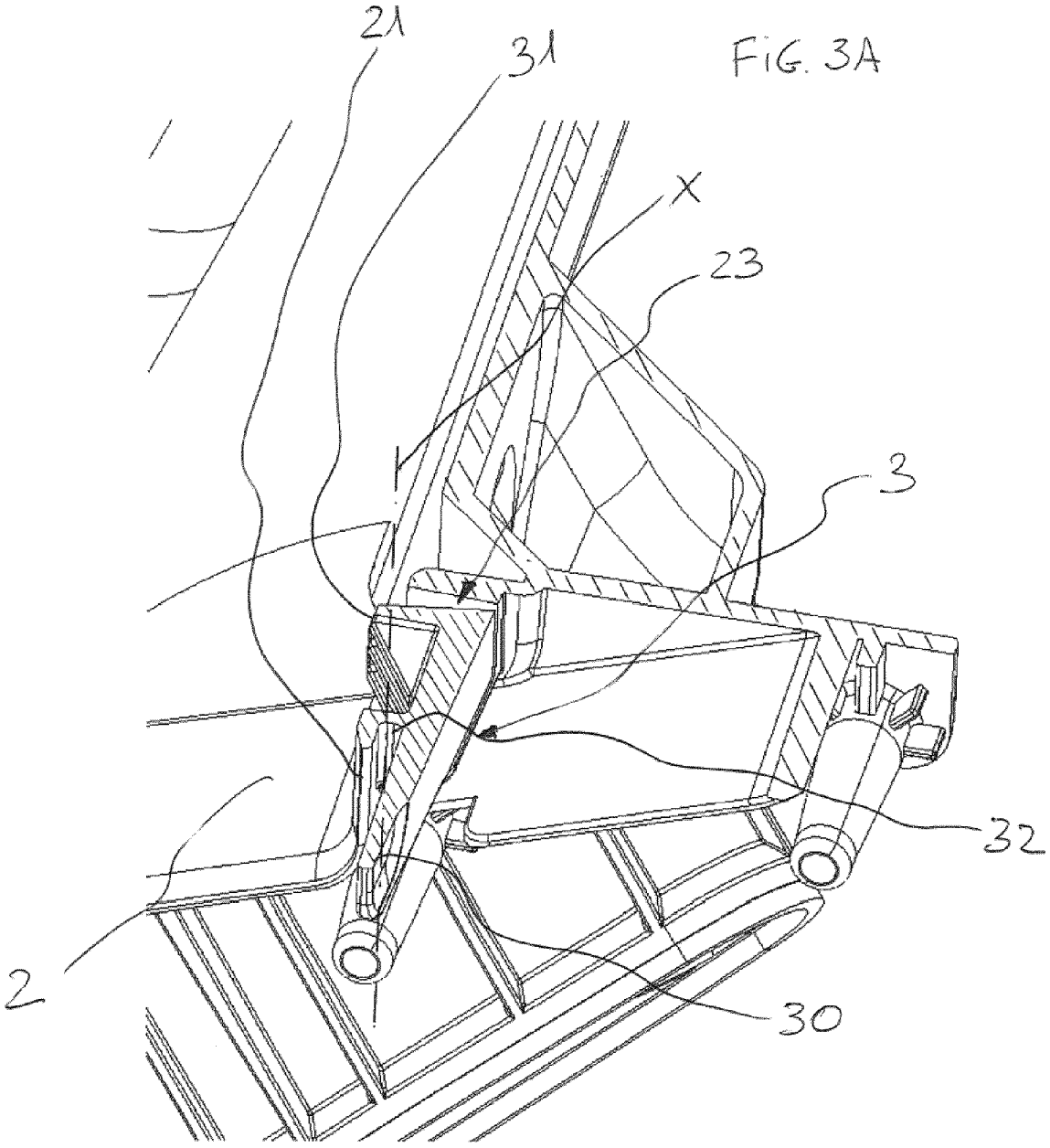

FIG. 3A

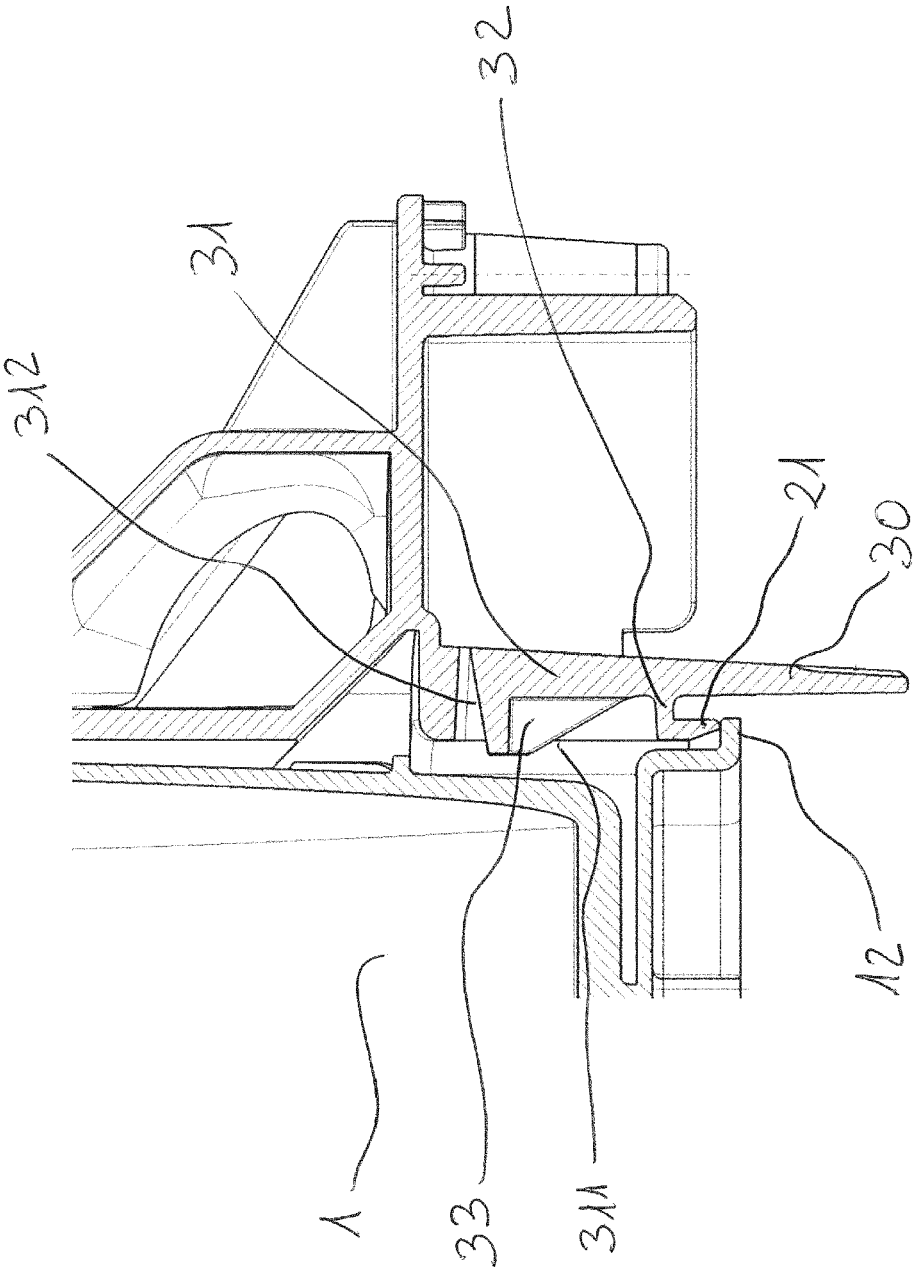

FIG. 4A

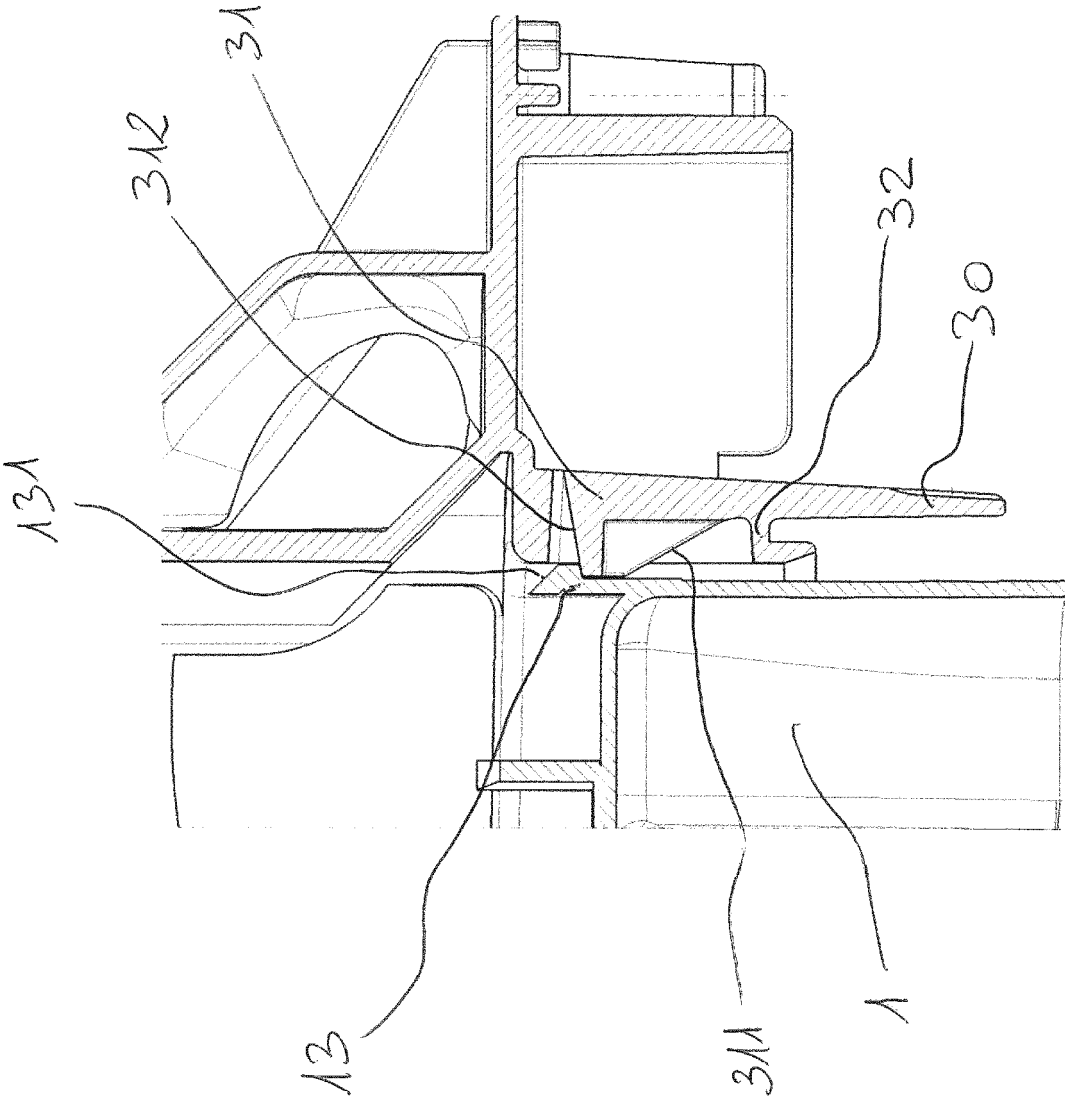

FIG. 4B

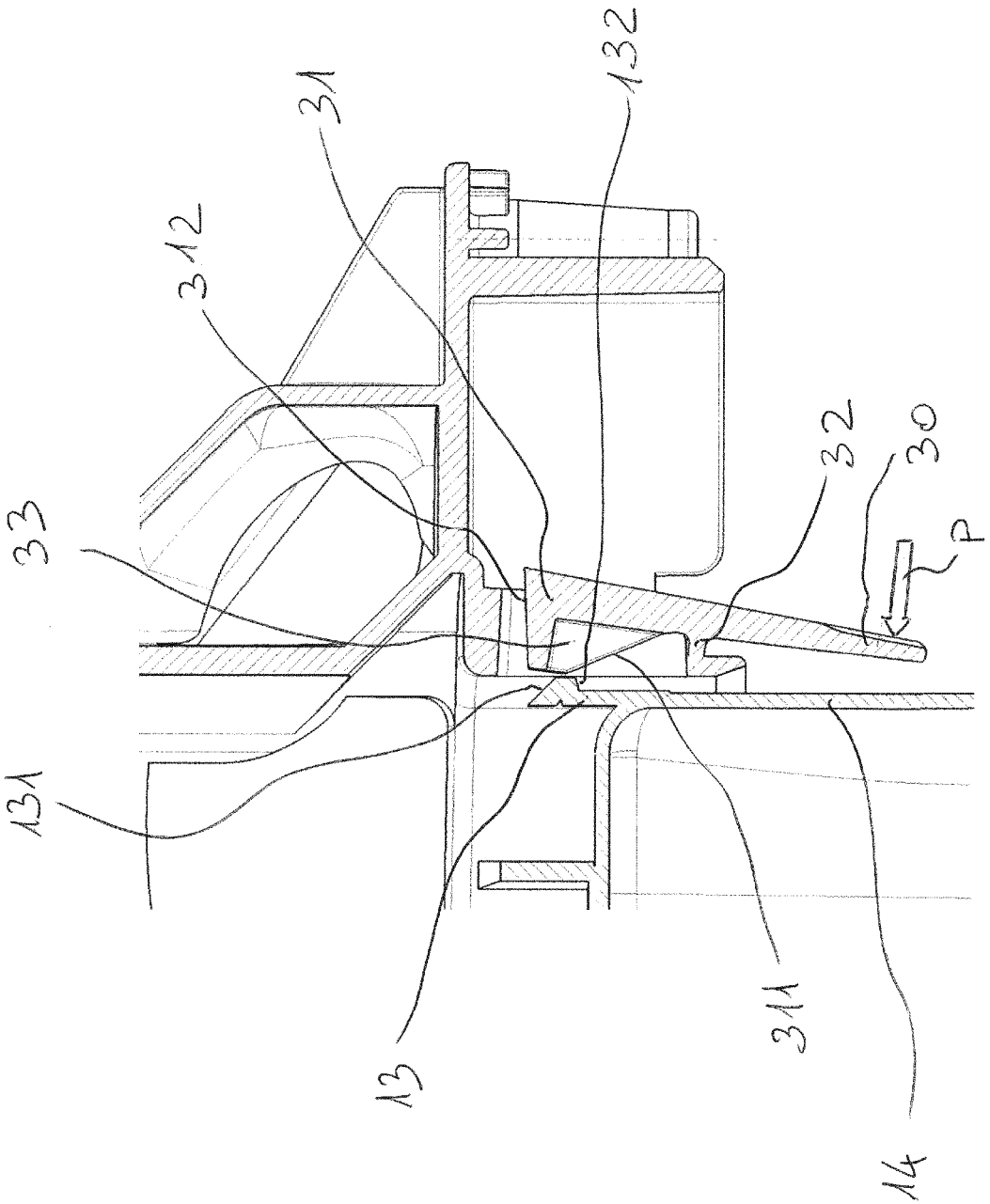

FIG. 4C

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EUROPEAN SEARCH REPORT

Application Number
EP 13 19 4210

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	EP 2 003 237 A1 (ELECTROLUX HOME PROD CORP [BE]) 17 December 2008 (2008-12-17) * paragraphs [0008] - [0010] * * paragraphs [0017] - [0022] * * figures 1-3 * -----	1-3,5-8, 10-13	INV. D06F39/02 ADD. D06F58/02
X	WO 2010/076206 A1 (ARCELIK AS [TR]; YILDIRIM IBRAHIM [TR]; VAROL ISAK [TR]; AMAC HAKAN [T) 8 July 2010 (2010-07-08) * paragraphs [0020] - [0028] * * figures 1-5 * -----	1,9,10, 12	
A	EP 1 690 972 A1 (PLASTICOS MONDRAGON S L U [ES]) 16 August 2006 (2006-08-16) * paragraph [0003] * * paragraph [0016] * * paragraph [0024] * * figures 3A, 3B, 3C * -----	1,9,10	
A	WO 2010/076176 A1 (ARCELIK AS [TR]; OZKALAY KORHAN [TR]) 8 July 2010 (2010-07-08) * paragraphs [0004] - [0005] * * paragraphs [0028] - [0031] * * paragraphs [0036] - [0037] * * figures 2-4, 6-9 * -----	1,3,9	TECHNICAL FIELDS SEARCHED (IPC) D06F A47L

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
Munich	16 April 2014	Weidner, Maximilian

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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D : document cited in the application
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EPO FORM 1503 03.82 (P04C01)

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 13 19 4210

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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16-04-2014

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