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(54) **Laundry treating appliance**

(57) The present invention relates to a laundry treating appliance, such as a washing machine or a machine having laundry drying functions; a laundry treating appliance according to the invention comprises a cabinet assembly (1) including a front wall (3), a rear wall (4), side panels (31, 32) arranged between the front and rear walls (3, 4) and one or more beam elements (10) for structurally connecting the front and rear walls (3, 4), the cabinet assembly (1) accommodating operational components which are required for carrying out a treatment on laundry and a control unit device designed to control the operational components, the appliance having one of the beam elements (10) made of an electrical insulating material and formed as a box member (6) having an interior housing (50) for accommodating the control unit device therein.

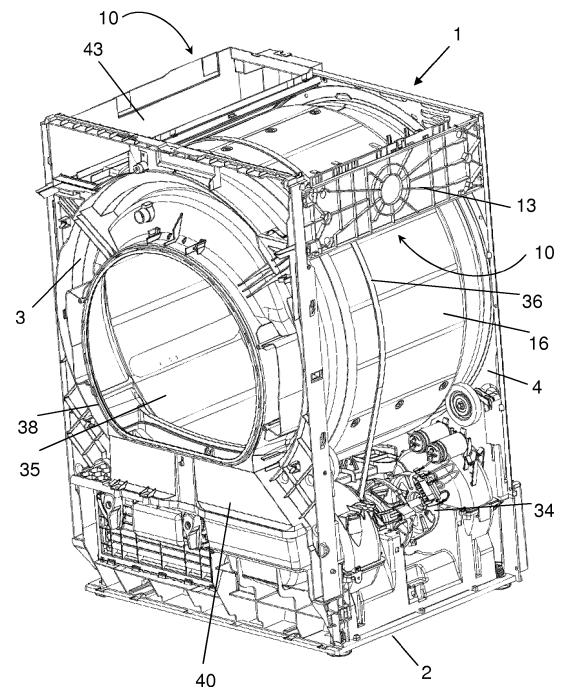


Fig.2

Description

Field of technology

[0001] The present invention relates to a laundry treating machine such as a laundry washing machine, a laundry washing-drying machine or a laundry dryer.

Background

[0002] Laundry washing machines, laundry washing-drying machines and laundry driers share some structural features as well as some technical issues, due to the very similar overall architecture, based on a rotary drum mounted in a support structure. For this reason, these machines are sometimes referred to as rotary drum laundry treating appliances, when it is intended to refer to any of these three types of machines, like in the present specification.

[0003] A rotary drum laundry treating appliance is made with a support structure that has the task of supporting the rotary drum and all the parts and elements of the appliance, either directly or indirectly, and of transferring the weight of the appliance and all stresses generated during operation to the floor on which the appliance is laid. Normally, the support structure comprises a cabinet assembly including a front wall and a rear wall of the appliance, as well as elements that structurally connect these two walls, at different heights so as to ensure that the support structure is sufficiently strong. By the expression "structurally connect" it is meant here that these elements are strong enough to bear mechanical stresses that go well beyond those merely implied by these elements themselves (such as their weight, or the forces necessary to fix them to the walls), so as to be able to transfer significant stresses between the walls, such as stresses due to the rotation of the drum, even at high speed or with somehow unbalanced loads.

[0004] In a first known solution, the supporting structure comprises a cabinet assembly including a base portion that connects a front and a rear wall at the bottom of the appliance, and one or more metal beams that connect the two walls at the top of the appliance. A front panel and further two side panels having decorative purpose only cover the machine supporting structure. Such a structure is disclosed in EP 1783266 A1. Moreover, the cabinet assembly typically accommodates also operational component parts of the machine which are required for treating laundry, such as a rotating drum, a control panel, air circulating conduits, heating devices, filters, liquid draining apparatus and so on. A control panel is generally provided at a front portion of the cabinet assembly with appropriate electronics connected thereto.

[0005] Due to reduced space behind the control panel, further control unit devices designed to control the machine operational components are arranged along a side of the appliance. In most cases, the control unit devices including a printed circuit board, onto which electronic

components are mounted, are placed inside a box closed with a cover for safety reasons.

[0006] To save space and to define a firm positioning for the box, the box is normally fastened to one of the metal beams of the appliance supporting structure.

[0007] According to this typical configuration, two components must be produced and handled, i.e. a metal beam element and a box containing the control unit device. Then the box must be fastened to the traverse either before or after that the metal beam element is connected to the front and rear panels of the cabinet assembly.

[0008] In both cases, two separate operation steps are to be carried out, that is connecting the metal beam element and fastening the box, and two components are involved, that is the beam element and the box.

[0009] Metal beam elements can cause some problems as they are heavy and not suitable to directly support a control unit device because it cannot ensure an appropriate electrical insulation of the control device from the surrounding components of the appliance. Moreover, the box and metal beam element assembling operation is time consuming and not always straightforward, having a negative impact on the global cost and operations of the appliance manufacture.

Objects of the disclosure

[0010] It is an object of the present invention to overcome or at least reduce the drawbacks noted above with reference to the prior art appliances.

[0011] A further object of the present invention is to provide a laundry treating appliance with a control unit device containing box member which has also the function of a structural element of the cabinet.

[0012] Another object of the present invention is to provide a laundry treating appliance with a structural control unit device containing box member which allows for cost reduction and improves assembly operations of the appliance.

Summary of the invention

[0013] The present disclosure provides a laundry treating appliance, such as a laundry washing machine, a laundry washing-drying machine or a laundry dryer, as set out in the accompanying claims.

[0014] Accordingly, the present disclosure provides a laundry drying appliance comprising a cabinet assembly including a front wall, a rear wall, side panels arranged between the front and rear walls and one or more beam elements for structurally connecting the front and rear walls, the cabinet assembly accommodating operational components which are required for carrying out a treatment on laundry and a control unit device designed to control the operational components, in the appliance one of the beam elements is made of an electrical insulating material and is formed as a box member having an interior housing for accommodating the control unit device

therein.

[0015] According to a further aspect of the invention, the laundry treating appliance has a drum for receiving laundry to be treated, wherein the beam element formed as a box member comprises an elongated plate, the control unit device being arranged over the elongated plate so as to be placed between the elongated plate and the drum.

[0016] In one embodiment of the invention the beam element formed as a box member comprises an elongated plate connected to the front and rear walls and a cover for closing the interior housing accommodating the control unit device.

[0017] In a further aspect of the invention the cover (7) is pivotally connected to the elongated plate, fastening devices being provided for fastening the cover onto the elongated plate so as to close the interior housing.

[0018] In one embodiment of the invention the elongated plate and the cover are formed as a single, unitary piece.

[0019] In another embodiment of the invention the cover is pivotally connected to the elongated plate by means of a pliable surface portion arranged between the cover and the elongated plate.

[0020] In one aspect of the invention the cover can be applied onto the box member interior housing independently from said cabinet side panels.

[0021] In another aspect of the invention the box member comprises one or more fastening devices to hold the control unit device.

[0022] According to an embodiment of the invention the beam element formed as a box member comprises strengthening and stiffening ribs arranged on an opposite side of the beam element formed as a box member relative to the interior housing accommodating the control unit device.

[0023] In another embodiment of the invention the laundry treating appliance has a drum for receiving laundry to be treated and the box member is formed on the beam element by walls protruding from an elongated plate towards the drum.

[0024] In one embodiment of the invention the cover has a seat for receiving at least a part of the control unit device.

[0025] In one aspect of the invention one of the said cabinet side panels is applied onto a first side of the beam element formed as a box member and the control unit device is arranged on a second side of said beam element which is opposite to the first side.

[0026] In a further aspect of the invention the box member comprises apertures.

[0027] In one embodiment of the invention, the front wall of the cabinet is covered by a decorative, non-structural panel.

[0028] In another embodiment of the invention a control panel for operating the appliance is arranged on the front wall of the appliance.

[0029] The present invention offers a number of ben-

efits. One of the advantages of the invention derives from the integration of a control unit device box member with a beam element of the appliance support structure, forming in this way a unique structural element, which has the task of joining the rear and front walls of the appliance cabinet assembly and the task of containing the control unit device which typically, in known appliances, is enclosed within a separate box fastened to traverse beam element.

[0030] This means that only one operation step is necessary to obtain the structural element. Another advantage is an easier assembling operation, which facilitates the work of the operators, because the single structural element is also lighter and made with an electrical insulating material, therefore needing no additional insulation.

[0031] All this results in a reduction of time during appliance assembling operation, which means a decrease in manufacturing cost.

[0032] A further advantage is given by the position of the beam element integrating the box member for housing an appliance control unit. By placing the box member in a region close to the drum a better removal of heat produced by the control unit device may be achieved. This advantage is particularly evident in a laundry drying machine, wherein the drum rotates and moves air within the appliance cabinet.

[0033] Another advantage is due to electrical insulation of the control unit device obtained by using an electrical insulating material for forming the beam element. In case of an electrical dispersion from the control unit device, any risk for the user is avoided because the dispersion is kept confined into the box member containing the control unit.

Brief description of the drawings

[0034] Reference will now be made, by way of example, to the accompanying drawings, in which:

Figure 1 is a perspective view of laundry treating appliance according to the invention;

Figure 2 shows the laundry treating appliance of Figure 1 with the front panel, the side panels and the top panel removed for better showing the cabinet assembly;

Figure 3a and 3b show a perspective view of a structural beam element formed as a box member for housing a control unit device in an open configuration, as seen from opposite sides respectively;

Figure 4a and 4b show a perspective view of a structural beam element formed as a box member for housing a control unit device in a closed configuration, as seen from opposite sides respectively;

Figure 5 shows the upper portion of the appliance of Figure 1 with some parts removed to show the structural beam element of Figures 3a to 4b installed in the appliance.

Detailed description of preferred embodiment

[0035] In the attached drawings the laundry treating appliance according to the invention is embodied as a laundry dryer, however the same invention can be equivalently applied to a laundry washing machine and/or to a laundry washing and drying machine.

[0036] With reference to Figures 1 and 2, the laundry dryer comprises a cabinet assembly 1 having a base portion 2, a front wall 3, a rear wall 4, and beam elements 10 structurally connecting the front wall 3 with the rear wall 4. The front and rear walls 3, 4 are further connected to the base portion 2 so as to form, together with the beam elements 10, a support structure that rests on a floor and supports all remaining parts and elements of the laundry dryer. These parts and elements include in particular a front panel 30, left and right side panels 31, 32, an electric motor 34, a rotary drum 16 comprising a laundry treatment chamber 35 for receiving laundry to be treated by the appliance, the drum being driven by the electric motor 34 via a belt transmission device 36. The front and side panels 30, 31 and 32 are mounted to the front and rear walls 3 and 4, but are not involved in the structural connection between these two walls, that is fully achieved by the base portion 2 and the beam elements 10. The front and side panels 30, 31 and 32 are decorative panels. Therefore, in particular, side panels 31 and 32 have a mechanical strength that is negligible compared to that of the front and rear walls 3, 4 and beam elements 10. The front panel 30 has an opening 37 giving access to the laundry treating chamber 35. Such opening 37 is aligned with a corresponding opening 38 formed on the front wall 3, and both openings 37, 38 are closed by a pivotable door 39.

[0037] The front wall 3 comprises an air duct 40 provided for conveying air through the laundry treating chamber 35 so as to dry wet laundry.

[0038] A control panel 41, for allowing a user to operate the appliance, is arranged on the front wall 3 of the appliance. A drawer-like water bearing device 42, like a water tank, is slidably received into a hopper 43 which is arranged close to one of the structural beam elements 10.

[0039] The cabinet assembly 1 contains all the operational components which are required for carrying out a treatment on laundry. Some of the operational components like the drum 16, its driving electric motor 34 have been already cited above, while other parts and elements of the laundry drier are not mentioned in detail here, but many of them are shown in the drawings.

[0040] A control unit device (not shown in the drawings), is provided to control the operational components of the appliance so as to perform a laundry treating process on laundry. Such control unit device may be embodied as a printed circuit board carrying electric/electronic elements thereon.

[0041] With further reference to Figures 3a, 3b, 4a, 4b, and 5, according to the invention, one of the beam elements 10 of the appliance support structure is formed as

a box member 6 that comprises an interior housing 50 for accommodating the control unit device. The beam element 10 incorporating the box member 6 is made of an electrical insulating material, preferably of polymeric nature. A couple of fastening devices 51 are provided on the box member 6 to hold the control unit device in a stable position.

[0042] A plurality of ribs 13 are provided for giving the beam element 10 formed as a box element 6 strength and rigidity to keep the cabinet assembly during manipulation and operation of the appliance. Ribs 13 are preferably formed on a side of the beam element 10 which is opposite to the side carrying the control unit device. In this way stiffening ribs 13 face a side panel 31 which is applied thereon. With such arrangement, the removal of the side panel 31 does not uncover the control unit device which remains behind the beam element 10.

[0043] The beam element 10 formed as a box member 6 comprises an elongated plate 8 over which the control unit device is to be placed. The elongated plate 8 features fixing devices 11 at its opposite ends, as can be seen in Figures 3a, 3b, 4a and 4b.

[0044] The fixing devices 11 are aimed to connect the elongated plate 8 of the beam element 10 formed as a box member 6 to the front and rear walls 3, 4, as can be easily seen in Figures 2 and 5. In this way, the beam element 10 keeps the front and rear panels 3, 4 in place, at the correct distance from each other.

[0045] The fixing devices 11 include threaded holes 12, or holes with threaded nuts, for engagement by screws passing through the front and rear walls 3, 4. Of course, those skilled in the art will appreciate that different fixing devices, other than the threaded holes and screws, can be used to fasten the beam element 10 to the front and rear walls 3, 4, e.g. nuts and bolts.

[0046] Walls 26, protruding from the elongated plate 8 towards the appliance drum 16, form the box member 6 and define the perimeter of the box member 6 interior housing 50. The elongated plate 8 forms the bottom portion of said interior housing 50.

[0047] A cover 7 may be provided for closing the interior housing 50 of the box member 6 so as to protect the control unit device and to further enhance the strength of the beam element 10 formed as a box member 6. Cover 7 may be formed as a piece which is separate from but attachable to the box member 6 through fastening devices 9. The cover 7 can be applied on the box member 6 interior housing 10 independently from the cabinet side panels 31, 32. The material constituting the cover is an electrical insulating material. Fastening devices 9 are provided either on the cover 7 or the elongated plate 8 or on both the cover 7 and the elongated plate 8. In a preferred embodiment depicted in Figures 3a to 4b the cover 7 and the elongated plate 8 are formed as a single, unitary piece. In this embodiment, the cover is pivotally connected to the elongated plate 8 by means of a pliable surface portion 14 arranged between the cover 7 and the elongated plate 8. The pliable surface portion 14 is

formed by locally reducing the thickness of the electrical insulating material forming the beam element 10, so as to form a portion that is pliable along a line. Such arrangement forms a hinge interconnecting the cover 7 with the elongated plate 8. In an alternative embodiment comprising a cover 7 which is detachable from the elongated plate 8, a hinge having a pivot and a pivot seat may be provided for hingedly interconnecting the cover 7 on the elongated plate 8.

[0048] The cover 7 preferably comprise a seat 55 provided for receiving at least a part of the control unit device. Since the control unit device may include components having a considerable height, for example a heat sink for cooling electronics, a portion or even the most part of the control unit device may be received in a seat 55 formed on the cover 7 and facing the elongated plate 8 when the cover 7 is applied thereon.

[0049] Apertures 56, 21 may be provided on the box member 6, in particular on the elongated plate 8 and the cover 7. Such apertures 56, 21 may be used for being passed through by wires connected or connectable to the control unit device, or for dispersing the heat produced by the control unit device. One or more clips 22 may be provided on an outer side of the box member 8 for holding wires and/or cables connected to or passing close to the control unit device.

[0050] The integration of a box member for containing a control unit device with a beam element of the appliance support structure allows forming a single structural element which has the task of joining the rear and front walls of the casing assembly and the task of safely containing the electric/electronic components.

[0051] Only one operation step is necessary to obtain the beam element.

[0052] Another advantage is a more simple assembling operation, which facilitates the work of the operators. The single structural element is lighter and entirely made from an electrical insulating material, which is preferably of polymeric nature.

[0053] The result is a reduction of time for carrying out the appliance assembling operations, which means a decrease in manufacturing cost.

[0054] Lastly, with the implementation of the present invention at least one of the metal beam elements is eliminated and a single structural element made of polymeric material and including a box member for containing a control unit device of the appliance is used.

[0055] It will be understood that, while in the foregoing reference was mainly made to a laundry treating appliance embodied in the form of a laundry dryer, the present invention is suitable for any apparatus intended for drying and/or washing clothes.

[0056] It will be appreciated that alterations and modifications may be made to the above without departing from the scope of the disclosure. Naturally, in order to satisfy local and specific requirements, a person skilled in the art may apply to the solution described above many modifications and alterations. Particularly, although the

present disclosure has been described with a certain degree of particularity with reference to preferred embodiment(s) thereof, it should be understood that various omissions, substitutions and changes in the form and details as well as other embodiments are possible; moreover, it is expressly intended that specific elements described in connection with any disclosed embodiment of the disclosure may be incorporated in any other embodiment as a general matter of design choice.

Claims

1. A laundry treating appliance comprising a cabinet assembly (1) including a front wall (3), a rear wall (4), side panels (31, 32) arranged between the front and rear walls (3, 4) and one or more beam elements (10) for structurally connecting the front and rear walls (3, 4), the cabinet assembly (1) accommodating operational components which are required for carrying out a treatment on laundry and a control unit device designed to control the operational components, the appliance being **characterized in that** one of the beam elements (10) is made of an electrical insulating material and is formed as a box member (6) having an interior housing (50) for accommodating the control unit device therein.
2. The laundry treating appliance of claim 1 having a drum (16) for receiving laundry to be treated, wherein the beam element (10) formed as a box member (6) comprises an elongated plate (8), the control unit device being arranged over the elongated plate (8) so as to be placed between the elongated plate (8) and the drum (16).
3. The laundry treating appliance of claim 1 or 2, wherein the beam element (10) formed as a box member (6) comprises an elongated plate (8) connected to the front and rear walls (3, 4) and a cover (7) for closing the interior housing (50) accommodating the control unit device.
4. The laundry treating appliance of claim 3 wherein the cover (7) is pivotally connected to said elongated plate (8), fastening devices (9) being provided for fastening the cover (7) onto the elongated plate (8) so as to close the interior housing (50).
5. The laundry treating appliance of claim 3 or 4, wherein the elongated plate (8) and the cover (7) are formed as a single, unitary piece.
6. The laundry treating appliance of claim 5 wherein the cover (7) is pivotally connected to said elongated plate (8) by means of a pliable surface portion (14) arranged between the cover (7) and the elongated plate (8).

7. The laundry treating appliance of any claim 3 to 6 wherein the cover (7) can be applied onto the box member interior housing (50) independently from said cabinet side panels (31, 32). 5
8. The laundry treating appliance of any preceding claim wherein the box member (6) comprises one or more fastening devices (51) to hold the control unit device. 10
9. The laundry treating appliance of any preceding claim wherein the beam element (10) formed as a box member (6) comprises strengthening and stiffening ribs (13) arranged on an opposite side of the beam element (10) formed as a box member (6) relative to the interior housing (50) accommodating the control unit device. 15
10. The laundry treating appliance of any preceding claim having a drum (16) for receiving laundry to be treated, wherein the box member (6) is formed on said beam element (10) by walls (26) protruding from an elongated plate (8) towards the drum (16). 20
11. The laundry treating appliance of any preceding claim wherein the cover (7) has a seat (55) for receiving at least a part of the control unit device. 25
12. The laundry treating appliance of any preceding claim wherein one of said cabinet side panels (31, 32) is applied onto a first side of the beam element (10) formed as a box member (6) and the control unit device is arranged on a second side of said beam element (10) which is opposite to the first side. 30 35
13. The laundry treating appliance of any preceding claim wherein the box member (6) comprises apertures (21, 56). 35
14. The laundry treating appliance of any preceding claim wherein the front wall (3) of the cabinet assembly (1) is covered by a decorative, non-structural panel (30). 40
15. The laundry treating appliance of any preceding claim wherein a control panel (41) for operating the appliance is arranged on the front wall (3). 45

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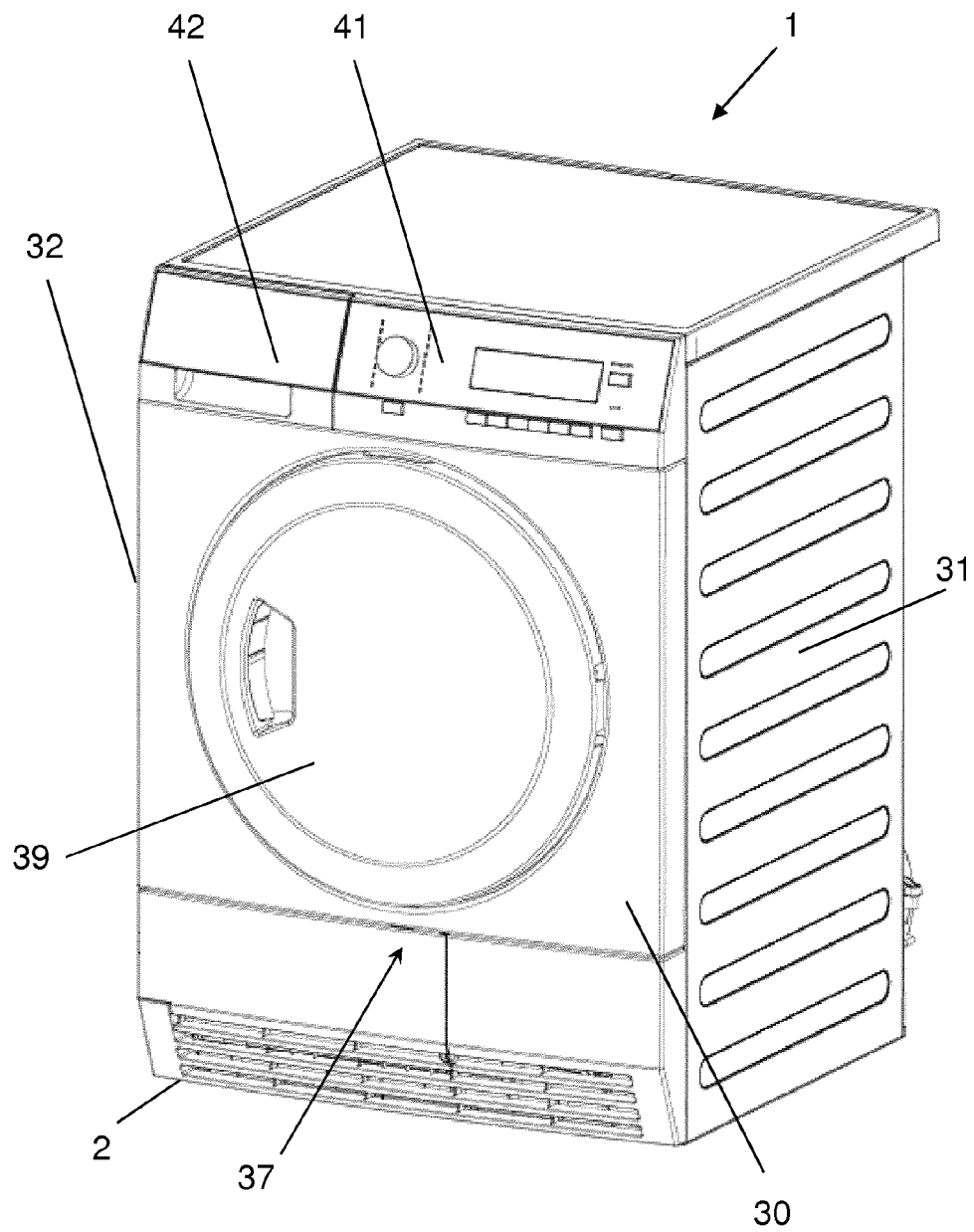


Fig. 1

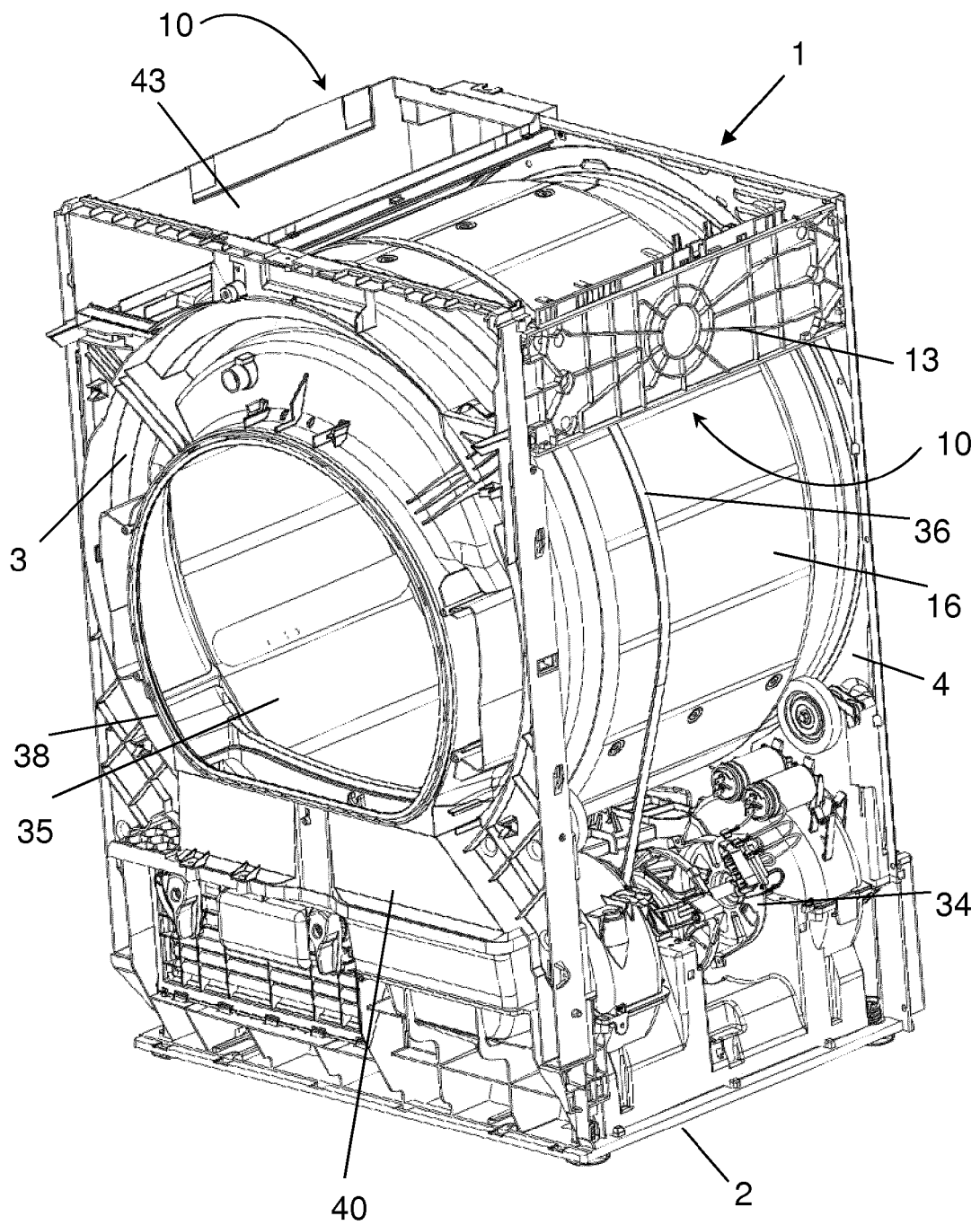
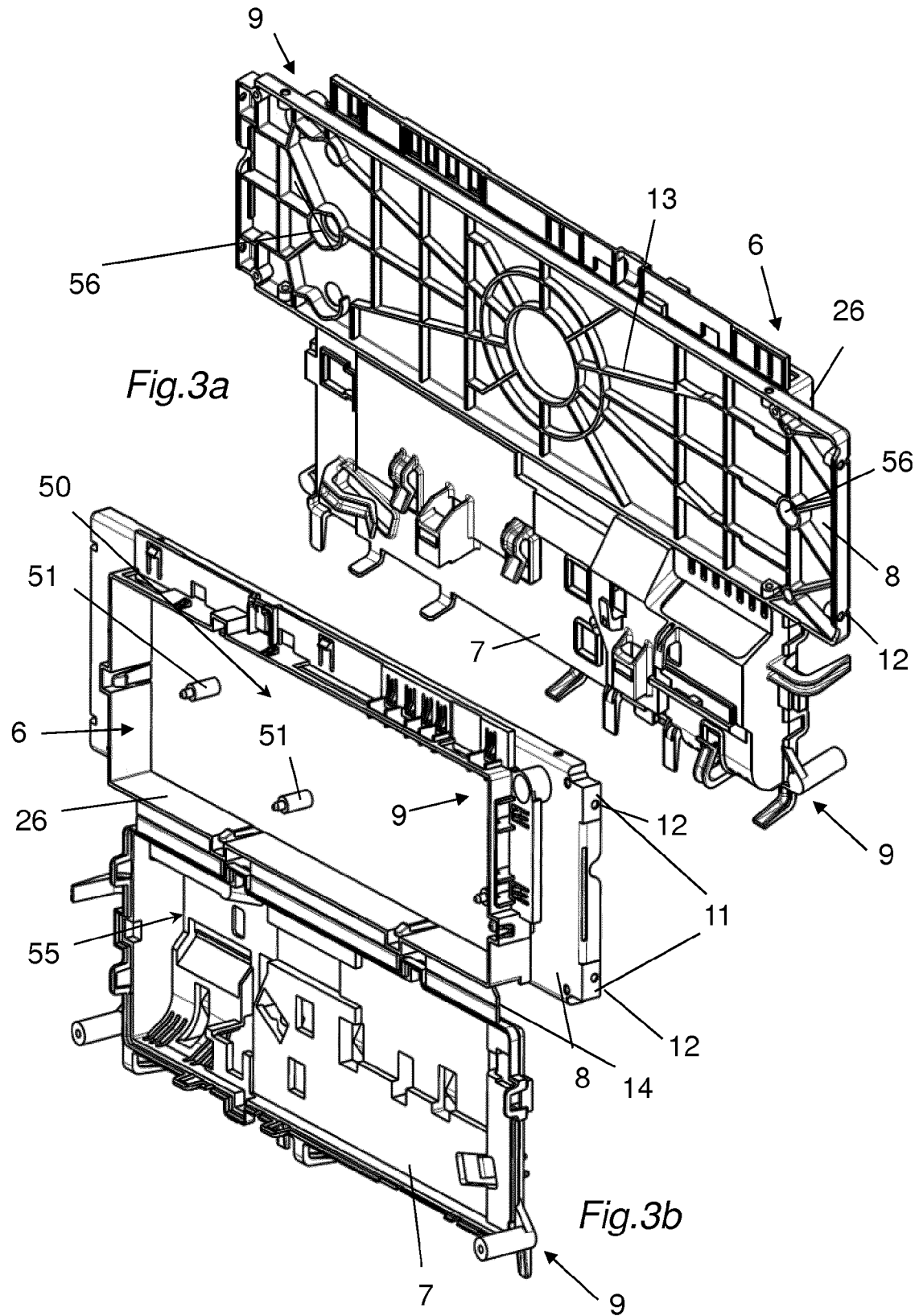
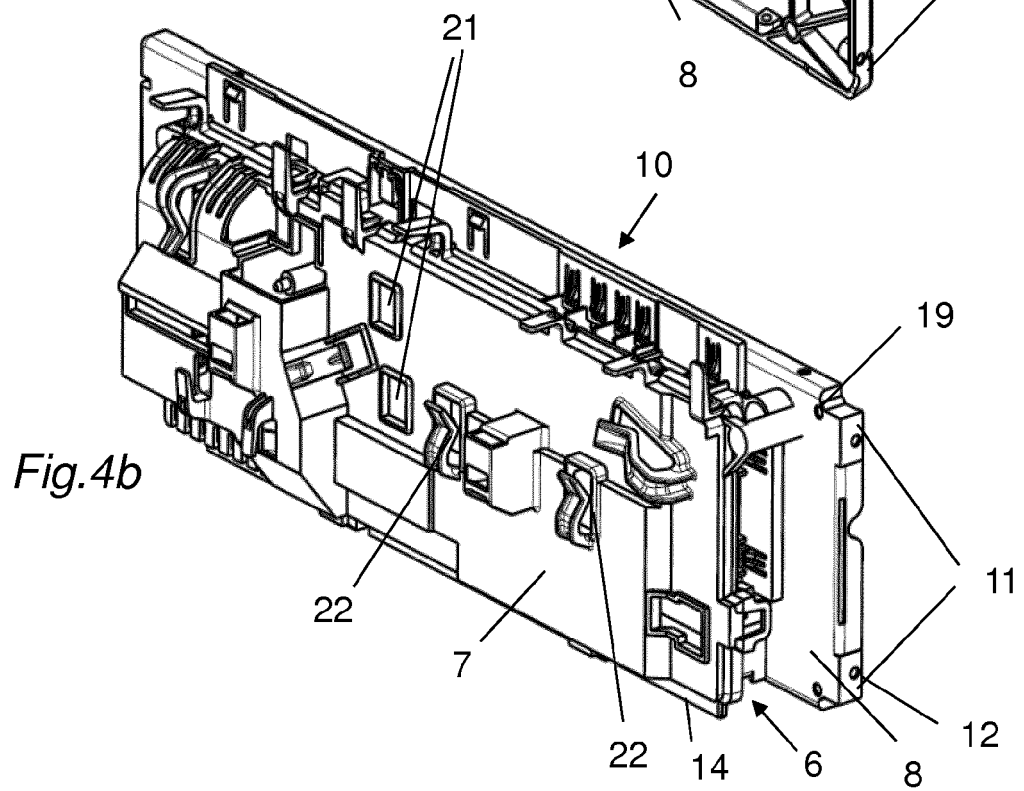
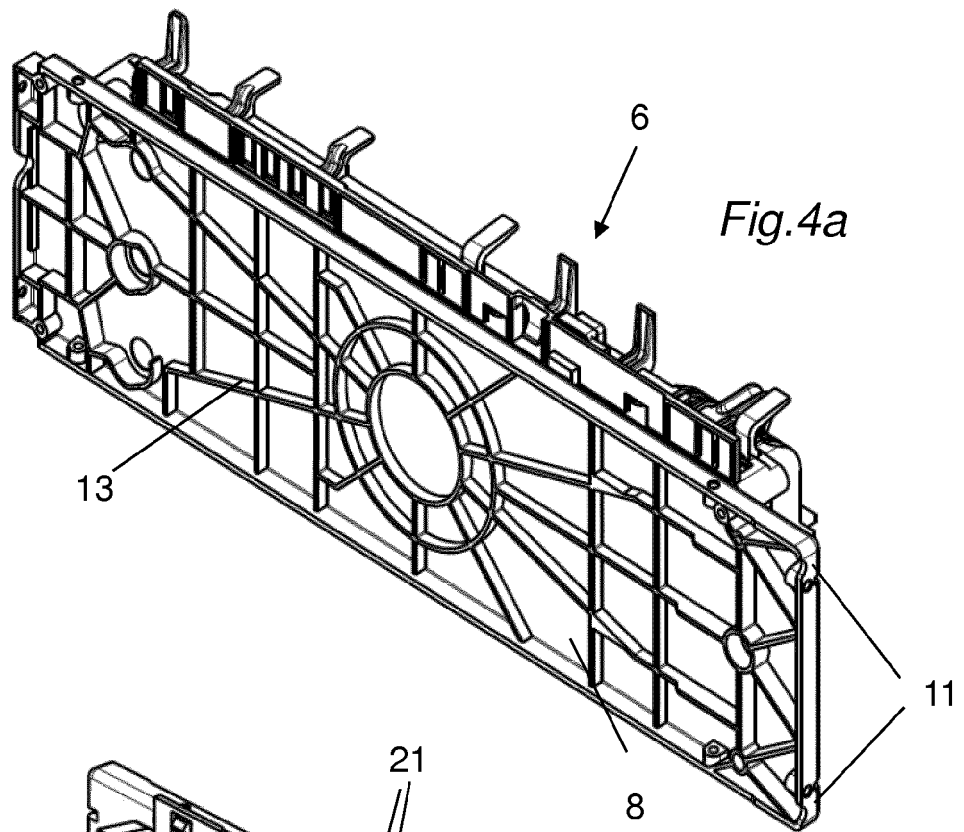


Fig.2





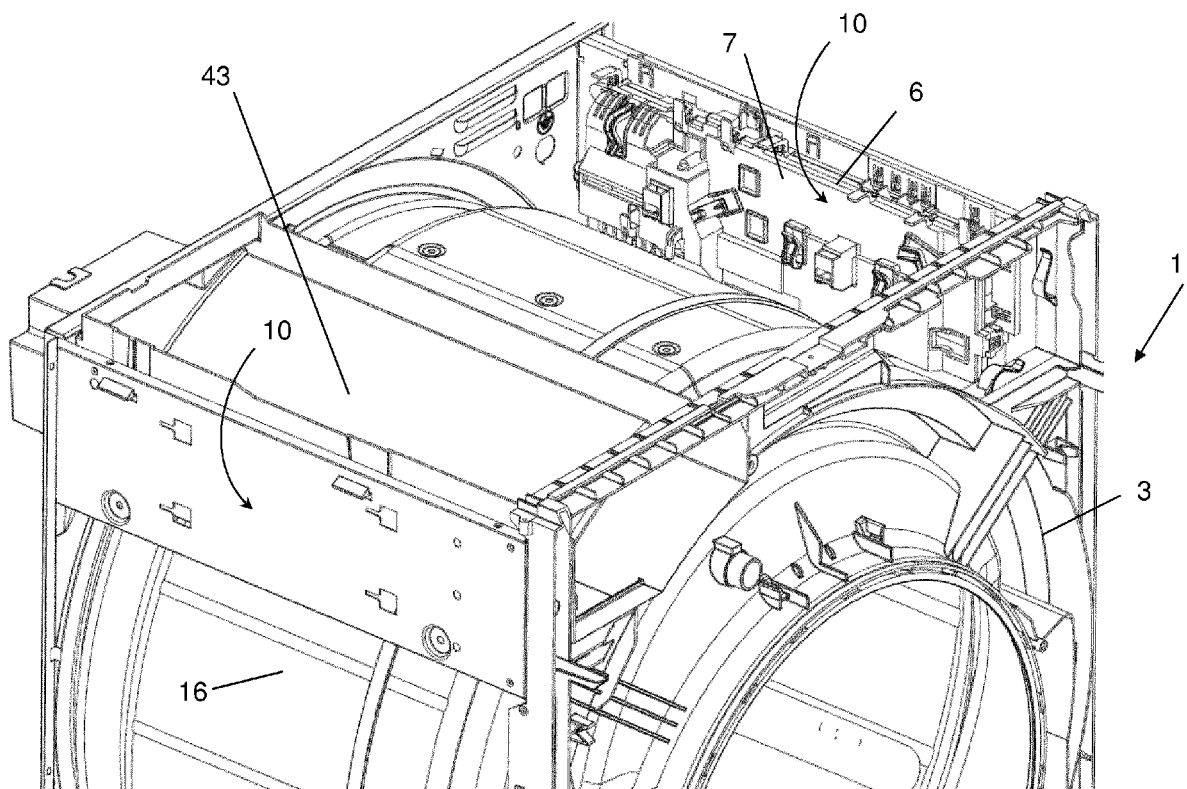


Fig.5



EUROPEAN SEARCH REPORT

Application Number
EP 12 19 9201

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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The present search report has been drawn up for all claims			
Place of search Munich		Date of completion of the search 22 May 2013	Examiner Stroppa, Giovanni
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	

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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REFERENCES CITED IN THE DESCRIPTION

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