

EUROPEAN PATENT APPLICATION

Application number: 85200503.2

Int. Cl.⁴: **F 25 D 23/06**

Date of filing: 01.04.85

Priority: 05.04.84 IT 2144684 U

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Date of publication of application: 09.10.85
Bulletin 85/41

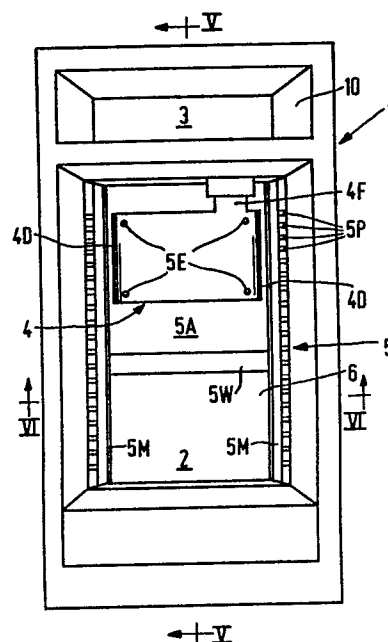
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Designated Contracting States: **DE FR GB SE**

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Multi-functional support element for a domestic refrigerator.

A multi-functional support element (5) arranged in a preservation compartment (2) of a refrigerator is formed integrally with projections (5B, 5C) for supporting an evaporator plate (4), with two parallel side walls (5M) comprising a series of aligned seats (5P) for supporting removable shelves, and with a channel (5W) for collecting water resulting from the defrosting of the evaporator plate.



Multi-functional support element for a domestic refrigerator.

This invention relates to a multi-functional support element for a domestic refrigerator with a preservation compartment in which an evaporator in the form of a plate is arranged near the back wall of said compartment.

German utility model No. 83 15 574 describes a refrigerator of the above type. In this known refrigerator, in which the insulation is constituted by foamed polyurethane, which is injected and polymerised in-situ between the inner liner and outer housing of the refrigerator to form a self-supporting rigid cabinet, the plate evaporator section relative to the warmer compartment is fixed to the rear wall of said compartment by spacers and screw means before the insulation is formed, said spacers requiring the rear wall to be suitably bored in order to be able to locate them.

The operations involved in mounting the plate section therefore take a considerable time and require great care in view of the fact that the inner liner of the refrigerator is constructed either of thin vacuum-moulded plastics material or of very thin sheet metal, which offer no rigidity as said operations precede the injection of the foamed polyurethane.

In said refrigerators, in order to collect the water resulting from the defrosting of the evaporator, a collection channel, for example, of the type described in French patents 2,256,386 and 2,304,042, has to be disposed below the plate section of the evaporator. The collection channel can only be mounted in-situ after the cabinet structure has become rigid. This complicates the refrigerator manufacturing process, particularly in the case of mass production. In addition, the racks which support the inner movable shelves of the refrigerator (for example of the type described in German utility model No. 81 18 466) are mounted by means of a manual operation which also takes a considerable time. If the racks are fixed to the rear wall of the refrigerator only by means of screws, their bending strength is undoubtedly low, and this can limit the loading capacity of shelves supported by said racks.

The object of the present invention is to obviate the aforesaid drawbacks. This object is attained by means of a self-supporting multi-functional element made of plastics material and comprising:

- 5 - a substantially flat rear wall formed integrally with projections for spacing, supporting and fixing the evaporator plate;
- two parallel side walls formed integrally with the rear wall and provided with a series aligned seats for supporting removable shelves, and
- a channel at the bottom of the rear wall for collecting water resulting from the defrosting of the evaporator plate.

10 The multi-functional element when fitted the evaporator, which is fixed without using separate pieces (such as screws and spacers), constitutes a multi-functional unit which is mounted in said refrigerator compartment from the rear before the in-situ formation of the insulation. Thus a first advantage is obtained, consisting in a reduction in the number of constituent components of the refrigerator, together with a second advantage consisting of the fact that the multi-functional unit forms a monolithic body together with the foamed polyurethane insulation and the refrigerator liner and housing. In addition, 20 the aforesaid drawbacks are obviated by virtue of a substantial simplification and speeding-up of the assembly of the refrigerator, thus also reducing manufacturing costs.

The invention will be more apparent from the detailed description given hereinafter by way of example with reference to the accompanying drawings, in which:

25 Figure 1 is a front perspective view of a refrigerator with two superposed preservation compartments which incorporates the multi-functional support element according to the invention and from which the doors have been removed;

30 Figure 2 is a fragmentary perspective view of the support element with the upper part shown in section, certain details having been omitted for simplicity of representation;

Figure 3 is a partial perspective view of a detail of the support element;

35 Figure 4 is a section on the line IV-IV of figure 2;

Figure 5 is a diagrammatic vertical section through the entire refrigerator cabinet on the line V-V of Figure 1;

Figure 6 is a horizontal section through part of the refrige-

rator on the line VI-VI of Figure 1, and

Figure 7 is a section on the line V-V of Figure 1 to an enlarged scale but limited to the lower preservation compartment.

5 In the drawings, the reference numeral 1 indicates generally a domestic refrigerator with the doors removed, which doors respectively close a large lower compartment 2 and an upper compartment 3 which is smaller and operates at a lower temperature than the lower compartment.

10 Each compartment is cooled by a different section of the evaporator of a convential refrigeration circuit, and the sections can be constructed as described in the aforesaid Italian utility model 22055 B/82. In particular, the higher working temperature of the compartment 2 is obtained by means of a plate evaporator 4 formed from two panels 4A, 4B which are cemented together and which have passages 4C
15 between them for the circulation of the refrigerant fluid. The evaporator 4, which is slightly curved or bent round at its side edges 4D, is fixed and supported by the multi-functional element according to the invention, indicated generally by 5, on the substantially flat rear wall 5A thereof by means of spacer projections 5B (see Figure 4) which are
20 formed integrally with said rear wall 5A. More precisely, in a position corresponding with the projections 5B the evaporator 4 comprises holes by means of which it is mounted on the cylindrical terminal parts 5C of said projections. The remaining part of each projection can be conical (as shown) or cylindrycal with a greater diameter than said
25 terminal part 5C. The evaporator 4 is constructed to the rest on the shoulder 5D of the projection. That portion of the terminal part 5C which projects beyond the hole in the evaporator 4 is deformed, for example by hot-riveting with a suitable tool, in such a manner as to form a head 5E which securely fixes the evaporator 4 to the multi-functional element (as shown by the broken line in Figure 4).

30 As can be seen in Figure 2, the evaporator 4 comprises an upwardly extending portion 4F which passes through a bridge 5G on the upper part of the rear wall 5A, and by the way of which the hydraulic connection is made to the rest of the conventional refrigeration circuit,
35 which is not shown but which preferably corresponds to that of the said German utility model 83 15 574. . The bridge in question serves to hide from view the point at which the portion 4F passes through the upper wall of the compartment 2.

The rear wall 5A of the multi-functional element 5 also constitutes a certain part of the back wall of the compartment 2 and at its bottom comprises a channel 5W formed integrally with the described parts. The channel serves for collecting the water which results from the defrosting of the evaporator 4, and in the bottom of the channel there is a connector 8 for connecting a tube (not shown) which discharges the defrosting water outside the refrigerator, for example on to the compressor housing of the refrigeration circuit.

Two narrow side walls 5M having a profiled cross-section and formed integrally with the rear wall 5A extend down the vertical sides of said rear wall of the multi-functional element 5 and below this wall, the height of the side walls being equal to the height of the compartment 2. Each side wall comprises a vertical series of shaped seats 5P used for the engagement and support of removable article-carrying shelves, which are not shown because they do not form subject matter of the present invention. Starting from its front edge, each side wall comprises a first portion 5" perpendicular to the rear wall 5A, then a first oblique face 5R, followed by a step 5S and then a face 5T which form substantially a right angle with the front face of the rear wall 5A. The seats 5P in each side wall open out of the oblique face 5R of the wall and comprise a horizontal lead-in portion 5Q and a downwardly directed terminal vertical portion 5U which opens into the former portion and has a rounded lower end. Below the channel 5W the back wall of the compartment 2 is completed by a panel 6 of thin sheet metal which is snap-fitted into suitable vertical seats 5V provided in those portions of the side walls 5M which lie below the channel 5W (see Figure 6).

In order to enable the panel 6 to be also snap-connected to the multi-functional element 5 at the bent horizontal upper edge of the panel, suitable seats 5Y are provided in the lower edge of the rear wall 5A of said element 5 (see Figure 7). The bent horizontal lower edge of said panel 6 snap-fits into seats 5X provided in a lower wall 5F which form part of the element 5 and which interconnects the lower ends of the two side walls 5M of said element. At its front, the lower wall 5F comprises similar seats 5G for the snap-connection of the rear edge of a sheet metal panel 20, which forms the bottom wall of the preservation compartment 2.

At its top, the multi-functional element 5 comprises a top wall 21 which interconnects the two side walls 5M and the rear wall 5A. In its edge, said wall 21 comprises horizontal seats 5' for the snap-connection of the bent horizontal rear edge of the panel 22 which constitutes the upper wall of the preservation compartment 2 (see Figure 7).

As can be seen in Figure 6, the side walls 5M of the multi-functional element 5 are provided laterally with suitable vertical seats 5Z for the snap-connection of the side walls 11A of the preservation compartment 2, the edge 11B each wall 11A being suitably bent in order to permit this snap-connection.

The assembly is carried out as follows:

Using known conventional methods, the inner liner 11 and outer housing 12 of the refrigerator are firstly placed in position with the exception of the back wall of the outer housing 12 and the back wall of the preservation compartment 2 which operates at higher temperature, so that the refrigerator is open rearwards at said compartment 2. Separately, the evaporator 4 of the compartment 2 is mounted and fixed (in the manner heretofore described) to the multi-functional element 5. The multi-functional element 5, with the evaporator 4 fixed to it, is then inserted through the rear of the compartment 2, and the evaporator 13 of the other compartment 3 which has already been placed about the box member 10 which defines this latter compartment is then connected to the evaporator 4 at the upwardly extending portion 4F thereof (see Figure 5).

As already stated, the side walls 5M of the multi-functional element 5 are provided laterally with suitable vertical seats 5Z for the snap-connection of the side walls 11A of the preservation compartment 2, the edge 11B of each wall 11A being suitable bent to permit this snap-connection. The bottom and top panel 20 and 22 are inserted into the respective seats 5G and 5'. Through the rear, the panel 6 is then inserted and its suitable bent lateral edges snap-engage in the seats 5V of the multi-functional element as heretofore stated. Finally, the back wall 14 of the outer housing 12 is mounted, and the foamed polyurethane 15 is injected between the inner panels 6, 11, 20, 22 and housing 12. The cross-linking of the foamed polyurethane makes the refrigerator cabinet monolithic, and in particular it "cements" the rear

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wall 5A and the side walls 5M of the multi-functional element, thus giving them a rigidity which is much greater than that of previously known constructions.

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1. A multi-functional support element for a domestic refrigerator with a preservation compartment in which an evaporator in the form of a plate is arranged near the back wall of said compartment, characterized in that the support element is made of plastics material,
5 is self-supporting and comprises:

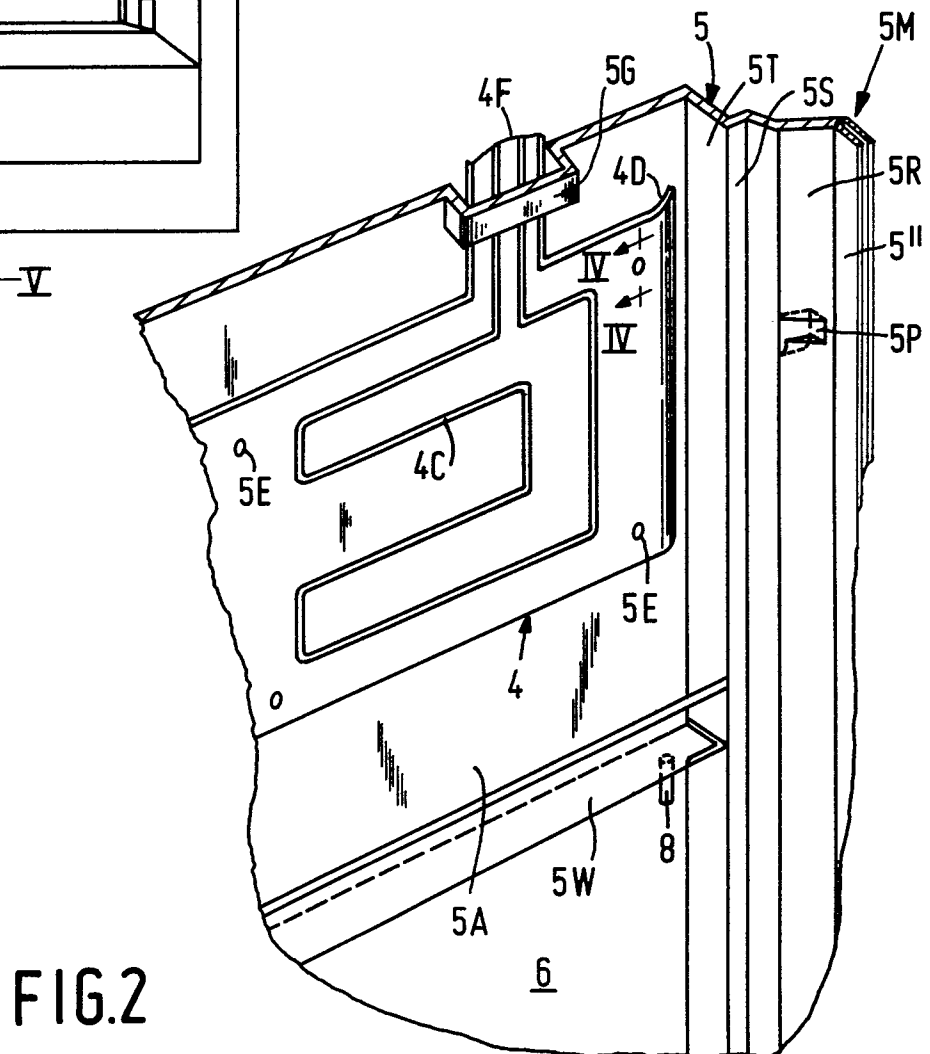
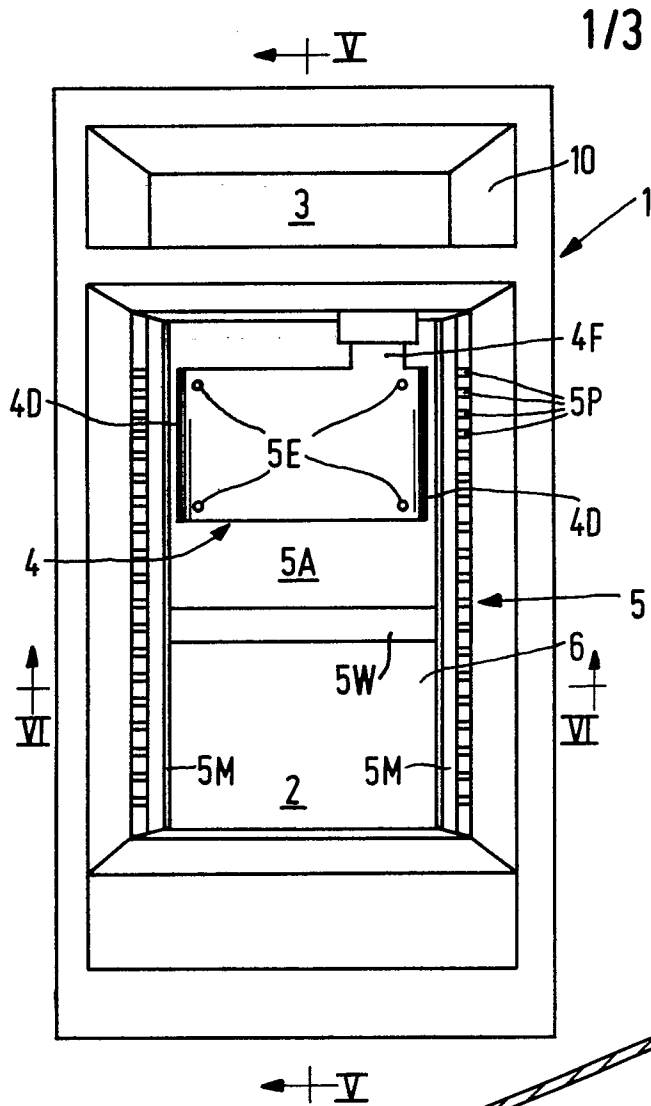
- a substantially flat rear wall formed integrally with projections for spacing, supporting and fixing the evaporator plate,
- two parallel side walls formed integrally with the rear wall and provided with a series of aligned seats for supporting removable shelves,
10 and
- at the bottom of the rear wall a channel for collecting water resulting from the defrosting of the evaporator plate.

2. A multi-functional element as claimed in Claim 1, characterized in that the rear wall and the side walls constitute a self-supporting monolithic structure with the other constituent parts of the refrigerator cabinet, after thermal insulation in the form of foamed polyurethane has been injected and polymerised.
15

3. A multi-functional element as claimed in Claim 1 or 2, characterized in that the rear wall comprises at its top a bridge for screening the area in which the evaporator plate extends towards an other section.
20

4. A multi-functional element as claimed in any one of the preceding claims, characterized in that the projections comprise thermally terminal deformable portions.
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5. A multi-functional element as claimed in Claim 1, characterized in that at least some of the walls of the preservation compartment are connected along their edges to said multi-functional element, which is provided with engagement seats for this purpose.



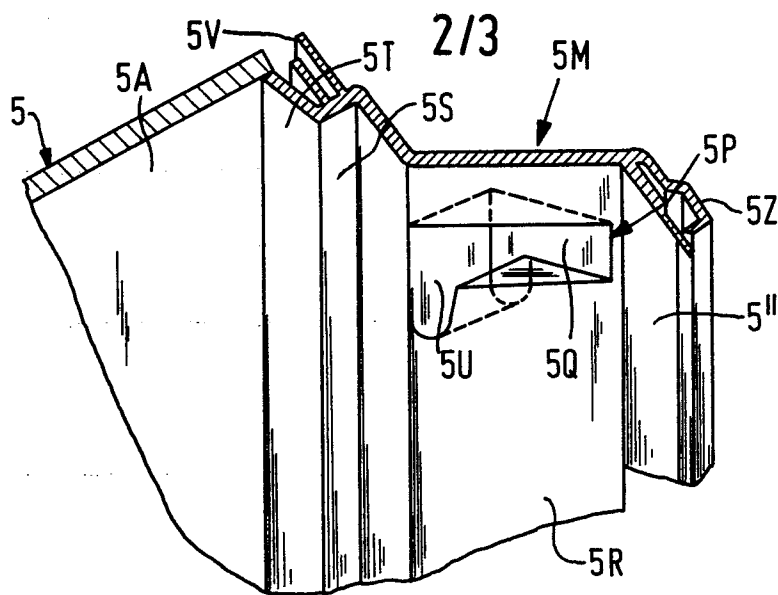


FIG. 3

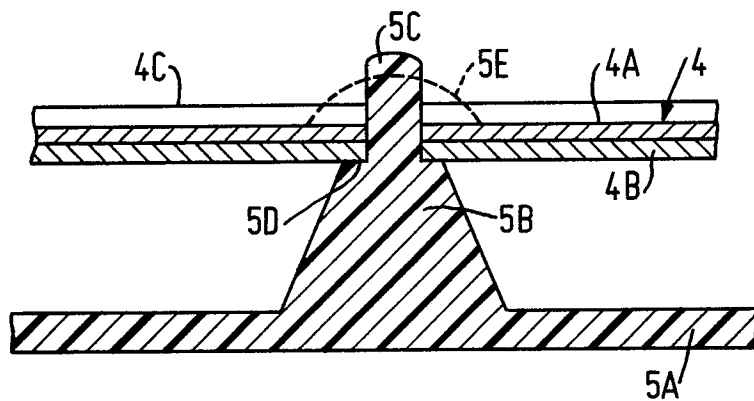


FIG. 4

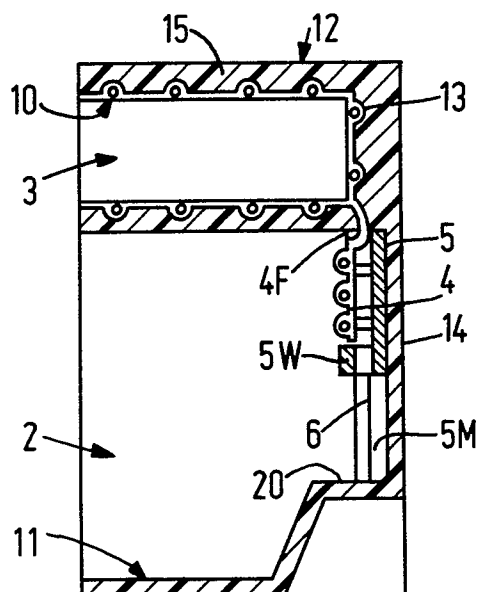


FIG. 5

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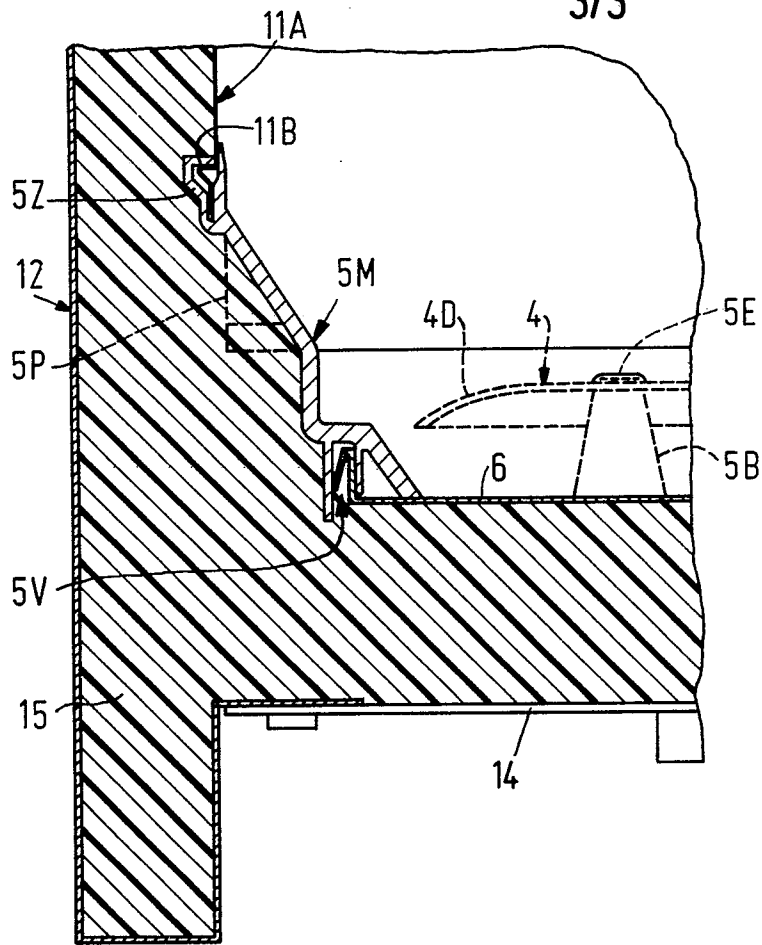


FIG. 6

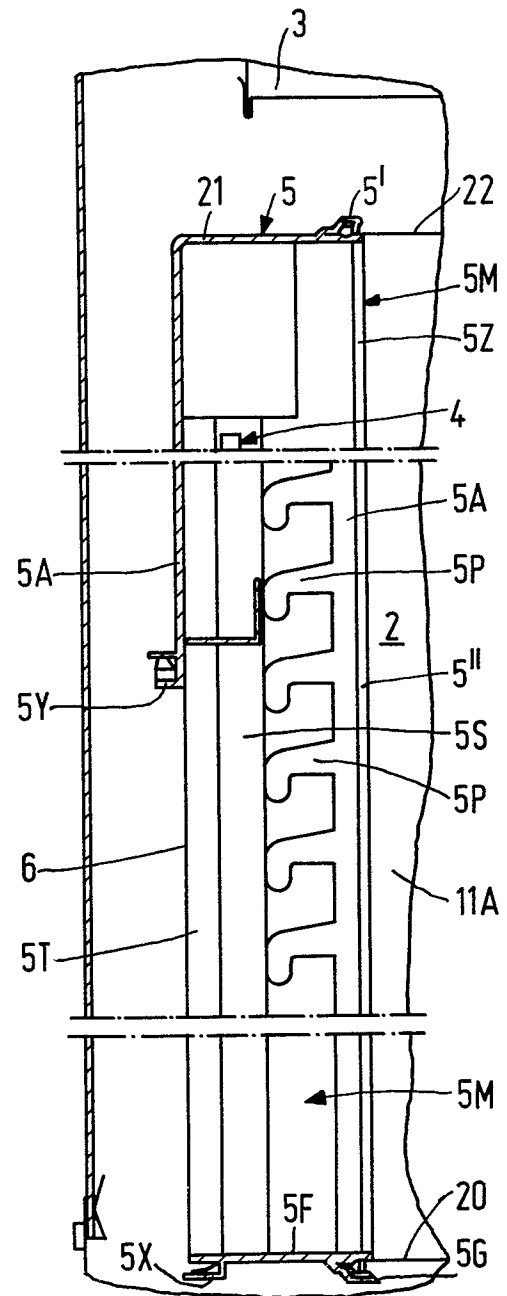


FIG. 7