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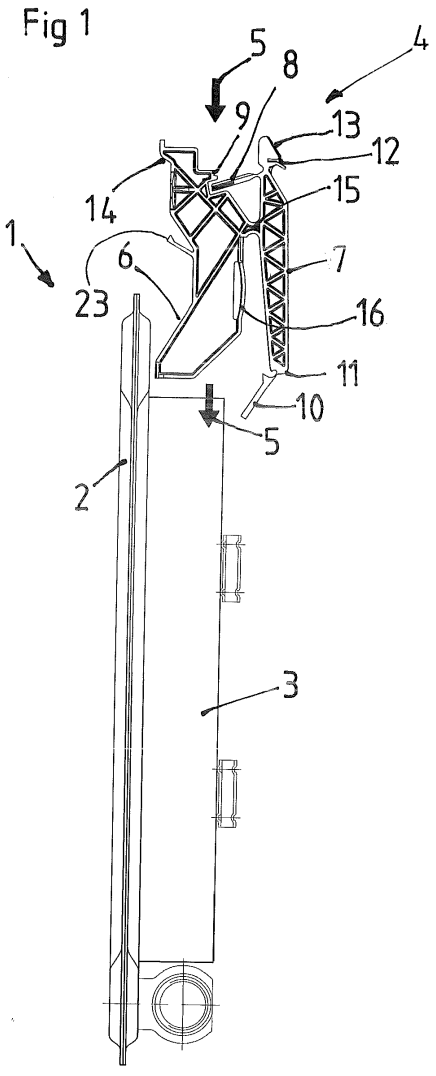
(54) **Grille support**

(57) A grille support (4) for an upper grille on a radiator (1), which includes a corrugated convection plate (3) on its back side, has a main member (6) and a holding member (7). The main member (6) is insertable into a space defined by the convection plate (3). The holding member (7), for holding the grille in a fixed position, is resilient.

A method of mounting a radiator grille with a grille support (4) includes the step of inserting the main member (6) in a space defined by a convection plate (3) on the radiator. The method further includes the steps of moving the holding member (6) to a retracted position, placing the grille on the radiator (1), and moving the holding member (6) to a fixed position.

Fig 1

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## Description

### TECHNICAL FIELD

**[0001]** The invention relates to a grille support for an upper grille on a radiator, which includes a corrugated convection plate on its back side, wherein the grille support has a main member, which is insertable into a space defined by the convection plate.

**[0002]** The invention also relates to a method of mounting a radiator grille with such a grille support, including the step of inserting the main member in a space defined by a convection plate on the radiator.

**[0003]** Finally the invention relates to a radiator including such a grille support.

### BACKGROUND ART

**[0004]** There are many types of radiators marketed, and in many cases the radiators are provided with an upper grille in order to prevent access to the space between radiator panels or a space behind a radiator, especially in the case where a convection plate is arranged on the back side of a radiator panel. One of the purposes of the grille is to prevent injuries to people, especially children, who may accidentally get a body part stuck between radiator panels or between a radiator panel and a convection plate. Another purpose is to prevent objects from falling into the space between the panels or behind a radiator, where they may get stuck and be difficult to remove. There is also an aesthetic aspect, as the grille gives the radiator a neat appearance and restricts the view between or behind the panel or panels.

**[0005]** While there is a wish to prevent access to the space between or behind radiator panels, the object of letting heated air rise upwards from the radiator remains, and thus a grille is used instead of a plate without openings.

**[0006]** Depending on the type of radiator, there are multiple varieties of fixing the grille to the radiator. However, a particularly difficult situation arises in the case of a radiator where a corrugated convection plate is arranged on the back side of a radiator panel and there is only a single radiator panel which may be used for supporting the grille.

**[0007]** One solution for arranging a grille on such a radiator is to extend the grille, which in general is manufactured from sheet metal, so that the extension of the grille is large enough to be bent and to come into contact with the corrugated convection plate on the back side of the radiator, while the front edge of the grille is supported by the upper edge of the radiator panel.

**[0008]** The main disadvantage of this solution is that a large amount of sheet metal has to be used, which will increase the manufacturing cost of the grille. Also, there will be further steps of manufacture, such as cutting and bending of the extension part, which will also increase the manufacturing cost.

**[0009]** Another solution involves arranging one or more separate supports, preferably manufactured from plastic, in one or more of the openings defined by the corrugated convection plate. This solution gives lower manufacturing costs, with a maintained neat appearance of the radiator with the mounted grille.

**[0010]** However, the grille will remain in position only vis-a-vis forces applied from above. If the grille is subjected to forces from below, such as when the radiator is held by the grille and lifted into place when it is to be mounted, the engagement between the grille and the grille support is not strong enough, and the grille and the radiator will be separated. This has the disadvantage that damages to the radiator or to the floors in the building, where it is to be mounted, may arise. Also, there is the risk of injuries to people which may be hit by the falling radiator. In order to overcome these risks, the personnel mounting or otherwise handling the radiators are advised not to lift the radiator by the grille, with the disadvantage that the radiators are more difficult to lift, as there are few other places where they are easy to grip.

### PROBLEM STRUCTURE

**[0011]** The object of the present invention is thus to provide a grille support which is able to form such a strong connection with the grille and the radiator that the radiator may be lifted by the grille without the risk that the grille is separated from the radiator.

### SOLUTION

**[0012]** The object of the invention is attained if the grille support which was intimated initially is characterized in that the grille support has a resilient holding member for holding the grille in a fixed position.

**[0013]** Further advantages will be attained if the grille support is provided with one or more of the features according to claims 2 to 8.

**[0014]** Concerning the method, the object is attained if it is characterized in the further steps of moving the holding member to a retracted position, placing the grille on the radiator, and moving the holding member to a fixed position.

**[0015]** Further advantages will be attained if the method is provided with one or more of the features according to claims 10 to 12.

**[0016]** Concerning the radiator, the object is attained if the radiator is provided with an above mentioned grille support.

### BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

**[0017]** The invention will now be described with reference to the accompanying drawings. In these drawings:

Fig 1 is a side view of the grille support according to

the invention and a radiator onto which it is about to be mounted;

Fig 2a is a side view of the grille support and an upper part of the radiator onto which it has been mounted, where the grille support is in a first position;

Fig 2b is a view according to Fig 2a, where the grille support is in a second position;

Fig 2c is a view according to Fig 2a, where the grille support is in a third position;

Fig 2d is a view according to Fig 2a, where the grille support is in a fourth position;

Fig 2e is a view according to Fig 2a, where the grille support is in a fifth position;

Fig 2f is a view according to Fig 2a, where the grille support is in a sixth position;

Fig 2g is a view according to Fig 2a, where the grille support is in a seventh position;

Fig 3 is a perspective view of the grille support according to the invention; and

Fig 4 is a planar view of the back side of the radiator, with a grille and a grille support according to the invention.

## DESCRIPTION OF THE PREFERRED EMBODIMENT

**[0018]** In the following description, words and phrases such as upper, lower, front, and back will be used. These expressions refer to a normal position of use of the grille support, i.e. when it is mounted on a radiator, which in its turn is mounted in an upright position on a wall.

**[0019]** In Fig 1, a radiator 1, with a radiator panel 2 and a corrugated convection plate 3, is shown schematically from the side, before a grille 17 (shown in Fig 2e-2g and Fig 4) or side plates have been mounted thereon. A grille support 4 according to the invention is shown above the convection plate 3, about to be inserted into a tubular space defined by the convection plate 3 and the back side of the radiator panel 2. The arrows 5 indicate the direction of insertion.

**[0020]** The grille support 4 is shown with its parts in their original positions, i. e. in the position wherein the grille support 4 is manufactured. The grille support 4 is preferably manufactured from a plastic material by injection moulding.

**[0021]** The grille support 4 has a main member 6, which is to be inserted into the tubular space defined by the convection plate 3. The grille support 4 also has a holding member 7 for contact with the grille 17. Between the main member 6 and the holding member 7, there is a flexible connector 15, which is flexible enough to allow the holding member 7 to attain different angular positions in relation to the main member 6, which will be obvious from figures 2a- 2g.

**[0022]** The main member 6 has a resilient portion 16, which allows the main member 6 to be pushed into the space defined by the convection plate 3 with a tight fit, and remain there by the force of friction. The main member 6 also has a bearing surface 14, which is shaped like the upper part of the radiator panel 2, against which it is intended to bear, when the main member 6 has been pushed into its final position. There are several more portions of the main member 6, facing the radiator panel 2, which will come into contact with the radiator panel 2 when the grille support 4 has been mounted.

**[0023]** In particular, there is a projection 23, extending from the main member 6 towards the radiator panel. When the grille support 4 is pushed into place, the projection 23 may bend when it passes the upper part of the radiator panel 2, but when the main member 6 is subject to a force in the opposite direction, the projection 23 will impede a movement in that direction, since it is angled slightly upwards.

**[0024]** Facing away from the radiator panel 2, there is arranged, on the main member 6, an abutment 9, which will cooperate with a locking means 8 on the holding member 7, for keeping the holding member 7 in a fixed position, wherein the grille 17 is fixed.

**[0025]** The holding member 7 has, at its upper end, a recess 12, for receiving a side edge of the grille 17 in its mounted position. Next to the recess 12, there is a slanting surface 13, on which the edge of the grille 17 may slide before entering into the recess 12, when the grille 17 is mounted on the grille support 4.

**[0026]** On the lower, or free, end 11 of the holding member 7, there is a bracing means 10, which may help keeping the holding member in a retracted position during the mounting of the grille 17, as will be obvious below in the description referring to Fig 2a-2g.

**[0027]** In Fig 2a, the grille support 4 has been pushed into the tubular space defined by the convection plate 3 and the radiator panel 2. The connector 15 between the main member 6 and the holding member 7 helps define the correct position of the grille support 4, which the bearing surface 14 of the main member 6 also does.

**[0028]** The locking means 8 is in a neutral position in Fig 2a.

**[0029]** In Fig 2b the free end 11 of the holding member 7 is pushed towards the convection plate 3, as is shown by the arrow 19. The bracing means 10 is extended downwards, in order not to obstruct the motion of the free end 11 towards the convection plate 3. The flexibility of the connector 15 will bring about a motion in the opposite direction of the upper end of the holding member 7, so that the locking means 8 may be brought upwards, in the direction of the arrow 20, past the abutment 9, into a position where it is biased towards the abutment 9. When

the pressure on the free end 11 of the holding member 7 is released, the locking means 8 will still be biased towards the abutment 9, even though the upper end of the holding member 7 moves slightly towards the radiator panel 2. This position of the grille support is shown in Fig 2c.

**[0030]** In order to bring the holding member 7 into a retracted position, wherein the grille is most easily mounted on the grille support 4, the free end 11 of the holding member should be moved away from the convection plate 3, into the position which is shown in Fig 2d. The locking means 8 is still biased towards the abutment 9 in this position of the holding member 7.

**[0031]** In the preferred embodiment, the bracing means 10 has been moved, with a force directed along the arrow 21, into a position at an approximately right angle with the convection plate 3, in order to keep the upper end of the holding member 7 in the retracted position without applying any force on the free end 11 of the holding member 7. However, in some embodiments of the invention, the bracing means 10 may be omitted, and the free end 11 is pulled away from the convection plate 3 manually.

**[0032]** When the holding member 7 is placed in its retracted position, the grille 17 may be lowered onto the top of the radiator 1 and the grille support 4, as is shown by the arrow 22 in Fig 2e. The front edge of the grille 17 will be supported by the upper edge of the radiator panel 2, while the back edge of the grille 17 is inserted into the recess 12 of the holding member 7. When the grille 17 is lowered onto the grille support 4, its back edge may slide along the slanting surface 13. Although the edge may not come into contact with the slanting surface 13, the shape and angle of the surface 13 will provide sufficient space for the grille 17 to move into its final, mounted position. The bracing means is still kept in place by a slight force in the direction of the arrow 21.

**[0033]** To achieve the mounted position, wherein the grille 17 is fixed, the holding member 7 will first have to be released from its retracted position. In the preferred embodiment this is achieved by releasing the bracing means 10, so that the free end 11 of the holding member 7 moves towards the convection plate 3 by action of the resilience of the connector 15. Depending on the material of the connector 15 and its dimensions, the resilience could be limited in some embodiments, and the movement of the free end 11 would have to be enhanced manually. In case there is no bracing means 10 provided on the holding means 7, the free end 11 of the holding member 7 will simply have to be released. The back edge of the grille 17 is then received in the recess 12 of the holding member 7 as the upper end of the holding member moves in a direction away from the radiator panel 2 into a fixed position. This state of the grille support 4 is shown in Fig 2f.

**[0034]** In order to fix the grille 17 in its mounted position, the holding member 7 must be kept in its fixed position by moving the locking means 8 from its current open position into a locked position. In Fig 2g it is shown that pressure downwards, in the direction of the arrow 22, is applied on the grille 17, while the free end 11 of the holding member 7 is pushed towards the convection plate 3, in the direction of the arrow 19. The upper end of the holding member 7 will move slightly forward, allowing the edge of the grille 17 to enter further into recess 12, while the locking means 8 will move into contact with the abutment 9, since it is biased in that direction. While the grille 17 is pushed downwards, it will be forced towards the wall (to the right in Fig 2a-2g), and its front edge will attain a tightened fit against the top edge of the radiator panel 2.

**[0035]** When the locking means 8 has come into proper contact with the abutment 9, the grille support 4 has been locked in its fixed position, and it is possible to lift the radiator 1 by the grille 17, provided that grille supports 4 are arranged with suitable intervals, depending on the weight of the radiator 1 and on the material properties of the grille supports 4.

**[0036]** In Fig 3, the grille support 4 is show in a perspective view for a clearer view of its parts, which are described above with reference to Fig 1.

**[0037]** Fig 4 shows a view from the back side of the radiator 1. In this figure it is clear that there are apertures 18 in the grille 17, wherein a part of the slanting surface 13 of the holding member 7 is visible where the grille support 4 is mounted. The apertures 18 in cooperation with at least one grille support 4 also provide a locking of the grille 17 in its longitudinal direction, i.e. the grille 17 is kept from sliding sideways on top of the radiator 1. The parts 13 of the grille supports 4 extending through the apertures 18 will effectively block such a motion.

**[0038]** The invention may be modified within the scope of the appended claims.

## Claims

1. Grille support for an upper grille (17) on a radiator (1), which includes a corrugated convection plate (3) on its back side, wherein the grille support (4) has a main member (6), which is insertable into a space defined by the convection plate (3), **characterized in that** the grille support (4) has a resilient holding member (7) for holding the grille (17) in a fixed position.

2. Grille support according to claim 1, **characterized in that** the grille support (4) comprises a flexible connector (15) between the main member (6) and the holding member (7), for making the holding member (6) movable between a retracted position and the fixed position.

3. Grille support according to claim 1 or claim 2, **characterized in that** the grille support (4) comprises a locking means (8) for locking the holding member (7) in its fixed position.

4. Grille support according to claim 3, **characterized in that** the locking means (8) is biased towards a locked position.

5. Grille support according to claim 3 or claim 4, **characterized in that** the locking means (8) bear against an abutment (9) in its locked position.

6. Grille support according to claim 2, **characterized in that** a bracing means (10) is arranged for temporarily supporting the holding member (6) in its retracted position.

7. Grille support according to claim 6, **characterized in that** the bracing means (10) is arranged at a free end (11) of the holding member (7).

8. Grille support according to any of claims 1 to 7, **characterized in that** holding member (7) has a recess (12) for receiving an edge portion of the grille (17).

9. Method of mounting a radiator grille (17) with a grille support (4) according to any of claims 1 to 8, including the step of inserting the main member (6) in a space defined by a convection plate (3) on the radiator (1), **characterized in** the further steps of moving the holding member (6) to a retracted position, placing the grille (17) on the radiator (1), and moving the holding member (6) to a fixed position.

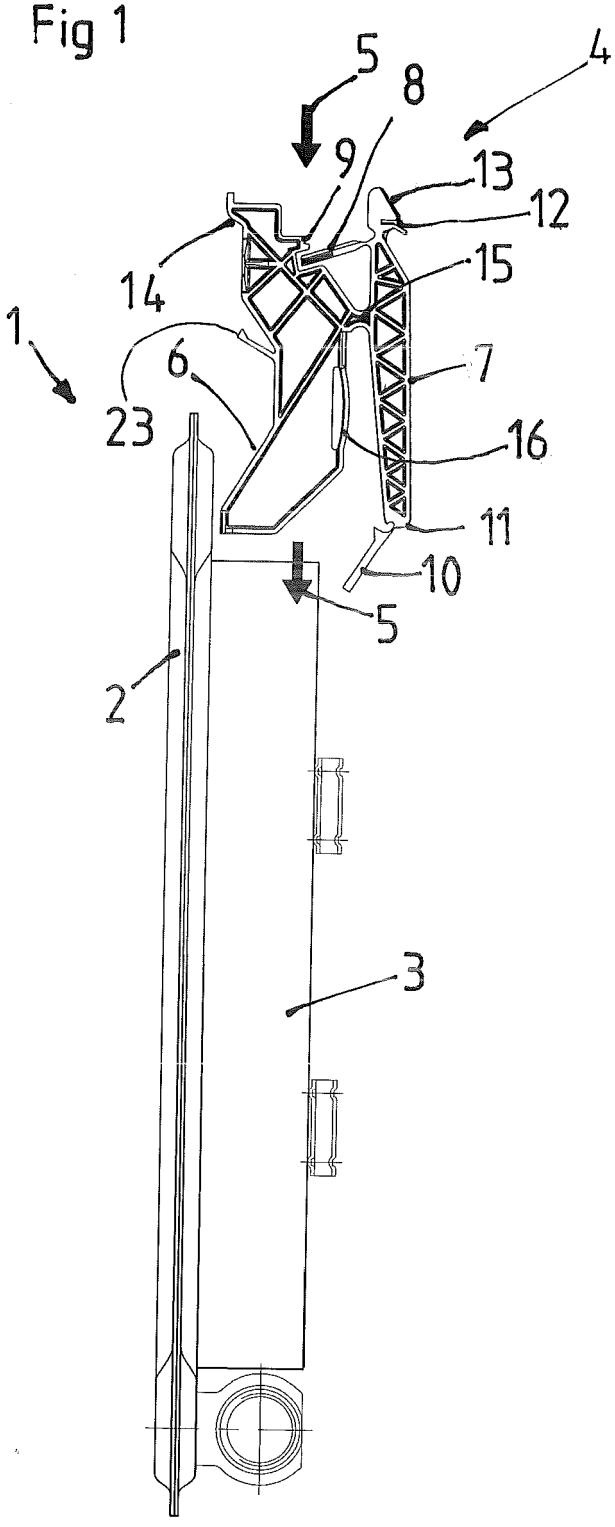
10. Method according to claim 9, **characterized in** the further steps of moving a locking means (8) to an open position before moving the holding member (6) to its fixed position, and moving the locking member (8) to a locked position after placing the grille (17) on the radiator (1).

11. Method according to claim 10, **characterized in that** the open position is a biased position and that moving the holding member (7) will simultaneously move the locking means (8) to the locked position.

12. Method according to any of claims 9 to 11, **characterized in** the further step of moving a bracing means (10) to a position where it braces the holding member (7) in its retracted position.

13. Radiator including a grille support (4) according to any of claims 1 to 8.

Fig 1



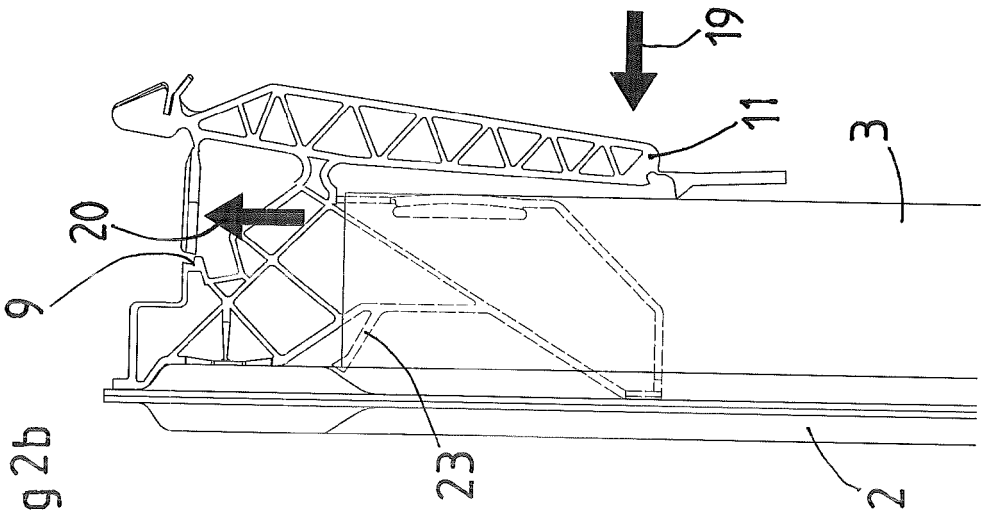



Fig 2b

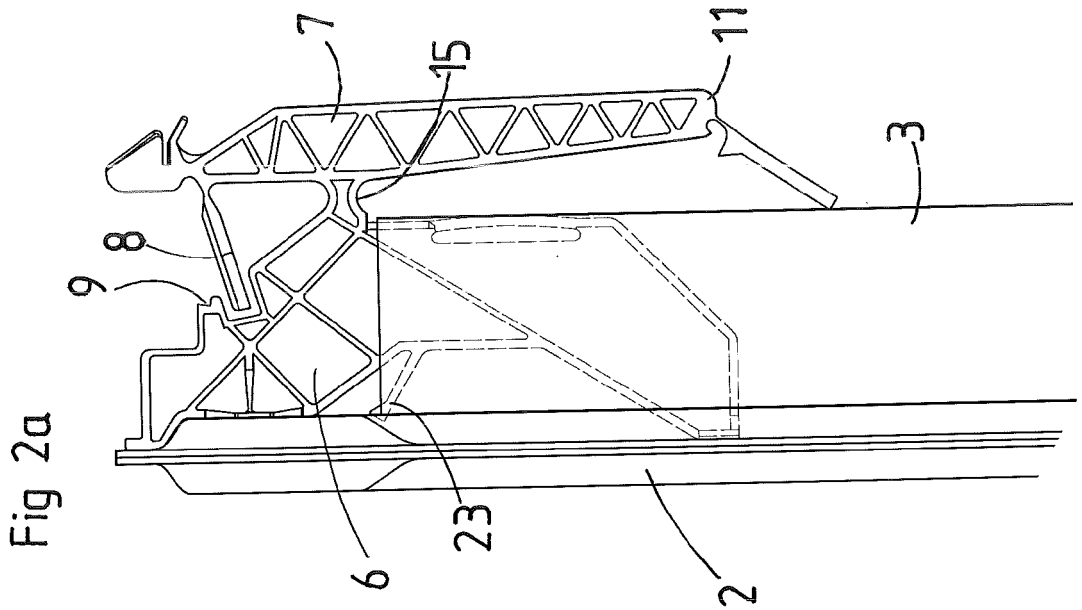



Fig 2a

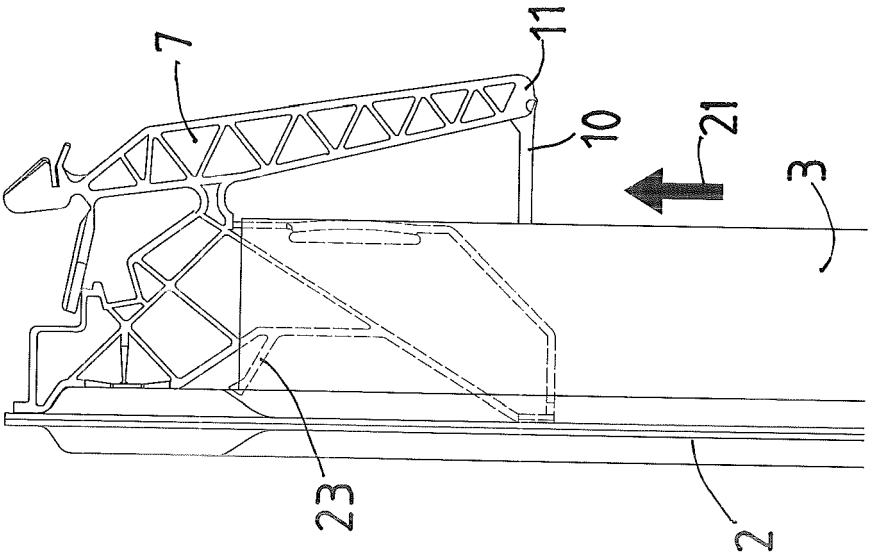



Fig 2d

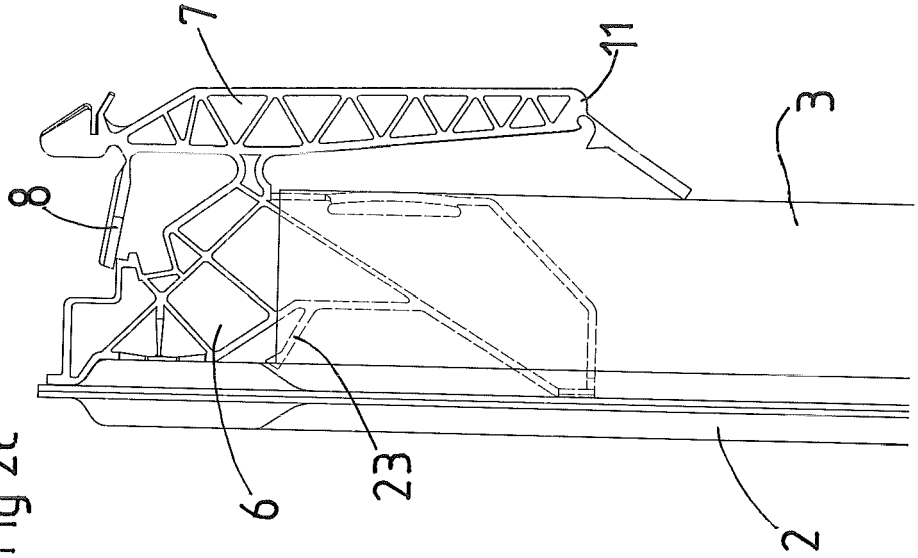



Fig 2c

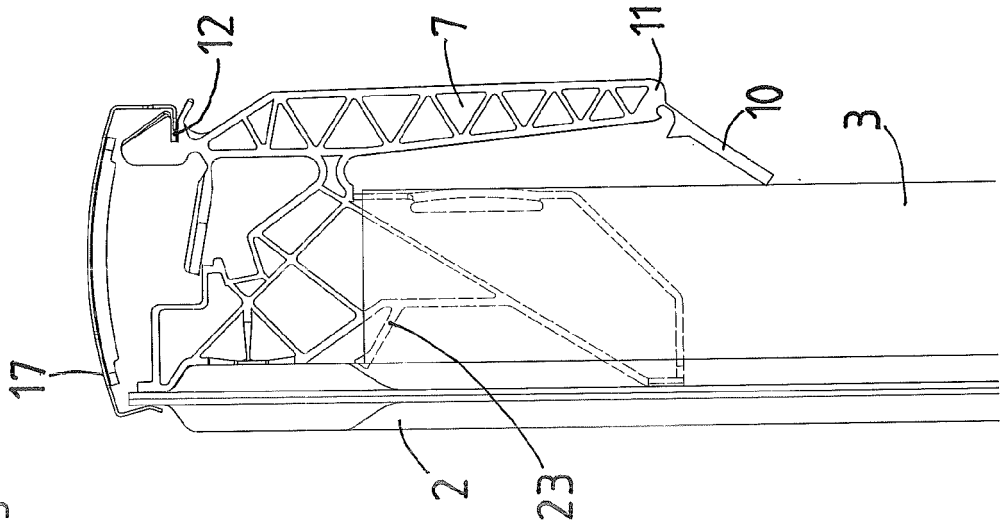



Fig 2f

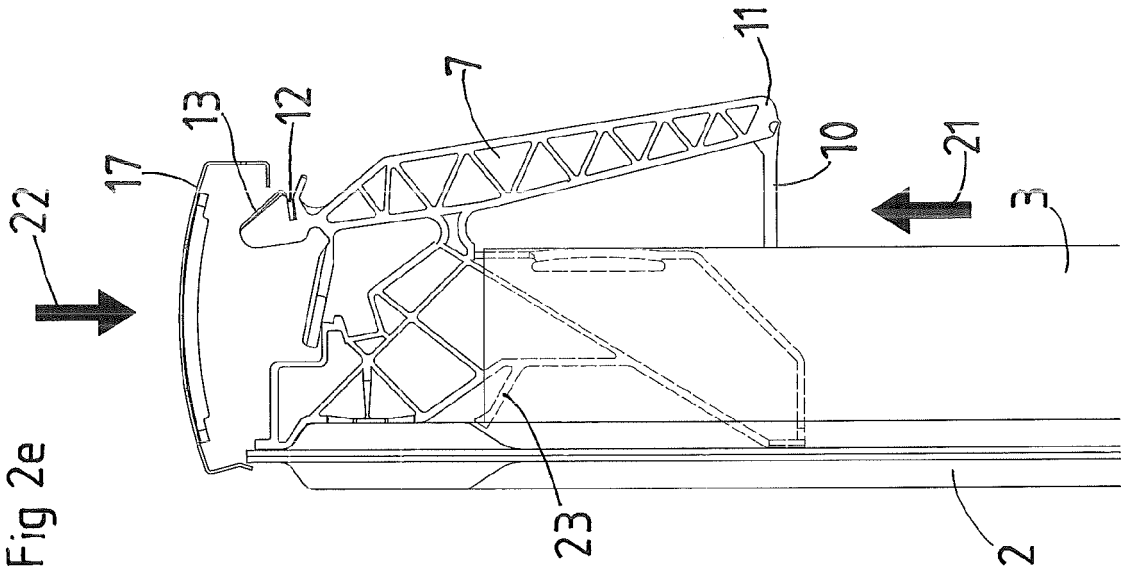



Fig 2e

Fig 2g

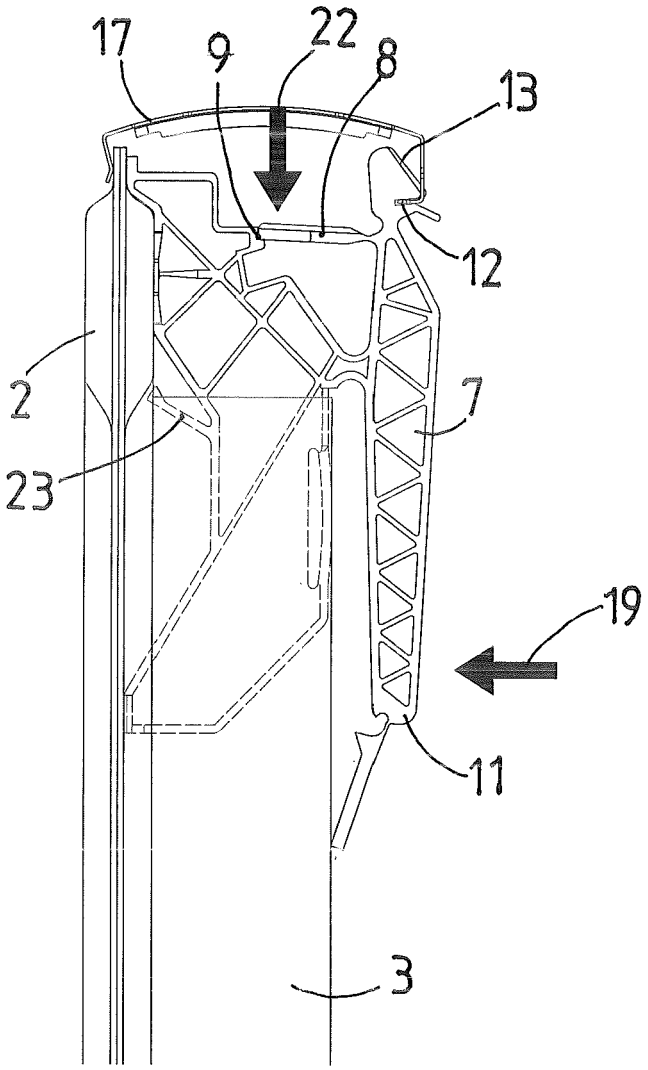
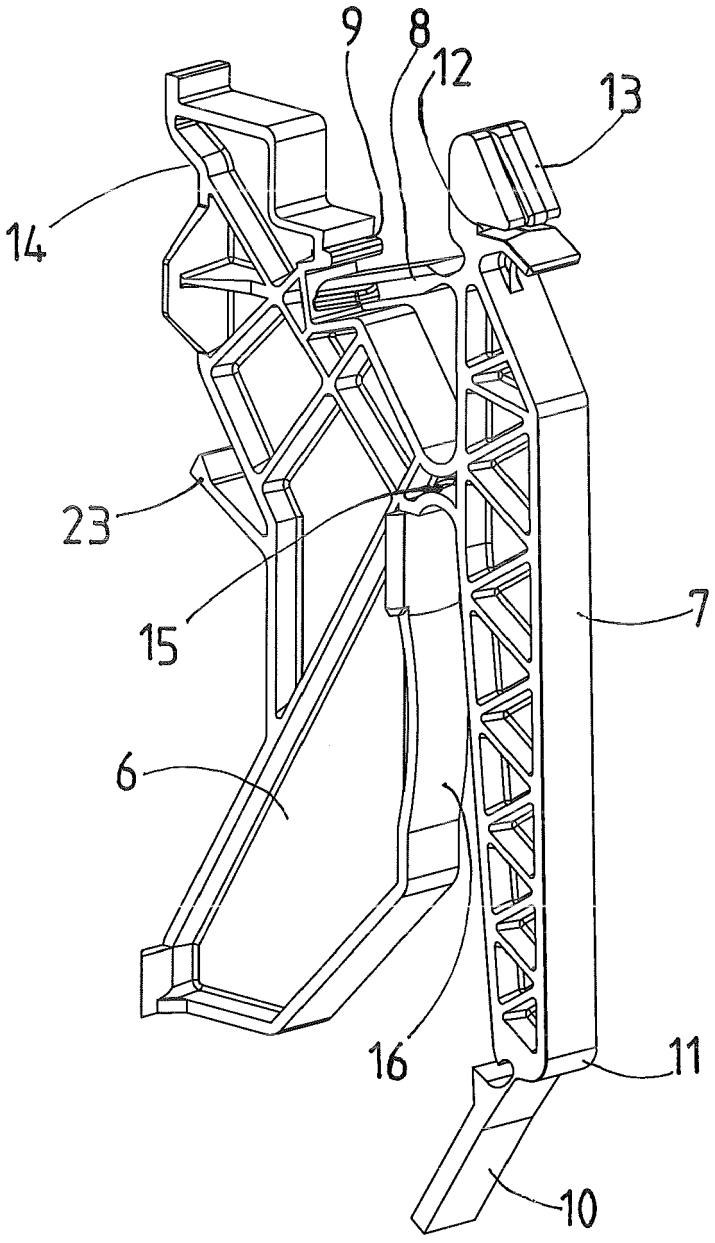


Fig 3



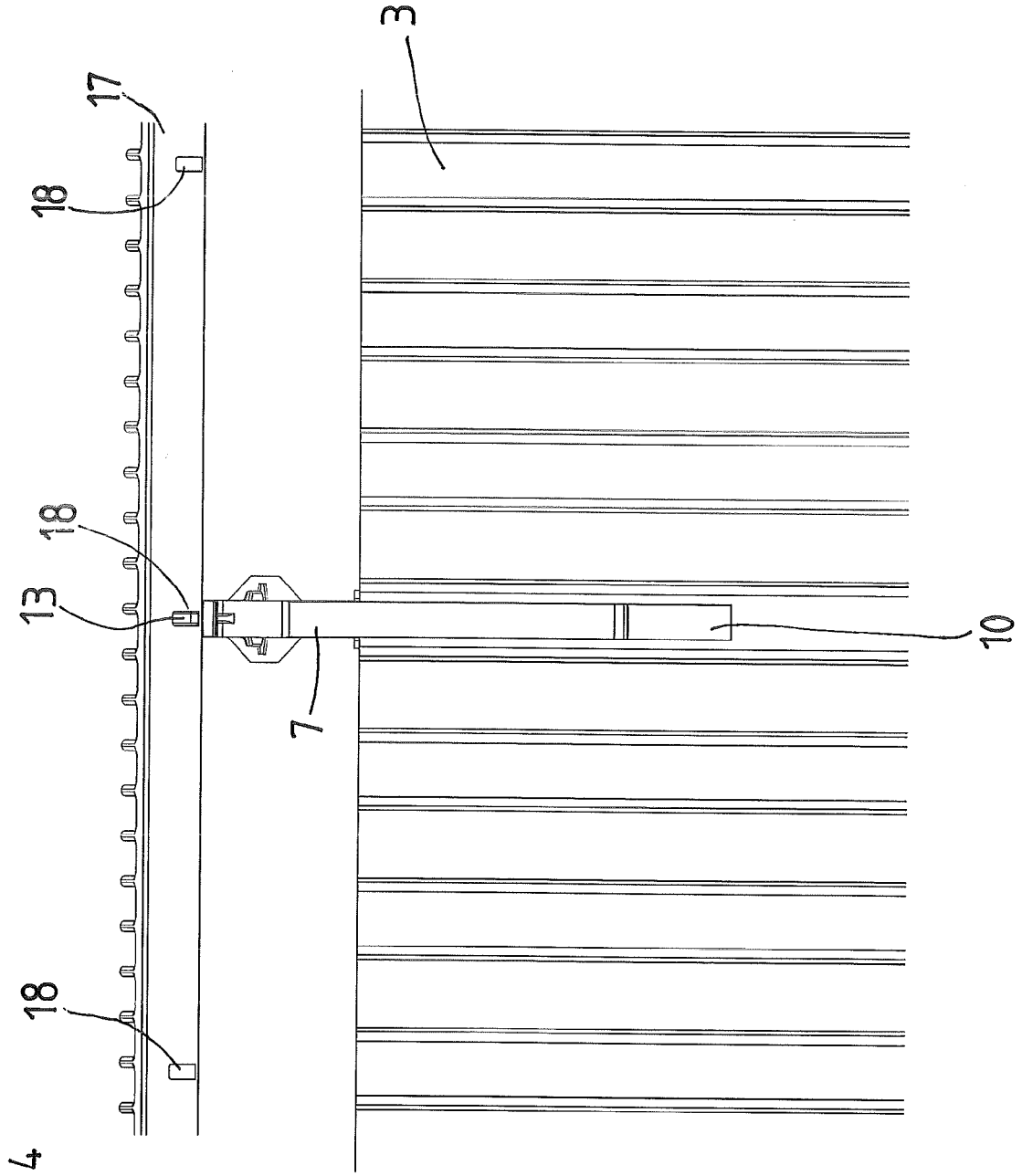



Fig 4

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# EUROPEAN SEARCH REPORT

Application Number
EP 12 19 6335

## 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 | DE 297 10 646 U1 (KERMI GMBH [DE]) 14 August 1997 (1997-08-14) * page 7 - page 10; figures 1b, 2a, 2b, 4 * | 1-7,9-13 | INV. F24D19/06 |
| X | DE 195 13 033 A1 (DIRR HEIZTECHNIK GMBH & CO KG [DE] ALUPLAN HEIZTECHNIK GMBH & CO [DE]) 12 October 1995 (1995-10-12) * column 5 - column 7; figures 1,2 * | 1,2,6-9, 12,13 | |
| X | DE 20 2009 012291 U1 (KERMI GMBH [DE]) 17 December 2009 (2009-12-17) * paragraph [0016] - paragraph [0018]; figures 1-5 * | 1-6,9,13 | |
| A | EP 1 400 759 A1 (KERMI GMBH [DE]) 24 March 2004 (2004-03-24) * the whole document * | 1-8 | |
| A | GB 2 012 564 A (S & H DESIGN PRODUCTS LTD) 1 August 1979 (1979-08-01) * the whole document * | 1,2,6,7 | TECHNICAL FIELDS SEARCHED (IPC) |
| A | EP 0 990 857 A2 (KERMI GMBH [DE]) 5 April 2000 (2000-04-05) * the whole document * | 1-5 | F24D |

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
|---|---|---|
| Munich | 22 March 2013 | Riesen, Jörg |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 12 19 6335

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22-03-2013

| Patent document cited in search report | Publication date | Patent family member(s) | Publication date |
|---|---|---|---|
| DE 29710646 U1 | 14-08-1997 | NONE | |
| DE 19513033 A1 | 12-10-1995 | DE 9405798 U1 | 26-05-1994 |
| | | DE 19513033 A1 | 12-10-1995 |
| DE 202009012291 U1 | 17-12-2009 | CN 102483244 A | 30-05-2012 |
| | | DE 202009012291 U1 | 17-12-2009 |
| | | EP 2475935 A2 | 18-07-2012 |
| | | WO 2011029545 A2 | 17-03-2011 |
| EP 1400759 A1 | 24-03-2004 | AT 426782 T | 15-04-2009 |
| | | DE 20214708 U1 | 21-11-2002 |
| | | EP 1400759 A1 | 24-03-2004 |
| GB 2012564 A | 01-08-1979 | NONE | |
| EP 0990857 A2 | 05-04-2000 | DE 29817420 U1 | 28-01-1999 |
| | | EP 0990857 A2 | 05-04-2000 |
| | | PL 335707 A1 | 10-04-2000 |

EPO FORM P0459

For more details about this annex : see Official Journal of the European Patent Office, No. 12/82