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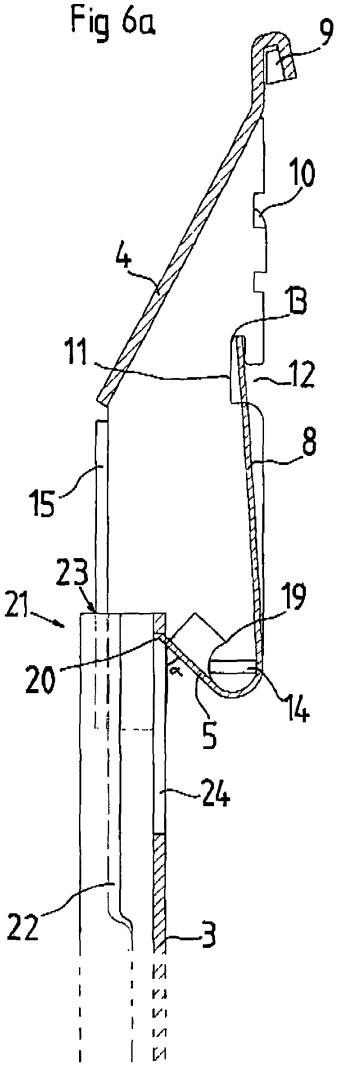
## (54) A mounting device for a radiator

(57) A device for mounting a radiator (2) on a substrate comprises an elongate rail (3), a first and a second (4) retainer device and a locking element (5) which prevents unintentional lifting of the radiator (2) from the mounting device. The retainer devices are disposed at each end region of the rail (3) and cooperate each with its portion of the radiator (2) or engagement devices disposed thereon. The second retainer device (4) is movable along the rail (3) towards and away from the first retainer device. The locking element (5) is disposed in the second retainer device (4) and makes an angle $\alpha$ with the rail (3). A force urges the locking element (5) against the rail (3) and strives to rotate the locking element (5) so that the angle $\alpha$ increases.

Fig 6a

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## Description

### TECHNICAL FIELD

**[0001]** The present invention relates to a device for mounting a radiator on a substrate, comprising an elongate rail formed for fixing on the substrate; a first retainer device at a first end region of the rail and formed for cooperation with a first portion of the radiator or an engagement device disposed thereon; a second retainer d4evice at an opposing second end region of the rail and formed for cooperation with a second portion of the radiator or an engagement device disposed thereon, the second retainer device being movable along the rail towards and away from the first retainer device; and a locking element disposed in the second retainer device For preventing unintentional lifting of the radiator from the mounting device.

### BACKGROUND ART

**[0002]** A very large number of different mounting devices are previously known in the art for retaining a radiator against a substrate, typically a wall. Many such mounting devices include, as has been intimated by way of introduction, an elongate rail which is mounted on a substrate and two retainer devices that engage with some part of, or on the radiator.

**[0003]** One among many examples of such a retainer device is shown in SE 522 030, where a mounting device is disclosed which comprises a first fixed retainer device and a helical spring that draws a second movable retainer device in a direction towards the first retainer device. The spring is disposed to extend between the rail and the movable retainer device so that it not only draws the retainer device but also a locking element in a direction towards the first retainer device. The purpose of the locking element is to prevent the second retainer device fro moving away from the first against the action of the helical spring, so that the radiator unintentionally loosens from the mounting device, for example on being jolted. On intentional dismounting of the radiator, use is made of a special tool for releasing the locking element. This construction per se functions well but suffers fro the drawback that it includes many parts, which entails a quite complicated mounting operation, since the mounting device is in general delivered ready-mounted. In addition, there is the drawback involved in costs for manufacture and storage of the components included in the mounting device.

**[0004]** Yet a further example of the prior art technology is shown in DE 20 217 874 U. This document discloses a construction where, granted, success has been achieved in obviating counterparts to the helical spring described above, by refraining from the movable retainer device automatically being drawn towards the fixed retainer device. However, the need for protection against the movable retainer device moving away from the fixed retainer device, and the risk that the radiator comes loose from the mounting device still remain to be solved. Attempts have been made to rectify this problem by providing a locking element which extends in the lateral direction so that it comes into contact with the rail at at least two places on each side thereof. For release of the locking elements, a release tool is integrated in the movable retainer device. When the release tool forcibly acts on the locking elements these reduce the strength of their engagement with the rail, or possibly lose contact altogether with the rail so that the retainer device is freely movable as long as the release tool is actuated.

**[0005]** The greatest drawback inherent in this construction is that the force that is inherent in the locking elements is not sufficient to keep the retainer device in its place. Thus, it is quite simple to release the radiator from the mounting device without actuating the release tool, and the risk of unintentional loosening of the radiator has, as a result, increased considerably. A further drawback in this construction is that, despite the fact that a detail as described above has been eliminated, it still contains quite a large number of components.

### PROBLEM STRUCTURE

**[0006]** Thus, the object of the present invention is to realise a mounting device which functions well in that unintentional loosening is actually prevented, at the same time as the use of the mounting device is intended to be as simple as possible. There is also a need in the art that such a mounting device contain as few components as possible, for facilitating manufacture, assembly and storage.

### SOLUTION

**[0007]** The object forming the basis of the present invention will be attained if the device intimated by way of introduction is characterised in that the locking element makes an angle $\alpha$ with the rail and is urged against the rail with a force striving to rotate the locking element so that the angle $\alpha$ increases.

**[0008]** Further advantages will be attained if the device according to the present invention is moreover given one or more of the characterising features as set forth in appended Claims 2 to 5.

### BRIEF DESCRIPTION OF THE ACCOMPANYING DRAWINGS

**[0009]** The present invention will now be described in greater detail hereinbelow, with reference to the accompanying Drawings. In the accompanying Drawings:

Fig. 1 is a straight side elevation of an upper portion of the mounting device according to the present invention together with a radiator mounted thereon;

Figs. 2a and b are straight side elevations of two components included din the mounting device in the dismounted state;

Fig. 3a is a plan view of the component illustrated in Fig. 2b;

Fig. 3b is a perspective view of the component in Figs. 2b and 3a;

Figs. 4a and b are plan views from two direction s of the retainer device included in the mounting device according to the present invention;

Figs. 5a and b are a plan view and an end elevation, respectively, of the rail included in the mounting device; and

Fig. 6a and b are sectional views of the mounting device in two different positions during mounting.

## DESCRIPTION OF PREFERRED EMBODIMENT

**[0010]** In the following description, use will be made of expressions such as 'upwards', 'downwards' and 'laterally'. These expressions principally relate to the orientation which the device according to the present invention assumes in the Figures, even if this orientation may possibly deviate from the orientation of the device while in operation in reality.

**[0011]** Fig. 1 shows a mounting device 1 according to the invention together with a radiator 2 which the mounting device 1 is intended to mount on a substrate, usually a wall. The mounting device 1 largely includes a rail 3 disposed on the substrate, upper and lower retainer devices, of which only the upper retainer device 4 is shown in Fig. 1, and spring means 8 which acts on the locking element 5.

**[0012]** The radiator 2 is gripped by the upper retainer device 4 around its upper edge 6 via an adapter 7. While this is not shown in the Figures, it is also conceivable that the retainer device 4 be formed for directly gripping around the edge 6 of the radiator 2 or also with an engagement device specifically provided for this purpose, for example on that side of the radiator 2 turned to face towards the wall. The radiator 2 is preferably gripped by an additional retainer device included in the mounting device 1 which, however, is not shown in the Figures. This retainer device is typically fixed and, in the preferred embodiment which is shown in Fig. 1, it would grasp around the lower edge of the radiator 2 or a lower engagement device on the radiator 2. The design of the lower, typically fixed retainer device may vary and is not a germane part of the invention unless it is designed as the retainer device in Fig. 1.

**[0013]** The rail 3 is secured in the substrate by means of screws or similar fixing means. Both the fixing means and the rail 3 are of relatively conventional type and will be described in greater detail hereinbelow with reference to Fig. 5. However, it should be pointed out that the rail 3 is quite elongate so that it extends between the two retainer devices of which the movable retainer device 4 is shown. Finally, the rail 3 is also provided with one or more holes for receiving the fixing means.

**[0014]** The retainer device 4 which is movable is shown in Fig. 1 and grips directly around some portion of the radiator 2, or via an adapter 7 in the manner illustrated in Fig. 1 or in any corresponding manner.

**[0015]** The locking element 5 makes an angle $\alpha$ with the rail 3. The outer edge of the locking element 5 which is not shown in Fig. 1 is in contact with the rail 3. The contact between the locking element 5 and the rail 3 is so strong that a powerful engagement between them is obtained and prevents the retainer device 4 from moving upwards, which entails that unintentional loosening of the radiator 2 from the mounting device 1 is counteracted. An upward movement of the retainer device 4 while the locking element 5 is in engagement with the rail 3 would namely entail that the angle $\alpha$ would increase. This is strongly counteracted by the inherent material properties of the locking element 5 and the spring means 8. A downward movement of the retainer device 4, which would lead to an improved engagement with the radiator 2, is however not prevented by the locking element 5. Such a movement tends to reduce the angle $\alpha$, which entails that its contact forces with the rail 3 are reduced, whereby the friction between the locking element 5 and the rail 3 is reduced so that the movement is permitted.

**[0016]** In the preferred embodiment, the spring means 8 is connected to the locking element 5 at that end which is opposite to the rail 3. The spring means 8 and the locking element 5 are resilient in relation to one another and when they are urged towards one another, they elastically strive away from one another. This results in the engagement of the locking element 5 with the rail 3 becoming stronger and improved if the spring means 8 is constantly urged against the locking element 5, i.e. if the spring means 8 is pretensioned towards the locking element 5.

**[0017]** The material properties in the locking element 5 and the spring means 8, as well as the elasticity therein are such that it is simpler to press the locking, element 5 and the spring means 8 to one another in relation to an unloaded position than to separate them from one another from the unloaded position. This factor results in the device according to the present invention having, in the preferred embodiment, a so-called one way locking with the aid of the locking element 5. A one way locking entails that a movement in one direction, i.e. downwards in Fig. 1, of the movable retainer device 4 is permitted, while an upward movement, or away from the fixed retainer device, is not possible. A loosening of the retainer device 4, i.e. an upward movement thereof requires that the locking element 5 be actuated with the aid if a special

tool. Such a tool grasps directly in the locking element 5 and reduces the angle $\alpha$ between the locking element 5 and the rail 3. In such instance, the locking element 5 loses, or at least reduces its contact with the rail 3 and an upward movement of the retainer device 4 is made possible.

**[0018]** As is shown in the preferred embodiment, the spring means 8 and the locking element 5 are of one piece manufacture with one another, even though it is possible to conceive of an embodiment where the spring means 8 is manufactured separately from the locking element 5. The spring means 8 need not even be a leaf spring, as shown in Fig. 1, but could very well be any other type of spring which pretensions the locking element in such a manner that the angle $\alpha$ strives to increase.

**[0019]** Fig. 2a shows the retainer device in detail without the rail 3 and the combined locking element 5 and spring means 8. The retainer device 4 is provided with an engagement member 9 for engagement either directly with the radiator 2 or with an adapter 7. A distance below, the retainer device 4 is provided with a pair of upper projections 10, of which only the one is visible in the side elevation according to Fig. 2a. The function of the upper projection 10 is to serve as a support on manual downward actuation of the retainer device 4 to a fixed engagement with the radiator 2 on mounting thereof.

**[0020]** A further distance below the upper projection 10, there are provided a pair of recesses 11. The recesses 11 are disposed to receive a part of the spring means 8, which will be described in greater detail below. The entry of the recess 11 is relatively wide so that a part of the spring means 8 can be inserted therein, while the recess 11 has an upwardly angled section 13 which is considerably narrower than the width of the entry 12, but which is nevertheless sufficiently large to receive a section of the spring means 8, i.e. the angled section 13 is wider than the thickness of the spring means 8.

**[0021]** At the lower end of the retainer device 4, there is disposed a fixing device 14 which is realised in that a portion of the material in the retainer device 4 is bent inwards. The presence of the fixing device 14 contributes in retaining the spring means 8 in a pretensioned position, and thereby the locking element 5, already before the retainer device 4 has been mounted on the rail 3.

**[0022]** Finally, the retainer device 4 has two lateral projections 15 which are provided for guiding in and maintaining the retainer device 4 in a slidable position at the end area of the rail 3. The function of the lateral projections 15 will be clarified further in the description of the detailed formation of the rail 3 given below, with reference to Fig. 5.

**[0023]** Fig. 2b shows the composite locking element and spring means 5, 8. Together, this arrangement has an angled form with two shanks 16 and 17, the long shank 16 constituting the main portion of the spring means 8, while the short shank 17 constitutes the main portion of the locking element 5.

**[0024]** At the end of the long shank 16, there are provided a pair of projections or fixing lugs 18 symmetrically thereon. The fixing lugs 18 are disposed to be inserted in the recesses 11 in the retainer device 4.

**[0025]** On the short shank 17, there are disposed a pair of catch means 19, preferably on both sides thereof The catch means 19 are disposed for engagement with the fixing device 14 at least temporarily, but possibly also permanently.

**[0026]** At the end of the short shank 17, there is disposed a tongue 20. The function of the tongue 20 is to guide the locking element 5 in the rail 3. To this end, a groove 24 is provided in the rail 3. This groove 24 is shown first in Fig. 5a, which will be described in greater detail below.

**[0027]** Fig. 3a is a plan view of the combined spring means and locking element 8 and 5, seen in the direction of the arrow A in Fig. 2b. It is more clearly apparent from this view that both the fixing lugs 18 and the catch means 19 in the preferred embodiment are disposed in mirror symmetry around an imaginary plane through the locking element and spring means 5 and 8. The tongue 20 is also more clearly visible in this view.

**[0028]** Fig. 3b shows the combined locking element and spring means 5 and 8 in perspective, which may serve the purpose of further clarifying the mutual positioning of the fixing lugs 18, the catch means 19 and the tongue 20 as well as their respective orientations.

**[0029]** Fig. 4a is a plan view of the retainer device 4 with the mounted spring means 8. The positioning of the locking element 5 can only be guessed in this Figure. The view which is shown in Fig. 4a is that side which is turned to face towards the radiator 2 on use of the mounting device 1. The fixing lugs 18 are inserted in recesses 11 in the retainer device 4 and are securely held in position in that they are moved into the angled section 13 and thereby cannot simply be released, since the spring means 8 is slightly pretensioned. This pretensioning is realised in that the catch means 19 now engage around the fixing devices 14.

**[0030]** In this view of the retainer device 4, the upper projections 10 and lateral projections 15, as well as their design are also clearly visible.

**[0031]** Fig. 4s shows the retainer device 4 with the locking element 5 and the spring means 8 mounted therein. This view is taken in the opposite direction compared with the view in Fig. 4a, i.e. that side of the retainer device 4 which is turned to face towards the rail 3 disposed on the substrate, i.e. the wall, is shown.

**[0032]** The locking element 5 with the tongue 20 are particularly clearly apparent from this view.

**[0033]** Fig. 5a is a plan view of an en portion 21 of the rail 3. Fig. 5b shows the same end portion in end elevation, i.e. seen from the arrow B in Fig. 5a. Most proximal the end of the rail 3, an inward fold 22 is made on each side of the material in the rail 3. In such instance, a guide 23 is formed in which the lateral projections 15 on the retainer device 4 may be accommodated. Further guiding

of the locking element 5, apart from the inward guiding which the retainer device 4 provides will be obtained by the groove 24 in which the tongue 20 of the locking element 5 is intended to run. On both sides of the groove 24, the free edge of the locking element 5 will abut and engage powerfully.

**[0034]** Fig. 5a also shows a hole 25 which is intended for securing of the rail 3 in the substrate, in general a wall.

**[0035]** Fig. 6a shows the upper retainer device 4 in the process of being mounted on the rail 3. For the sake of clarity, the radiator 2 is not included in this Figure, even though, in normal cases, it is disposed in the proximity of the rail 3, typically supported on the retainer device disposed in the opposite end of the rail 3.

**[0036]** The retainer device 4 has been passed down a distance in the guide 23 and the tongue 20 has snapped into the groove 24. Since the locking element 5 extends on both sides of the groove 24, its edge will abut against the rail 3 in these regions, and prevents the tongue 20 from projecting further into the groove 24.

**[0037]** That position which is shown in Fig. 6a is the uppermost position in which the retainer device 4 can be deemed to be mounted on the rail 3. The locking element 5 is in contact with the rail 3 and prevents in principle an upward movement of the retainer device 4. In this position, the tongue 20 will also provide an additional locking against the retainer device 4 being drawn upwards. The reason for this is that the tongue 20 will come into contact with the upper region of the groove 24 I this position. The contact of the locking element 5 with the rail 3 is, however, sufficient to prevent an unintentional upward movement of the retainer device 4.

**[0038]** Fig. 6b shows a more typical position of use when the radiator 2 has been mounted in place with the aid of the mounting device 1. The contact between the locking element 5 and the rail 3 prevents, as was mentioned above, an upward movement. If, on the other hand, a release of the radiator 2 is desired, for example on replacement or repair, it is possible to actuate the locking element 5 in order to loosen it from the rail. In Fig. 6b, the arrow C shows the suitable point of attack for a release tool and the direction of the force that should be applied with the release tool. When such a force of sufficient strength is applied on the locking element 5, this will be urged towards the longer shank 16, which entails that the angle $\alpha$ is reduced. The contact between the front edge of the locking element 5 and the rail 3 will be reduced or will cease completely. Regardless of what happens, the urging force will be reduced and thereby the friction between the locking element 5 and the rail 3. It is then possible to draw the retainer device 4 upwards. If the release tool is no longer urged against the locking element 5 during the upward movement, the locking element 5 will spring back towards the rail 3 and come into contact therewith with a greater force. Further attempts to draw the retainer device 4 upwards result in the angle $\alpha$ increasing and the movement is blocked It is thus necessary to apply a force with the aid of the release tool on the locking element 5 throughout the whole of the desired upward movement.

**[0039]** The release tool may have a series of different designs, but is preferably hook-like. Possibly, it may be integrated in the retainer device 4. Particularly advantageous is if the lower portion of the release tool can be given a linear abutment against the locking element so that a substantially symmetrical force can be applied thereon. At the upper end of the release tool, there is preferably disposed a suitable retainer device or handle, in order for the user to apply a grip that is steady and can be maintained throughout the entire upward movement.

**[0040]** The present invention may be further modified without departing from the scope of the appended Claims.

## Claims

1. A device for mounting a radiator (2) on a substrate, comprising: an elongate rail (3) formed for fixing on the substrate, a lower retainer device at a lower end region of the rail (3), and formed for cooperation with a lower portion of the radiator (2) or an engagement device disposed thereon; an upper retainer device (4) at an opposing end region (21) of the rail (3) and formed for cooperation with an upper portion (6) of the radiator (2) or an engagement device disposed thereon, the upper retainer device (4) being movable along the rail (3) towards and away from the lower retainer device, and a locking element (5) disposed in the upper retainer device (4) for preventing unintentional lifting of the radiator (2) from the mounting device (1), the locking element making an angle ($\alpha$) with the rail (3) and being urged against the rail (3) with a spring force that strives to rotate the locking element (5) so that the angle ($\alpha$) increases, **characterised in that** spring means (8) realising the spring force extends between the upper retainer device (4) and the locking element (5).

2. The device as claimed in Claim 1, **characterised in that** the spring means (8) is of one piece manufacture with the locking element (5).

3. The device as claimed in Claim 1 or 2, **characterised in that** the spring means (8) is tensioned in the upper retainer device (4),

4. The device as claimed in Claim 1, **characterised in that** the spring means (8) is pretensioned towards the locking element (5).

Fig 1

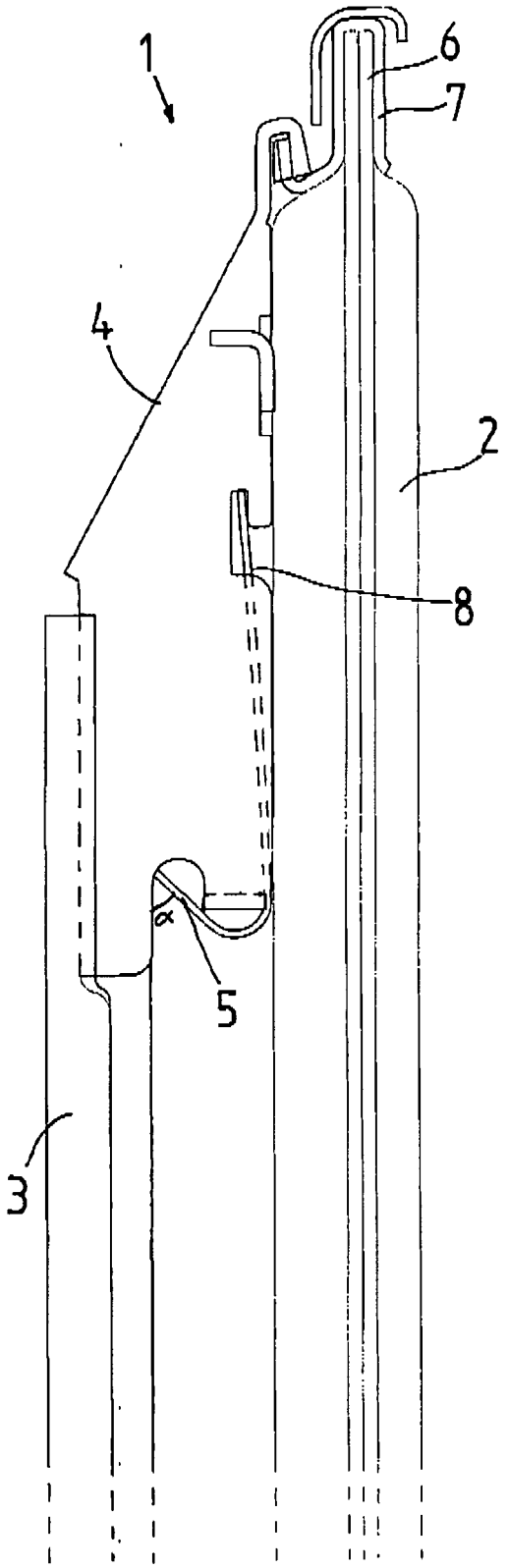


Fig 2a

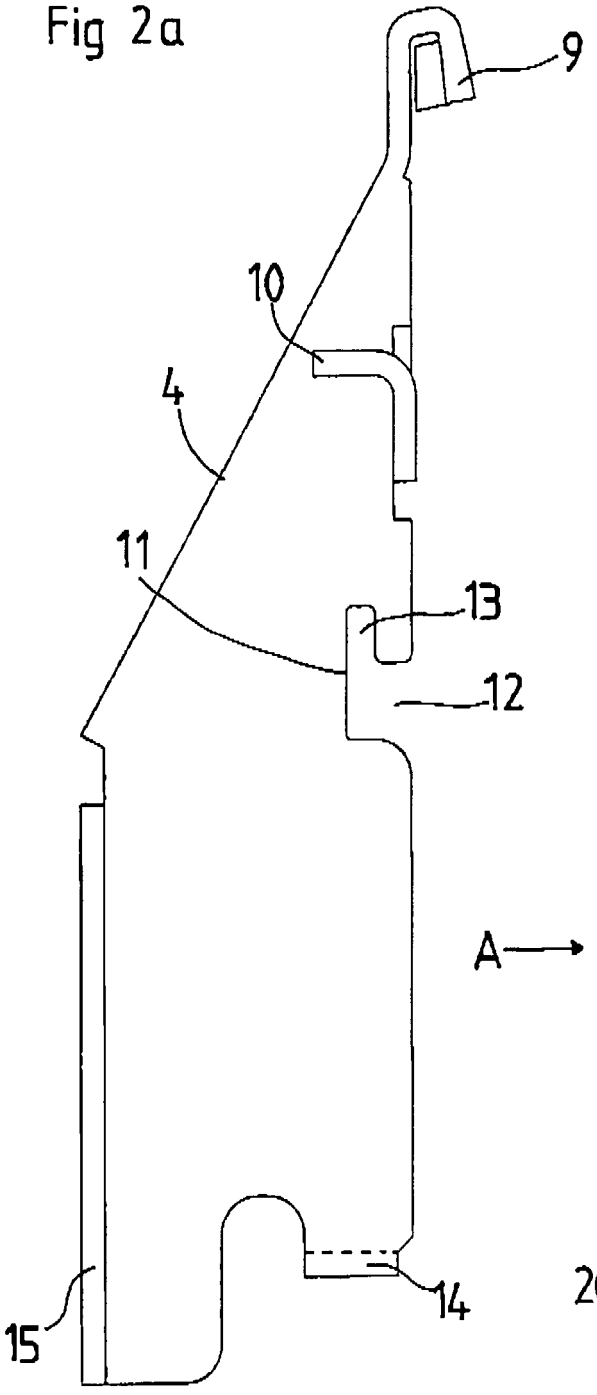
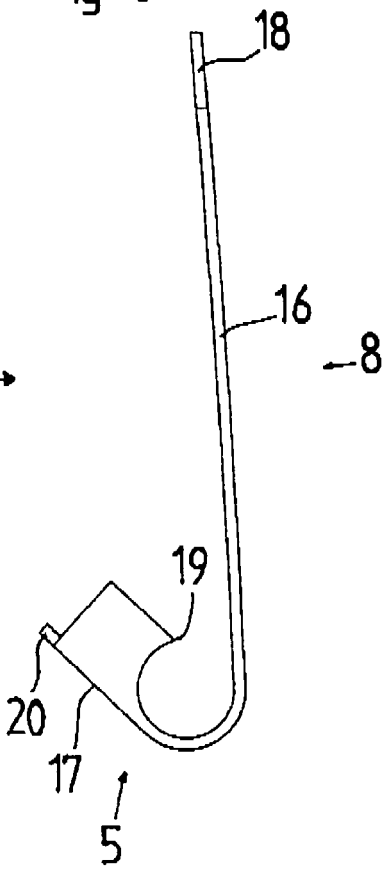



Fig 2b



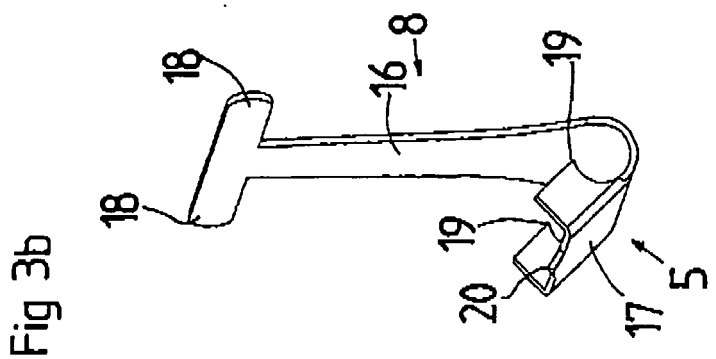



Fig 3b

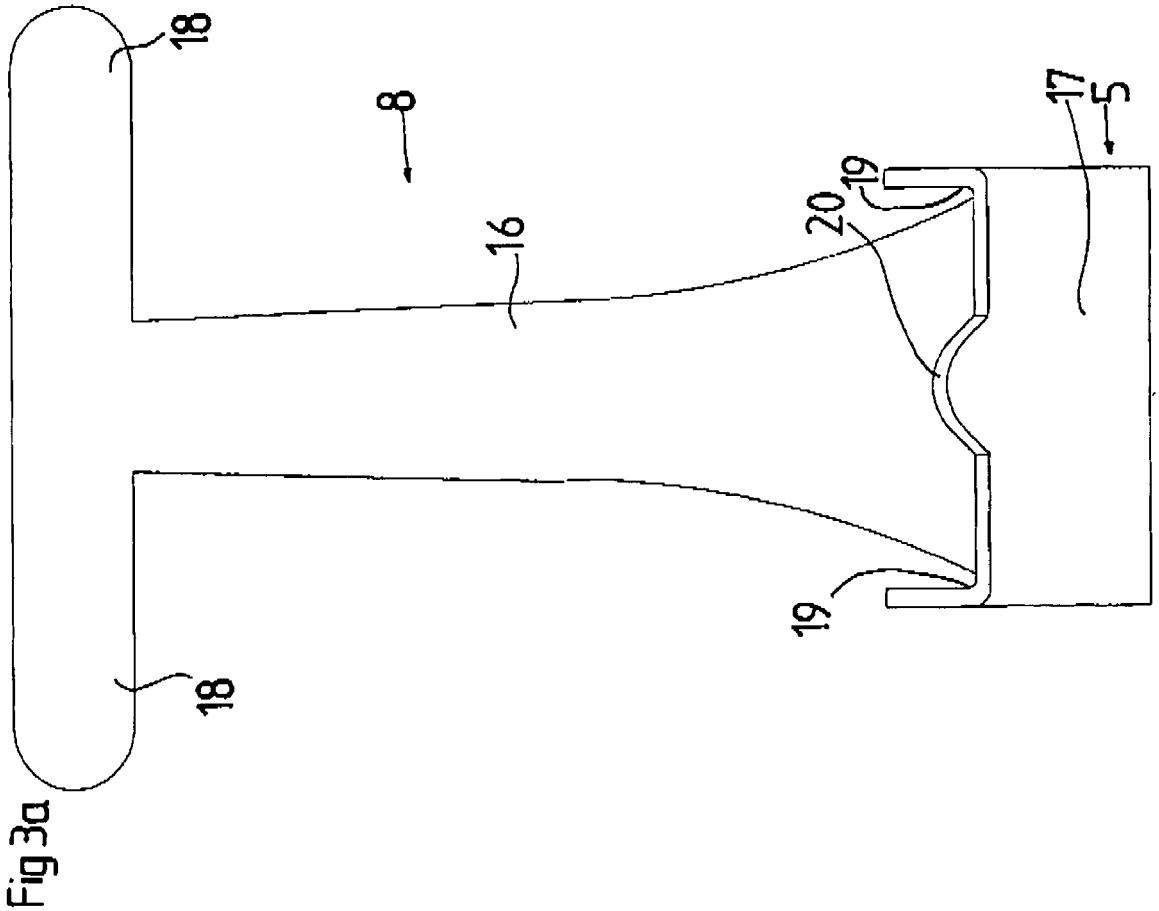



Fig 3a

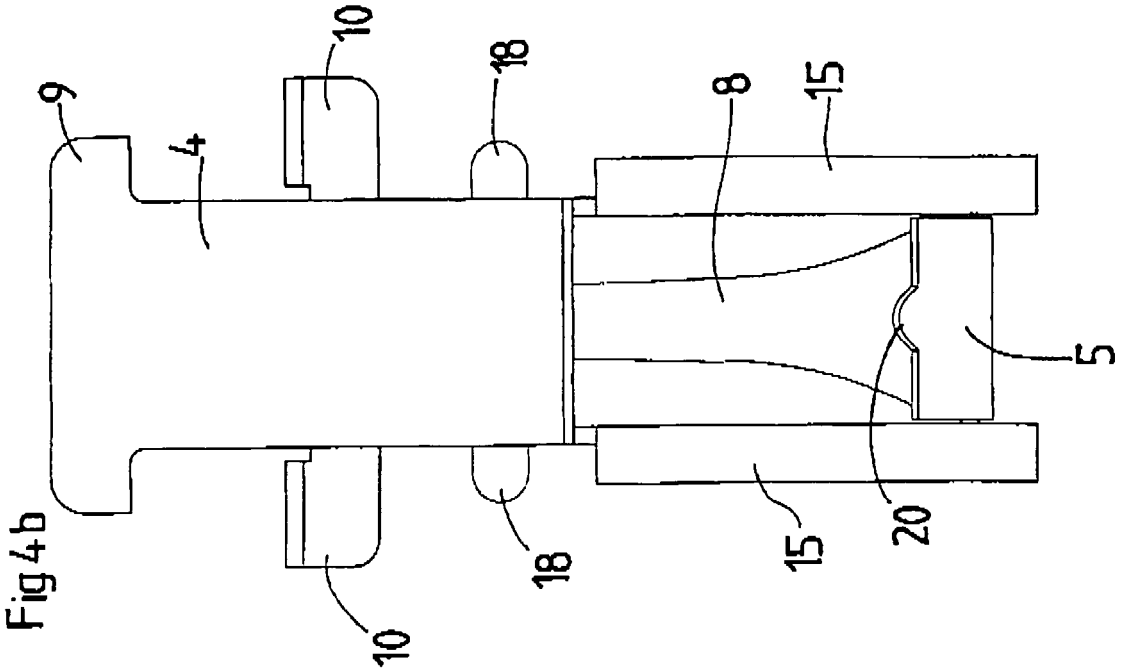



Fig 4b

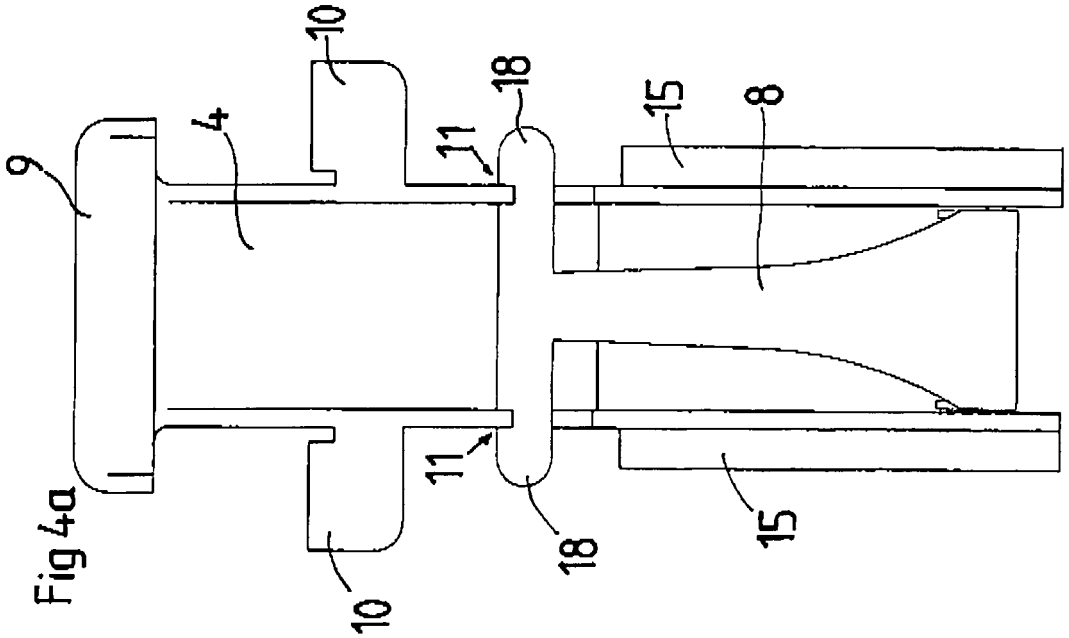



Fig 4a

Fig 5a

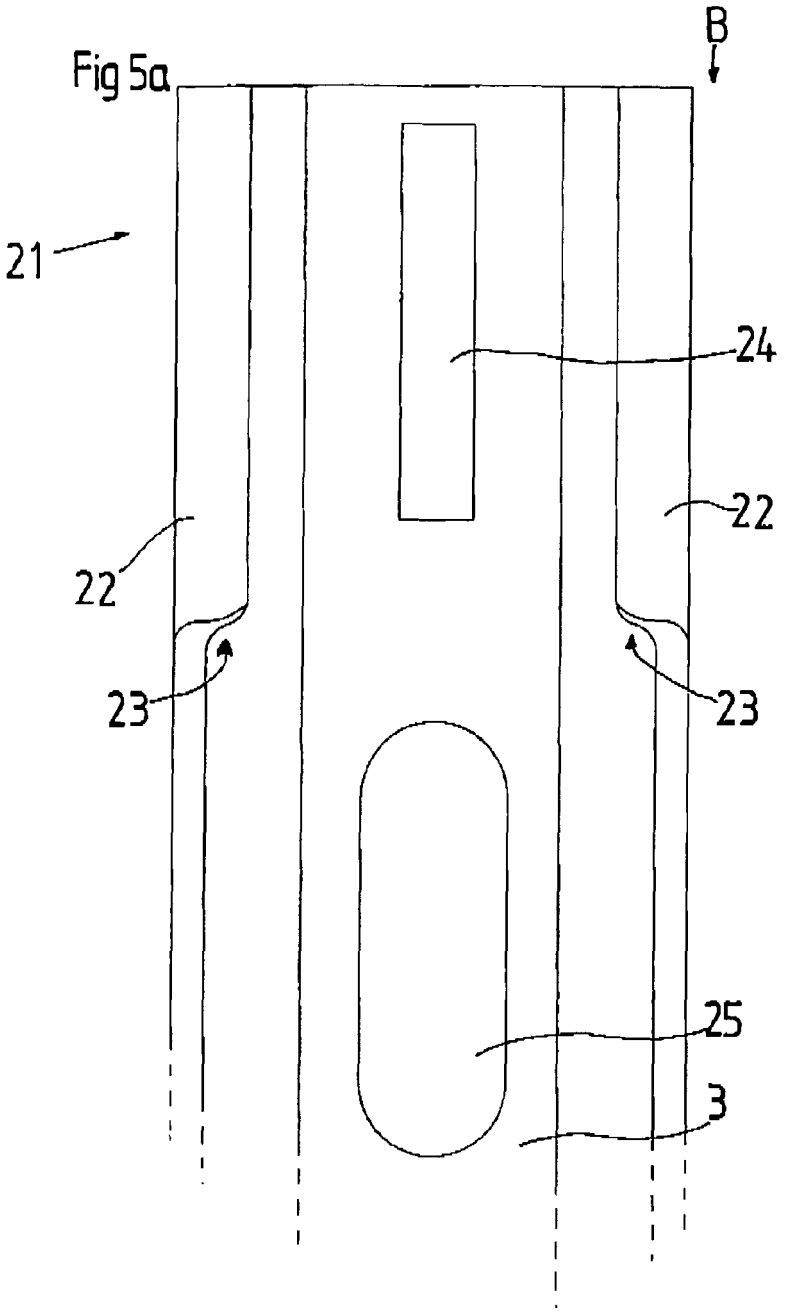



Fig 5b

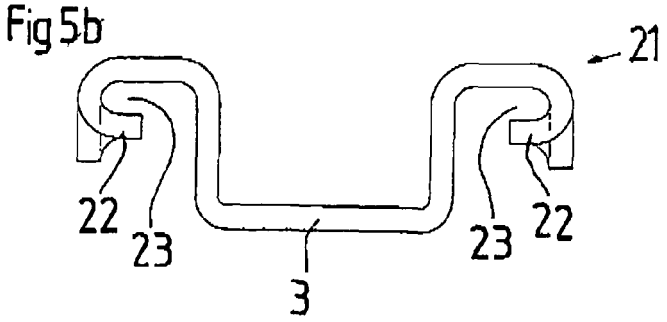


Fig 6a

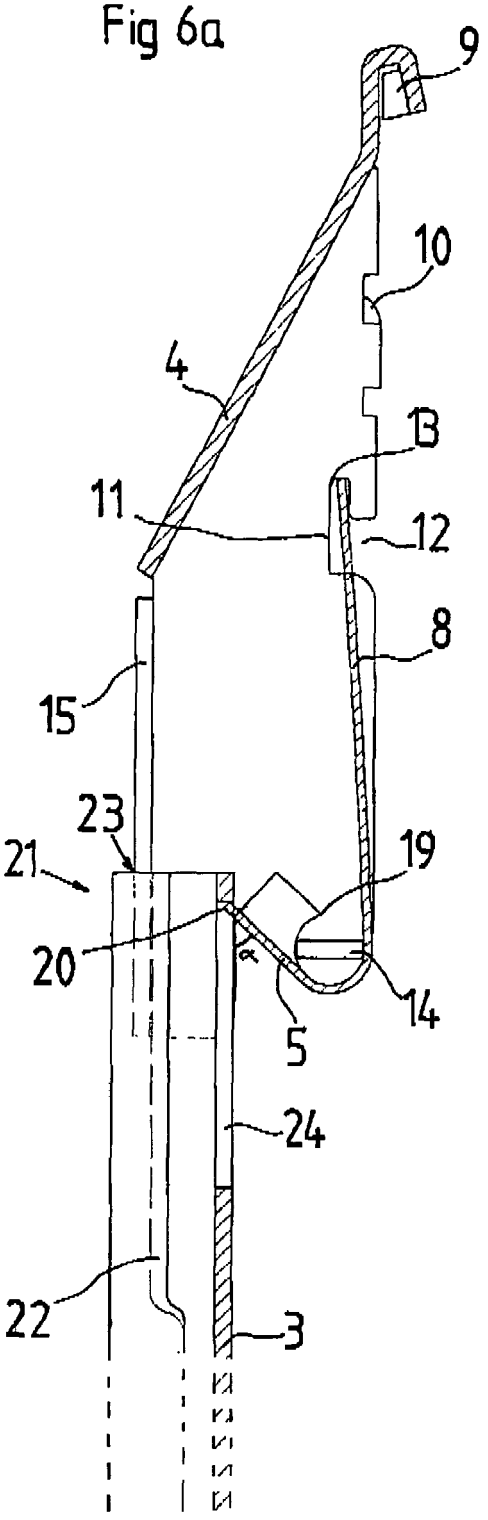

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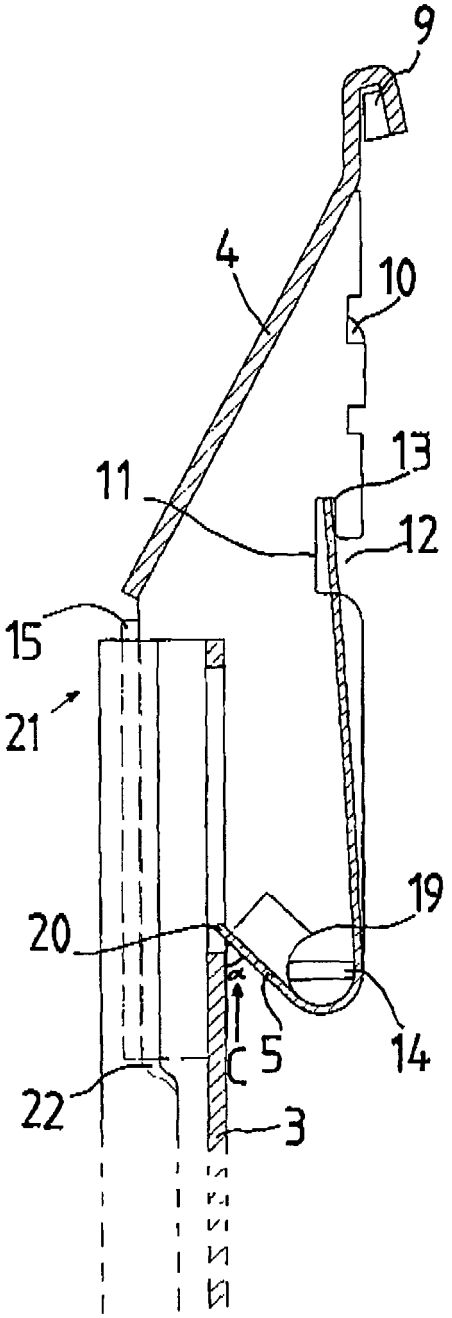
Fig 6b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# EUROPEAN SEARCH REPORT

Application Number
EP 06 00 9513

## DOCUMENTS CONSIDERED TO BE RELEVANT

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|---|---|---|---|
| X | EP 1 420 211 A2 (ULAMO BEHEER BV [NL]) 19 May 2004 (2004-05-19) * paragraph [0016] - paragraph [0023]; figures 1-3 * | 1-4 | INV. F24D19/02 |
| X | DE 198 53 061 C1 (GOTTBEHUET HANS GERD GMBH [DE]) 5 January 2000 (2000-01-05) * column 4, line 16 - line 61; figures 3,4,9 * | 1-4 | |
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TECHNICAL FIELDS SEARCHED (IPC)

F24D

The present search report has been drawn up for all claims

| Place of search | Date of completion of the search | Examiner |
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| Munich | 2 October 2006 | Arndt, Markus |

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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1

EPO FORM 1503 03.82 (P04C01)

## ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 06 00 9513

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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02-10-2006

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

## REFERENCES CITED IN THE DESCRIPTION

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### Patent documents cited in the description


- SE 522030 **[0003]**
- DE 20217874 U **[0004]**