(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 2 505 738 A2**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.10.2012 Bulletin 2012/40

(51) Int Cl.:
E04F 13/08 *(2006.01)* ***E04D 13/158*** *(2006.01)*

(21) Application number: **12162609.7**

(22) Date of filing: **30.03.2012**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA ME

(30) Priority: **30.03.2011 NL 2006491**

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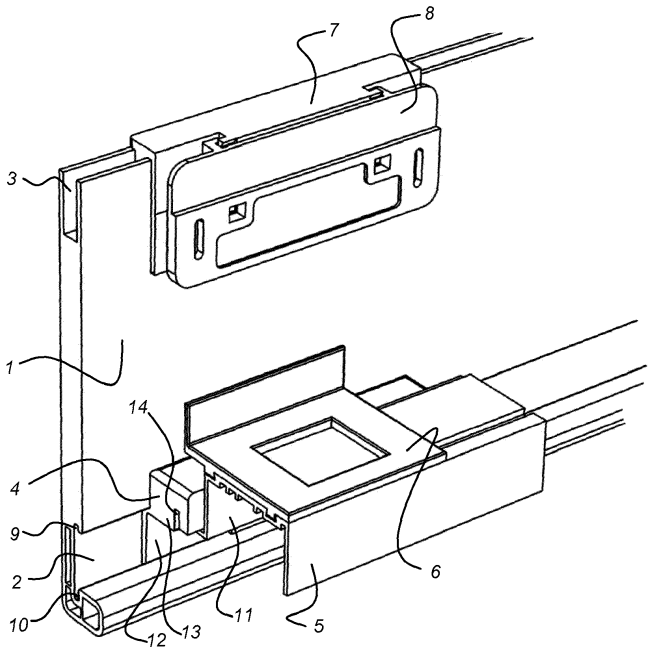
(54) **Panel connecting assembly**

(57) The invention relates to a panel attachment assembly comprising a panel which on one side is provided with a panel rail that is continuous in the longitudinal direction, and a suspension assembly comprising a suspension rail and a suspension member, wherein the suspension member comprises a panel attachment end that is adapted for being accommodated in the panel rail, and a hook member adapted for being able to hook into a continuous rail hook on the suspension rail. In one embodiment the panel comprises a groove at an upper edge, which groove is continuous in longitudinal direction, and the assembly further comprise a retaining assembly having an attachment member and an attachment member, wherein the retaining member comprises a hook fitting in the groove.

Fig 1



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Description

BACKGROUND OF THE INVENTION

[0001] The invention relates to a panel attachment assembly.

[0002] In the state of the art different ways and means are known for attaching panels to buildings. In the embodiments the panels are for instance attached to battens. Most known attachment systems are hard to use, especially on locations that are hard to reach such as eaves. The use in the outside air sometimes during cold weather conditions has not proved to be easy.

[0003] GB-2251004 for instance mentions various attachments and known synthetic snap systems for attaching a roof gutter. Such connections may be difficult to use when it is too cold or too hot.

[0004] WO94/19561 describes a panel provided with grooves and a profile provided with grooves, and an attachment member that is adapted for on the one hand extending into the grooves of the panel and on the other hand extending into the grooves of the profile. Detaching the panel after attaching does not seem to be easy.

[0005] FR2814184 shows assemblies of panels provided with undercut grooves, special fastening clips, and beams provided with grooves on the opposite sides and in which the fastening clips are able to clamp into with resilient legs. In addition the resilient legs extend around the beam. Permanent attachment depends on the (permanent) resilience of the resilient legs of the fastening clips.

[0006] JP60148421U1 describes specific means for the attachment of a corrugated plate.

[0007] DE102004036328 describes an attachment member for cladding elements provided with a T-groove. The attachment members are provided with a head having swivelling arms which by means of resilient clamping can be brought into position in which they clamp in the T-groove. The resilient clamping is provided with a carrying bar which in case of clamping in a hole should drop into the supporting structure. In addition clamping is possible at positions of a hole in the supporting structure.

[0008] Therefore there is room for improvement of this attachment of panels that has been known per se for a long time.

SUMMARY OF THE INVENTION

[0009] It is an object of the invention to provide an improved panel attachment assembly.

[0010] It is a further or additional object of the invention to provide a panel assembly with which a panel can easily be mounted to a building.

[0011] For that purpose the invention provides a panel attachment assembly according to claim 1.

[0012] In one embodiment the panel rail comprises an undercut groove on both sides. In that way it is easy to attach a further part to it. Such a groove is also called T-groove.

[0013] In one embodiment the panel attachment end in the mounted condition extends in the undercuts of the undercut groove, in one embodiment clamping in the undercuts. In that way a panel attachment end can reliably and easily be arranged. In one embodiment the undercut groove has a substantially rectangular cross-section. In a further embodiment the cross-section of the panel attachment end is adapted thereto.

[0014] In one embodiment the panel attachment end has at least one plate member having a thickness at one outer end adapted for fitting in the undercut and a height that is smaller than the entry width (h3) of the groove plus the undercut depth of one of the undercuts.

[0015] In one embodiment a locking member is provided so as to hinge with respect to the at least one plate member, at an edge provided with a flanged edge that in the locking position of the locking member is situated in a plane with the at least one plate member and wherein the flanged edge extends in the opposite undercut. A simple mounting, also in situ for instance under cold conditions, thus is possible.

[0016] In one embodiment the locking member further comprises a snap member and the at least one plate member comprises a snap member further cooperating with said snap member for in cooperation snapping the locking member onto the panel members in the first locked position.

[0017] In one embodiment the suspension rail comprises a rail hook that is continuous in the longitudinal direction, in one embodiment having an L-shaped cross-section.

[0018] In one embodiment the hook member comprises a substantially block-shaped part, in one embodiment hollow, provided with a rectangular slot fitting on an upright leg of the continuous rail hook of the suspension rail. These measures make easy yet relatively play-free mounting possible.

[0019] In one embodiment the panel attachment assembly further comprises a confining member on the suspension rail in order to prevent that the hook member gets detached from the suspension rail.

[0020] In one embodiment the smallest free space between the hook member and the confining member (h5) is smaller than the part of the hook member extending in the suspension rail (h6) in order to block detachment of the hook member.

[0021] In one embodiment the suspension rail comprises a confining member on the suspension rail, in one embodiment slidable along the suspension rail. The confining members further ensure ventilation space between panel and suspension rail. Moreover the confining members can be arranged on the suspension rail before mounting the panel and after hanging the panel be slid into their confining location. Mounting is thus facilitated.

[0022] In one embodiment the panel comprises a groove at an upper edge, which groove is continuous in the longitudinal direction, and the assembly further com-

prises a retaining assembly with an attachment member and a retaining member, wherein the retaining member comprises a hook fitting in the groove. In one embodiment the groove is provided in a longitudinal edge which in the attached condition forms the upper edge.

[0023] In one embodiment the retaining member and the attachment member comprise a mutually cooperating rail so that with respect to each other the retaining member and the attachment member can be slid transverse to the longitudinal direction of the panel.

[0024] In one embodiment the retaining member and the attachment member are provided with mutually cooperating teeth transverse to the longitudinal direction of the panel and a cam or teeth engaging the teeth, adapted for blocking a movement of the retaining member transverse to the longitudinal direction of the panel and away from the panel. In that way the retaining member can for instance be knocked into place so that a reliable and secure retaining of the upper edge of a panel is possible. It is even possible to provide the confining member and attachment member with a mutually cooperating stop halfway. In that way the members can be supplied partially inside each other and be attached together to a building, after which the panel can be suspended and be retained at the upper edge by knocking the retaining member with the hook into plate in the panel.

[0025] The invention further relates to a suspension member intended and suitable for a panel attachment assembly as described.

[0026] The invention further relates to a retaining assembly comprising an attachment member and a retaining member, intended and suitable for a panel attachment assembly as described.

[0027] The invention further relates to an assembly of a panel and a device to be connected thereto, wherein the panel is provided with an undercut groove on both sides, and the device comprises an attachment member provided with a plate member provided with an edge having a thickness adapted for fitting into an undercut and a height smaller than the groove opening plus the undercut depth of said undercut, and a locking member provided with a flanged edge having a thickness adapted for fitting in the opposite groove, wherein the locking member has a locking position wherein the flanged edge is situated in a plane with the plate member and extends in the opposite undercut and has an unlocking position in which the flanged edge does not extend into the undercut.

[0028] The invention further relates to an assembly of a panel and a device to be attached thereto, wherein the panel is provided with an undercut on both sides, and the device comprises two members that mutually in a locking position are situated in one plane with opposite edges that extend in the opposite undercuts, and wherein mutually in an unlocking position the opposite edges have a joint distance that is smaller than an entry width of the groove plus the depth of one undercut.

[0029] By means of these assemblies a device can be connected to a panel in an easy and reliable manner. If the groove is continuous, for instance a hook or something else can be connected to a panel at a wanted position.

[0030] The invention further relates to a device provided with one or more of the characterising measures described in the attached description and/or shown in the attached drawings.

[0031] It will be clear that the various aspects mentioned in this patent application can be combined and each individually are eligible for a divisional patent application.

SHORT DESCRIPTION OF THE FIGURES

[0032] In the attached figures an embodiment of a panel attachment assembly according to the invention is shown in which:

Figure 1 shows a view in perspective of an embodiment of a panel attachment assembly from the rear side of a panel that can be used as fascia;

Figure 2 shows a view in perspective of the embodiment of figure 1, from a lower point of view;

Figure 3 shows a disassembled view of figure 2, and

Figures 4a and 4b show details of snapping and locking a suspension member into a slot that is undercut on two sides in a panel.

DESCRIPTION OF THE EMBODIMENTS

[0033] Figure 1 shows a view in perspective of a panel attachment assembly which is provided with a panel 1. In this embodiment panel 1 is a façade finishing panel, such as a fascia. At a longitudinal edge the panel 1 is provided with a slot 2 which is undercut on both sides, so that two undercuts 9 and 10 have been formed. Such a slot is also named T-groove. In an opposite longitudinal edge a slot 3 is also provided. In this embodiment a slot 3 is provided in a side edge.

[0034] The panel attachment assembly comprises a suspension assembly at the lower side of the panel 1, from which suspension assembly the panel 1, in the attached condition, is actually hung. This suspension assembly engages into the slot 2. At the upper longitudinal edge there is a retaining assembly that engages into the slot 3 and retains panel 1, that means stops the panel 1 from moving in the normal direction and upwards.

[0035] The suspension assembly comprises a continuous rail 5, only a part of which is shown in the figures. In one embodiment the rail 5 is for instance made of aluminium. The object of a rigid profile such as rail 5 is providing a properly level basis to which panel 1 can be attached level. The continuous rail 5 is provided with a rail hook 11 onto which a suspension member 4 can be hooked. In figures 2 and 3 an embodiment of the rail hook

11 can be seen better. In the embodiment the rail hook 11 in this case has a substantially L-shaped cross-section resulting in a rectangular gutter.

[0036] In one embodiment the suspension member 4 is an injection moulded part of synthetic material, in one embodiment for instance of polyethene, polypropene, nylon (polyamide) or the like. Suspension member 4 comprises a panel attachment end 12 which as regards shape and dimensions is adapted for fitting in the slot 2. Particularly the panel attachment end 12 fits in the undercut slot 2 to be able to slide in the longitudinal direction of the slot 2 but not to get detached therefrom. In figures 2 and 3 panel attachment end 12 can be seen better. Figure 4 shows a cross-section of panel attachment end 12, when discussing said figure its particular effect will be explained.

[0037] Suspension member 4 further comprises a hook member 13 with which suspension member 4 can be hooked onto the rail hook 11. In this embodiment the hook member substantially is a block. In figure 2 it can be seen that the block can be designed hollow. The hook member 13 comprises a groove 14 the shape and dimensions of which are adapted for being able to hook onto rail hook 11. In this case the groove 14 is rectangular. In that way suspension member 4 is able to slide over the rail hook 11.

[0038] In order to prevent that suspension member 4 after hooking into the continuous rail hook 11 gets detached from rail 5, the suspension assembly further comprises a confining member 6. Confining member 6 is provided with attachment members 15 with which it can be attached to the continuous rail 5. In this embodiment the attachment members 15 have a dovetail cross-section and grooves in the rail have a shape corresponding therewith so that confining member 6 can be snapped onto the rail 5, or can be slid onto it. Confining member 6 further has an end 16 extending above the rail hook 11. The intermediate space between end 16 and rail hook 11 is adapted so that hook member 13 cannot get detached from rail hook 11. In this case the intermediate space between end 16 and rail hook 11, h2, is smaller than height h1 of engaging part 17 of hook member 13. Confining member 6 has a predominantly temporary purpose, namely temporarily locking panel 1 during mounting activities before the retaining assembly has been arranged. During mounting first the rail 5 will be attached in place. In addition a suspension member will be attached to the panel 1. Then the panel 1 will be hung from the rail 5. On rail 5 two or more confining members may already have been provided. In order to temporarily lock panel 1 the confining members 6 can be slid above the suspension members.

[0039] The retaining assembly in one embodiment further comprises an attachment member 8 and a retaining member 7 engaging into it. Attachment member 8 has attachment ends 18 for securing attachment member 8 to for instance an eave. Attachment member 8 can for instance be screwed. Attachment member 8 further comprises L-shaped rail 19 situated opposite and opening opposite each other, in this case on a plate member 20. Not visible on plate member 20 is that near rail 19 for instance teeth are provided. Retaining member 7 further comprises a hook 21 that can extend into groove 3. In one embodiment the dimension of the hook 21 is adapted for fitting into groove 3, in one embodiment for fitting in a clamping manner. Instead of an in this case continuous hook 21, also separate hooks or members positioned in line can be provided that extend into the groove 3. In one embodiment the hook 21 comprises several teeth, substantially in line.

[0040] Retaining member 7 comprises a plate 22 provided with a flange 23, in this case at the edge of plate 22. Projecting from the flange 23 and spaced apart from the plate 22 in this case hook 21 is provided. In one embodiment the distance is chosen such that when the hook 21 rests in groove 3, plate 22 abuts the rear side of panel 1. On the side facing away from panel 1, retaining member 7 is furthermore provided with a longitudinal rib 25 that is undercut on both sides with undercuts 26 the shape and dimension of which is adapted for fitting between the L-shaped rail 19 of attachment member 8 in a sliding manner. The longitudinal rib 25 is provided with teeth or upwardly oriented barbs 24 as a result of which retaining member 7, when it has been slid from the top down into groove 3 and into attachment member 8, it is locked as the teeth engage onto an engagement member. In one embodiment this may be flexible lips provided with a part projecting from the surface of the plate member 20 in the direction of the retaining member 7. Also other placements of the teeth on rib 25 and lips are possible. It is even possible to provide the teeth on attachment member 8 and provide engaging parts on retaining member 7.

[0041] In figures 1 and 2 the retaining assembly is shown in its final condition in which it retains a panel 1. In figure 3 retaining member 7 and attachment member 8 are shown in a fully disassembled condition. The retaining assembly however can be supplied in a condition in which retaining member 7 and attachment member 8 are partially inserted into each other.

[0042] The teeth or barbs 24 then do not yet engage onto each other. For that purpose retaining member 7 and attachment member 8 can be provided with mutually engaging retaining members. In one embodiment attachment member 8 is provided with a cam and retaining member 7 is provided with a corresponding cavity that engage onto each other such that they will get detached by using slight force or by a tap of a hammer.

[0043] In the space between hook 21 and plate 22, one or more synthetic blades that are placed transverse may be provided, which blades cut into the upper edge of panel 1 at pressing the hook 21 into the groove 3 in order to keep retaining member 7 positioned in the longitudinal direction. In one embodiment the synthetic blades are oblique, for instance higher at plate 22 and sloping down towards hook 21 as a result of which they are better ca-

pable of cutting into the synthetic material of panel 1.

[0044] In figures 4a and 4b the panel attachment end 12 is shown in cross-section in groove 2 that is undercut on both sides. In figure 3 that part is shown in front view. For the operation principle of said panel attachment end separate protection is explicitly sought.

[0045] The attachment end 12 has two plate members 27 having a thickness at an outer end that is adapted for fitting into the undercut 10. The plate members 27 further have a width that is smaller than the entry width h3 of the groove plus the undercut depth of one of the undercuts. The sum of undercut depths and entry width h3 is indicated by h4. A locking member 28 is connected so as to hinge between the plate members 27. The locking member 28 comprises a hinge member 34 extending transverse to the plate members 27. At an edge the locking member 28 is connected so as to hinge, at an opposite edge a flanged edge 30 is provided that extends transverse to the hinge member and which in a locking position of the hinge member 34 is situated in a plane with the plate members 27. The flanged edge 30 extends in the opposite undercut 9. In one embodiment as shown, the locking member 28 further comprises a snap member 31 and the plate members 27 further comprise snap members 32 cooperating with the snap member 31 in order to snap the locking member 28 to the panel members 27 in the first locked position.

[0046] The suspension rail 5 usually is a continuous rail of a rigid material, so that the rail is able to form a flat and straight basis on a sometimes not flat base of a building. Suitable material for the suspension rail may for instance be aluminium. An alternative may be an extrusion profile of a relative rigid synthetic material, for instance a fibre-reinforced synthetic material.

[0047] The other parts of the assembly, such as suspension member 4, confining member 6, attachment member 8 and retaining member 7 may for instance be injection moulded parts of a synthetic material that is suitable for such use, usually outdoors. Suitable synthetic materials may be HDPE, polypropene, polyamide or nylon.

[0048] In use the panel 1 is attached to a building in the following manner. First the rail 5 is positioned on the building so that it is at the wanted location. On the rail confining members 6 may subsequently be arranged, or they have already been arranged on the rail 5 prior to attachment of the rail 5. As second step suspension members 4 can be attached in the groove 2 at various positions on the rear side of panel 1 in the manner described above.

[0049] The retaining assembly with an attachment member and a confining member are supplied partially inserted into each other. At a fixed vertical distance from the rail 5 retaining assemblies are attached to the building. Usually at approximately 20-40 cm, depending on the type of panel.

[0050] After that the panel 1 can be hung from rail 5, wherein the hook members 13 of suspension members 4 hook into the rail hook 11.

[0051] Finally the retaining members 7 with the undercut rib 25 can now be slid between the L-shaped parts 19 of the attachment member and pushed down until the hook 21 hooks in the groove 3 and the barbs snap along the teeth of the attachment member 8, so that retaining member 7 can no longer be slid out of attachment member 8. In addition for instance a tap can be given vertically on retaining member 7 by means of a synthetic hammer, as a result of which the said synthetic blades cut into the panel 1 and optionally the hook 21, which alternatively may consist of a number of teeth, can cut into the panel 1 for an even better fixation of panel 1. Panel 1 is now secured.

[0052] The suspension assembly with suspension member 4 and suspension rail 5 make it possible to easily hang a panel such that positioning is possible. After that the position can be fixated by means of the retaining assembly with attachment member 8 and retaining member 7 in a manner that is easy to perform in a construction situation. The suspension rail 5 can then form a good reference for attaching the members at the correct position.

[0053] It will be clear that the above description is included to illustrate the working of preferred embodiments, and not to limit the scope of the invention. Starting from the above explanation many variations that fall within the spirit and scope of the present invention will be evident to an expert.

Claims

1. Panel attachment assembly comprising a panel (1) which on one side is provided with a panel rail (2) that is continuous in the longitudinal direction, and a suspension assembly comprising a suspension rail (5) and a suspension member (4), wherein the suspension member (4) comprises a panel attachment end (12) that is adapted for being accommodated in the panel rail (2), and a hook member (13) adapted for being able to hook into a continuous rail hook (11) at the suspension rail (5).

2. Panel attachment assembly according to claim 1, wherein the panel at an upper edge comprises a groove (3) that is continuous in the longitudinal direction, and wherein the assembly further comprises a retaining assembly with an attachment member (8) and a retaining member (7), wherein the retaining member (7) comprises a hook (21) fitting in the groove (3).

3. Panel attachment assembly according to claim 2, wherein the retaining member (7) and the attachment member (8) comprise a mutually cooperating rail (19) so that with respect to each other the retaining member (7) and the attachment member (8) can

be slid transverse to the longitudinal direction of the panel (1).

4. Panel attachment assembly according to claim 3, wherein the retaining member and the attachment member are provided with mutually cooperating teeth (24) transverse to the longitudinal direction of the panel and a cam or teeth engaging the teeth, adapted for blocking a movement of the retaining member (7) transverse to the longitudinal direction of the panel and away from the panel.

5. Panel attachment assembly according to one or more of the preceding claims, wherein the panel rail (2) on either side comprises an undercut groove (9, 10), particularly wherein the panel attachment end in the mounted condition extends into the undercuts of the undercut groove, in one embodiment clamping in the undercuts.

6. Panel attachment assembly according to claim 5, wherein the panel attachment end comprises at least one plate member (27) having a thickness at an outer end adapted for fitting in the undercut (10) and a height that is smaller than the entry width (h3) of the groove plus the undercut depth of one of the undercuts.

7. Panel attachment assembly according to claim 6, wherein a locking member (28) is provided so as to hinge with respect to the at least one plate member, at an edge provided with a flanged edge (30) that in the locking position of the locking member (28) is situated in a plane with the at least one plate member (27) and wherein the flanged edge extends in the opposite undercut (9).

8. Panel attachment assembly according to claim 7, wherein the locking member (28) further comprises a snap member (31) and the at least one plate member (27) comprises snap member (32) further cooperating with said snap member (31) for in cooperation snapping the locking member (28) onto the panel members (27) in the first locked position.

9. Panel attachment assembly according to any one of the preceding claims, wherein the suspension rail (5) comprises a rail hook (11) that is continuous in the longitudinal direction, in one embodiment having an L-shaped cross-section.

10. Panel attachment assembly according to any one of the preceding claims, wherein the hook member (13) comprises a substantially block-shaped part, in one embodiment hollow, provided with a rectangular slot (14) fitting on an upright leg of the continuous rail hook (11) of the suspension rail (5).

11. Panel attachment assembly according to any one of the preceding claims, further comprising a confining member (6) on the suspension rail (5) in order to prevent that the hook member (4) gets detached from the suspension rail (11).

12. Panel attachment assembly according to the preceding claim, wherein the smallest free space between the hook member and the confining member (h5) is smaller than the part of the hook member extending in the suspension rail (h6) in order to block detachment of the hook member.

13. Panel attachment assembly according to the preceding claim, wherein the suspension rail comprises a confining member on the suspension rail, in one embodiment slidable along the suspension rail.

14. Suspension member (4) intended and suitable for a panel attachment assembly according to any one of the preceding claims.

15. Retaining assembly comprising an attachment member (8) and a retaining member (7) intended and suitable for a panel attachment assembly according to any one of the preceding claims.

Fig 1

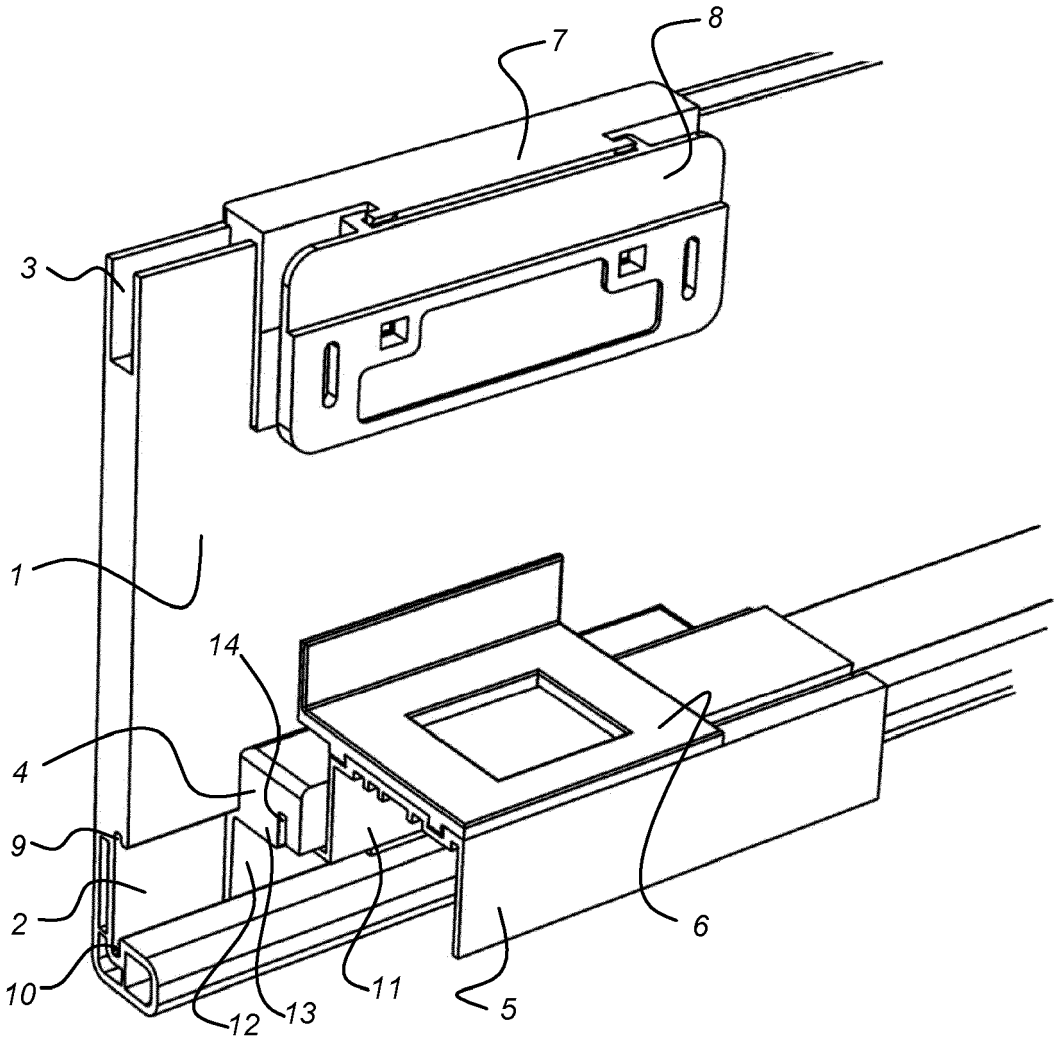


Fig 2

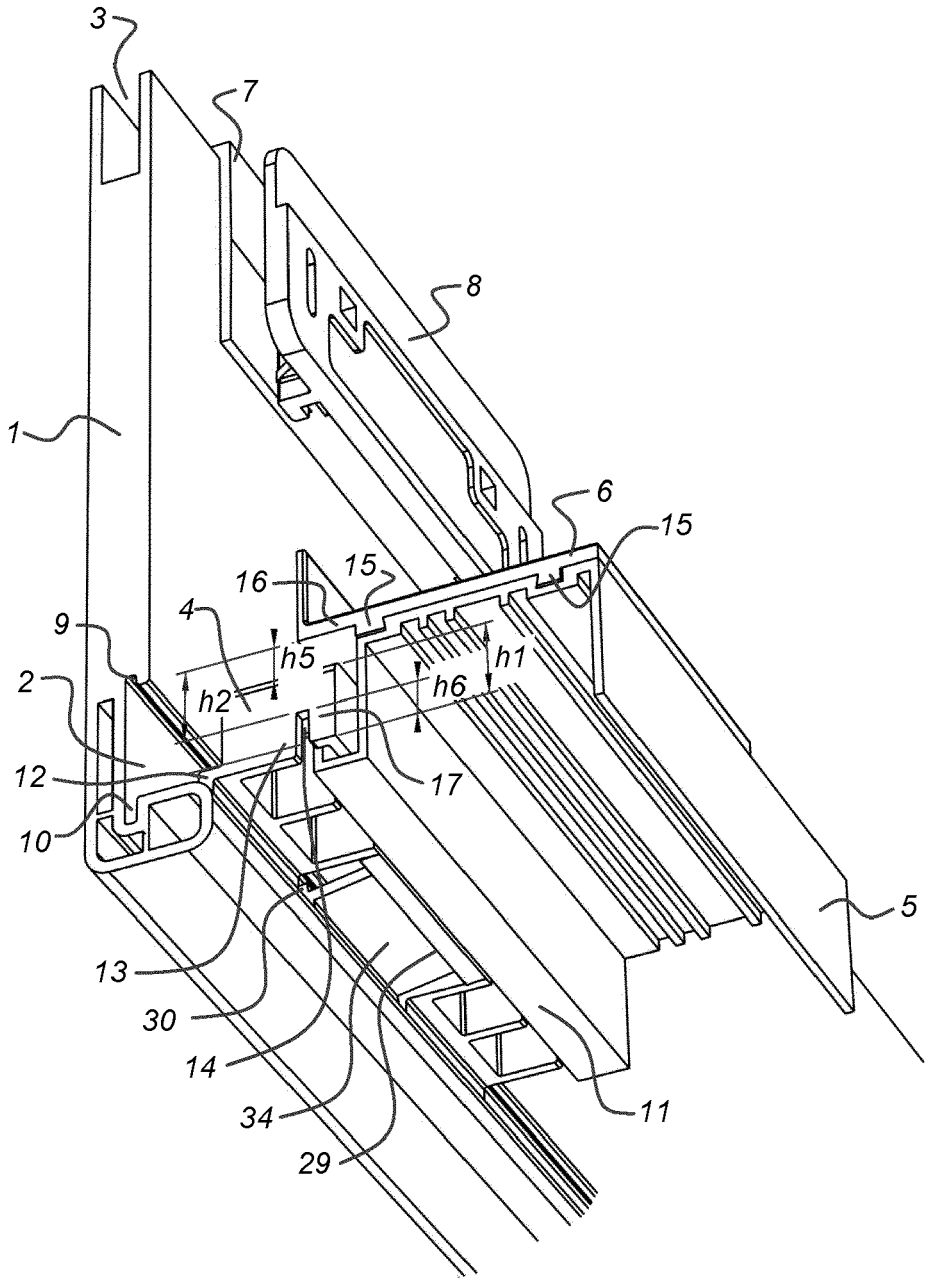


Fig 3

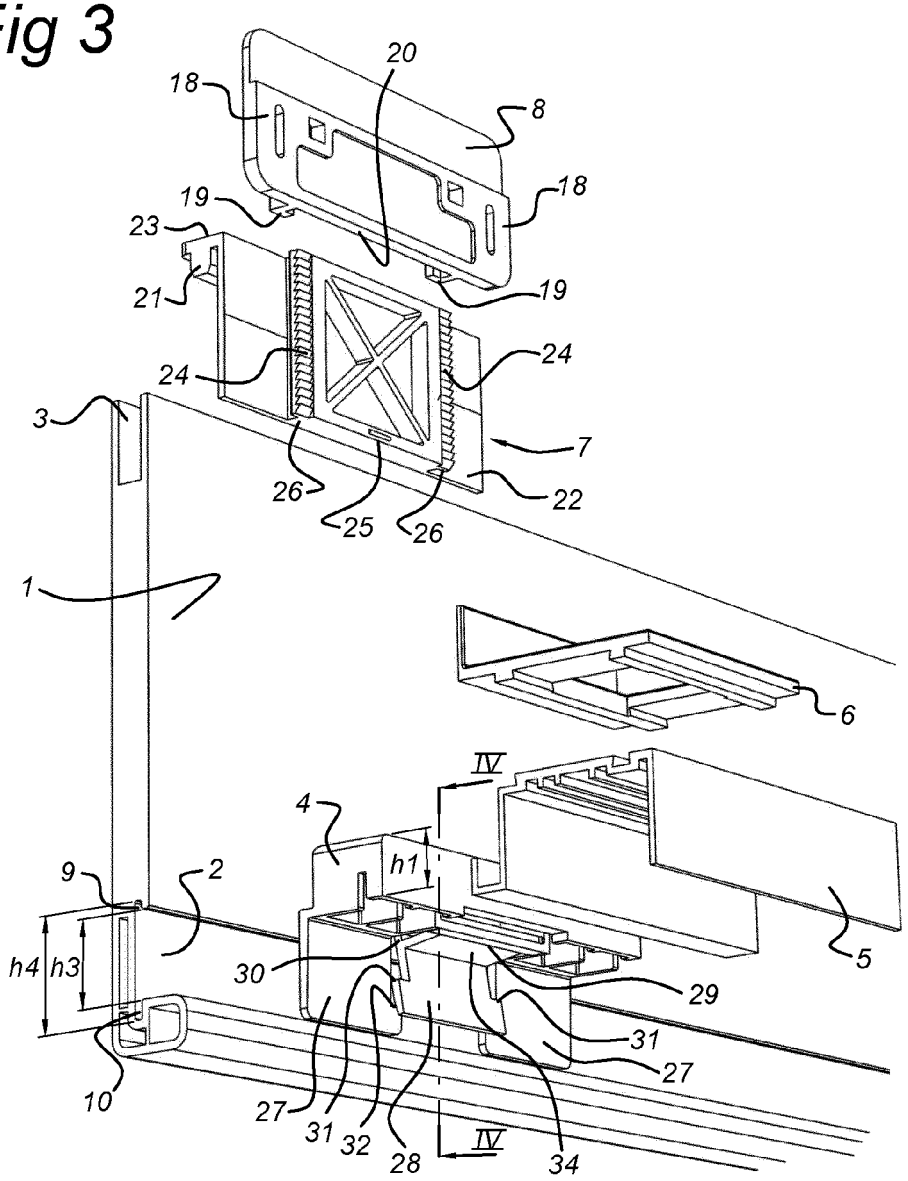


Fig 4a

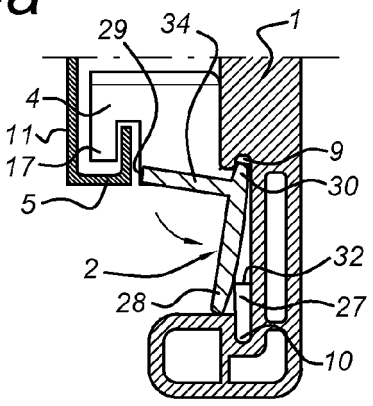
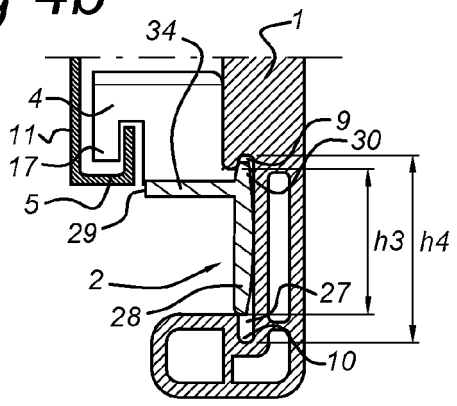


Fig 4b



REFERENCES CITED IN THE DESCRIPTION

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