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(54) **Brickwork support system**

(57) A brickwork support system for supporting brickwork cladding comprises a bracket (1,21) and a support member (2,22). The bracket (1,21) is attached through a fixing aperture (4,24) to a bolt extending from a cast-in channel member on a concrete wall. The bracket has a web portion (5,25) which contacts the concrete wall and two outwardly extending flanges (6,26). The flanges (6,26) are each provided with a substantial-

ly L-shaped slot (7,27) which receives a corresponding portion of the support member (2,22). The support member is provided with a load bearing projection (17,31) which engages and supports the brick cladding. The arrangement of the slots (7,27) and support member (2,22) allows relative longitudinal sliding movement of the support member (2,22) and bracket (1,21) but prevents relative lateral horizontal movement, vertical movement and relative rotation of the two components.

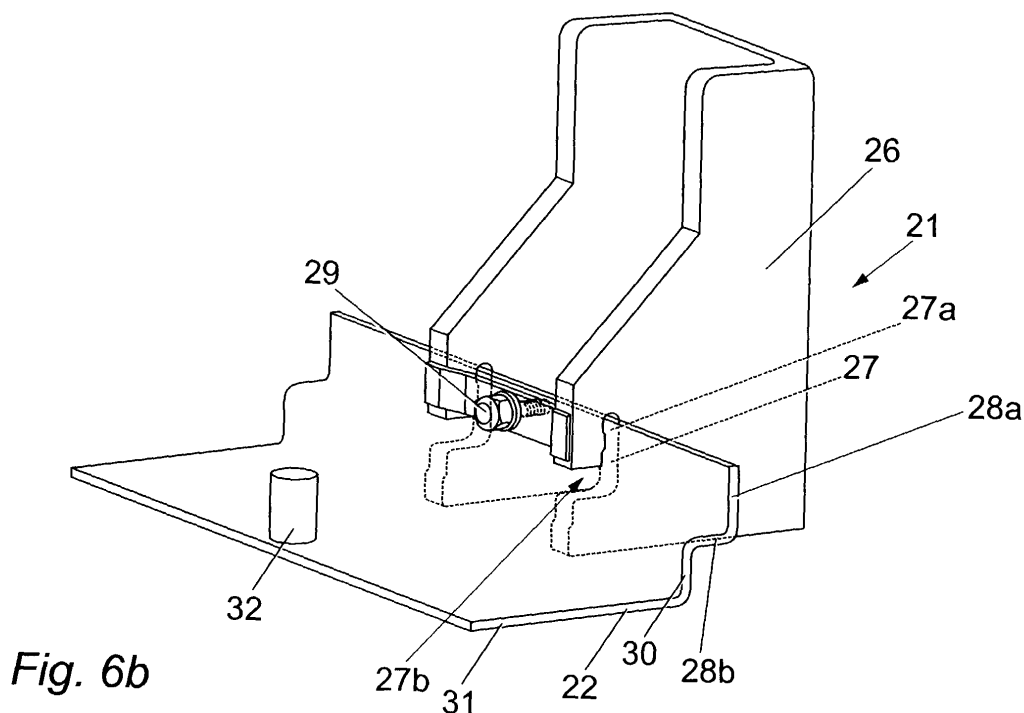


Fig. 6b

Description

[0001] This invention relates to a support system, preferably but not exclusively for use in the support of cladding or facing for a structure.

[0002] It is standard practice in building construction and refurbishment to provide the building with a cladding or facing. Consequently there are a large number of known systems for supporting cladding or facings on the face of a structure.

[0003] It is known to provide an angle section member secured to the structure by bolts extending through slots in an upwardly extending leg in the angle section, to allow a small horizontal adjustment of the angle section. Normally, the angle section has an outwardly extending leg which projects into a bed joint between vertically adjacent bricks in the cladding. A disadvantage of such a system is that the bolts need to be located in the structure of the building with absolute accuracy in the vertical direction, or the additional cost of providing a cast-in serrated mounting means to provide a limited degree of vertical adjustment, must be incurred. Another disadvantage is that, in order to provide sufficient strength, the thickness of the angle section may be close to or greater than the joint thickness between vertically adjacent bricks. This requires the use of more expensive, so-called pistol bricks, if the original joint width is to be maintained at the position of the support.

[0004] To provide a more flexible system and in particular to improve adjustability, it is known to provide a horizontal locating bar on the structure, to which fabricated brackets are secured and are vertically adjustable by a screw system or the provision of serrations. An angle section support is located in seat portions provided in the bracket to provide support to the cladding. These supports may be screwed into the bracket, but they may also be simply hooked into the seats in the bracket, with the supports being secured by the seats when in operation.

[0005] Although the support hooked onto the bracket has a number of advantages over the screwed-in support, such as ease of manufacture and installation, the disadvantage of existing hooked supports is that they may easily be dislodged from their seats on the bracket. Furthermore, although less complicated than screw-in supports, the existing hooked-on supports are still relatively complicated to manufacture, with a resultant effect on manufacturing costs.

[0006] It is therefore the aim of the present invention to provide a brickwork support system that is simple to produce and install, and which still retains a secure angle between the bracket and support without the need for additional components.

[0007] According to a first aspect of the present invention, there is provided a support means comprising:

at least one bracket provided with a first fixing means for securing to a first structure and

a longitudinally extending support member for supporting a second structure at a distance from the first structure,

the support member having a formation thereon which is engageable with at least one corresponding slot on the bracket to provide vertical support of the support member,

the formation and slot being shaped so as to permit relative longitudinal sliding movement of the support member and bracket and to prevent relative lateral horizontal movement, vertical movement and relative rotation about the longitudinal axis of the support member and bracket.

[0008] Preferably, the first fixing means is interposed between the bracket and the first structure to provide a connection for the bracket to the structure.

[0009] Preferably, the bracket is provided with an aperture, and wherein the first fixing means comprises a bolt or stud anchored to the first structure and extending through said aperture.

[0010] Preferably, the first fixing means further comprises a structural support channel to be set into the first structure and securing said bolt or stud. Preferably, the support channel is cast into concrete of the first structure. Alternatively, the support channel may be installed after completion of the first structure.

[0011] Preferably, the slot comprises a first substantially horizontal portion and a second substantially vertical portion. Most preferably, the slot is substantially L-shaped.

[0012] Preferably, the support member is adapted such that it may fit within the slot of the bracket, the support member including a load-bearing projection which engages and supports the second structure.

[0013] Preferably, the bracket comprises a web portion which contacts the first structure when in use, and wherein the load bearing projection projects in a plane substantially perpendicular to the web portion of the bracket.

[0014] Preferably, the bracket further comprises at least one flange which projects in a plane substantially perpendicular to the web portion, the at least one slot being provided in the at least one flange to receive a corresponding portion of the support member.

[0015] In a preferred embodiment, the bracket is a channel member having two flanges, each flange having a slot therein.

[0016] In a further preferred embodiment each flange has a number of slots thereon for engaging a corresponding number of support members.

[0017] Preferably, the first fixing means is adapted to allow adjustment of the bracket in directions having a vertical and/or horizontal component.

[0018] Preferably, the bracket is provided with a second fixing means adapted to secure the support member to the bracket so as to prevent relative longitudinal sliding movement of the support member and bracket

once said support member is in the desired position.

[0019] In one embodiment, the support means comprises one bracket, the support member engaging the bracket.

In an alternative embodiment, the support means comprises a plurality of brackets, the support member engaging each of the brackets.

[0020] According to a second aspect of the present invention, there is provided a support means comprising:

a longitudinally extending support member for supporting cladding for a building, and a plurality of spaced-apart brackets fixed to the wall of the building, the support member and the brackets being mutually engageable to permit relative longitudinal sliding movement of the support member and brackets and to prevent relative lateral movement, vertical movement and relative rotation about the longitudinal axis of the support member and bracket.

[0021] According to a third aspect of the present invention, there is provided a method of supporting cladding on a structure comprising:

securing a plurality of brackets to the structure and engaging a longitudinally extending support member with slots provided in said plurality of brackets by sliding the support member in a direction parallel to its longitudinal axis, the slots preventing relative lateral horizontal movement, vertical movement and relative rotation about the longitudinal axis of the support member and brackets, and supporting one or more cladding members on a support surface of said support member.

[0022] A preferred embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawings, in which:-

Figure 1 is a perspective view of a bracket and support member;

Figures 2(a)-(c) are front, side and plan views of a bracket similar to that of Figure 1 but having a vertical slot;

Figure 3 is a side view of a brickwork support system;

Figure 4 is a side view of a second embodiment of the brickwork support system;

Figure 5 shows a side view of a third embodiment of the brickwork support system;

Figures 6(a)-(c) are front, side and plan views of a

fourth embodiment of the brickwork support system; and

Figures 7(a)-(c) are front, side and plan views of a fifth embodiment of the brickwork support system.

[0023] Figure 1 shows a bracket 1 for attachment through a fixing aperture 4 to a bolt (not shown) extending from a cast-in channel member on a concrete wall (or an expanding bolt projecting from a hole drilled in the concrete). Figure 1 also shows a support member 2 for supporting a second structure in the form of a brick cladding, at a distance from the first structure. The support member 2 is movable relative to the bracket 1 along the wall.

[0024] The fixing aperture 4 is a slot disposed at an angle so as to allow adjustment in directions having a vertical and/or horizontal component, and is formed in a web portion 5 of the bracket 1 which contacts the concrete wall when in use. Figure 2 shows an alternative arrangement of the fixing aperture 4 that is disposed in a substantially vertical direction. In addition, Figure 2 also shows an optional plurality of detent portions about the fixing aperture. The detent portions are shown here as a sawtooth arrangement 13. The bracket may be provided with the sawtooth arrangement 13 so as to provide a more secure fixing. By placing a washer or shim (not shown) with the same sawtooth pattern on the bolt before attaching the securing nut, the teeth of the washer will mate with the teeth of the sawtooth arrangement 13 when the nut is tightened on the bolt. This will then prevent any vertical slip by the bracket when in use.

[0025] The bracket 1 includes a pair of flanges 6 that project in a plane substantially perpendicular to the web portion 5. The flanges 6 each have a formation in the form of a substantially L-shaped slot 7 that has substantially vertical and horizontal portions 7a, 7b and is formed so as to receive a corresponding portion of the support member 2. The horizontal portion 7b is wider than the vertical portion 7a, to aid sliding, since in use the support member 2 does not bear against the upper edge of the horizontal portion 7b.

[0026] The profile of the support member 2 is such that it may fit into the slots 7 of the connecting sections 6. The support member 2 is made up of a first substantially vertical portion 8a and a substantially horizontal portion 8b that enter the slots 7, and a substantially vertical connecting web 10 which continues into a substantially horizontal second section 11 which has a load bearing projection 17 which extends in a plane perpendicular to the web portion 5 of the bracket 1 when in use.

[0027] The support member 2 is formed by pressing or bending from one piece of sheet metal, typically steel or stainless steel. The bracket 1 is also of unitary construction. The length of the support member can be determined depending on the requirements of the job. The advantage of producing the support member from one piece of metal is that no welding or complex folding is

required. In some existing support systems, the support member is folded over such that two surfaces of the member are adjacent one another and then welded together. This leads to corrosion at the weld and where the two surfaces meet, and the area must be descaled to avoid such problems. No such problems occur with the arrangement of the present invention.

[0028] Figure 3 shows the bracket 1 and support member 2 arrangement when in use to support brick cladding 9 on the load bearing projection 17. A number of brackets 1 are secured to the bolts (not shown) extending from the concrete wall 12 and adjusted to be in horizontal alignment to receive the support member 2. The support member 2 is then slid through the slots 7 of each bracket 1 such that the flange 8a of the support member 2 is secured in the substantially vertical portions 7a of the slots 7, and the connecting web section 10 lies flush with front edges 6a of the flanges 6.

[0029] By providing the support member 2 in continuous lengths, it is no longer necessary to provide a plurality of support members and the clips that are usually required to fix adjacent support members together. The support member 2 of the present invention may be supplied loose and adjusted on site, or else it can be tack welded to set the bracket positions.

[0030] By providing slots 7 that are formed to mirror the profile of the support member 2, there is no need for additional adapters to be inserted into the slots 7 with the support member to obtain a secure fixing. For this reason, the installation of the present invention is much simpler than existing support systems that require the use of adjustable clamps, spacers and the like to secure the support member to the bracket. As a result, the manufacture of the present invention is also simpler and more cost effective than that of existing support systems.

[0031] Once the support member is installed, it cannot be moved laterally or vertically, and cannot be rotated. However, the formation of the support member and slots in the bracket allow relative longitudinal sliding movement of the support member and brackets.

[0032] Thus, the main advantage of the present invention over existing support systems is that the horizontal position of the brackets may be adjusted thanks to the permitted relative longitudinal sliding movement of the support member and brackets. This accommodates errors in the drilling of the steelwork to which the brackets are mounted, and also allows the positioning of the brackets to avoid reinforcement bars in concrete structures where the brackets are mounted on such structures. Furthermore, corner sections can be used where the brackets are horizontally adjustable relative to the support member. Such corner sections are made up of two support members each usually having a 45 degree end face so that placing the two end faces together produces a 90 degree corner. For small returns, the two angled faces of the support members may be welded together. Alternatively, the end faces may be mi-

tried with a gap, usually 10mm, between the faces. In addition, the brackets may be manufactured in differing sizes or widths to compensate for any uneven surfaces encountered, so that the support member may still slide through the slots of the brackets cleanly. Shims can be provided with the brackets for any fine adjustment required when installing.

[0033] Modifications and improvements may be incorporated without departing from the scope of the invention. One modification to the present invention is shown in Figure 4. Here, the bracket 1 has a number of slots 7 so that a number of support members 2 may be accommodated at the same time. It should also be noted, however, that in brackets having only one slot, that slot may be positioned at any position on the bracket, not just near the base as illustrated in the embodiments herein. A further modification would be to replace the vertical portion 7a of the slot with an upwardly sloping portion (not shown) which is inclined at a non-perpendicular angle to the horizontal portion 7b. The slot 7 may include a further non-vertical portion (not shown) at the end of the vertical portion 7a, distal from the horizontal portion 7b. The horizontal portion 7b may be made narrow, to provide a closer fit to the web 8b of the support member 2, while the vertical portion 7a may be longer to allow an increased clearance and tolerance to the height of the flange 8a of the support member 2.

[0034] A further adaptation is shown in Figure 5, where the front edge of the vertical portion 7a of the slots 7 and the front edges 6a of the flanges 6 are provided with nib portions 40. The nib portions 40 are protrusions which project from the respective aforementioned edges on the flanges 6 in order to ensure that load transfer from the support member 2 to the bracket 1 takes place at pre-selected points.

[0035] Although it is envisaged that the support system would be utilised with a number of brackets, it may also be used with only one bracket and a short length of support member, as shown in the embodiment of Figures 6(a)-(c). Figure 5 shows a bracket 21 substantially the same as described in the previous embodiments, with a fixing aperture 24 for receipt of a bolt (not shown) so that the bracket 21 may be fixed in the manner previously described. The bracket 21 has a web portion 25 which contacts the first structure when in use and a pair of flanges 26 that project in a plane substantially perpendicular to the web portion 25. The flanges 26 each have a slot 27 that has substantially vertical and horizontal portions 27a, 27b and which receives a support member 22, again substantially in the form previously described.

[0036] The support member 22 is made up of a first substantially vertical portion 28a and a substantially horizontal portion 28b whose shape corresponds to the slots 27 of the bracket 21. Also provided on the support member 22 is a substantially vertical connecting web 30 which continues into a substantially horizontal load bearing portion 31 which extends in a plane perpendic-

ular to the web portion 25 of the bracket 21. If required, the load bearing portion 31 may be provided with a hook 32 with which to engage the cladding.

[0037] The difference between the embodiment of Figures 6(a)-(c) and the previously described embodiments is that here the support system is provided with a fixing arrangement to secure the support member 22 in position on the bracket 21. The fixing arrangement comprises a fastener 23 and bolt 29 which are provided in order to prevent the support member 22 moving in the longitudinal direction relative to the bracket 21 under dynamic loading. The fastener 23 is substantially U-shaped with an aperture in the centre for receiving the bolt 29. In this embodiment, the support member 22 also has an aperture in the vertical portion 28a to allow the bolt 29 to pass through. As seen best in Figure 6(c), once in position, the fastener 23 fits over the edges of the two flanges 26 of the bracket 21. Thus, once the bolt 29 is fitted through the fastener 23 and the support member 22, and a nut (not shown) is fitted to the bolt 29, the combination of fastener 23 and bolt 29 holds the support member 22 securely in place.

[0038] Figures 7(a)-(c) show a further embodiment of the brickwork support system of the present invention. This embodiment is identical to that shown in Figures 6(a)-(c) save that a different type of fastener is used in the fixing arrangement. In the embodiment of Figures 7(a)-(c), the fastener 33 comprises a plate member having a bolt receiving portion 33a and a support member retaining portion 33b which is at an angle of more than 90 degrees to the bolt receiving portion 33a. Once the support member 22 is installed in the bracket 21, the fastener 33 is fixed in place as described in respect of the previous embodiment. With the fastener 33 provided with the angled retaining portion 33b, the support member 22 is held against the lower edge of the horizontal portion 27b of the slot 27, as best seen in Figure 7(b).

[0039] It is also envisaged that the system can be supplied with a number of brackets already held on the support member. In this case, folding tabs would be provided at opposite ends of the support member flange in order to prevent the brackets sliding off the support member when being installed. Once installed, the tabs can be folded back into the flange of the support member so as not to impede the positioning of the brackets.

Claims

1. A support means comprising:

at least one bracket (1,21) provided with a first fixing means for securing to a first structure and at least one longitudinally extending support member (2,22) for supporting a second structure at a distance from the first structure, the support member (2,22) having a formation (8a,8b) thereon which is engageable with at

least one corresponding slot (7,27) on the bracket to provide vertical support of the support member (2,22), the formation (8a,8b) and slot (7,27) being shaped so as to permit relative longitudinal sliding movement of the support member (2,22) and bracket (1,21) and to prevent relative lateral horizontal movement, vertical movement and relative rotation about the longitudinal axis of the support member (2,22) and bracket (1,21).

2. The support means of Claim 1, wherein the first fixing means is interposed between the bracket (1,21) and the first structure to provide a connection for the bracket (1,21) to the structure.
3. The support means of either Claim 1 or Claim 2, wherein the bracket (1,21) is provided with an aperture (4,24), and wherein the first fixing means comprises a bolt or stud anchored to the first structure and extending through said aperture (4,24).
4. The support means of Claim 3, wherein the first fixing means further comprises a structural support channel to be set into the first structure and securing said bolt or stud.
5. The support means of Claim 4, wherein the support channel is cast into concrete of the first structure.
6. The support means of Claim 4, wherein the support channel is installed after completion of the first structure.
7. The support means of any preceding claim, wherein the slot (7,27) comprises a first substantially horizontal portion (7b,27b) and a second substantially vertical portion (7a,27a).
8. The support means of Claim 7, wherein the slot (7,27) is substantially L-shaped.
9. The support means of any preceding claim, wherein the support member (2,22) is adapted such that it may fit within the slot of the bracket (1,21), the support member (2,22) including a load bearing projection (17,31) which engages and supports the second structure.
10. The support means of Claim 9, wherein the bracket (1,21) comprises a web portion (5,25) which contacts the first structure when in use, and wherein the load bearing projection (17,31) projects in a plane substantially perpendicular to the web portion (5,25) of the bracket (1,21).
11. The support means of Claim 10, wherein the brack-

et (1,21) further comprises at least one flange (6,26) which projects in a plane substantially perpendicular to the web portion (5,25), the at least one slot (7,27) being provided in the at least one flange (6,26) to receive a corresponding portion of the support member (2,22). 5

12. The support means of Claim 11, wherein the bracket (1,21) is a channel member having two flanges (6,26), each flange (6,26) having a slot (7,27) therein. 10

13. The support means of Claim 12, wherein each flange (6,26) may have a number of slots (7,27) thereon for engaging a corresponding number of support members (2,22). 15

14. The support means of any preceding claim, wherein the first fixing means is adapted to allow adjustment of the bracket (1,21) in directions having a vertical and/or horizontal component. 20

15. The support means of any preceding claim, wherein the bracket (21) is provided with a second fixing means (23,29) adapted to secure the support member (22) to the bracket (21) so as to prevent relative longitudinal sliding movement of the support member (22) and bracket (21) once said support member (22) is in the desired position. 25

16. The support means of any preceding claim, wherein the support means comprises one bracket (1,21), the support member (2,22) engaging the bracket (1,21). 30

17. The support means of any of Claims 1 to 15, wherein said support means comprises a plurality of brackets (1,21), the support member (2,22) engaging each of the brackets (1,21). 35

18. A support means comprising: 40

a longitudinally extending support member (2,22) for supporting cladding for a building, and a plurality of spaced-apart brackets (1,21) fixed to the wall of the building, the support member (2,22) and the brackets (1,21) being mutually engageable to permit relative longitudinal sliding movement of the support member (2,22) and brackets (1,21) and to prevent relative lateral movement, vertical movement and relative rotation about the longitudinal axis of the support member (2,22) and bracket (1,21). 45 50

19. A method of supporting cladding on a structure comprising: 55

securing a plurality of brackets (1,21) to the

structure, and engaging a longitudinally extending support member (2,22) with slots (7,27) provided in said plurality of brackets (1,21) by sliding the support member (2,22) in a direction parallel to its longitudinal axis, the slots (7,27) preventing relative lateral horizontal movement, vertical movement and relative rotation about the longitudinal axis of the support member (2,22) and brackets (1,21), and supporting one or more cladding members on a support surface (17,31) of said support member (2,22).

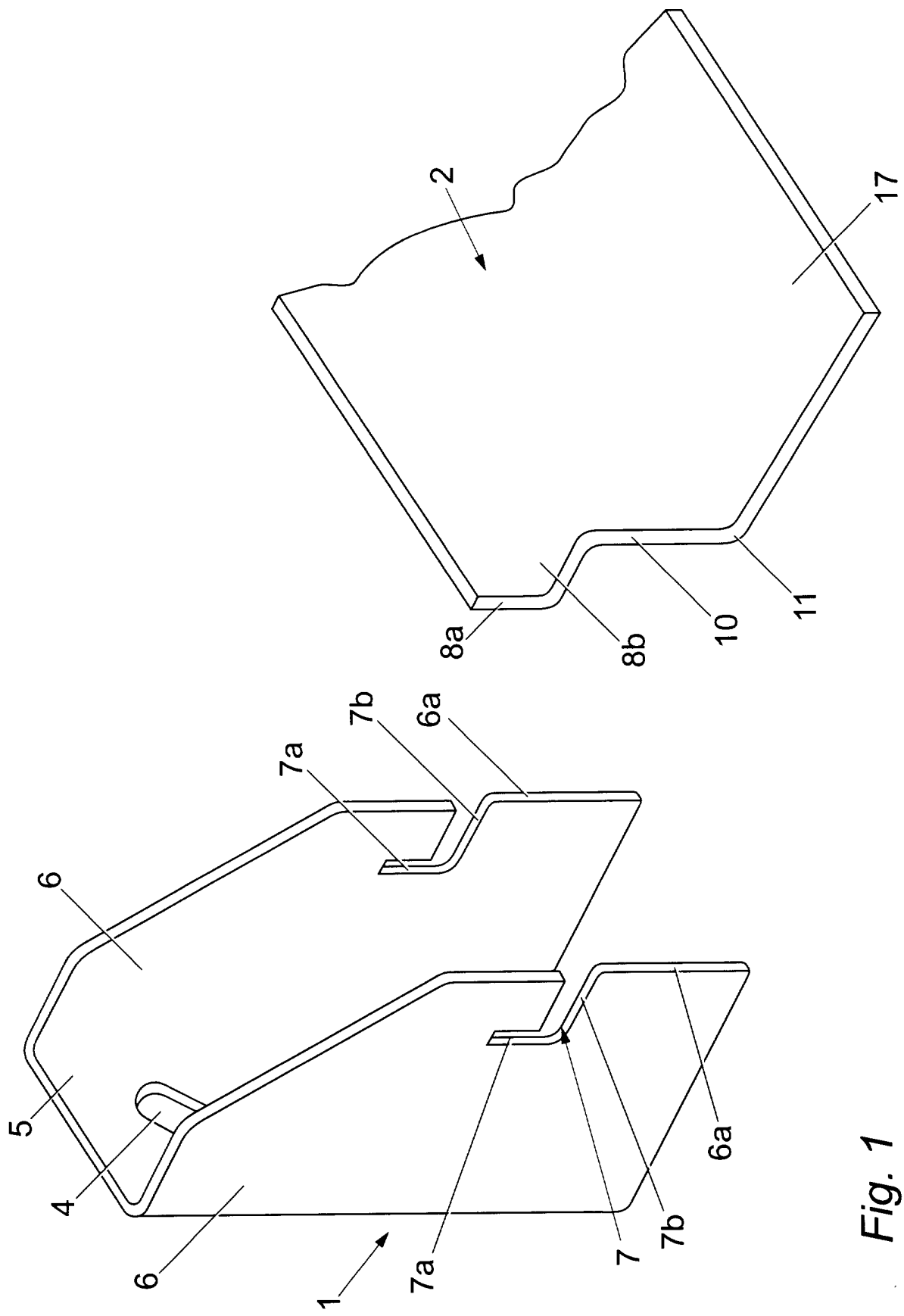


Fig. 1

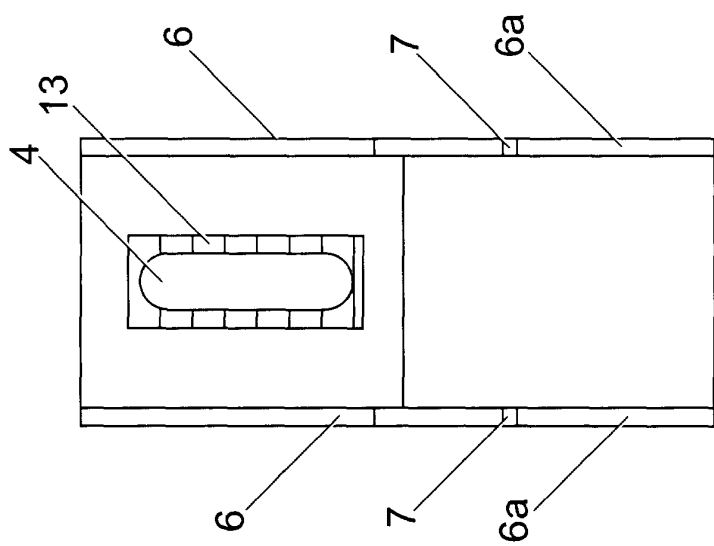


Fig. 2a

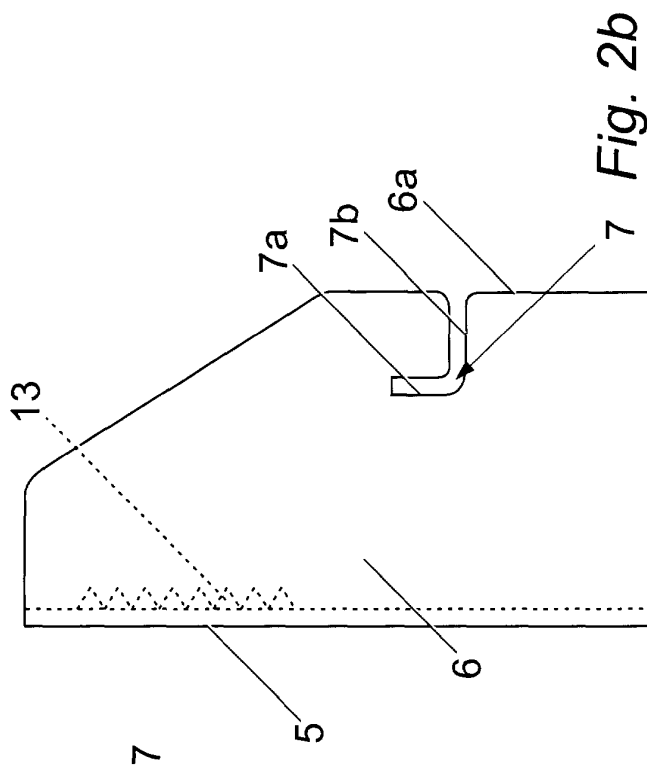


Fig. 2b

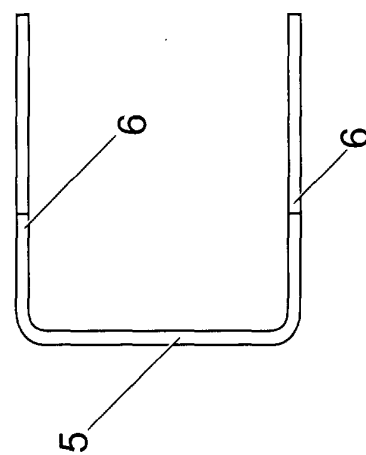


Fig. 2c

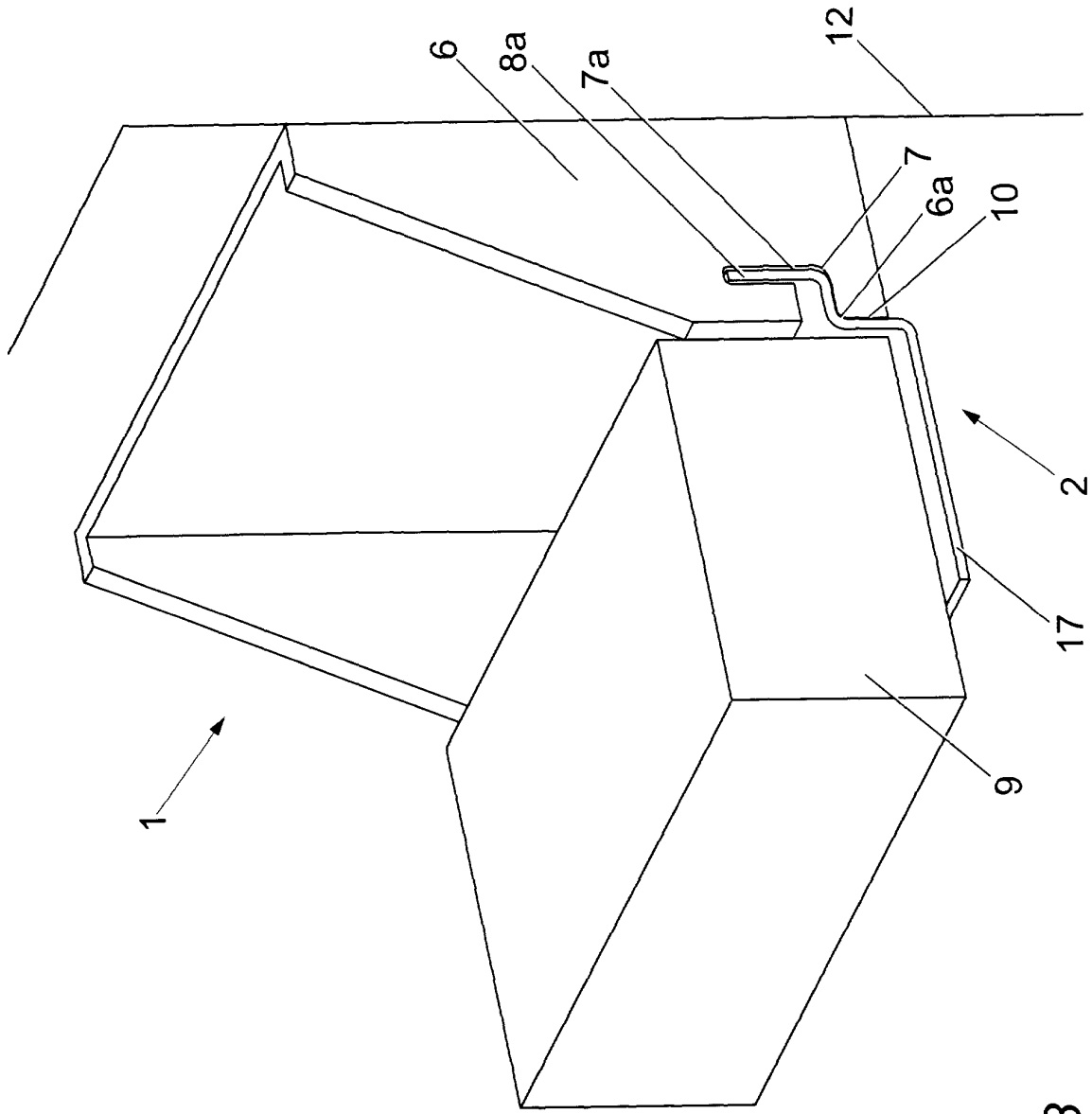
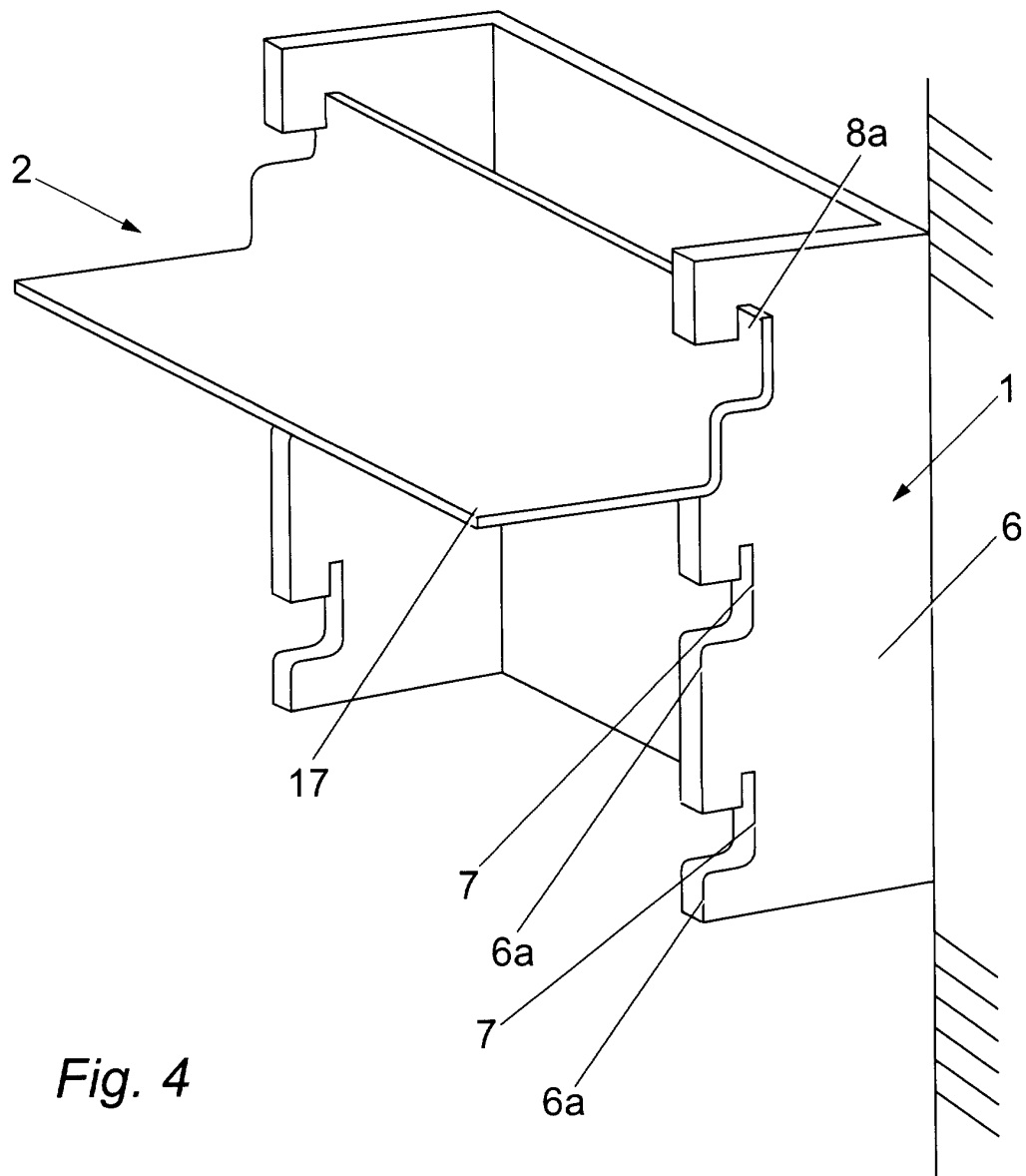


Fig. 3



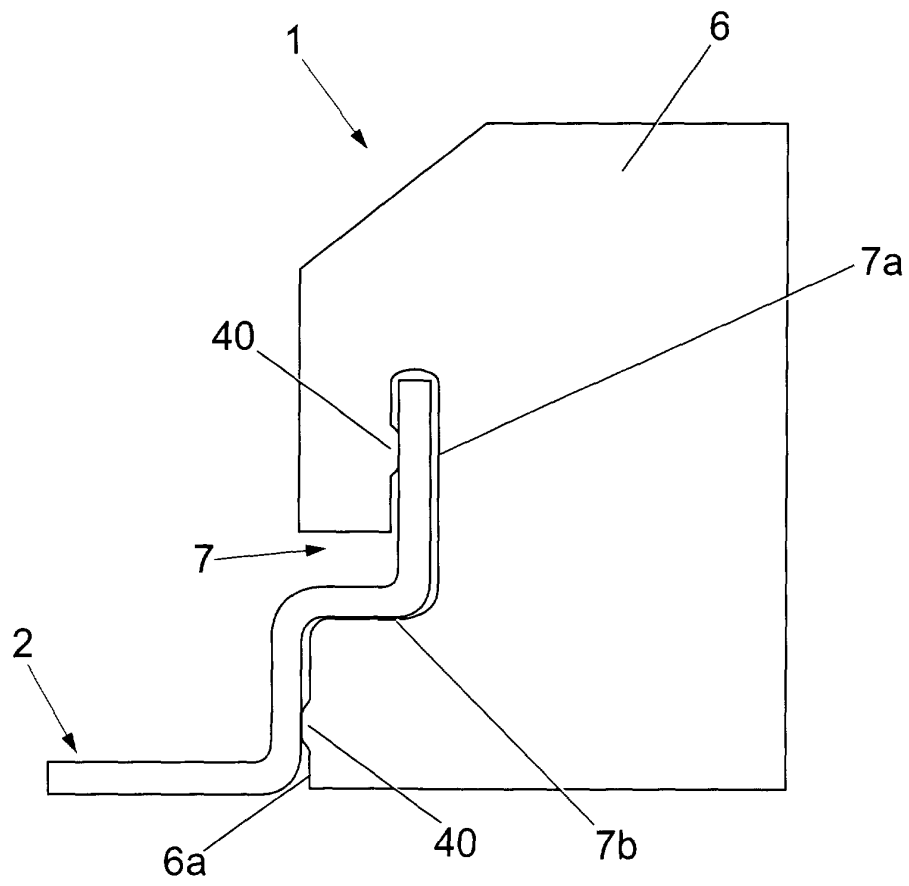
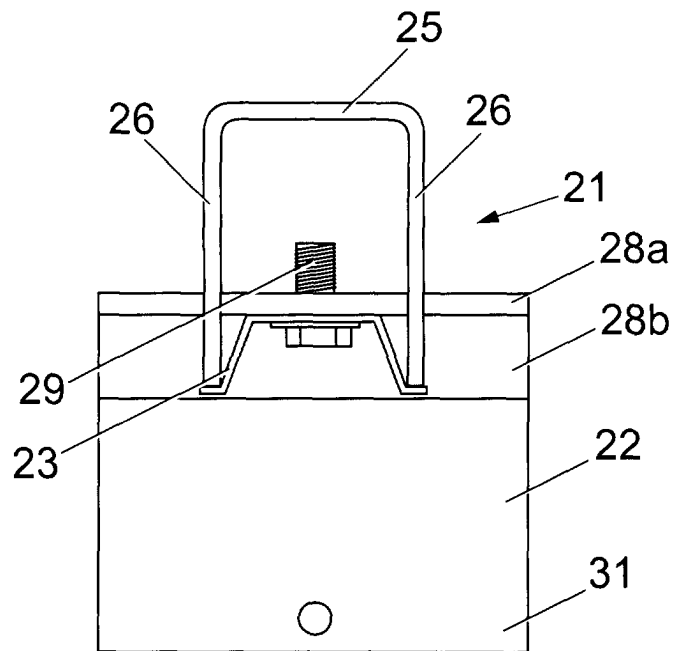
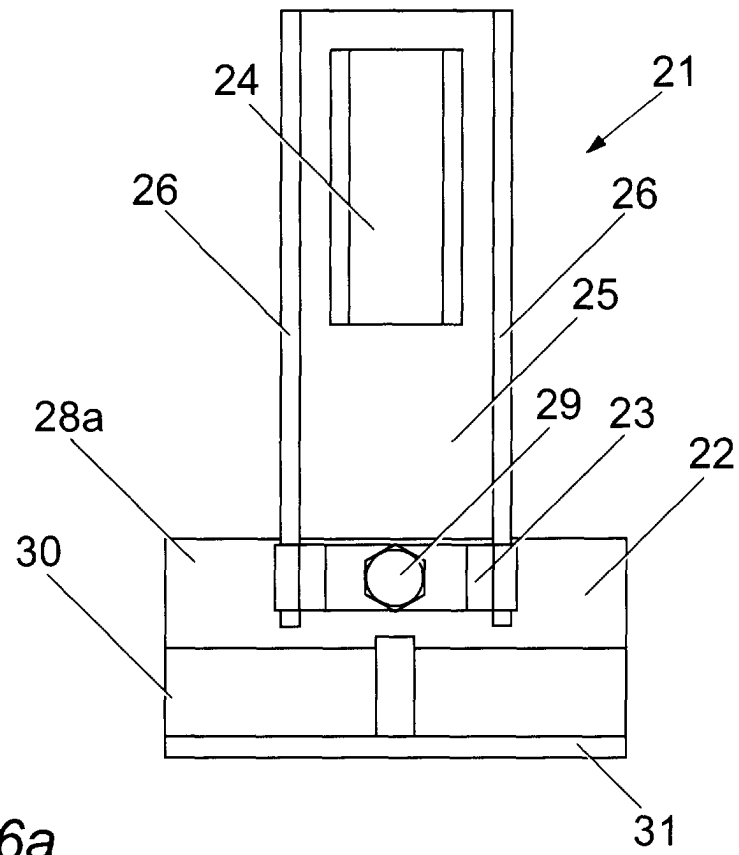


Fig. 5



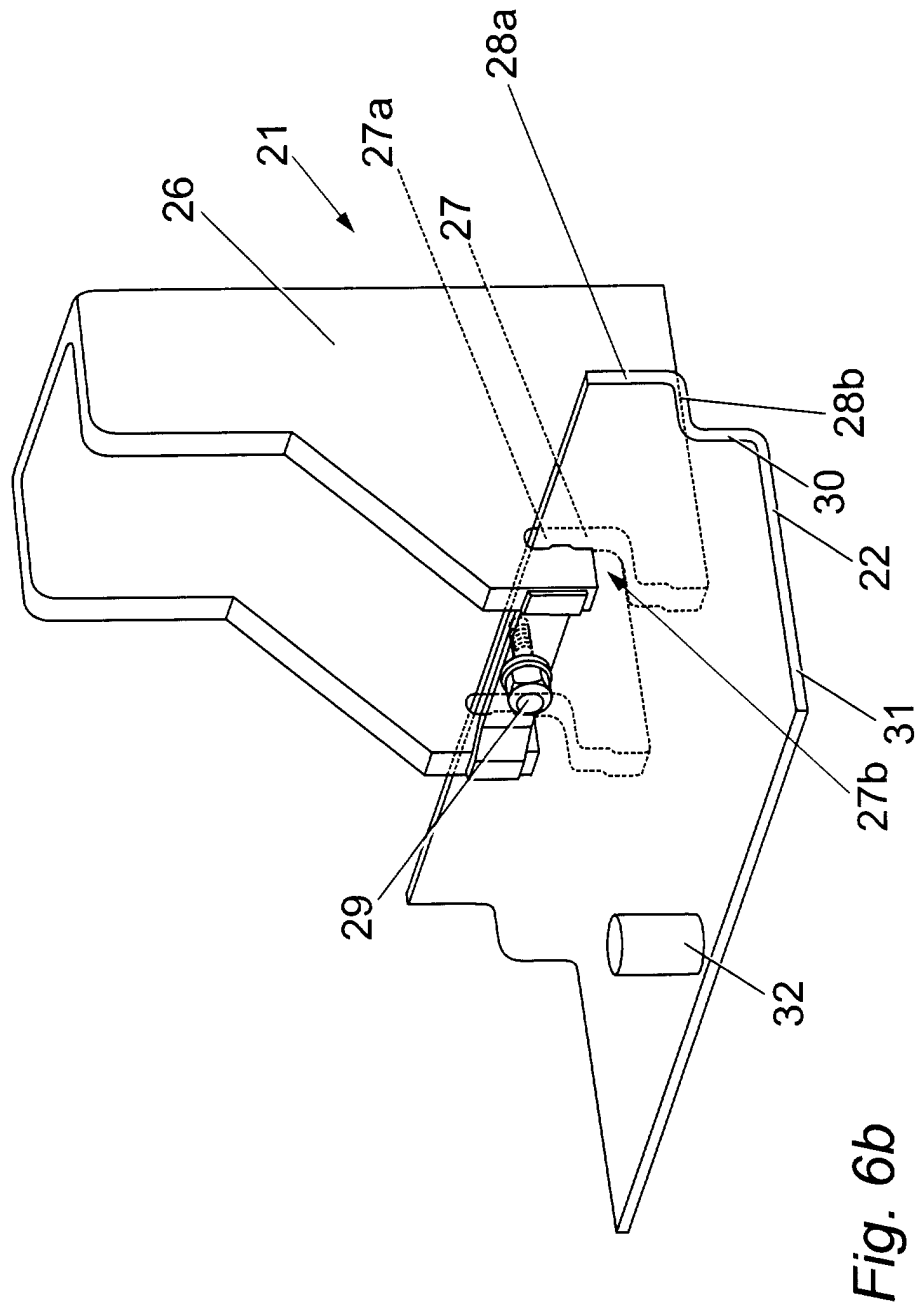


Fig. 6b

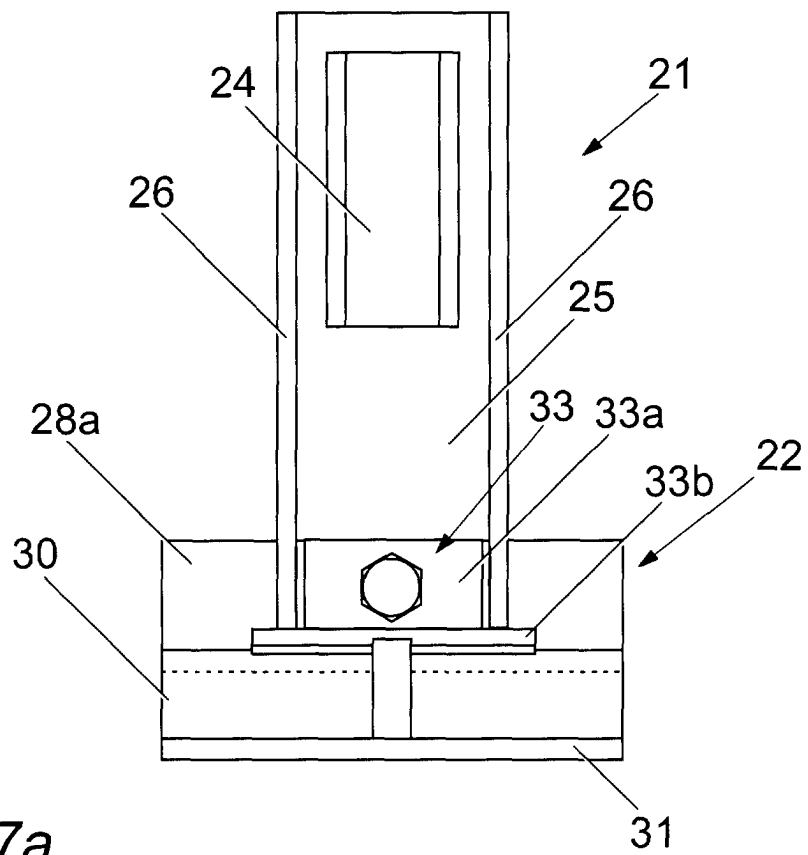


Fig. 7a

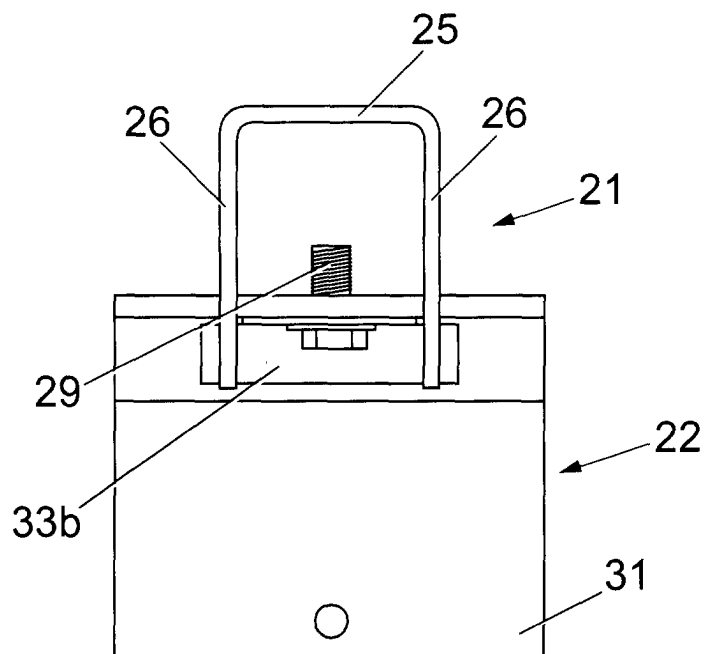


Fig. 7c

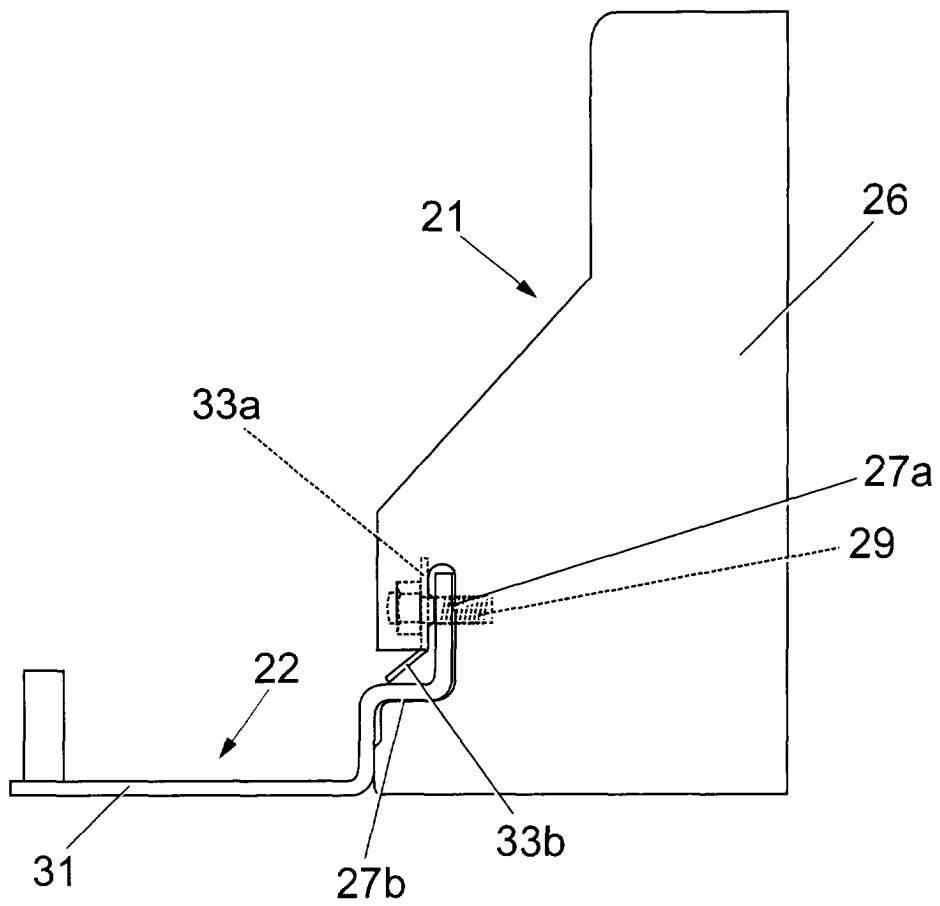


Fig. 7b