

(19)



(11)

EP 1 775 398 B1

(12)

EUROPEAN PATENT SPECIFICATION

(45) Date of publication and mention
of the grant of the patent:
12.05.2010 Bulletin 2010/19

(51) Int Cl.:
E04B 9/30 (2006.01)

(21) Application number: **06021413.7**

(22) Date of filing: **12.10.2006**

(54) **Connector for ceiling systems**

Deckensystemverbinder

Connecteur pour systèmes de plafond

(84) Designated Contracting States:
**AT BE BG CH CY CZ DE DK EE ES FI FR GB GR
HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI
SK TR**

(30) Priority: **12.10.2005 US 726052 P**

(43) Date of publication of application:
18.04.2007 Bulletin 2007/16

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WO-A-2005/017274 DE-U1- 8 518 489

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Description

[0001] The invention relates to a connector for ceiling systems.

[0002] EP 0 956 405 B1 discloses a ceiling system with a subassembly comprising a profile rail and at least one universal suspension element. The profile rail is in cross section a C-rail which is open at the top and which is made of sheet metal. The suspension element is made of a single-piece sheet metal part, which, at its two ends, has a respective anchor portion with lateral incisions. The spacing between the incisions is dimensioned such that the peripheries of the C-rails can be accommodated when the peripheries are directed towards each other. The suspension element has a center piece connecting the two anchor portions, wherein in each case one weakening line is provided along the connecting lines between the center piece and the two anchor portions. A further weakening line is provided in the center of the center piece between the two connecting lines between the center piece and the two anchor portions. Further, a series of bores runs from one of the two anchor portions at least beyond the center of the center piece.

[0003] The weakening lines are formed by two peripheral notches on the opposite peripheries of the suspension element. The bores are used for taking up a hook which can be connected with a supporting structure of a building. For reinforcing the suspension element, two parallel spaced longitudinal rows of adjacent beads are provided.

[0004] The suspension element can be used in its full extension to fix the profile rail on a beam or the like. Further it can be folded along its weakening lines around the edges of a beam and be fixed on the same. In a third alternative, the suspension element can be folded along its central weakening line, along which a slot is provided, and can be used by this doubling on itself for holding the profile rail by means of a hook connected to a ceiling and the like. The subassembly is not provided for connecting a ceiling grid with a wall.

[0005] WO 2005/017274 A1 discloses a connecting system for profiled rails used in a ceiling grid. The connecting system comprises a connector, which has a middle bottom and two angled limbs laterally formed thereon. Thus, the connector has a U-shape in cross-section. Each lateral limb has near each of its two ends two tabs, facing each other and extending from the limb on the same side such as to form a splice piece for taking up a fish plate. Such fish plates are the legs of a connecting element, which are connected by a sheet section extending perpendicular to the legs. The sheet section extends on one side beyond the legs and is bent rectangularly and outwardly, i.e. off from the legs, to act as a clamping part.

[0006] If the fish plate legs of the connecting element are inserted in the splice pieces of the limbs of the connector, the connector and the connecting element form an element unit, which can be fixed to another element

or profile rail by means of the clamping part action.

[0007] The connecting element is built from sheet metal in the factory and can be used only in connection with the specifically adapted connector. The clamping part has a fixed predetermined position and is not intended to be used for fixing a ceiling system to a building wall, which usually is not exactly straight.

[0008] A wall anchor of the prior art (installation manual of Armstrong Metalldecken AG, Switzerland, printed January 2005, page 82, Art. 300.144) consists of a base element having a U-shape in cross-section with a bottom part and two identical opposed side parts. With one of its free edges, the bottom part is integrally connected with a first vertical section, which in turn is integrally connected to a horizontal section, which in turn is integrally connected with a second vertical section including an aperture for fixing the wall anchor or connector to a building wall.

[0009] The wall anchor according to this prior art can be directly slid into C- or D-profiles. Even if the dimensions of the profiles or ceiling runners are standardized, at least three kinds of wall anchors must be supplied to adapt the fixing of the ceiling system at several locations.

[0010] DE 85 18 489 U1 discloses a substructure for a suspended ceiling comprising a connector, which shows all the features of the preamble of claim 1.

[0011] Therefore, it is the object of the invention to provide a ceiling connector, which can be used in only one design at every location of the ceiling system and which can be easily shaped and adapted at the site of its installation to the intended extension of the ceiling and to the given extension of the wall structure where it is to be fixed.

[0012] According to the invention this object is obtained with a connector for ceiling systems made of strong resilient material. The connector comprises a base member having a top edge integrally connected to a top edge attachment section, a bottom edge, a first side edge integrally connected to a first side edge attachment section and a second side edge opposing the first side edge and integrally connected to a second side edge attachment section. The top edge and the side edges extend substantially perpendicular to each other. Along the top edge a relief slot is provided extending through the material. In the top edge attachment section at least one further relief slot is provided extending parallel to the top edge and through the material. At least one aperture is provided at least in the top edge attachment section. The two side edge attachment sections are perpendicularly bent along the side edges such that they oppose each other in parallel for engagement with a ceiling grid. The top edge attachment section of the connector is formable on site by bending it along its relief slots such that the at least one aperture allows fixing of the top edge attachment section in a position adapted to a building support element.

[0013] If the connector is provided along each side edge with a relief slot, the connector is formable on site from a flat single piece which can be shipped with the lowest possible bulk volume.

[0014] Preferably, the side edge attachment sections extend both in the same amount beyond the bottom edge of the base member.

[0015] A fictive prolongation of the bottom edge of the base member may extend into both side edge attachment sections in the same amount beyond the extension of the top edge of the base member.

[0016] It is convenient that further apertures are provided in the base member and/or at least one of the side edge attachment sections.

[0017] Advantageously, the relief slots may consist of a plurality of aligned adjacent short slots or holes.

[0018] The connector according to the invention, which can be made of steel or aluminum, has one or more target bending points which are defined by relief slots which extend through the resilient material and allow for ease in bending by the ceiling installer. This permits the connector to be used in several different ceiling applications. If the side edges of the connector are provided with relief slots, it can be easily bent by an installer at the installation site and can be delivered completely flat which will make it cheaper to ship from the manufacturing facility to the customer.

[0019] In the following, embodiments of the invention are illustrated by reference to the drawings in which

- Fig. 1 shows a front view of a first embodiment of a connector the top edge attachment section of which is folded up to a first use condition,
- Fig. 2 is a side view of the connector of Fig. 1,
- Fig. 3 is a top view of the connector of Fig. 1 and 2,
- Fig. 4 shows a second embodiment of a connector in its transporting and storing condition,
- Fig. 5 shows one use situation of the connector fixed to a wall together with a sloped ceiling,
- Fig. 6 is a schematic side view of the connector connecting a wall and a profile in the use condition of Fig. 3
- Fig. 7 is a schematic side view as Fig. 6 and shows the connector in a second use condition,
- Fig. 8 is a side view as Fig. 6 and 7 and shows the connector in a use condition similar to Fig. 7 and
- Fig. 9 shows in a schematic side view two connectors used together with a main runner and two cross runners of a ceiling grid.

[0020] The first embodiment of a connector as shown in Fig. 1 to 3 is made of strong resilient material, such as steel or aluminum. The connector comprises a base member 10. The base member 10 has a top edge 11, integrally connected to a top edge attachment section 17, a bottom edge 12, a first side edge 13 integrally connected to a first side edge attachment section 15 and a second side edge 14 opposing the first side edge 13 and integrally connected to a second side edge attachment section 16.

[0021] The top edge 11 and the side edges 13, 14 extend substantially perpendicular to each other. Along the

top edge 11, a relief slot 22 is provided. In the top edge attachment section 17 a further relief slot 23 is provided extending parallel to the top edge 11. The relief slots 22 and 23 extend through the material of the connector. In the top edge attachment section 17 apertures 19 are provided for inserting mechanical fasteners therethrough.

[0022] The connector is formable on the installation site by bending. The two side edge attachment sections 15, 16 are perpendicularly bent along their side edges 13, 14 such that they oppose each other in parallel for engagement with a ceiling grid. This can be made in factory or on site. The top edge attachment section 17 is formable on site along its relief slots 22 and 23 such that at least one of the apertures 19 allows fixing of the top edge attachment section 17 of the connector in a position adapted to a building support element 30, i.e. the building wall (Fig. 5 to 7).

[0023] The connector of Fig. 1 to 3 is shown formed into one shape in which it can be used. The side edge attachment sections 15 and 16 can be attached to a ceiling panel by sliding them into a splice receiving channel of a C- or D-profile of a ceiling runner. The relief slots 22 and 23 provide ease in bending for an installing person taking into account that the relief slots 22 and 23 act as an identifying mark indicating where the connector is to be bent.

[0024] In the second embodiment of the connector as shown in Fig. 4 a relief slot 20 is provided along the side edge 13 and a relief slot 21 is provided along the opposing side edge 14. The connector of this second embodiment can be transported as a flat single piece and can be formed on site to the shape of the connector of Fig. 1 to 3 by first bending the side edge attachment sections 15, 16 on site perpendicularly to the base member 10 along the relief slots 20 and 21, respectively, such that the side edge attachment sections 15, 16 extend in the same direction from the base member 10 parallel to each other, whereafter the top attachment section 17 is adapted as stated above. The bending along the relief slots 20 and 21, respectively, is less difficult on site than the bending without such relief slots according to the first embodiment.

[0025] As shown in Fig. 1 to 4, the side edge attachment sections 15 and 16 extend both in the same amount beyond the bottom edge 12 of the base member 10, while the bottom edge 12 of the base member 10 extends into both side edge attachment sections 15, 16 in the same amount beyond the extension of the top edge 11 of the base member 10 providing undercuts, which can be seen on the lower right part in Fig. 2.

[0026] As shown in Fig. 1 and 4, apertures 19 can also be provided in the base member 10 and - not shown - in the side edge attachment sections 15 and 16, if necessary.

[0027] The relief slots 20 to 23 as shown in Fig. 1 to 4 can be replaced by a plurality of aligned adjacent short slots or holes, that have the same effect with regard to identification of the bending line and of ease of bending,

giving the connector its flexibility and its performance to be used in a plurality of fixing positions.

[0028] Fig. 5 shows schematically the use of a connector fixing a ceiling consisting of runners and ceiling plates to a wall 30 of building. Along the wall 30 a rectangular edge angle 31 is fixed with its one vertical leg to the wall by means of screws 32. The horizontal leg of the edge angle 31 is used for supporting ceiling runners. Such ceiling runners may be C-profiles 35 (Fig. 6) or D-profiles 36. The D-profile 36 shown in Fig. 5 and supporting ceiling panels 38 is arranged to form a "sloped" ceiling. For attaching the sloped ceiling to the wall 30, the connector according to the invention is inserted into the D-profile 36 with its side edge attachment sections, of which only the section 15 is shown. The side attachment sections are bent on site by the installing person from the base member 10 along the relief slots 20 and 21, respectively, such that they fit into the D-profile 36 and hold the profile 36 securely. The top edge 11 of the base member 10 is bent along the relief slot 22 as shown in Fig. 5. Along the relief slot 23 the top edge attachment section 17 is bent such that its upper part is flush with the surface of the wall 30. The screw 39 is inserted through the aperture 19 and fixed to the wall 30. Thus, with the connector of the invention the ceiling can be supported by the edge angle 31 and is fixed to the wall 30 in a sloped condition by the connector bent on site by the installing person to the shape necessary for attachment.

[0029] As shown in Fig. 6, a C-profile 35 for a subceiling is attached to the wall 30 of a building by means of the connector of the invention. The side edge attachment sections, of which only the section 16 is shown, are brought into supporting engagement with the C-profile 35 by sliding into the C-profile 35. The C-profile 35 is supported by the edge angle 31 fixed to the wall 30. The C-profile 35 is fixed to the wall 30 by means of the top edge attachment section 17 in a straight condition, i.e. not bent along the relief slot 23.

[0030] In Fig. 7 the edge angle 31 has a cross-sectional profile of two steps with two horizontal parts and two vertical parts, the vertical part with the free end being fixed to the wall 30, while the horizontal part having the free end supports the C-profile 35. The C-profile 35 is held by the connector as shown in Fig. 6 with the side edge attachment sections, of which only the side attachment section 16 is shown, inserted into the C-profile 35. The connector has its top edge attachment section 17 bent along the top edge 11 of the base member 10 and the relief slot 22 to a horizontal part and along the relief slot 23 into a vertical part parallel to the wall 30 for fixing it through the aperture 19.

[0031] The embodiment of Fig. 8 is similar to the embodiment of Fig. 7 as far as the wall angle 31 is concerned, which has on its intermediate vertical portion two spaced horizontal flanges 33 and 34 contacting at their ends the free edges of the undercut mentioned above in connection with Fig. 3. The connector is bent on side in

accordance with Fig. 7.

[0032] Fig. 9 shows the use of two connectors according to the invention in connection with D-profiles 36 as main runner and two cross runners. Each D-profile 36 has a bottom with an outer flange and two opposing side walls, the upper ends of which are bent inwardly. As shown in Fig. 9, the connectors are pushed into the cross-runners and hold them on the side limbs of the main runner. The top edge attachment sections 17 of the connectors are bent into a somewhat vertical position along the relief slot 23. The connectors can be fixed by a self-drilling screw (not shown in Fig. 9) to the top or side part of the D-profile 36.

Claims

1. Connector for ceiling systems made of strong resilient material, the connector comprising a base member (10) having

- a top edge (11) integrally connected to a top edge attachment section (17),
- a bottom edge (12),
- wherein in the top edge attachment section (17) at least one relief slot (23) is provided extending parallel to the top edge (11) and through the material,
- wherein at least one aperture (19) is provided at least in the top edge attachment section (17),

characterised in that said base member (10) has

- a first side edge (13) integrally connected to a first side edge attachment section (15) and
- a second side edge (14) opposing the first side edge (13) and integrally connected to a second side edge attachment section (16),
- wherein the top edge (11) and the side edges (13, 14) extend substantially perpendicular to each other,
- wherein along the top edge (11) a further relief slot (22) is provided extending through the material,
- wherein the two side edge attachment sections (15, 16) are bent along the side edges (13, 14) such that they oppose each other in parallel for engagement with a ceiling grid and
- wherein the top edge attachment section (17) of the connector is formable on site by bending along its relief slots (22, 23) such that the at least one aperture (19) allows fixing of the top edge attachment section (17) in a position adapted to a building support element (30).

2. Connector according to claim 1, wherein along each side edge (13, 14) a relief slot (20, 21) is provided such that the connector is formable on site from a

flat single piece.

3. Connector according to claim 1 or 2, wherein the side edge attachment sections (15, 16) extend both in the same amount beyond the bottom edge (12) of the base member (10). 5
4. Connector according to one of the preceding claims, wherein a fictive prolongation of the bottom edge (12) of the base member (10) extends into both side edge attachment sections (15, 16) in the same amount beyond the extension of the top edge (11) of the base member (10). 10
5. Connector according to one of the preceding claims, wherein further apertures (19) are provided in the base member (10) and/or at least one of the side edge attachment sections (15, 16). 15
6. Connector according to one of the preceding claims, wherein the relief slots (20 to 23) consist of a plurality of aligned adjacent short slots or holes. 20

Patentansprüche

1. Verbinder für Deckensysteme aus einem festen elastischen Material, wobei der Verbinder ein Basiselement (10) umfasst, das
 - eine mit einem Oberkantenbefestigungsabschnitt (17) einstückig verbundene Oberkante (11) und
 - eine Unterkante (12) aufweist,
 - wobei in dem Oberkantenbefestigungsabschnitt (17) wenigstens ein Entlastungsschlitz (23) vorgesehen ist, der sich parallel zu der Oberkante (11) und durch das Material erstreckt,
 - wobei wenigstens eine Öffnung (19) wenigstens in dem Oberkantenbefestigungsabschnitt (17) vorgesehen ist,

dadurch gekennzeichnet, dass das Basiselement (10) 45

- eine mit einem ersten Seitenkantenbefestigungsabschnitt (15) einstückig verbundene erste Seitenkante (13) und
- eine der ersten Seitenkante (13) gegenüberliegende und mit einem zweiten Seitenkantenbefestigungsabschnitt (16) einstückig verbundene zweite Seitenkante (14) aufweist,
- wobei die Oberkante (11) und die Seitenkanten (13, 14) sich im Wesentlichen senkrecht zueinander erstrecken,
- wobei entlang der Oberkante (11) ein weiterer Entlastungsschlitz (22) vorgesehen ist, der sich

durch das Material erstreckt,

- wobei die zwei Seitenkantenbefestigungsabschnitte (15, 16) entlang der Seitenkanten (13, 14) derart gebogen sind, dass sie für einen Eingriff mit einem Deckengitter einander parallel gegenüberliegen, und
- wobei der Oberkantenbefestigungsabschnitt (17) des Verbinders vor Ort formbar ist, indem er entlang seiner Entlastungsschlitze (22, 23) derart gebogen wird, dass die wenigstens eine Öffnung (19) die Befestigung des Oberkantenbefestigungsabschnitts (17) in einer an ein Bauelement (30) angepassten Position erlaubt.

2. Verbinder nach Anspruch 1, wobei entlang jeder Seitenkante (13, 14) ein Entlastungsschlitz (20, 21) derart vorgesehen ist, dass der Verbinder vor Ort aus einem flachen einzelnen Teil formbar ist.
3. Verbinder nach Anspruch 1 oder 2, wobei die Seitenkantenbefestigungsabschnitte (15, 16) sich beide in gleichem Maße über die Unterkante (12) des Basiselements (10) hinaus erstrecken.
4. Verbinder nach einem der vorhergehenden Ansprüche, wobei eine fiktive Verlängerung der Unterkante (12) des Basiselements (10) sich in gleichem Maße in beide Seitenkantenbefestigungsabschnitte (15, 16) über die Erstreckung der Oberkante (11) des Basiselements (10) hinaus erstreckt. 30
5. Verbinder nach einem der vorhergehenden Ansprüche, wobei weitere Öffnungen (19) in dem Basiselement (10) und/oder wenigstens einem der Seitenkantenbefestigungsabschnitte (15, 16) vorgesehen sind. 35
6. Verbinder nach einem der vorhergehenden Ansprüche, wobei die Entlastungsschlitze (20 bis 23) aus einer Vielzahl von fluchtenden benachbarten kurzen Schlitzen oder Löchern bestehen. 40

Revendications

1. Connecteur pour systèmes de plafond, formé d'un matériau élastique solide, le connecteur comprenant un élément de base (10) pourvu
 - d'un bord supérieur (11) solidaire d'une section de fixation de bord supérieur (17),
 - d'un bord inférieur (12),
 - dans lequel au moins une fente de soulagement (23) s'étendant parallèlement au bord supérieur (11) à travers le matériau est prévue dans la section de fixation de bord supérieur (17),
 - dans lequel au moins une ouverture (19) est

prévu au moins dans la section de fixation de bord supérieur (17),

à 23) consistent en une pluralité de fentes courtes ou de trous adjacent(e)s aligné(e)s.

caractérisé en ce que ledit élément de base (10) comprend

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- un premier bord latéral (13) solidaire d'une section de fixation de premier bord latéral (15) et
- un second bord latéral (14) opposé au premier bord latéral (13) et solidaire d'une section de fixation de second bord latéral (16),
- dans lequel le bord supérieur (11) et les bords latéraux (13, 14) s'étendent de manière essentiellement perpendiculaire les uns aux autres,
- dans lequel une autre fente de soulagement (22) s'étendant à travers le matériau est prévue le long du bord supérieur (11),
- dans lequel les deux sections de fixation de bord latéral (15, 16) sont pliées le long des bords latéraux (13, 14) de manière à être opposées parallèlement l'une à l'autre pour s'engager avec une grille de plafond et
- dans lequel on peut donner forme à la section de fixation de bord supérieur (17) du connecteur sur place en la pliant le long de ses fentes de soulagement (22, 23) de manière à ce que la au moins une ouverture (19) permette d'attacher la section de fixation de bord supérieur (17) dans une position adaptée sur un élément de support de construction (30).

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2. Connecteur selon la revendication 1, dans lequel une fente de soulagement (20, 21) est prévue le long de chaque bord latéral (13, 14) de manière à ce que l'on puisse donner forme au connecteur sur place à partir d'une unique pièce plate.
3. Connecteur selon la revendication 1 ou 2, dans lequel les sections de fixation de bord latéral (15, 16) s'étendent toutes les deux de façon égale au-delà du bord inférieur (12) de l'élément de base (10).
4. Connecteur selon l'une des revendications précédentes, dans lequel un prolongement imaginaire du bord inférieur (12) de l'élément de base (10) pénètre dans les deux sections de fixation de bord latéral (15, 16) en dépassant de façon égale l'étendue en longueur du bord supérieur (11) de l'élément de base (10).
5. Connecteur selon l'une des revendications précédentes, dans lequel des ouvertures supplémentaires (19) sont prévues dans l'élément de base (10) et/ou au moins une des sections de fixation de bord latéral (15, 16).
6. Connecteur selon l'une des revendications précédentes, dans lequel les fentes de soulagement (20

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Fig. 2

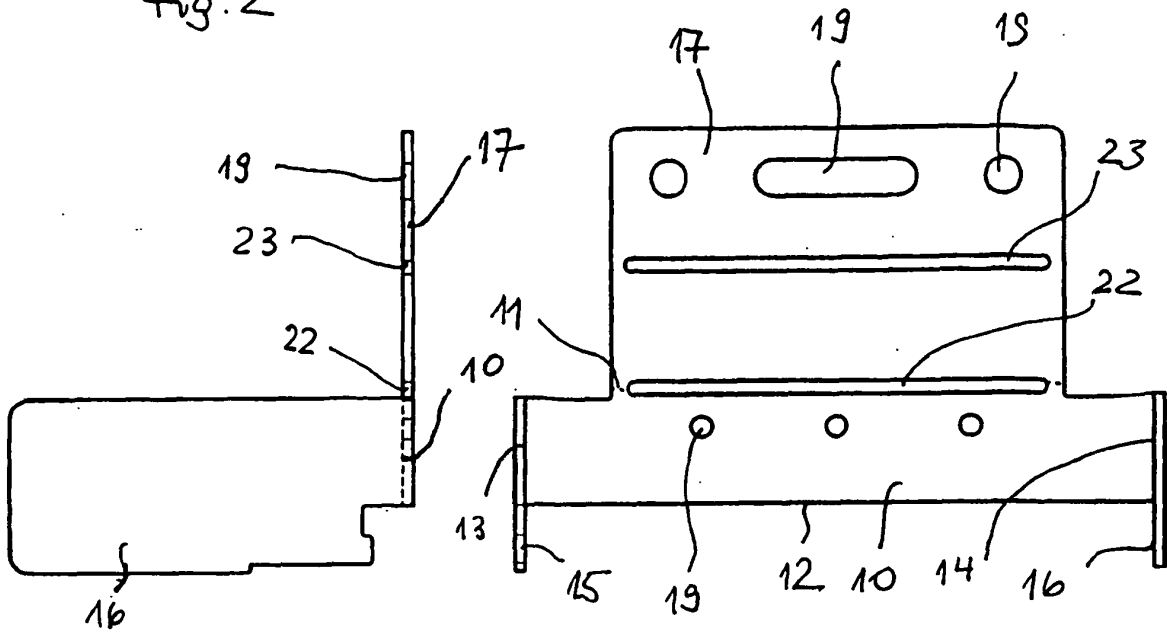


Fig. 1

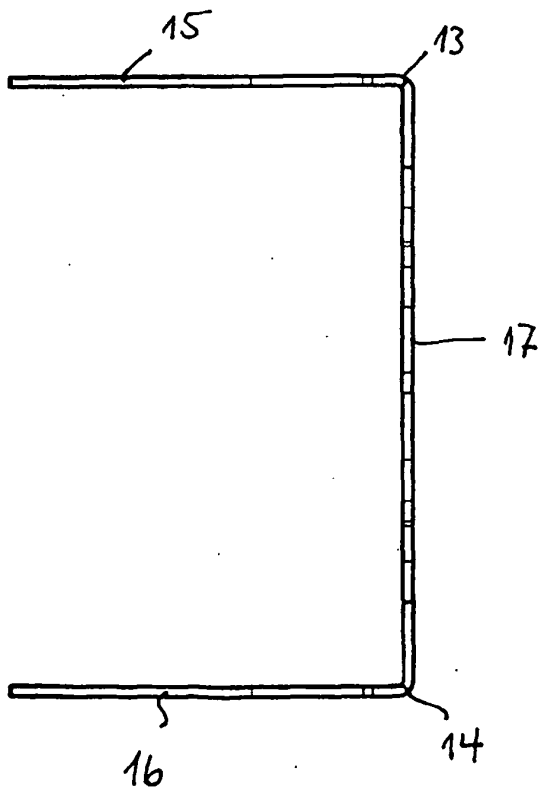


Fig. 3

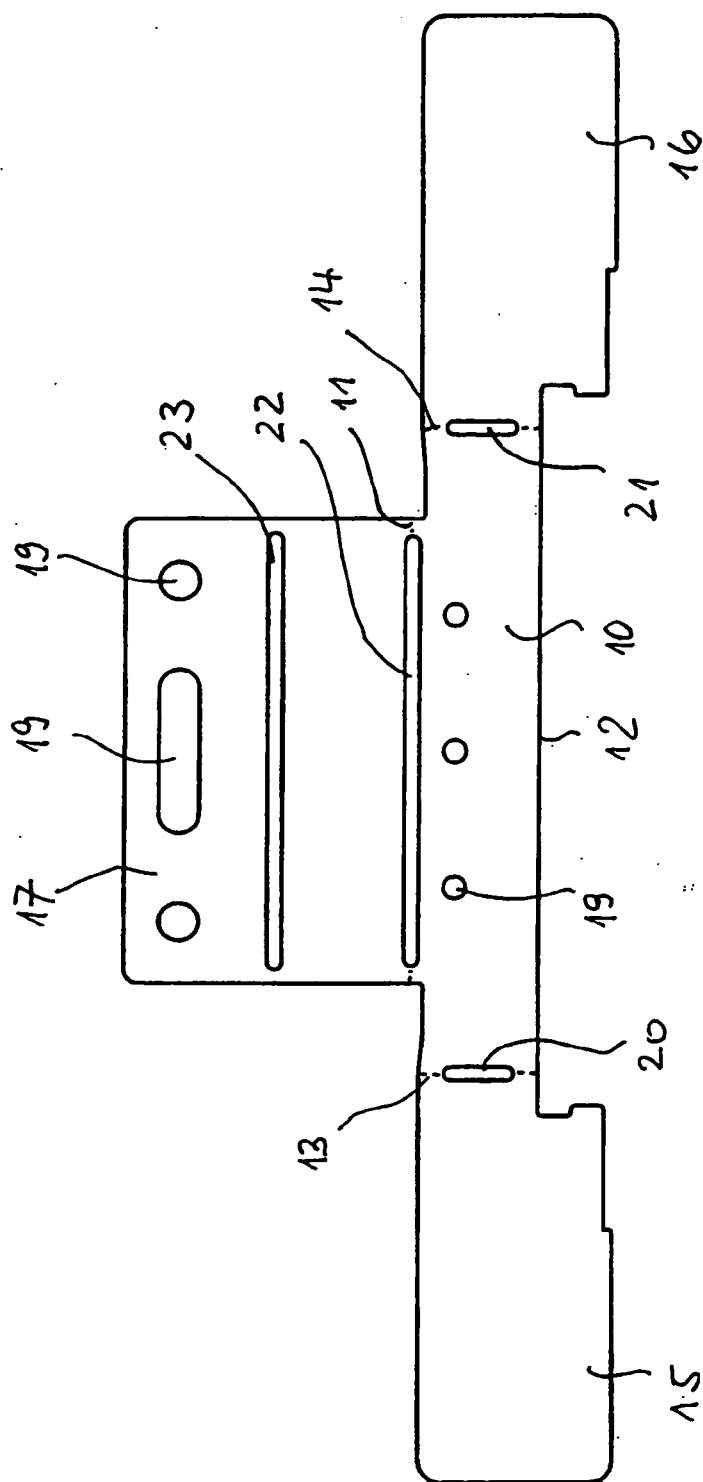
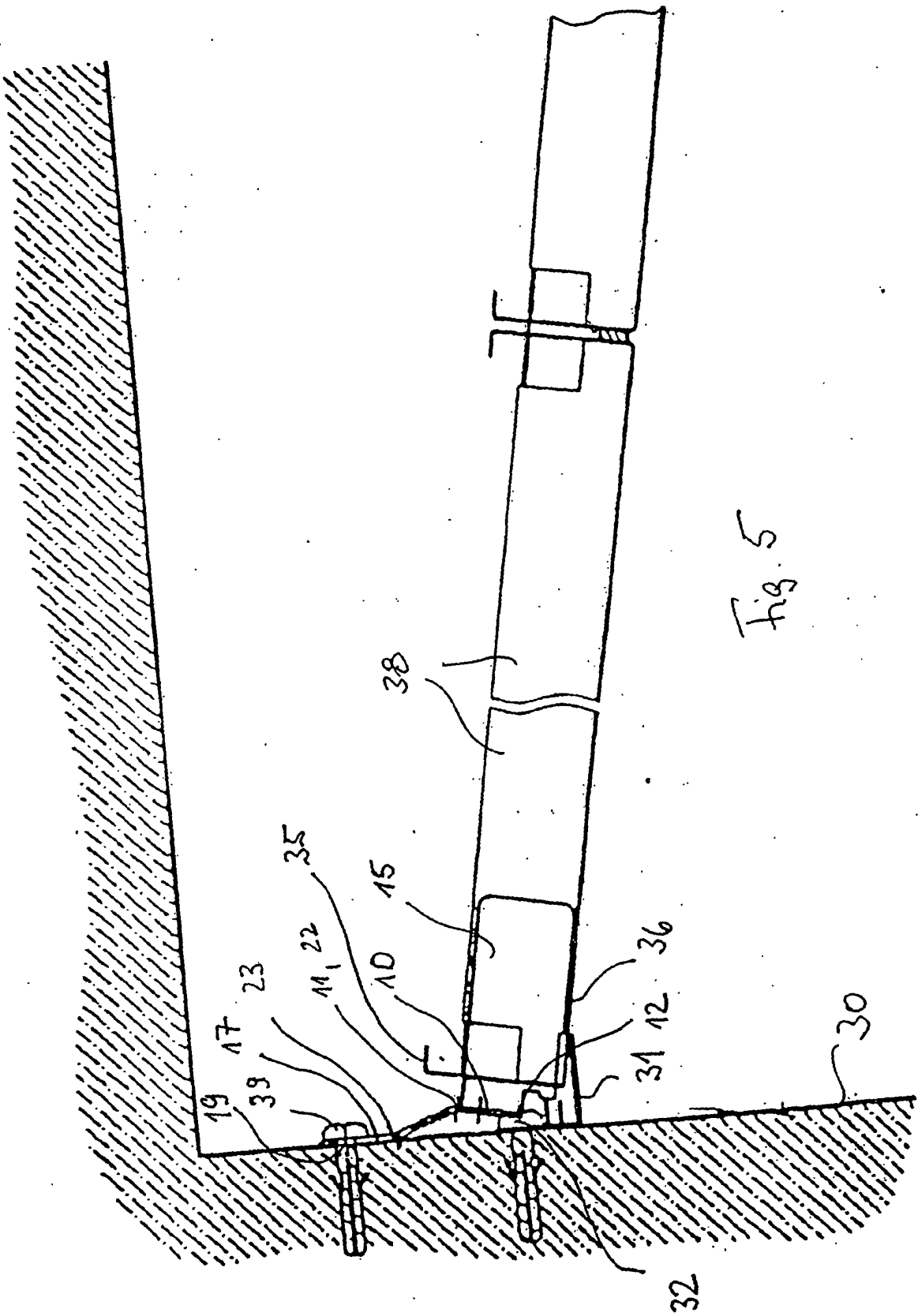
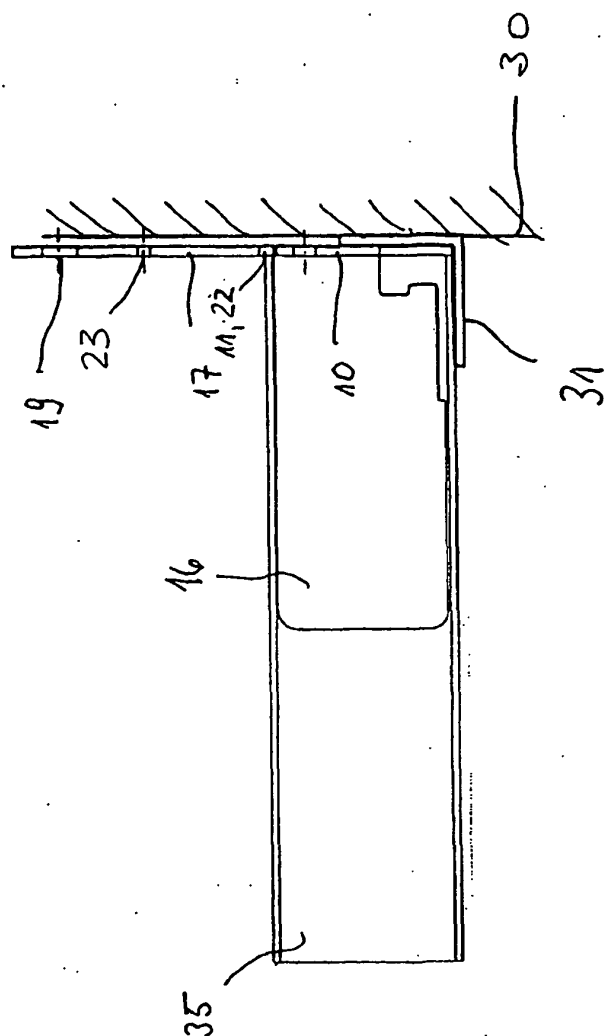
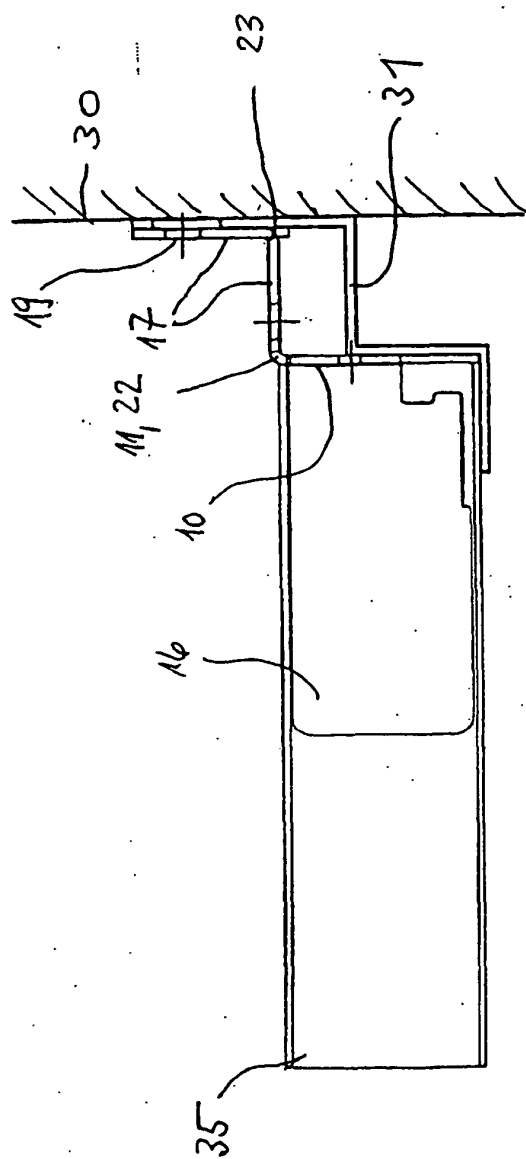


Fig. 4





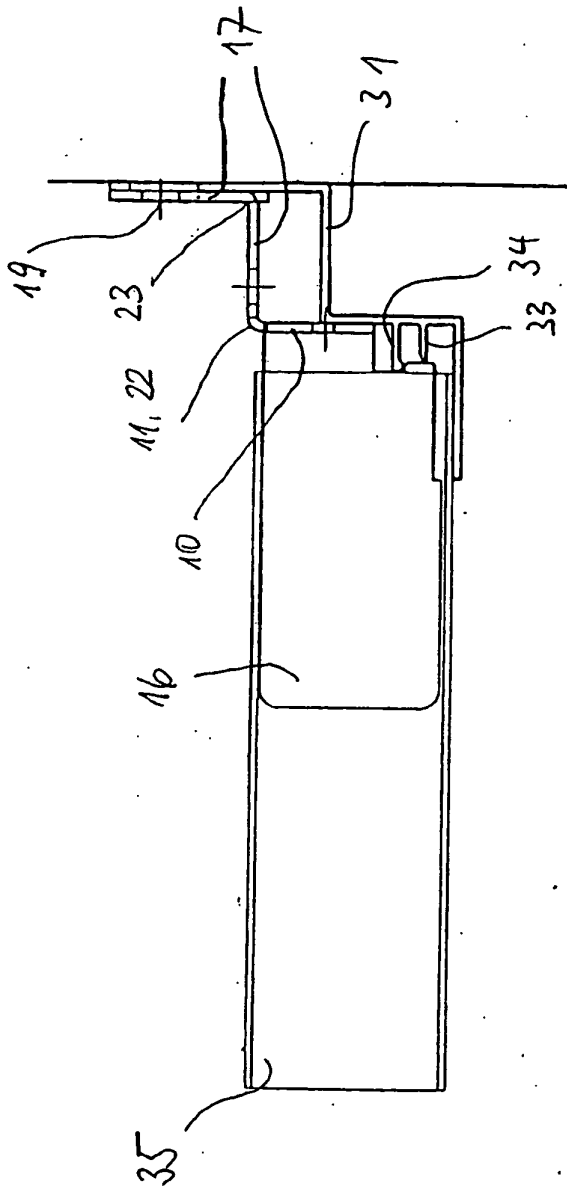


FIG. 8

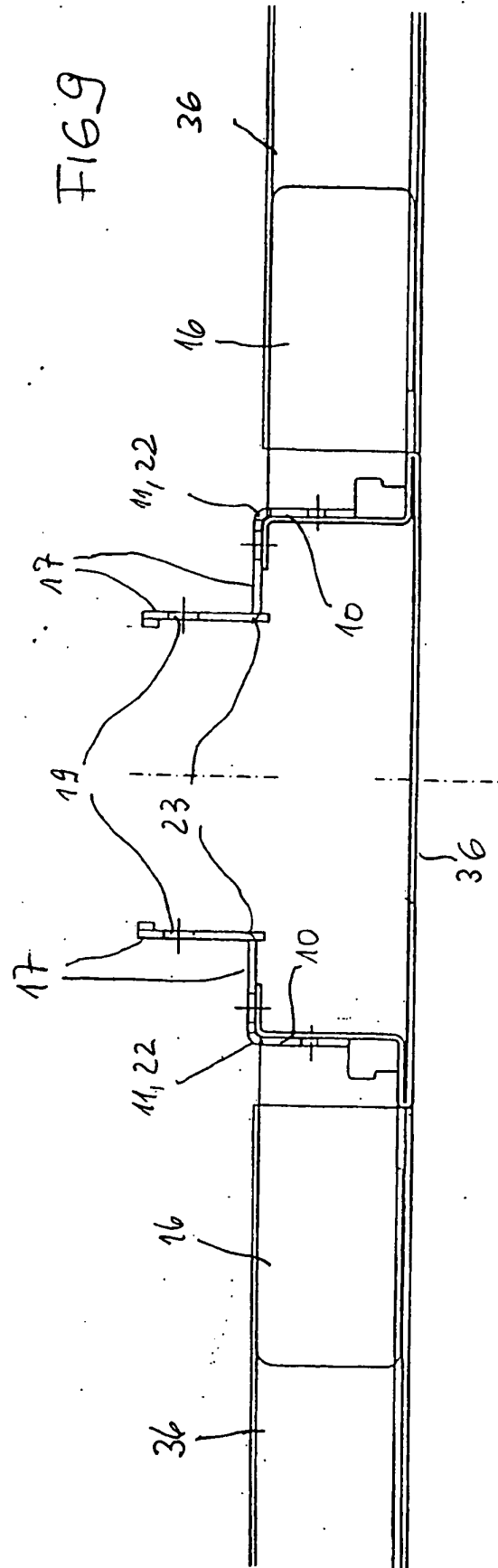


FIG. 9

REFERENCES CITED IN THE DESCRIPTION

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