



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
07.09.2005 Bulletin 2005/36

(51) Int Cl.7: **E04B 1/61**

(21) Application number: **04447056.5**

(22) Date of filing: **05.03.2004**

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

(72) Inventor: **Verhaeghe, Jan**
9120 Beveren (BE)

(74) Representative: **Luys, Marie-José A.H. et al**
Gevers & Vander Haeghen,
Holidaystraat 7
1831 Diegem (BE)

(71) Applicant: **Groep Stevens International,**
Naamloze Vennootschap
9160 Lokeren (BE)

(54) **Connecting device**

(57) The present invention relates to a connecting device (9) for connecting an adjacent first and second panel (10, 20) along facing sides (19, 29) in a spaced relationship, the first panel comprising opposite first and second faces (11, 12), the second panel comprising opposite first and second faces (21, 22). The connecting device (9) comprises a first and a second part (1, 2), the first part (1) being provided for mounting to the first face (11, 21) of the first and second panel and the second part (2) being provided for mounting to the second face (12, 22) of the first and second panel (10, 20) opposite the first face (11, 21), the first and second part (1, 2) respectively comprising first and second connecting means (4, 5) which are provided to mutually engage each other in view of connecting the first and second

part (1, 2). The connecting means extend within a space (3) between the first and second panel (10, 20). The first part (1) comprises a first and second wing (13, 14) on opposite sides of the first connecting means (4) and the second part (2) comprises a third and fourth wing (23, 24) on opposite sides of the second connecting means (5), the first wing (13) being provided to co-operate with the third wing (23) upon connecting the first and second part (1, 2) in view of forming a first space (38) for holding the first panel (10) therebetween, the second wing (14) being provided to co-operate with the fourth wing (24) upon connecting the first and second part (1, 2) in view of forming a second space (39) for holding the second panel (20) adjacent to the first panel (10) therebetween, the first and second space being positioned on opposite sides of the connecting means (4, 5).

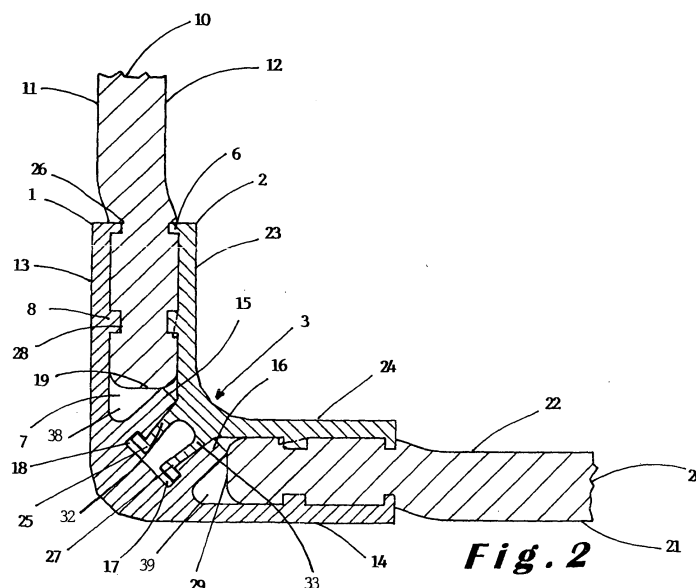


Fig. 2

Description

[0001] The present invention relates to a connecting device for connecting an adjacent first and second panel along facing sides in a spaced relationship, the first panel comprising opposite first and second faces, the second panel comprising opposite first and second faces.

[0002] From the art, a wide variety of connecting means are known which allow connecting adjacent panels to each other. Thereby the faces of adjacent panels may for example extend in line whereas adjacent sides face each other; in another example the faces of adjacent panels extend under an angle with respect to each other. Known connecting techniques include bolting, riveting, gluing, connecting by means of mortar. Other known connecting techniques include the use of hinges or connecting profiles that are fastened to the panels to be connected. The existing techniques however present the disadvantage that they are laborious, time consuming and expensive, and involve that the panels get physically damaged upon connecting them, as a consequence of which the panels are often not suitable for further use.

[0003] There is thus a need to a connecting device with which the connection of adjacent panels may be effectuated in a fast manner, thereby minimising the risk to damaging the panels.

[0004] The present invention therefore aims at providing a connecting device with which adjacent panels may be connected to each other in a fast manner, with a minimum risk to damaging the panels.

[0005] This is achieved according to the present invention with the technical features of the characterising part of the first claim.

[0006] The connecting device of the present invention is characterised in that it comprises a first and a second part, the first part being provided for mounting to the first face of the first and second panel and the second part being provided for mounting to the second face of the first and second panel opposite the first face, the first and second part respectively comprising first and second connecting means which are provided to mutually engage each other in view of connecting the first and second part, in that the connecting means extend within a space between the first and second panel, in that the first part comprises a first and second wing on opposite sides of the first connecting means and the second part comprises a third and fourth wing on opposite sides of the second connecting means, the first wing being provided to co-operate with the third wing upon connecting the first and second part in view of forming a first space for holding the first panel therebetween, the second wing being provided to co-operate with the fourth wing upon connecting the first and second part in view of forming a second space for holding the second panel adjacent to the first panel therebetween, the first and second space being positioned on opposite sides of the connecting means

[0007] As the connecting means extend within a space between the first and second panel, as the first and second connecting means are provided to mutually engage each other, the connection between the first and second part of the connecting device may be established without affecting or damaging the panels. Thereby the first wing is provided to co-operate with the third wing for holding the first panel between them and the second wing is provided to co-operate with the fourth wing for holding the second panel adjacent to the first panel between them. The presence of opposite wings on either side of the connecting means allows receiving and holding a panel between the first and second part of the connecting device without the need to damaging the panels.

[0008] A preferred embodiment is characterised in that the first connecting means comprise a clamping profile which protrudes within the space between the first and second panels, from the first part towards the second part, the clamping profile enclosing within it a space for receiving and holding the second connecting means. The second connecting means protrude from the second part towards the first connecting means. This preferred embodiment allows obtaining a connecting device with which the connection between adjacent panels is effectuated in a direction that extends perpendicularly to the direction in which the panels are to be connected.

[0009] Another preferred embodiment of the invention is characterised in that the first connecting means comprise a pair of opposite clamping profiles which are tiltably mounted with respect to each other. This is done to facilitate insertion of the second connecting means within the first connecting means, and simultaneously to provide a connection which may be disassembled afterwards, thereby minimising the risk to damaging the connecting device as well as the panels.

[0010] The present invention also relates to an assembly of the above described connecting device and a first and second panel.

[0011] The present invention further relates to a construction comprising a plurality of panels assembled to each other by means of the connecting device of this invention.

[0012] Preferred embodiments with which the above described connection may be established in practise are illustrated in the appending figures and described in the figure description.

[0013] Figure 1 shows in cross section a preferred embodiment of the connecting device of this invention connecting two panels with parallel facing sides.

[0014] Figure 2 shows in cross section a preferred embodiment of the connecting device of this invention connecting two panels with perpendicular sides.

[0015] Figure 3 shows a cross section of a building comprising parallel circumferential walls connected to each other using a preferred embodiment of the connecting device of this invention.

[0016] Figure 4 shows the cross section of figure 1, however additional fastening means 40 being provided for fastening the parts of the connecting device to each other.

[0017] Figure 1 shows a first panel 10 having a first or a front face 11 and a second or a back face 12 and a first side 19; and a second panel 20 having a first or a front 21 face and a second or a back face 22 and a second side 29. The first side 19 of the first panel 10 and the second side 29 of the second panel 20 face each other; they are positioned at a distance from each other and extend parallel to each other. In figure 2, the first side 19 and second side 21 extend perpendicular with respect to each other. However as can be seen from figure 3, the first and second sides 19, 21 may extend under any other angle required by the circumstances.

[0018] The connecting device 9 for connecting the first 10 and second panel 20 comprises a first part 1, which is provided for mounting to a first face 11 of the first panel 10 and to a first face 21 of the second panel 20. The connecting device 9 comprises a second part 2, which is provided for mounting to a second face 12 of the first panel 10 and to a second face 22 of the second panel 20. The first part 1 comprises first connecting means 4, the second part 2 comprises second connecting means 5, which are provided to mutually engage each other, in particular to interlock, in view of connecting the first and second part 1, 2. Adjacent panels to be connected are spaced somewhat from each other (see figure 1, 2, 3). The connecting means 1, 2 extend within that space 3, as a consequence of which the connection may be established without damaging the panels. The dimensions of the space 3 may be varied depending on the circumstances in which the panels to be connected need to be positioned with respect to each other.

[0019] The first connecting means 4 protrude from the first part 1 towards the second part 2. The second connecting means 5 protrude from the second part 2 towards the first part 1. The second connecting means are provided to be received in an engaging, preferably an interlocking manner into the first connecting means 4, although this may be inversed if the circumstances so require. In the preferred embodiment shown in figures 1, 2, 3 the first connecting means 4 comprise a pair of opposite clamps 15, 16 or clamping profiles which are moveable towards and from each other or may tilt or flex somewhat with respect to each other to allow inserting the second connecting means 5 and in view of providing a connection which may be disassembled after a connection had been established, thereby minimising the risk to damaging the connecting device as well as the panels. The clamps 15, 16 enclose a central space 7 between them. The second connecting means 5 are provided to be at least partially received within the central space 7, and to be clamped between the clamps 15, 16.

[0020] On opposite sides of the first connecting means 4 of the first part 1, a first and second wing 13,

14 is provided. The first wing 13 is provided for mounting to a first face 11 of the first panel 10. The second wing 14 is provided for mounting to a first face 21 of the second panel 20. Similarly, on opposite sides of the second connecting means 5 a third and fourth wing 23, 24 are provided. The third wing 23 is provided for mounting to the second face 12 of the first panel 10. The fourth wing 24 is provided for mounting to the second face 21 of the second panel 2. When establishing the connection between the first and second part 1, 2 of the connecting device, the first wing 13 is provided to co-operate with the third wing 23 to form a space between them for receiving and holding the first panel 10 between them; similarly the second wing 14 is provided to co-operate with the fourth wing 24 for holding the second panel 20 between them. Thereby, the dimensions of the connecting means 4, 5 in cross direction of the connecting device as shown in figure 1 and 2, will mostly be adapted to the thickness of the panels to be connected by them. In the embodiments shown, the connecting means 4, 5 are positioned centrally of respectively the first and second part 1, 2. Depending on the circumstances in which the connecting device 9 of this invention is to be used, the position of the connecting means 4, 5 may however be shifted towards an end part of the corresponding part 1, 2.

[0021] The first and second wing 13, 14 of the first part 1, and the first and second wing 23, 24 of the second part 2 may either extend in line as is shown in figure 1. This type of connecting device will mainly be used when connecting adjacent panels the faces 11, 21 and 12, 22 respectively extend in line. The first and second wing 13, 14 of the first part 1 may however also extend perpendicularly with respect to each other as is shown in figure 2. In that case the first part 1 will be used with a second part 2 in which the first and second wing 23, 24 will usually also extend perpendicular. This type of connecting device 9 allows connecting panels positioned perpendicularly with respect to each other. However, as can be seen from figure 3, the first and second wing 13, 14 of the first part 1, and the first and second wing 23, 24 of the second part 2 may extend under any other angle, depending on the positioning of the panels that need to be connected. To take account of the shape of the panels 10, 20 that need to be connected, the first angle between the first and second wing 13, 14 may be the same as or different from the second angle between the third and fourth wing 23, 24.

[0022] To improve the fixation of the panels 10, 20 within the connecting device 9 and to further secure the positioning of the first and second panel 10, 20 with respect to each other, each of the first, second, third and fourth wings 13, 14, 23, 24 comprises at least one protrusion 6 protruding towards, if so desired into the panel 10, 20. To improve clamping, the protrusion 6 is preferably positioned at a part distal from the connecting means 4, 5. The position of the protrusion 6 may be the same or different on different wings 13, 14, 23, 24. To

improve positioning of the panels 10, 20 within the connecting device and to minimise the risk to damaging the panels, each panel preferably comprises a corresponding recess 26 for receiving the protrusion 6. If so desired, one or more of the wings 13, 14, 23, 24 may comprise an additional protrusion 8, in which case each panel will mostly comprise an additional recess 28 for receiving that protrusion 8. The presence of co-operating and engaging protrusions 6, 8 on the wings 13, 14, 23, 24 and recesses 26, 28 allows increasing the fixation of the panels 10, 20. It is however also possible to provide the co-operating protrusions on the panels and recesses at corresponding positions in the wings.

[0023] An optimum clamping action is obtained in case the clamping profiles 15, 16 take the form of a pair of opposite protrusions, which may flex with respect to each other, as is shown in figure 1, 2, 3. This may for example be achieved by a tiltable mounting of the clamps 15, 16. Preferably the clamping profiles are mounted such that they are subjected to a force forcing them towards each other, but may however be displaced from each other when inserting the second connecting means 5.

[0024] The second connecting means 5 comprise a profile which is to be received within a space 7 and to engage the clamps 15, 16. In case the clamps 15, 16 may flex with respect to each other, the profile 5 may be a rigid profile. Preferably however, the profile 5 is resilient or somewhat compressible in the direction connecting the first and second sides 19, 29 of the panels, to facilitate insertion in the first connecting means 4. The profile 5 may for example take the shape of a second clamp, comprising opposite third and fourth protrusions 32, 33. The fixation of the second connecting means 5 within the first connecting means 4 may be improved by having the third and fourth protrusions 32, 33 movable to each other, but subjected to an outwardly directed force forcing them apart.

[0025] However, any other clamping device ought suitable by the person skilled in the art may be used for this purpose. At least one of the first and second protrusions 15, 16 comprise at a position proximal to the corresponding wing 13, 14 a recess 17, 18 for receiving a corresponding fifth and sixth protrusion 25, 27 provided on the second connecting means 5 and protruding there from towards at least one of the third and fourth wing 23, 24. Recesses 17, 18 will generally be dimensioned such that they are capable of receiving fifth and sixth protrusion 25, 27, preferably leaving some additional room in the direction in which the first and second part 1, 2 are assembled, designated with the arrows. In that way the connecting device of this invention is suitable for use with panels of varying thickness. However, to accommodate panels of widely varying dimensions or widths, it may be advisable adapting the length of the first and second connecting means 4, 5 in the connecting direction of the first and second part 1, 2, to the width of the panels.

[0026] If so desired, the fixation of the panels within the connecting device may be further strengthened by fastening the first part 1 to the first face 11, 21 of one or both of the first and second panel 10, 20; or by fastening the second part 2 to the second face 12, 22 of one or both of the first and second panel 10, 20. This fixation may be established using any fixation technique known to the person skilled in the art, for example riveting, bolting, gluing, welding etc. In a commercial embodiment it is however also possible to fasten the first panel 10 to the first wing 13 of the first part 1, and to fasten the second panel 20 to the second wing 24 of the second part, and to thereafter assemble these parts together.

[0027] Panels 10, 20 are confined in their position by the clamping action exerted by the first and second part 1, 2, which keeps the first and second part 1, 2 of the connecting device 9 together.

[0028] In another possible preferred embodiment the end parts of the first and third wings 13, 23 may be bent somewhat towards each other, and similarly the end parts of the second and fourth wings 14, 24 may be bent towards each other.

[0029] According to a further preferred embodiment the first and second part 1, 2 of the connecting device 9 may be fastened to each other by means of bolting or riveting or any other technique, preferably at the position of the connecting means 4, 5 as this allows minimising the risk to damaging the panels.

[0030] When envisaging connecting the first and second panel 10, 20 to a third panel 30 extending in a different direction as is shown in figure 3, either the first or second part 1, 2 of the connecting device 9 may contain further connecting means 31 for receiving and holding a third panel 30.

[0031] Depending on the circumstances the first and second part 1, 2 of the connecting device 9 may have the same or a different length in width direction of the panels 10, 20, and the same or a different height taken in height direction of the panels 10, 20. Similarly, either one or both of the first and second part 1, 2 may extend over the entire height as the panels 10, 20 or over only part thereof. Furthermore, if so desired the first part 1 may comprise a plurality of first connecting means 4 in height direction of the part 1. Similarly, the second part 2 may comprise a plurality of second connecting means 5 in height direction of the part 2. It is however also possible to provide the first and second part 1, 2 with both first and second connecting means 4, 5, the connecting means being positioned in such a way that each time first connecting means on one part are capable of engaging second connecting means on the other opposite part. It is further possible that the first part 1 comprises in length direction of the part (parallel to one or both of the faces 11, 21) a plurality of first and/or second connecting means, spaced from each other over regular distances. Similarly the second part 2 may comprise in length direction thereof (parallel to one or both of the faces 12, 22) a plurality of first and/or second connecting

means, spaced from each other over regular distances. In that way a single connecting device is capable of connecting more than two adjacent panels.

[0032] The connection of adjacent panels as is shown in figure 1 and 2 may be established as follows. The first part 1 of the connecting device 9 is mounted to a first face 11 of the first panel 10, in such a way that protrusions 6, 8 are received in the recesses provided on the panel and the first side 19 of the first panel extends along and preferably abuts against an outer face of protrusion 15. The second panel 20 is mounted to the first part 1 of the connecting device in a similar manner. The position of the panels 10, 20 with respect to each other is fixed by inserting the second connecting means 5 into the space 7 between the clamping profiles 16, 17, in such a way that

- the fifth and sixth protrusions 25, 27 on the second connecting means 5 are received in the corresponding recesses 18, 17
- protrusions 6 and 8 on the wings 13, 14, 23, 24 are received in the corresponding recess 26, 28 provided in the panels 10, 20.

The panels may be disassembled by pushing third and fourth protrusions 32, 33 towards each other, and retracting the second connecting means 5 from the first connecting means 4.

[0033] From the above given description it becomes apparent that because the first and second part 1, 2 of the connecting device 9 of this invention are to be assembled in a direction perpendicular to the direction in which adjacent panels are to be connected, namely along the facing sides 19, 29 which extend perpendicular to the first and second part 1, 2 a simple connection technique is obtained. The present invention does not make use of the known insertion technique, where a panel is inserted in the groove present between respectively the first and third 13, 23 and the second and fourth 14, 24 wing, which is followed by sliding the panel through the groove until the panel has reached the required position. The fact that the assembling can be effected in a direction perpendicular to the direction in which the panels are to be connected, renders the device of this invention particularly suitable for use with heavy panels having large dimensions. The clamping action exerted by the first and second connecting means 4, 5 holding together the first and second part 1, 2 of the connecting device 9, has the consequence that opposite wings 13, 23 on the one hand and 14, 24 are kept at a limited distance from each other. The clamping action exerted by the first and second connecting means 4, 5 has the further consequence that (i) a clamping action is exerted by opposite first and third wings 13, 23 to the opposite first and second face 11, 12 of the first panel 10 received in the space enclosed by the first and third wings 13, 23; and (ii) that similarly a clamping force is exerted to the first and second face 21, 22 of the second

panel 20 by opposite second and fourth wings 14, 24 to the opposite first and second face 21, 22 of the second panel 20 received in the space enclosed by the second and fourth wings 14, 24. In that way the position of the panels 10, 20 with respect to each other may be fixed, with minimum risk to damaging the panels. The panels 10, 20 are further confined in their position by the presence of the co-operating engaging protrusions 6 and recesses 26, preferably also the co-operating engaging protrusions 8 and recesses 28.

[0034] In the embodiment of figure 2, the first and second side 19, 29 of respectively the first and second panel 10, 20 abut only against an edge or a part of the clamping profiles 15, 16.

[0035] In the embodiment of figure 3 a construction is shown comprising concentric inner and outer walls 34, 35 leaving a space 37 between them. The inner and outer wall 34, 35 are connected to each other at several intermediate positions by means of connecting panels 36. The connecting panel 36 may either be a single panel or an assembly of two panels 10, 20 and the above described connecting device 9 of this invention. To connect adjacent panels in circumferential direction use is made of the above described connecting device 9 of this invention, in which wings 13, 14, 23, 24 extend with respect to each other under an angle required by the specific circumstances. At the position where a connection to a further panel 36 is needed, use is made of a connecting device 9, where the second part 2 comprises further connecting means 31 for receiving the third panel within it. To improve the strength of the construction, the further connecting means 31 are preferably provided to exert a clamping action to the panel 36.

[0036] The connecting device 9 of this invention may be made of any suitable material known to the person skilled in the art. The connecting device 9 may for example be made of metal, for example aluminium, reinforced aluminium or steel or any other suitable metal; of plastic material, plastic material comprising fibrous reinforcement. The connecting device of this invention is particularly provided for use with resin impregnated sandwich panels comprising an upper and a lower layer of glass fibre mat, enclosing a foamed core, the upper and lower layer being fastened to the core by means of tufting. The person skilled in the art will be capable of selecting the most appropriate material for the connecting device, which shows sufficient rigidity and sufficient bending strength to provide the clamping forces needed to allow an accurate and durable positioning of adjacent panels.

[0037] The panels 10, 20 suitable for use with the connecting device of this invention may also be made of any suitable material known to the person skilled in the art. The panels may for example be made of glass, plastic material, fibrous reinforced plastic material, sandwich panels for example those panels comprising a foam core enclosed between an upper and lower layer of fibrous reinforcing material plaster, wood, metal or any

other material. The dimensions of the panels 10, 20 are not critical to the invention and may vary within wide ranges from a few cm to several m.

[0038] The connecting device of this invention is suitable for building constructions with widely varying dimensions. The versatility of the connecting device further allows providing constructions having widely varying shapes and dimensions. The connecting device of this invention is for example suitable for use in the construction of buildings, which because of the simple connection technique may be erected within the shortest possible time. As the possibility is provided to disassemble the parts of the connecting device and the panels, the buildings may be of a temporary nature. An appropriate choice of the nature of the used materials allows controlling the costs. The open spaces in the connecting means 4, 5 are suitable for accommodating wiring and tubing.

Claims

1. A connecting device (9) for connecting an adjacent first and second panel (10, 20) along facing sides (19, 29) in a spaced relationship, the first panel comprising opposite first and second faces (11, 12), the second panel comprising opposite first and second faces (21, 22), **characterised in that** the connecting device (9) comprises a first and a second part (1, 2), the first part (1) being provided for mounting to the first face (11, 21) of the first and second panel and the second part (2) being provided for mounting to the second face (12, 22) of the first and second panel (10, 20) opposite the first face (11, 21), the first and second part (1, 2) respectively comprising first and second connecting means (4, 5) which are provided to mutually engage each other in view of connecting the first and second part (1, 2), **in that** the connecting means extend within a space (3) between the first and second panel (10, 20), **in that** the first part (1) comprises a first and second wing (13, 14) on opposite sides of the first connecting means (4) and the second part (2) comprises a third and fourth wing (23, 24) on opposite sides of the second connecting means (5), the first wing (13) being provided to co-operate with the third wing (23) upon connecting the first and second part (1, 2) in view of forming a first space (38) for holding the first panel (10) therebetween, the second wing (14) being provided to co-operate with the fourth wing (24) upon connecting the first and second part (1, 2) in view of forming a second space (39) for holding the second panel (20) adjacent to the first panel (10) therebetween, the first and second space being positioned on opposite sides of the connecting means (4, 5).

2. A device as claimed in claim 1, **characterised in**

that the first connecting means (4) comprise a clamping profile (15, 16) which protrudes within the space (3) between the first and second panels (10, 20), from the first part (1) towards the second part (2), the clamping profile (15, 16) enclosing within it a space (7) for receiving and holding the second connecting means (5) protruding from the second part (2) towards the first connecting means (4).

3. A device as claimed in claim 1 or 2, **characterised in that** the first connecting means (4) comprise a pair of opposite clamping profiles (15, 16) which are moveable towards and from each other.

4. A device as claimed in any one of claims 1-3, **characterised in that** the first connecting means (4) comprise a pair of opposite protrusions (15, 16), at least one of the protrusions (15, 16) comprising at a position proximal to the corresponding wing a recess (17, 18) for receiving a corresponding protrusion (27, 28) provided on the second connecting means (5) and protruding from the second connecting means (5) towards at least one of the second and third wing (23, 24).

5. A device as claimed in any one of claims 1-4, **characterised in that** the second connecting means (5) are resilient in a direction connecting the first and second panel (10, 20).

6. A device as claimed in any one of claims 1-5, **characterised in that** each wing (13, 14, 23, 24) comprises at a part distal from the connecting means (4, 5) at least one protrusion (6, 8) protruding towards the panel (10, 20).

7. A device as claimed in any one of claims 1-6, **characterised in that** the first and second wing (13, 14), respectively the third and fourth wing (23, 24) extend in line.

8. A device as claimed in any one of claims 1-7, **characterised in that** the first and second wing (13, 14) extend under a first angle with respect to each other, and the third and fourth wing (23, 24) extend under a second angle with respect to each other, the first and second angle being the same or different.

9. A device as claimed in any one of claims 1-8, **characterised in that** one or both of the first and second part (1, 2) comprise means (31) for holding a third panel (30) and connecting the first and second panel (10, 20) to the third panel (30).

10. An assembly of the device as claimed in any one of claims 1-9 and a first and second panel (10, 20).

11. An assembly of the device as claimed in claim 10,

characterised in that each wing (13, 14, 23, 24) comprises at a part distal from the connecting means (4, 5) at least one protrusion (6, 8) protruding towards the panel (10, 20) and **in that** the first and second panel comprise a corresponding recess (26, 28) for receiving the at least one protrusion (6, 8). 5

- 12.** A construction comprising a plurality of panels (10, 20) assembled to each other by means of the connecting device as claimed in any one of claims 1-8. 10

15

20

25

30

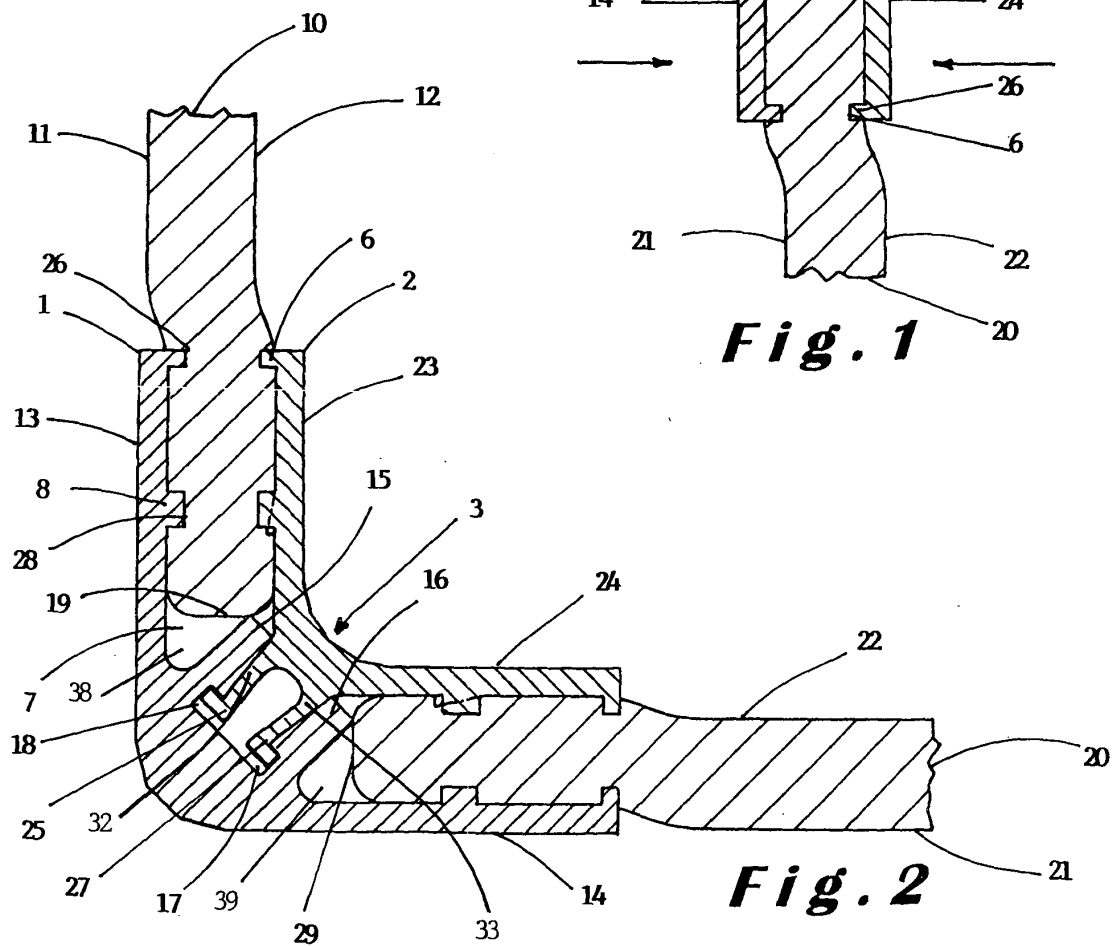
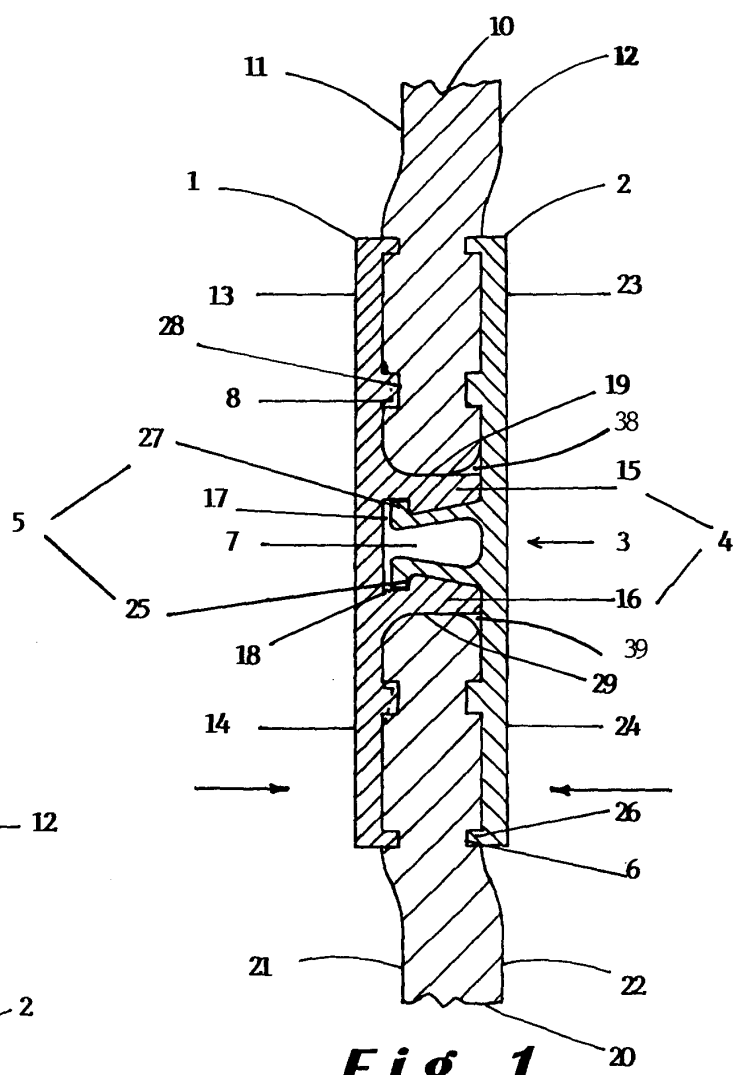
35

40

45

50

55



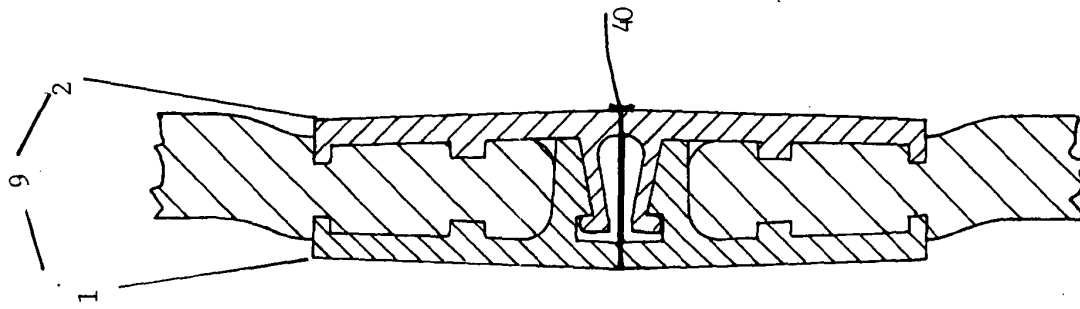


Fig. 4

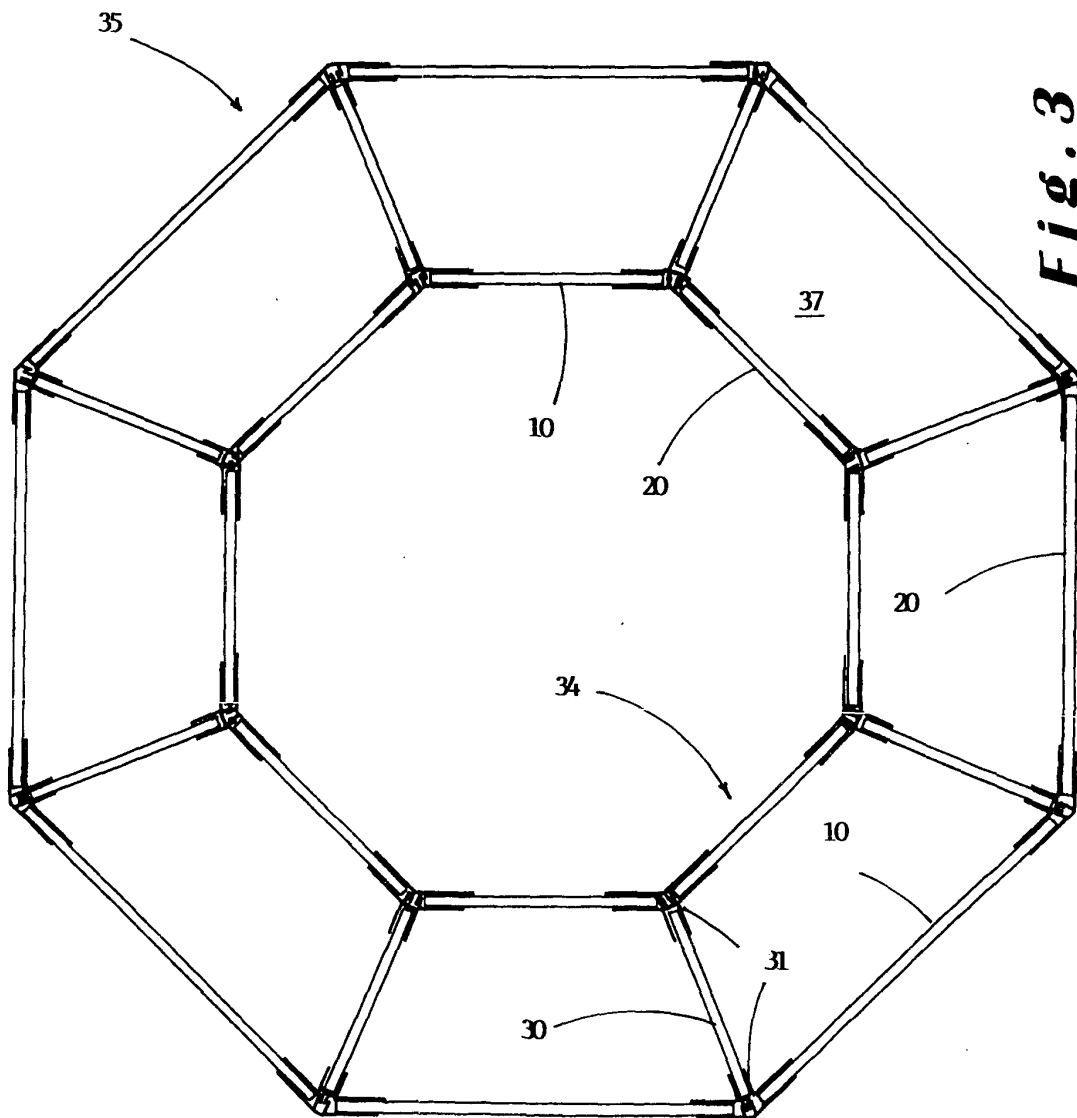


Fig. 3



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 04 44 7056

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.7)
X	EP 0 430 921 A (AUSTRIA METALL) 5 June 1991 (1991-06-05) * the whole document *	1-7, 10-12	E04B1/61
X	US 4 385 850 A (BOBATH PETER L) 31 May 1983 (1983-05-31) * the whole document *	1-5,7,8, 10,12	
A		6,11	
X	FR 1 028 792 A (FOREIGN INVEST INC) 27 May 1953 (1953-05-27) * the whole document *	1,7,9, 10,12	
X	WO 01/90586 A (CHUI KING WAH) 29 November 2001 (2001-11-29) * figure 10 *	1-3,5,7, 10,12	
X	US 3 436 881 A (SCHLECHT RALPH O) 8 April 1969 (1969-04-08) * figures 4,5 *	1-3, 8-10,12	
X	EP 1 081 393 A (INVENTIO AG) 7 March 2001 (2001-03-07) * the whole document *	1,8,10, 12	TECHNICAL FIELDS SEARCHED (Int.Cl.7) E04B
A		6,11	
The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 5 August 2004	Examiner Delzor, F
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

1
EPO FORM 1503 03.02 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 04 44 7056

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
The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

05-08-2004

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
EP 0430921	A	05-06-1991	AT 396348 B	25-08-1993
			AT 264589 A	15-12-1992
			EP 0430921 A1	05-06-1991
			NO 904964 A	21-05-1991

US 4385850	A	31-05-1983	DE 3017589 A1	20-11-1980
			FR 2456246 A1	05-12-1980
			GB 2052004 A ,B	21-01-1981
			IT 1133410 B	09-07-1986

FR 1028792	A	27-05-1953	NONE	

WO 0190586	A	29-11-2001	AU 6875901 A	03-12-2001
			WO 0190586 A2	29-11-2001

US 3436881	A	08-04-1969	NONE	

EP 1081393	A	07-03-2001	EP 1081393 A1	07-03-2001
