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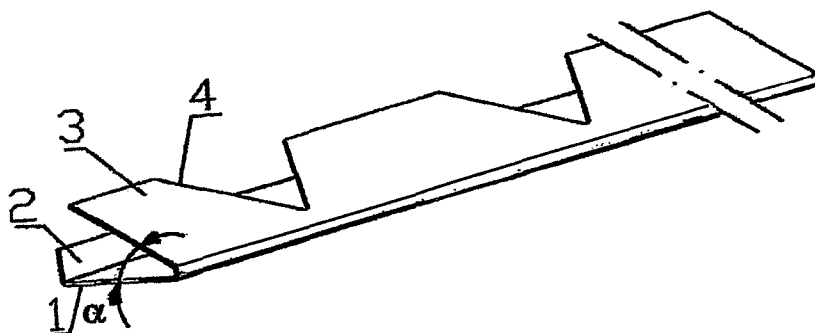
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**WO 2007/032694 A1**

(54) Title: A MOULDING TO JOIN BOARDS, ESPECIALLY PAPER-GYPSUM-BOARDS, AT AN ANGLE



(57) Abstract: The moulding has a back part (1), one straight arm (2) at right angle relative to the back part, and a second arm (3) which is slant, situated at acute angle relative to the back part (1). The slant arm (3) has notches (4) in its longitudinal edge, situated locally at certain intervals each from the other, along its length.

A moulding to join boards, especially paper-gypsum-boards, at an angle.

The subject of the invention is a building moulding to join boards, especially paper-gypsum-boards, at an angle.

Partition walls, suspended ceilings and built-in structures of garrets are made of paper-gypsum-boards being joined and secured to a frame construction made of metallic sections. Metallic skeletons of paper-gypsum-walls and suspended ceilings are made usually of even-armed channel sections, and the boards are fixed with plate screws to their back faces. In the constructions of such a type the ends of outermost corner boards touching each other are free and not permanently joined each other, only the edge of the corner is coated with silicone or gypsum layer joining superficially both the boards. The junction is not rigid, and the stresses occurring during the operation of an object cause wall distortions and corner deformations as well as cracks at the junctions of walls. When the built-in structure of a garret is made on a metallic skeleton, channel sections are suspended in suspension members in the form of band hangers which are secured with plate screws to both the arms of a channel section. In places that are hard to reach, as for example at the corners of sloping garrets, the assembly is especially difficult and in practice the outermost channel sections are fixed to a suspension member with one arm only, and this does not ensure a sufficient rigidity and stability of the junction.

Mouldings to joint board elements at an angle permanently in the form of metallic angle, which are suitable to join boards at right angle, are well-known.

According to the invention, a moulding containing the back part and the straight arm situated at approximately right angle relative to the back part is characterized in that it has the other arm which is slant, situated at acute angle relative to the back part. Advantageously, the acute angle is within the range of  $30^\circ$  to  $75^\circ$ . Advantageously, the slant arm has notches in its longitudinal edge, situated locally at certain intervals each from the other, along its length. The notches enable to insert freely the end of a mounting tool, a drill or a screwdriver, and they also make it possible to adjust the angle of inclination of the slant arm in relation to the back part of the moulding. Advantageously, the notches has the shape of grooves of straight sides, for example in the form of triangles, rectangular or trapezoidal grooves, the vertices of which are closed by the back part of the moulding. The notches can have the shape of grooves of rounded profile, for example of semicircular, oval profile, and the vertex of its arc edge is close by the back part. Advantageously, the slant arm has a longitudinal bead situated close by the back part, along its length. This solution enables to reinforce the corner of the moulding and so to maintain a constant angle of deflection as well as it makes easier to deflect the upper part of the slant arm during mounting operation. Advantageously, the slant arm has the width greater than the width

of the straight arm, and this increases the range of adjustment of its angle of deflection during mounting operation. Advantageously, the straight arm has the first stiffening edge in such a form that its longitudinal edge is bent inwards or outwards. Advantageously, the slant arm has at the end the second stiffening edge in such a form that its longitudinal edge is bent inwards. Advantageously, both the arms, the straight and the slant one, have the stiffening edge. Advantageously, the moulding is made of sheet less than 1 mm in thickness. In another constructional form the moulding has ports situated in the back part and in the slant arm. The ports serve to insert fixing screws. The mentioned features essential for the solution can be used in various combinations creating many constructional forms of the moulding according to the invention.

The solution in accordance with the invention makes it possible to introduce a new assortment of mouldings used in finishing building and in consequence simplifies the technology of the assembly of card-gypsum-boards and also increases the quality of wall and ceiling constructions mounted on steel skeletons because it enable to fasten rigidly the ends of boards placed in the corners. The fastening is stable and the boards do not change their place during the operation of an object. Moreover, the construction of the moulding allow to create easy untypical space arrangements of boards being assembled at an angle, and this can be used for decorative or masking purposes in the building engineering.

The solution according to the invention is explained more exactly in the examples of realization and in drawings in which Fig. 1 shows the moulding in perspective view, Fig. 2 shows the first constructional variant of the moulding, in perspective view, Fig. 3 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 2 in perspective view, Fig. 4 shows a fragment of the moulding constituting another constructional variant of the moulding presented in Fig. 2 in perspective view, Fig. 5 shows a fragment of the moulding constituting another more constructional variant of the moulding presented in Fig. 2 in perspective view, Fig. 6 shows the second constructional variant of the moulding in perspective view, Fig. 7 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 6 in perspective view, Fig. 8 shows a fragment of the moulding constituting another constructional variant of the moulding presented in Fig. 6 in perspective view, Fig. 9 shows a fragment of the moulding constituting another more constructional variant of the moulding presented in Fig. 6 in perspective view, Fig. 10 shows the third constructional form of the moulding in perspective view, Fig. 11 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 10 in perspective view, Fig. 12 shows a fragment of the moulding constituting another constructional

variant of the moulding presented in Fig. 10 in perspective view, Fig. 13 shows a fragment of the moulding constituting another more constructional variant of the moulding presented in Fig. 10 in perspective view, Fig. 14 shows the fourth constructional variant of the moulding in perspective view, Fig. 15 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 14 in perspective view, Fig. 16 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 14 in perspective view, Fig. 17 shows a fragment of the moulding constituting another constructional variant of the moulding presented in Fig. 14 in perspective view, Fig. 18 shows a fragment of the moulding constituting another more constructional variant of the moulding presented in Fig. 1 and in Fig. 2 in perspective view, Fig. 19 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 6 in perspective view, Fig. 20 shows a fragment of the moulding constituting another constructional variant of the moulding presented in Fig. 1 in perspective view, Fig. 21 shows a fragment of the moulding constituting another more constructional variant of the moulding presented in Fig. 1 and in Fig. 2 in perspective view, Fig. 22 shows a fragment of the moulding constituting the next constructional variant of the moulding presented in Fig. 1 and in Fig. 2 in perspective view, Fig. 23 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 6 in perspective view, Fig. 24 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 10 in perspective view, Fig. 25 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 2 in perspective view, Fig. 26 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 14 in perspective view, Fig. 27 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 6 in perspective view, Fig. 28 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 10 in perspective view, Fig. 29 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 in perspective view, Fig. 30 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 14 in perspective view, Fig. 31 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 6 in perspective view, Fig. 32 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 10 in perspective view, Fig. 33 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 2 in perspective view, Fig. 34 shows a fragment of the moulding constituting a constructional variant

of the moulding presented in Fig. 1 and in Fig. 14 in perspective view, Fig. 35 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 6 in perspective view, Fig. 36 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 10 in perspective view, Fig. 37 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 2 in perspective view, Fig. 38 shows a fragment of the moulding constituting a constructional variant of the moulding presented in Fig. 1 and in Fig. 14 in perspective view, Fig. 39 shows a fragment of the moulding constituting another constructional variant of the moulding presented in Fig. 1 and in Fig. 6 in perspective view, Fig. 40 shows a fragment of the moulding constituting another constructional variant of the moulding presented in Fig. 1 and in Fig. 10 in perspective view, Fig. 41 shows a fragment of the moulding in front view, Fig. 42 shows the moulding in section by the transverse plane A-A in Fig. 41, Fig. 43 shows schematically mirror reflections of the first position of the moulding, Fig. 44 shows mirror reflections of the second position of the moulding, Fig. 45 shows mirror reflections of the third position of the moulding, Fig. 46 shows mirror reflections of the fourth position of the moulding, Fig. 47 shows mirror reflections of the fifth position of the moulding, Fig. 48 shows mirror reflections of the sixth position of the moulding.

#### Example I

A moulding according to the invention has the form of a section bent of sheet, containing the back part 1 and two arms, on the one side the straight arm 2 situated at approximately right angle relative to the back part 1, and on the other side the slant arm 3 inclined at acute angle relative to the back part 1. Both the arms are situated on one side of the moulding. Advantageously, the acute angle  $\alpha$  is within the range of  $30^\circ$  to  $75^\circ$ . The moulding is made of zinc coated sheet or of another plate, 0,5 mm thick. At this thickness of sheet the slant arm can be pressed or pulled away slightly, and this enables to adjust within a certain range the angular position of the boards to be joined. The assembly of walls with the use of this moulding is made as follows: at first the moulding is fixed by means of plate screws with its back part to a main wall or to another board, or to a rafter, and then a paper-gypsum-board is fastened to the slant arm 3. The required angle of inclination  $\alpha$  of the wall is determined using a level by deflecting slightly the slant arm 3 to one or another side, as necessary. A moulding according to the invention is fit for fastening paper-gypsum-boards as well as boards made of other materials and makes it possible to join boards at an angle in various combinations of wall slopes, one-sided slopes and their mirror reflection, and also to obtain horizontal ceilings at slant roofs. It can be obtained ceiling vaults such as symmetrical slant, unsymmetrical slant, of various angles of inclinations of the walls,

one-sided slant roofs, for example roofs protecting from rain, angular combinations of vertical walls, constructions walling up protruding pipes or unnecessary alcoves. A characteristic common feature of all junctions is that the moulding always remains inside the junction and is invisible. Depending on the location of the back part and the position of the slant arm it is obtained another mounting combination. For example, at the first mounting position of the moulding, according to Fig. 43, in which its back part 1 is vertical and the slant arm 3 is turned upwards, to the left or right side, two mirror reflections, the left and the right one, of the angular combination of a vertical wall and an upwards inclined wall are obtained. At the second mounting position of the moulding, according to Fig. 44, in which its back part 2 is vertical and the slant arm 3 is turned downwards, two mirror reflections, the left and the right one, of the angular combination of a vertical wall and an downwards inclined wall are obtained. At the third mounting position of the moulding, according to Fig. 45, in which the back part 1 is horizontal and the slant arm 3 is turned downwards, two mirror reflections, the left and the right one, of the angular combination of a vertical wall and an downwards inclined wall are obtained, and this makes it possible to perform masking or decorative suspended constructions of triangular cross-section. At the fourth mounting position of the moulding, according to Fig. 46, in which the back part 1 is horizontal and the slant arm 3 is turned upwards, two mirror reflections, the left and the right one, of the angular combination of a horizontal board and an upwards inclined wall are obtained, and this makes it possible to perform masking or decorative suspended constructions of trapezoidal cross-section. At the fifth mounting position, according to Fig. 47, in which the back part 1 is situated obliquely and the slant arm 3 is situated horizontally and is at the bottom and is directed to the left or to the right, two mirror reflections, the left and the right one, of the angular combination of a horizontal wall and an downwards inclined wall are obtained, and this makes it possible to build horizontal ceilings at sloping roofs. At the sixth mounting position of the moulding, according to Fig. 48, in which the back part 1 is situated obliquely and the slant arm 3 is situated horizontally and is at the top and is directed to the left or to the right, two mirror reflections, the left and the right one, of the angular combination of a horizontal board and an upwards inclined board are obtained, and this makes it possible to build masking or decorative constructions of triangular cross-section with a horizontal upper wall which are suspended on the vertical walls. Each of the above mentioned combinations can occur in an unsymmetrical arrangement in which the boards of one built-in construction are inclined at various angles, and also in an one-sided arrangement such as one-sided roofs.

### Example II

A solution analogous to that presented in Example I, but the slant arm 3 has local notches 4, 5 in its longitudinal edge. The notches are situated at certain intervals along the whole length of the slant arm 3 and made to facilitate the access of the ends of mounting tools, a drill or a screwdriver, when drilling ports in the back part 1 as well as mounting mouldings with plate screws. The notches can have straight sides 4, for example in the form triangular, trapezoidal, rectangular grooves, or in the form of grooves having rounded sides 5, for example semicircular, oval or of other arc profiles, and also other shapes. The lower edges of grooves are situated close by the back part 1. The notches 4, 5 decrease the rigidity of the slant arm 3 having such an advantageous effect that this arm can be deflected obliquely within a certain range to one or another side, increasing the range of free adjustment of the angle of the setting of a board to be mounted. After the board has been to the slant arm, the required rigidity of the joint is restored.

### Example III

A solution analogous to that presented in Example I or in Example II, but the slant arm 3 has a longitudinal bead 9 situated close by the back part on its whole length. The bead 9 reinforces the corner of the moulding enabling to maintain a constant angle  $\alpha$ , whereas the turning aside of the upper part of the slant arm 3 facilitates the adjustment of the angular deflection of the arm during mounting operation.

### Example IV

A solution analogous to that presented in Example I or in Example II or in Example III but the back part 1 of the moulding has onwards profiled longitudinal ribs 6 which reinforce the construction. The moulding has one rib situated in the middle of its back part or two ribs situated one at each side of the back part. The longitudinal ribs are profiled on the whole length of the moulding.

### Example V

A solution analogous to that presented in Example I or in Example II or in Example III, but the straight arm 2 has the first stiffening edge 7 bent inwards or outwards of its longitudinal side.

### Example VI

A solution analogous to that presented in Example I or in Example II or in Example III, but the slant arm 3 has the second stiffening edge 8 bent inwards of its longitudinal side.

### Example VII

A solution analogous to that presented in Example I or in Example II or in Example III, but the straight arm 2 has the first stiffening edge 7, while the slant arm 3 has the second stiffening edge 8.

Example VIII

A solution analogous to that presented in Example I or in Example II, but the moulding has ports 10 in the back part 1 and in the slant arm 3. The ports serve to insert fixing screws.



## Patent claims

1. A moulding to joint at an angle boards, especially paper-gypsum-boards, containing the back part and one arm being straight, situated at approximately right angle relative to the back part, characterized in that it has the other arm (3) being slant, situated at acute angle ( $\alpha$ ) relative to the back part (1).
2. A moulding as claimed in claim 1 characterized in that the slant arm (3) has notches (4, 5) in its longitudinal edge, situated locally at certain intervals each from the other, along its length.
3. A moulding as claimed in claim 2 characterized in that the notches (4) have straight sides.
4. A moulding as claimed in claim 2 characterized in that the notches (5) have the shape of grooves of rounded profile, and the vertices of their arc edges are close by the back part (1).
5. A moulding as claimed in claim 1 or in claim 2 characterized in that the slant arm (3) has a longitudinal bead (9) situated close by the back part (1), along its whole length.
6. A moulding as claimed in claim 1 or in claim 2 characterized in that the back part (1) has at least one profiled longitudinal rib (6).
7. A moulding as claimed in claim 1 or in claim 2 characterized in that the straight arm (2) has the first stiffening edge (7) in the form of a bend inwards or outwards of its longitudinal edge.
8. A moulding as claimed in claim 1 or in claim 2 characterized in that the slant arm (3) has the second stiffening edge (8) in the form of a bend inwards of its longitudinal edge.
9. A moulding as claimed in claim 1 or in claim 2 characterized in that the right angle ( $\alpha$ ) is within the range of 30° to 75°.
10. A moulding as claimed in claim 1 characterized in that the slant arm (3) is wider than the straight arm (2).
11. A moulding as claimed in claim 1 characterized in that it has ports (10) for fixing element in its back part (1) as well as in the slant arm (3).
12. A moulding as claimed in claim 1 or in claim 2 characterized in that it is made of sheet less than 1 mm in thickness.

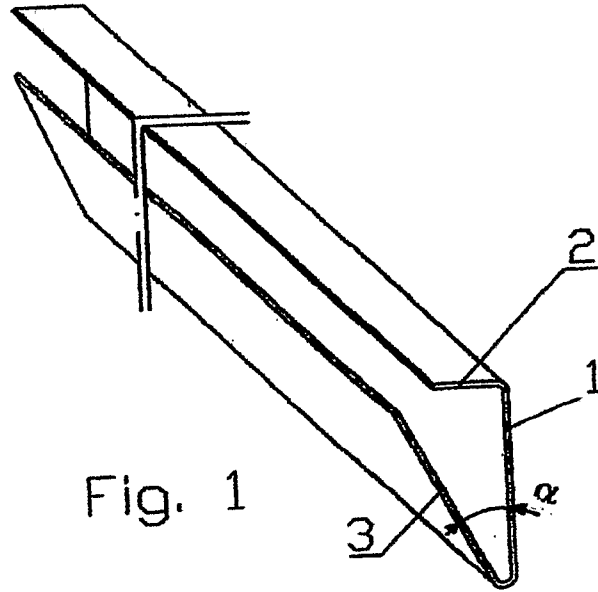


Fig. 1

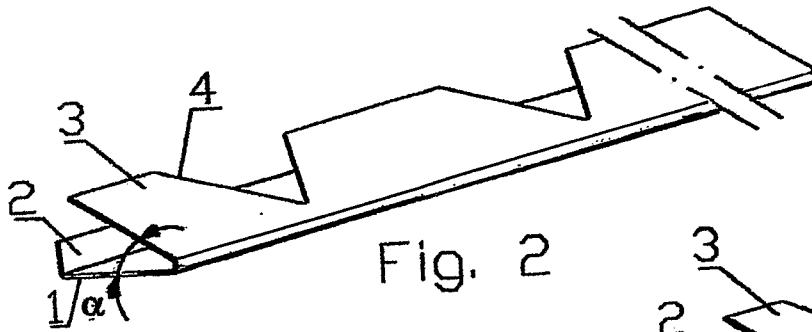


Fig. 2

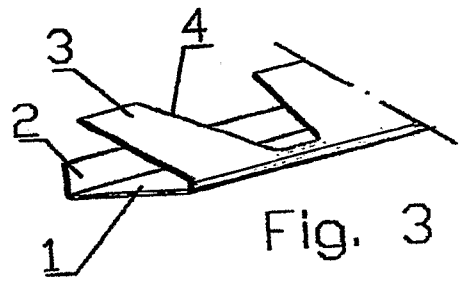


Fig. 3

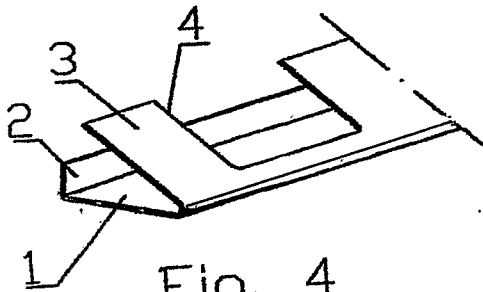


Fig. 4

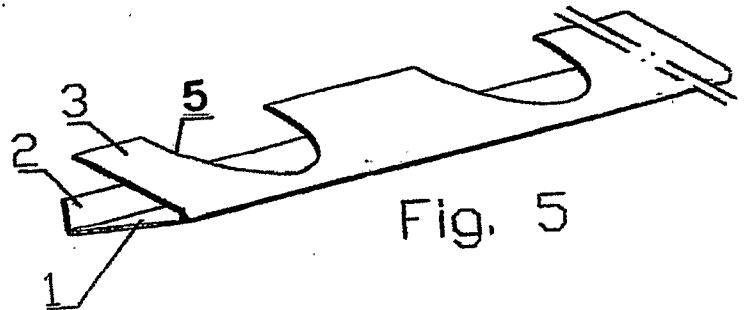


Fig. 5

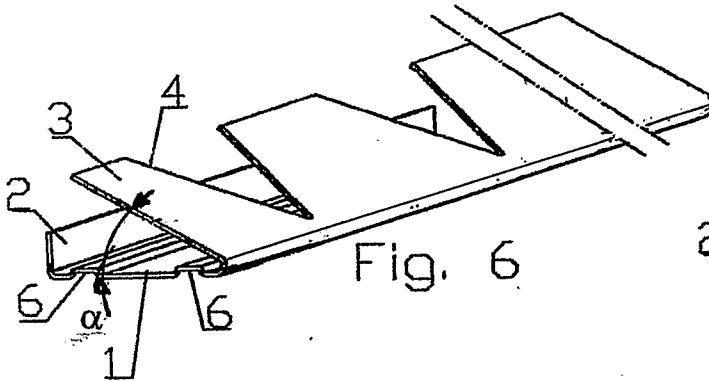


Fig. 6

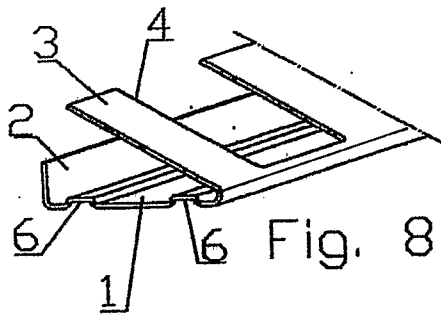
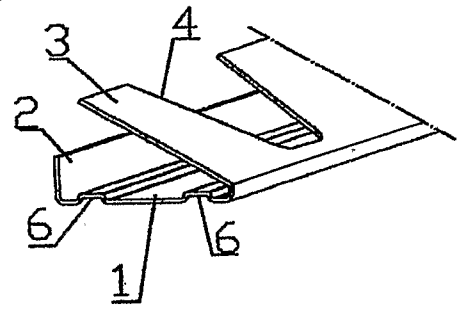


Fig. 8

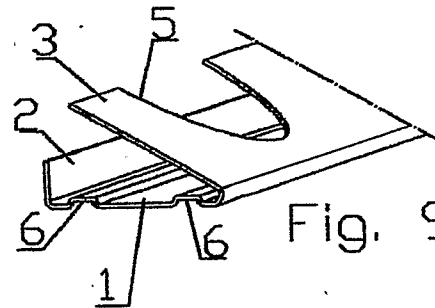


Fig. 9

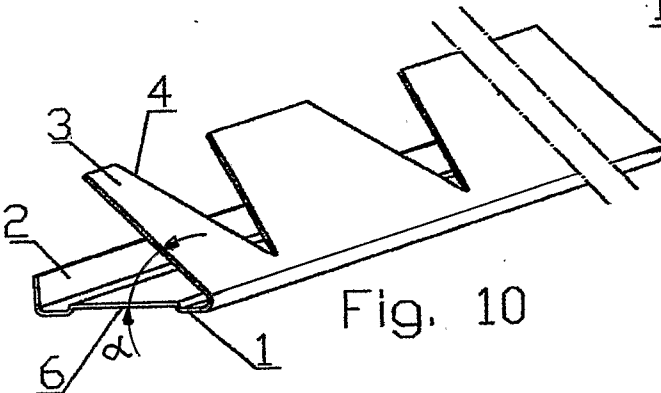


Fig. 10

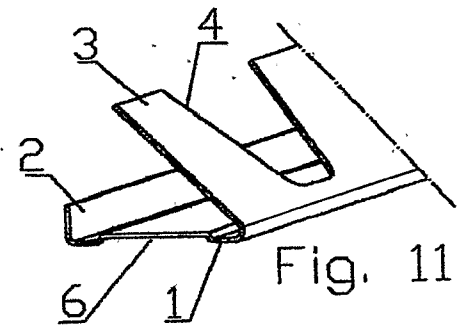


Fig. 11

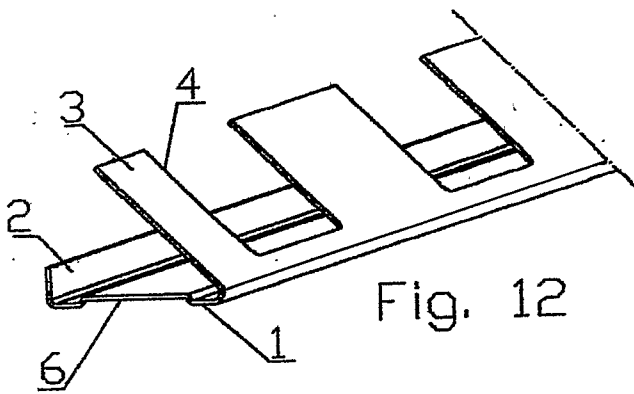


Fig. 12

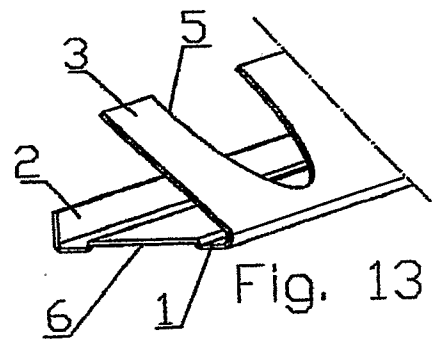


Fig. 13

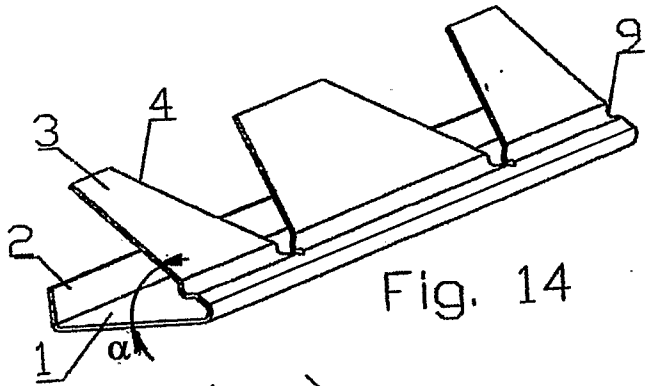


Fig. 14

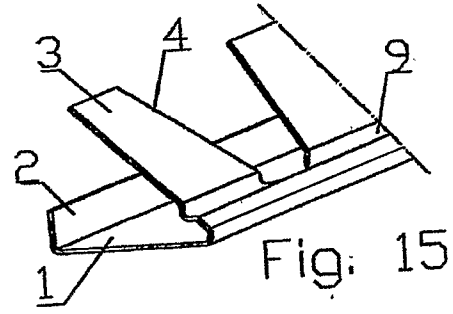


Fig. 15

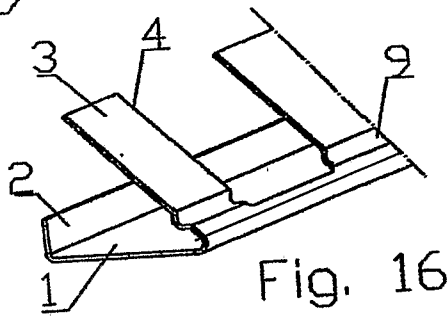


Fig. 16

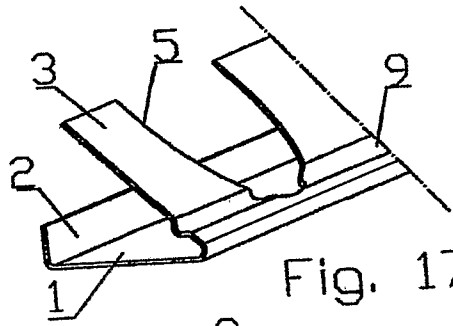


Fig. 17

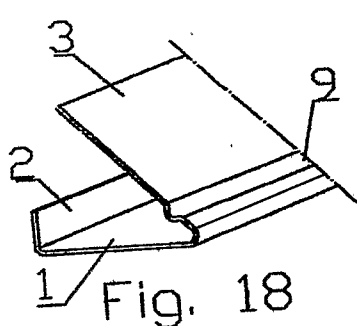


Fig. 18

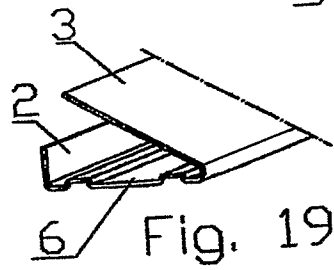


Fig. 19

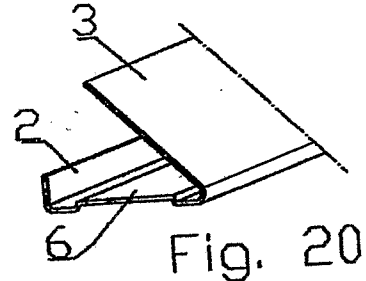


Fig. 20

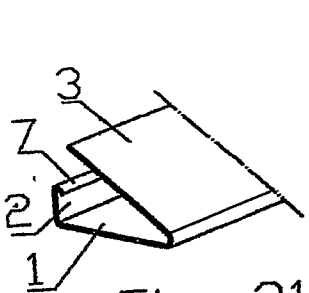


Fig. 21

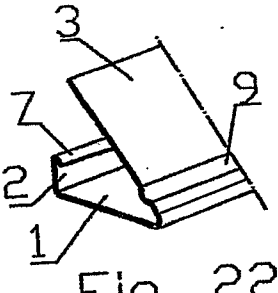


Fig. 22

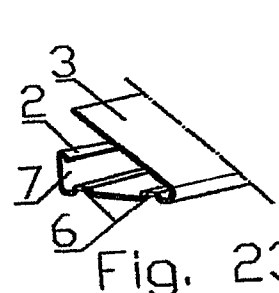


Fig. 23

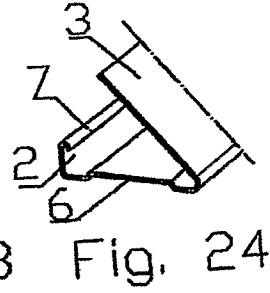
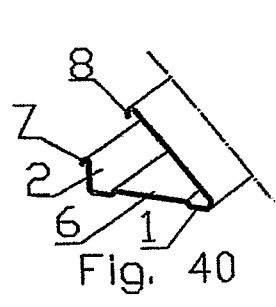
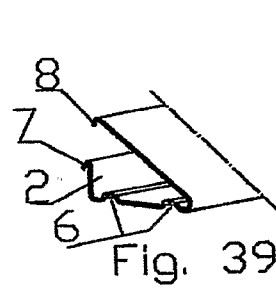
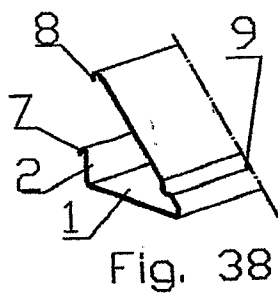
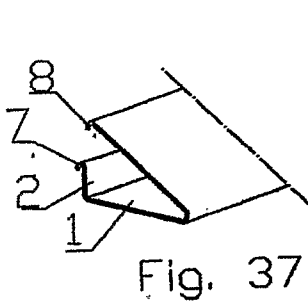
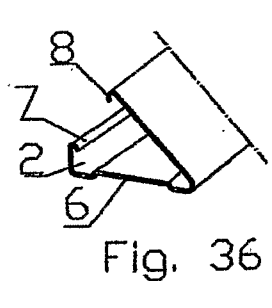
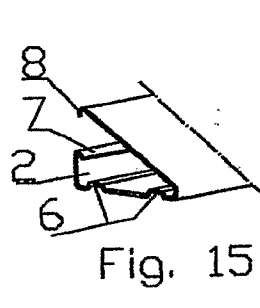
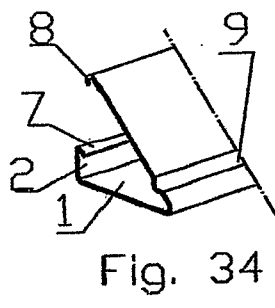
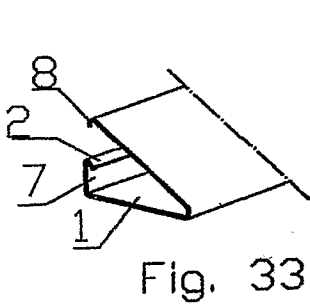
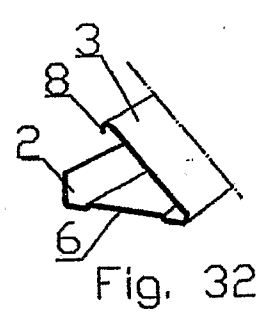
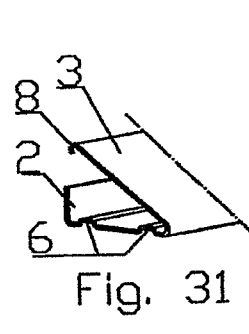
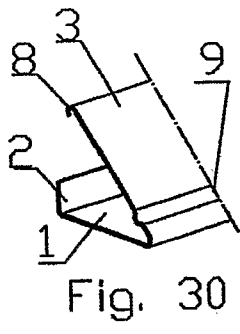
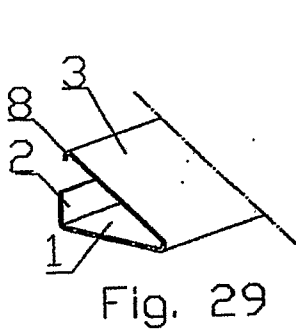
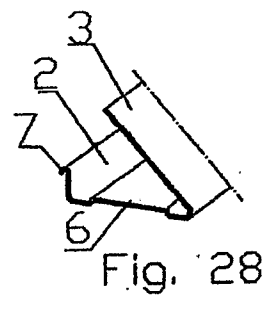
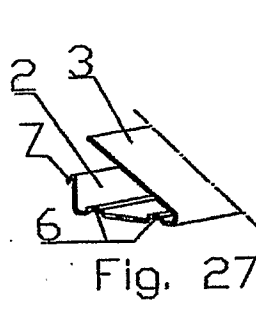
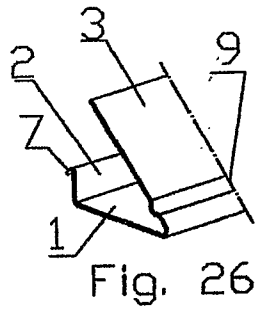
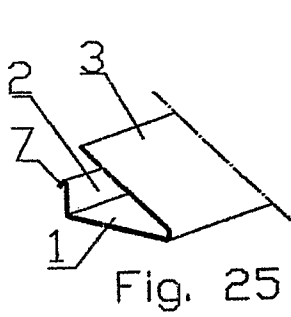


Fig. 24



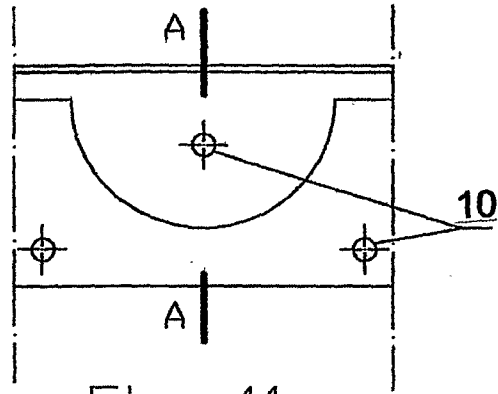


Fig. 41

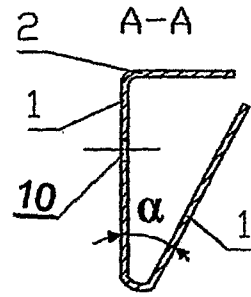


Fig. 42

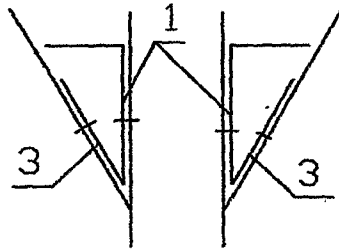


Fig. 43

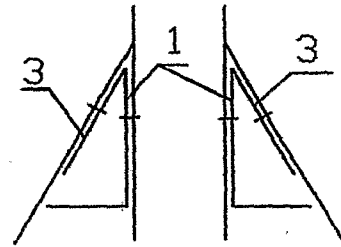


Fig. 44

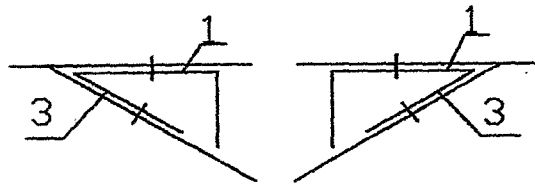


Fig. 45

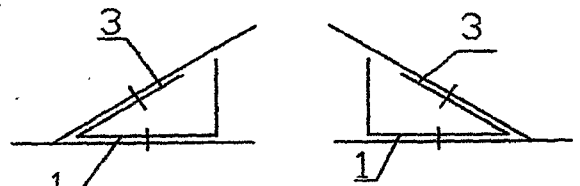


Fig. 46

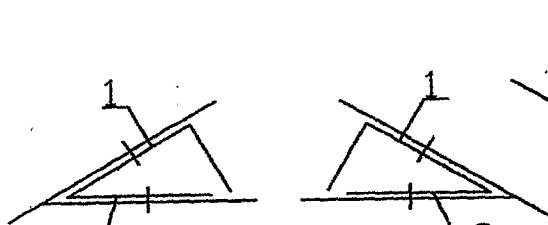


Fig. 47

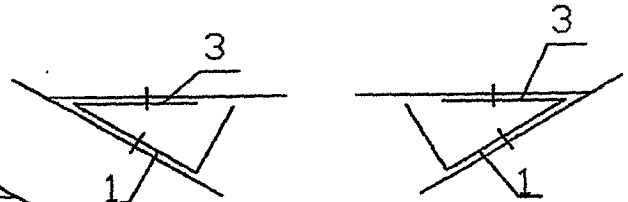


Fig. 48

**INTERNATIONAL SEARCH REPORT**

International application No  
PCT/PL2005/000062

**A. CLASSIFICATION OF SUBJECT MATTER**  
INV. E04F13/08

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
E04F E04B E04C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 818 661 A (VAN PRAGG A,US) 25 June 1974 (1974-06-25) figure 1	1-12
X	US 2 110 841 A (MAIER GEORGE M) 8 March 1938 (1938-03-08) figure 5	1-12
X	US 5 749 192 A (MENCHETTI ET AL) 12 May 1998 (1998-05-12)  column 3, line 9 - line 55; figures 4-6	1-12
X	DE 103 18 119 A1 (JUNGNICKEL, UWE) 11 November 2004 (2004-11-11) figures 1,11	1-12

Further documents are listed in the continuation of Box C.  See patent family annex.

\* Special categories of cited documents :

*A* document defining the general state of the art which is not considered to be of particular relevance	*T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
*E* earlier document but published on or after the international filing date	*X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
*L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	*Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
*O* document referring to an oral disclosure, use, exhibition or other means	*Z* document member of the same patent family
*P* document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search  29 May 2006	Date of mailing of the international search report  02/06/2006
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Name and mailing address of the ISA/ European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl, Fax: (+31-70) 340-3016	Authorized officer  Severens, G
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# INTERNATIONAL SEARCH REPORT

International application No  
PCT/PL2005/000062

## C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 1 124 023 A (RICHTER-SYSTEM GMBH & CO. KG) 16 August 2001 (2001-08-16) figures 1,4,5 -----	2-12



# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/PL2005/000062

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 3818661	A	25-06-1974	NONE
US 2110841	A	08-03-1938	NONE
US 5749192	A	12-05-1998	CA 2095758 A1 26-08-1994
DE 10318119	A1	11-11-2004	NONE
EP 1124023	A	16-08-2001	NONE