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(54) **A system of profile elements and an insertion guide element for use in such a system**

(57) The invention provides a system of profile elements for the construction of frame structures, said system comprising elongate hollow profile elements (1,2,3; 20,21) with at least one longitudinal channel with substantially rectangular cross-section and joining elements for providing angle joints between two such profile elements, said joining elements comprising a centring and load transferring insertion guide element (4; 22) with a substantially rod-shaped shank part (5;23) for insertion with comparatively tight sliding adjustment into the mouth of said channel at a cut surface in one of said two profile elements, and a substantially circular-section-shaped head part (6;25) integral with the shank part and a first side wall portion (7;35) which joins one (8;33) of two opposite parallel sides of the shank part and forms an angle (ν) therewith corresponding to a prescribed maximum angle for said predetermined angle range, between which side wall portion and the other (11;34) of said opposite sides of the shank part the head part has a cylindrical wall section (9;36) with a radius corresponding to the width of a channel in the second of said two profile elements.

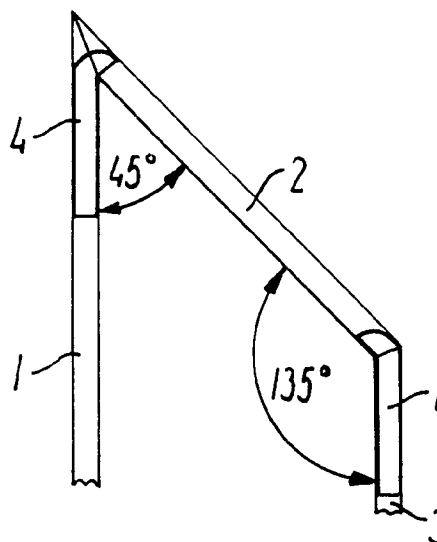


FIG.3

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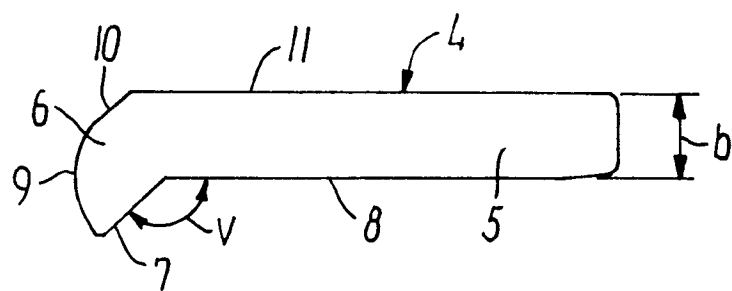


FIG. 5

Description

The present invention relates to a system of profile elements for the construction of frame structures, said system comprising elongate hollow profile elements with at least one longitudinal channel with substantially rectangular cross-section and joining elements for providing angle joints between two such profile elements, said joining elements comprising a centring and load transferring insertion guide element with a substantially rod-shaped shank part for insertion with comparatively tight sliding adjustment into the mouth of said channel at a cut surface in one of said two profile elements.

Such systems are i.a. used in building structures, to which considerable requirements are made in respect of the tightness, the strength and the appearance of the joints between the profile elements. The mounting of such a system most often takes place on the building site and is normally carried out by means of screw connections, as in many cases it is impossible to weld the profile elements which may consist of plastics, steel or other types of metal materials. When assembling systems of this type it is a general problem that the profile elements are to be positioned accurately relative to each other before establishing the connection to ensure that the above-mentioned requirements are met. Particularly in connection with abutting joints between profile elements of the same cross-section outline and in particular in case of the profile elements not forming right angles with each other, like for instance in bay extensions or in roof constructions, it is difficult to bring and maintain the profile elements into a correct mutual position.

From DE published specification No. 30 35 361 a structure for the construction of picture frames is known, in which the profile elements designed as hollow profiles are connected in right-angled corner joints by means of likewise right-angled joining elements, and the construction is thus not suited for joining profile elements under other angles relative to each other.

On this background it is the object of the invention to provide a system, in which the mounting of the profile elements has been simplified, and where the joints between these elements possess the desired qualities.

The object is met by means of a system which is characteristic in that said joining elements with a view to providing angle joints within a predetermined angle range comprise a substantially circular-section-shaped head part integral with the shank part and having a first side wall portion which joins one of two opposite parallel sides of the shank part and forms an angle therewith corresponding to a prescribed maximum angle for said predetermined angle range, between which side wall portion and the other of said opposite sides of the shank part the head part has a cylindrical wall section with a radius corresponding to the width of a channel in the other of said two profile elements.

In this way, the desired centring and the simple mounting of such a system is obtained. Moreover, the

load transferring function of the joints is improved.

In a system of profile elements for the construction of load-carrying frame structures comprising at least one column profile element which with an end surface forms an angle joint with a transverse girder profile element, a particularly suited alternative embodiment of the invention is characteristic in that the shank part of the insertion guide element is fastened in a channel in the column profile element, whereas the head part is inserted in a channel in the girder profile element either from its mouth at an end cut surface or through an opening in an outer wall of said channel, the head part being retained in the girder profile element by means of a locking engagement.

This locking engagement may preferably be provided by means of transversely flushing holes in the head part of the insertion guide element and opposite wall portions of said channel in the girder profile element.

Moreover, the invention relates to an insertion guide element for use in an angle joint between two elongate profile elements with at least one longitudinal channel with substantially rectangular cross-section, said insertion guide element having the features stated in claim 8.

Through this insertion guide element, a standard part is provided which may be used in a number of joints between profile elements with mutually differing slope. The special design ensures an easy mounting and a stable fixation of the profile elements relative to each other over the entire angle range in question.

Advantageous embodiments of the insertion guide element are stated in subclaims 9-11.

The invention will be described in detail in the following by means of some examples of embodiments and with reference to the schematic drawing, in which

Figs 1-4 show a system in a first embodiment of the invention, with differing angles between the profile elements of the system,

Fig. 5 a plane view at a larger scale of an insertion guide element in a first embodiment of the invention,

Fig. 6 a part of a system with an angle joint between a column profile element and a girder profile element, seen from the front and partially as a sectional view,

Fig. 7 the angle joint shown in Fig. 6, seen from the side and partially as a sectional view,

Fig. 8 a perspective view at a larger scale of an insertion guide element in an alternative embodiment of the invention for use in the system shown in Figs 6 and 7, and

Fig. 9 a system comprising an angle joint in connection with an assemblage point.

In the various figures the same reference numerals refer to parts having a similar or analogous function.

In Figs 1-4 an example of a system of profile elements 1, 2, and 3 is shown, which as a whole constitutes

part of a bigger frame structure, like for instance a building structure. The profile elements are connected with each other by corner joints, which at each point of assembly have one or more insertion guide elements 4.

The embodiment of the insertion guide element 4 is seen in detail in Fig. 5. The insertion guide element 4 has a substantially rod-shaped shank part 5 with a width b and a substantially circular-section-shaped head part 6 integral with the shank part 5. The head part 6 has a first side wall portion 7 which forms an angle v with a first side 8 of the shank part 5 and which extends into a cylindrical wall section 9. The wall section 9 extends in turn tangentially into a second wall portion 10 extending to a second side 11 of the shank part 5. The construction of the insertion guide element 4 is such that the first side wall portion 7 of the head part 6 has a length which is substantially equal to the width b of the shank part 5, and the cylindrical wall section 9 has a radius likewise corresponding to the width b . The centre axis of the wall section 9 is positioned in the intersection point between the first side 8 of the shank part and the first side wall portion 7, and the section 9 extends through a curved length of 90° , which has the effect that the first side wall portion 7 and the second wall portion 10 form two mutually parallel surfaces which are separated by a distance corresponding to the width b , and that the obtuse angle between the second wall portion 10 and the second side 11 of the shank part 5 is equal to the angle v . The angle v corresponds to a prescribed maximum value of the angle joint between the profile elements, and here amounts to a value of 135° .

The joining of for instance the profile elements 1 and 2 as shown in Figs 1-4 is carried out in the following way: the shank part 5 on the insertion guide element 4 is passed from the cut end surface of the profile 1 into a channel not shown in detail in one of the profile elements 1. The width b of the shank part 5 is chosen such that this insertion takes place with a comparatively tight sliding adjustment. If desired, one or more insertion guide elements 4 may be used at one point of joining, and in particular in connection with wide profile elements this will give an even better centring and load transfer. This naturally requires a corresponding number of channels in the profile elements. Following this the head part 6 of the insertion guide 4 is introduced into a corresponding channel in the second profile element 2. The profile elements 1 and 2 are now centred, their cut end surfaces covering each other completely, and may now be joined by means of for instance screws, bolts between exterior yokes or by gluing or welding.

As will be seen from Figs 1-4, the insertion guide element 4 brings about a safe centring and load transfer within a big angle range, in this case from 45° to 135° . These extreme positions are determined by the fact that the side wall portion 7 on the head part 6 is perpendicular to and abuts a side wall in the channel, in which the head part 6 is introduced.

Figs 6 and 7 show a part of a system, in which a

column profile element 20 forms an angle joint with a transverse girder profile element 21 by means of an insertion guide element 22 with a shank part 23 which is introduced into and fastened for instance by means of rivets in a channel 24 in the column profile element 20. The insertion guide element 22 is with a head part 25 inserted in a channel 26 in the girder profile element 21 through an opening 27 in an outer wall of this channel. The head part 25 is retained in the girder profile element 21 by means of a locking engagement which in the embodiment shown is established thereby that in the head part 25 a transverse hole 28 is provided which flushes with holes 29, 30 in the opposite walls of the channel 26 in the girder profile element 21, as well as a by a pin (not shown) which is introduced into the holes 28, 29, and 30, whereby the column profile element 20 and the girder profile element 21 become mutually locked.

Fig. 8 shows the construction of the insertion guide element 22. As will appear, a ledge 31 with a shoulder 32 is formed between the shank part 23 and the head part 25, said shoulder extending between opposite sides 33, 34 of the shank part 23 in an angle which will be explained in the following. The object of the shoulder 32 is to put a bottom limit to the angle range of the angle joint between the profile elements, here the column profile element 20 and the girder profile element 21, and amounts in the embodiment shown here to approx. 30° . In addition thereto the insertion guide element 22 is, like the element 4 shown in Fig. 5, provided with a first side wall portion 35 and a cylindrical wall section 36.

Finally, Fig. 9 shows a system, in which a corner joint of the same type as shown in Figs 1-4 and guided by means of one or more insertion guide elements 4, as shown in fig. 5, is connected with a column profile element 20 by means of an insertion guide element 22 as described with reference to Figs. 6 and 7.

Claims

1. A system of profile elements for the construction of frame structures, said system comprising elongate hollow profile elements (1,2,3;20,21) with at least one longitudinal channel with substantially rectangular cross-section and joining elements for providing angle joints between two such profile elements, said joining elements comprising a centring and load transferring insertion guide element (4;22) with a substantially rod-shaped shank part (5;23) for insertion with comparatively tight sliding adjustment into the mouth of said channel at a cut surface in one of said two profile elements, **characterized** in that said joining elements with a view to providing angle joints within a predetermined angle range comprise a substantially circular-section-shaped head part (6;25) integral with the shank part and having a first side wall portion (7;35) which joins one (8;33) of two opposite parallel sides of the shank

part and forms an angle (v) therewith corresponding to a prescribed maximum angle for said predetermined angle range, between which side wall portion and the other (11;34) of said opposite sides of the shank part the head part has a cylindrical wall section (9;36) with a radius corresponding to the width of a channel in the other of said two profile elements.

2. A system of profile elements according to claim 1, **characterized** in that said first side wall portion (7) of the head part (6) has a length and the cylindrical wall section (9) a radius corresponding to the width (b) of the shank part (5) between said opposite parallel sides (8,11), the cylindrical wall section extending through a curved length of 90° and joining the other of said opposite parallel sides of the shank part through a second wall portion (10) of the head part parallel with said first wall portion.

3. A system of profile elements according to claim 2, **characterized** in that said maximum angle (v) amounts to 135°.

4. A system of profile elements according to claim 1, 2 or 3, in which said two profile elements have identical cross-section profiles and have been made with bevelled end cut surfaces for the provision of a corner joint, **characterized** in that the head part of the insertion guide element is inserted in said channel in the other of said two profile elements in the mouth thereof at the end cut surface.

5. A system of profile elements according to claim 1 for the construction of load-carrying frame structures comprising at least one column profile element (20) which with an end surface forms an angle joint with a transverse girder profile element (21), **characterized** in that the shank part (23) of the insertion guide element (22) is fastened in a channel (24) in the column profile element (20), whereas the head part (25) is inserted in a channel (26) in the girder profile element (21) either from its mouth at an end cut surface or through an opening (27) in an outer wall of said channel, the head part being retained in the girder profile element by means of a locking engagement.

6. A system of profile elements according to claim 5, **characterized** in that the locking engagement is provided by means of transversely flushing holes (28,29,30) in the head part (25) of the insertion guide element and opposite wall portions of said channel (26) in the girder profile element.

7. A system of profile elements according to claim 5 or 6, **characterized** in that between the shank part (23) and head part (23) of the insertion guide ele-

ment (22) a ledge (31) with a shoulder surface (32) is formed, which extends between said opposite sides (33,34) of the shank part and forms an angle therewith corresponding to a prescribed minimum angle for said angle range.

8. An insertion guide element (4;22) for use in an angle joint between two elongate profile elements with at least one longitudinal channel with substantially rectangular cross-section, comprising a substantially rod-shaped shank part (5;23) for insertion with comparatively tight sliding adjustment into the mouth of said channel at a cut surface in one of said two profile elements, **characterized** in comprising a substantially circular-section-shaped head part (6;25) integral with the shank part and a first side wall portion (7;35) which joins one (8;33) of two opposite parallel sides of the shank part and forms an angle (v) therewith corresponding to a prescribed maximum angle for said predetermined angle range, between which side wall portion and the other (11;34) of said opposite sides of the shank part the head part has a cylindrical wall section (9;36) with a radius corresponding to the width of a channel in the other of said two profile elements.

9. An insertion guide element according to claim 8, **characterized** in that said first side wall portion (7) of the head part (6) has a length and the cylindrical wall section (9) a radius corresponding to the width (b) of the shank part (5) between said D opposite parallel sides (8,11), the cylindrical wall section extending through a curved length of 90° and joining the other of said opposite parallel sides of the shank part through a second wall portion (10) of the head part parallel with said first wall portion.

10. An insertion guide element according to claim 8 or 9, **characterized** in that said maximum angle (v) amounts to 135°.

11. An insertion guide element according to claim 8, **characterized** in that between the shank part (23) and head part (23) of the insertion guide element (22) a ledge (31) with a shoulder surface (32) is formed which extends between said opposite sides (33,34) of the shank part and forms an angle therewith corresponding to a prescribed minimum angle for said angle range.

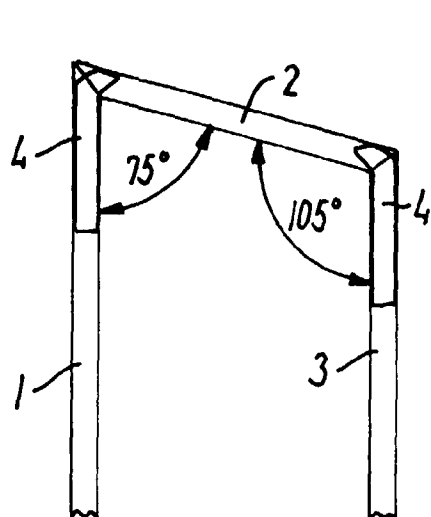


FIG. 1

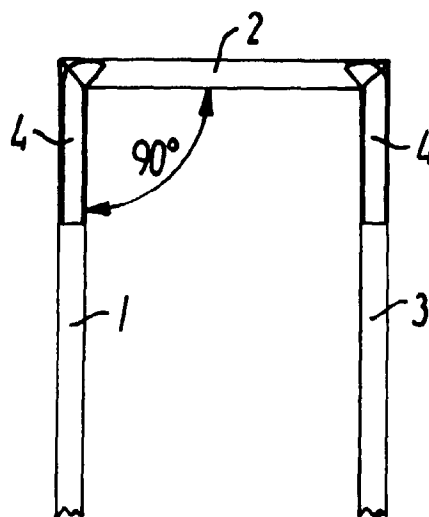


FIG. 2

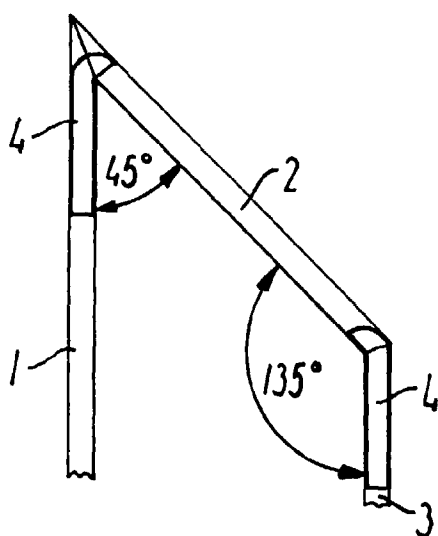


FIG. 3

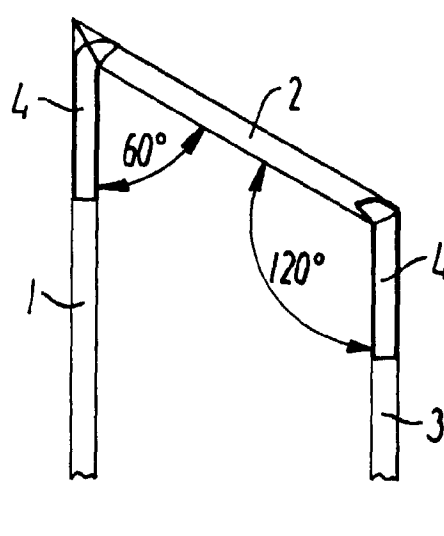


FIG. 4

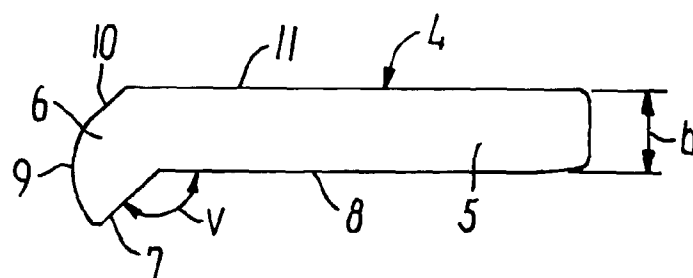


FIG. 5

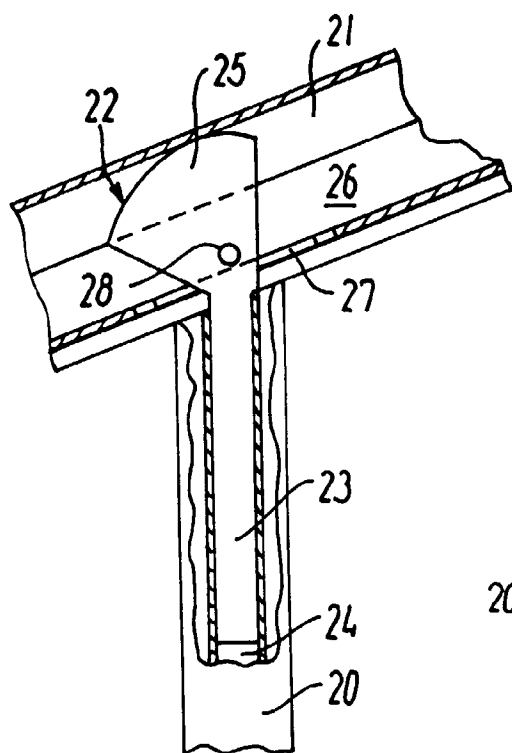


FIG. 6

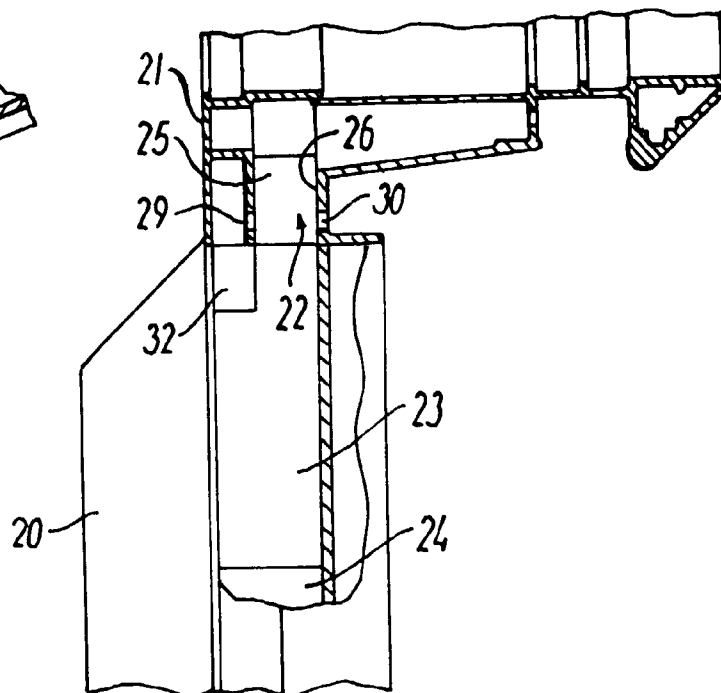


FIG. 7

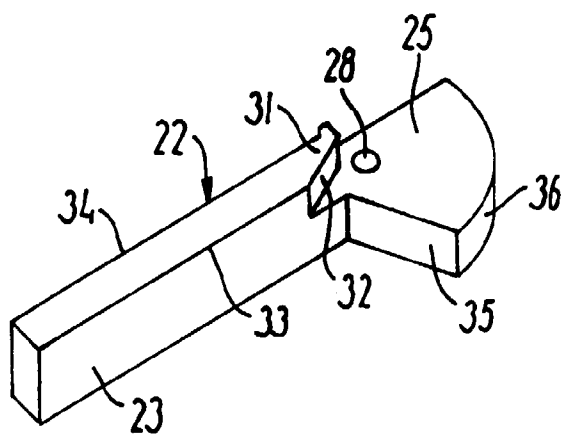


FIG. 8

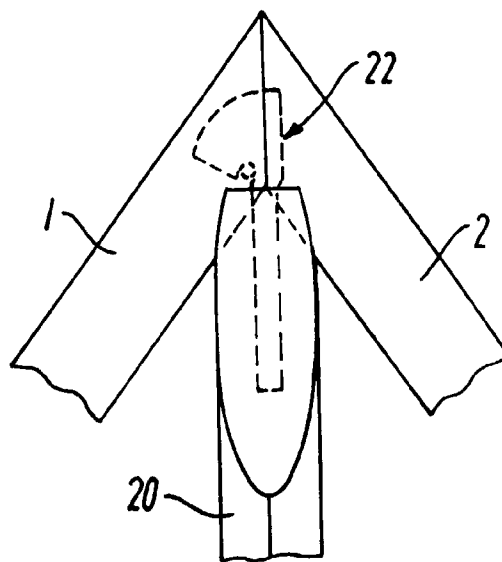


FIG. 9



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EUROPEAN SEARCH REPORT

Application Number
EP 96 61 0044.8

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.6)
A	DE, A1, 3322699 (ALAPE ADOLF LAMPRECHT KG), 3 January 1985 (03.01.85) * figures 1-3, line 9, line 2 - line 11, last paragraph * --	1,8	E04B 1/58 F16B 7/04
A	EP, A1, 0065212 (SOLDIMPEX PAUL SCHOCKEMÖHLE GMBH & CO. KG.), 24 November 1982 (24.11.82) * page 7, line 20 - page 8, line 17, figures 1-4 * --	1,8	
A	DE, A1, 2925700 (WELCO TECHNIK AG), 7 February 1980 (07.02.80) * figures 2-6, abstract * --	1,8	
A	WO, A1, 9520093 (COUTIER INDUSTRIE ET AL), 27 July 1995 (27.07.95) * page 6, line 1 - line 32, figures 3-8 * -----	1,8	TECHNICAL FIELDS SEARCHED (Int. Cl.6) E04B E06B E04H F16B
The present search report has been drawn up for all claims			
Place of search STOCKHOLM		Date of completion of the search 3 March 1997	Examiner HEDLUND INGEMAR
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