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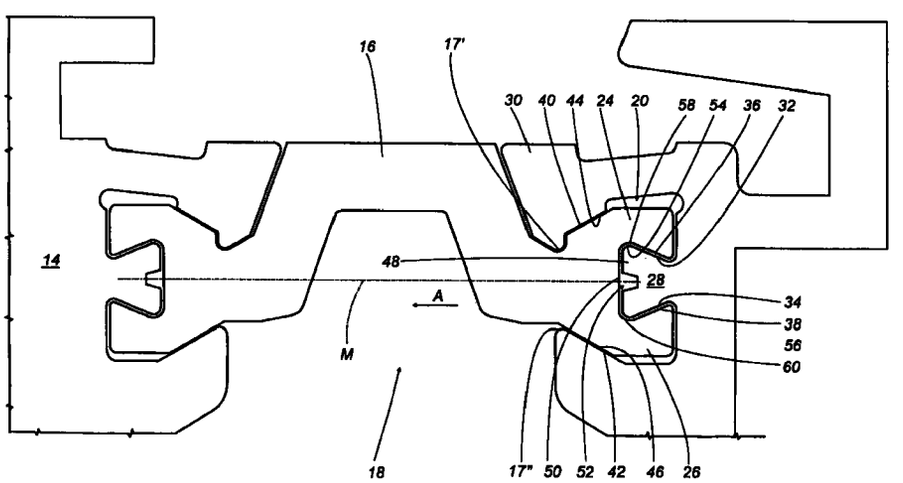
Remarks:
A request for correction of figure 1 has been filed pursuant to Rule 88 EPC. A decision on the request will be taken during the proceedings before the Examining Division (Guidelines for Examination in the EPO, A-V, 3.).

(54) Structural elements, preferably a section and a heat insulation element, that can be connected to each other, and an assembly using these elements.

(57) The invention envisages a first structural element, preferably a light alloy section, comprising a channel (20) into which at least one second structural element (16), in particular, a heat insulating element is joined. Inside the channel (20), the section comprises a tongue (28) that extends lengthways parallel to the slotting portion (22) of the second structural element (16) and in contact with the slotting portion (22) so as to reinforce it crossways and hold it securely inside the channel (20) in the section. The invention also relates to a structural element, in particular a heat insulation element (16), that can be used with the aforementioned section (12) and comprising a portion (22) that slots into the channel (20) of the section, said slotting portion (22) being defined by or comprising a first part (24) and a second part (26) that can be elastically deformed crossways and that between them form a longitudinal groove into which the reinforcing tongue (28) of the section (12) slots.

FIG.1



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Description

[0001] The present invention relates to a section, preferably a light alloy section, suitable to be joined to at least one second element, in particular, a heat insulation element. The present invention also relates to a structural element, especially a heat insulation element, that can be used with the aforementioned section and a structural assembly comprising at least one section of the type mentioned above and a corresponding structural element.

[0002] The present invention can be used especially in the manufacture of door and window frames, curtain walls and frames for display cabinets and show-cases or small constructions such as trade fair stands.

[0003] At present, in the sector of frames made from light alloy structural elements, the structural elements used to provide heat insulation are joined to the supporting structural sections proper by slotting a tongue-like portion of each heat insulation element into a matching channel made in each supporting section so as to rigidly secure the heat insulation element to the light alloy element.

[0004] The operation by which the heat insulation element is inserted and secured to the structural section consists in sliding the slotting portion of the insulation element lengthways into the matching channel in the supporting section and then rolling, that is, strongly compressing, a lateral portion or arm of the channel so as to plastically deform it against the slotting portion, thus holding it securely inside the channel.

[0005] The slotting portion of the insulation element usually consists of a first and second portion between which there is a separate metal contrast bar designed to reinforce the insulation element not only to oppose the pressure exerted on the portion or arm of the channel to be deformed but also to compensate for any geometrical irregularities so as to prevent the slotting portion of the insulation element from sliding out of the channelled section.

[0006] In addition, according to prior art, to prevent the slotting portion from slipping during processing, an adhesive is used to keep said bar attached to the flexible securing portions.

[0007] The aim of the present invention is to improve the structural elements of the type described above, in particular by simplifying the joints and also by eliminating the need for the separate metal contrast bar and the adhesive.

[0008] This aim is achieved by providing a structural element having the characteristics described in claim 1. In particular, it provides a structural element, preferably a light alloy section, comprising a channel to be joined to at least one second structural element, preferably a heat insulation element, said second structural element being of the type that comprises a slotting portion that fits into the channel in the first structural element, said channel having an opening to allow the passage of the slotting portion on the second structural element and being delimited by longitudinal lateral surfaces of the first structural element, characterized in that the channel in the first structural element comprises a tongue protruding from at least one of the lateral surfaces of the channel and extending lengthways parallel to the slotting portion on the second structural element, said tongue being designed to hold the slotting portion on the second structural element firmly in the channel in the first structural element.

[0009] The fact that the structural element has a channel with a tongue made inside it designed to securely join the slotting portion of the second structural element to the channel eliminates the need for the separate metal bar and the adhesive used in prior art. This translates as savings on components and production costs.

[0010] Moreover, since the separate bar is no longer used and no adhesive needs to be applied, the operations required to make the joint are much more simple and take less time.

[0011] As described in claim 16 below, the present invention also applies to a structural element, in particular, a heat insulation element, that can be used with the aforesaid structural element or section, and to a structural assembly comprising at least one structural element or section and a corresponding heat insulation structural element as described in claim 22.

[0012] The dependent claims apply to preferred embodiments with advantageous features.

[0013] The description which follows refers to preferred embodiments of the present invention from which further technical characteristics and advantages of the invention are apparent. The description is made with reference to the accompanying drawings in which:

Figure 1 is a cross section of a part of an assembly consisting of the section and the heat insulation element made according to the present invention;
Figure 2 is a detail view of the channel in the section in the preferred embodiment of the present invention;
Figure 3 is a detail view of the slotting portion made on the heat insulation element in the preferred embodiment of the present invention.

[0014] Figure 1 illustrates in cross section a part of a structural assembly extending lengthways, for example, a window frame or similar assembly comprising a light alloy section 12 extending lengthways, designed to be applied to the outside of a building and connected, through a heat insulation element 16 extending lengthways (made from heat insulating material) to another longitudinal section 14, also made of light alloy, designed to be applied to the inside of the building.

[0015] Figure 1 illustrates in particular one half of a door or window frame shoulder which is symmetrically completed by a second heat insulation element (not illustrated) connecting the sections 12 and 14 in exactly

the same way to the element 16 and which forms with the latter a heat insulating air space 18 between the outside section and the inside section of the assembly.

[0016] With reference in particular to the connection between the heat insulation element 16 and the aluminium section 12, it can be seen that the section 12 has a channel 20 which extends lengthways and is broadly in the shape of a "C", designed to receive and retain a matching shaped portion 22 of the heat insulation element 16.

[0017] With reference also to Figure 2, it can be seen that the channel 20 of the section 12 has an opening 17 at the front, an endwall 19, on the side opposite the opening 17 and opposing lateral surfaces 21 and 23 which converge towards the front so as to hook and retain the portion 22 of the heat insulation element 16. The lateral surfaces 21 and 23 of the channel 20 end at corresponding edges 17' and 17" on opposite sides of the opening 17.

[0018] The heat insulation element 16 also extends lengthways and, as illustrated in Figure 3, has a slotting portion 22, broadly in the shape of a "C" and being suitable in size for sliding lengthways into the channel 20 of the section 12, said shaped slotting portion forming a central groove 25 with an opening 27 at the front and an opposite endwall 29.

[0019] The lateral surfaces of the groove 25 in the slotting portion of the heat insulation element are formed by arms or wings 24 and 26 which can be elastically deformed crossways and between which there can conveniently be placed - as shown in Figure 1 - a tongue 28 that projects from the endwall 19 of the channel 20 of the section 12 and extends lengthways parallel to the slotting portion 22 of the second structural element 16.

[0020] Said tongue 28, by fitting into the groove 25 made in the slotting portion 22 of the heat insulation element, creates an inseparable joint between the slotting portion 22 on the second structural element 16 and the channel 20 in the first structural element.

[0021] The sides of the tongue 28, by coming into contact with the opposite walls of the groove 25, make it possible to reinforce the slotting portion 22 of the heat insulation element, and in particular, the flexible wings 24 and 26, providing a positive reaction to the pressure exerted on the arm 30 of the section 12 by the rolling equipment when the portion 22 of the heat insulation element is slotted into the channel 20 and creating a joint that is stronger and more resistant than joints that could be obtained with the separate bar known to prior art.

[0022] The tongue 28 also has suitable means that, when the force on the second structural element 16 tends to disengage it from the channel 20 (in the direction labelled A in the drawings), the lateral faces of the slotting portion 22 of the second structural element 16 are forced against opposite walls of the channel 20 in the first structural element 12.

[0023] In particular, as shown in Figure 1, the reinforcing tongue has flat surfaces 32 and 34 that come into contact with the flexible opposite parts 24 and 26 of the element 16 - in particular, the plane surfaces 36 and 38 of these - which diverge in the perpendicular disengagement direction A from the channel 20. This setup is particularly advantageous. Every time the portion 22 is pulled in the direction of the arrow A of disengagement from the channel 20 of the section 12, said diverging surfaces 32 and 34 act in conjunction with the opposite surfaces 36 and 38 of the flexible parts and, through reciprocal expansion of the flexible parts 24 and 26, increase the pressure that the slotting portion 22 exerts as a whole on the lateral surfaces of the channel, thus strengthening the fit between the slotting portion 22 and the channel 20.

[0024] Although the diverging surfaces in this preferred embodiment of the invention are plane surfaces, other shapes are also possible, without departing from the scope of the inventive concept. For example, plane diverging surfaces might constitute only a part of the lateral profile of the tongue or the tongue might have a curved shape along all or part of its length. In fact, the lateral edges of the tongue might even not diverge, although in this case the advantage would not be so evident.

[0025] Moreover, in another embodiment, instead of two diverging surfaces 32 and 34, the tongue has only one inclined surface (either the surface 32 or the surface 34) that comes into contact with a corresponding surface (36 or 38) of a single flexible part (24 or 26) of the slotting portion 22 of the heat insulation element so that, when the heat insulation element is forced in the disengagement direction A, the slotting portion 22 is pressed against a corresponding wall (40 or 42) of the channel 20, thus increasing the pressure between the slotting portion 22 and the section channel 20 in proportion to the applied disengagement force.

[0026] According to the setup illustrated here, the opposite lateral surfaces 40 and 42 of the channel 20 of the section engage the corresponding surfaces 44 and 46 of the portion 22 of the heat insulation element 16 and converge in the direction A in which the slotting portion is disengaged from the channel.

[0027] Preferably, said surfaces 32 and 34 of the tongue 28 and the corresponding surfaces 36 and 38 of the flexible parts 24 and 26 of the portion 22, are located, respectively, upstream, relative to the direction A of disengagement from the channel, of the converging surfaces 40 and 42 and of the corresponding surfaces 44 and 46 of the slotting portion 22.

[0028] The reinforcing tongue 28 has a broadly triangular shape which widens in the disengagement direction and has a transverse end surface 48 that is substantially flat, to match a corresponding flat face 50 of the bottom 29 of the groove 25 in the slotting portion 22 of the heat insulation element.

[0029] In the centre of said flat transverse surface 48, there is a recess 52 which gives the tongue 28 a dove-

tail shape and provides the face 48 with a lengthways score which increases the friction against the opposing face 50 of the groove 25 in the slotting portion 22 of the heat insulation element 16.

[0030] The edges 54 and 56 between the front face 48 and the diverging plane surfaces 32 and 34 of the tongue 28 are rounded. Similarly, there are also rounded edges 58 and 60 between the bottom face 50 of the groove 25 and the plane diverging faces 36 and 38 of the lateral faces of the groove 25 in the slotting portion 22. As a result, the tongue 28 fits snugly into the groove 25 in the C-shaped slotting portion 22 of the heat insulation element 16.

[0031] Another advantageous characteristic of the invention is that, in the direction of disengagement A of the slotting portion 22, at least one edge 54 of the tongue 28 is aligned with an opposite portion of edge 17' of the channel opening 17 so as to further reinforce the fit between the slotting portion 22 and the channel 20 in the section.

[0032] The transverse edges of the free ends of the arms or transversely flexible parts 24 and 26 of the slotting portion 22 on the heat insulation element are flat and designed to come into contact with the parts of the bottom 19 of the channel 20 that are on either side of the tongue 28. The slotting portion therefore substantially matches the channel in the supporting section.

[0033] Preferably, each of the two diverging surfaces 32 and 34 of the tongue 28, within the section channel and the corresponding opposite surfaces 36 and 38 is inclined by an angle of approximately 20° with respect to the axis of symmetry M (drawn with a dot-dashed line in the illustration).

[0034] The tongue 28 is integral with the endwall 19 of the channel 20 in the first structural element or section 12 and is preferably made in a single block with the first structural element 12.

[0035] Moreover, in the preferred embodiment illustrated, the sections 12 and 14 are made of aluminium and the heat insulation element 16 is made of rigid, heat insulating plastic.

[0036] The invention described can be subject to modifications and variations without thereby departing from the scope of the inventive concept.

[0037] Moreover, all the details of the invention may be substituted by technically equivalent elements.

Claims

1. A structural element, preferably a light alloy section, comprising a channel (20) to be joined to at least one second structural element (16), preferably a heat insulation element, said second structural element (16) being of the type that comprises a slotting portion (22) that fits into the channel (20) in the first structural element (12), said channel (20) having an opening (17) to allow the slotting portion (22) on the second structural element (16) to pass into the channel (20) and being delimited by longitudinal lateral surfaces (19, 21, 23) of the first structural element (12), characterized in that the channel (20) in the first structural element comprises a tongue (28) protruding from at least one of the lateral surfaces (19) of the channel and extending lengthways parallel to the slotting portion (22) on the second structural element (16), said tongue (28) being designed to hold the slotting portion (22) on the second structural element (16) firmly in the channel (20) in the first structural element (16).

2. The structural element according to claim 1 characterized in that the tongue (28) comes into contact with the slotting portion (22) on the second structural element (16) in such a way as to strengthen it crossways.

3. The structural element according to one of the foregoing claims characterized in that the tongue (28) comprises means that, when the force on the second structural element (16) tends to disengage it from the channel (20) in a direction (A), one of the lateral faces (44) of the slotting portion (22) of the second structural element (16) is forced against the corresponding opposite wall (40) of the channel (20) in the first structural element (12).

4. The structural element according to claim 3, that can be used in conjunction with a second structural element (16) having a portion (22 or 24) that slots into the channel (20) in the first structural element and that defines or comprises at least one part which can be elastically deformed crossways characterized in that the means for forcing the slotting portion (22) of the second structural element (16) against the opposite surface of the channel (20) in the first structural element comprise at least one lateral surface (32 or 34) of the tongue (28) designed to come into contact with an opposite surface (36 or 38) of the elastically deformable part of the second structural element (16), said lateral surface (32 or 34) being angled in such a manner as to force the slotting portion (22) of the second structural element (16) against a corresponding opposite surface (40 or 42) of the channel (20) in the first structural element when the second structural element (16) is forced in the direction (A) of disengagement from the channel (20).

5. The structural element according to any of the foregoing claims, that can be used in conjunction with a second structural element (16) having a portion (22) that slots into the channel (20) in the first structural element and that defines or comprises a first part (24) and a second part (26) which can be elastically deformed crossways, characterized in that the reinforcing tongue (28) on the first structural

element (12) is shaped in such a way that it can be placed between said flexible parts (24, 26) of the second structural element (16).

6. The structural element according to claim 5 characterized in that the means for forcing the slotting portion (22) of the second structural element (16) against the opposite surface of the channel (20) in the first structural element comprise a first and a second lateral surface (32, 34) of the tongue (28) designed to come into contact with opposite surfaces (36, 38) of the elastically deformable parts (24, 26) of the second structural element (16), said lateral surfaces (32, 34) of the tongue (28) diverging from each other in such a way as to force the slotting portion of the second structural element (16) against corresponding and opposite surfaces (40, 42) of the channel (20) in the first structural element when the second structural element (16) is forced in the direction (A) of disengagement from the channel (20).

7. The structural element according to claim 4 or 6 characterized in that the angled surfaces (32, 34) that force the opposite flexible parts (24, 26) of the second structural element (16) are plane surfaces.

8. The structural element according to claim 7 characterized in that the channel (20) in the first structural element has surfaces (40, 42) to engage the slotting portion (22) of the second structural element (16) that act on the sides of the latter and converge in the direction of disengagement of the slotting portion (22) from the channel (20) in the first structural element and characterized also in that said diverging surfaces (32, 34) that contact the flexible parts of the tongue are located, relative to the direction (A) of disengagement from the channel (20), upstream of the converging surfaces (40, 42) that engage the sides of the slotting portion (22).

9. The structural element according to any one of the foregoing claims from 4 to 8 characterized in that the tongue (28) is shaped in such a way as to slot into the opposite flexible parts (24, 26) of the second structural element (16).

10. The structural element according to claim 9 characterized in that the reinforcing tongue (28) has a broadly triangular shape.

11. The structural element according to any of the foregoing claims characterized in that the tongue (28) has a transverse end surface (48) that is substantially flat and, substantially in the centre of said flat surface (48), has a recess (52).

12. The structural element according to claim 11 characterized in that the tongue (28) has rounded edges (54, 56) between the front face (48) and the diverging plane surfaces (32, 34).

13. The structural element according to any of the foregoing claims characterized in that the tongue (28) has, in the direction of disengagement (A) of the slotting portion (22), at least one edge (54) that is aligned with an opposite portion of edge (17') of the channel opening (17).

14. The structural element according to any of the foregoing claims characterized in that the tongue (28) is integral with the endwall of the channel (20) in the first structural element (12) in a position facing the opening (17) of the channel (20).

15. The structural element according to any of the foregoing claims characterized in that the tongue (28) is made in a single block with the first structural element (12).

16. A structural element, in particular a heat insulation element (16), that can be used with a first structural element (12) as described in any one of the foregoing claims from 1 to 15, characterized in that it comprises a portion (22) that slots into the channel (20) in the first structural element, said slotting portion (22) being defined by or comprising a first part (24) and a second part (26) which can be elastically deformed crossways and which form between them a groove (25) into which the reinforcing tongue (28) of the first structural element (12) is slotted.

17. The structural element according to claim 16 characterized in that the groove into which the tongue slots comprises contact surfaces (58, 60) forming part of the lateral surfaces (54, 56) of the tongue (28) on the first structural element that diverge in the direction (A) of disengagement of the slotting portion (22) of the structural element (16) from the channel (20) in the first structural element (12).

18. The structural element according to claim 17 characterized in that the slotting portion (22) of the second structural element (16) has lateral surfaces (44, 46) that engage matching surfaces (40, 42) of the channel (20) in the first structural element that converge in the direction of disengagement of the slotting portion from the channel (20) and characterized also in that the diverging surfaces (36, 38) of the groove (25) for the tongue (28) are located, relative to the direction (A) of disengagement of the slotting portion (22) from the channel (20), upstream of the converging surfaces (44, 46) that engage the sides of the slotting portion (22).

19. The structural element according to any one of the

foregoing claims from 16 to 18 characterized in that the groove (25) for the tongue (28) on the first structural element has a shape to match the outer profile of the tongue (28).

20. The structural element according to claim 19 characterized in that the groove (25) for the tongue (28) on the first structural element is broadly triangular in shape.

21. The structural element according to claim 20 characterized in that the groove for the tongue has rounded edges (58, 60) between a bottom face (50) of the groove (25) and the latter's diverging surfaces (36, 38).

22. The structural element according to any one of the foregoing claims from 16 to 21 characterized in that the flexible parts (24, 26) of the slotting portion on the structural element (16) widen crossways in the direction opposite the slotting direction.

23. A structural assembly comprising at least one first structural element (12) according to any of the foregoing claims from 1 to 15 and a corresponding second structural element (16) according to any of the foregoing claims from 16 to 22.

24. The structural assembly according to claim 23 for the manufacture of door and window frames, curtain walls and similar constructions or structures comprising at least one structural element (16), designed to provide heat insulation and having at each end a specially shaped slotting portion (22), and a first structural element (12) and second structural element (14), located opposite each other, consisting preferably of light alloy sections, designed to be placed on the outside and on the inside of the construction, respectively, and each having a channel (20) to match the corresponding opposite slotting portions (22) of the heat insulation element.

FIG.1

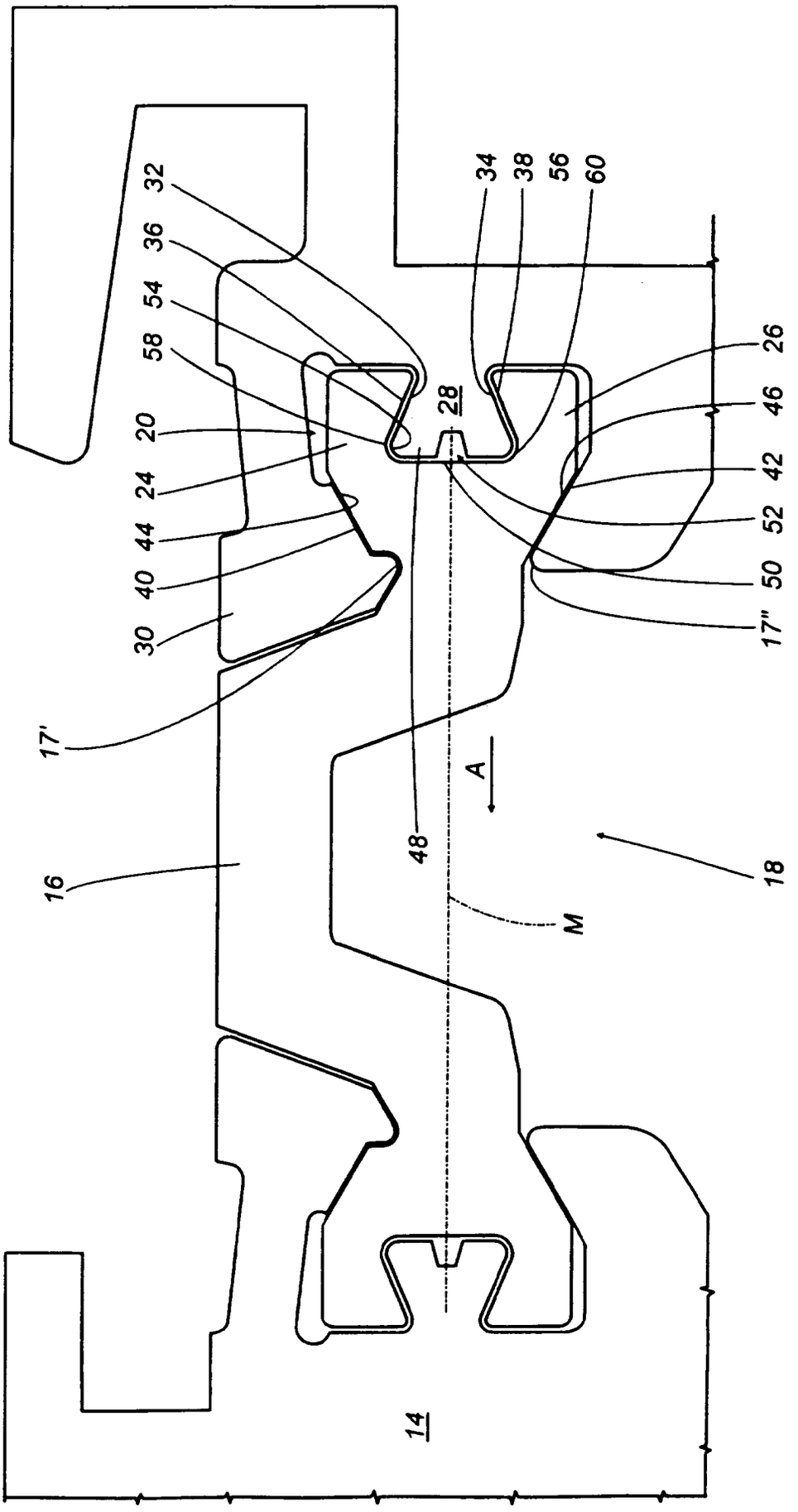
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FIG.2

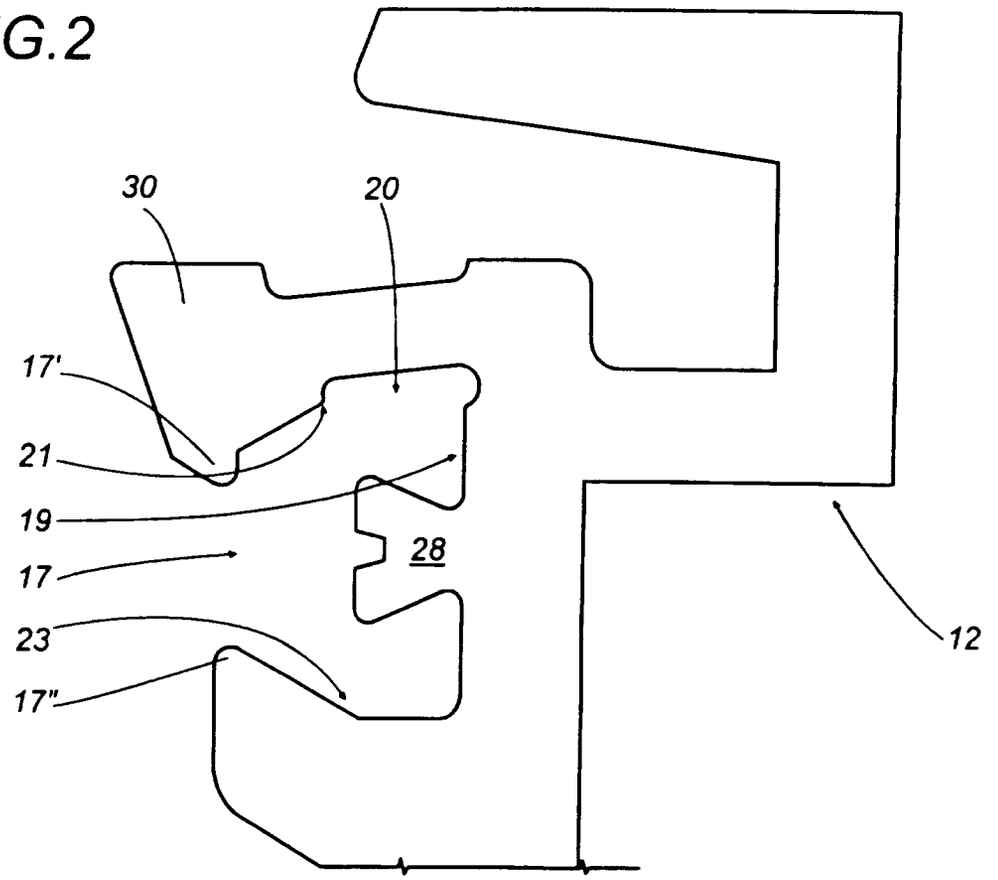
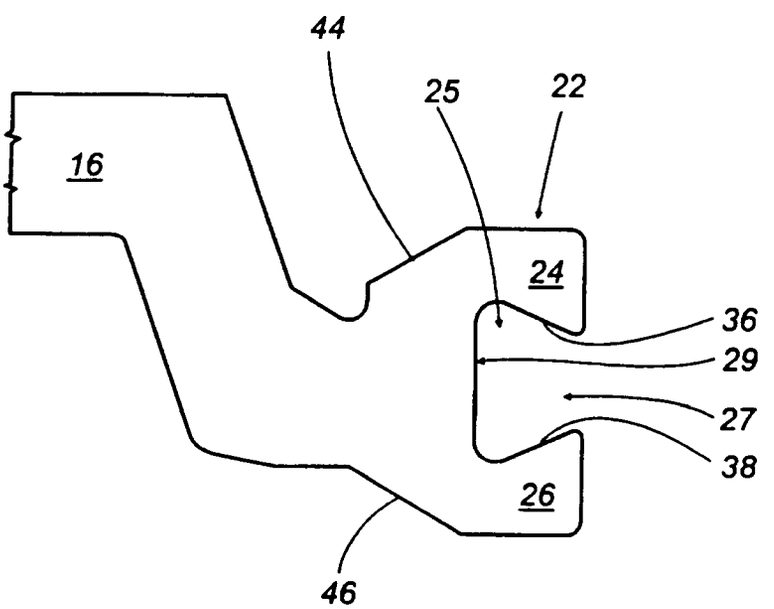


FIG.3



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EUROPEAN SEARCH REPORT

Application Number
EP 98 83 0142

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)
X	FR 1 489 331 A (CLAEYS) 17 November 1967	1-7,9, 10, 14-17, 19,20, 22-24	E06B3/273
Y	* the whole document *	8,18	
A		11	

X	US 5 469 683 A (MCKENNA GREGORY B ET AL) 28 November 1995	1-6,9, 12, 14-17, 21-24	
A	* column 4, line 15 - column 6, line 30; figures *	8	

Y	GB 2 083 116 A (GARTNER & CO) 17 March 1982 * page 2, line 80 - line 105; figures 6,7 *	8,18	

			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E06B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	12 August 1998	Depoorter, 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
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D : document cited in the application
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