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(54) **Structural assembly made of structural elements, preferably a section and a heat insulation element**

Zusammenbau aus Strukturelementen, insbesondere ein Profil und ein wärmeisolierendes Element

Assemblage d'éléments structuraux, notamment un profilé et un élément isolant thermiquement

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Description

[0001] The present invention relates to a structural assembly having a first section, preferably a light alloy section, suitable to be joined to at least one second element, in particular, a heat insulation 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, as document FR 1489331 discloses.

[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, as documents US 5469683 and GB 2083116 point out.

[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 assembly having the characteristics described in claim 1.

[0009] The fact that the first 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] The dependent claims apply to preferred embodiments with advantageous features.

[0012] 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.

[0013] 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.

[0014] 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.

[0015] 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.

[0016] 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.

[0017] 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.

[0018] 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.

[0019] 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.

[0020] 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.

[0021] 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.

[0022] 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.

[0023] 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.

[0024] 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.

[0025] 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.

[0026] 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.

[0027] 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.

[0028] In the centre of said flat transverse surface 48, there is a recess 52 which gives the tongue 28 a dovetail 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.

[0029] 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.

[0030] 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.

[0031] 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 substan-

tially matches the channel in the supporting section.

[0032] 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).

[0033] 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.

[0034] 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.

[0035] The invention described can be subject to modifications and variations without thereby departing from the scope of the claims.

Claims

1. A structural assembly comprising a first structural element (12) having a channel (20) to be joined to at least one second structural element. (16), 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), the channel (20) in the first structural element comprising 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) having a transverse end surface (48) that is flat and being designed to hold the slotting portion (22) on the second structural element (16) firmly in the channel (20) in the first structural element (12), **characterized in that** the tongue (28) has, in the centre of said flat surface (48), a recess (52).

2. A structural assembly 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. A structural assembly according to claim 1 **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), lateral faces (44, 46) of the slotting portion (22) of the second structural element (16) are forced against the corresponding opposite walls (40, 42) of the channel (20) in the first structural element (12).

4. A structural assembly according to claim 3, **characterized in that** the second structural element (16) comprises at least one part which can be elastically deformed crossways 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 comprising 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. A structural assembly according to claim 1, **characterized in that** the second structural element (16) comprises a first part (24) and a second part (26) which can be elastically deformed crossways, the reinforcing tongue (28) on the first structural element (12) being shaped in such a way that it can be placed between said flexible parts (24, 26) of the second structural element (16).

6. A structural assembly according to claim 5 **characterized in that** said lateral surfaces (32, 34) of the tongue (28) diverges 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. A structural assembly 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. A structural assembly according to claim 7 **characterized in that** the 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, said diverging surfaces (32, 34) of the tongue that are in contact with the flexible parts of the second structural element (16) 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 slot-

ting portion (22).

9. A structural assembly 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. A structural assembly according to claim 9 **characterized in that** the reinforcing tongue (28) has a broadly triangular shape.

11. A structural assembly according to claim 10 **characterized in that** the tongue (28) has rounded edges (54, 56) between the front face (48) and the diverging plane surfaces (32, 34).

12. A structural assembly according to claim 3 **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).

13. A structural assembly according to claim 1 **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).

14. A structural assembly according to claim 1 **characterized in that** the tongue (28) is made in a single block with the first structural element (12).

15. A structural assembly according to claim 14 **characterized in that** the first part (24) and the second part (26) form between them a groove (25) into which the reinforcing tongue (28) of the first structural element (12) is slotted.

16. A structural assembly according to claim 15 **characterized in that** the groove (25) into which the tongue slots comprises surfaces (58, 60) in contact with the lateral surfaces (54, 56) of the tongue (28) on the first structural element (12) 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).

17. A structural assembly according to claim 15 **characterized in that** the groove (25) for the tongue (28) on the first structural element (12) has a shape to match the outer profile of the tongue (28).

18. A structural assembly according to claim 17 **characterized in that** the groove (25) for the tongue (28) on the first structural element is broadly triangular in shape.

19. A structural assembly according to claim 18 **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).

Patentansprüche

1. Zusammenbau aus Strukturelementen, enthaltend ein erstes Strukturelement (12) mit einem Kanal (20), um mit wenigstens einem zweiten Strukturelement (16) verbunden zu werden, wobei das genannte zweite Strukturelement (16) von einem Typ ist, der einen Verbindungsabschnitt (22) enthält, welcher in den Kanal (20) des ersten Strukturelementes (12) greift, wobei der genannte Kanal (20) eine Öffnung (17) aufweist, die es dem Verbindungsabschnitt (22) an dem zweiten Strukturelement (16) erlaubt, in den Kanal (20) eingepasst und von den längsverlaufenden seitlichen Oberflächen (19, 21, 23) des ersten Strukturelementes (12) eingegrenzt zu werden, wobei der Kanal (20) in dem ersten Strukturelement eine Zunge (28) enthält, die von wenigstens einer der seitlichen Oberflächen (19) des Kanals hervorsteht und sich in Längsrichtung parallel zu dem Verbindungsabschnitt (22) an dem zweiten Strukturelement (16) erstreckt, wobei die genannte Zunge (28) eine querverlaufende flache Endfläche (48) aufweist und dazu bestimmt ist, den Verbindungsabschnitt (22) an dem zweiten Strukturelement (16) fest in dem Kanal (20) in dem ersten Strukturelement (12) zu halten, **dadurch gekennzeichnet, dass** die Zunge (28) in der Mitte der genannten flachen Oberfläche (48) eine Vertiefung (52) aufweist.

2. Strukturzusammenbau nach Patentanspruch 1, **dadurch gekennzeichnet, dass** die Zunge (28) mit dem Verbindungsabschnitt (22) an dem zweiten Strukturelement (16) auf solche Weise in Kontakt kommt, dass sie diesen in Querrichtung verstärkt.

3. Strukturzusammenbau nach Patentanspruch 1, **dadurch gekennzeichnet, dass** die Zunge (28) Mittel enthält, so dass, wenn die auf das zweite Strukturelement (16) ausgeübte Kraft dazu neigt, sie aus dem Kanal (20) in einer Richtung (A) freizugeben, die Seitenflächen (44, 46) des Verbindungsabschnittes (22) des zweiten Strukturelementes (16) gegen die entsprechenden gegenüberliegenden Wände (40, 42) des Kanals (20) in dem ersten Strukturelement (12) gedrückt werden.

4. Strukturzusammenbau nach Patentanspruch 3, **dadurch gekennzeichnet, dass** das zweite Strukturelement (16) wenigstens einen Teil enthält, welcher in Querrichtung elastisch verformt werden

kann, wobei die Mittel zum Drücken des Verbindungsabschnittes (22) des zweiten Strukturelementes (16) gegen die gegenüberliegende Oberfläche des Kanals (20) in dem ersten Strukturelement wenigstens eine seitliche Oberfläche (32 oder 34) der Zunge (28) enthalten, die dazu bestimmt ist, mit einer gegenüberliegenden Oberfläche (36 oder 38) des elastisch verformbaren Teils des zweiten Strukturelementes (16) in Kontakt zu kommen, wobei die genannte seitliche Oberfläche (32 oder 34) auf solche Weise geneigt ist, dass der Verbindungsabschnitt (22) des zweiten Strukturelementes (16) gegen eine entsprechende gegenüberliegende Oberfläche (40 oder 42) des Kanals (20) in dem ersten Strukturelement gedrückt wird, wenn das zweite Strukturelement (16) in der Richtung (A) der Freigabe aus dem Kanal (20) einer Belastung unterliegt.

5. Strukturzusammenbau nach Patentanspruch 1, **dadurch gekennzeichnet, dass** das zweite Strukturelement (16) einen ersten Teil (24) und einen zweiten Teil (26) enthält, welche in Querrichtung elastisch verformt werden können, wobei die verstärkende Zunge (28) an dem ersten Strukturelement (12) auf solche Weise geformt ist, dass sie zwischen den genannten flexiblen Teilen (24, 26) des zweiten Strukturelementes (16) angeordnet werden kann.

6. Strukturzusammenbau nach Patentanspruch 5, **dadurch gekennzeichnet, dass** die genannten seitlichen Oberflächen (32, 34) der Zunge (28) voneinander auf solche Weise divergieren, dass der Verbindungsabschnitt des zweiten Strukturelementes (16) gegen die entsprechenden und gegenüberliegenden Oberflächen (40, 42) des Kanals (20) in dem ersten Strukturelement gedrückt wird, wenn das zweite Strukturelement (16) in der Richtung (A) der Freigabe aus dem Kanal (20) einer Belastung unterliegt.

7. Strukturzusammenbau nach Patentanspruch 4 oder 6, **dadurch gekennzeichnet, dass** die geneigten Oberflächen (32, 34), welche auf die gegenüberliegenden flexiblen Teile (24, 26) des zweiten Strukturelementes (16) drücken, ebene Oberflächen sind.

8. Strukturzusammenbau nach Patentanspruch 7, **dadurch gekennzeichnet, dass** die Oberflächen (40, 42) zum Halten des Verbindungsabschnittes (22) des zweiten Strukturelementes (16) auf die Seiten von letzterem wirken und in Richtung der Freigabe des Verbindungsabschnittes (22) aus dem Kanal (20) in dem ersten Strukturelement konvergieren, wobei die genannten divergierenden Oberflächen (32, 34) der Zunge, die sich im Kontakt mit den flexiblen Teilen des zweiten Strukturelementes (16) befinden, im Verhältnis zu der Richtung (A) der Freigabe aus dem Kanal (20) stromaufwärts der konvergierenden Oberflächen (40, 42) angeordnet sind, welche die Seiten des Verbindungsabschnittes (22) halten.

9. Strukturzusammenbau nach einem beliebigen der vorstehenden Patentansprüche von 4 bis 8, **dadurch gekennzeichnet, dass** die Zunge (28) auf solche Weise geformt ist, dass sie sich in die sich gegenüberliegenden flexiblen Teile (24, 26) des zweiten Strukturelementes (16) einfügt.

10. Strukturzusammenbau nach Patentanspruch 9, **dadurch gekennzeichnet, dass** die verstärkende Zunge (28) eine allgemein dreieckige Form hat.

11. Strukturzusammenbau nach Patentanspruch 10, **dadurch gekennzeichnet, dass** die Zunge (28) zwischen der vorderen Fläche (48) und den divergierenden ebenen Oberflächen (32, 34) abgerundete Kanten (54, 56) hat.

12. Strukturzusammenbau nach Patentanspruch 3, **dadurch gekennzeichnet, dass** die Zunge (28) in Richtung der Freigabe (A) des Verbindungsabschnittes (22) wenigstens eine Kante (54) aufweist, die zu einem gegenüberliegenden Kantenabschnitt (17') der Kanalöffnung (17) ausgerichtet ist.

13. Strukturzusammenbau nach Patentanspruch 1, **dadurch gekennzeichnet, dass** die Zunge (28) in einem Stück mit der Endwand des Kanals (20) in dem ersten Strukturelement (12) gearbeitet ist, und zwar in einer Position, die der Öffnung (17) des Kanals (20) zugewandt ist.

14. Strukturzusammenbau nach Patentanspruch 1, **dadurch gekennzeichnet, dass** die Zunge (28) in einem einzigen Block mit dem ersten Strukturelement (12) hergestellt ist.

15. Strukturzusammenbau nach Patentanspruch 14, **dadurch gekennzeichnet, dass** der erste Teil (24) und der zweite Teil (26) zwischen sich eine Nutung (25) bilden, in welche die verstärkende Zunge (28) des ersten Strukturelementes (12) eingesetzt wird.

16. Strukturzusammenbau nach Patentanspruch 15, **dadurch gekennzeichnet, dass** die Nutung (25), in welche die Zunge eingesetzt ist, Oberflächen (58, 60) im Kontakt mit den seitlichen Oberflächen (54, 56) der Zunge (28) an dem ersten Strukturelement (12) enthält, welche in Richtung (A) der Freigabe des Verbindungsabschnittes (22) des Strukturelementes (16) aus dem Kanal (20) in dem ersten Strukturelement (12) divergieren.

17. Strukturzusammenbau nach Patentanspruch 15, **dadurch gekennzeichnet, dass** die Nutung (25) für die Zunge (28) an dem ersten Strukturelement (12) eine Form aufweist, die dem äusseren Profil der Zunge (28) angepasst ist.

18. Strukturzusammenbau nach Patentanspruch 17, **dadurch gekennzeichnet, dass** die Nutung (25) für die Zunge (28) an dem ersten Strukturelement allgemein dreieckig in der Form ist.

19. Strukturzusammenbau nach Patentanspruch 18, **dadurch gekennzeichnet, dass** die Nutung für die Zunge zwischen einer unteren Fläche (50) der Nutung (25) und den divergierenden Oberflächen (36, 38) von letzterer abgerundete Ecken aufweist.

Revendications

1. Un assemblage structurel comprenant un premier élément structurel (12) ayant un canal (20) destiné à être joint à au moins un second élément structurel (16), ledit second élément structurel (16) étant du type comprenant une partie d'emboîtement (22) qui s'emboîte dans le canal (20) du premier élément structurel (12), ledit canal (20) ayant une ouverture (17) pour permettre le passage de la partie d'emboîtement (22) du second élément structurel (16) dans le canal (20) et étant délimité par des surfaces latérales longitudinales (19, 21, 23) du premier élément structurel (12), le canal (20) du premier élément structurel comprenant une protubérance (28) saillant d'au moins une (19) des surfaces latérales du canal et s'étendant, dans le sens longitudinal, parallèlement à la partie d'emboîtement (22) du second élément structurel (16), ladite protubérance (28) ayant une surface d'extrémité transversale (48) qui est plate et étant destinée à maintenir fermement la partie d'emboîtement (22) du second élément structurel (16) dans le canal (20) du premier élément structurel (12), ledit assemblage structurel étant **caractérisé en ce que** la protubérance (28) comporte, au centre de ladite surface plate (48), un évidement (52).

2. Un assemblage structurel selon la revendication 1, **caractérisé en ce que** la protubérance (28) vient au contact de la partie d'emboîtement (22) du second élément structurel (16) de manière à la renforcer transversalement.

3. Un assemblage structurel selon la revendication 1, **caractérisé en ce que** la protubérance (28) comprend des moyens par l'intermédiaire desquels, quand une force appliquée sur le second élément structurel (16) tend à le désengager du canal (20) dans une direction (A), des faces latérales (44, 46) de la partie d'emboîtement (22) du second élément structurel (16) sont forcées contre des parois opposées correspondantes (40, 42) du canal (20) du premier élément structurel (12).

4. Un assemblage structurel selon la revendication 3, **caractérisé en ce que** le second élément structurel (16) comprend au moins une partie qui peut être déformée transversalement de façon élastique, les moyens de forçage de la partie d'emboîtement (22) du second élément structurel (16) contre la surface opposée du canal (20) du premier élément structurel comprenant au moins une surface latérale (32 ou 34) de la protubérance (28) destinée à venir au contact d'une surface opposée (36 ou 38) de la partie élastiquement déformable du second élément structurel (16), ladite surface latérale (32 ou 34) étant inclinée de manière à forcer la partie d'emboîtement (22) du second élément structurel (16) contre une surface opposée correspondante (40 ou 42) du canal (20) du premier élément structurel quand le second élément structurel (16) est forcé dans la direction (A) de désengagement du canal (20).

5. Un assemblage structurel selon la revendication 1, **caractérisé en ce que** le second élément structurel (16) comprend une première partie (24) et une seconde partie (26) qui peuvent être déformées transversalement de façon élastique, la protubérance de renforcement (28) du premier élément structurel (12) étant conformée de manière à pouvoir être placée entre lesdites parties flexibles (24, 26) du second élément structurel (16).

6. Un assemblage structurel selon la revendication 5, **caractérisé en ce que** lesdites surfaces latérales (32, 34) de la protubérance (28) divergent l'une de l'autre de manière à forcer la partie d'emboîtement du second élément structurel (16) contre des surfaces correspondantes et opposées (40, 42) du canal (20) du premier élément structurel quand le second élément structurel (16) est forcé dans la direction (A) de désengagement du canal (20).

7. Un assemblage structurel selon la revendication 4 ou 6, **caractérisé en ce que** les surfaces inclinées (32, 34) qui forcent les parties flexibles opposées (24, 26) du second élément structurel (16) sont des surfaces planes.

8. Un assemblage structurel selon la revendication 7, **caractérisé en ce que** les surfaces (40, 42) de prise de la partie d'emboîtement (22) du second élément structurel (16) agissent sur les côtés de ce dernier et convergent dans la direction de désengagement de la partie d'emboîtement (22) du canal (20) du premier élément structurel, lesdites surfaces divergentes (32, 34) de la protubérance qui

viennent au contact des parties flexibles du second élément structurel (16) sont situées, par rapport à la direction (A) de désengagement du canal (20), en amont des surfaces convergentes (40, 42) de prise latérale de la partie d'emboîtement (22).

9. Un assemblage structurel selon l'une quelconque des revendications précédentes de 4 à 8, **caractérisé en ce que** la protubérance (28) est conformée de manière à s'emboîter dans les parties flexibles opposées (24, 26) du second éléments structurel (16).

10. Un assemblage structurel selon la revendication 9, **caractérisé en ce que** la protubérance de renforcement (28) a une forme générale triangulaire.

11. Un assemblage structurel selon la revendication 10, **caractérisé en ce que** la protubérance (28) a des bords arrondis (54, 56) entre la face avant (48) et les surfaces planes divergentes (32, 34).

12. Un assemblage structurel selon la revendication 3, **caractérisé en ce que** la protubérance (28) a, dans la direction (A) de désengagement de la partie d'emboîtement (22), au moins un bord (54) qui est aligné avec une portion de bord opposée (17') de l'ouverture (17) du canal.

13. Un assemblage structurel selon la revendication 1, **caractérisé en ce que** la protubérance (28) fait partie intégrale de la paroi d'extrémité du canal (20) du premier élément structurel (12) dans une position qui fait face à l'ouverture (17) du canal (20).

14. Un assemblage structurel selon la revendication 1, **caractérisé en ce que** la protubérance (28) est réalisée en un corps unique avec le premier élément structurel (12).

15. Un assemblage structurel selon la revendication 14, **caractérisé en ce que** la première partie (24) et la seconde partie (26) définissent entre elles une gorge (25) dans laquelle est emboîtée la protubérance de renforcement (28) du premier élément structurel (12).

16. Un assemblage structurel selon la revendication 15, **caractérisé en ce que** la gorge (25) dans laquelle s'emboîte la protubérance comprend des surfaces (58, 60), en contact avec les surfaces latérales (54, 56) de la protubérance (28) du premier élément structurel (12), qui divergent dans la direction (A) de désengagement de la partie d'emboîtement (22) de l'élément structurel (16) du canal (20) du premier élément structurel (12).

17. Un assemblage structurel selon la revendication 15, **caractérisé en ce que** la gorge (25) relative à la protubérance (28) du premier élément structurel (12) est conformée de manière à épouser le profil extérieur de la protubérance (28).

18. Un assemblage structurel selon la revendication 17, **caractérisé en ce que** la gorge (25) relative à la protubérance (28) du premier élément structurel a une forme générale triangulaire.

19. Un assemblage structurel selon la revendication 18, **caractérisé en ce que** la gorge relative à la protubérance a des bords arrondis (58, 60) entre une face de fond (50) de la gorge (25) elle-même et les surfaces divergentes (36, 38) de cette dernière.

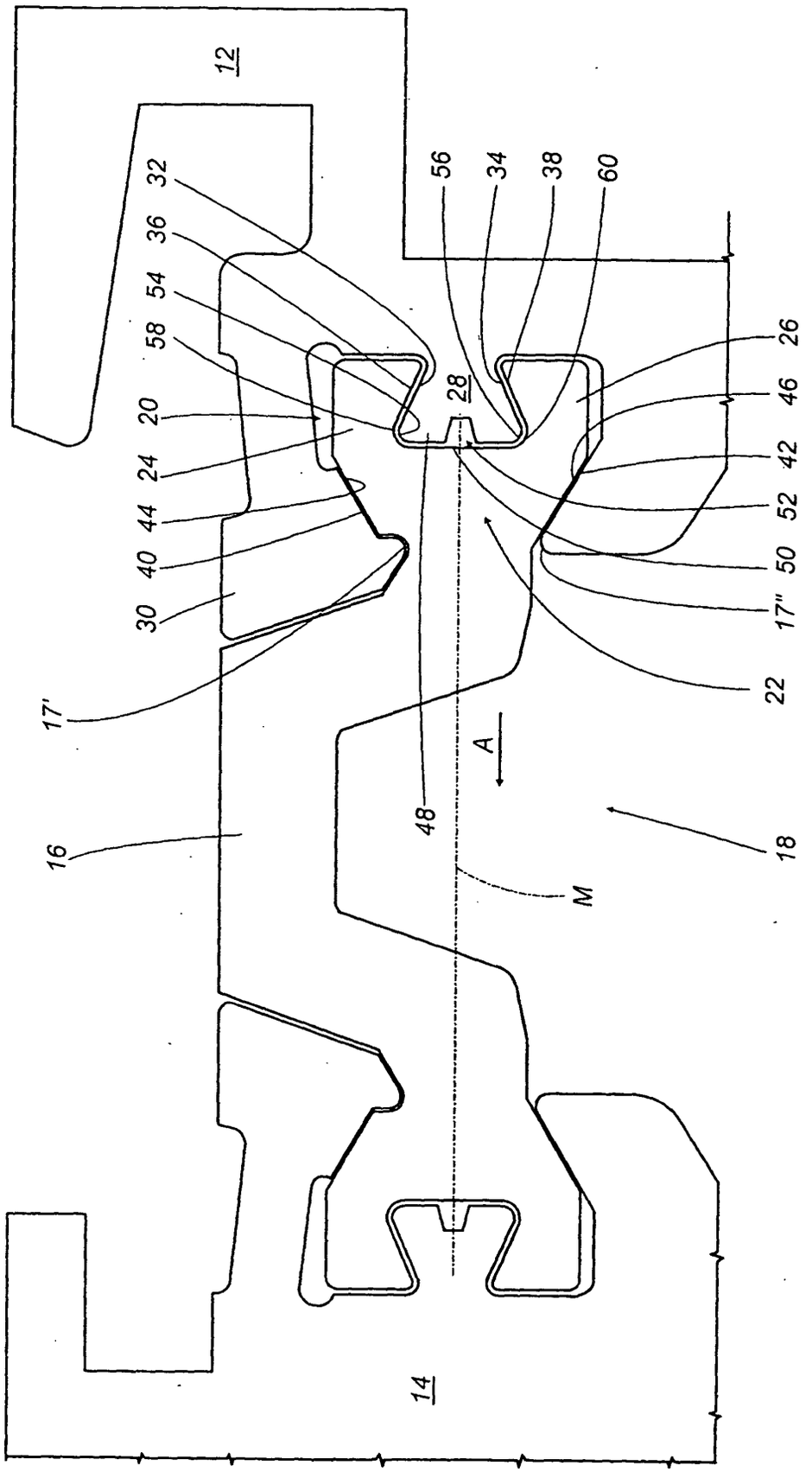

12
32
36
54
58
20
24
44
40
30
17'
16
14
56
34
38
60
28
26
46
42
52
50
17"
22
A
48
M
18

FIG.1

FIG.2

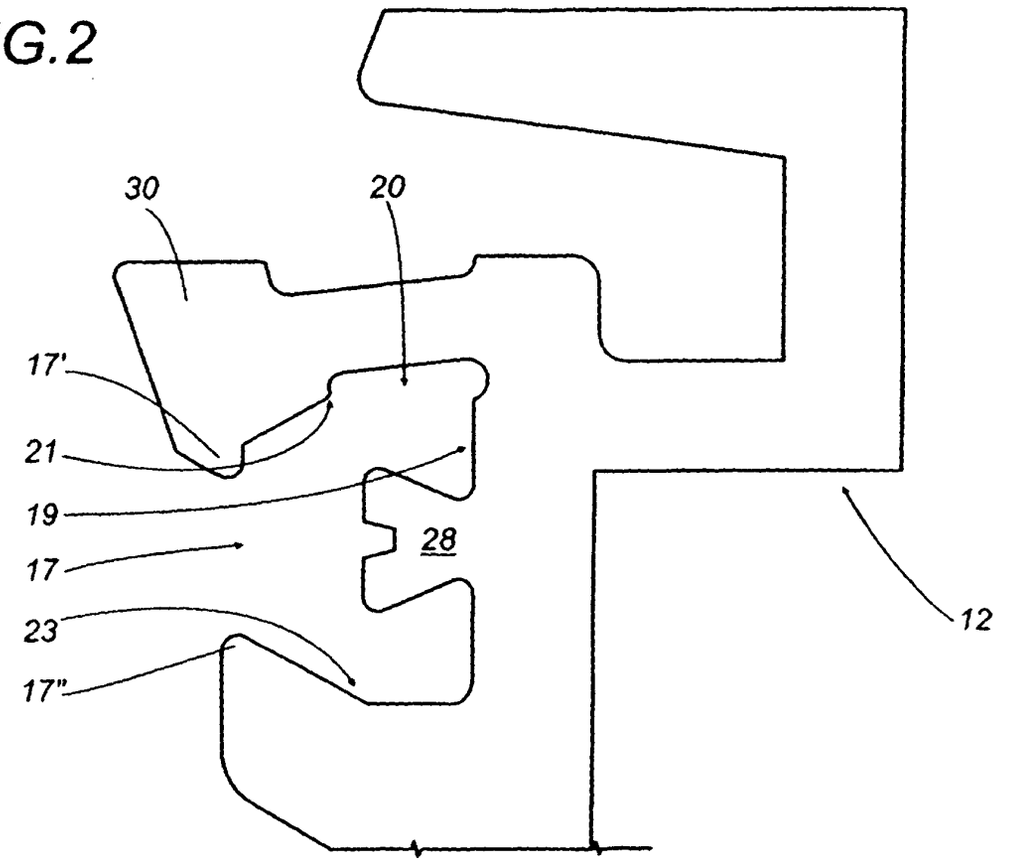


FIG.3

