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(54) **Set of cold metal section bars which are convertible into thermally-broken section bars**

Kaltmetallprofilsatz zum Herstellen von thermisch gebrochenen Verbundprofilen

Ensemble de profilés métalliques froids pour la fabrication de profilés sans pont thermique

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Description

The present invention relates to a set of cold metal section bars which are convertible into thermally-broken section bars suitable for cold door and window frames and for thermally-broken (insulated) door and window frames.

During the course of the present description and of the claims, the expression "cold section bars" is used to indicate section bars that are not thermally insulated while the expression "thermally-broken section bars" stands for thermally insulated section bars.

Various kinds of section bars are currently on the market:

- a) so called cold or whole section bars, constituted by section bars made wholly of metal, without thermal insulation;
- b) so called whole section bars with a thermal screen, constituted by section bars made wholly of metal to which insulating elements are applied, generally in plastic, on the external part of the frame, so as to form a barrier to the exchange of heat;
- c) thermally-broken or insulated section bars, comprising insulating elements interposed between elements of external and internal metal section bars.

Thermally-broken section bars, in turn, can be of different type.

One type of thermally-broken section bar is obtained from two metal section bars, one internal and the other external, extruded separately, that are joined together by means of bars of insulating material inserted in specially-provided seats and then clamped through a rolling process.

These thermally-broken section bars have several drawbacks.

Tolerances and parallelisms between the two internal and external elements are difficult to obtain and to check, as they are section bars extruded separately, thus, easily, imperfections occur in joining the two elements together.

Moreover, the two internal and external elements can have a non-uniform anodization and their aging can also be non-uniform.

Another type of thermally-broken section bar is obtained from a whole metal section bar provided with a tubular casing that connects the elements of the internal and external metal section bars, extruded in one single piece. During the production step of the section bars, polyurethane foam is injected into the tubular casing and the metal walls of the tubular casing connecting the elements of internal and external metal section bars are then removed, by means of a cutting operation, so that the two internal and external elements remain connected together only through the injected polyurethane foam.

This thermally-broken section bar does not have the

drawbacks of the section bar with separate internal and external elements, but it does require a laborious and expensive manufacturing process, that cannot be executed by an assembler of door and window frames, due to the complexity of the operations of injecting foam into the tubular casing and of subsequently cutting the walls connecting the internal and external section bar elements.

Attempts have been made tending to transform a cold section bar into a thermally-broken section bar, but the results attained so far have not been satisfactory.

The object of the present invention is a set of section bars constituted by whole metal section bars, which may be extruded in one single piece, that can be used as cold section bars and can be converted into thermally-broken section bars with simple operations, that may also be executed outside the production line of the section bars, thus that can also be executed by an assembler of door and window frames when it becomes necessary to manufacture a thermally-broken section bar, rather than a cold section bar.

Another object of the present invention is a set of section bars that have an optimum conformation both as cold metal section bars and as thermally-broken section bars, obtained by the transformation of the cold metal section bars.

According to the invention, the abovementioned objects are attained with a set of cold metal section bars which are convertible into thermally-broken section bars, particularly for door and window frames, each comprising an element of internal metal section bar and an element of external metal section bar connected together by means of connecting walls, characterized in that

said connecting walls are made of metal and comprise teeth linked to said elements of internal and external section bars by means of weakening lines suitable for making them deformable, and strips connected to said deformable teeth by means of further weakening lines suitable for making them removable, the thickness of said strips being less than the thickness of said teeth,

said elements of internal and external section bar are provided with longitudinal recesses each formed by one of said deformable teeth, by at least one rigid ridge substantially parallel to said teeth and by a back wall connecting one tooth and one ridge, and

said element of external section bar comprises at least one abutment fin connected to at least one of said back walls by means of a connecting tang protruding outward, so as to form a chamber for aeration and for collection of water in the proximity of said fin and to minimize the transmission of deformations from said teeth to said fin.

DE-A-2 710 441 and WO-A-8 001 929 disclose a

similar arrangement with metal sections manufactured joined by removable strips with intermediate weakened areas and grooves on the sections for receipt of a thermally-insulating spacer. WO-A-8 001 929 also showing deformation of the groove sidewall.

According to a preferred embodiment, said element of internal section bar is provided with at least two longitudinal recesses arranged at a distance greater than that at which two corresponding longitudinal recesses of the element of external section bar are arranged and said removable strips are inclined with respect to said back wall, converging toward said element of external section bar, so as to carry any water and condensate toward said collection chamber.

According to another preferred embodiment, said abutment fin has a substantially convex wall, so that deformations of said teeth involve only variations in the curvature of the fin.

The abovementioned objects are also attained with a set of thermally-broken section bars, particularly for door and window frames, each comprising an element of internal metal section bar and an element of external metal section bar connected together by means of insulating bars housed in matching longitudinal recesses of an element of internal section bar and of an element of external section bar, characterized in that

said longitudinal recesses are each formed by a deformable tooth, by at least one rigid ridge substantially parallel to said tooth and by a back wall connecting one tooth and one ridge, said tooth being connected to the respective element of internal and external metal section bar by means of a weakening line suitable for making it easier to fold them over extremities of said insulating bars, so as to clamp them in said recesses leaving an air space between them, and

said element of external section bar comprises at least one abutment fin connected to at least one of said back walls by means of a connecting tang protruding outward, so as to form a chamber for aeration and for collection of water in the proximity of said fin and to minimize the transmission of deformations from said tooth to said fin.

EP-A-0 103 272 discloses a similar arrangement of thermally-broken section bars in which metal sections are separated by thermal insulation, part of which comprises two plastics strips that seat in grooves on the section bars with deformation of the groove sidewall, Fig. 1 also showing an example (first frame, 1) having a fin joined by a tang to one of the section bars to form a chamber.

Preferably, said insulating bars are arranged inclined with respect to said back wall, converging towards said element of external section bar, so as to carry any water and condensate toward said collection chamber.

With the set of section bars according to the invention there is the great advantage of being able to produce unified section bars, that have an optimized conformation as regards weight, strength and performance, both when they are utilized as cold section bars and when they are utilized, after an easy and simple conversion, as thermally-broken section bars.

In fact, the transversal resistant cross-section of the cold section bars is dimensioned so that a reduced resistant cross-section of the removable strips, due to a lesser thickness than that of the teeth, is substantially compensated by that of the rigid ridges. The weight of the material that is removed and discarded in the case of transformation into thermally-broken section bars is thus reduced to a minimum.

In thermally-broken section bars, the ridges, together with the teeth, form longitudinal recesses suitable for housing insulating bars, keeping them at a distance from one another, so that they remain separated by an air space and an effective thermal insulation is obtained.

Moreover, the operations of conversion can also be executed outside the plant that manufactures the section bars, by an assembler of door and window frames when it becomes necessary to install a thermally-broken door and window frame. The conversion requires very simple interventions, that consist in the insertion of insulating bars in the matching longitudinal recesses of the elements of internal and external section bar, in the removal of the strips cutting them along their respective weakening lines and in folding the teeth with respect to the respective weakening lines, so as to firmly fasten ends of the insulating bars in the corresponding longitudinal recesses.

Another advantage of the set of unified section bars, made according to the invention, is represented by the possibility of carrying toward draining holes water and condensate that may infiltrate inside the door and window frames both in the case of cold door and window frames and in the case of thermally-broken door and window frames. Carrying is executed through the inclined arrangement of the removable strips, converging toward the element of external section bar in cold section bars, and through the inclined arrangement of the insulating bars, that also converge toward the element of external section bar in thermally-broken section bars.

Moreover, the substantially convex shape of the abutment fin introduces a good margin of tolerance against possible deformations caused by the bending of the teeth, because the deformations involve only variations in the curvature of the fin, that can be discerned by the naked eye only with difficulty. Thus the convex shape is also favourable from an aesthetic viewpoint.

Further advantages of the set of section bars according to the invention are represented by the low costs of extrusion and by the substantial reduction of storage stocks. In addition, parallelisms and tolerances between the two internal and external elements of the thermally-broken section bars are easy to obtain and to check,

risks of imperfections in joining the two elements together are reduced and their anodization and aging are uniform.

Features and advantages of the invention will now be illustrated with reference to embodiments of the invention represented as non-limiting examples in the enclosed figures, wherein:

Figs. 1, 3, 5, 7, 9 and 11 are top plan views of a first, second, third, fourth, fifth, sixth cold metal section bar, respectively, according to the invention;

Figs. 2, 4, 6, 8, 10 and 12 are top plan views of a first, second, third, fourth, fifth, sixth thermally-broken section bar, respectively, according to the invention, obtained from the section bars of Figs. 1, 3, 5, 7, 9 and 11, respectively;

Fig. 13 shows on an enlarged scale strips, teeth and insulating bars of the section bars of Figs. 1-12;

Figs. 14 and 15 are partial views in a transversal cross-section of door and window frames with movable panes made with the cold section bars of Figs. 1 and 3 and with the thermally-broken section bars of Figs. 2 and 4, respectively;

Figs. 16 and 17 are partial views in a transversal cross-section of door and window frames with several movable panes made with the cold section bars of Figs. 3 and 7 and with the thermally-broken section bars of Figs. 4 and 8, respectively;

Fig. 18 is a partial view in a transversal cross-section of a frame made with cold section bars of Fig. 3 and provided with a cross-beam formed by the cold section bar of Fig. 11;

Fig. 19 is a cross-sectional view in an enlarged scale of a seat and of a stem of a screw of the cross-beam of Fig. 18.

There is indicated as a whole with 1 in Fig. 1 a cold metal section bar having a transversal cross-section substantially in the shape of a "Z", made by extrusion, preferably in an aluminium alloy. The section bar 1 comprises an element of internal section bar 7 and an element of external section bar 8 connected by means of connecting walls 9. The connecting walls 9 are formed by deformable longitudinal teeth 11 and by removable longitudinal strips 12 having a thickness that is less than the thickness of the teeth 11. The strips 12 are connected to the teeth 11 by means of longitudinal weakening lines 13 suitable for making it easier to cut them; the teeth 11 are connected to the elements of internal section bar 7 and of external section bar 8 by means of weakening lines 14 suitable for making it easier to bend them, as also shown in Fig. 13.

The elements of internal section bar 7 and of external section bar 8 are provided with rigid ridges 15 substantially parallel to the teeth 11, that with back walls 16 and with the teeth 11 form longitudinal recesses 18. The recesses 18 belonging to the element of internal section bar 7 are arranged at a distance greater than that at

which the recesses 18 belonging to the corresponding element of external metal section bar 8 are arranged and, thus, the strips 12 are inclined with respect to the back walls 16 and converge toward the element of external section bar 8, so as to carry water and condensate toward a chamber 19 for aeration and collection of water and condensate.

The element of external section bar 8 comprises an abutment fin 21 formed by a substantially convex wall, so that deformations of the teeth 11 involve only variations in the curvature of the fin. The fin 21 is provided with a "C"-shaped seat 22 suitable for housing a seal and an alignment bracket, not shown. The fin 21 is linked to the back walls 16 by means of a connecting tang 23 protruding outward, with which it forms the abovementioned chamber 19, so as to minimize the transmission of deformations from the teeth 11 to the fin 21. With the fin 21 there is integral a resting tang 31.

The element of internal section bar 7 is formed by a tubular casing 24, having a substantially rectangular transversal cross-section, with which there is integral an abutment fin 25, provided with a C-shaped seat 26 for a seal. In the tubular casing 24 there is a C-shaped seat 27 suitable for housing a hinged element or a glass-holding section bar, a U-shaped seat 28, suitable for housing a seal or a self-tapping screw, as shown in Fig. 19.

From the section bar 1 it is possible to obtain a thermally-broken section bar, similar to that indicated in Fig. 2 as a whole with 10, wherein the parts like to those of section bar 1 are indicated with the same reference numbers.

In order to make the thermally-broken section bar 10, a pair of insulating bars 29 is inserted into the matching recesses 18 of the section bar elements 7 and 8, as shown in Fig. 13, and the strips 12 are then cut from the teeth 11, so as to divide the element of internal section bar 7 from the element of external section bar 8. Moreover, the deformable teeth 11 are folded with respect to the weakening lines 14, so as to clamp the extremities of the insulating bars 29 in the recesses 18, as shown in Fig. 2, leaving an air space 17 between the bars. The bars 29 are inclined like the strips 12, converging toward the element of external section bar 8 and their extremities 29a have a trapeze-like shape, on which the teeth 11 are folded. The insulating bars 29 are preferably made of polyamide reinforced with glass fibres.

The section bars 1 and 10 have an optimized conformation both as cold section bars, and as thermally-broken section bars, as regards weight, resistance, performance. In fact the transversal cross-section of the cold section bars resistant to operational stresses is obtained by reducing the resistant cross-section of the removable strips, as their thickness is less than that of the teeth, and substantially compensating it with that of the rigid ridges. The weight of the material that is removed and discarded in the case of the conversion in thermally-broken section bars is thus very small. In the thermally-

broken section bar 10 the pair of insulating bars 29, separated by an air space 17, allows an effective thermal insulation to be obtained.

When it becomes necessary to install a thermally-broken section bar, an assembler of door and window frames can convert the cold section bar 1 into the thermally-broken section bar 10 with few and simple operations, thus outside the production line of the section bars.

The unification of the section bars, as has been said, allows extrusion costs and storage charges to be reduced to a minimum. Other advantages are represented by the easy obtaining and checking tolerances and parallelisms between the two elements of internal and external section bar 7 and 8 of the thermally-broken section bars, by the minimization of risks of imperfections in joining the two internal and external elements together and by the uniformity of treatment of surface finishing and of aging of the two elements.

There is shown in Fig. 3 a cold metal section bar 2 having a substantially Z-shaped transversal cross-section, wherein the parts like or corresponding to those of the section bar 1 of Fig. 1 are indicated with the same reference numbers.

The abutment fin 21 of the section bar 2 is provided with the resting tang 31 and with a bent extremity 32. The tubular casing 24 has a C-shaped seat 33 suitable for housing a hinge element or for joining up with another section bar, and a resting tang 34.

There is shown in Fig. 4 a thermally-broken section bar 20 obtained from the section bar 2 with the same operations described earlier with reference to the conversion of the cold section bar 1 into the thermally-broken section bar 10. The parts like to those of the section bars 2 and 10 are indicated with the same reference numbers.

There are shown in Figs. 5 and 6 a cold metal section bar 3 and a thermally-broken section bar 30 obtained from the section bar 3 having a substantially Z-shaped transversal cross-section. In the section bars 3 and 30 the parts like or corresponding to those of the section bars 2 and 20 are indicated with the same reference numbers. The element of external section bar 8 has a tubular casing 35 to which there are integral the tang 23 and two rigid ridges 15 that, with the back walls 16 and the deformable teeth 11, form the recesses 18.

There are shown in Figs. 7 and 8 a cold metal section bar 4 and a thermally-broken section bar 40 obtained from the section bar 4 having a substantially inverted L-shaped transversal cross-section. The parts like or corresponding to those of the section bars 1, 10 and 3, 30 are indicated with the same reference numbers. With the tubular casing 24 there are integral resting tangs 36 suitable for engaging with another section bar and a double-C seat 37 for a hinge element, for a clamping rod (bolt) of a movable part and for a supplementary lock match. In the tubular casing 35 there is a resting seat 38 suitable for engaging with another sec-

tion bar.

There are shown in Figs. 9 and 10 a cold metal section bar 5 and a thermally-broken section bar 50 obtained from the section bar 5 having a substantially inverted L-shaped transversal cross-section. The parts like or corresponding to those of the section bars 7 and 8 are indicated with the same reference numbers. With the tubular casing 35 there is integral a bracket tang 39.

There are shown in Figs. 11 and 12 a cold metal section bar 6 and a thermally-broken section bar 60 obtained from the section bar 6 having a substantially T-shaped transversal cross-section. The parts like or corresponding to those of the section bars 1 and 10 are indicated with the same reference numbers.

In Fig. 14 there is represented diagrammatically a cold door and window frame with a side hung pane comprising a fixed frame 41 made with section bars 1 and a movable frame 42 made with section bars 2. There is indicated with 43 a sealing gasket housed in the seat 28, that makes abutment against the tang 34 of the section bar 2.

In Fig. 15 there is represented diagrammatically a thermally-broken door and window frame with a side hung pane comprising a fixed frame 44 made with section bars 10 and a movable frame 45 made with section bars 20.

In Fig. 16 there is represented diagrammatically a cold door and window frame with several movable panes comprising a fixed frame 46 made with section bars 2 and movable frames 47 and 48 made with section bars 4 and 2, respectively.

In Fig. 17 there is represented diagrammatically a thermally-broken door and window frame with several movable panes comprising a fixed frame 49 made with section bars 20 and movable frames 51 and 52 made with section bars 40 and 20, respectively.

In Fig. 18 there is represented diagrammatically a frame formed by section bars 2, provided with a cross-beam formed by the section bar 6, joined to the vertical section bars 2 by means of self-tapping screws like that indicated with 53. The screws 53 pass through holes 54 of a section bar 2 and are screwed into the U-shaped seats 28 of the section bar 6, as also shown in Fig. 19.

Claims

1. Set of cold (i.e. not thermally insulated) metal section bars (1; 2; 3; 4; 5; 6) which are convertible into thermally-broken (i.e. thermally insulated) section bars (10; 20; 30; 40; 50; 60), particularly for door and window frames, each comprising an element of internal metal section bar (7) and an element of external metal section bar (8) connected together by means of connecting walls (9), characterized in that

said connecting walls (9) are made of metal and comprise teeth (11) linked to said elements of

internal and external section bars (7, 8) by means of weakening lines (14) suitable for making them deformable, and strips (12) connected to said deformable teeth (11) by means of further weakening lines (13) suitable for making them removable, the thickness of said strips (12) being less than the thickness of said teeth (11),

said elements of internal and external section bars (7, 8) are provided with longitudinal recesses (18) each formed by one of said deformable teeth (11), by at least one rigid ridge (15) substantially parallel to said teeth (11) and by a back wall (16) connecting one tooth (11) and one ridge (15), and

said element of external section bar (8) comprises at least one abutment fin (21) connected to at least one of said back walls (16) by means of a connecting tang (23) protruding outward, so as to form a chamber (19) for aeration and for collection of water in the proximity of said fin (21) and to minimize the transmission of deformations from said teeth (11) to said fin (21).

2. Set of section bars according to claim 1, characterized in that said element of internal section bar (7) is provided with at least two longitudinal recesses (18) arranged at a distance greater than that at which two corresponding longitudinal recesses (18) of the element of external section bar (8) are arranged and said removable strips (12) are inclined with respect to said back wall (16), converging toward said element of external section bar (8), so as to carry any water and condensate toward said collection chamber (19).

3. Set of section bars according to claim 1, characterized in that said abutment fin (21) has a substantially convex wall, so that deformations of said teeth (11) involve only variations in the curvature of the fin (21).

4. Set of section bars according to claim 1, characterized in that with said element of internal section bar (7) there is integral at least one U-shaped seat (28), suitable for housing a seal (43) or a self-tapping screw (53).

5. Set of thermally-broken (i.e. thermally insulated) section bars (10; 20; 30; 40; 50; 60), particularly for door and window frames, each comprising an element of internal metal section bar (7) and an element of external metal section bar (8) connected together by means of insulating bars (29) housed in matching longitudinal recesses (18) of an element of internal section bar (7) and of an element of external section bar (8), characterized in that

said longitudinal recesses (18) are each formed by a deformable tooth (11), by at least one rigid ridge (15) substantially parallel to said tooth (11) and by a back wall (16) connecting one tooth (11) and one ridge (15), said tooth (11) being connected to the respective element of internal and external metal section bar (7, 8) by means of a weakening line (14) suitable for making it easier to fold them over extremities (29a) of said insulating bars (29), so as to clamp them in said recesses (18) leaving an air space (17) between them, and

said element of external section bar (8) comprises at least one abutment fin (21) connected to at least one of said back walls (16) by means of a connecting tang (23) protruding outward, so as to form a chamber (19) for aeration and for collection of water in the proximity of said fin (21) and to minimize the transmission of deformations from said tooth (11) to said fin (21).

6. Set of section bars according to claim 5, characterized in that said insulating bars (29) are arranged inclined with respect to said back wall (16), converging towards said element of external section bar (8), so as to carry any water and condensate toward said collection chamber (19).
7. Set of section bars according to claim 5, characterized in that said abutment fin (21) has a substantially convex wall, so that deformations of said tooth (11) involve only variations in the curvature of the fin (21).
8. Set of section bars according to claim 5, characterized in that with said element of internal section bar (7) there is integral at least one U-shaped seat (28), suitable for housing a seal (43) or a self-tapping screw (53).

Patentansprüche

1. Satz aus kalten (d.h. thermisch nicht isolierten) Metallprofilen (1; 2; 3; 4; 5; 6), die in thermisch unterbrochene (d.h. thermisch isolierte) Profile (10; 20; 30; 40; 50; 60) umwandelbar sind, insbesondere für Tür- und Fensterrahmen, von denen jedes ein internes Metallprofilelement(7) und ein externes Metallprofilelement(8) umfaßt, die miteinander durch Verbindungswände (9) verbunden sind, dadurch **gekennzeichnet**, daß

die Verbindungswände (9) aus Metall bestehen und Zähne (11) umfassen, die mit den internen und externen Profilelementen (7, 8) durch Schwächungslinien (14) verbunden sind, aufgrund derer sie verformbar sind, und Streifen

(12) umfassen, die mit den verformbaren Zähnen (11) durch weitere Schwächungslinien (13) verbunden sind, aufgrund derer sie entfernbar sind, wobei die Dicke dieser Streifen (12) geringer als die Dicke der Zähne (11) ist,

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die internen und externen Profilelemente (7, 8) mit Längsausnehmungen (18) versehen sind, die jede durch einen der verformbaren Zähne (11), durch zumindest einen zu den Zähnen (11) im wesentlichen parallelen, starren Steg (15) und durch eine Rückwand (16) gebildet sind, die einen Zahn (11) und einen Steg (15) verbindet, und

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das externe Profilelement (8) zumindest eine Anlagerippe (21) umfaßt, die mit zumindestens einer der Rückwände (16) durch einen nach außen vorstehenden Verbindungzapfen (23) verbunden ist, um eine Kammer (19) in der Nähe der Rippe (21) zum Belüften und zum Sammeln von Wasser zu bilden und um die Übertragung von Verformungen von den Zähnen (11) auf die Rippe (21) zu minimieren.

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2. Profilsatz nach Anspruch 1, dadurch **gekennzeichnet**, daß

das interne Profilelement (7) mit zumindest zwei Längsausnehmungen (18) versehen ist, die in einem größeren Abstand angeordnet sind als der, in dem zwei entsprechende Längsausnehmungen (18) des externen Profilelementes (8) angeordnet sind,

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und die entfernbar Streifen (12) mit Bezug auf die Rückwand (16) geneigt sind, auf das externe Profilelement (8) hin konvergierend, um etwaiges Wasser und Kondensat zu der Sammelkammer (19) zu leiten.

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3. Profilsatz nach Anspruch 1, dadurch **gekennzeichnet**, daß die Anlagerippe (21) eine im wesentlichen konvexe Wand aufweist, so daß Verformungen der Zähne (11) nur mit Variationen der Krümmung der Rippe (21) verbunden sind.

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4. Profilsatz nach Anspruch 1, dadurch **gekennzeichnet**, daß mit dem internen Profilelement (7) zumindest ein U-förmiger Sitz (28) einteilig ausgebildet ist, der zum Aufnehmen einer Dichtung (43) oder einer selbstschneidenden Schraube (53) geeignet ist.

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5. Satz von thermisch unterbrochenen (d.h. thermisch isolierten) Profilen (10; 20; 30; 40; 50; 60), insbesondere für Tür- und Fensterrahmen, von denen je-

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des ein internes Metallprofilelement (7) und ein externes Metallprofilelement (8) umfaßt, die miteinander durch Isolierstäbe (29) verbunden sind, die in passenden Längsausnehmungen (18) eines internen Profilelementes (7) und eines externen Profilelementes (8) aufgenommen sind, dadurch **gekennzeichnet**, daß

die Längsausnehmungen (18) jede durch einen verformbaren Zahn (11), durch zumindest einen zu dem Zahn (11) im wesentlichen parallelen, starren Steg (15) und durch eine Rückwand (16) gebildet sind, die einen Zahn (11) und einen Steg (15) verbindet, wobei der Zahn (11) mit dem entsprechenden internen und externen Metallprofilelement (7, 8) durch eine Schwächungslinie (14) verbunden ist, aufgrund derer es erleichtert wird, die Zähne über Enden (29a) der Isolierstäbe (29) zu falten, um die Isolierstäbe unter Freilassung eines Luftraumes (17) zwischen ihnen in den Ausnehmungen (18) zu klemmen, und

das externe Profilelement (8) zumindest eine Anlagerippe (21) umfaßt, die mit zumindest einer der Rückwände (16) durch einen nach außen vorstehenden Verbindungzapfen (23) verbunden ist, um eine Kammer (19) in der Nähe der Rippe (21) zum Belüften und zum Sammeln von Wasser zu bilden und um die Übertragung von Verformungen von den Zähnen (11) auf die Rippe (21) zu minimieren.

6. Profilsatz nach Anspruch 5, dadurch **gekennzeichnet**, daß

die Isolierstäbe (29) mit Bezug auf die Rückwand (16) geneigt angeordnet sind, auf das externe Profilelement (8) hin konvergierend, um etwaiges Wasser und Kondensat zu der Sammelkammer (19) zu leiten.

7. Profilsatz nach Anspruch 5, dadurch **gekennzeichnet**, daß die Anlagerippe (21) eine im wesentlichen konvexe Wand aufweist, so daß Verformungen der Zähne (11) nur mit Variationen der Krümmung der Rippe (21) verbunden sind.

8. Profilsatz nach Anspruch 5, dadurch **gekennzeichnet**, daß mit dem internen Profilelement (7) zumindest ein U-förmiger Sitz (28) einteilig ausgebildet ist, der zum Aufnehmen einer Dichtung (43) oder einer selbstschneidenden Schraube (53) geeignet ist.

Revendications

1. Ensemble de profilés métalliques froids (1, 2, 3, 4, 5, 6), c'est-à-dire non isolés du point de vue thermique, qui peuvent être transformés en des profilés sans pont thermique (10, 20, 30, 40, 50, 60), c'est-à-dire isolés du point de vue thermique, particulièrement destinés aux cadres de portes et fenêtres, comprenant chacun un élément de profilé intérieur métallique (7) et un élément de profilé extérieur métallique (8) couplés l'un à l'autre par des parois de liaison (9),
caractérisé en ce que :
 - lesdites parois de liaison (9) sont faites en métal et comprennent des dents (11) liées auxdits éléments de profilé intérieurs et extérieurs (7, 8) par des lignes de moindre résistance (14) permettant de les rendre déformables, et des bandes (12) couplées auxdites dents déformables (11) par d'autres lignes de moindre résistance (13) permettant de les rendre amovibles, l'épaisseur desdites bandes (12) étant inférieure à l'épaisseur desdites dents (11),
 - lesdits éléments de profilé intérieurs et extérieurs (7, 8) sont dotés de cavités longitudinales (18) dont chacune est formée par l'une desdites dents déformables (11), par au moins une arête rigide (15) sensiblement parallèle auxdites dents (11) et par une paroi arrière (16) qui relie une dent (11) et une arête (15), et
 - ledit élément de profilé extérieur (8) comprend au moins une ailette d'arrêt (21) couplée à l'une au moins desdites parois arrière (16) par une patte de liaison (23) faisant saillie vers l'extérieur, de façon à former une chambre (19) d'aération et de récupération d'eau au voisinage de ladite ailette (21) et à minimiser la transmission des déformations desdites dents (11) à ladite ailette (21).
2. Ensemble de profilés selon la revendication 1, caractérisé en ce que ledit élément de profilé intérieur (7) comprend au moins deux cavités longitudinales (18) espacées d'une distance supérieure à celle dont sont espacées deux cavités longitudinales (18) correspondantes de l'élément de profilé extérieur (8), et lesdites bandes amovibles (12) sont inclinées par rapport à ladite paroi arrière (16) en convergeant vers ledit élément de profilé extérieur (8), de manière à évacuer toute l'eau et tout la condensation vers ladite chambre de récupération (19).
3. Ensemble de profilés selon la revendication 1, caractérisé en ce que ladite ailette de butée (21) comprend une paroi sensiblement convexe de sorte que des déformations desdites dents (11) ne provoquent que des variations de la courbure de l'ailette
4. Ensemble de profilés selon la revendication 1, caractérisé en ce qu'au moins un logement (28), en forme de U et apte à recevoir un joint d'étanchéité (43) ou une vis auto-taraudeuse (53), est intégré audit élément de profilé intérieur (7).
5. Ensemble de profilés sans pont thermique (10, 20, 30, 40, 50, 60), c'est-à-dire isolés du point de vue thermique, particulièrement destinés aux cadres de portes et fenêtres, comprenant chacun un élément de profilé intérieur métallique (7) et un élément de profilé extérieur métallique (8) couplés l'un à l'autre par des barres isolantes (29) logées dans des cavités longitudinales appariées (18) d'un élément de profilé intérieur (7) et d'un élément de profilé extérieur (8),
caractérisé en ce que :
 - chaque cavité longitudinale (18) est formée par une dent déformable (11), par au moins une arête rigide (15) sensiblement parallèle à ladite dent (11) et par une paroi arrière (16) reliant une dent (11) et une arête (15), ladite dent (11) étant reliée à l'élément respectif de profilé intérieur ou extérieur (7, 8) par une ligne de moindre résistance (14) permettant de la replier plus facilement sur les extrémités (29a) desdites barres isolantes (29) afin de les pincer dans lesdites cavités (18) en laissant un espace d'air (17) entre elles, et
 - ledit élément de profilé extérieur (8) comprend au moins une ailette d'arrêt (21) couplée à l'une au moins desdites parois arrière (16) par une patte de liaison (23) faisant saillie vers l'extérieur, de façon à former une chambre (19) d'aération et de récupération d'eau au voisinage de ladite ailette (21) et à minimiser la transmission des déformations desdites dents (11) à ladite ailette (21).
6. Ensemble de profilés selon la revendication 5, caractérisé en ce que lesdites barres isolantes (29) sont inclinées par rapport à ladite paroi arrière (16) en convergeant vers ledit élément de profilé extérieur (8), de manière à évacuer toute l'eau et toute la condensation vers ladite chambre de récupération (19).
7. Ensemble de profilés selon la revendication 5, caractérisé en ce que ladite ailette d'arrêt (21) comprend une paroi sensiblement convexe de sorte que des déformations de ladite dent (11) ne provoquent que des variations de la courbure de l'ailette (21).
8. Ensemble de profilés selon la revendication 5, caractérisé en ce qu'au moins un logement (28), en

forme de U et apte à recevoir un joint d'étanchéité (43) ou une vis auto-taraudeuse (53), est intégré audit élément de profilé intérieur (7).

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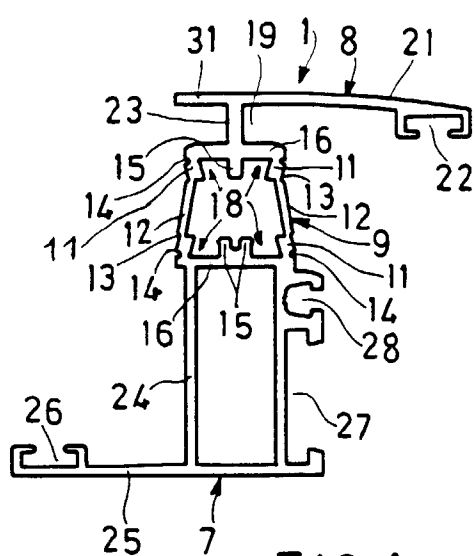


FIG. 1

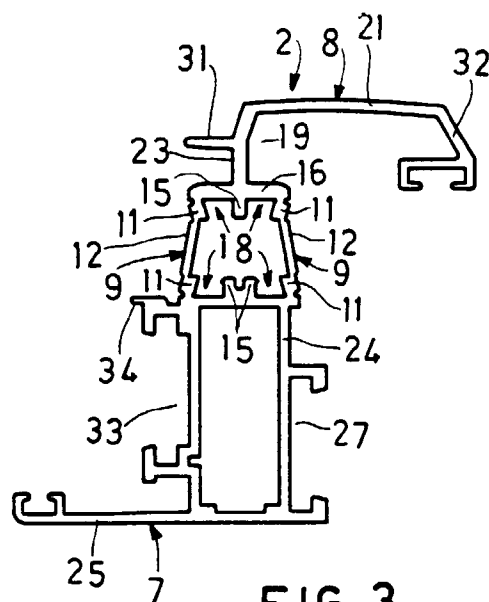


FIG. 3

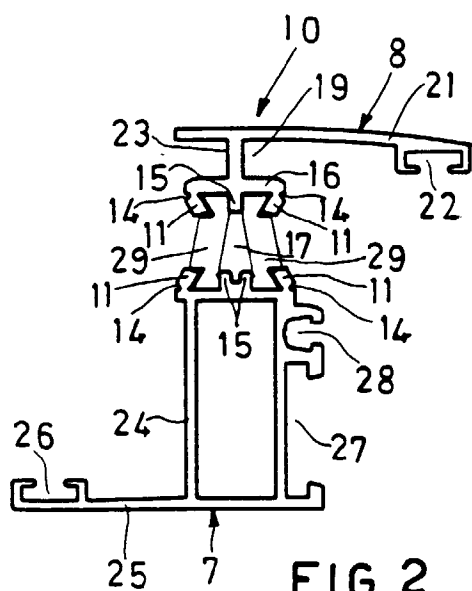


FIG. 2

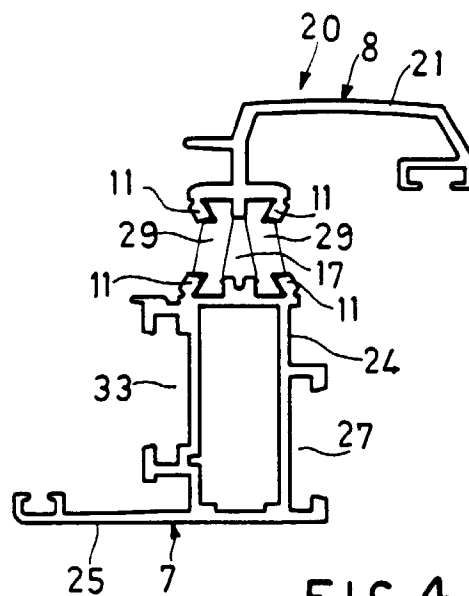


FIG. 4

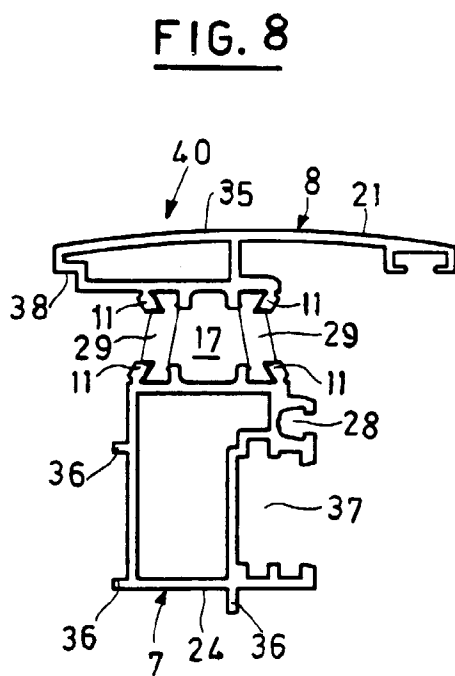
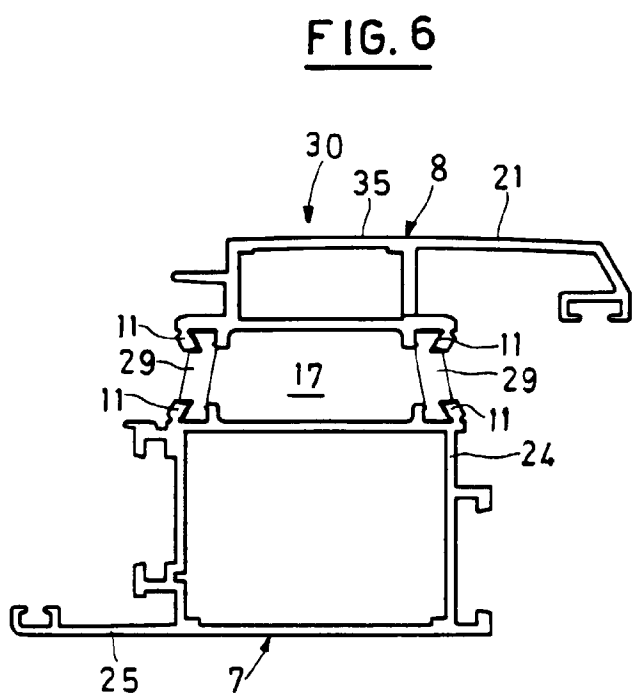
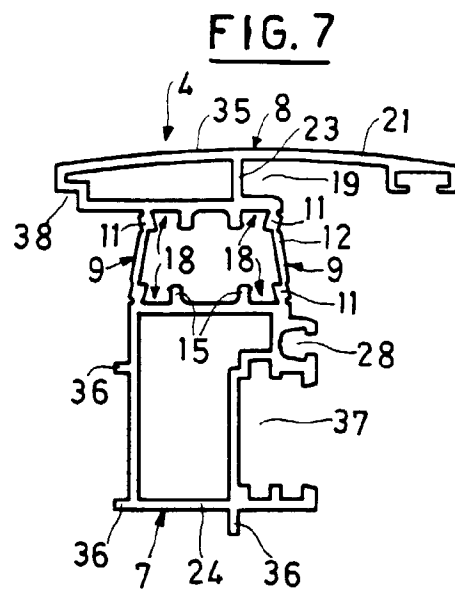
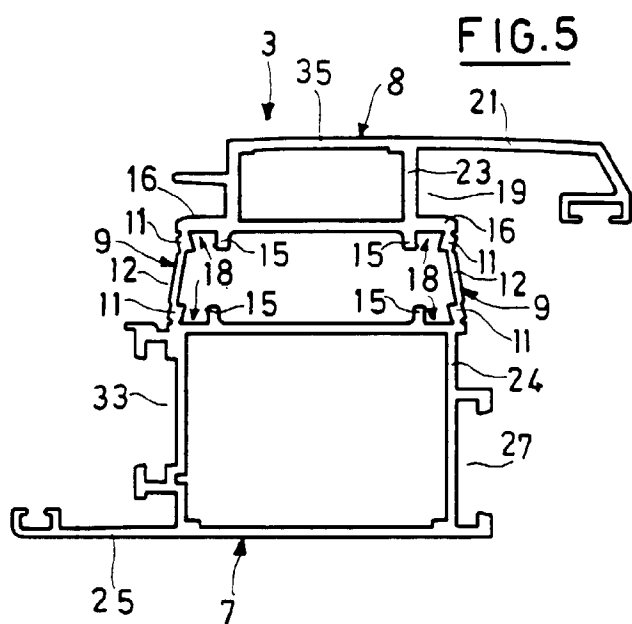


FIG. 9

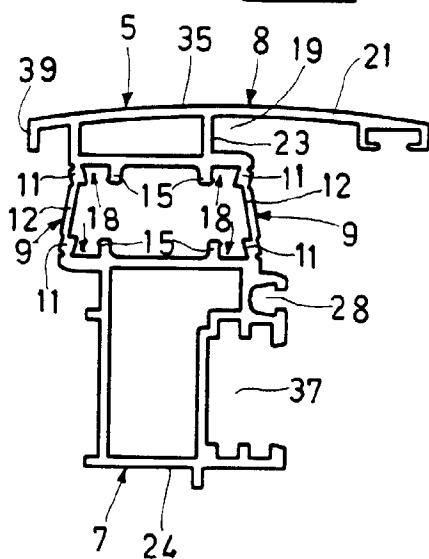


FIG. 11

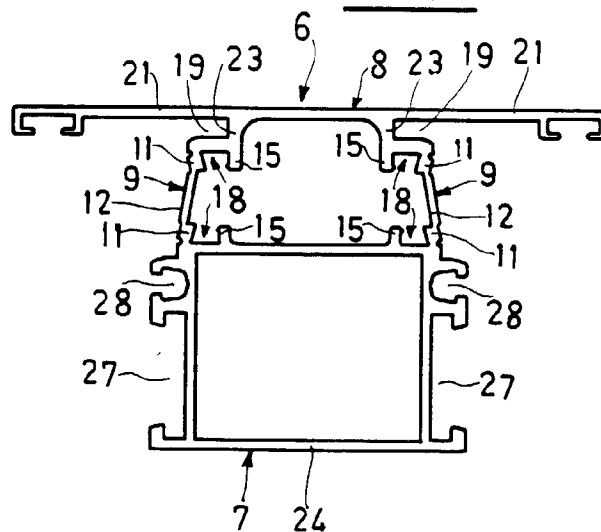


FIG. 10

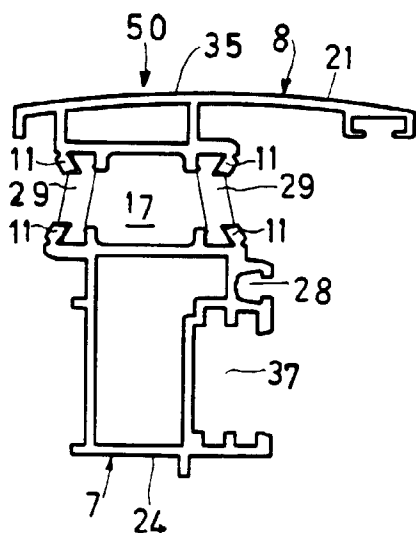


FIG. 12

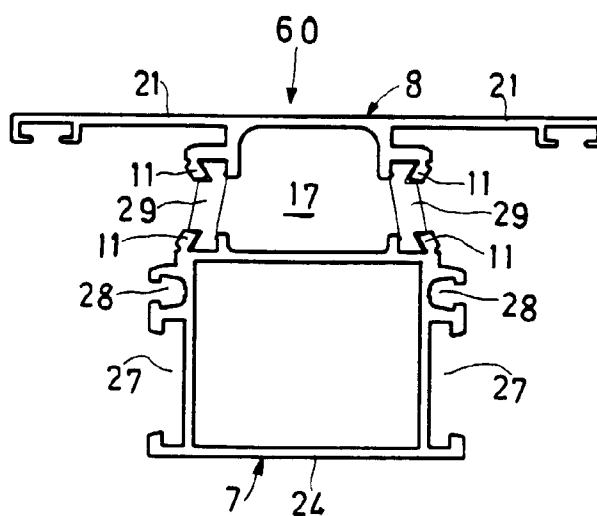


FIG. 19

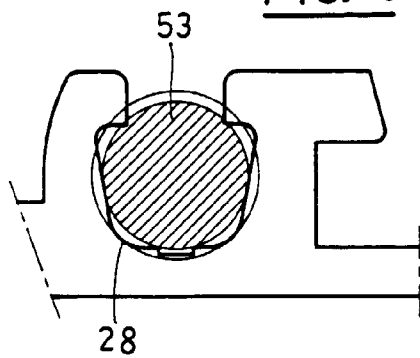


FIG. 13

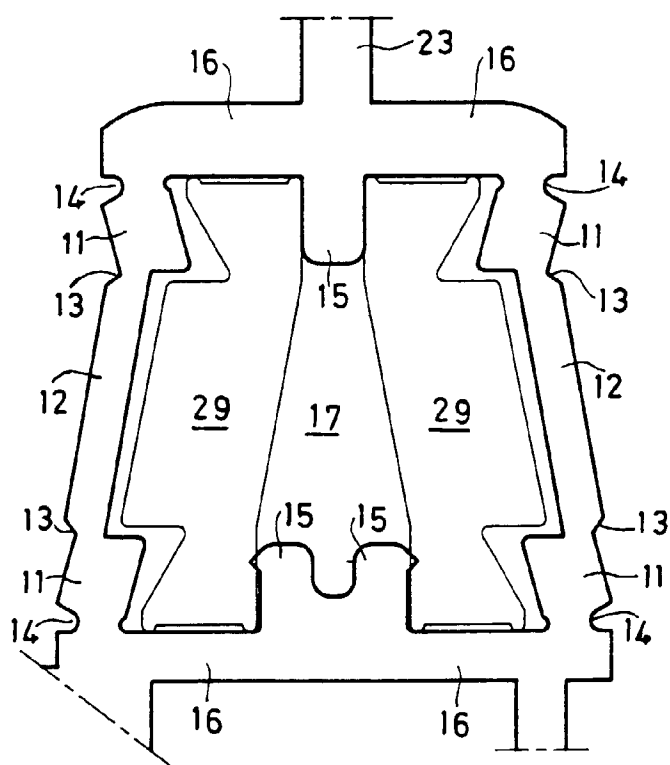
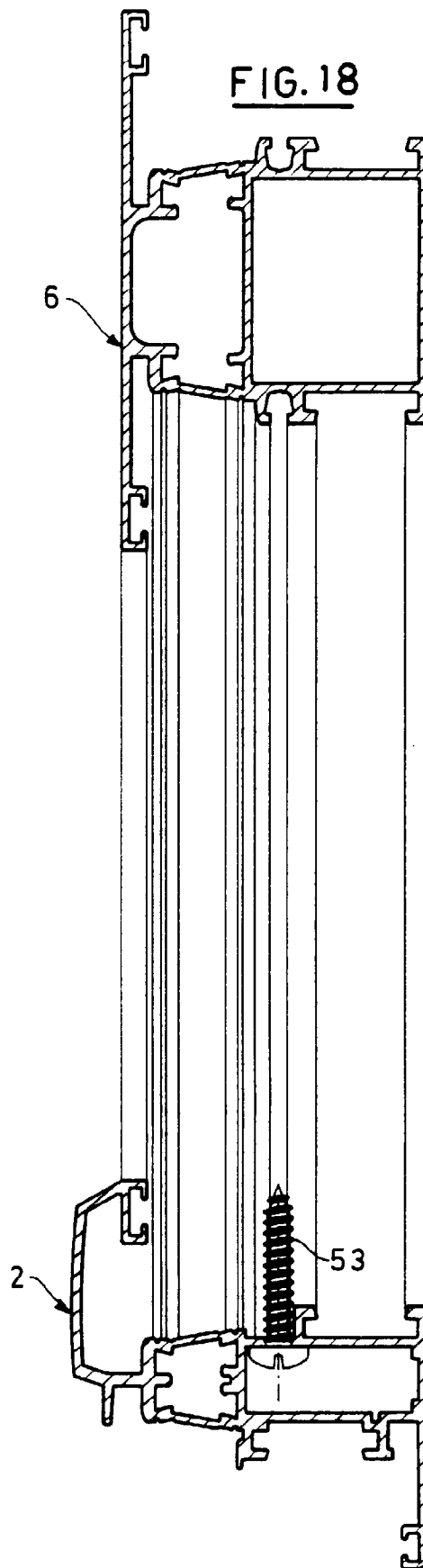


FIG. 18



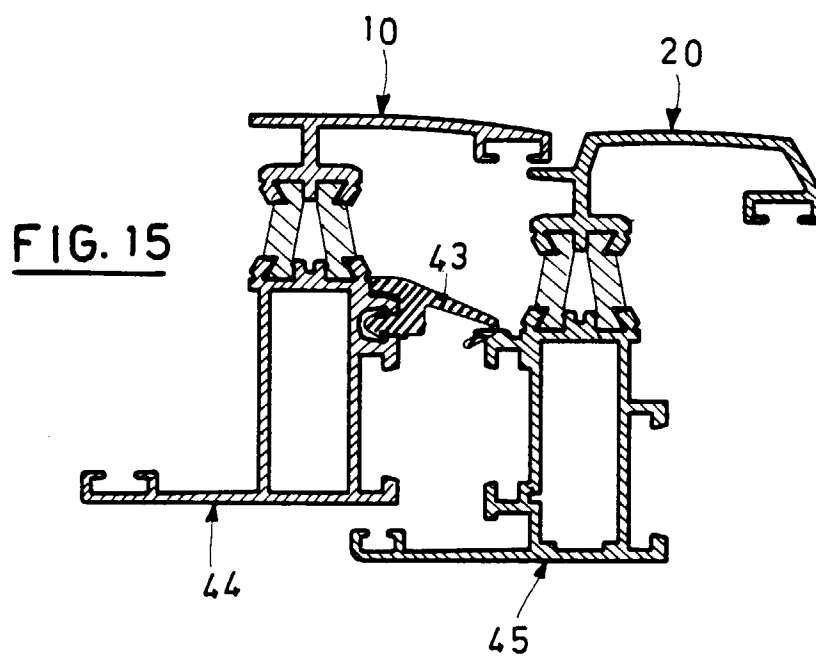
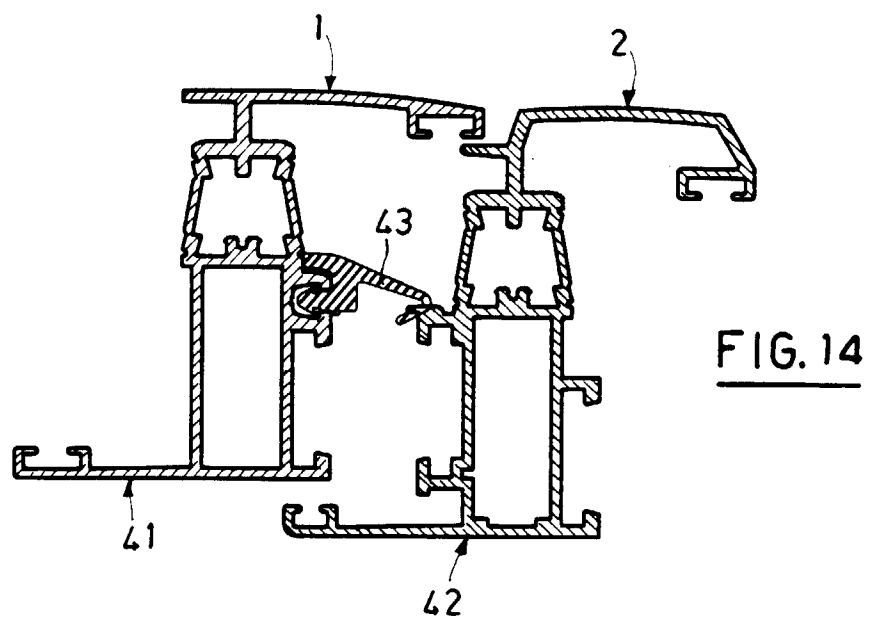


FIG. 16

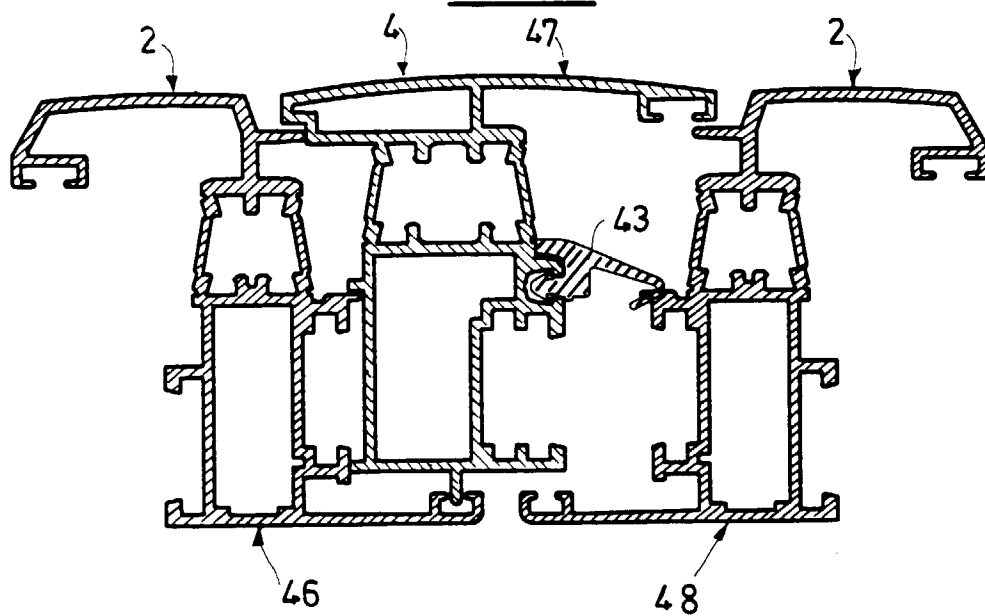


FIG. 17

