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(71) Applicant: **ALUMIX S.p.A.**
Piazza Marconi, 25
I-00144 Roma (IT)

(72) Inventor: **Accapezzato, Francesco, c/o Alumix S.P.A.**
Divisione Estrusi,
Via Marittima II KM 5600
I-04014 Fossanova LT (IT)

(74) Representative: **Trupiano, Roberto**
BREVETTI EUROPA S.r.l.
Piazza Bernini, 6
I-20133 Milano (MI) (IT)

(54) Set-squareconnecting structure for right-angle connections of metal sections for door- and window casings, frames and the like.

(57) Right-angle connecting structure for hollow sections cut at 45° for the realization of door- and window frames, casings and the like, utilizing a set-square composed of two flat and superposed angle bars inserted into the ends of said sections and provided with a tensioning dowel to allow teeth protruding from an angle bar to insert stably into eyelets obtained in the walls of said sections; said structure being provided with wedge-shaped means for driving and restraining said dowel during the screwing, for the shifting of the upper angle bar on the lower angle bar, and with plug-in hooking means, obtained transversally on the matching faces of said angle bars, suitable to prevent, during the tensioning of said dowel, the rotation and/or shiftings of the flanges of the upper angle bar relatively to the lower angle bar, and to allow the regular engagement of said teeth into the relevant eyelets and the safe and stable locking of the sections with one another.

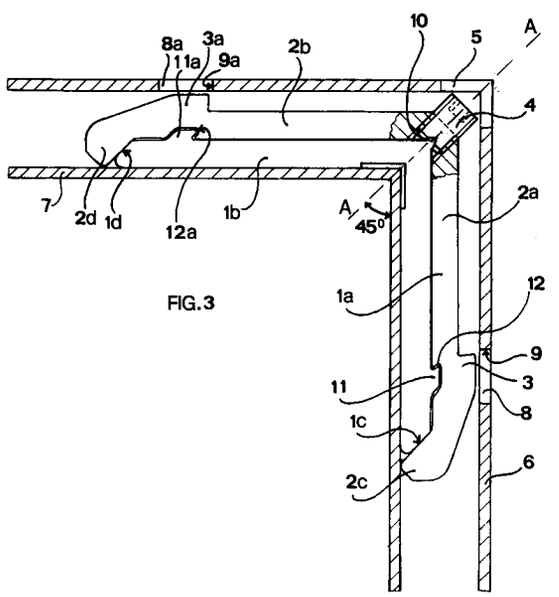

FIG.3

EP 0 644 312 A2

Object of this invention is to provide a set-square-shaped connecting structure, particularly suitable to realize stable right-angle connections of the ends of hollow metal sections utilized for door- and window frames, casings and the like.

As is known, the most widespread present technique for the 90° connection of hollow metal sections, utilized to produce door- and window frames and casings and similar structures, involves the cutting at 45° of the ends of each couple of sections to be connected at 90°, and their connection by means of couples of two-flange elements or bars, usually called set-squares, bent at a right angle relatively to one another; a couple of flanges is inserted into the end of a section and the other couple into the end of the other section to be connected to the first one, and then locked to one another and to the sections.

Generally, said set-squares are composed by two angle bars, constituted each by two flat bars, arranged at 90° and inserted into the sections in superposed position relatively to one another, until they are freely positioned against the opposing internal walls of the sections. The pressure-connection of the ends of the two sections is obtained by means of a screw, inserted in a hole obtained in the corner of the sections and positioned with its axis on the cutting plane of said sections.

Said screw engages only into the corner of the couple of bars which is superposed to the other couple.

By screwing said screw, the end of this heads towards a flat seat obtained in the corner of the two bars forming the lower angle bar, causing the slipping of the outermost couple of bars on the innermost ones (which are in touch with the opposing walls of the two sections); said slipping shifts the bars of the outermost angle bar towards the corner of the sections, which bars force a tooth or the like protruding from them to stable insert into an eyelet obtained in the external walls of the two sections; if the tensioning of the screw goes on, the two sections are pushed against one another, realizing in this way a stable connection.

In practice, as the two angle bars forming the connecting set-square are constituted by metal straps of different lengths, and precisely as the tensioning one, positioned on the lower one is tighter than the other one, the drawback creates that the screw, by operating on a flat seat of the corner of the lower angle bar, tends to cause the rotation of the flanges of the upper angle bar on those of the lower angle bar, which makes difficult the insertion of the teeth of the two flanges of the upper angle bar in the relevant eyelets obtained in the sections arranged at 90° relatively to one another, and as a consequence of this difficulty, the edges of the eyelets and the teeth for the insertion in same undergo deformations that may jeopardize the stability of the connection.

Object therefore of this invention is to provide a set-square connecting structure of the type composed of two superposed angle bars for the right-angle connection of hollow sections, so designed as to obviate the drawbacks shown by the known types of set-squares, with no need for particular and/or expensive changes in the shape of said angle bars.

Another object of this invention is to realize a set-square of the above specified type, whose structure is such as to require neither modifications nor special arrangements in the eyelets of the sections and in the hooking teeth protruding from the upper angle bar which will translate on the lower one.

These and still other objects, which shall be more clearly stressed by the following description, are obtained by a set-square connecting structure for the right-angle connection of the ends, cut at 45°, of hollow metal sections for door- and window frames, casings and the like, utilizing a set-square composed by two flat and superposed angle bars inserted into the ends of two adjoining sections, so as to tighten said ends to one another through a tensioning screw and the hooking of teeth protruding from the set-square into eyelets or windows obtained in the outer part of the sections to be connected to one another, which structure comprises, according to this invention, substantially wedge-shaped means having the function of guiding and restraining said screw, interposed between the corner of the lower angle bar and the end of the tensioning screw positioned as an engagement means on the corner of the upper angle bar and operatable through a hole obtained in the corner of the right-angle joined sections, as well as plug-in hooking means obtained, in the perpendicular direction relatively to the axis of the sections, on the faces in touch with one another of the two superposed angle bars suitable to prevent the rotation, during the tightening of the screw, of the flanges of the upper angle bar relatively to those of the lower angle bar, ensuring in this way the regular hooking of said teeth of the upper angle bar into the corresponding eyelets of the sections and the perfect positioning and locking of the ends of said sections between one another.

More particularly, said plug-in hooking means of said angle bars are constituted by at least a rib or projection obtained, in the direction perpendicular to the axis of the sections to be connected, on the flanges of the lower angle bar, and by at least a corresponding groove obtained in the adjoining face of the flanges of the angle bar subject to tensioning by means of said screw, the coupling of said ribs and the corresponding grooves being

realized with a clearance to allow, during the tightening of said screw, the necessary shiftings of the angle bar towards the connection corner of the sections and the hooking of the teeth of said angle bar into the eyelets of said sections.

Besides, said guiding and restraining means for said tightening screw are constituted by a substantially conic element protruding from the corner of the lower angle bar and inserted into a corresponding conic hollow space obtained axially in the ends of said screw.

Further characteristics and advantages of this invention shall be more clearly shown by the detailed following description of one of its possible embodiments, made with reference to the attached drawings, which are given by way of mere indications, wherein:

Fig. 1 shows, in perspective view, a set-square of a known type for the angle connection of hollow metal sections;

Fig. 2 shows, in section and on a greater scale, the known set-square of Fig. 1, inserted into the ends of two sections to be connected to one another, while

Fig. 3 shows, always in section, the set-square connecting structure, realized according to the invention and inserted on two sections right-angle approached to one another.

With reference to Figs. 1 and 2, a traditional set-square for the right-angle connection of two hollow sections whose ends are cut at 45° is substantially constituted as illustrated, by way of example, in Fig.1 Said set-square is constituted by two components superposed to one another and realized starting from flat metal bars, bent both at right angle, so as to realize two angle bars superposable to one another. The more extended angle bar, indicated by 1, has equal flanges 1a and 1b and flat opposing surfaces, while the upper angle bar, globally indicated by 2 on Fig. 1, has a shorter width, and its two flanges 2a and 2b are provided each with a protruding tooth 3 and 3a (whose function will be clarified in the following) and, at the ends, with a part 2c and 2d arched and angularly levelled, so as to remain in touch with the ends, also levelled, 1c and 1d of flanges 1a-1b of the lower angle bar.

Besides, on the corner of the upper angle bar 2, a threaded hole is obtained, whose axis is orientated at 45° relatively to the flanges, in which a threaded dowel 4 (capstan screw or the like) whose end is flattened and rests on a similar levelled surface 4a obtained on the corner of the lower angle bar 1 (Fig. 2); said dowel 4 is inserted through a hole 5 obtained in the connection corner between the two sections 6 and 7 to be connected to one another at 90°. Lastly, said sections are provided with a wide opening or window 8 and 8a respectively to stably house teeth 3 and 3a of the upper angle bar 1 during the screwing of said dowel 4, as will be better clarified in the following.

The locking of the two sections 6 and 7 is carried out by inserting the two angle bars 1 and 2 between the ends of the sections, kept spaced out and then approached at 90°, so that angle bar 1 rests on the internal wall of section 6, as illustrated on Fig. 2, and then, by screwing dowel 5 which, being engaged with a threading obtained only in the corner of the upper angle bar 2 (Fig. 1) and heading with its end towards plane 4a of the lower angle bar, causes the upper angle bar to shift towards the right angle formed by the two sections.

During the screwing of the dowel, the arched ends 2c and 2 d of the flanges 2a-2b of the upper angle bar 2, slitting on the planes indicated by 1c-1d of the lower angle bar 1, cause flanges 2a-2b to get near the internal wall of sections 6-7, until teeth 3 and 3a insert into eyelets 8-8a of said sections. By thoroughly tightening dowel 4, said teeth engage against edge 9-9a of the eyelets, ensuring in this way the approaching and stable connection of the angle bar ends of the two sections.

The utilization of this type of set-square composed by two angle bars has, in practice, the drawback that, during the screwing of the dowel, the flanges 2a and 2b of the upper angle bar tend to rotate relatively to the flanges of the lower angle bar, due to the lack of a guiding system such as to allow flanges 2a-2b to shift only axially relatively to the sections, i.e. without side shiftings. This rotation involves, as said in the premisse, damages to the edges of the teeth and truing difficulties between teeth and eyelets, i.e. drawbacks which may even cause an imperfect connection of the sections.

According to this invention, to obviate these drawbacks, the set-square illustrated on Fig. 1 is substantially modified, i.e. realized as illustrated on Fig.3. The shape and size (according to the type of sections to be right-angle connected) of the two angle bars 1 and 2 is substantially unchanged; the improvements which allow to prevent the aforementioned drawbacks consist, first of all, in providing, instead of the levelling 4a (Fig. 2) of the corner of the lower angle bar 1, a protruding guide element 10, having substantially a truncated-cone shape, suitable to freely house a corresponding conic hollow space obtained in the end of threaded dowel 4. The conic coupling reduces frictions during the tightening of the dowel, reducing at the same time the tendency to rotate of the upper angle bar relatively to the lower one.

Besides, always according to the invention, to ensure a translation without rotation of angle bar 2 towards the connection corner of the sections, a transversal rib 11-11a is obtained on the face of flanges 1a-1b of the lower angle bar, said rib being

slightly bent towards the corner and suitable to remain inserted, with a slight clearance, in a corresponding groove 12 and 12a obtained in the face of flanges 2a-2b of the upper angle bar 2.

Therefore, during the screwing of dowel 4, as the mobile angle bar 2a remains always loosely hooked with the lower angle bar through the fittings 11-12, it cannot undergo angular shiftings relatively to the lower angle bar and the sections; in this way, the hooking of teeth 3-3a in eyelets 8-8a of the sections is ensured, as is ensured the stable mutual hooking of the ends of said sections when teeth 3-3a engage with the upper edge 9-9a of the respective eyelets 8-8a.

Said transversal ribs 11-11a may have a length equal or even shorter than the width "L" of the lower angle bar 1, while also more ribs may be provided which engage with as many grooves of the mobile angle bar 2.

Lastly, it is obvious that the dimensions and the materials utilized may change according to the size of the hollow space of the sections, without exceeding the protection scope of this invention as described hereabove an claimed hereafter.

Claims

1. Set-square connecting structure for the right-angle connection of the ends, cut at 45°, of hollow sections for door- and window frames, casings and the like, utilizing a set-square composed by two flat and superposed angle bars, inserted in said ends of the sections and provided with a tensioning dowel, so as to realize the stable tightening of said ends through the hooking of teeth protruding from the upper angle bar into eyelets obtained in the walls of the sections, characterized in that it comprises substantially wedge-shaped means having the function of guide and restraint for said screw, interposed between the corner of the lower angle bar and the end of the tensioning screw placed as an engament means on the corner of the upper angle bar and opereratable through a hole obtained in the corner of the right-angle-approached sections, as well as plug-in hooking means obtained, perpendicularly to the axis of the sections, on the faces in touch with one another of the two superposed angle bars, suitable to prevent the rotation, during the tensioning of the screw, of the flanges of the upper angle bar relatively to those of the lower angle bar, ensuring in this way the regular hooking of said teeth of the upper angle bar into the corresponding eyelets of the sections and the perfect positioning and locking between one another of the ends of said sections.

2. Connecting structure according to claim 1, characterized in that said hooking means between said superposed angle bars are constituted by at least a rib or continuous projection, obtained transversally on the flanges of the lower angle bar, enaged with at least a corresponding groove obtained on the flanges of the upper angle bar subject to tensioning, the coupling between said ribs and the relevant grooves being realized with a clearance to allow, during the tensioning of said dowel, the shifting of the upper angle bar and the ensuing hooking of said teeth in the respective eyelets.

3. Connecting structure according to claim 1, characterized in that it provides for guide and restraint means for said tightening dowel, constituted by a substantially conic protrusion, protruding from the lower angle bar and inserted into a corresponding conic hollow space obtained in the ends of said dowel.

4. Connecting structure, according to claim 1, characterized in that said transversal ribs are obtained on the flanges of the translatable angle bar and the corresponding eyelets on the flanges of the lower angle bar.

5. Structure according to the above claims, characterized in that it is realized in view of the aforementioned objects and utilizations, according to what has been described and illustrated.

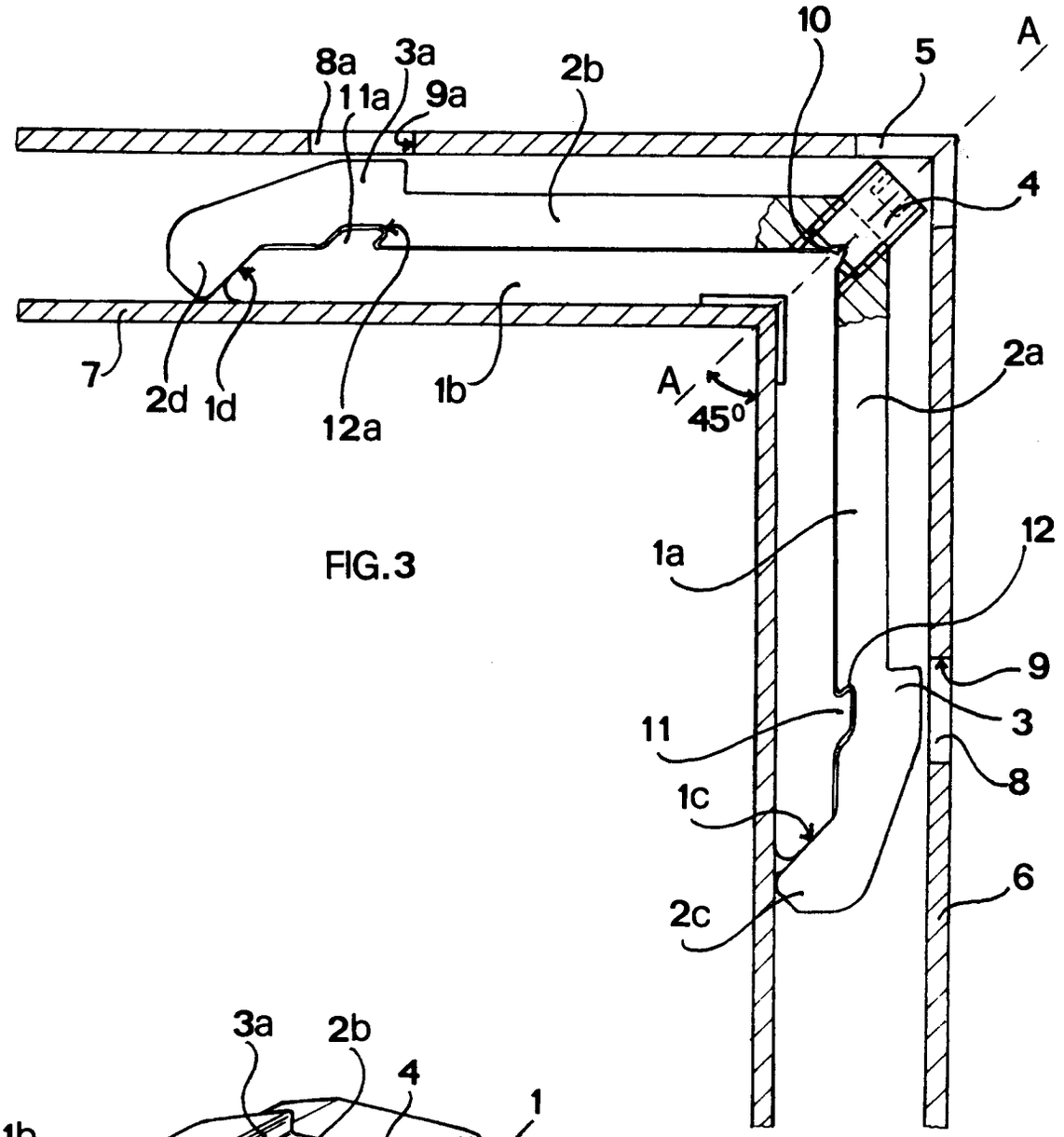
10
A
8a
3a
11a
9a
2b
5
4
7
2d
1d
12a
1b
A
45°
2a
1a
12
9
11
3
8
1c
6
2c

FIG.3

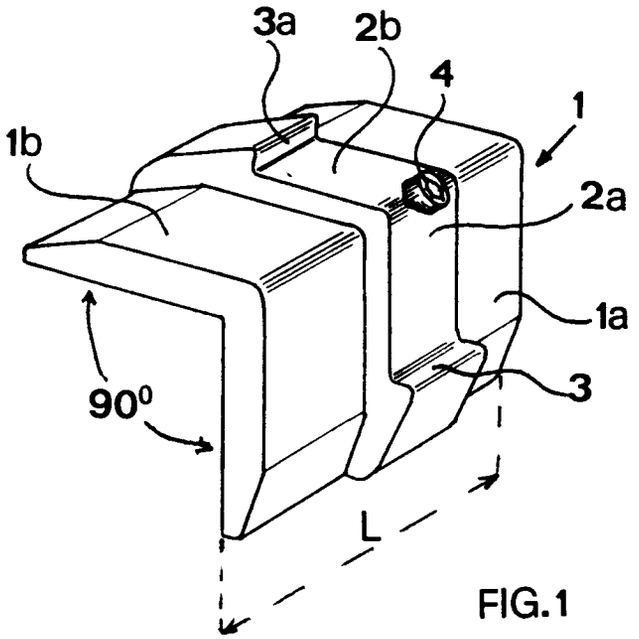
3a
2b
4
1
1b
2a
1a
90°
3
L

FIG.1

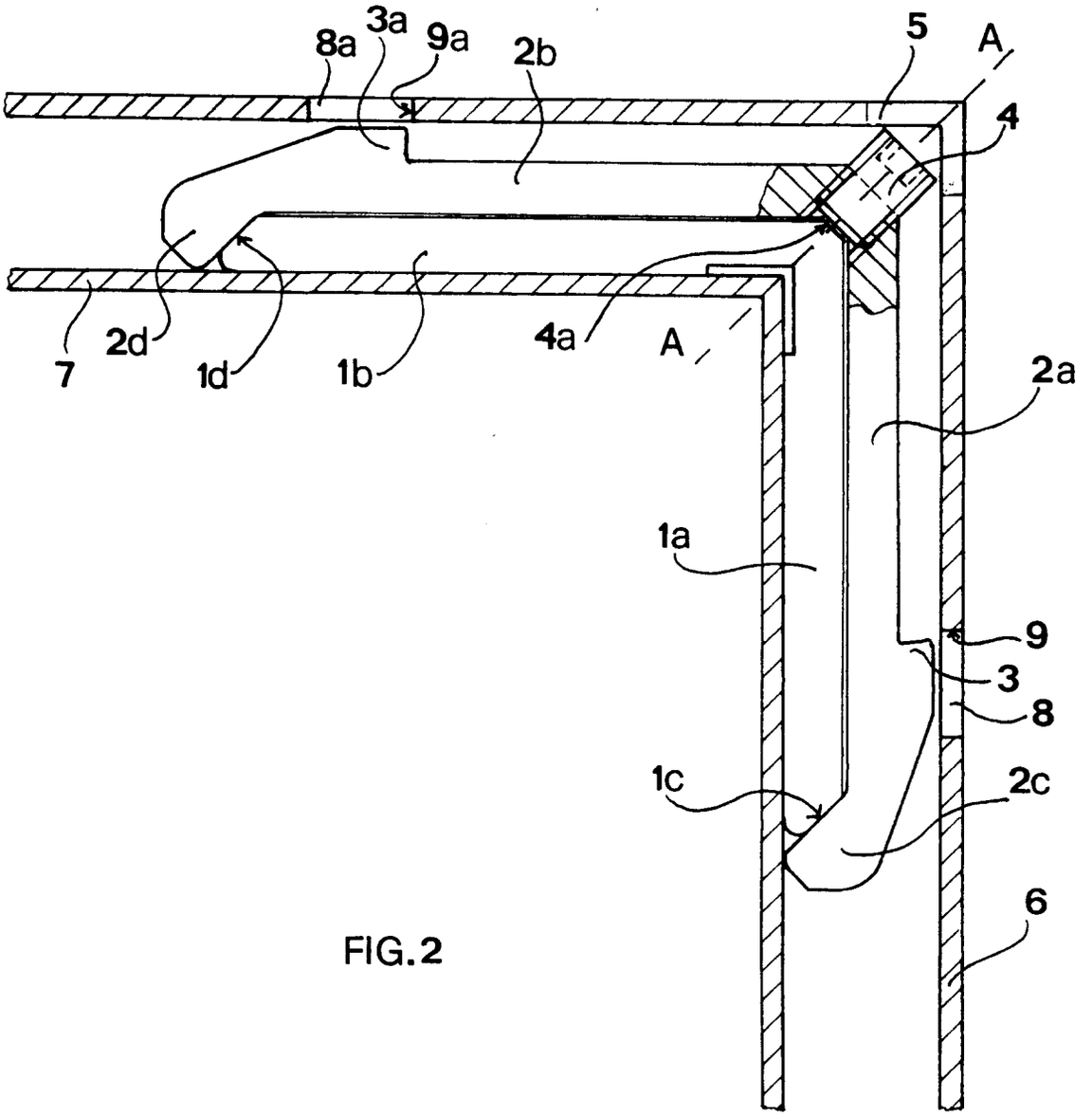

FIG.2