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(54) Joint for structural connection of tubular section bars, in particular for the construction of casings.

(57) A joint (1) for structural connection of section bars (2,3), in particular for window or door casings wherein a first section bar (2) is provided with a longitudinal groove (4) and a second section bar (3) is oriented transversely to the first section bar (2) and opposes its free end (5) to the groove (4), comprises an elastically deformable connecting body connecting the section bars (2,3), is fitted with hook-shaped adjacent ends (7a, 7b), and projects the hook-shaped ends (7a,7b) from the free end (5) of the second section bar (3) towards the groove (4), engaging them in sliding coupling therewith. The joint (1) further comprises a single screw (8) which connects to the second section bar (3) the connecting body (6) and which engages with the body (6) in a way able to cause, upon tightening, the forcing of the hook-shaped ends (7a,7b) into the groove (4) thereby inhibiting the relative sliding of the section bars (2,3).

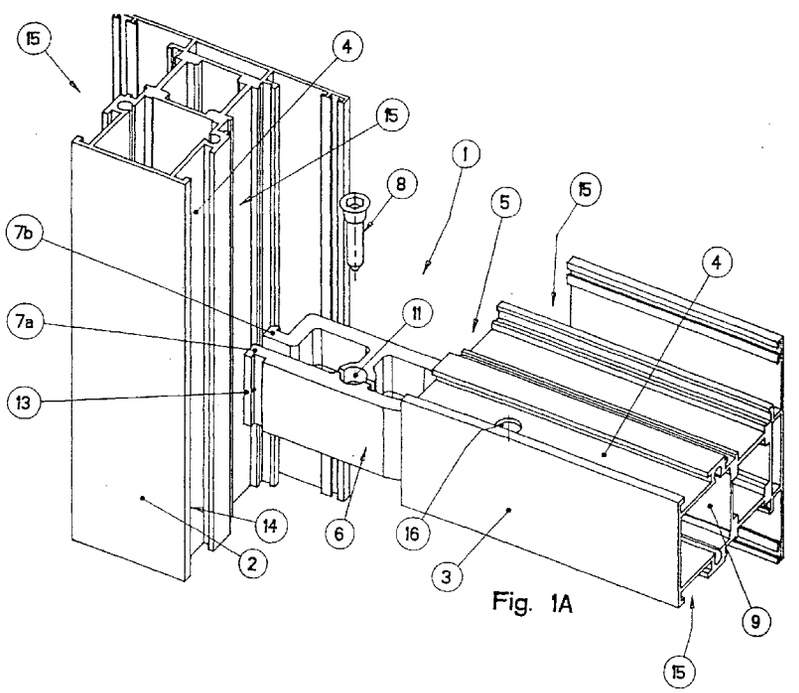

Fig. 1A

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Description

The present invention relates to a joint for the structural connection of section bars, in particular tubular ones, for the construction of metal casings.

In the construction of casings, such as doors or windows for buildings, widespread use is made of structural frames, which are obtained through the connection of rectilinear elements of tubular bars, produced with particular profiles of their cross section.

The connections between the various elements are obtained by means of connecting joints, usually of a removable type, prefabricated according to wide ranges of different shapes.

In the specific case of the connection of the vertical elements (posts) and of the intennediate horizontal elements (crosspieces) of the frame, T connections are set. These are obtained by means of connecting bodies that allow to connect first vertical section bars, uninterrupted, which constitute the posts of the frame, with second section bars which are instead set horizontally between the posts and are connected with their head to the sides thereof.

In the construction of the frame, the connecting bodies of the joints are first fastened to the opposite ends of the crosspiece and subsequently fastened to the posts of the frame. To allow these operations, the connecting bodies are structured in such a way as to provide for distinct connecting means destined to operate respectively with the crosspiece and with the post.

The fastening means that operate between connecting body and crosspiece are structured in various ways. Some known embodiments, some of which are manufactured by the Applicant itself, provide for elastically snapping push buttons which engage into holes in the crosspiece, or adopt mechanical expansion systems obtained by means of wedges driven by screws.

The fastening means that operate instead between connecting body and posts are in all known cases constituted by screws. These are inserted, through holes obtained on the post, from the side of the post that is opposite to the one engaged by the crosspiece.

Such joints present some disadvantages, whereof the main one is represented by the fact that the position in height of the crosspiece is determined univocally by the position of execution of the hole (or holes) made on the posts. In other words, if a positioning error is made, or if the height position of the crosspiece is to be modified deliberately, it is necessary to make a new series of holes on the posts of the frame to house the screws fastening the connecting body and the posts.

Another disadvantage of prior art joints is further represented by a certain constructive complexity, deriving from the presence of a dual system of means for fastening the connecting body with crosspieces and posts which entails a correspondingly high manufacturing cost of the joint.

The object of the present invention therefore is to eliminate these drawbacks by means of a joint of the kind mentioned above wherein the height position of the crosspiece can be modulated with the utmost freedom and wherein the definitive locking in place of the crosspiece is simpler and quicker.

According to the invention this object is obtained by means of a joint for structural connection of the type indicated in the preamble of claim 1, wherein the connecting body is monolithic and expansible by elastic deformation, is provided with hook-shaped adjacent ends and projects these ends from a free end of the section bar that constitutes the crosspiece of the frame, towards an opposite groove possessed by the section bar that constitutes the post. The connecting body comprises a single screw, tightening which allows to deform the connecting body in such a way as to fasten it rigidly to the crosspiece and simultaneously to force the hook-shaped ends into the groove of the post, thereby inhibiting relative sliding between post and crosspiece.

A joint realised according to the invention has numerous advantages. Since the conjunction of the connecting body is performed along a groove normally present in the section bar, which extends with continuity for the entire length of the post, the joint allows the possibility of modulating in an adjustable manner the position in height of the crosspiece.

Moreover, since there is only one screw, located in correspondence with the crosspiece, locking the crosspiece is easy, immediate and convenient and requires no preliminary work on the post, with evident advantages in terms of costs and of the speed of construction of the frame.

Since the side of the post that is opposite to the one engaged by the crosspiece is totally free of the presence of fastening organs, the joint according to the invention allows the possibility to realise cross-shaped joints as well, obtained by connecting two crosspieces to the two sides of the same vertical post.

The joint according to the invention therefore has the advantage of allowing the possibility of being employed indifferently for the realisation of angle connections, of T connections and of cross connections, revealing advantageous characteristics of multi-functionality.

The realisation of the connecting body in a single, U-shaped piece, between whose arms the connecting screw operates, allows the advantage of a considerable constructive simplification which makes the joint very economical to produce.

The screw is fitted with a truncated cone collar housed in a complementary cavity of the connecting body which is offset with respect to the collar. By appropriately choosing the size and the orientation of the offset, this feature allows the screw to exert, upon being tightened, a thrusting action tangential to the crosspiece which allows, with the same tightening operation, also to approach the latter to the post with which it is connected.

One of the hook-shaped ends further presents a

cusp-shaped projection jutting towards a wall of the groove of the post not involved with the sliding of the connecting body. This project in no way hinders the adjustment of the crosspiece; however when the screw is tightened, it produces a pennanent impression on the wall wherein the projection remains stably engaged after the joint is locked in place. This characteristic has the effect of producing an increase in the stability of the fastening of the crosspiece on the post, which allows the crosspiece to support in total safety even very heavy glass panes.

The technical characteristics of the invention, according to the aforesaid objects, are readily apparent from the content of the claims reported below and its advantages shall be made more evident in the detailed description that follows, made with reference to the accompanying drawings which show an embodiment provided purely by way of non-limiting example, in which:

- Figures 1A and 1B are perspective overall views of a joint according to the invention represented axonometrically respectively in an exploded configuration and in a fully mounted configuration;

- Figure 2 is a perspective, axonometric view of a connecting body of the joint;

- Figures 3, 4 are respectively a front view, a side view of the connecting body in Figure 2;

- Figure 5 is a section view of the connecting body obtained according to the line V-V in Figure 3;

- Figures 4A, 6 and 7 are partial views of some details of the connecting body shown in enlarged scale;

- Figure 8 is an overall perspective view of a screw that is engaged with the connecting body as per the previous figures.

In accordance with Figures 1A and 1B of the accompanying drawings, the number 1 indicates in its entirety a joint for the structural connection of tubular section bars 2,3, in particular destined to the construction of posts and crosspieces of metal frames for window and door casings.

Section bars 2,3 present by way of non-limiting example identical geometry of the respective cross sections; they are provided in particular with a longitudinal groove 4, obtained on the respective side walls 15, which runs along the entire length of the section bars 2,3 without interruption; and lastly they are shown in Figures 1A and 1B with mutually orthogonal orientation able to identify a connection having essentially a "T" shape.

More specifically, a first section bar 2 shown vertically allows to obtain a post of the frame, the second section bar 3 which is oriented horizontally and opposes its free end 5 to the longitudinal groove 4 of the first section bar 2 instead exemplifies a crosspiece of the frame.

The joint 1 essentially comprises a connecting body 6 which is housed in a cavity 9 of the second section bar 3 (which constitutes the crosspiece) and which is fastened thereto by means of a single screw 8 which is engaged through a hole 16 obtained in a side wall 15 of the crosspiece.

The connecting body 6 is monolithic, presents preferably "U" shaped cross section (Figures 2 and 3) and its contour is essentially quadrilateral complementarily to the corresponding contour of the cavity 9 for housing the second section bar 3.

The connecting body 6 is further provided with anns 12a,12b essentially parallel and elastically deformable bearing, in correspondence with their respective adjacent terminal parts, ends 7a,7b with a hook conformation and shaped complementarily to the cross section presented by the longitudinal groove 14 of the post.

The connecting body 6 is further provided with a truncated cone shaped seat 11 defined in its entirety by the combination of two opposite component parts obtained on the two anns 12a, 12b (Figure 7).

The screw 8 (Figure 8) is provided with a truncated cone shaped collar 10 and a cylindrical stem 17. The screw 8 can be associated with the connecting body 6 in correspondence with a hole 18 destined to receive the stem 17. The hole 18 is offset with respect to the axis of the seat 1 1 by a certain distance indicated as "d" along a direction X of approach of the second section bar 3 (crosspiece) to the first section bar (see also Figure 5).

The joint 1 further comprises latching means operatively positioned between the hook-shaped ends 7a,7b of the anns 12a, 12b and the longitudinal groove of the first section bar 2.

In a preferable embodiment, such latching means are realised by a cusp-shaped projection 13 (Figures 4 and 4A)jutting from and borne by at least one of the hook-shaped ends 7a,7b towards an opposite wall 14 of the longitudinal groove 4 of the second section bar 3 (post).

The operation of the joint 1 is easily understandable starting from Figure 1A wherefrom it can be observed that the connecting body 6 is latched, manually by means of elastic snapping, to the longitudinal groove 4 of the first section bar 2 (post). This operation is made possible by the introduction into the longitudinal groove 4 of one 7a of the hook-shaped ends 7a,7b. Imparting to the first section bar 2 and to the connecting body 6 opposite angular rotations, as a result of the elastic deformability of the connecting body 6, it is possible to introduce into the longitudinal groove 4 also the other end 7b. Figure 6 also shows in particular that this second end 7b presents a chamfer 30 able to facilitate the insertion of the end 7b itself into the longitudinal groove 4.

At this point, the connecting body 6 remains associated to the longitudinal groove 4 in sliding coupling

with the possibility of being displaced manually along the longitudinal groove 4 itself into the desired position.

The second section bar 3 is then placed next to the first section bar 2 receiving within its cavity 9 the connecting body 6 whilst correspondingly the seat 11 and the hole 18 align themselves with the hole 16 of the second section bar (crosspiece). Once this alignment condition is reached, the hook-shaped ends 7a,7b of the connecting body 6 jut out from the free end 5 of the crosspiece towards the longitudinal groove 4 of the post remaining engaged therein in sliding coupling. After inserting, albeit partially, the screw 8 into the hole 18 and between the arms 12a, 12b, said arms 12a, 12b are moved away from each other and are pressed against opposite walls 14a of the longitudinal groove 4 of the first section bar 2.

Under these conditions, depending on the more or less marked engagement of the screw 8, a friction reaction is created whose intensity can be controlled at will and which allows to let the crosspiece slide with respect to the post, whilst maintaining stable the final position given, without any intervention by the operator who is assembling the frame.

Once the final position desired is reached, the screw 8 is tightened completely with the consequence of forcing the hook-shaped ends 7a,7b onto the walls 14a of the longitudinal groove 4 such as to cause the immobility of the crosspiece even under the weight of glass panes of considerable thickness and size.

The condition of immobility is assured by friction as well as by the presence of the cusp-shaped projection 13. The latter, after the screw 8 is tightened completely, makes an impression of corresponding shape on the opposite wall 14. The projection 13 and the impression containing it thereby create a geometric constraint which further contrasts the possibility of relative sliding of the crosspiece and of the post after the screw 8 is fully tightened.

By virtue of the offset existing between the collar 10 and the truncated cone shaped seat 1 complementary thereto, when the screw 8 is fully tightened the collar 10 and the seat 11 interact together in such a way as to push the second section bar 3 against the first section bar mutually forcing them against each other.

It should also be observed, lastly, that the interference of the screw 8 with the arms 12a,12b of the connecting body 6 causes also an elastic expansion of the connecting body 6 within the cavity 9 of the second section bar 3 which assures the cancellation of the mutual mounting backlash, rigidly fastening the connecting body 6 to the crosspiece itself.

The joint 1 according to the invention in addition to being of simple construction, low cost, and rapid mounting, also allows the possibility of constructing, without any sort of modification, cross connections, in alternative to the "T" shaped connection shown purely by way of example. This form of connection, though not shown in the figures, can easily be understood if one thinks of placing in Figure 1 B a second crosspiece on the wall 15 opposite to the one engaged by the crosspiece shown in the Figure.

The invention thus conceived can be subject to numerous modifications and variations, without thereby departing from the scope of the inventive concept. Moreover, all components may be replaced with technically equivalent elements.

Claims

1. Joint (1) for structural connection of section bars (2,3), in particular for the construction of window and door casings, in which casings a first section bar (2) is provided with a longitudinal groove (4) and a second section bar (3) is oriented transversely to the first section bar (2) and it opposes its own free end (5) to the longitudinal groove (4), the joint (1) comprising a connecting body (6) which mutually connects to each other said section bars (2,3), characterised in that the connecting body (6) is elastically defonnable, is provided with adjacent hook-shaped ends (7a,7b), and projects the hook-shaped ends (7a,7b) from the free end (5) of the second section bar (3) towards the longitudinal groove (4), said hook-shaped ends (7a,7b) engaging in sliding coupling along the groove (4); and in that it comprises at least one screw (8) which connects to the second section bar (3) the connecting body (6) and which engages with said connecting body (6) in a way able to cause, upon being tightened, at least the forcing of the hook-shaped ends (7a,7b) into the groove (4) thereby inhibiting their relative sliding and determining the mutual fastening of said section bars (2,3).

2. Joint, according to claim 1, characterised in that the connecting body (6) is contained in a cavity (9) of the second section bar (3).

3. Joint, according to claim 1, characterised in that the connecting body (6) has its contour complementary to the cavity (9) of the second section bar (3).

4. Joint, according to claim 1, characterised in that there is only a single screw (8).

5. Joint, according to claim 1, characterised in that the screw (8) is fitted with a truncated cone shaped collar (10) and in that the connecting body (6) presents a seat (11) whose shape is complementary to the collar (10), which seat (11) is offset with respect to the collar (10) along a direction (X) of approach of the second section bar (3) to the first section bar (2), said collar (10) and said seat (11) interacting with each other during the tightening of the screw (8) in a way able to push the second section bar (3)

against the first section bar (2) mutually forcing them.

6. Joint, according to claim 1, characterised in that the connecting body (6) presents elastically deformable arms (12a,12b) between which the screw (8) is inserted in a condition of interference with the arms (12a,12b) thereby causing them to move mutually away from each other.

7. Joint, according to claim 1, characterised in that it comprises latching means (13) which are positioned between the hook-shaped ends (7a,7b) and the groove (4) and are activated in correspondence with the tightening of the screw (8) in such a way as to contrast the relative sliding of the hook-shaped ends (7a,7b) along the groove (4).

8. Joint, according to claim 7, characterised in that the latching means comprise at least one projection (13) borne by and jutting from at least one of the hook-shaped ends (7a) towards an opposite wall (14) of the groove (4), the projection (13) producing on the wall (14) in correspondence with the tightening of the screw (8), a corresponding impression wherein the projection (13) remains engaged thereby contrasting said relative sliding.

9. Joint, according to claim 8, characterised in that said projection (14) presents cusp shape.

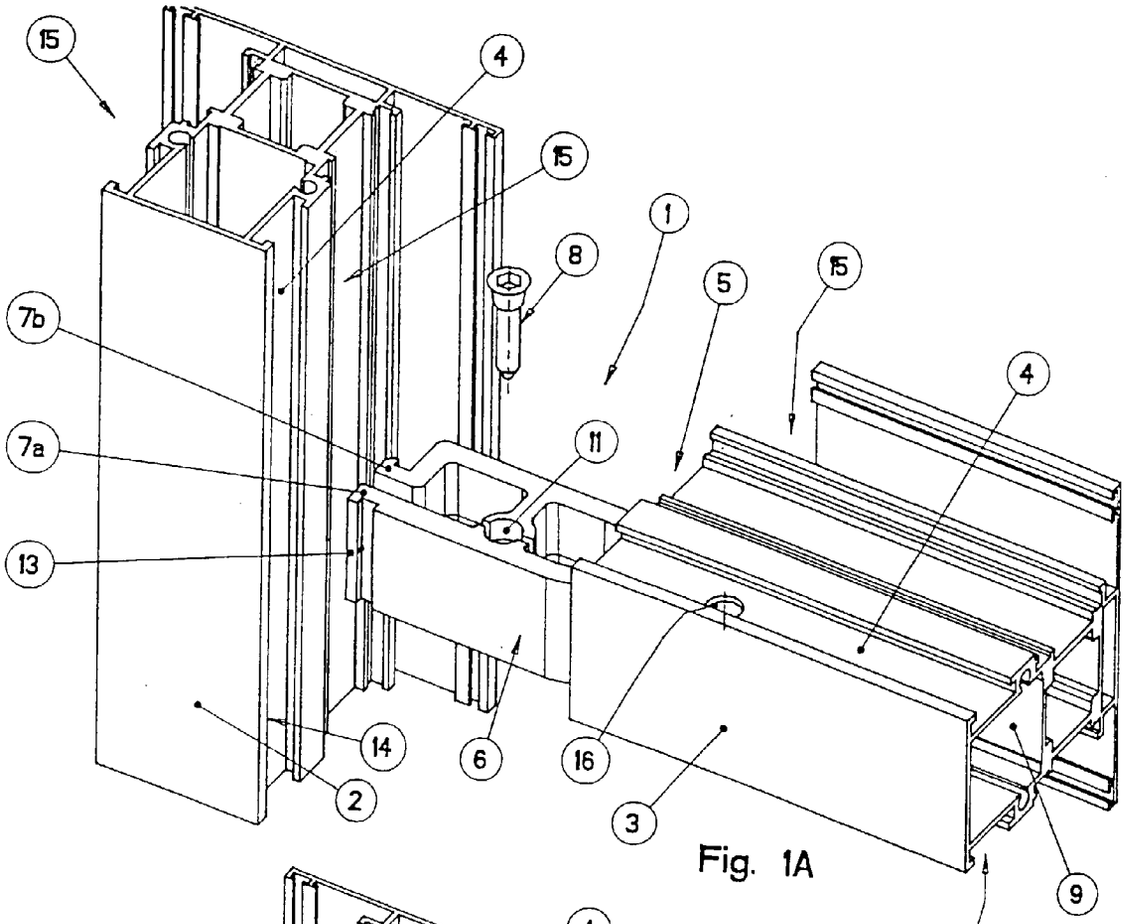
15
4
15
1
8
5
15
7b
4
7a
11
13
14
6
16
2
3
9
15

Fig. 1A

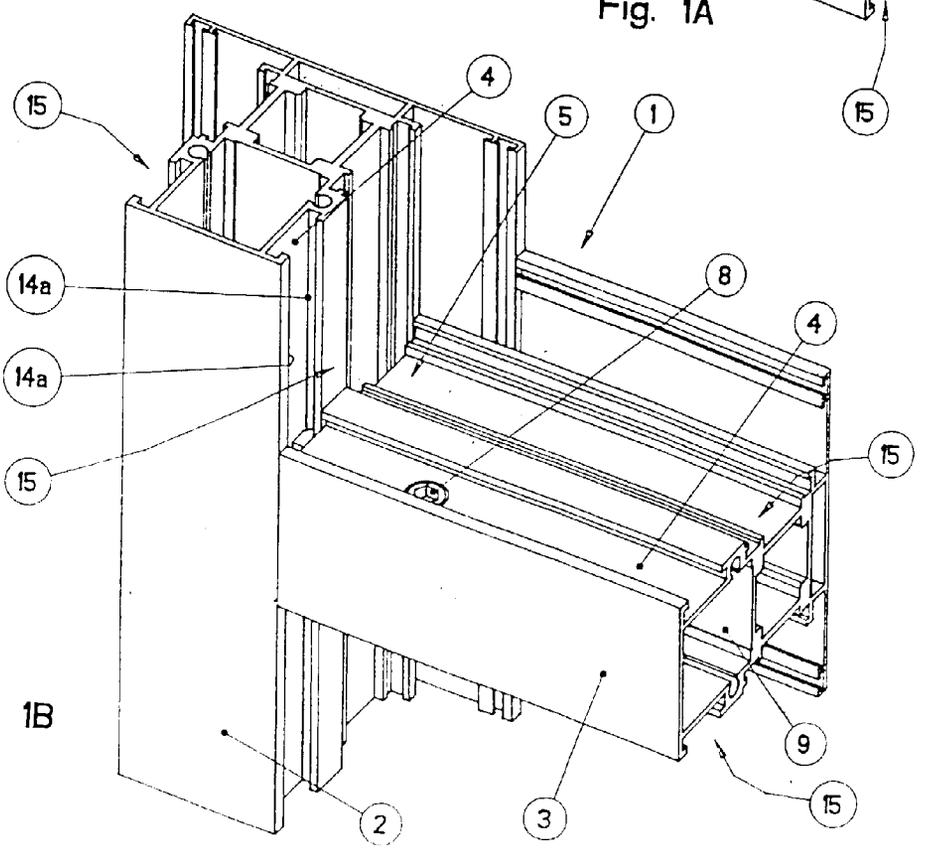
15
4
5
1
14a
8
4
14a
15
15
9
2
3
15

Fig. 1B

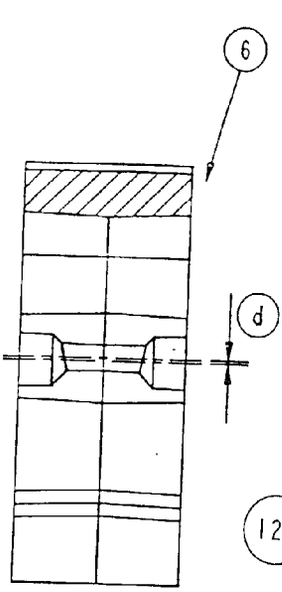

Fig. 5

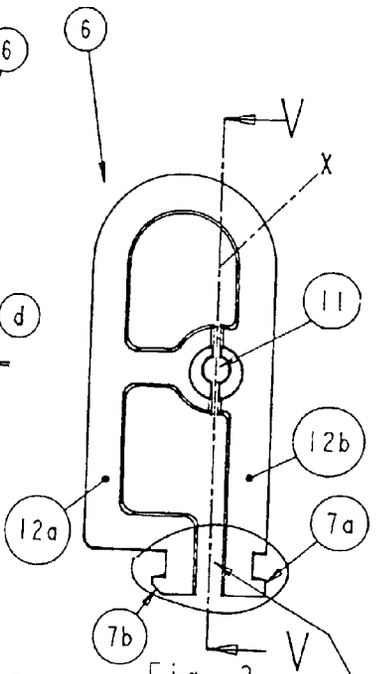

Fig. 3

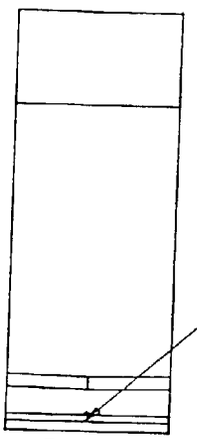

Fig. 4

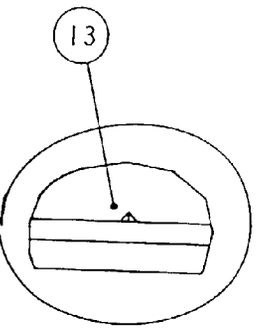

Fig. 4A

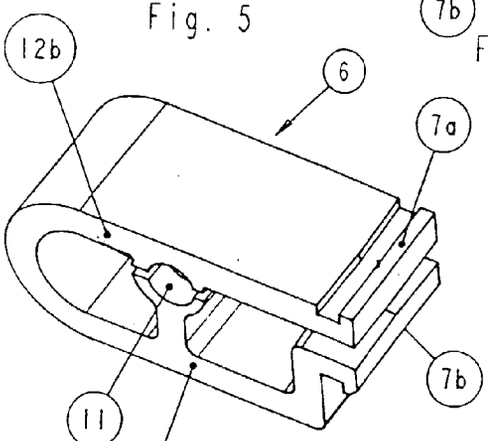

Fig. 2

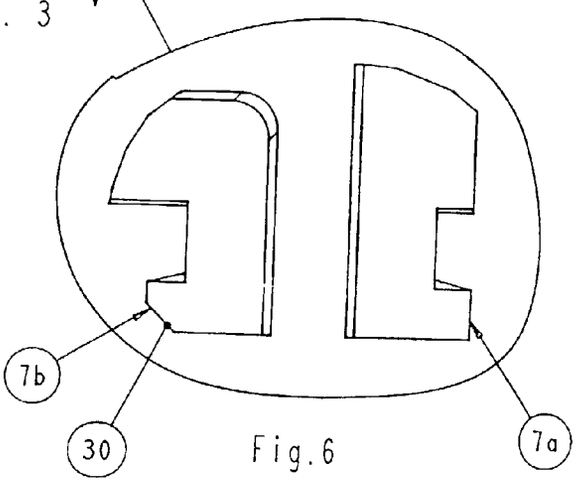

Fig.6

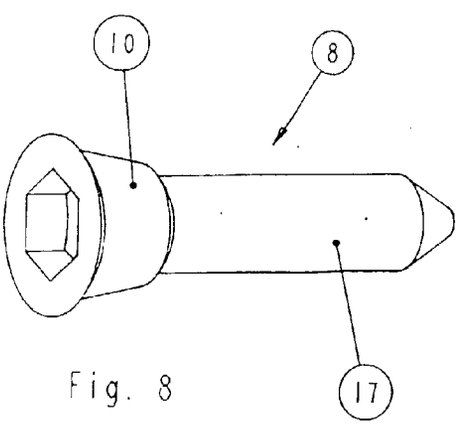

Fig. 8

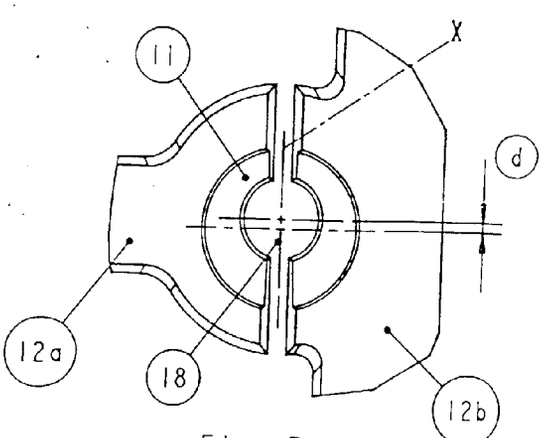

Fig. 7