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(54) **Suspension frame for a false ceiling**

Aufhängegerippe für eine aufgehängte Decke

Ossature de suspension pour faux plafond

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(56) References cited:
AT-A- 316 081
GB-A- 2 099 476
US-A- 3 292 332
US-A- 4 724 647
US-A- 5 241 799

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Description

The invention relates to a suspension frame for a false ceiling comprising main profiles that in cross-section have substantially the form of an inverted T, or a twofold T, in other words, a profile with a body and, in working position, at least at the bottom side two laterally veering flanges and cross-profiles with an analogous cross-section cooperating therewith.

False ceilings that use main profiles that intersect cross-profiles at an angle of 90° are known. The voids between said profiles are finished off with square, often rectangular panels. The originated pattern is thus always orthogonal. The realisation of ceilings differing from one of said orthogonal patterns is then, for technical and economical reasons, not or very difficultly feasible.

A structure for a false ceiling that exclusively allows the realisation of an orthogonal structure is known from the U.S. patent 3,292,332. On the other hand, a profile enabling to realise checkered grids is known from the document AT 316081, but the pattern can never deviate from the originally established shape.

The object of the invention is now to realise a suspension frame for such ceilings that enables to install cross-profiles at any angle in regard to the main profiles, so as to be able to use rectangular, gridded or trapezoidal shaped panels or combination thereof in the finishing of the ceiling too.

To render this possible according to the invention, the body of said cross-profile is extended at each extremity further than the flanges pertaining thereto and bent over an angle, while the main profile, in the area where one or more cross-profiles intersect the main profile at said angle, comprises grooves to lodge the extremities of cross-profiles.

In the most preferred embodiment, the angles at which the extremities of the body of the cross-profile are bent comprise 45°, respectively 135°.

A particularity of the invention is that the flanges pertaining to a cross-profile, which are placed underneath in working position, are smaller that the flanges pertaining to a main profile, in such a manner that the intersection between two cross-profiles that reach out towards each other at an angle of 45°, resp. 135° joins precisely the lateral edge of the flange of a main profile.

Characteristic of the invention is that the relation between the width A of a main profile and the width B of all cross-profiles comply to the equation $B=1/2A\sqrt{2}$.

Other details and advantages of the invention will appear from the following description of a suspension frame for a false ceiling according to the invention. This description is exclusively given by way of example and does not limit the invention. The reference numbers relate to the annexed figures.

Figure 1 is a lateral view of the portion of the main profile in the area where the grooves appear, intended to lodge the extremities of the converging cross-profiles.

Figure 2 is partly a top view and partly a cross-sectioning through a main profile and several converging cross-profiles.

Figure 3 shows a perspective view of the extremities of several converging cross-profiles and a portion of a main profile.

Figure 4 to 9 illustrate schematically several possible patterns to be realised by means of main- and cross-profiles according to the invention.

The suspension frame shown by these figures comprises the combination of main profiles 1, which comprise as usual a body 2 and two laterally extending wings 3. The main profiles, as incidently the cross-profiles that will be described too, therefor show the form of an inverted T. It is clear that a so-called twofold T could also be used.

In the body 2 of the main profiles 1, where one or more cross-profiles are to be fastened to the main profile, a series of grooves 4 are provided in order to lodge the extremities of cross-profiles (minimum one, maximum six).

The cross-profiles can be profiles 5, which are mounted orthogonally with respect to the main profile 1, or left and right cross-profiles that are to be mounted for example at an angle of 45° with respect to a main profile 1. Such left and right cross-profiles are indexed 6 and 7 in the figures 2 and 3.

The body of all these cross-profiles are prolonged by an extremity which extends into the core-axis of the body 2 of a profile 5. The extremity of a cross-profile 5 is indexed 5'. The extremities of the left and right cross-profiles 6 and 7 are indexed 6' and 7'.

The extremities 6' and 7' of the body 2 of a right and left cross-profile 6, resp. 7, are bent at an angle of 45° with respect to the body of such right and left profiles, but this angle could also comprise 135°.

All extremities of the different cross-profiles , i.e. the extremities 5', 6' and 7', display a slot 8 above, and a notch 9 at the bottom.

From the figures 1 and 2 it can be derived that the extremities 5', 6', 7' of the different cross-profiles, in the grooves or notches 4 of a main profile 1 alternatively left and right, fit next to each other in the grooves 4. In figure 2 one can see how the extremities of the different cross-profiles fit next to each other in the grooves 4 of a main profile 1, and how they can no longer dislodge from these grooves, owing to the presence of the brackets 8 and the notches 9.

In order to present a smooth junction of the different cross-profiles 5, 6, and 7 with the edge of the wings 3 of a main profile 1, these cross-profiles are cut out according to the desired angle. A cross-profile 5 that converges with two cross-profiles 6 and 7, can in turn also be cut out or not to concentrate into a point.

It will be noticed that the core-axis of all cross-profiles converging to a main profile join in one point on that main profile. Consequently, two or pairs of cross-profiles can always be found on both sides of a main profile, the

core-axis of which are in each other's prolongation. This provides an installation as well as an economical advantage with respect to the panels that fill the openings between the different profiles.

Standard panels are square of rectangular. These standard panels can now easily be made to fill the openings in the diagonal system. When cut diagonally, the leftover material can directly be reusable in another place in a pattern, owing to its shape and dimensions, leftover material is thus in no way lost.

The relation between the width of a cross-profile and that of a main profile 1 can be determined as follows. The mathematical ratio between both widths, essential to the suspension system according to the invention, resides in the relation between the width A of the main profile 1 and the width B of all cross-profiles, i.e.: $B = 1/2A\sqrt{2}$. This results for example, for a width of the wings of a main profile equal to 21, in a width of the wings of a cross-profile equal to the half of 21 x 1,4142... This determines the width B of all cross-profiles, equal to 14,8491 rounded off to 15.

It is evident that with the help of the different profiles and the combinations between main- and cross-profiles, a plurality of variants can be assembled, and therefor, that a false ceiling can adapt certain patterns that deviate greatly from the upto now rather monotonous orthogonal patterns.

Consequently, the invention is not limited to the embodiments described hereinabove, and many variants could be applied for as far as these modifications stay within the limits of the claims annexed hereto.

Claims

1. Suspension frame for a false ceiling comprising main profiles (1) that in cross-section have substantially the form of an inverted T, or a twofold T, in cross-section, in other words, a profile with a body (2) and, in working position, at least at the bottom side two laterally veering flanges (3) and cross-profiles (5,6,7) with an analogous cross-section cooperating therewith, characterised in that the body (2) of said cross-profiles (5,6,7) is extended from each extremity further than the flanges (3) pertaining thereto and bent at an angle, while the main profiles (1), in the area where one or more cross-profiles (5,6,7) intersect the main profiles at said angle, comprises grooves (4) to lodge the extremities of cross-profiles (5,6,7).

2. Suspension frame as claimed in claim 1, characterised in that the core-axis of all cross-profiles intersect each other in one point on the core-axis of the main profile where they converge.

3. Suspension frame as claimed in claims 1 and 2, characterised in that the angles at which the extremities of the body (2) of the cross-profiles (5,6,7) are bent comprise 45°, resp. 135°.

4. Suspension frame as claimed in any one of the claims 1, 2 and 3, characterised in that the flanges (3) belonging to a cross-profile (5,6,7) which are placed underneath in working position, are smaller than the flanges (3) belonging to a main profile, in such a manner that the intersection between two cross-profiles which reach out towards each other at an angle of 45°, join precisely the edge of the flange of the main profile.

5. Suspension frame as claimed in claim 4, characterised in that the relation between the width A of a main profile and the width B of all cross-profiles comply to the equation $B = 1/2A\sqrt{2}$.

Patentansprüche

1. Aufhängungsrahmen für eine eingeschobene Dekke, enthaltend: Hauptprofile, die im Querschnitt im wesentlichen die Form eines hängenden "T" haben, oder im Querschnitt eines Doppel-"T", mit anderen Worten, ein Profil mit einem Körper (2) und, in Arbeitsposition, zumindest an der Unterseite zwei seitlich fierende Flansche (3) und damit zusammenwirkende Kreuzprofile (5,6,7) mit einem analogen Querschnitt, dadurch gekennzeichnet, daß der Körper (2) dieser Kreuzprofile an jedem Ende über die dazugehörigen Flansche (3) hinaus verlängert und in einem Winkel gebogen ist, während die Hauptprofile (1), in dem Gebiet, in dem ein oder mehrere Kreuzprofile (5,6,7) die Hauptprofile in diesem Winkel schneiden, Schlitze (4) enthält, um die Enden der Kreuzprofile (5,6,7) anzubringen.

2. Aufhängungsrahmen nach Anspruch 1, dadurch gekennzeichnet, daß die Kernachsen aller Kreuzprofile sich in einem Punkt auf der Kernachse des Hauptprofils, wo sie zusammenlaufen, kreuzen.

3. Aufhängungsrahmen nach Ansprüchen 1 und 2, dadurch gekennzeichnet, daß die Winkel, in denen die Enden des Körpers (2) der Kreuzprofile (5,6,7) gebogen sind, 45 Grad bzw. 135 Grad betragen.

4. Aufhängungsrahmen nach einem der Ansprüche 1, 2 oder 3, dadurch gekennzeichnet, daß die zu einem Kreuzprofil (5,6,7) gehörigen Flansche (3), die in der Arbeitsposition unterhalb angebracht sind, kleiner sind als die zum Hauptprofil gehörigen Flansche (3), und zwar in solch einer Weise, daß die Kreuzung zwischen zwei Kreuzprofilen, welche in einem Winkel von 45 Grad zueinander gerichtet sind, genau an der Kante des Flansches des Hauptprofils ansetzen.

5. Aufhängungsrahmen nach Anspruch 4, dadurch gekennzeichnet, daß die Beziehung zwischen der Breite A des Hauptprofils und der Breite B aller Kreuzprofile der Gleichung $B = \frac{1}{2}\sqrt{2} + A$ genügt.

Revendications

1. Armature de suspension pour faux plafond comprenant des profilés principaux (1) qui en coupe transversale ont essentiellement la forme d'un T inversé ou d'un double T, en coupe transversale, en d'autres termes, un profilé avec un corps (2) et, en position de travail, au moins au côté inférieur deux rebords orientés latéralement (3) et des profilés transversaux (5, 6, 7) d'une section transversale analogue coopérant avec ceux-ci, caractérisée en ce que le corps (2) des profilés transversaux (5, 6, 7) s'étend de chaque extrémité davantage que les rebords (3) concernés et est recourbé d'un certain angle, tandis que les profilés principaux (1), dans la zone où un ou plusieurs profilés transversaux (5, 6, 7) coupent les profilés principaux suivant cet angle, comprennent des rainures (4) pour loger les extrémités des profilés transversaux (5, 6, 7).

2. Armature de suspension suivant la revendication 1, caractérisée en ce que l'axe central de tous les profilés transversaux se coupe respectivement en un point sur l'axe central du profilé principal où ils convergent.

3. Armature de suspension suivant l'une ou l'autre des revendications 1 et 2, caractérisée en ce que les angles auxquels les extrémités du corps (2) des profilés transversaux (5, 6, 7) sont recourbés sont de 45°, respectivement 135°.

4. Armature de suspension suivant l'une quelconque des revendications 1, 2 et 3, caractérisée en ce que les rebords (3) appartenant à un profilé transversal (5, 6, 7) qui sont placés en dessous en position de travail, sont plus petits que les rebords (3) appartenant à un profilé principal, de manière telle que l'intersection entre deux profilés transversaux qui s'étendent l'un vers l'autre suivant un angle de 45°, coïncide de façon précise avec l'arête du rebord du profilé principal.

5. Armature de suspension suivant la revendication 4, caractérisé en ce que la relation entre la largeur A d'un profilé principal et la largeur B de tous les profilés transversaux satisfait à l'équation $B = 1/2A\sqrt{2}$.

FIG. 1

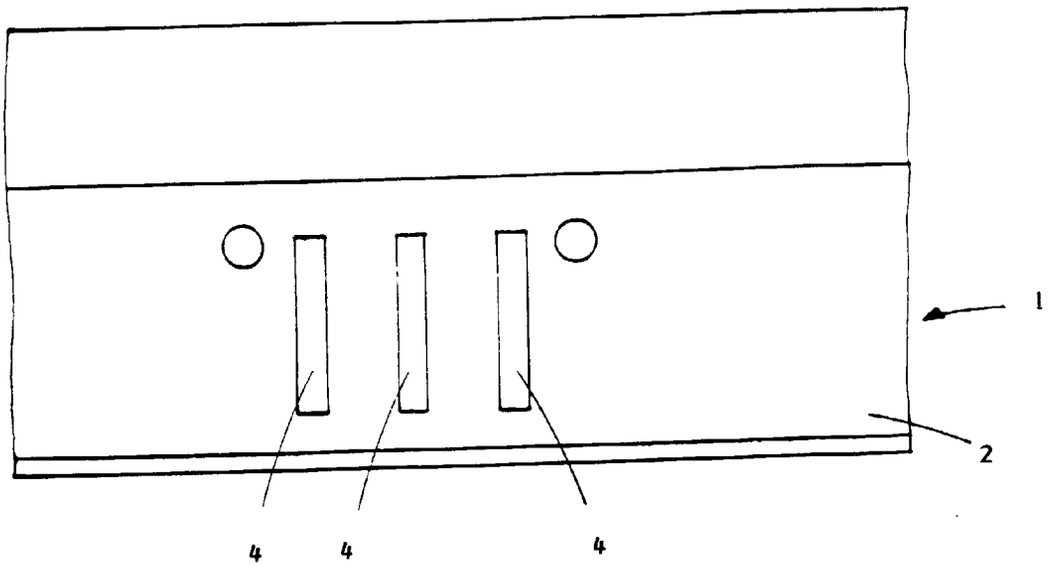


FIG. 2

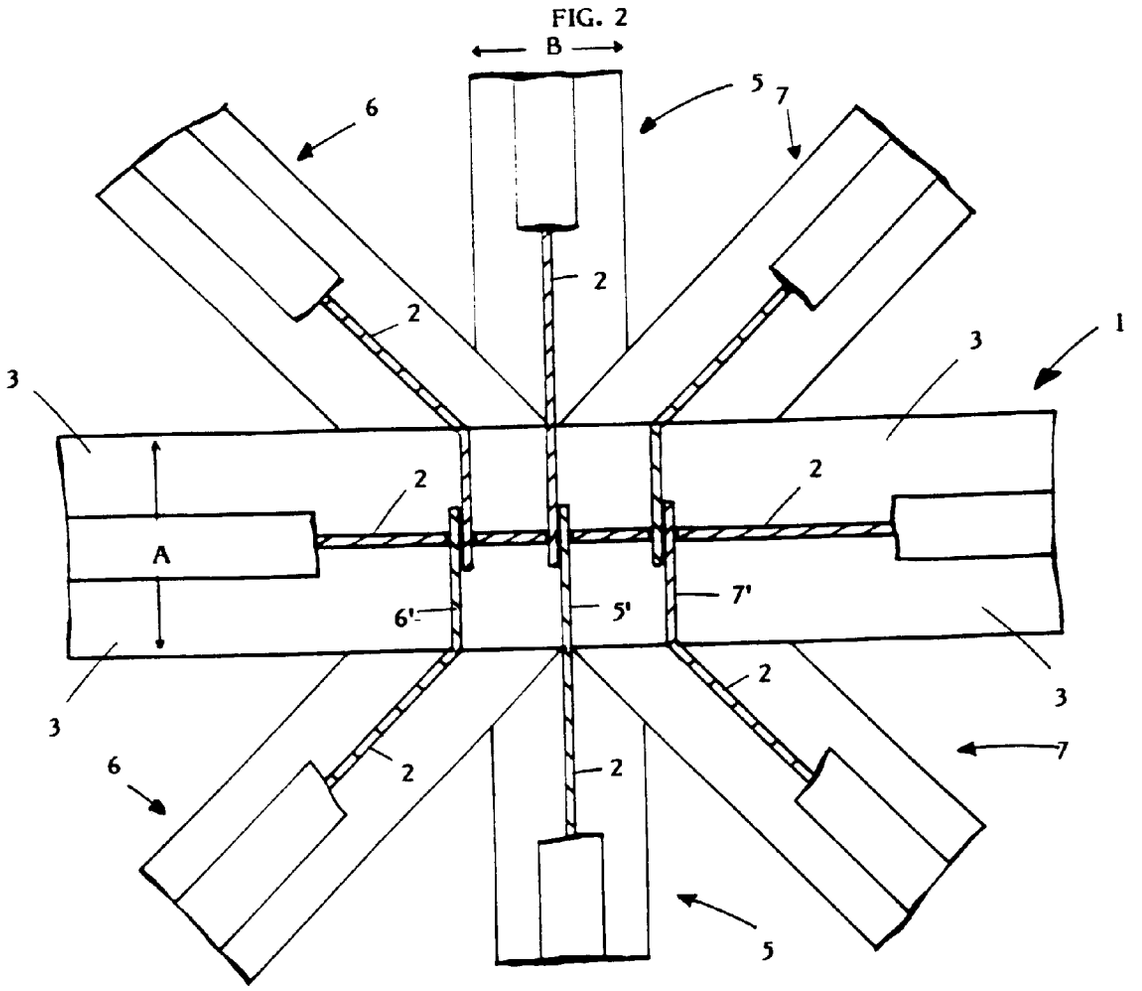


FIG. 4

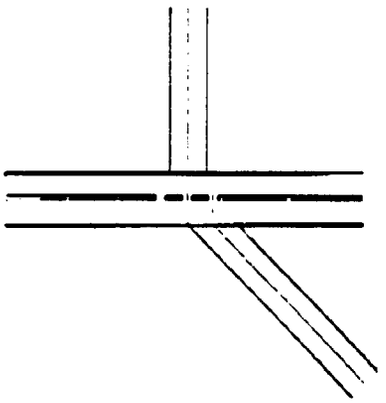


FIG. 5

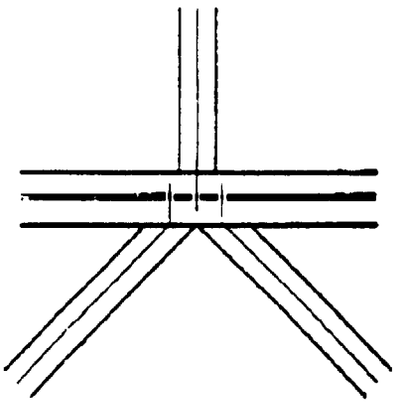


FIG. 6

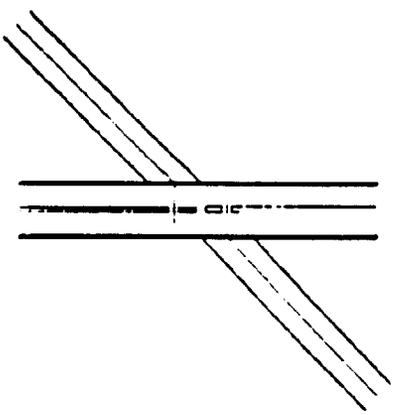


FIG. 7

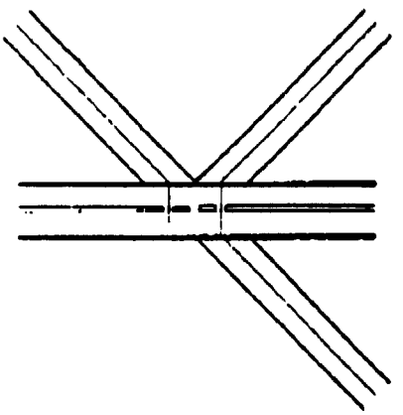


FIG. 8

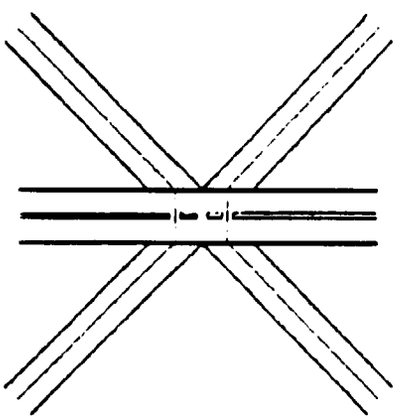
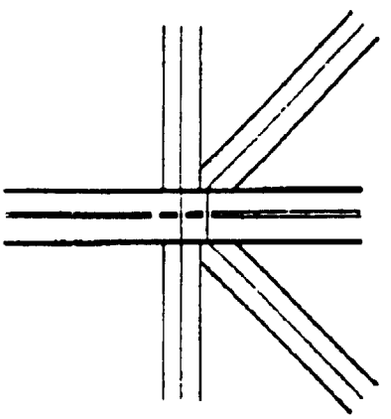


FIG. 9



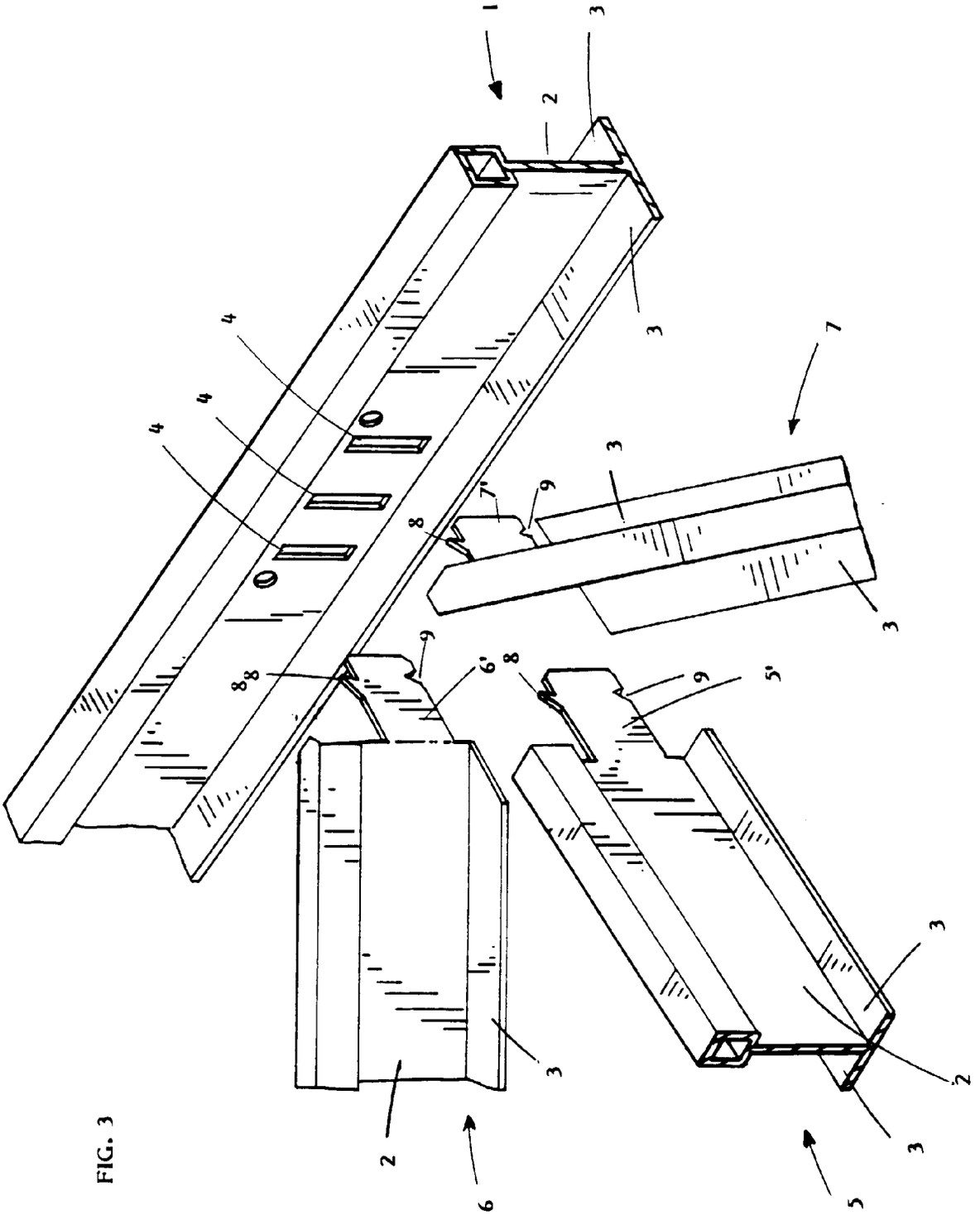


FIG. 3