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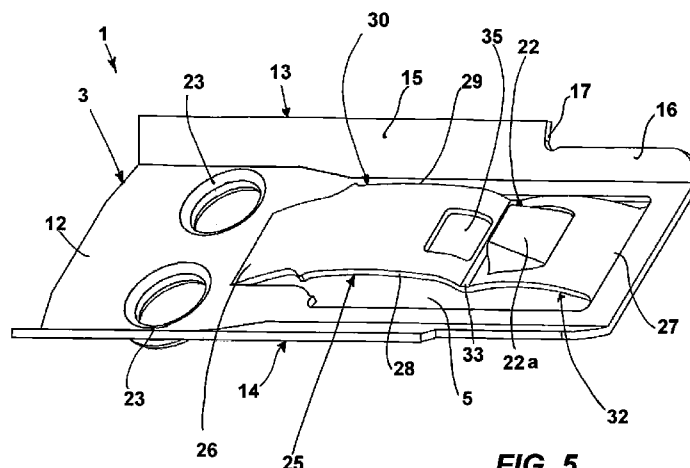
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(54) Title: CONNECTION ARTICLE FOR A BAR OF A SUPPORT STRUCTURE OF A FALSE CEILING



(57) Abstract: The present disclosure relates to a clip, or connection article (1) for a metal bar (2) of a support structure for false ceilings. The clip (1) includes a plate sheet metal body (3), wherein the plate sheet metal body (3) comprises a bridge sheet metal portion (25) having free side edges (28, 29) separated with respect to a remaining portion of the plate sheet metal body (3) to define a cavity or slot (5) in the plate sheet metal body (3). The bridge sheet metal portion (25) has ends (26, 27) integrally formed with the remaining portion of the plate sheet metal body (3), and wherein the bridge sheet metal portion (25) is an elastically deformable structure and is adapted to assume a first position, in the first position the bridge sheet metal portion (25) being in a resting condition and projecting in a cantilevered manner with respect to the cavity (5), and a second unstable position of loading, in the second position the bridge sheet metal portion (25) being in an elastically deformed condition (25), displaced with respect to the first position.

CONNECTION ARTICLE FOR A BAR OF A SUPPORT STRUCTURE OF A FALSE CEILING

DESCRIPTION

The present disclosure refers to a clip, or connection article, suitable for
5 support structures, or load-bearing structures, of false ceilings, i.e. support
structures for plates or panels placed underneath a regular ceiling, which are
connected to the ceiling by a so-called hanger, steel rods, an iron wire, bars or other
coupling articles.

Support structures for false ceilings comprise a frame intended for supporting
10 or propping of panels or plates, wherein the frame includes metal bars fixed and
crossed by a special joint to ideally form a grid, the grid defining a bearing plane for
the panels or plates of the false ceiling.

The above-mentioned connection article, or, as above said, the clip, includes a
plate sheet metal body, intended to be fixed on one side to one end of a first metal
15 bar, and on the other side inserted in and coupled to, e.g. by a detent, a slot of a
second metal bar. Another connection article or clip may be inserted in and coupled
to the same slot, on the opposite side of the second metal bar, said connection
article or clip being in turn connected to one end of a third metal bar. Said
connection article, alone or in pair with another connection article or clip, therefore
20 provides at least two metal bars to be joined and fixed to each other in an area of
intersection.

At the basis of the present disclosure there is recognition by the inventor that,
in connection with this scope, the clip must ensure a connection to the second bar
that ensures mechanical strength, to ensure in turn a safe joint between bars.
25 Moreover, it is required the possibility of easily connecting and, if necessary,
disconnecting the clip to/from the second metal bar in a step of
assembling/disassembling the support frame. In fact, it should be considered that
during a phase of assembling/disassembling the frame of a false ceiling by an
operator, normally the operator does not have a wide view of the clips. In fact often
30 the operator works from beneath, with the arms up straight; therefore, the operator
finds it difficult to see when a clip is correctly engaged or disengaged with respect to
the slit of the metal bar.

In particular, at the basis of the present disclosure there is the recognition by
the inventor that, currently, at the time of disengagement of a clip, an operator must
35 make use of a tool, like, e.g., a screwdriver, to temporarily release the clip from the
metal bar, for instance by exerting a pulling action on the detent. During the
disengaging, the clip, and more specifically the detent, may be excessively forced by

the tool used, even stretching the material at the yield strength and beyond, thus preventing or making uncertain a possibility of clip reuse. Moreover, an operator, owing to the poor visibility available in carrying out the operations, works under uncertain conditions, as, by not seeing the clip, he/she is often forced to act in a random manner with said tool, or by exerting a manual forcing, and therefore has no way to know "for certain" that the clips have been disengaged (released) from the metal bar.

Therefore, the present disclosure stems from the technical problem of providing a connection article or clip for bars of false ceilings allowing to overcome the drawbacks mentioned above with reference to the known art, and/or attain further advantages or features.

Such a technical problem can be solved by a connection article, or clip, according to independent claim 1, a combination of a connection article or clip and a bar for false ceilings according to claim 16, a support structure for a false ceiling according to claim 22 and a process for actuating a clip according to claim 23.

Particular embodiments of the subject-matter of the present disclosure are defined in the corresponding dependent claims.

In particular, according to some aspects of the present disclosure, the clip includes a bridge sheet metal portion provided with an engagement zone or engaging element, for engaging to a counter-engaging element, e.g. associated to the slit of the metal bar. The bridge sheet metal portion has, according to the present disclosure, elastic properties or configuration, i.e. is structured so as to exhibit elastic behavior when subjected to a momentary deforming action, such that, as the momentary deforming action ceases, the bridge sheet metal portion returns to the original position.

In particular, the bridge sheet metal portion can assume a first position, or initial position, wherein in the first position the bridge sheet metal portion is in a resting condition, and at least one second position, wherein in the second position the bridge sheet metal portion is in an elastically deformed, highly unstable condition (second position), in the second position said bridge sheet metal portion being temporarily flexed with respect to the initial position.

The bridge sheet metal portion, according to the present disclosure, may be construed as an element that serves or acts as a button connected to the remaining portion of the sheet metal body (which can be pressed and momentarily flexed) and that exhibits elastic return. When the bridge sheet metal portion is deformed and flexed in the second position, a displacement of the engaging element is obtained

which provides a practical release from the counter-engaging element of the metal bar.

Thanks to the elastic behavior, and to the possibility of pressing the bridge sheet metal portion to the second position, even by one finger, an operator can easily act on the clip without tool use and without the risk of stretching the material at the yield strength and beyond.

In order to give the elastic behavior to the bridge sheet metal portion, in some embodiments, the bridge sheet metal portion may be a sheet metal piece that is cut sideways with respect to a remaining part of the clip and thereafter is integrally joined at the ends with the remaining portion of the clip and that, after the cutting, is then shaped.

In an embodiment of the present disclosure, the sheet metal portion is a portion which has been elongated, or a portion longer than the slot in which it is located. In other words, the bridge sheet metal portion is a sheet metal piece longer, i.e. elongated, than a remaining part of the plate sheet metal body to which the bridge sheet metal portion is fixed.

This elongated configuration allows to the bridge sheet metal portion, when it is pressed, to be subjected to a temporary compression in the longitudinal direction before reaching the second position. In practice, when it is pushed and pressed to reach the disengaging position, the bridge sheet metal portion can assume an intermediate condition, between the first position and the second position mentioned above, wherein such intermediate condition is highly unstable, and is due to a momentary compression in the longitudinal direction.

In particular, according to some aspects of the present disclosure the unstable intermediate position (of compression) can be both a transitory position, when pressing the bridge sheet metal portion to the second position at the time of clip release, and an unstable position that may be assumed at the time of clip engagement.

In practice, the unstable intermediate position can be assumed at the time of an engagement of the clip to the bar, when the clip is partially inserted in the slit of the bar. In particular, at such a time the bridge portion can be inserted in a slit of a metal bar and can be elastically deformed, e.g. by compression, to allow the engaging element to pass over the slit until engagement with the counter-engaging element associated to the metal bar, optionally with a typical "click" of concluded engagement. It follows that, besides the above-mentioned first and second position, the bridge sheet metal portion can assume an unstable intermediate position (of compression) that can foster the engagement of the clip to the metal bar. Said

unstable intermediate position (of compression) is automatically assumed by the bridge sheet metal portion, thanks to the fact that the bridge sheet metal portion is elongated, and, at the time of engagement of the clip, may be obtained without any pressure exerted by an operator on the bridge sheet metal portion.

- 5 Other features and the operation modes of the subject-matter of the present disclosure will be made evident from the following detailed description of some preferred embodiments thereof, given by way of a non-limiting example. However, it is evident how each embodiment may entail one or more of the advantages listed above; in any case, it is however not required for each embodiment to concomitantly
- 10 entail all of the advantages listed.

Reference will be made to the figures of the annexed drawings, wherein:

- Figures 1 and 2 show a partial perspective view of a support structure for false ceilings during operation steps of assembling, according to an embodiment of the present disclosure;
- 15 - Figure 3 shows a partial top view of a support structure in an operation step, according to an embodiment of the present disclosure;
- Figure 4 shows a partially sectional partial top plan view of a support structure during an operation step, according to an embodiment of the present disclosure;
- Figure 5 shows a top perspective view of a connection article in an operative
- 20 condition, according to an embodiment of the present disclosure;
- Figure 6 shows a perspective view of a connection article in a further operative condition, according to an embodiment of the present disclosure;
- Figure 7 shows a plan view of a connection article according to an embodiment of the present disclosure;
- 25 - Figure 8 shows a sectional view along line VIII-VIII of Figure 7 in a first operative condition;
- Figure 9 shows a sectional view along line VIII-VIII of Figure 7 in a second operative condition;
- Figures 10-11 show sectional views of a pair of connection articles according to
- 30 the present disclosure in two different operative steps;
- Figure 12 shows an enlarged scale view of a detail of a metal bar according to the present disclosure.

With reference to the annexed figures, a clip or connection article for a support frame of a support structure of a false ceiling according to the present disclosure is

35 denoted by reference number 1.

The clip 1 is fixed to a metal bar 2, which in the example has a T-shaped section, and is obtained by bending a sheet metal, in order to obtain an overlap of two sheet

metal portions. The metal bar 2 can be different from the one illustrated, for instance of different section, as for example, it can be a C-shaped or U-shaped section, or even of a further different T-shape/section.

As shown in the figures, the clip 1 can be inserted in a slit 4 of a second metal bar 2, to be engaged with an edge defining the slit 4 in the metal bar 2. In the same slit 4, from another side of the metal bar 2, another clip 1 can be inserted, which is in turn fixed to an end of a third metal bar 2, to form an area of intersection, or cross-like configuration, of a support or propping structure for a false ceiling.

In practice, the two clips 1 are inserted from opposite sides in the same slit 4 of the metal bar 2, and are both connected to opposite sides of the metal bar 2 in the slit 4. As visible from the figures, the two clips 1, when seen from one side, are partially overlapped in the slit 4.

In other embodiments, not shown in the figures, a single clip 1, fixed to one end of a first metal bar 2, is intended to be inserted alone in a slit 4 of a metal bar 2, orthogonal to the first bar, for instance in the region of a side wall of the false ceiling, where it is impossible to form an intersection.

Each clip 1 includes a plate sheet metal body 3 formed by a first clip portion 11 including a slot 5 or cavity, wherein said first clip portion 11 is intended to be removably inserted and engaged in the above-mentioned slit 4 of the bar 2. The clip 1 includes a second clip portion 21 intended to be fixed to the metal bar 2.

The present disclosure relates in particular to the first clip portion 11 for connection with the slit 4 of the metal bar 2; it follows that in the following description the second clip portion 21 will not be described, it being understood that it can be made with slits, retainers, fins or other types of connection elements according to the needs for connection to the metal bar 2. In the example illustrated in the annexed figures, by way of example, the connection is obtained by riveting of a portion 23 of the clip, e.g. having the shape of a collar or circular crown, inserted and riveted in corresponding holes of the metal bar.

The plate sheet metal body 3 includes, in the first clip portion 11, a bridge sheet metal portion 25, which has free side edges 28, 29 and ends 26, 27 of the bridge integrally fixed, or formed as one piece with a remaining portion of the plate sheet metal body 3, which actually surrounds the bridge sheet metal portion 25.

The bridge sheet metal portion 25 is obtained by two cuts in the first clip portion 11, wherein such cuts define the above-mentioned slot 5 or cavity.

In the bridge sheet metal portion 25 an engagement zone 22 is present, intended for engaging with a counter-engaging element connected to the slit 4 of the above-mentioned second metal bar 2. In the embodiment illustrated herein, the

engagement zone 22 comprises a detent 22a formed by a thin plate cut and bent, projecting with respect to a remaining part of the bridge sheet metal portion 25. It follows that, in the embodiment illustrated, the counter-engaging element is the edge of the slit of the metal bar 2. Alternatively, the engaging element of the clip can be a hole adapted to be engaged by a detent (counter-engaging element) associated to the edge defining the slit 4 of the metal bar 2.

With respect to the engagement zone 22, an operative front side, where the engaging of the second metal bar 2 in the slit 4 occurs, and a rear side or back, opposite to the operative front side, are defined in the clip 1.

According to an aspect of the present disclosure, the bridge sheet metal portion 25 exhibits elastic behavior, i.e. is structurally elastic, and is adapted to assume a first position, wherein in the first position the bridge sheet metal portion 25 projects in a cantilevered manner with respect to the slot/cavity 5 of the plate sheet metal body 3 (on the side of said operative front side), and a second position, wherein in the second position the bridge sheet metal portion 25 is in an elastically deformed condition, for instance, being deformed following a pressing action exerted, e.g. with a finger, towards the slot 5 on the bridge sheet metal portion 25, i.e. towards the rear side or back of the clip 1.

The elastic deformation of the bridge sheet metal portion 25 causes a displacement of the engaging element 22a, as may be seen from a comparison of figures 5 and 6, or of figures 8 and 9, and provides the clip 1 to be disengaged from the slit 4.

In the example illustrated, in order to obtain the possibility of an elastic deformation, the bridge sheet metal portion 25 is a sheet metal piece longer, i.e. it has been suitably elongated, than the slot 5 or cavity in which it is housed. By the wording "longer" it is meant that a linear development of the bridge sheet metal portion 25 on a plane has a length greater than the linear length of the slot 5.

Even more specifically, the bridge sheet metal portion 25 is a piece of sheet metal having at least partially a curved configuration and presenting a convex external surface 24, on which a pressure adapted to deform the bridge sheet metal portion 25 is exerted.

Thanks to the fact that the bridge sheet metal portion 25 is longer than the slot 5, by exerting a pressure on the bridge sheet metal portion 25, said bridge sheet metal portion 25 is subjected, at first, to a compression in the longitudinal direction at the time of a passing in the cavity 5, and is then completely flexed beyond the cavity 5 to assume the second position.

The reaching of the second position by the bridge sheet metal portion 25 can

determine, when touched, a certain vibration, click, or in general a "tactile sensation", corresponding to a sort of "end-of-stroke" of the displacement of the bridge sheet metal portion 25 and allowing to obtain a correct positioning of the detent 22a for release from the edge of the slit 4.

5 In other words, the bridge sheet metal portion 25 is, or serves as a pressure button, with elastic return.

In practice, it is found that, in the embodiment illustrated, the bridge sheet metal portion 25 can assume at least three distinct positions.

10 An initial position, in the absence of pressing action, is the first position mentioned above.

A final position, which is the second position, in the presence of a pressing action, wherein the bridge sheet metal portion 25 is completely pressed and flexed, the final position corresponding to a condition of total loading or of end-of-stroke, with automatic return to the initial position as the pressing action ceases. In
15 connection to the final position, the reaching of said final position provides the above-mentioned "tactile sensation" of a correct positioning of the detent 22a which allows release from the slit 4.

20 An intermediate position (of compression), which is an unstable intermediate position of passing through between the initial position and the final position for release of the detent 2a.

In particular, said unstable intermediate position has also a second function, independent of that of passing through between the first position and the second position, and that therefore can be independent of a pressing action, e.g. exerted by the operator. In fact, such an unstable intermediate position can be assumed by the
25 bridge sheet metal portion 25 when the bridge sheet metal portion 25 is inserted in the slit 4, and the engaging element 22a interacts with the slit 4. In practice, at the time of insertion in the slit, the bridge sheet metal portion 25 automatically compresses itself in the unstable intermediate position, slightly displacing the detent 22a so as to allow engagement of the engaging element 22a.

30 In particular, to obtain the connection with the metal bar 2, the first clip portion 11 is inserted in the slit 4 of the metal bar 2, with the operative front side facing the edge defining the slit 4, and the back of the clip facing a central zone of the slit 4. The bridge sheet metal portion 25 is subjected to a compression deformation (the above-mentioned intermediate position) at the time of passing in the slit 4, so as to
35 allow the detent 22a to pass over, in the slit 4, the edge of the metal bar 2. Thanks to the elastic properties of the bridge sheet metal portion 25, the detent 22a engages stably against the wall of the metal bar 2. Insertion of the detent 22a in the

slit 4 is also fostered by the curved configuration of the bridge sheet metal portion 25, defining a sort of lead-in or tilted plane at the time of insertion.

The elastic return moreover fosters a release or disconnection of the clip from the metal bar 2. In fact, as said, when the bridge sheet metal portion 25 is pressed, a
5 complete deformation of the bridge sheet metal portion 25 is obtained (the above-mentioned final position) causing a displacement of the detent 22a associated thereto with respect to the metal bar 2.

Moreover, it may be observed that the curved shape of the sheet metal portion, and in particular of the convex surface 24 of the bridge sheet metal portion 25,
10 allows an operator to recognize by touch the bridge sheet metal portion 25 and to act thereon without hesitation, to release the clip 1 from the slit 4. Moreover, the elastic deformation of the bridge sheet metal portion 25 may be "felt" by touch from an operator, thanks to the fact that, as said, at the time of the end-of-stroke, the operator feels a sort of vibration, or click (and in general a "tactile sensation").

15 Even more specifically, in the embodiment illustrated, the bridge sheet metal portion 25 includes a first bridge part 30 and a second bridge part 32. In the exemplary embodiment illustrated, the first bridge part 30 is longer than the second bridge part 32.

The above-mentioned engagement zone 22 or region, i.e. the detent 22a, is
20 associated to the second bridge part 32.

A bending line 33 is interposed between the first bridge part 30 and the second bridge part 32, the bending line defining a groove or recess between the first bridge part 30 and the second bridge part 32. The bending line 33 defines a groove on the convex external surface 24. In other words, the bending line 33 defines a sort of
25 interruption of the curvature of the bridge sheet metal portion 25. In fact, with reference to the figures, the first bridge part 30 and the second bridge part 32 have a downward-facing concavity, whereas the bending line 33 defines a recess having a V-like profile, with an upward-facing concavity. Alternatively, in embodiments not illustrated, the bending line can have another shape different from a groove shape,
30 e.g., it can be bent so as to have a double groove.

It follows that the bending line 33 defines a dovetail profile with the first bridge part 30 and the second bridge part 32.

Even more specifically, referring to Figures 7 and 8, it has to be noted that, in the exemplary embodiment illustrated, in order to displace the engaging element 22a a
35 pressure is exerted with a finger on the first bridge part 30. In said step, the bending line 33 bends slightly, acting as instantaneous fulcrum (or axis of instantaneous rotation) to allow an angular displacement of the first bridge part 30 with respect to

the second bridge part 32. At the same time, due to the geometry of the parts described above, the second bridge part 32 flexes in the same direction of the pressure force and displaces the detent 22a.

This deformed position is highly unstable, or transient, i.e. it is not possible to hold such position if not by keeping up a continuous and high pressing action. Such condition moreover causes a remarkable flexing of the ends 26, 27 with respect to the remaining portion of plate sheet metal body 3. It follows that as soon as the force applied on the first bridge part 30 ceases, and the user releases the clip 1, the ends 26 and 27 return to their original position of resting, and the entire bridge sheet metal portion 25 returns to an undeformed condition.

In practice, as the deforming action ceases, the bridge sheet metal portion 25 returns to the undeformed position, projecting and cantilevered with respect to the slot 5.

Moreover, it is observed that in the embodiment illustrated the clip 1 has straps 80, 81 or connecting portions interposed between the end 27 of the second bridge part 32 and a free end 82 of the clip 1. When the clip 1 is in the final position, completely deformed, such straps 80, 81 are subjected to a momentary torsion, which contributes to obtain said effect of vibration, click or of tactile sensation of the bridge sheet metal portion 25.

Moreover, it is observed that thanks to the fact that the first bridge part 30 on which pressure is exerted is longer than the second bridge part 32, the flexibility of the bridge sheet metal portion 25 is increased to the utmost. Moreover, it is observed that in the exemplary embodiment illustrated, the bending line 33 is close to the detent 22a, i.e. the bending line 33 is adjacent and very near to the detent 22a. Thanks to this configuration a high flexion of the detent 22a is obtained. This configuration allows maximizing displacement of the detent 22a, i.e. to obtain a maximum stroke or travel of the detent during the disengaging.

Apart from the greater length of the first bridge part 30 with respect to the second bridge part 32, flexibility can be further fostered by the presence of a relief hole 35 in the first bridge part 30.

According to further aspects of the present disclosure, in the embodiment illustrated herein, the clip 1 has a profile suitable for a correct and univocal insertion in the slit 4 of the metal bar 2.

In particular, the clip 1 comprises a substantially plane central region 12, wherein the slot 5 and the bridge sheet metal portion 25 are located. Besides the central region 12, the clip 1 comprises a first lateral region 13 and a second lateral region 14, wherein the first lateral region 13 and the second lateral region 14 are wings

diverging the one with respect to the other. In practice, seen in side section, the first lateral region 13, the central region 12 and the second lateral region 14 have a substantially trapezium-like profile.

Moreover, it is observed that each of the first lateral region 13 and the second lateral region 14 has a step-like profile, i.e. each of the first lateral region 13 and of the second lateral region 14 includes a first part 15 higher than a second part 16. Each second part 16, with the first part 15 adjacent thereto, defines a shoulder 17.

To obtain the clip 1 according to the invention, the process is substantially as follows. In particular, the process is carried out by a so-called pitch die.

10 A rolled metal strip is provided. The material used allows to have sufficient elongation and a high mechanical strength; among others, in the specific instance said material is stainless steel with >8% elongation, carbon steel and alike metals.

For instance, in the embodiment described by way of a non-limiting example the strip has a height of 17mm.

15 Starting from a rolled metal strip, initially a shearing with drilling is carried out, in order to make the individual plate sheet metal bodies 3, and for each of them the slot 5 (to define the bridge sheet metal portion 25) and the holes at the crown-shaped portions 23.

Subsequently, the plate sheet metal body 3 is subjected to bending, to form the diverging wings, i.e. the first lateral region 13 and the second lateral region 14 of the plate sheet metal body 3.

Subsequently, the bridge sheet metal portion 25 is subjected to a double step of deep-drawing.

25 In particular, in a first step, a positive deep-drawing is carried out in order to bring the bridge sheet metal portion 25 out of the plane of the remaining portion of the plate sheet metal body 3 and therefore of the cavity 5, to form said convex surface 24. During this step, an elongation of the bridge sheet metal portion 25 is carried out. (As said above, the elongation allows to compress the bridge sheet metal portion 25 when said pressing on the convex surface is carried out, and obtain the second deformed position of the clip or the intermediate position).

30 Subsequently, in a second step, a deep-drawing opposite to the bending is carried out, i.e. the bridge sheet metal portion 25 is compressed, with formation of said bending line 33. The second step of deep-drawing in the opposite direction allows to define a correct shape of the bridge sheet metal portion 25, as well as the formation/position of the bending line 33, which allows to act as fulcrum or hinge and control the extent of displacement or flexion of the second bridge part 32, which leads or is associated to the detent 22a.

According to further aspects and to some embodiments of the present disclosure, the metal bar has a slit shaped so as to house, substantially univocally, the clip, and in particular the first portion 11 of the clip 1. More specifically, the slit 4 of the metal bar has a shape complementary to the profile of the clip 1 and allowing to guide the insertion of the first clip portion 11.

In particular, referring to Figure 12, the slit 4 is symmetrical with respect to a plane (identified in Figure 12 by a dashed line P) passing orthogonal through the metal bar 2. In particular, with respect to said plane P, the slit 4 of the metal bar 2 comprises a first recess 40, having, e.g., a substantially trapezoidal profile, a second recess 41 having, e.g., a substantially trapezoidal or squared profile, and a third recess 42 having, e.g., a substantially trapezoidal profile.

A first tab 45 is present between the first recess 40 and the second recess 41, the first tab being projecting towards a central zone of the slit 4 and having, e.g., a substantially trapezoidal profile. A second tab 46 is present, between the second recess 41 and the third recess 42, the second tab 46 being also projecting in the slit 4, and having, e.g., a substantially trapezoidal profile.

The first recess 40 is intended to receive the first lateral region 13 of the clip 1, and the third recess 42 is intended to receive the second lateral region 14 of the clip 1. It may be observed that the clip 1 is inserted by sliding, making the first lateral region 13 slide in the first recess 40 and making the second lateral region 14 slide in the third recess 42.

As soon as the detent 22a enters the recess 41, as already mentioned, the bridge sheet metal portion 25 deforms slightly elastically (intermediate position), to allow the detent 22a to pass over the edge of the metal bar 2 defining the second recess 41 in the slit 4.

When the edge is passed over, thanks to the elastic return of the bridge sheet metal portion 25, the detent 22a cooperates with the edge of the metal bar defining the second recess 41, interacting by interference. In practice, thanks to the elastic properties of the button or bridge sheet metal portion 25, the detent 22a passes over the edge of the metal bar 2 in the slit 4 and engages on the wall of the metal bar 2. The clip 1 remains blocked thanks to the fact that the shoulder 17 of the first lateral region 13 and the shoulder 17 of the second lateral region 14 abut against the opposite surface of the metal bar 2. It follows that the metal bar 2 remains trapped between the shoulder 17 and the detent 22a.

Moreover, it can be understood that the insertion of the clip in the slit 4 is, as said, substantially univocal, and an operator cannot go wrong when inserting said clip. In other words, there is no chance of mistake (or anyhow there is a very small

chance of mistake) of insertion of the clip 1 in the slit of the metal bar. In fact, the lateral regions 13, 14 are univocally intended to slide in the corresponding recesses 40, 42 of the slit 4.

Referring to Figures 3-4 and Figures 10-11, it is to be noted that a second clip 1
5 can be inserted from the opposite side of the metal bar 2.

The insertion of the second clip 1 creates no interference with the first clip 1. In fact, the two clips 1 are inserted so as to have the back of a clip face the back of the other clip 1, said backs in the exemplary embodiment substantially having no projections.

10 More specifically (referring to Figures 10 and 11), the two clips are arranged upturned the one with respect to the other. In fact, the back or rear side of the first bridge part 30 of a clip 1 faces the back or rear side of the second bridge part 32 of the second clip 1, and vice versa. This upturned arrangement provides space in order to deform the bridge sheet metal portion 25 and remove the engaging of the
15 engaging element 22a with the slit 4. In fact, the bridge sheet metal portion 25 can be pressed with a sufficient space thanks to the fact that it is displaced towards the back of the second bridge part 32 of the other clip, back which is concave, and where it is further present a recess defined by the detent 22a. Therefore, to the bridge sheet metal portion 25 an increased stroke is allowed, thanks to the fact that
20 the second bridge part 32 of the other clip 1 opposite thereto leaves a space sufficient for the movement of the first bridge part 30 of the first clip 1.

Moreover, it is observed that the possibility of univocally inserting each clip 1 in the slit 4 allows to avoid arranging separators or guides in the slit 4 for guiding the insertion of the clip 1. Therefore, the slit 4 offers the greatest possible space to
25 house the pair of clips 1.

The subject-matter of the present disclosure has hereto been described with reference to preferred embodiments thereof. It is understood that there may be other embodiments referable to the same inventive concept, all falling within the protective scope of the claims set forth hereinafter.

CLAIMS

1. Clip, or connection article (1) for a metal bar (2) of a support structure for false ceilings, said clip (1) including a plate sheet metal body (3), wherein the plate sheet metal body (3) comprises a bridge sheet metal portion (25) having free side edges (28, 29) separated with respect to a remaining portion of the plate sheet metal body (3) to define a cavity or slot (5) in the plate sheet metal body (3), wherein the bridge sheet metal portion (25) has ends (26, 27) integrally formed with the remaining portion of the plate sheet metal body (3), wherein the bridge sheet metal portion (25) is an elastically deformable structure and is adapted to assume a first position, in the first position the bridge sheet metal portion (25) being in a resting condition and projecting in a cantilevered manner with respect to the cavity (5), and a second unstable position of loading, in the second position the bridge sheet metal portion (25) being in an elastically deformed condition (25), displaced with respect to the first position.
2. Clip, or connection article (1) for a metal bar (2) of a support structure for false ceilings, said clip (1) including a plate sheet metal body (3), wherein a slot (5) or cavity is present in the plate sheet metal body (3), and wherein, in the region of said slot (5), the plate sheet metal body (3) comprises a bridge sheet metal portion (25) having ends (26, 27) integrally formed with a remaining portion of the plate sheet metal body (3), wherein the bridge sheet metal portion (25) is an elastic button adapted to assume a first position, in the first position the bridge sheet metal portion (25) being in a resting condition and projecting in a cantilevered manner with respect to the cavity (5), and a second unstable position of loading, in the second position the bridge sheet metal portion (25) being in an elastically deformed condition (25), displaced with respect to the first position.
3. Clip, or connection article (1) according to claim 1 or 2, wherein said second position is displaced with respect to the first position towards the cavity (5).
4. Clip, or connection article (1) according to claim 1 or 2, wherein the bridge sheet metal portion (25) includes an engagement zone (22), for removably engaging the connection article (1) to a metal bar (2), and wherein said first position is an initial position in absence of a pressing action, and said second position is an end-of-stroke or final position, corresponding to a condition of disengaging for disengaging the engagement zone (22) from the metal bar (2).
5. Clip, or connection article (1) according to any one of the preceding claims, wherein a vibration or a click of the bridge sheet metal portion (25) corresponds to the second position, said vibration or click being perceptible by touch.

6. Clip, or connection article (1) according to any one of the preceding claims, wherein the bridge sheet metal portion (25) is longer than the slot (5) or cavity.
7. Clip, or connection article (1) according to any one of the preceding claims, wherein said clip (1) is adapted to further assume an intermediate unstable
5 position between the first position and the second position.
8. Clip, or connection article (1) according to claim 7, wherein, in said intermediate unstable position, the bridge sheet metal portion (25) is in a condition of compression along a longitudinal direction.
9. Clip, or connection article (1) according to any one of the preceding claims,
10 wherein, in said first position, the bridge sheet metal portion (25) is in a curved configuration and has a convex external surface (24).
10. Clip, or connection article (1) according to any one of the preceding claims, wherein the bridge sheet metal portion (25) includes a first bridge part (30) and a second bridge part (32), wherein a bending line (33) is interposed between the
15 first bridge part (30) and the second bridge part (32), the bending line defining a groove or recess, concave or convex, between the first bridge part (30) and the second bridge part (32).
11. Clip, or connection article (1) according to claim 10, wherein the bending line (33) defines a dovetail profile with the first bridge part (30) and the second bridge
20 part (32).
12. Clip, or connection article (1) according to claim 10 or 11, in conjunction with claim 4, wherein the first bridge part (30) is longer than the second bridge part (32) and wherein said engagement zone (22) or region is associated to the second bridge part (32).
- 25 13. Clip, or connection article (1) according to any one of the claims 10 to 12, wherein the bending line (33) is adapted to act as fulcrum or axis of instantaneous rotation, to allow an angular displacement of the first bridge part (30) with respect to the second bridge part (32).
14. Clip, or connection article (1) according to any one of the preceding claims,
30 comprising a central region (12), a first lateral region (13) and a second lateral region (14), wherein the slot (5) and the bridge sheet metal portion (25) are located in the central region, and wherein the first lateral region (13) and the second lateral region (14) are wings diverging the one with respect to the other.
15. Clip, or connection article (1) according to claim 14, wherein the one and/or the
35 other between the first lateral region (13) and the second lateral region (14) has a step-like profile and includes a first part (15) higher than a second part (16), said first part (15) and second part (16) defining a shoulder (17).

16. Combination of a clip (1) according to any one of the preceding claims and a metal bar (2) of a support structure for false ceilings, wherein said bridge sheet metal portion (25) is inserted in and coupled to a slit (4) of the metal bar (2).
17. Combination according to claim 16, wherein the slit (4) has a shape complementary to a profile of the clip (1) and wherein said shape is adapted to act as guide for guiding an insertion of the clip (1).
18. Combination according to claim 16 or 17, wherein the slit (4) is symmetrical with respect to a plane (P) passing orthogonal through the metal bar (2), and, with respect to said plane (P), the slit (4) of the metal bar (2) comprises a first recess (40), a second recess (41), and a third recess (42), wherein a first tab (45) is present between the first recess (40) and the second recess (41), the first tab being projecting towards a central zone of the slit (4) and, a second tab (46) is present, between the second recess (41) and the third recess (42), the second tab (46) being also projecting towards a central zone of the slit (4).
19. Combination according to claim 18, when dependent from claims 4 and 14, wherein the first recess (40) is intended to receive the first lateral region (13) of the clip (1), and the third recess (42) is intended to receive the second lateral region (14) of the clip (1), and wherein, in an engaging condition, the metal bar (2) is held between the shoulder (17) and the engagement zone (22).
20. Combination according to an one of the claims 16 to 19, wherein two clips (1) are housed in the slit (4), wherein each clip (1) has a rear side or back facing a rear side or back of the other clip (1) and wherein the bridge sheet metal portion (25) of each clip faces the opposite side with respect to the other clip (1).
21. Combination according to claim 20, when dependent from any one of claims 10 to 13, wherein the two clips are inverted or reversed the one with respect to the other, and wherein the first bridge part (30) of a clip is at least partially overlapped to the second bridge part (32) of the second clip (1), and vice versa.
22. Support structure for a false ceiling including a combination of a clip and a bar according to any one of the claims 16 to 21.
23. Process for actuating a clip, or connection article (1) with respect to a metal bar (2) of a support structure for false ceilings, the process comprising the steps of:
- providing a clip (1) including a plate sheet metal body (3), wherein the plate sheet metal body (3) comprises a bridge sheet metal portion (25) having free side edges (28, 29) with respect to a remaining portion of the plate sheet metal body (3) to define a cavity or slot (5) in the plate sheet metal body (3), wherein the bridge sheet metal portion (25) has ends (26, 27) integrally formed with the remaining portion of the plate sheet metal body (3),

- associating an engagement zone (22) to the bridge sheet metal portion for engaging a corresponding zone of the metal bar (2), and, starting from a resting condition in which the bridge sheet metal portion (25) projects in a cantilevered manner with respect to the cavity (5), elastically deforming the bridge sheet metal portion (25) by a pressing action to displace the bridge sheet metal portion (25) from the resting condition, to release the clip (1) from the metal bar (2).
24. Process according to claim 21, wherein, in order to assume the second position, the bridge sheet metal portion (25) is pressed and displaced towards the cavity (5).
25. Process according to claim 23 or 24, wherein the bridge sheet metal portion (25) is initially in a curved configuration and is pressed to assume a flexed configuration in the cavity (5).
26. Process according to any one of the preceding claims 23 to 25, wherein initially said bridge sheet metal portion (25) is in a first position corresponding to said resting condition in absence of a pressing action, and, when said bridge sheet metal portion (25) is pressed, it is pressed to end-of-stroke until assuming a second unstable position of loading, and wherein, passing between said first position and said second position, said clip (1) is adapted to further assume an unstable intermediate position, in the intermediate position the bridge sheet metal portion being subjected to compression.
27. Process according to claim 26, wherein, when said portion (25) is pressed completely in the second position, said vibration or a click of the bridge sheet metal portion (25) is generated, said vibration or said click being perceptible by touch by a user.
28. Process according to claim 26 or 27, wherein, when said bridge sheet metal portion (25) is in the second position, said bridge sheet metal portion (25) is in a condition suitable for release from the metal bar (2).
29. Process according to any one of the claims 26 to 28, wherein when the clip (1) is inserted in the slit (4) of the metal bar (2) for engaging the metal bar (2), said bridge sheet metal portion (25) assumes the unstable intermediate position.
30. Process according to any one of the claims 23 to 29, wherein the metal bar has a slit (4), the bridge sheet metal portion (25) of the clip (1) being adapted to be removably engaged to the slit, and wherein the slit (4) has a shape or profile complementary to a profile of the clip and allows an univocal insertion of the clip (1) in the slit (4).

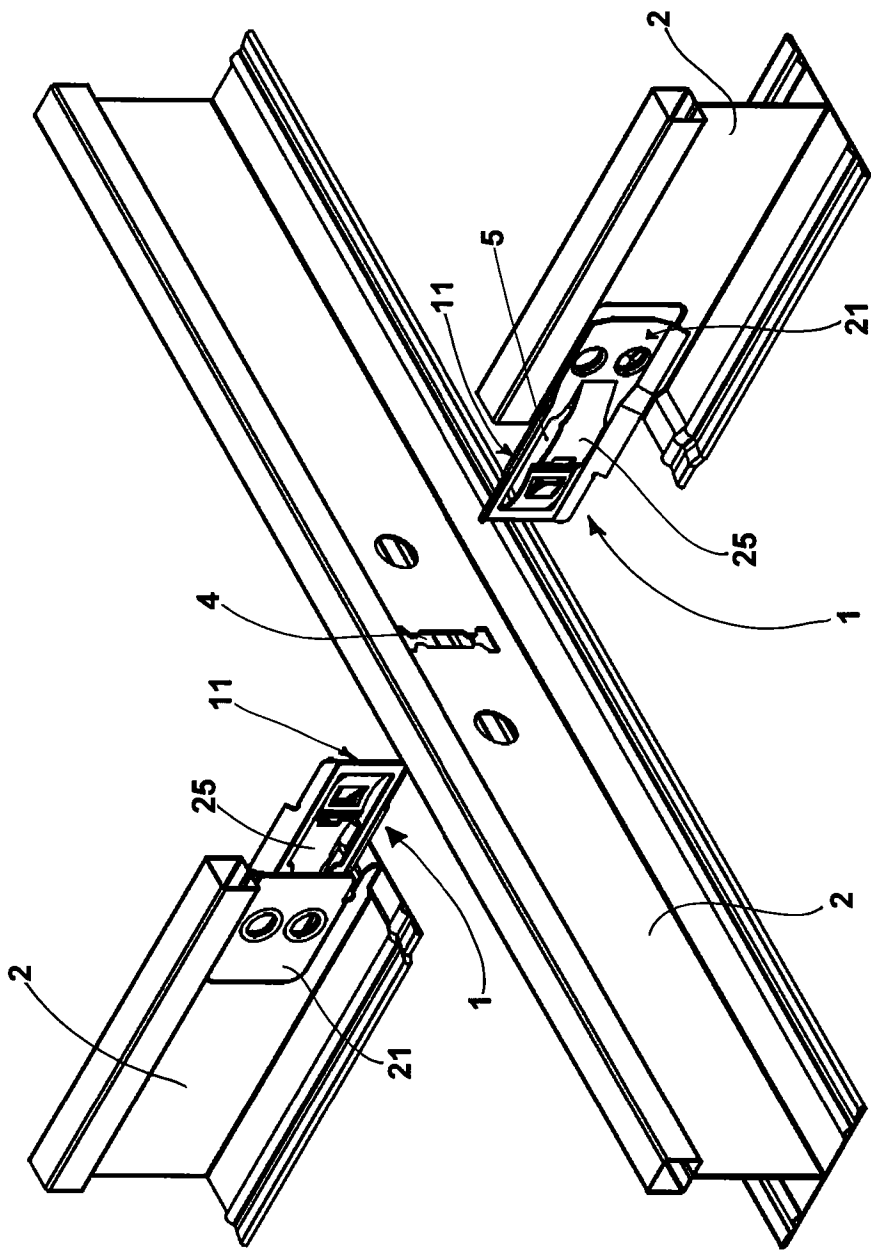


FIG. 1

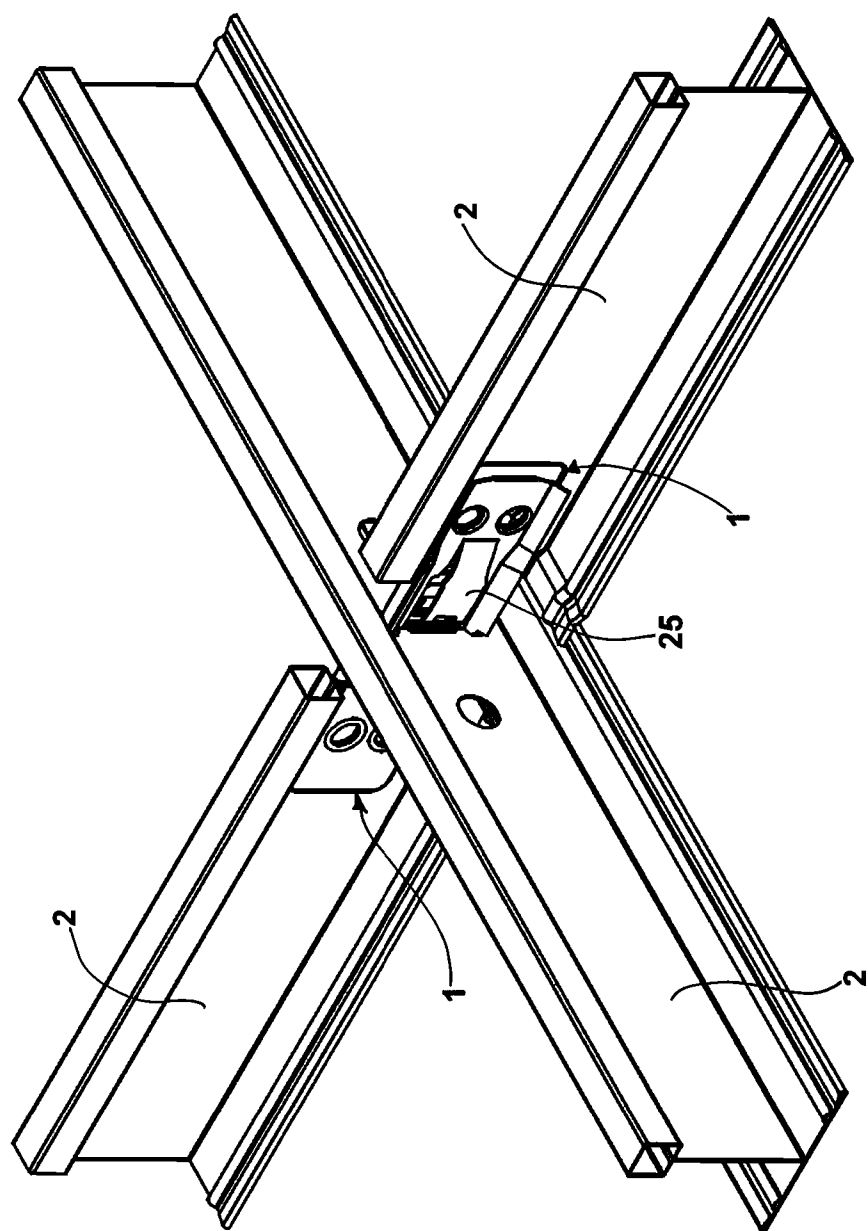


FIG. 2

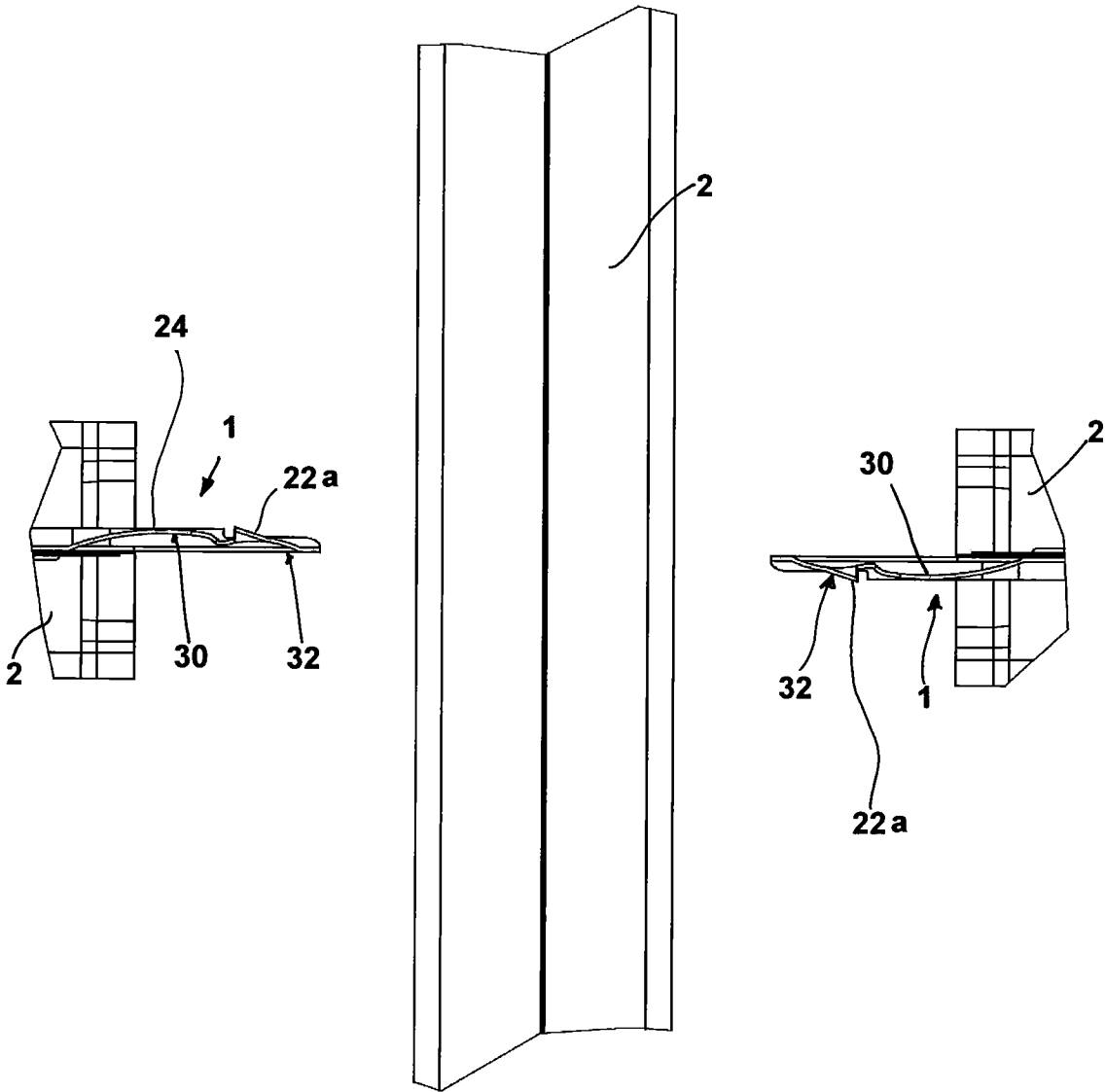
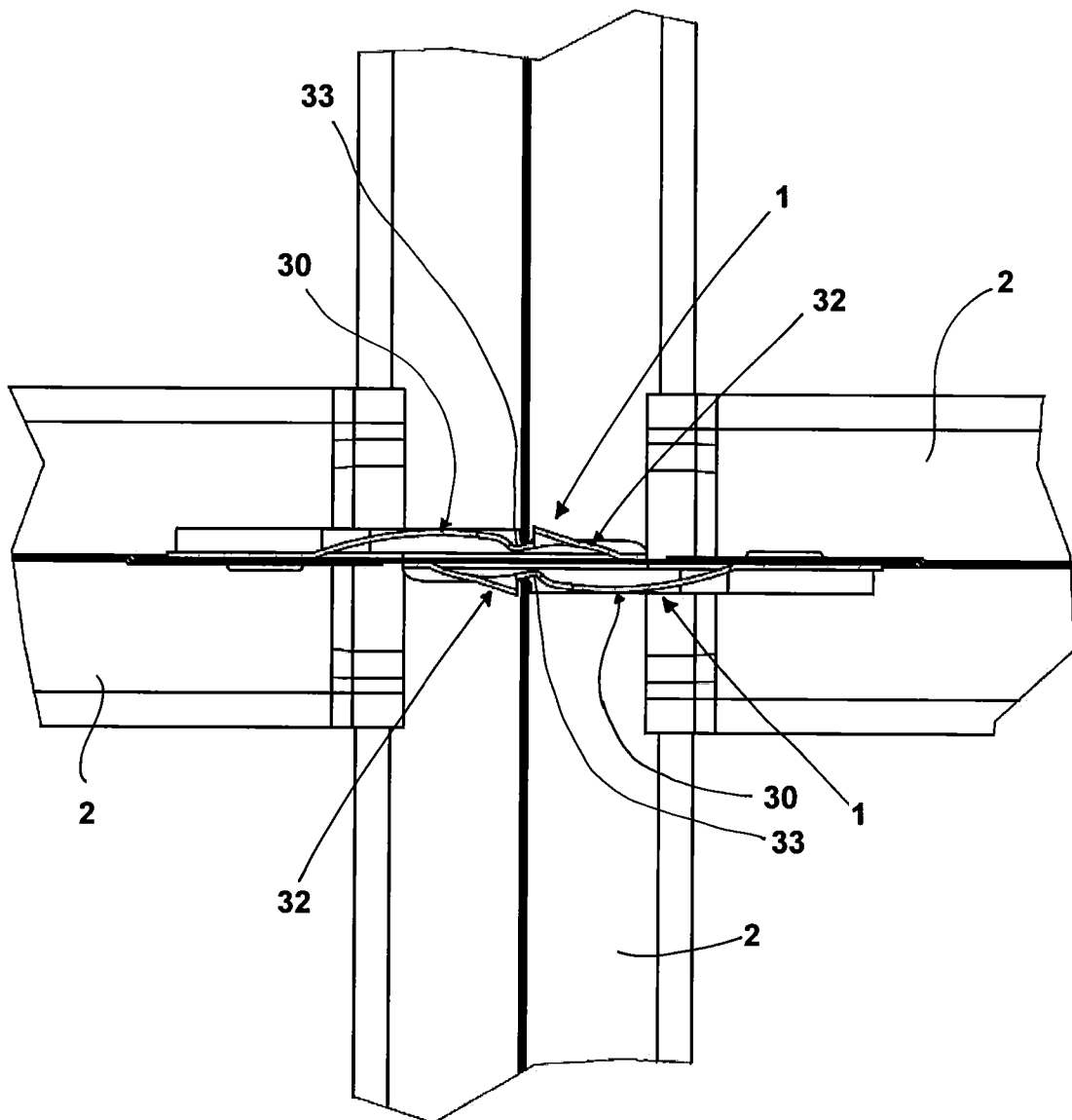


FIG. 3

**FIG. 4**

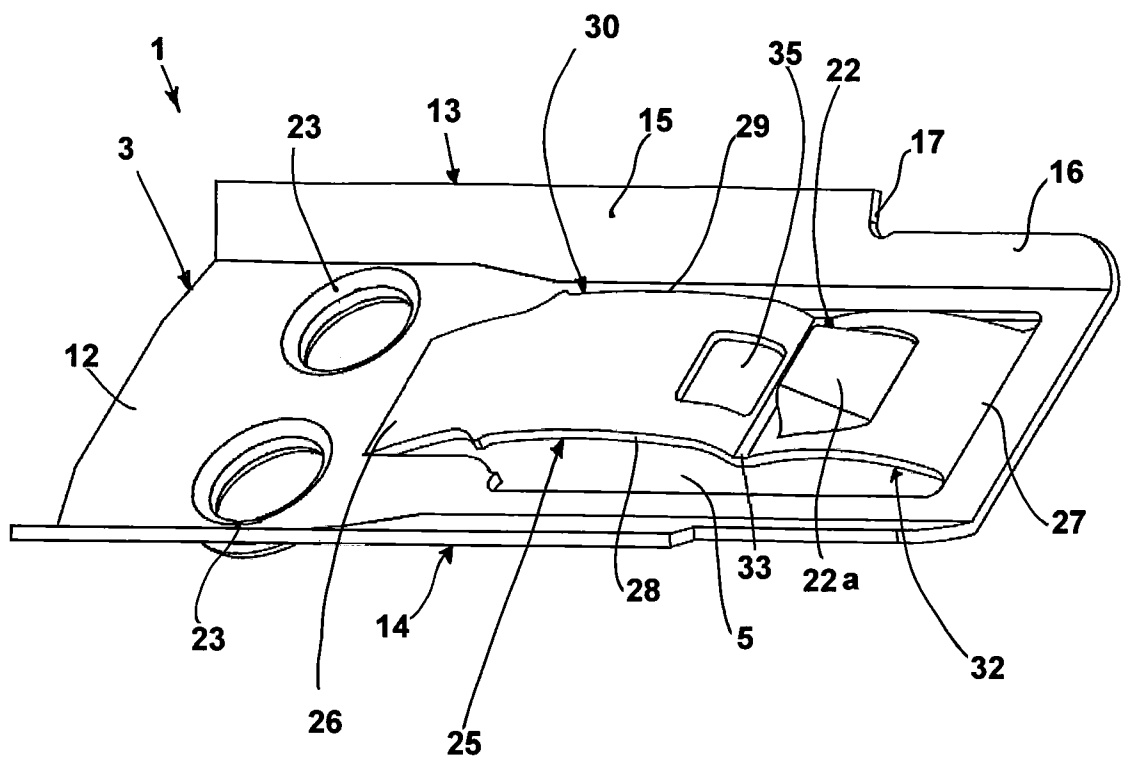


FIG. 5

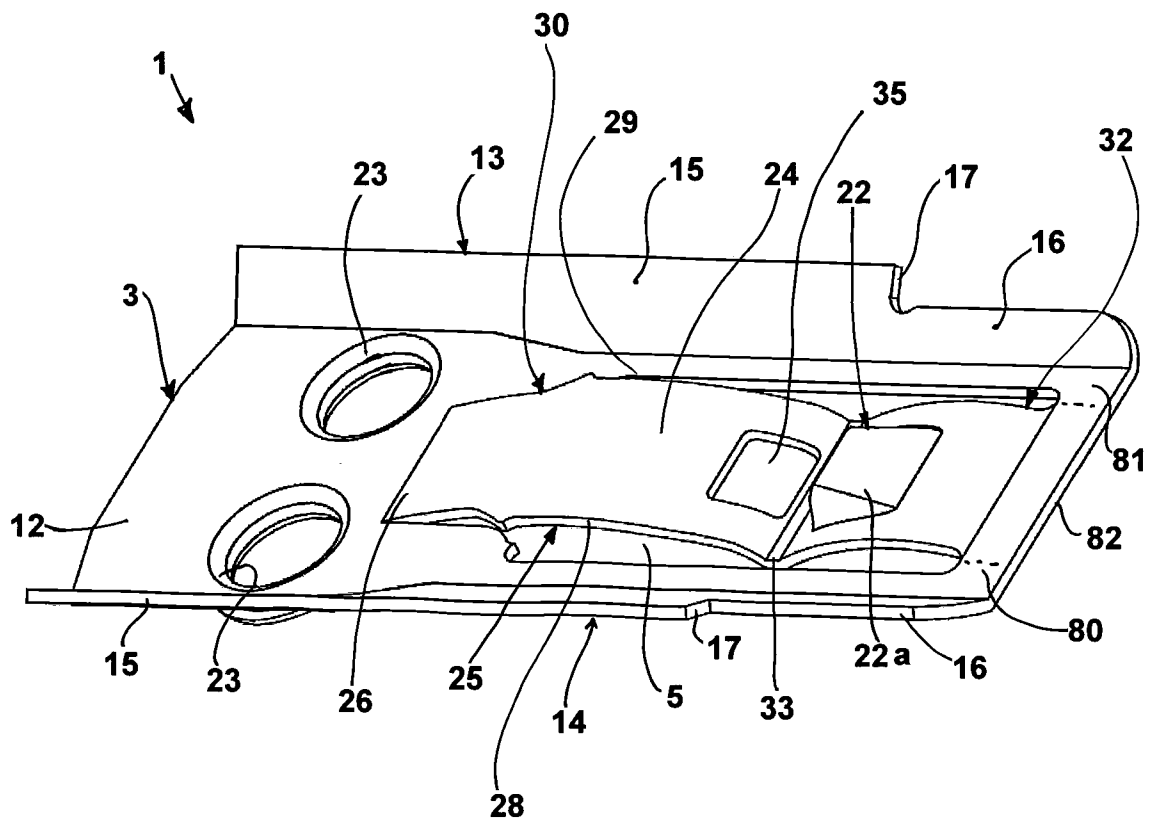


FIG. 6

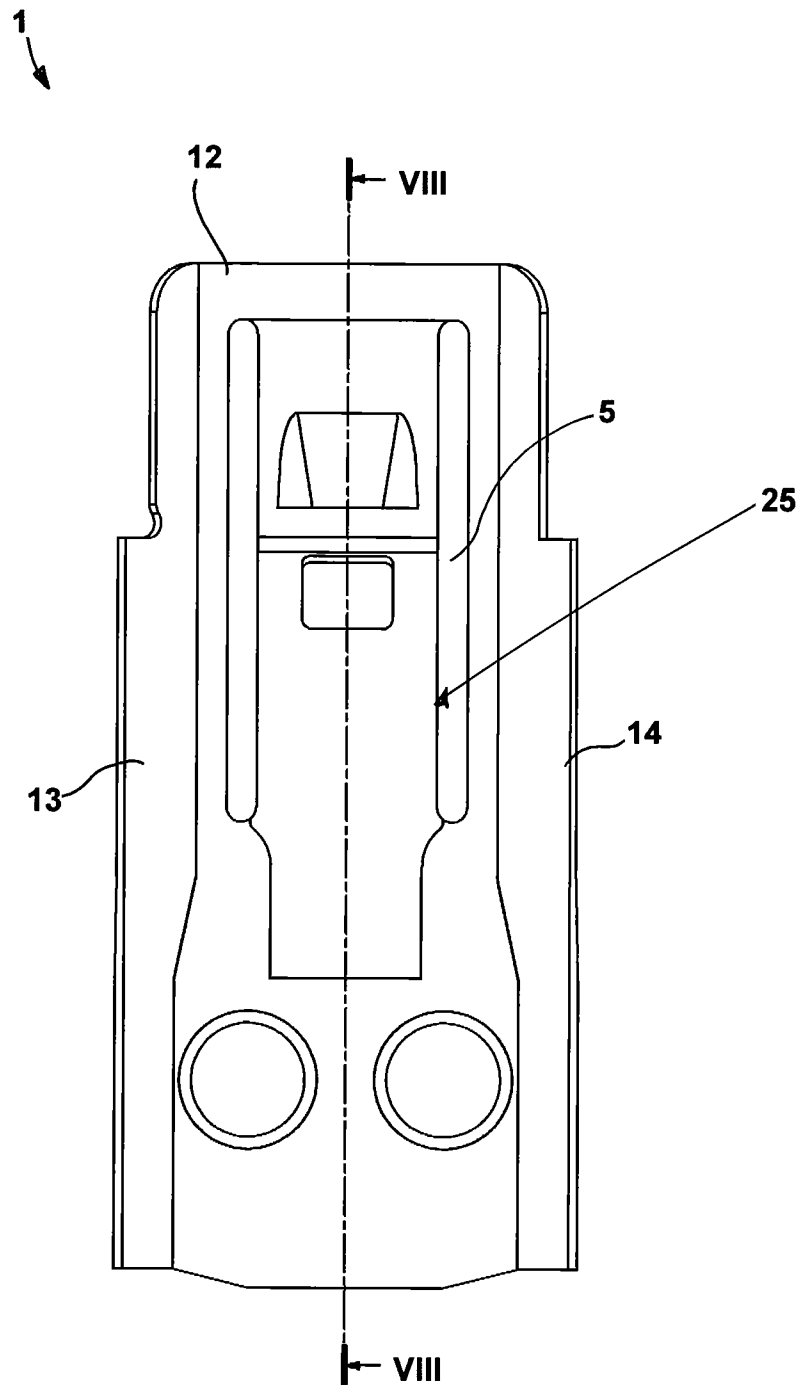


FIG. 7

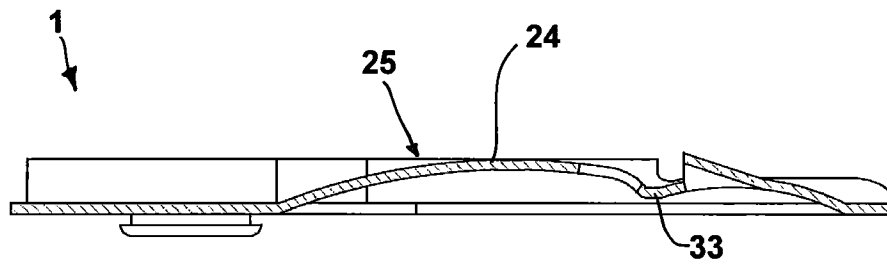


FIG. 8

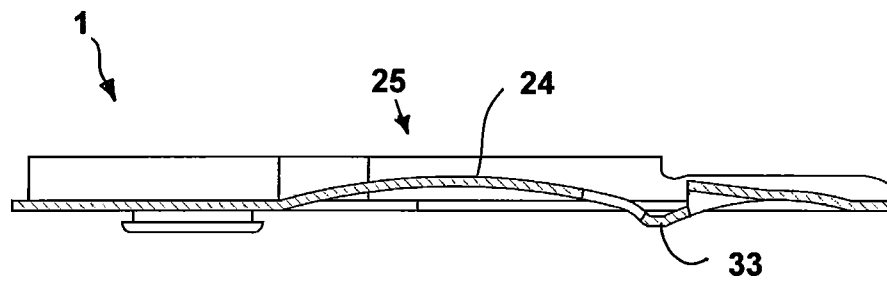


FIG. 9

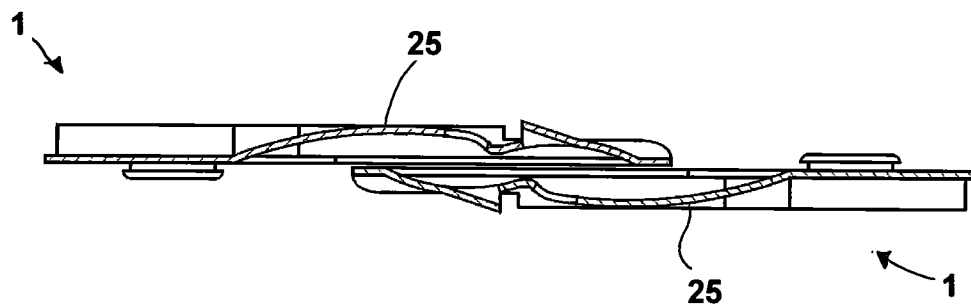


FIG. 10

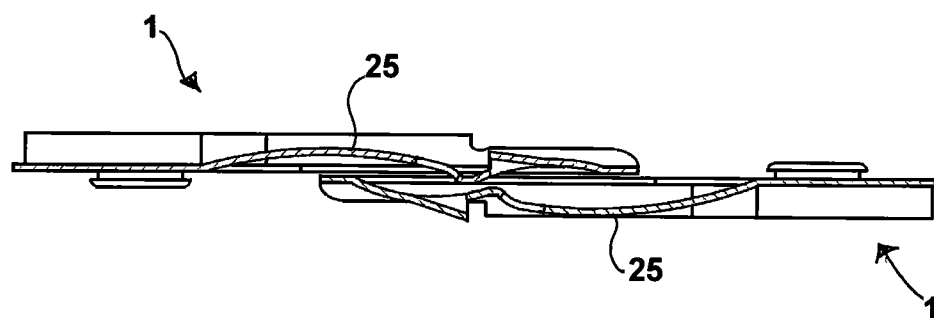


FIG. 11

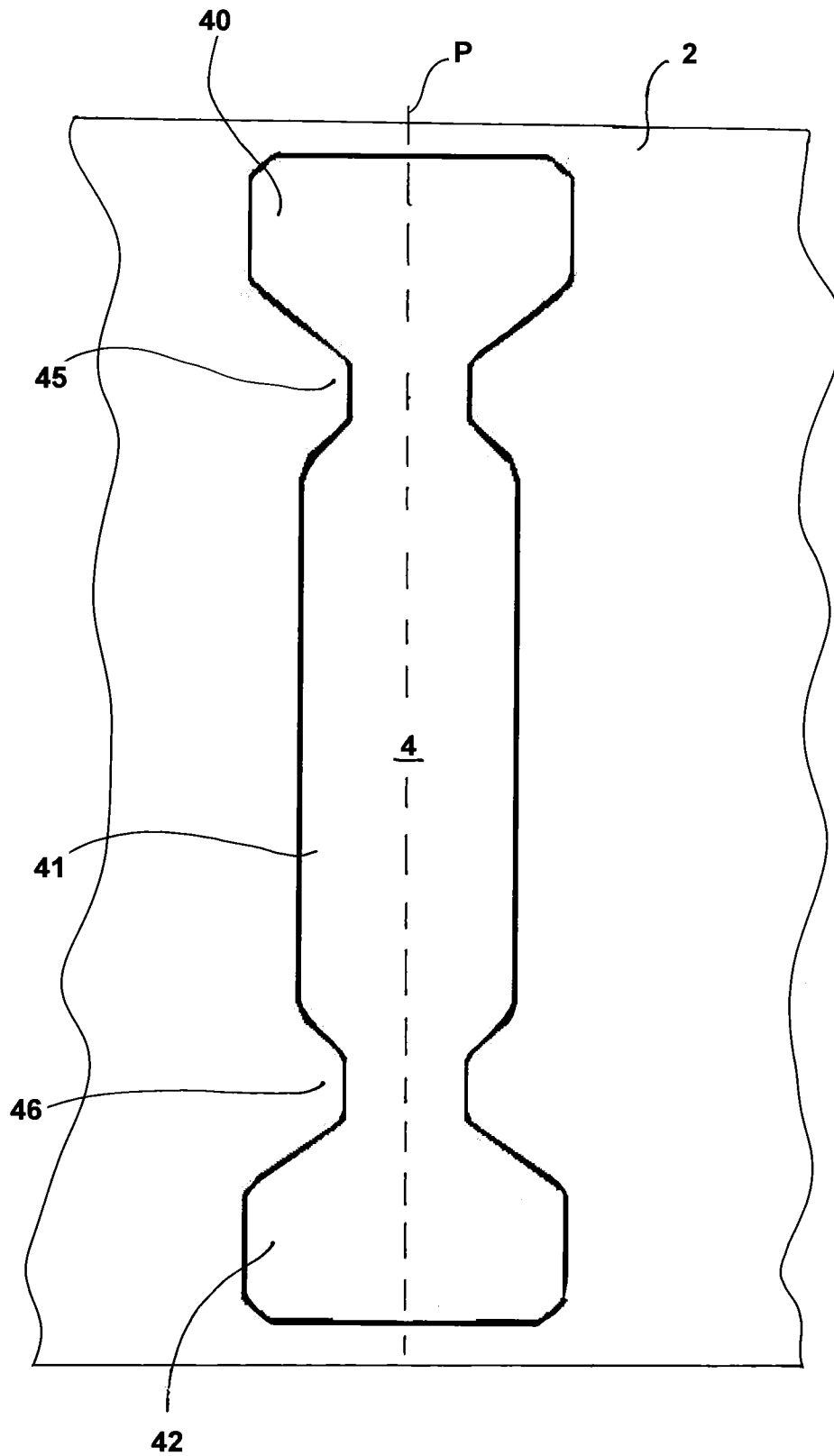


FIG. 12

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2012/052560

A. CLASSIFICATION OF SUBJECT MATTER

INV. E04B9/12

ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

E04B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EP0-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2 908 059 A (ANGLADA DOMENECH GERARDO ET AL) 13 October 1959 (1959-10-13) column 4, line 47 - column 5, line 21; figures 7-10 -----	1-9
X	US 2002/112424 A1 (ZABOROWSKI STANISLAW [CA]) 22 August 2002 (2002-08-22) paragraph [0060]; figures 8-9 -----	1-4,7, 16,17, 23-26, 28-30
X	US 4 021 986 A (MCCALL FRANCIS L ET AL) 10 May 1977 (1977-05-10) -----	1-4,6-9, 16,17, 20,22
Y	page 8, column 3, line 41 - line 57 ----- -/--	14,15, 18,19

☒ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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"O" document referring to an oral disclosure, use, exhibition or other means

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"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

19 February 2013

Date of mailing of the international search report

25/02/2013

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Demeester, Jan

INTERNATIONAL SEARCH REPORT

International application No

PCT/IB2012/052560

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2012/052560

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			US 2003192268 A1	16-10-2003

US 4021986	A	10-05-1977	NONE	

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			US 2012085060 A1	12-04-2012
