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(54) **Joist for formwork**

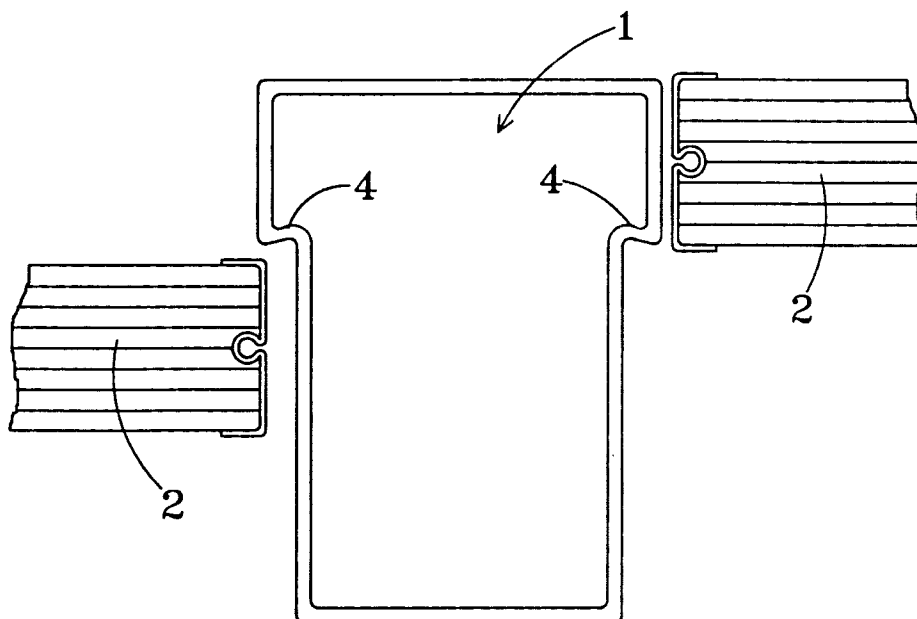
(57) The joist for formwork (1) is characterized in that its cross section comprises a part of more thickness and a part of smaller thickness, forming a T-shaped profile.

It also comprises means (A, B) for its coupling to the joists (1) adjacent to it in longitudinal direction, con-

stituted by a first coupling element (A), provided at one end of the joist and provided with a hole (14), and a second coupling element (B), provided at the other end of the joist and provided with a pin.

A joist is provided that facilitates the disassembly, since it only has a small part of its vertical wall in contact with the panel in the moment of the disassembly.

FIG. 1



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Description

The present invention refers to a joist for formwork, which serves for the supporting of some panels that receive the mass of concrete, the panels leaning directly on the joist or on some swivels placed next to it.

Different formwork systems that comprise joists are known for forming horizontal surfaces (floors or roofs). Habitually, the known formwork systems comprise a number of joists, some of which comprise swivels placed next to them. Wooden panels are placed on these swivels or directly on the joist, to receive the mass of concrete.

Once enough time has passed, the structure of the formwork is withdrawn by means of a plurality of removable jaws provided in the swivels. When these jaws are withdrawn, the swivels fall, the wooden panels being removed thereafter.

These systems are described in patents ES-471.247, of the same applicant that the present application, and ES-489.281, of Alfredo Cervera Planas. In these patents it is described the use of joists of rectangular or trapezoidal cross section.

The known joists have the drawback that they are difficult to disassemble, because some concrete always remains between the joist and the panels. In the case of the joists with trapezoidal cross section, this problem is smaller. However, they allow the accumulation of concrete.

Also, the known joists are difficult to transport due to their dimensions and weight, and because they can not be held easily.

On the other hand, when the panels lean directly on the joists, a wooden profile can be placed subject to the joist in their upper part, nailing the panels of the ends to this wooden profile for further security. This system has the drawback that the assembly of the joist and the wooden profile has a higher height than the joists in which the panels lean on the swivels. This causes that the panels do not rest perfectly in the foreseen manner.

Also, due to the height of the joist and the wooden profile very long nails are used that contact with the steel of the bottom of the joist.

Joists are also known that present at its ends means to couple lengthwise several of them, to adapt them to the different extensions of the concrete floors; by these means of longitudinal coupling, each one of the joists leans on another at one end and it supports a third joist at the opposed end.

The coupling means of the joists known up to now consist in two horizontal flanges that protrude each one from an end of the joist: the flange of one end of the joist has welded to it a vertical pin directed downwardly and the flange at the other end presents a complementary hole, so that in order to join two joists the pin of a joist is introduced in the hole of the adjacent joist.

However, it has been found that this system presents some drawbacks: in the first place, in some

cases the flanges that present the hole bend when the structure is disassembled, and this prevents or makes difficult the introduction of the pin in the following use of the joists.

Another drawback is that the mounted assembly necessarily has some play, because otherwise it would be practically impossible to carry out the coupling and its disassembly; this play can harm the stability and resistance of the structure.

Also, the support between two adjacent joists is limited to a flange that protrudes in horizontal direction from the end of the joist, so that the joint is not very resistant.

With the joist of the invention it is possible to solve the mentioned drawbacks, presenting other advantages that will be described.

The joist for formwork of the invention is characterized in that its cross section comprises a part of more thickness and a part of smaller thickness, forming a T-shaped profile.

Thanks to this feature, a joist is obtained that facilitates the disassembly, because it has only a small part of its vertical wall in contact with the panel in the moment of the disassembly. Also, it prevents the concrete that there is between the joist and the panel to slip by the whole vertical wall of the joist, soiling and producing concrete accumulations that difficult the disassembly after using the joist several times.

According to three alternative embodiments of the invention, the external wall of the part of greater thickness of the cross section of the joist forms an acute, right or obtuse angle with the joining portion between the part of more thickness and the part of smaller thickness. This way, a configuration is obtained that allows the operator to hold the joist, facilitating his placement and transport.

According to an embodiment of the invention, the joist comprises in its interior a profile, preferably of wood, in the area of greater thickness of the cross section of the joist, being this uncovered panel located in its upper part. This joist type will only be used when the panel leans directly on it and it is necessary to nail it.

The use of this joist type with a profile in its interior allows not to increase its height, preventing that the nails contact the steel of the bottom of the joist. Also, it allows that the panels lean on perfectly in the foreseen way and that the profile is protected against the blows.

The joist for formwork of the present invention is also characterized in that it comprises means for its coupling to the joists adjacent to it in longitudinal direction, constituted by a first coupling element, provided at one end of the joist and provided with a hole, and a second coupling element, provided at the other end of the joist and provided with a pin.

Advantageously, said first coupling element comprises a hollow seat that presents two lateral faces, constituted by extensions of the lateral walls of the joist, and an upper face, in which the mentioned hole is formed.

This coupling element does not undergo the risk of bending, so that the joist is more reliable and more du-

nable, and it does not require maintenance; also, the formwork structure may be dismantled quickly and with easiness.

Also, the seat offers a good support surface to the pin of the second coupling element, favouring therefore the absence of play in the mounted assembly.

Advantageously, the second coupling element comprises a hollow jut that presents two lateral faces, constituted by extensions of the lateral walls of the joist, and an lower face, from which the one mentioned pin protrudes.

This feature of the second coupling element reinforces even more the resistance of the joint; the front face of the jut of a joist can also support against the face of end of the adjacent joist, being guaranteed a greater rigidity of the mounted group this way.

In an embodiment of the invention, said hollow seat is formed for approximately the lower half of the corresponding end of the joist, and the hollow jut is formed for approximately the upper half of the corresponding end of the joist.

Preferably said hollow seat also presents an inclined front face, so that the seat is tapered toward its lower part; this way, a free area is created in the lower part of the joint that allows that two adjacent joists can be coupled and disconnect swivelling at least one of them respect to the other one, which facilitates both operations.

Also preferably, the hole formed in the upper face of the seat is slightly elongate in the longitudinal direction of the joist; thanks to this feature, the pin is introduced easily in the hole even with the swivelling movement that has been described. However, the elongate form of the hole does not involve a possibility of play in the mounted joint, thanks to the complementary form of the seat and the jut that leans on it.

In a favourite embodiment, the joist also comprises, in the part of its lower wall located under said seat, a hole and a drainage tube that facilitate the elimination of water or concrete that can penetrate inside the joist through the coupling hole.

According to another feature of the invention, the end face of the joist that is below the mentioned jut is inclined; this inclination collaborates in defining the free area in the lower part of the joint that has already been mentioned.

In an embodiment, the pin is fixed to the lower face of the jut; alternatively, the pin can be fixed to the upper wall of the joist and cross the lower face of the jut, so that its resistance is increased.

The end of this pin is advantageously frustoconical, and its tip can be rounded, so that its introduction is facilitated in the corresponding coupling hole.

For a best understanding of what is described in the present specification, some drawings are enclosed which, only by way of example, an embodiment of the joist is represented.

In this drawings,

figure 1 is an elevation view of a first embodiment of the joist of the invention, in which it have also been represented a couple of panels that lean on corresponding joists;

figure 2 is an elevation view of a second embodiment of the joist of the invention, in which a panel has also been represented which leans directly on the joist;

figures 3 and 4 are perspective views of a joist of the invention in formwork position with their swivels; figure 5 is a perspective view which represents an joist according to the invention, in which is appreciated mainly one of the two ends;

figure 6 is a perspective view, from below, of the end of the joist that is not clearly visible in figure 5; and figure 7 is a section view of two coupled joists.

As may be seen in figure 1, in which a first embodiment of the joist 1 of the invention has been represented, the cross section of it has substantially a T-shape cross section. This first embodiment is used when the panels 2 lean on swivels 5 (figures 3 and 4) disposed next to the joist 1. The use of these swivels 5 is described in patent ES-471.247 mentioned previously.

In the embodiment represented in the figures, the external wall of the part of greater thickness of the cross section of the joist 1 forms an acute angle with the joining portion 4 between the part of greater thickness and the part of smaller thickness. The panel 2 of the right of the figure 1 is represented in the formwork position, while the panel 2 of the left is in disassembly position.

As has been mentioned previously, in two alternative embodiments of the joist of the invention, the external wall of the part of greater thickness of the cross section of the joist forms a right or obtuse angle with the joining portion between the part of greater thickness and the part of smaller thickness.

In figure 2 a second embodiment of the joist 1 of the invention is represented. In this embodiment, the joist 1 comprises in its interior a wooden profile 3 in the upper part of it, so that, in the part of greater thickness. As may be appreciated in this figure, this profile 3 is discovered in its upper part.

This joist 1 is only used when the panel 2 leans totally on it and to nail it in the joist 1. It should be indicated that the first embodiment of the joist, represented in figure 1, could also be used in the case that the panel 2 leans totally on the joist 1, when it is not necessary to nail the panel to the joist.

As it has been said previously, a joist 1 is provided that allows an easier disassembly. This is provided thanks to only a small part of their vertical wall is in contact with the panel in the moment of the disassembly. Also, it prevents the concrete that there are between the joist and the panel to slip by the whole vertical wall of the joist, dirtying and producing concrete accumulations that difficult the disassembly after using the joist several times.

The formwork process is not described with detail since it is known from the patents mentioned previously and it is not the object of the present invention.

A joist 1 according to the invention is represented in figure 5. It is constituted by a hollow bar, with T-shape cross section that presents some elements A and B for the coupling with the adjacent joists in longitudinal direction, each one located in an end of the joist and represented with detail in figures 5 and 6, respectively.

The element A is constituted by a hollow seat 10 that protrudes from the corresponding end face 11 of the joist; the seat 10 is formed by two lateral parallel faces 12, constituted by continuations of the lateral walls 30 of the joist, and an upper face 13, in which is practised a hole 14 that will house the pin of the other coupling element B. This hole 14, as may be seen in the figure, is slightly elongate in the longitudinal direction of the joist.

The front face 15 of the seat is inclined, to define a free area in the lower part of the joint, like it will be described later with reference to figure 7.

The element B (figure 6) is constituted by a hollow jut 20 that protrudes from the corresponding end face 21 of the joist; this end face 21 is also inclined, like it will be explained later.

The jut 20 is formed by corresponding parallel lateral faces 22, constituted by continuations of the lateral walls 30 of the joist, and an lower face 23 from which the pin 24 to lodge, in assembly situation, in the hole 14 of the adjacent joist. A substantially vertical front face 15 completes the jut 20.

Figure 7 shows two joists 1a and 1b in section in coupling situation.

As may be appreciated, in coupling position the pin 24 is inserted in the hole 14, the lower face 23 of the jut 20 is leaning on the upper face 13 of the seat 10, and the front face 25 of the jut of the joist 1b is next to the end face 11 of the joist 1a.

The front face 15 of the seat of the joist 1a and the end face 21 of the joist 1b, inclined, define between both a notch or free area 40, thanks to which the two joists 1a and 1b can be coupled and separated swivelling one respect to the other, in the sense indicated by the arrows in figure 7. In this case, the hole 14 allows the crossing of the pin 24 thanks to its slightly elongate form.

In figure 7 it may be seen also that, in this embodiment, the pin 24 is welded to the upper wall 50 of the joist and it crosses the lower face 23 of the corresponding jut.

Optionally (figure 7), in the lower wall 6, in the area under the coupling hole 13, a hole 16 and a drainage tube 17 can be provided to facilitate the elimination of water or concrete.

From figure 7 it may be deduced that, thanks to the features of the invention, the coupling of the joists 1a, 1b do not present any play and, however, it is easy and quick of to mount and to dismount.

Although reference has been made to a concrete embodiment of the invention, it is evident for a person

skilled in the art that the described joist is susceptible of numerous variations and modifications, and that all the mentioned details can be substituted by other technically equivalent ones, without departing from the protection scope defined by the enclosed claims.

Claims

1. Joist for formwork (1), which serves for supporting some panels (2) that receive the mass of concrete, the panels leaning directly on the joist (1) or on some swivels (5) placed next to the joist (1), characterized in that its cross section comprises a part of greater thickness and a part of smaller thickness, forming a T-shaped profile.
2. Joist according to claim 1, characterized in that the external wall of the part of greater thickness of the cross section of the joist forms an acute angle with the joining portion (4) between the part of greater thickness and the part of smaller thickness.
3. Joist according to claim 1, characterized in that the external wall of the part of greater thickness of the cross section of the joist forms a right angle with the joining portion (4) between the part of greater thickness and the part of smaller thickness.
4. Joist according to claim 1, characterized in that the external wall of the part of greater thickness of the cross section of the joist forms an obtuse angle with the joining portion (4) between the part of greater thickness and the part of smaller thickness.
5. Joist according to any of the previous claims, characterized in that it comprises inside it a wooden profile (3) in the area of greater thickness of the cross section of the joist, this profile being open at its upper part.
6. Joist according to claim 1, characterized in that it comprises means (A, B) for its coupling to the joists (1) adjacent to it in longitudinal direction, constituted by a first coupling element (A), provided at one end of the joist and provided with a hole (14), and a second coupling element (B), provided at the other end of the joist and provided with a pin.
7. Joist according to claim 6, characterized in that said first coupling element (A) comprises a hollow seat (10) that presents two lateral faces (12), constituted by extensions of the lateral walls (30) of the joist, and an upper face (13), in which the mentioned hole is formed (14).
8. Joist according to claim 6, characterized in that said second coupling element (B) comprises a hollow jut

(20) that presents two lateral faces (22), constituted by extensions of the lateral walls (30) of the joist, and an lower face (23), from which said pin (24) protrudes.

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9. Joist according to claims 6 and 7, characterized in that this hollow seat (10) is formed by approximately the lower half of the corresponding end of the joist, and in that this hollow jut (20) is formed by approximately the upper half of the corresponding end of the joist. 10
10. Joist according to any of claims 6 to 8, characterized in that said hollow seat (10) also presents an inclined front face (21), so that the seat is tapered toward its lower part. 15
11. Joist according to any of claims 6 to 9, characterized in that the hole (14) formed in the upper face of the seat (10) is slightly elongate in the longitudinal direction of the joist. 20
12. Joist according to anyone of claims 6 to 10, characterized in that it also comprises, in the part of its lower wall located under said seat (10), a hole (16) and a drainage tube (17). 25
13. Joist according to claims 7 or 8, characterized in that the front face (15) of the joist that is below said jut (20) is inclined. 30
14. Joist according to any of claims 7, 8 or 12, characterized in that said pin (24) is fixed to the lower face (23) of the jut (20). 35
15. Joist according to any of claims 7, 9 or 12, characterized in that said pin (24) is fixed to the upper wall of the joist and it crosses the lower face (23) of the jut (20). 40
16. Joist according to anyone of claims 7, 8, 12, 13 or 14, characterized in that the end of said pin (24) is frustoconical. 45
17. Joist according to anyone of claims 7, 8, 12, 13, 14 or 15, characterized in that the tip of said pin (24) is rounded. 50

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FIG. 1

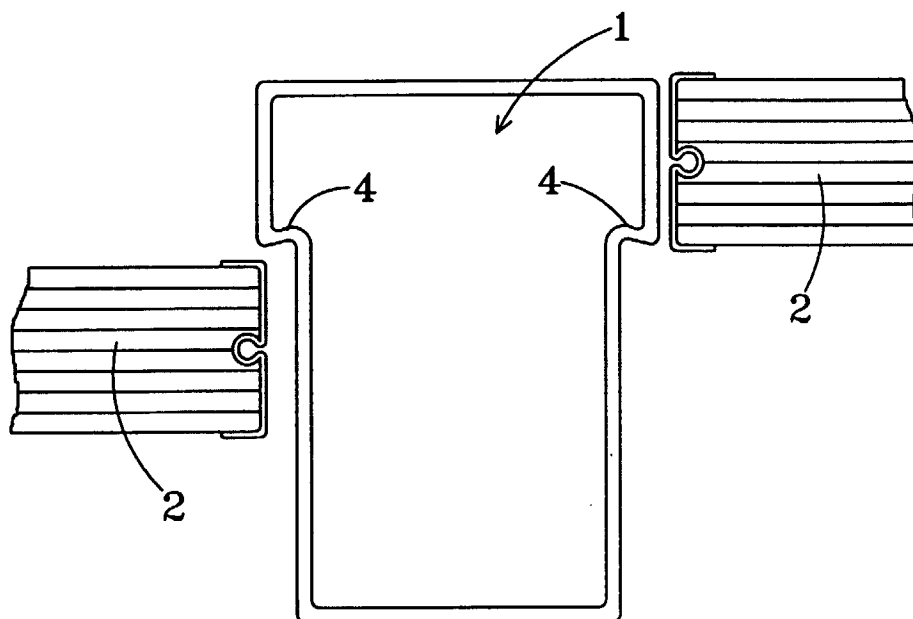
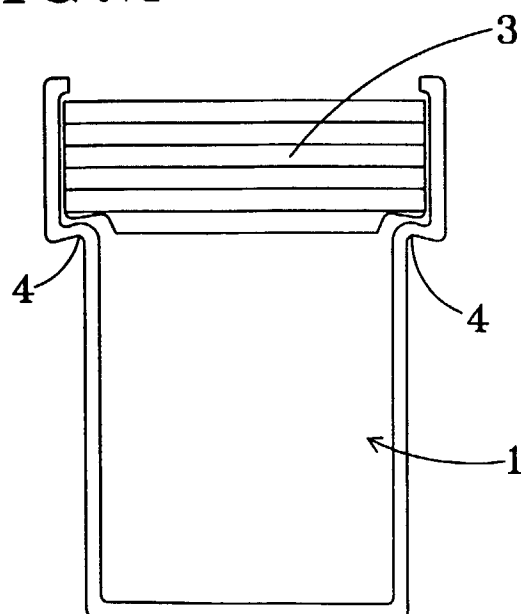
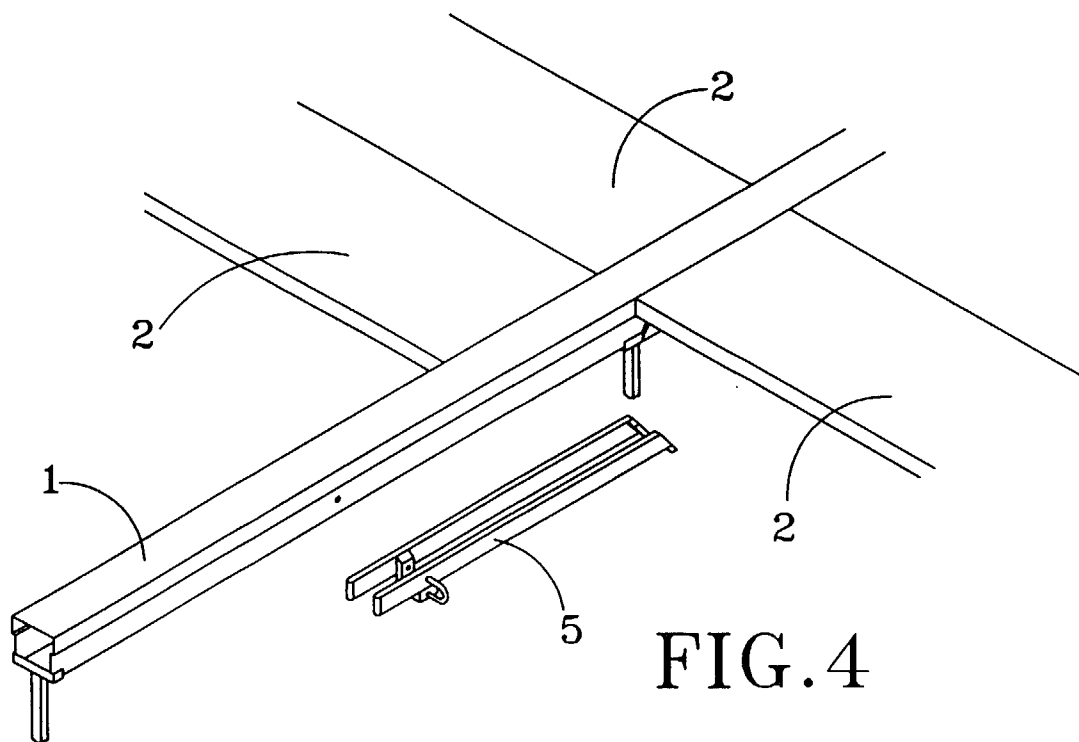
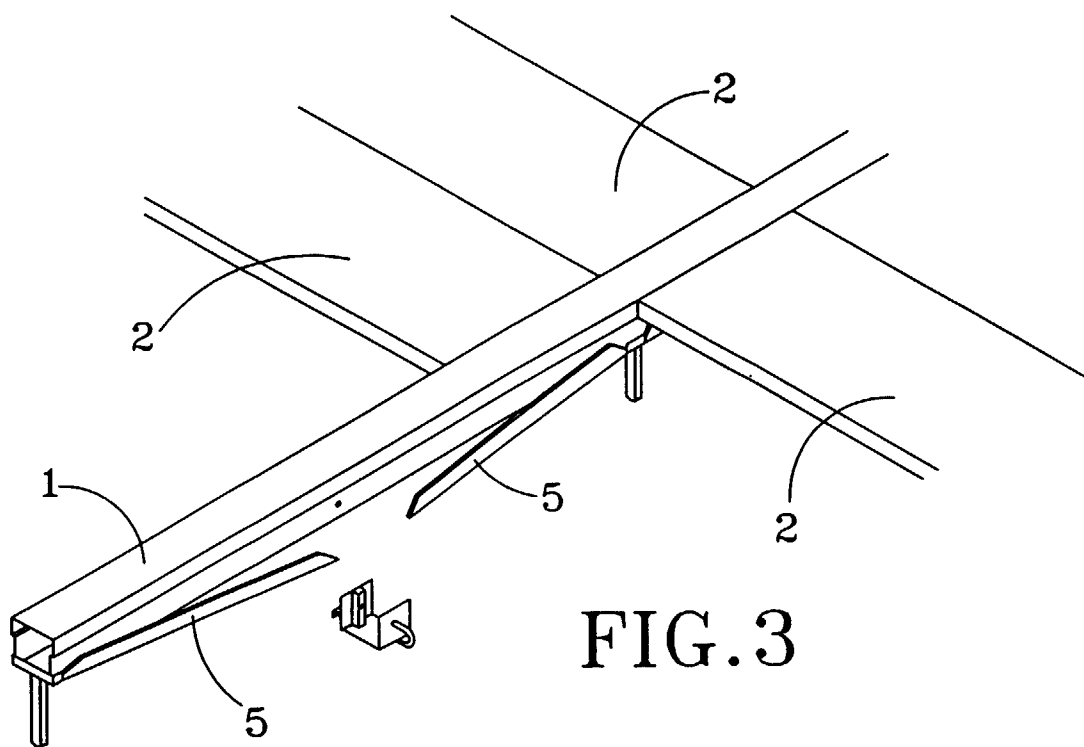


FIG. 2





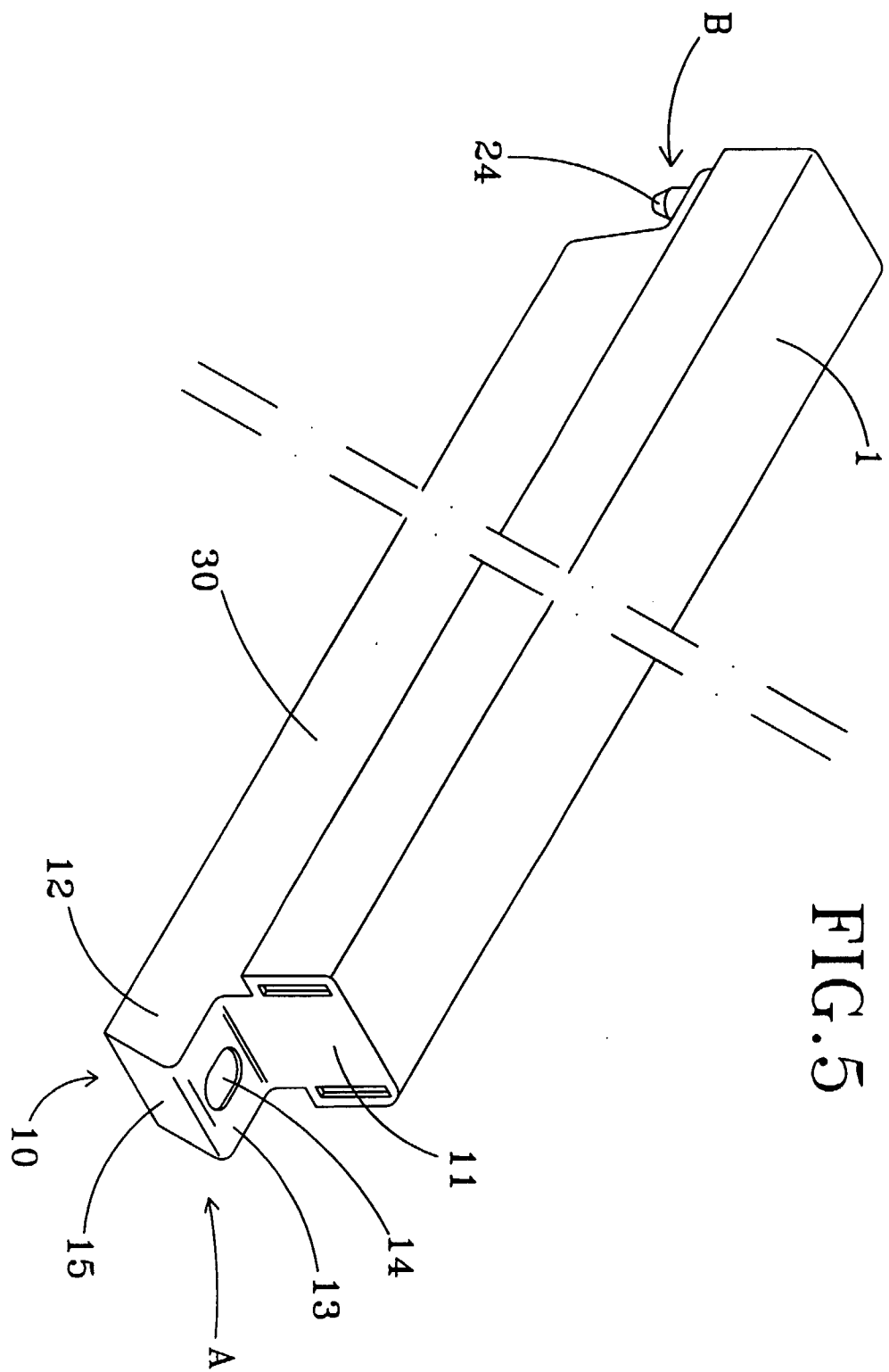


FIG. 6

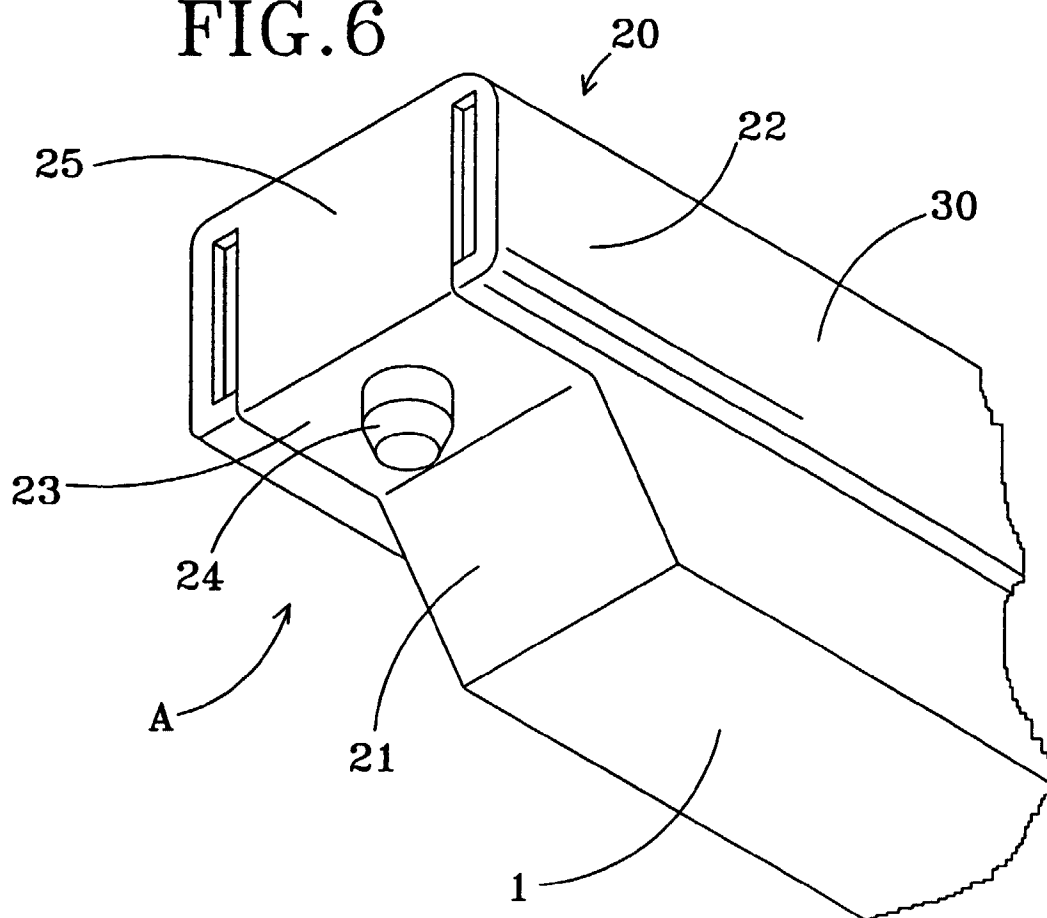
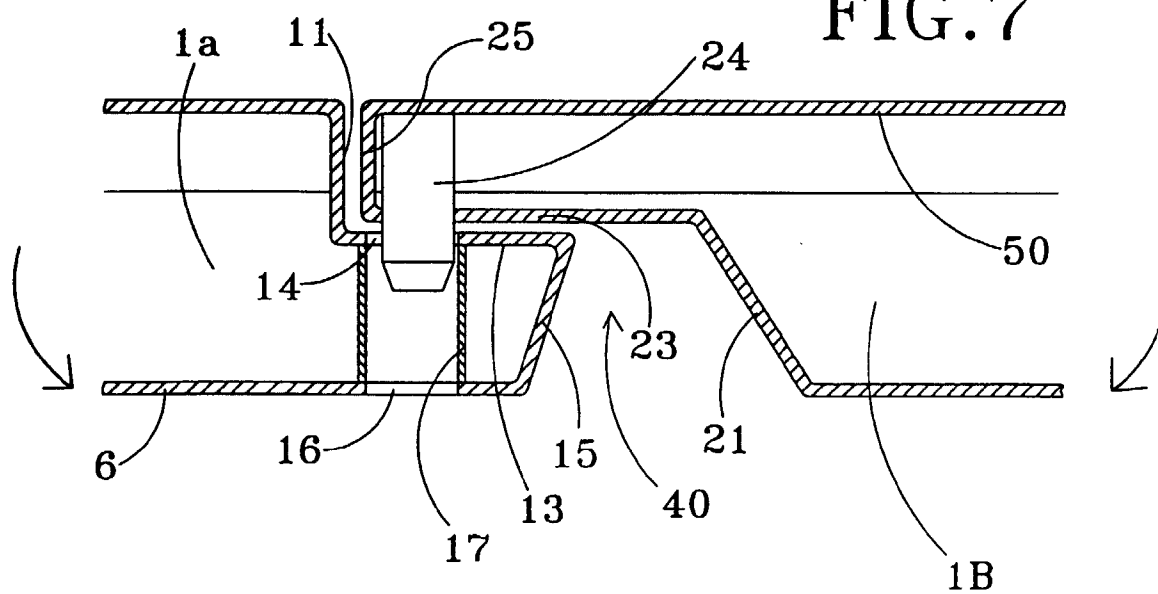


FIG. 7





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 98 50 0084

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 279 049 A (HOLLMANN) 24 August 1988 * claims; figures *	1,3,5	E04G11/50
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A	DE 89 07 860 U (ROSE) 10 August 1989		
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A	US 3 431 694 A (HUNNEBECK) 11 March 1969		TECHNICAL FIELDS SEARCHED (Int.Cl.6)
A	FR 1 460 514 A (BETONBAU) 8 February 1967		E04G
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 13 July 1998	Examiner Vijverman, W
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document		T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document	

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