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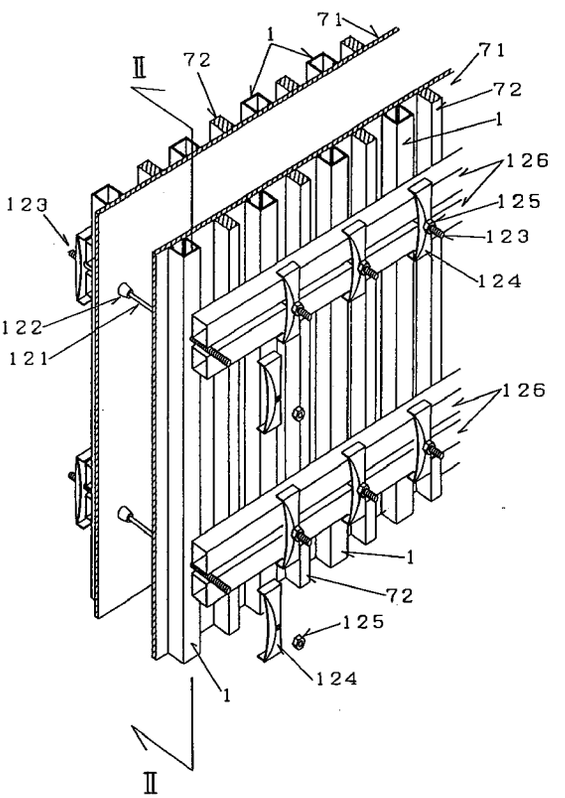
(54) Concrete form deformation preventing member and method of assembling concrete form with the same

(57) A concrete form deformation preventing member consists of a bar having a substantially C-shaped cross section and comprising a main plate portion (2) which is flat at least on its surface and a horizontal pair of strip-shaped side plate portions (3a, 3b) extending from both sides of the main plate portion toward the rear surface side perpendicularly to the main plate portion (2), and through holes (5) are provided longitudinally along the cross-directional center of the main plate portion (2) at prescribed pitches. In assembling of a concrete form, both end portions of a spacing fixture (122, 122, 123) for fixing a pair of form panels (71, 72) to each other while spacing the same outwardly extending beyond the pair of form panels (71, 72) are inserted in the through holes (5) and the rear surface of the main plate portion (2) is pressed on both end portions of the spacing fixture, whereby open ends of the pair of side plate portions (3a, 3b) come into contact with the rear surfaces of said form panels (71, 72), for preventing deformation of the form panels (71, 72).

FIG. 1



EP 0 758 043 A1

Description

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to a concrete form deformation preventing member for preventing deformation of a form panel which is employed for concrete placing or molding of concrete secondary products in construction or civil engineering works, for example, in assembling of a concrete form, and a method of assembling a concrete form with the same.

Description of the Background Art

In general, a wood form panel prepared by nailing crossbars to a plywood board and a metal form panel prepared by fixing metal ribs to an iron plate or an aluminum plate are known as such form panels. As a typical example of the conventional wood form panel, Fig. 8A shows form panels 70, each of which is prepared by fastening and fixing a flat plate 71 consisting of plywood to a plurality of reinforcing crossbars 72 with nails 73. In order to assemble a concrete form with such form panels 70, the reinforcing crossbars 72 of the adjacent form panels 70 are fastened to each other with nails 73, thereby mutually coupling/fixing the form panels 70 with/to each other. Fig. 8B shows an exemplary concrete form having a cross concrete form portion 74, which is assembled in the aforementioned manner. The flat plates 71 may be prepared from plastic plates, in place of plywood boards.

With reference to Figs. 9 to 11B, description is now made on an exemplary structure of a conventional concrete form which is assembled by fixing a pair of such form panels 70 to each other at a prescribed space through a concrete placing source. In this prior art, members which are mainly formed by separators 121, attachments 122 and clamping members 123 are employed as spacing fixtures for fixing the opposite form panels 70 to each other while spacing the same. As shown in Fig. 11A, each separator 121 has a pair of male screws 121a which are formed on both ends of a bar. Each male screw 121a fits with a female screw 122c which is provided on one end of each attachment 122 shown in Fig. 11B. A male screw 122d which is formed on the other end of the attachment 122 to be substantially coaxial with the female screw 122c passes through a spacing fixture mounting hole 76 provided in each form panel 70, so that an end of a substantially truncated-conical presser part 122a of resin which is engaged with the outer periphery of an attachment body part 122b comes into contact with a concrete placing surface of the form panel 70. A female screw 123a which is provided on one end of each clamping member 123 shown in Fig. 11C fits with the male screw 122d of the attachment 122, whereby the attachment 122 is clamped/fixed to the form panel 70.

A male screw 123b is provided on the other end of the clamping member 123, so that a pair of thin angular cylindrical form support members 126 of a metal are opposed to each other through each clamping member 123 by a support member 124 and a nut 125 which are mounted on the male screw 123b, thereby bridging a plurality of transversely arranged form panels 70 with each other.

However, the aforementioned method of assembling the conventional concrete form has the following problem: In the aforementioned method of assembling the conventional concrete form, each form panel is prepared by mounting vertical reinforcements 72 on a plywood board 71 having a width W of 900 mm at pitches (lengths P shown in Fig. 12) of about 300 mm, for example, as shown in Fig. 12. Therefore, spacing fixture mounting holes 76 and the vertical reinforcements 72 are at relatively large distances, and hence such plywood boards 71, which must be in a state shown in Fig. 10A, are deformed as shown in Fig. 10B, due to dispersion in clamping strength of the nuts 125 against the male screws 123b of the clamping members 123. Namely, although the distance between the opposite plywood boards 71 which is set by the separators 121 and the attachments 122 is maintained at a constant level, the plywood board 71 subjected to larger clamping force is outwardly swollen and that subjected to smaller clamping force is inwardly depressed if the nuts 125 fitting with the pairs of clamping members 123 for fastening/fixing the opposite form panels 70 to each other are different in clamping force from each other.

When the form panels are irregularized in the aforementioned manner, the surface of the molded concrete is also irregularized to exert a significant influence on subsequent execution. Consequently, the surface performance of concrete such as smoothness or surface finish is disadvantageously deteriorated.

In order to solve the aforementioned problem of the prior art, a pair of round pipes 127 may be interposed between each plywood board 71 and each thin angular cylindrical form support member 126 around both sides of each spacing fixture mounting hole 76 as shown in Fig. 13, for example. In this case, deformation of the plywood board 71 caused by clamping is suppressed to some extent. However, the round pipes 127 are in line contact with the surface of the plywood board 71, and hence the space between the contact lines of the pair of round pipes 127 with the plywood board 71 is increased. Thus, the effect for suppressing deformation of the plywood board 71 is insufficient.

In place of the round pipes 127, a pair of thin angular cylindrical pipes 128 may be employed as reinforcements for preventing deformation of the plywood board 71, as shown in Fig. 14. Such thin angular cylindrical pipes 128 are in surface contact with the surface of the plywood board 71, and the space between the contact portions of these pipes 128 can be minimized. Thus, the effect for preventing deformation of the plywood board 71 is remarkably improved as compared with the case

of employing the round pipes 127.

In this case, however, the thin angular cylindrical members 128 cannot be fixed until each transverse reinforcement (thin angular cylindrical form support member) 126 is fixed and clamped If these thin angular cylindrical pipes 128 are temporarily fixed for performing the assembling operation, the number of the reinforcements is increased and some parts are required for the temporary fixation, resulting in unpreferable problems in both of working efficiency and the material cost.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a concrete form deformation preventing member improving an effect of preventing deformation of a form panel in assembling of a concrete form without damaging workability and remarkably increasing the material cost.

In order to attain the aforementioned object, the concrete form deformation preventing member according to the present invention consists of a bar having a substantially C-shaped cross section and comprising a strip-shaped main plate portion which is flat at least on its surface, and a horizontal pair of strip-shaped side plate portions extending from both sides of the main plate portion toward the rear surface side perpendicularly to the main plate portion. Through holes are provided at the cross-directional center of the main plate portion of the bar at prescribed pitches along the longitudinal direction.

According to the inventive concrete form deformation preventing member having the aforementioned structure, the pitches of the through holes are equalized with those of spacing fixture mounting holes of a form panel to which the present invention is applied so that the spacing fixture mounting holes of the form panel and the through holes of the inventive concrete form deformation preventing member corresponding thereto are coaxial with each other, end portions of spacing fixtures are inserted in both of the spacing fixture mounting holes and the through holes and fastened by nuts or the like, whereby the fixtures can be so fixed that front ends of the side plate portions press the surface of the form panel from both sides of portions close to the spacing fixture mounting holes without separately providing temporary fixing means in particular. In relation to a line of spacing fixture mounting holes of the form panel, therefore, both sides of portions close to the spacing fixture mounting holes can be reliably pressed by only one bar, leading to such specific effects that working efficiency is extremely improved, the number of parts can be minimized and the material cost is not remarkably increased.

The pitches of the through holes in the inventive concrete form deformation preventing member are set substantially at integral times as long as 300 mm. This is because the pitches of the spacing fixture mounting holes of the form panel are defined to be set at integral times as long as 300 mm.

In consideration of dimensions of members for fastening/fixing the spacing fixtures, the width of the main plate portion of the inventive concrete form deformation preventing member is preferably set to be at least 35 mm and not more than 120 mm. No spaces for fastening/fixing the spacing fixtures are ensured if the width of the main plate portion is less than the above numerical range, while spaces between contact portions pressing both sides of the spacing fixture mounting holes of the form panel are so increased that the effect of preventing deformation cannot be sufficiently attained.

The inventive method of assembling a concrete form with the aforementioned concrete form deformation preventing member according to the present invention is adapted to insert both end portions of spacing fixtures outwardly projecting beyond a pair of opposite form panels in the through holes of the aforementioned concrete form deformation preventing member according to the present invention and pressing the rear surface of the main plate portion of the concrete form deformation preventing member on both end portions of the spacing fixtures, so that front ends of the pair of side plate portions come into contact with the rear surfaces of the form panels for preventing deformation of the form panels.

The concrete form deformation preventing member has a substantially C-shaped cross section and the pitches of the through holes provided in the main plate portion are equalized with those of the spacing fixture mounting holes provided in the form panels, whereby end portions of the spacing fixtures for fixing the pair of opposite form panels to each other while spacing the same can be inserted in the through holes so that the concrete form deformation preventing member can perform temporary fixation and fixation before and after fastening of the spacing fixtures respectively without separately providing independent means in particular. Therefore, the workability in assembling of the concrete form is improved as compared with the conventional method, while the effect of preventing deformation of the concrete form can be reliably attained without remarkably increasing the material cost.

In more concrete terms, the method of assembling a concrete form with the inventive concrete form deformation preventing member comprises the following steps: First, a plurality of pairs of form panels provided with spacing fixture mounting holes at the same pitches as those of through holes of the concrete form deformation preventing member in the longitudinal direction at axial centers are adjacently arranged in the cross direction, to be opposed to each other every pair for forming a concrete placing portion.

Then, a plurality of spacing fixtures for fixing the pairs of opposite form panels to each other while keeping the same at prescribed distances are inserted in opposite spacing fixture mounting holes of the opposite form panels and mounted for bridging the opposite pairs of form panels with each other. Thereafter both end portions of the plurality of mounted spacing fixtures out-

wardly projecting from the respective ones of the opposite pairs of form panels are inserted in the through holes while open ends of the side plate portions of the concrete form deformation preventing member are fastened/fixed by fastening means provided on both end portions of the respective ones of the spacing fixtures while pressing the rear surface of the main plate portion of the concrete form deformation preventing member.

The foregoing and other objects, features, aspects and advantages of the present invention will become more apparent from the following detailed description of the present invention when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a partially fragmented exploded perspective view showing a method of assembling a concrete form according to an embodiment of the present invention;

Fig. 2 is a sectional view taken along the line II - II in Fig. 1;

Fig. 3A is a partially fragmented perspective view of a concrete form deformation preventing member 1 employed in the embodiment of the present invention, and Fig. 3B is an enlarged cross sectional view along the center of a through hole 5 of the concrete form deformation preventing member 1;

Fig. 4 is a horizontal sectional view showing an assembled state of the concrete form in the embodiment of the present invention;

Fig. 5 is a partially fragmented exploded perspective view showing a method of assembling a concrete form according to another embodiment of the present invention;

Fig. 6 is a sectional view taken along the line VI - VI in Fig. 5;

Fig. 7 shows a horizontal section in Fig. 5;

Fig. 8A is a perspective view showing a state of coupling/fixing conventional wood form panels to each other by nailing, and Fig. 8B is a plan view showing a cross concrete form assembled with the form panels shown in Fig. 8A;

Fig. 9 is a partially fragmented perspective view showing a wood concrete form assembled by a conventional method;

Fig. 10A is a sectional view taken along the line X - X in Fig. 9, and Fig. 10B is a sectional view corresponding to Fig. 10A, showing form panels deformed by dispersion in clamping strength of nuts 125;

Figs. 11A to 11C illustrate respective elements of a generally employed spacing fixture in an exploded manner;

Fig. 12 is a perspective view showing a conventional typical wood form panel;

Fig. 13 is a plan view showing a conventional method of preventing deformation of a form panel with round pipe members;

Fig. 14 is a plan view showing a conventional method of preventing deformation of a form panel with thin angular pipe members; and

Fig. 15 is a perspective view showing a form panel already proposed in Japanese Patent Laying-Open No. 8-13792 (1996) by the inventor.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

An embodiment of the present invention is now described with reference to the drawings.

In this embodiment, the present invention is applied to assembling of the conventional wood concrete form described with reference to Figs. 11 to 14. In this embodiment, substantially C-shaped concrete form deformation preventing members 1 are mounted on positions between adjacent vertical reinforcements 72, where spacing fixture mounting holes 76 for receiving spacing fixtures consisting of separators 121, attachments 122 and fastening members 123 are arranged in parallel with the vertical reinforcements 72, as shown in Figs. 1 and 2.

Male screws 123b are provided on other ends of the fastening members 123, so that pars of thin angular cylindrical form support members 126 of a metal are fixed by support members 124 and nuts 125 which are mounted on the male screws 123b, to be opposed to each other through the respective fastening members 123 for bridging a plurality of transversely arranged form panels 70 with each other.

Each concrete form deformation preventing member 1 has a shape shown in Fig. 3A. Namely, the concrete form deformation preventing member 1 comprises a thin main plate portion 2 extending in the form of a strip, a pair of side plate portions 3a and 3b extending from both sides of the main plate portion 2 perpendicularly to the main plate portion 2, and a pair of inner extensions 4a and 4b inwardly extending from respective open ends of the side plate portions 3a and 3b substantially in parallel with the main plate portion 2. This concrete form deformation preventing member 1 has a substantially C-shaped cross section, as shown in Fig. 3B.

Through holes 5 are formed in the main plate portion 2 of the concrete form deformation preventing member 1 at pitches of 300 mm or 600 mm, i.e., integral times as long as 300 mm, in coincidence with the spacing fixture mounting holes of each form panel 70 to which the present invention is applied. The height (dimension h shown in Fig. 3B) of the side plate portions 3a and 3b is set to substantially coincide with that of the vertical reinforcements 72 of each form panel 70 to which the present invention is applied, and the width (dimension w shown in Fig. 3B) of the main plate portion 2 is so set that fastening portions on both ends of spacing fixtures for fixing the opposite form panels 70 to each other while spacing the same, i.e., the fastening members 123 or the like, can be inserted from the open

ends of the concrete form deformation preventing member 1. This dimension w is set in the range of 35 to 120 mm.

The pair of inner extensions 4a and 4b of each concrete form deformation preventing member 1 are provided for sufficiently ensuring contact areas with the surface of each form panel 70 or for improving bending strength of the concrete form deformation preventing member 1 itself, these inner extensions 4a and 4b may not necessarily be provided if the required strength is not so much high.

The material for the concrete form deformation preventing member 1 is prepared by molding a sheet metal or from a draw-molded member of fiber reinforced plastic, and this material is properly selected in response to the required strength. When a draw-molded member of fiber reinforced plastic is employed, its thickness must be at least 3 mm.

According to this embodiment, ends of the spacing fixtures for fixing the opposite form panels 70 to each other at a prescribed space can be mounted on the through holes 5 for fastening/fixing the same with the concrete form deformation preventing members 1 having substantially C-shaped cross sections, whereby the concrete form deformation preventing members 1 can be temporarily fixed by the spacing fixtures themselves in assembling of a concrete form, while the concrete form deformation preventing members 1 can also be clamped/fixed simultaneously with fastening/fixation of the spacing fixtures. Further, both sides of portions around the spacing fixture mounting holes 76 are pressed by the respective inner extensions 4a adn 4b of the pairs of side plate portions 3a and 3b, whereby portions immediately close to the spacing fixture mounting holes 76 can be reliably pressed as compared with the case of pressing the same by pairs of pipe members or the like. In case of fitting the nuts 125 with the male screws 123b of the fastening members 123 of the spacing fixtures, therefore, excessive clamping of the nuts 125 is prevented due to restriction by the height (dimension h) of the side plate portions 3a and 3b of the concrete form deformation preventing members 1. Consequently, the problem of dispersion in clamping strength of the respective nuts 125 on both ends of the spacing fixtures is solved, thereby preventing deformation of the form panels in the vicinity of the spacing fixture mounting holes 76, which has been problematic in the prior art. Following this, surface performance of molded concrete can be improved.

Another embodiment of the present invention is now described with reference to Figs. 5 to 7 and Fig. 15. In this embodiment, form deformation preventing members 1 according to the present invention are applied to assembling of a concrete form with a form panel 101 consisting of a fiber reinforced plastic compact having a shape shown in Fig. 15, which has already been proposed in Japanese Patent Laying-Open No. 8-13792 (1996) by the inventor.

Referring to Fig. 15, each form panel 101 employed in this embodiment comprises a front plate portion 103, a pair of strip-shaped side plate portions 104, and a pair of strip-shaped rear plate portions 105. Fig. 15 is a perspective view of the form panel 101 as viewed from the back.

This form panel 101 consists of such a long flat plate that the length between the longitudinal ends of the front plate portion 103 is set to be about 10 times as long as that between the cross-directional ends, and its surface is formed flatly. The pair of side plate portions 104 define long strip-shaped bodies perpendicularly extending from the cross-directional edges of the front plate portion 103 toward the rear surface side to be opposed to each other, and the surfaces thereof are formed flatly. Further, the pair of rear plate portions 105 define long strip-shaped bodies inwardly perpendicularly extending from respective cross-directional forward ends of the side plate portions 104 to face the rear surface of the front plate portion 103. The surfaces thereof are formed flatly, while the forward ends inwardly project to define reinforcing thick portions.

In the front plate portion 103 of the form panel 101, a plurality of mounting holes 106 are formed along its cross-directional center at prescribed spaces in the longitudinal direction. Further, a plurality of mounting holes 107 are formed in the pair of side plate portions 104 in correspondence to the positions of the mounting holes 106 of the front plate portion 3, and these mounting holes 107 are arranged on positions separated from the surface of the front plate portion 103 at prescribed distances in the cross direction. In addition, a plurality of mounting holes 108 are formed in the pair of rear plate portions 105 in correspondence to the positions of the mounting holes 106 of the front plate portion 103, and these mounting holes 108 are arranged on positions separated from the surfaces of the side plate portions 104 at the same distances as those between the centers of the mounting holes 107 and the surface of the front plate portion 103 in the cross direction.

Fig. 5 is a perspective view showing the concrete form deformation preventing members 1 described with reference to Figs. 3A and 3B, which are applied for assembling a concrete form by transversely arranging a plurality of pairs of such form panels 101 to be opposed to each other at prescribed spaces between the front plate portions 103. Fig. 6 is a sectional view taken along the line VI - VI in Fig. 5, and Fig. 7 shows a horizontal section in Fig. 5.

Referring to Figs. 5 to 7, the pairs of side plate portions 3a and 3b of the concrete form deformation preventing members 1 are mounted so that the open ends thereof are in contact with the rear side surfaces of the front plate portions 103 of the form panels 101 for forming the concrete form to vertically extend along the cross-directional centers. Similarly to the embodiment described with reference to Figs. 1 to 4, the respective concrete form deformation preventing members 1 are fastened/fixed by spacing fixtures consisting of separators 121, attachments 122 and fastening members 123

in the spacing fixture mounting holes 5 thereof.

In this embodiment, pairs of members 1a which are identical to the concrete form deformation preventing members 1 are fixed by support members 124 and nuts 125 as transverse reinforcements.

Thus, the concrete form deformation preventing member 1 according to the present invention is also effectively applicable to assembling of a newly developed form panel 101 while a member having the same shape can be utilized also as a transverse reinforcement, whereby vertical and transverse reinforcements can be defined by members which are absolutely identical to each other, conveniently in consideration of saving of the material cost.

Although the present invention has been described and illustrated in detail, it is clearly understood that the same is by way of illustration and example only and is not to be taken by way of limitation, the spirit and scope of the present invention being limited only by the terms of the appended claims.

Claims

1. A concrete form deformation preventing member, consisting of a bar having a substantially C-shaped cross section and comprising:

   a strip-shaped main plate portion (2) being flat at least on its surface; and
   a horizontal pair of strip-shaped side plate portions (3a, 3b) extending from both sides of said main plate portion (2) toward the rear surface side perpendicularly to said main plate portion (2),
   through holes (5) being provided along the cross-directional center of said main plate portion (2) at prescribed pitches in the longitudinal direction.

2. The concrete form deformation preventing member in accordance with claim 1, wherein said pitches of said through holes (5) are substantially integral times as long as 300 mm.

3. The concrete form deformation preventing member in accordance with claim 1 or 2, wherein the width of said main plate portion (2) is at least 35 mm and not more than 120 mm.

4. A method of assembling a concrete form by arranging and fixing a pair of form panels (71, 72) to be opposed to each other while keeping a prescribed distance by providing a spacing fixture (121, 122, 123) therebetween and preventing deformation of said form panels (71, 72) with a concrete form deformation preventing member (1), wherein

   said concrete form deformation preventing member (1) consists of a bar having a substantially C-shaped cross section and including:
   a strip-shaped main plate portion (2) being flat at least on its surface, and
   a horizontal pair of strip-shaped side plate portions (3a, 3b) extending from both sides of said main plate portion (2) toward the rear surface side perpendicularly to said main plate portion (2),
   with through holes (5) being provided along the cross-directional center of said main piate portion (2) at prescribed pitches in the longitudinal direction, and
   both end portions of said spacing fixture outwardly extending beyond said pair of form panels (71, 72) are inserted in said through holes (5) of said concrete form deformation preventing member (1) for pressing the rear surface of said main plate portion (2) of said concrete form deformation preventing member (1) on both end portions of said spacing fixture, thereby bringing open ends of said pair of side plate portions (3a, 3b) into contact with the rear surfaces of said form panels (71, 72) and preventing deformation of said form panels (71, 72).

5. The method of assembling a concrete form in accordance with claim 4 , wherein said concrete form deformation preventing member (1) is prepared from that having said through holes (5) being at pitches substantially integral times as long as 300 mm.

6. The method of assembling a concrete form in accordance with claim 4 or 5, wherein said concrete form deformation preventing member (1) is prepared from that having said main plate portion (2) being at a width of at least 35 mm and 120 mm.

7. A method of assembling a concrete form with a concrete form deformation preventing member (1) consisting of a bar having a substantially C-shaped cross section and including:

   a strip-shaped main plate portion (2) being flat at least on its surface, and
   a horizontal pair of strip-shaped side plate portions (3a, 3b) extending from both sides of said main plate portion (2) toward the rear surface side perpendicularly to said main plate portion (2),
   with through holes (5) being provided along the cross-directional center of said main plate portion (2) at prescribed pitches in the longitudinal direction, said method comprising the steps of:
   arranging a plurality of pairs of form panels (71, 72) being provided with spacing fixture mounting holes (76) longitudinally along cross-sectional centers at the same pitches as said

through holes (5) of said concrete form deformation preventing member to be cross-directionally adjacent to each other and opposed to each other every pair for forming a concrete placing portion;

mounting a plurality of spacing fixtures (121, 122, 123) for fixing said opposite pairs of form panels (71, 72) to each other while keeping prescribed distances by inserting the same in opposite said spacing fixture mounting holes (76) of opposite said form panels (71, 72) for bridging opposite said pairs of form panels (71, 72) with each other; and

inserting both end portions of said plurality of spacing fixtures outwardly projecting from respective ones of said opposite pairs of form panels (71, 72) in said through holes (5) while fastening/fixing open ends of said side plate portions (3a, 3b) of said concrete form deformation preventing member (1) by fastening means (123) being provided on said both end portions of respective ones of said spacing fixtures while pressing the rear surface of said main plate portion (2) of each said concrete form deformation preventing member.

8. The method of assembling a concrete form in accordance with claim 7, wherein said concrete form deformation preventing member (1) is prepared from that having said through holes (5) being at pitches substantially integral times as long as 300 mm.

9. The method of assembling a concrete form in accordance with claim 7 or 8, wherein said concrete form deformation preventing member (1) is prepared from that having said main plate portion (2) being at a width of at least 35 mm and 120 mm.

FIG. 1

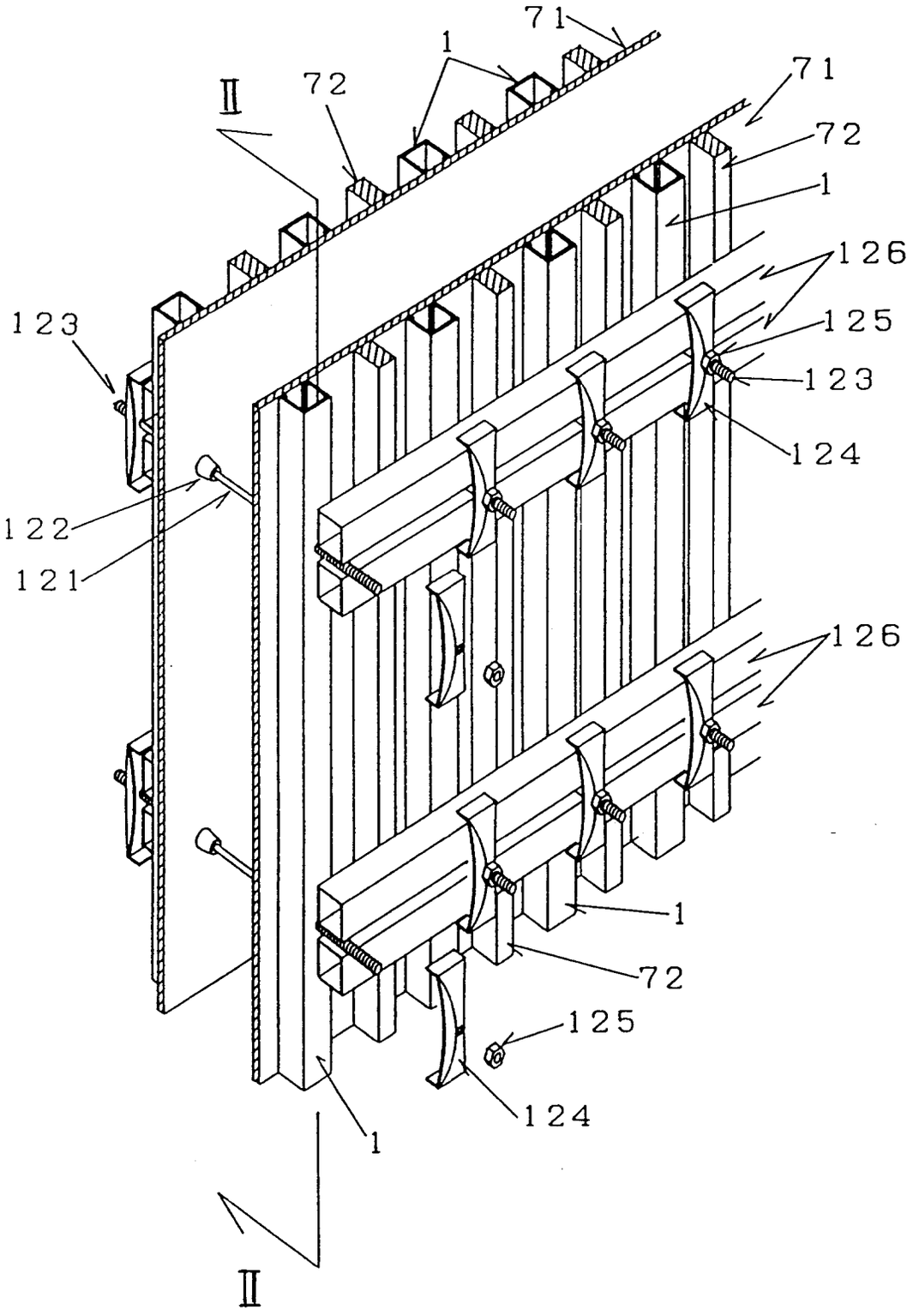


FIG. 2

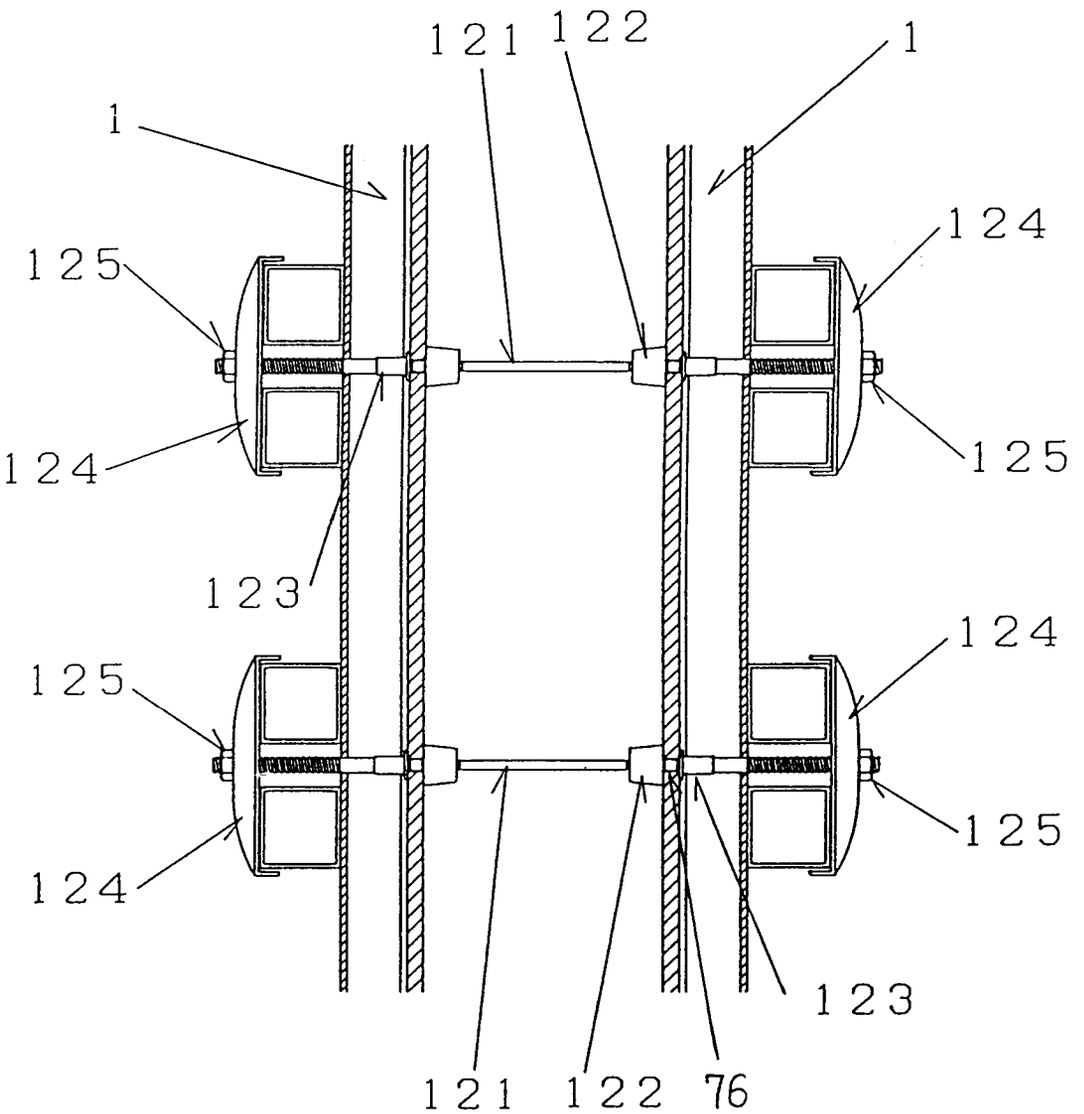


FIG. 3A

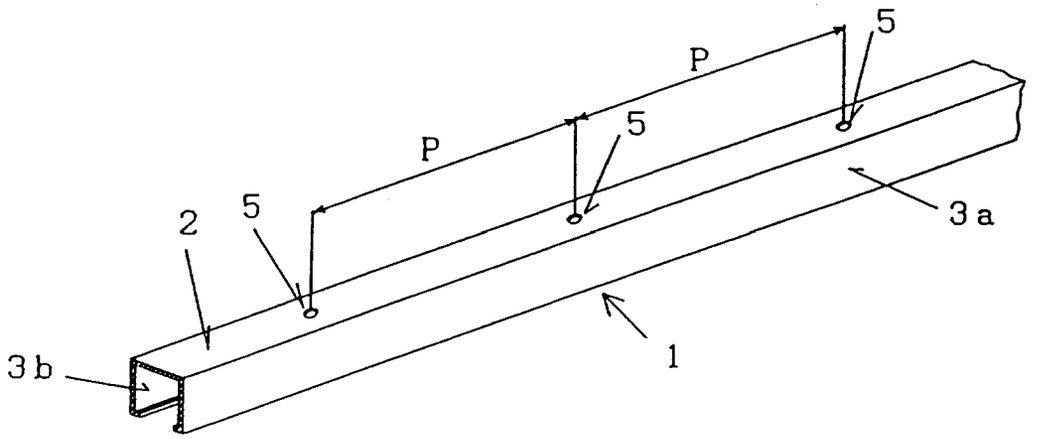
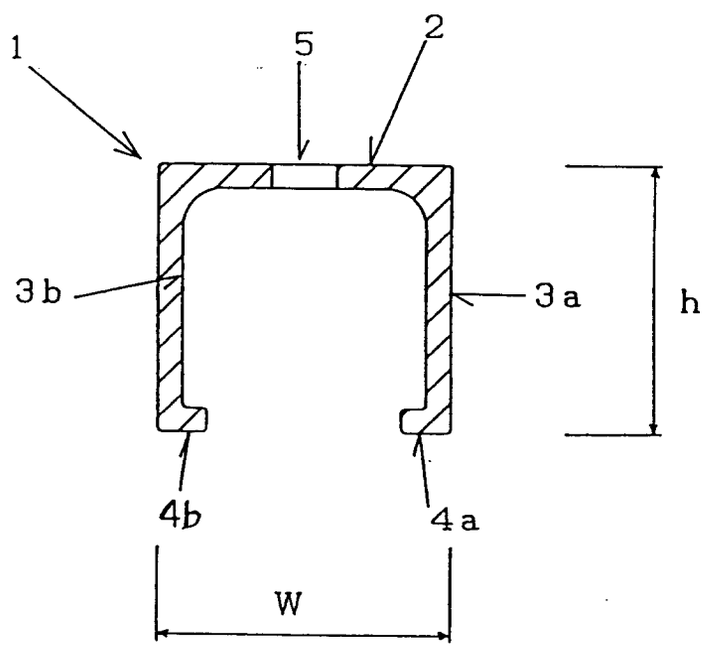


FIG. 3B



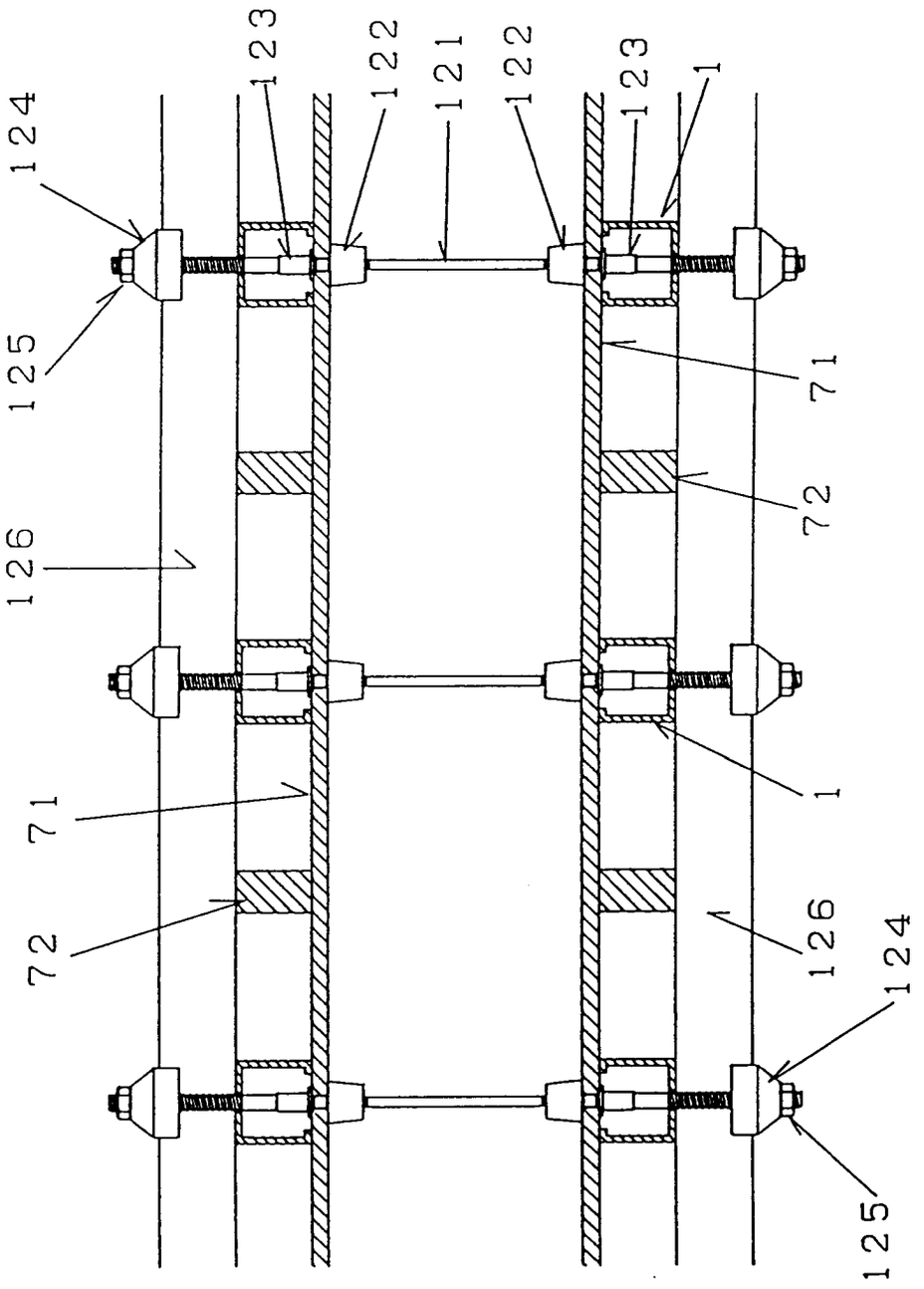


FIG. 4

FIG. 5

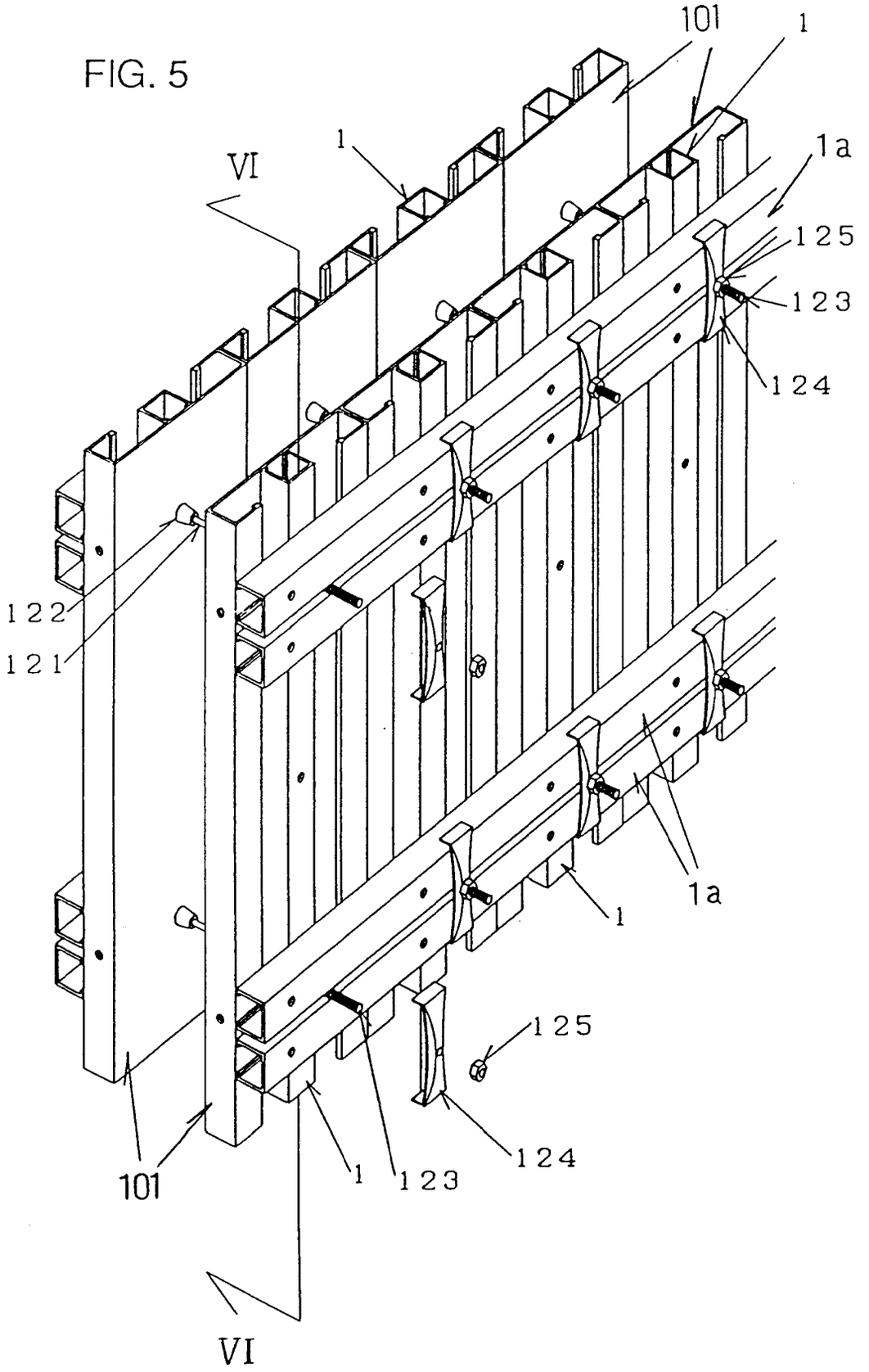
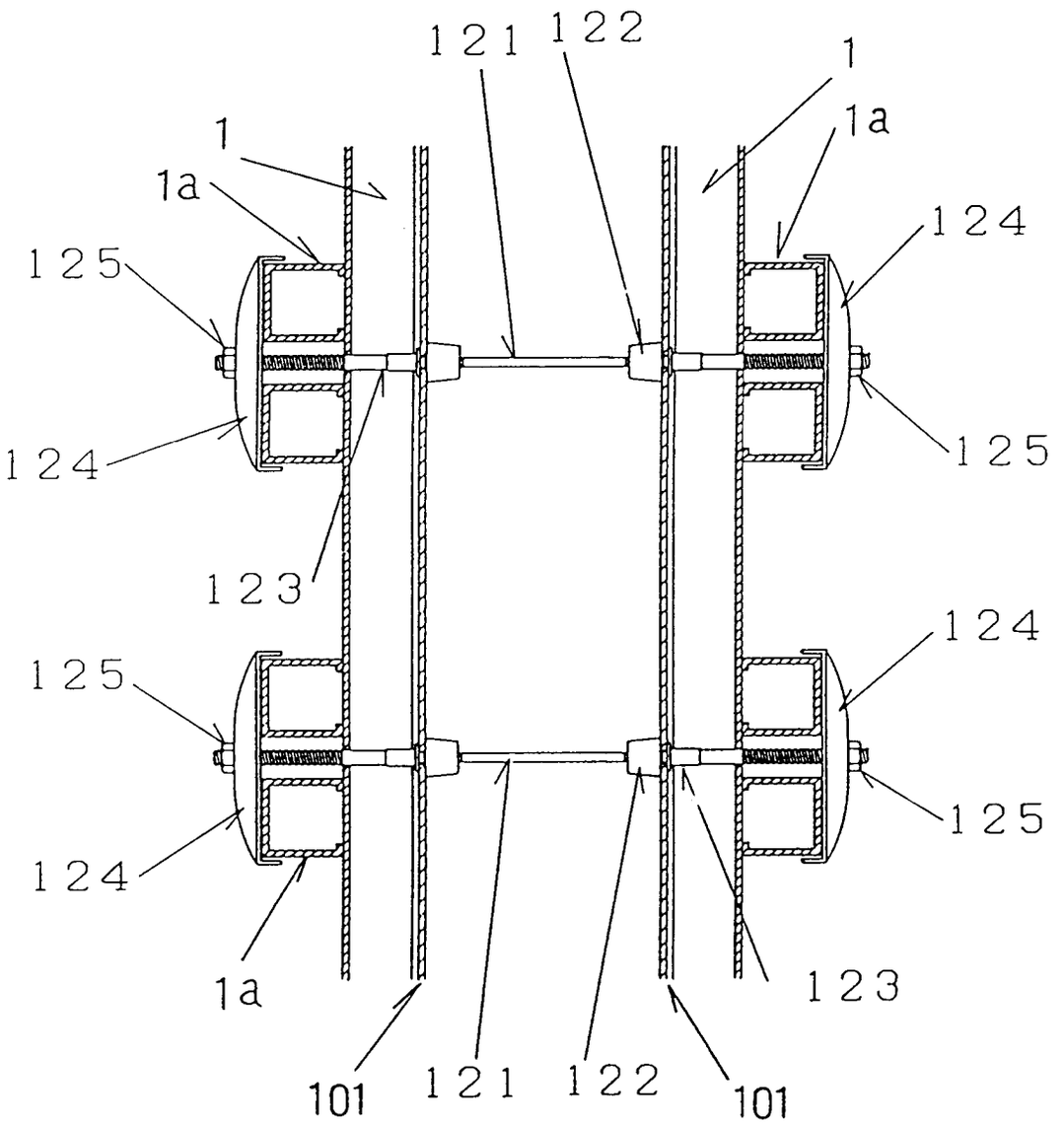


FIG. 6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122
1
1a
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FIG. 7

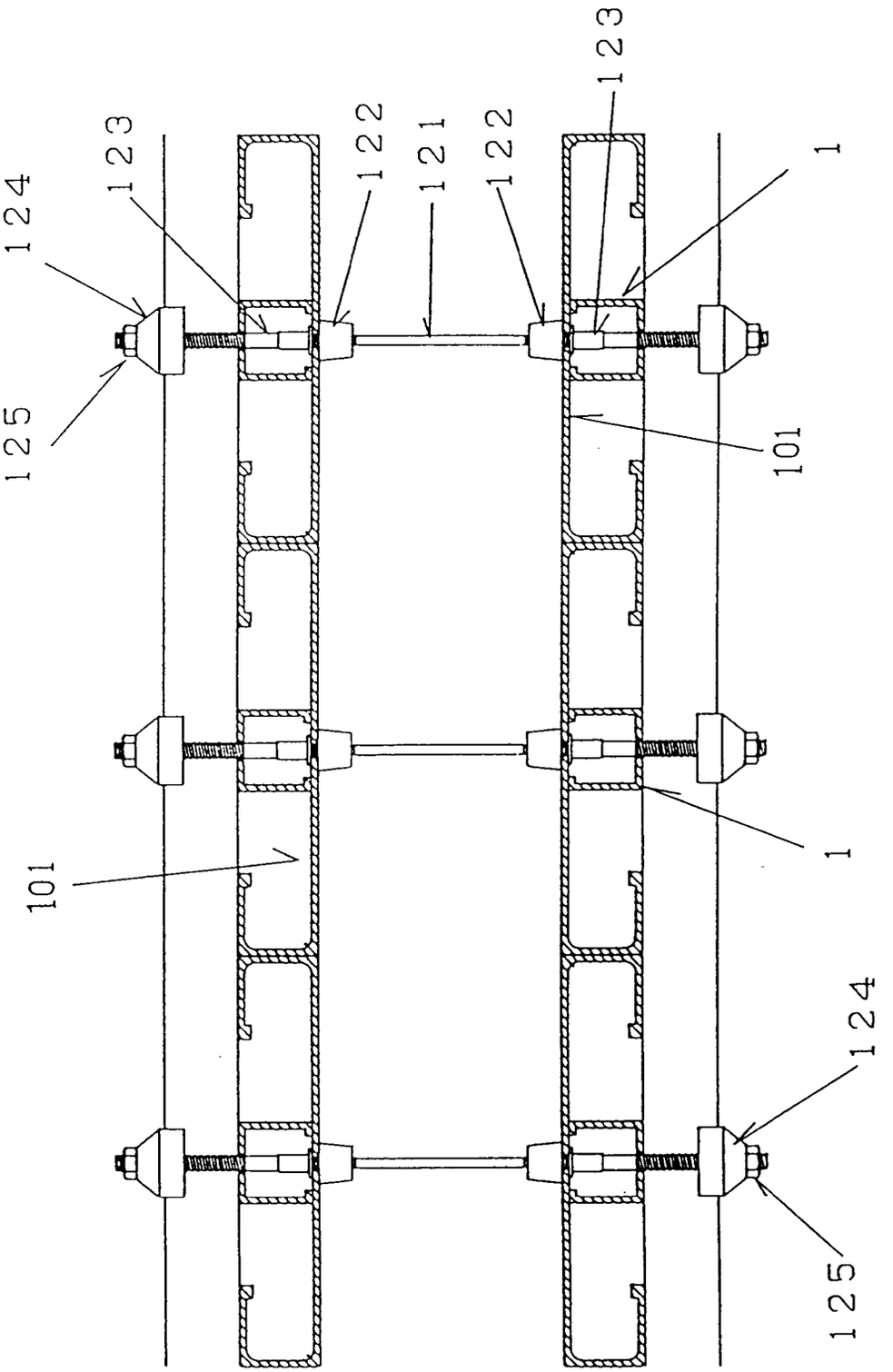

FIG. 8A

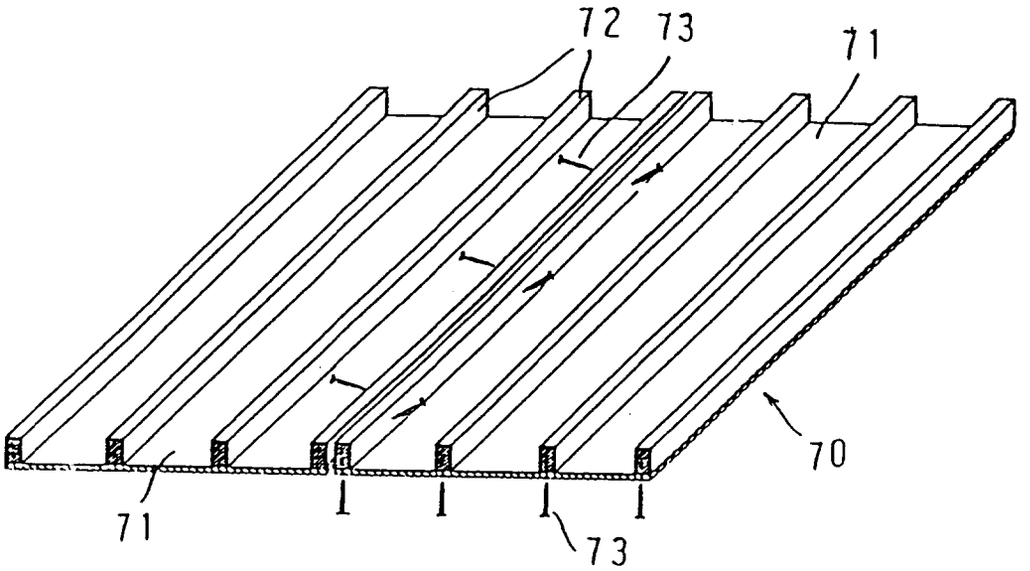

FIG. 8B

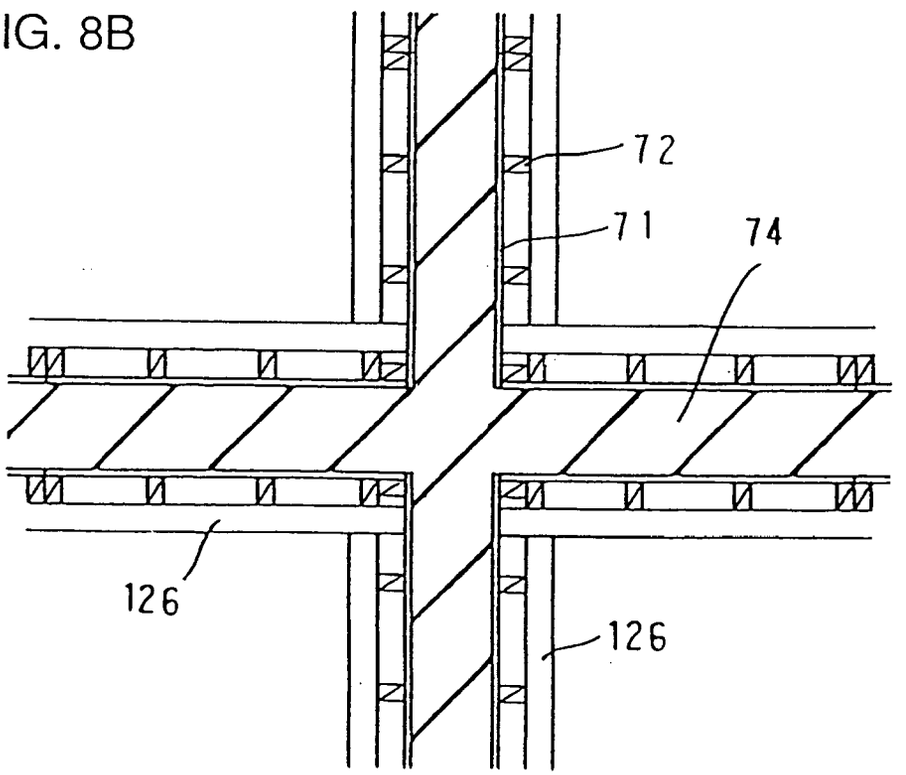

FIG. 9

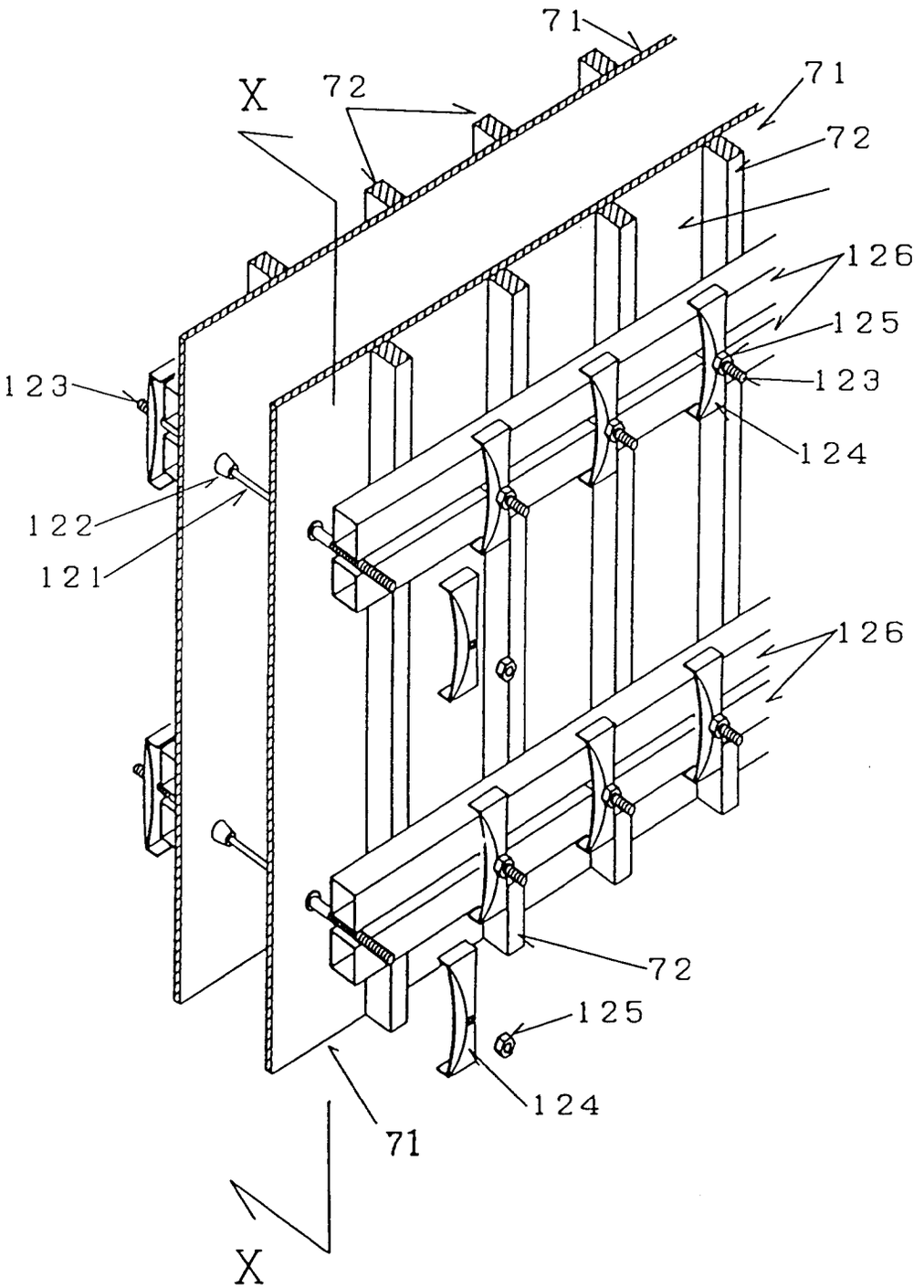

FIG. 10A

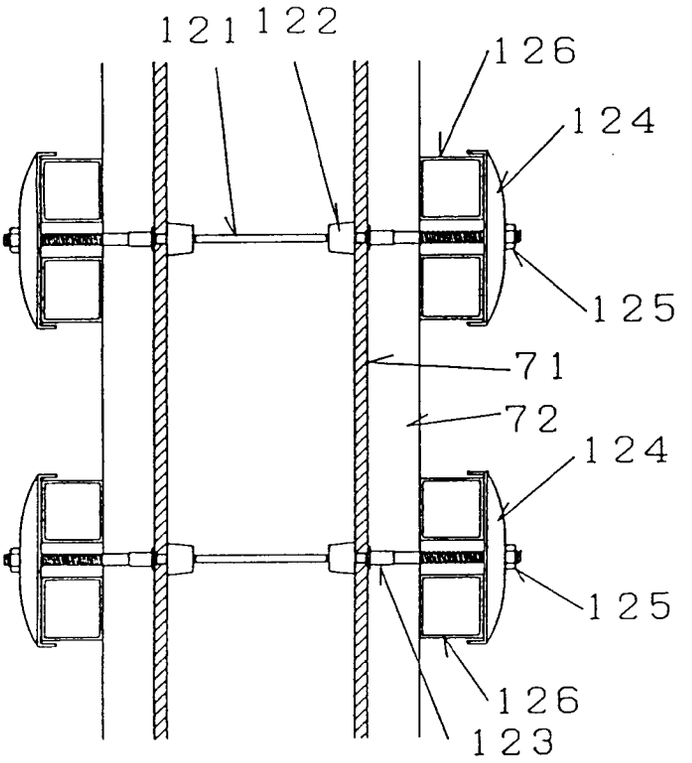

FIG. 10B

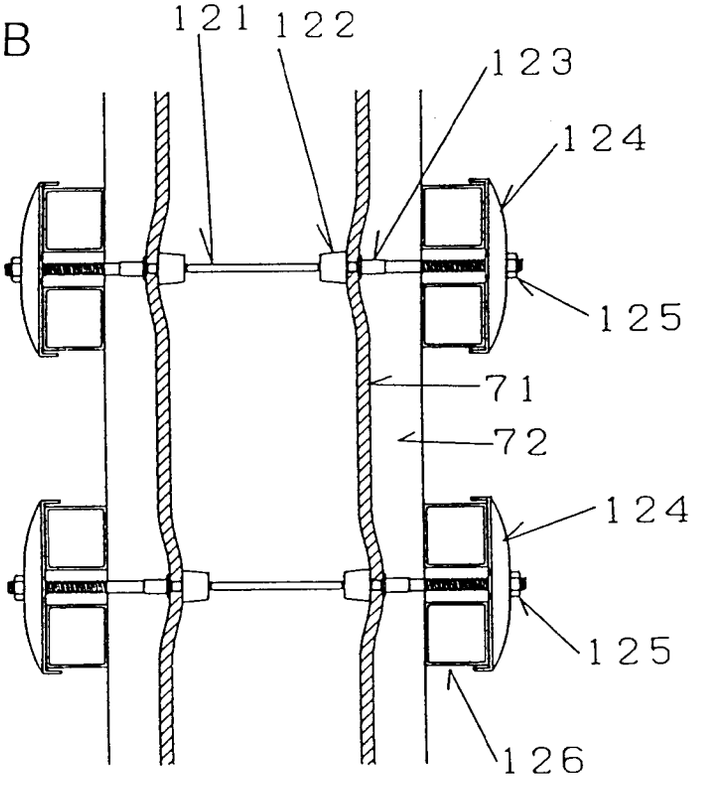

FIG. 11A

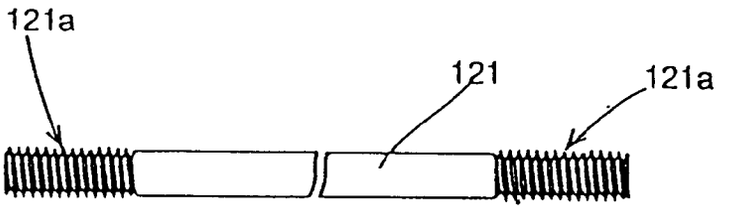

FIG. 11B

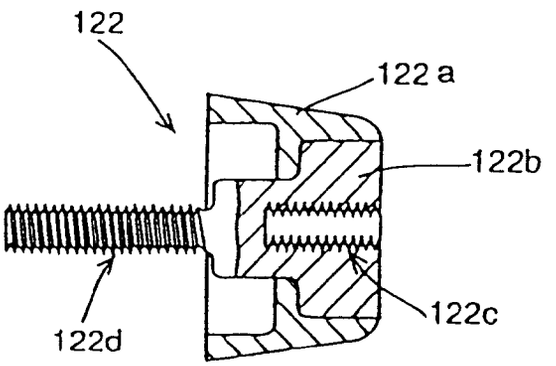

FIG. 11C

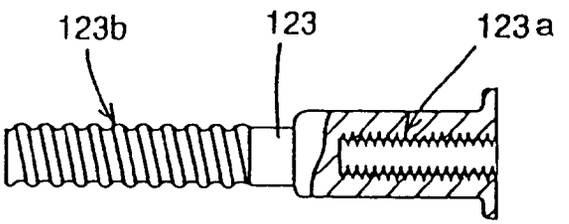

FIG. 12

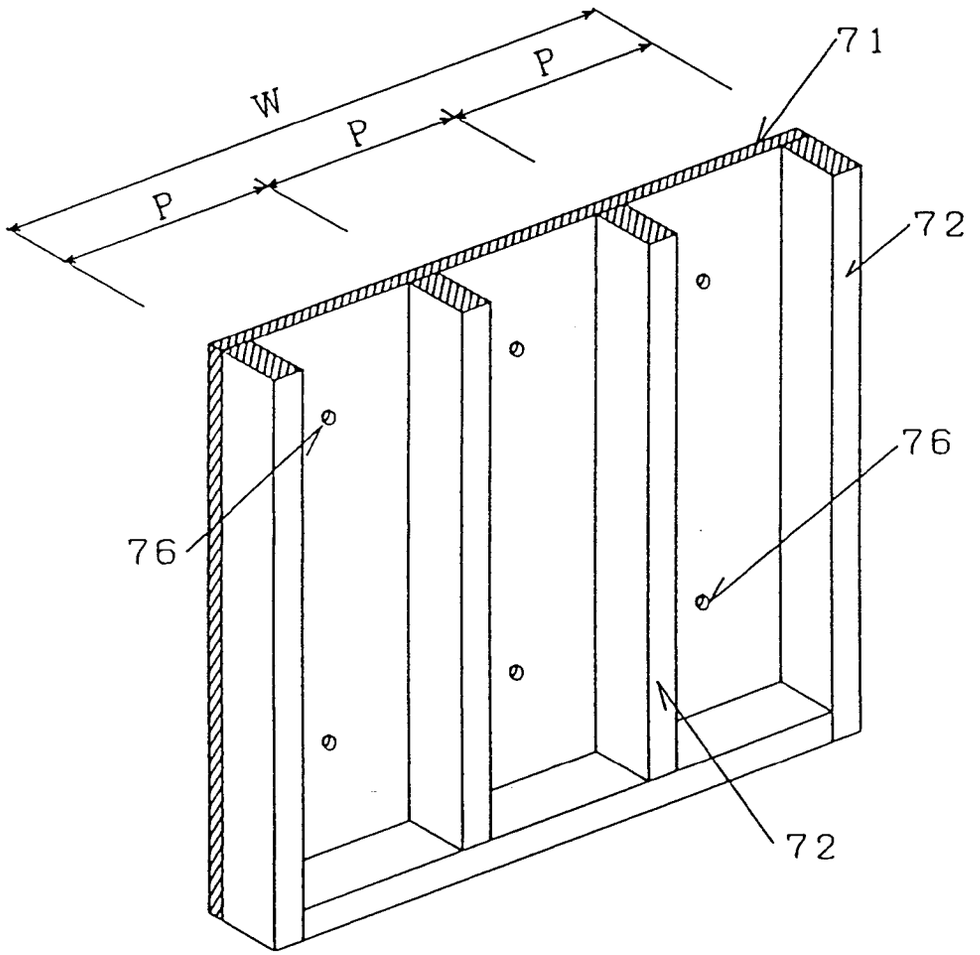

FIG. 13

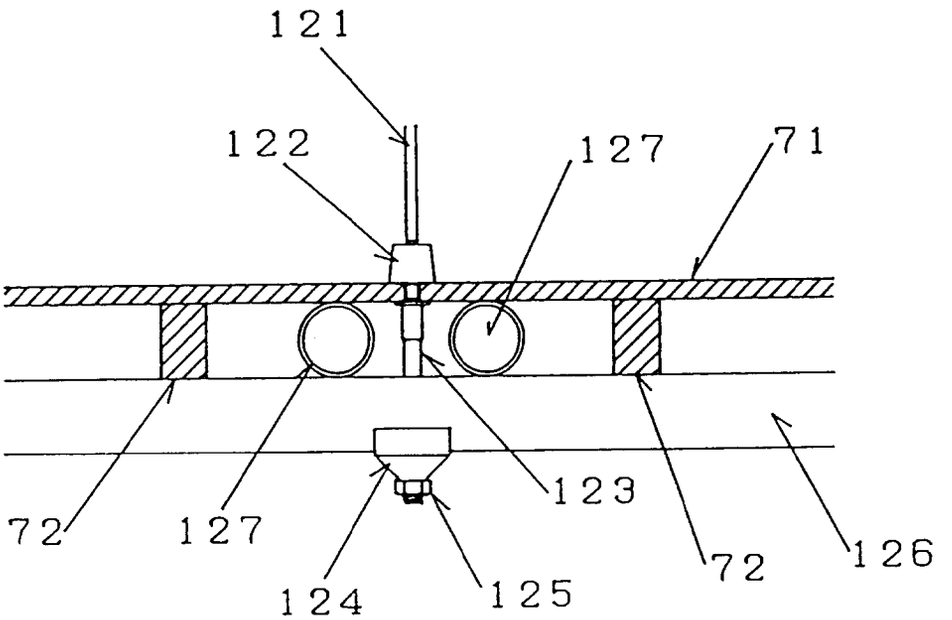
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FIG. 14

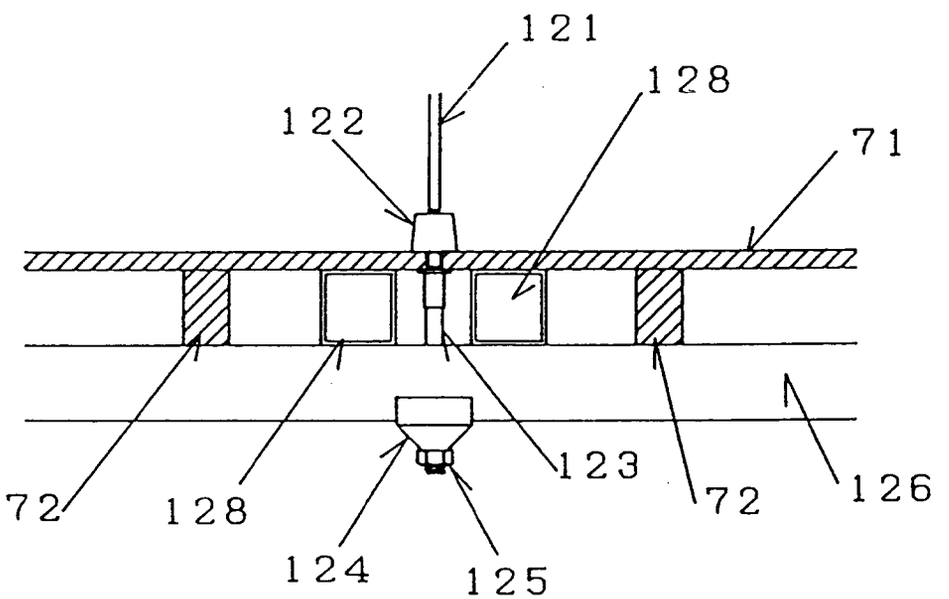
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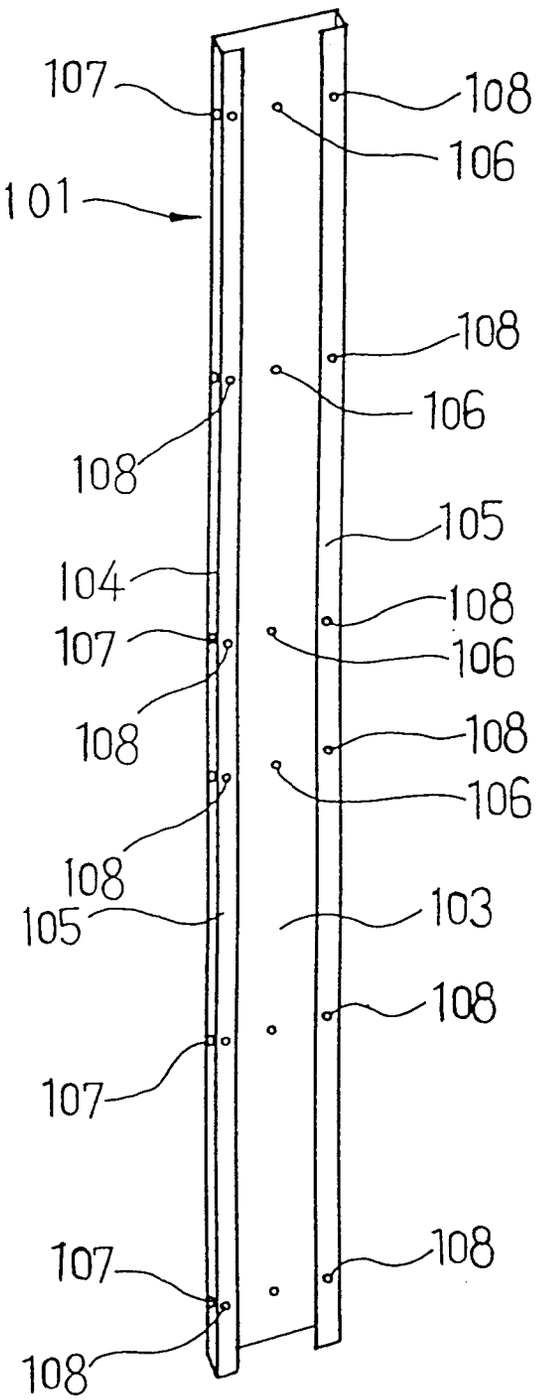
FIG. 15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EUROPEAN SEARCH REPORT

Application Number
EP 96 11 1090

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	US-A-3 385 557 (RAMBELLE) * column 6, line 24 - column 8; figures *	1,4,7	E04G17/14 E04G11/12
X	DE-A-19 17 639 (SYMONS MFG CY.) * page 3 - page 8; figures *	1,4,7	
X A	US-A-2 816 345 (SYMONS) * the whole document *	1,7 4	
A	EP-A-0 062 420 (ALUMA SYSTEMS INC.)		
A	DE-A-24 26 708 (MAIER)		

TECHNICAL FIELDS SEARCHED (Int.Cl.6)
E04G

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	16 October 1996	Vijverman, W

CATEGORY OF CITED DOCUMENTS

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