(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) EP 1 321 592 A1

(12) EUROPEAN PATENT APPLICATION

(43) Date of publication:
25.06.2003 Bulletin 2003/26

(51) Int Cl.[7]: **E04B 1/24**, F16B 7/04

(21) Application number: **01830802.3**

(22) Date of filing: **21.12.2001**

(84) Designated Contracting States:
AT BE CH CY DE DK ES FI FR GB GR IE IT LI LU MC NL PT SE TR
Designated Extension States:
AL LT LV MK RO SI

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Remarks:
In accordance with the last part of Article 14 (2) EPC the applicant has filed a text with which it is intended to bring the translation into conformity with the original text of the application.

(54) Self-supporting framework modular structure with extruded sections and self-supporting boards and method for making same

(57) A method to provide a self-supporting structure prefabricated building framework, for building industry, based on a basement (11) comprising a plurality of anchorages (12) for main uprights (3) suitably forming bearing pillars the main uprights (3) are slotted section rods and having outside a plurality of longitudinal grooves (3') , in which are put connecting elements (5,6,7) at knots predetermined. Each connecting element (5,6,7) has a first portion (13) that engages and locks into in an of the grooves (3') and a second portion (13') that protrudes from said groove (3'). The main uprights (3) are collegati to each other through the use of main girders (4) having outside a plurality of grooves (4') longitudinal in which engage with and is bloccano said seconde portions (13') of said connecting elements (5,6,7), can be connected further uprights (14,14a) and/or girders secondary (15) having same width of said uprights (3) and main girders (4), is provided the application of supporting boards (20) modular external and inner having inside flanged elements that engage the main uprights (3) and impegnati superiormente and inferiormente from said main girders (4).

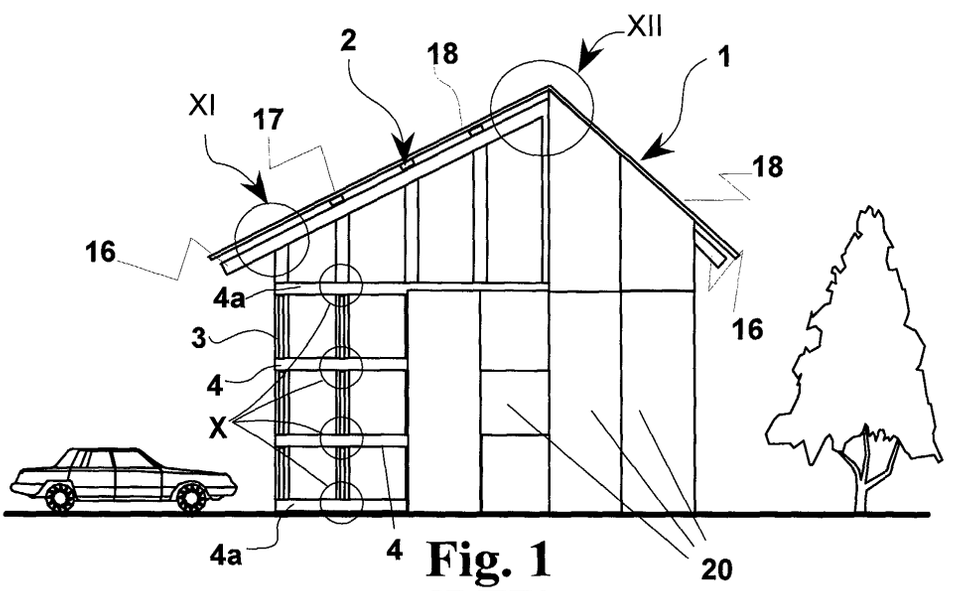

Fig. 1

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Description

Field of the invention

[0001] The invention described below refers to a method for making a self-supporting framework structure, as that of a pre-fabricated building for use as house, office, emergency dwelling, dormitory, mess-room, warehouse etc.,

[0002] The invention has also the object to obtain a modular structure, by using and fastening to each other extruded sections, supporting boards; this structure can be used, for example, to make pre-fabricated buildings.

[0003] Furthermore the invention relates also to a connecting and locking device quickly releasable that allows to carry out this method, for joining the extruded sections of the structure and the supporting boards applied to them.

Background of the invention

[0004] A pre-fabricated building can be made quickly, like a house, office, emergency dwelling, dormitory, mess-room etc.

[0005] The particular flexibility of the pre-fabricated structure allows both a lasting and a temporary use. Furthermore the construction method is suitable to be executed quickly because it is a ready solution and of direct installation. According to the needs, the rooms of pre-fabricated building can be changed, enlarged or removed and used in other places.

[0006] The technique of production and of construction of pre-fabricated structures, presently, has however some limitations if modular and ready to made solutions are required.

[0007] In fact, the existing pre-fabricated buildings used as houses are made almost completely of wood even if they are assembled by means of metal carpentry.

[0008] This causes a pre-fabricated structure to be expensive and requiring a lot of work of specialized workers.

Summary of the invention

[0009] It is therefore object of the present invention to provide a method for making a self-supporting framework structure, for example a pre-fabricated one, that does not present the drawback of the known systems.

[0010] It is another object of the present invention to provide a method for making a modular structure, by fastening to each other extruded sections and self-supporting boards, and that allows, with respect to the prior art, to obtain a structure that is light, strong, easy and quick to assemble.

[0011] It is a particular object of the invention to provide connecting elements for joining steadily and quickly two or more sections and/or supporting boards so that they turn out integral to each other.

[0012] According to a first aspect of the invention, a method to provide a self-supporting pre-fabricated framework structure provides the steps of:

- pre-arranging a basement comprising a plurality of anchorages for main uprights that form the bearing pillars of the structure;
- preparing said main uprights in the form of slotted section rods having outside a plurality of longitudinal grooves;
- connecting the main uprights to said anchorages creating said pillars;
- arranging connecting elements at predetermined knots on the main uprights characterised by having each a first portion that engages and locks into said grooves and a second portion that protrudes from them;
- connecting to each other the main uprights at the knots, previously arranged, through the use of main girders having outside a plurality of longitudinal grooves in which the second portions of the connecting elements engage and are locked.

[0013] Advantageously, is provided the application of further secondary girders and/or uprights having respectively the same width of said main uprights and girders.

[0014] In particular, the secondary uprights have the same height as the distance between two consecutive main girders, whereas the girders secondary have the same length as the distance between two consecutive main uprights. Preferably, the secondary uprights and/or girders have such a profile to engage with a click in the grooves of the main girders and uprights. Alternatively, said connecting elements are used for their connection.

[0015] Once the framework structure according to the invention is formed by the main and secondary uprights and girders, modular external supporting boards are applied to the framework structure. Furthermore, the supporting boards have inside flanged elements that engage the main uprights along their longitudinal edges and fit the girders up and down.

[0016] Preferably, the anchorages prepared in the basement are in the form of fastening protruding elements from the basement same. Such protruding elements have cross section equal and complementary to the inner channel of the main uprights, whereby their connection to the main uprights is carried out simply, introducing the uprights on the protruding elements and blocking it with bolts .

[0017] The the main uprights are connected to the main girders, as above said, by connecting elements. Preferably, each connecting element is formed by at least two orthogonal rods integral to each other. Every rod has cross section engaging in the profiled groove of the uprights and/or main girders and each of them can be fastened in a quickly releasable way in the grooves

of the girders and of the main uprights.

[0018] Advantageously, several types of connecting elements are provided, according to the different needs of the structure according to the invention. In fact, for example, for making a peaked roof, oblique girders are provided that engage with the upper ends of the main uprights. In this case, the connecting elements have the first portion that moves vertically in a respective groove of the upright, whereas the second portion is bent at an angle, respectively acute or obtuse, depending on the upward or downward portion of the girder oblique with respect to the knot. Concerning, instead, the connection of two girders at the peak of the roof, connecting elements are provided that have a first and a second portion engaging the respective grooves of said two girders.

[0019] The peculiarity of the structures according to the invention is flexibility, that allows both a lasting and a temporary use; the construction method is quick to carry out because the structural elements are ready and of direct installation.

[0020] A pre-fabricated made with the method according to the present invention can be adapted according to the place and climate with safety and high comfort.

Brief description of the drawings

[0021] Further characteristics of the device according to the present invention, will be made clearer with the following description of an embodiment thereof, exemplifying but not limitative, with reference to the attached drawings, wherein:

- figure 1 shows a diagrammatical elevational view of a pre-fabricated building executed with a structure according to the invention;
- figures 2A and 2B, show respectively a plan view from below of the structure of which to figure 1, and a cross sectional enlarged view of the fondation, wherein are shown the fastening elements for pillars main of the structure;
- figures 3A, 3B, show respectively the setions of a pilastro and of a girder main;
- figure 3C shows an embodiment of the girder main of figure 3B with alette of fastening for supporting boards;
- figures from 3D to 3E show respectively the setions of a pilastro secondary and girder secondary;
- figures from 3F to 3G, show the setions of two uprights auxiliary ;
- figure 3H shows in cross section a girder secondary, fissabile to the main uprights with connecting elements;
- figures 4A, 4B show in cross section according to a plane horizontal a step fastening of supporting boards, inner and external, to of the pillars main and/or auxiliary added to the pillars principali, in correspondsnza respectively of the knots of union indicated respectively with IV-A and IV-B of figure 2A;
- Figures 5A and 5B show respectively top plan and a perspective view an connecting element to centre for fissare a upright main to a girder main;
- figures 6A and 6B 7, 8 and 9 show other types connecting elements, used for matching of the pillars and of the girders;
- figure 10 shows a perspective view of the fastening of a upright main to a girder main;
- Figures 10A and 10B show an elevational view cross sectioned of a upright main and different main girders to various height,
- Figure 10C shows an elevational view cross sectioned of a upright main and different main girders to various height with montaggio of the supporting boards;
- figure 10D shows the vista of figure 10C with the addition of a girder secondary;
- figures 11 and 12 show a partial elevational view of the zone of union of the structure at the points of the roof indicated respectively with XI and XII in figure 1.

Description of a preferred embodiment

[0022] With reference to figure 1, for causing a self-supporting framework structure, such as for example the frame carrying 2 of a structure of a pre-fabricated building 1 for use as house, may be used the main uprights 3 (figure 3A) and main girders 4 and 4a (figure 3B or 3C).

[0023] Per main uprights, is intended an a desired of the uprights 3 shown top plan in figure 2A with function of pilastro, wherelike for main girders is intendono girders horizontali 4 and 4a connecting between main uprights.

[0024] In figure 1 are furthermore shown the girders oblique 16 for causing the tetto, the traversi horizontali 17 and the boards 18 on which rests in turn the manto that full the copertura. Furthermore are shown supporting boards 20, connected both to the main uprights that to the main girders.

[0025] As shown in figures 3A and 3B, the main uprights 3 and the main girders 4 can be obtained for extrusion, and have the characteristic cross section of a rod profilata slot having outside a plurality of longitudinal grooves 3' and 4'.

[0026] The grooves 3' and 4' are to each other equal and have a first portion in sottosquadro 24 and a second portion in sottosquadro 25. The girder main 4a of figure 3C has an ala additional profilata 28 that protrudes opposite to the groove 4', for to block superiormente and inferiormerte the supporting boards.

[0027] In figures 3D and 3E are shown secondary uprights 14 and 14a having edges protruding 26 suitable for engaging with the portions in sottosquadro 24 of the groove 3' of the upright main, and/or auxiliary for an engagement to click. The upright secondary 14 has width the same as the girder main 4, for part that protrudes

from the groove 3'.

[0028] In figures 3F and 3G are shown uprights auxiliary 19 and 19a having connectings 29 to T suitable fox engaging in the portions in sottosquadro 25 of the grooves 3' of the main uprights 3.

[0029] In figure 3H is shown a girder secondary 15 that has grooves 4' of form the same as the grooves 3' and 4' respectively of the uprights and of the main girders 3 and 4.

[0030] According to the present invention, it is possible montare the pre-fabricated building 1 (figure 1-2B) by fastening to each other the uprights 3, 14, 14a, 19, 19a, and of the girders 4, 4a, 15, obtaining as result appunto the structure light 2, strong as well as easy and quick to assemble, according to the following different steps.

[0031] Firstly, is provided the pre-arranging a basement 11 (figure 2A and 2B) on which is connected a plurality of plates with fastening elements 12 for main uprights 3, creating thus the bearing pillars of the structure 2, In particular, the fastening elements 12 are protruding towards the above and have cross section equal and complementary to the inner channel 23 of the main uprights 3, in which engage with. The matching is bloccato with a bolts.

[0032] With reference to figures 4A and 4B, the pillars are completati aggiungendo to the main uprights 3 the secondary uprights 14,14a and uprights auxiliary 19,19a, for allowing the fastening of pannellature portanti 20 inner and external and to provide different tipologie of walls, for example the indicated with IV-A and IV-B in figure 1. Such accoppiamenti are obtained with impegni to click of the edges 26 or impegni to incastro with the connectings 29 to T.

[0033] With reference to figures from 5A to 9, for unire to each other girders or uprights Lhat hasno the grooves 3' and 4', having the relative sottoaquadri 25, are used connecting elements 5, 6, 7, 8, 9 and 10. They are characterised by having each a first portion to rod 13 and a second portion to rod 13', to cross section this from entersre in the grooves 3' and 4'. Each of said portions to rod 13 and 13' has at least a tassello 27 movable between a first position wherein it scompare in the surface of the rod 13, 13' and a second position wherein it protrudes from the surface of the rod 13, 13'.

[0034] Tipici knots for connecting according to the invention between a upright and a girder of the structure 2 are those indicated with X in figure 1 and shown in figures 10, 10A and 10B. In this case, for fissare the girder main 4 or 4a to the upright main 3 are used the connecting elements 5 (or 6, 7), which have the two portions to rod 13 and 13' orthogonal to each other. Introducing the first portion 13 in said grooves of the main uprights 3, and then intervenendo manually, with a movement rotational on ognone of said tasselli of locking 27, by means of protruding elements with connectings for chiavi to brugola 31, locks into the connecting element 5,6 or 7 to the upright main 3. In particular, the tassello 27 is rotated by means of the said pin 31 after essersi located at the sottosquadro 25 of the groove 3'. Second portion 13', which protrudes from the grooves 3', locks into like by means of tasselli 27 in the sottosquadri 25 of the grooves 4' of the girders 4 or 4a. In said position, is prevented the movement of outlet of the rod 13 from the channel 3' of the upright main 3 and of the rod 13' from the channel 4' of the girder main 4 or 4a. The tasselli 27 provide of the systems of autolocking of known type, for providing rotations of locking not predetermined.

[0035] With reference to figure 10C are added the supporting boards 20 and the girders secondary 15.

[0036] I supporting boards 20 are applied inside and outside to the structure 2. They are bloccati laterally to the main uprights by agganci to baionetta (non shown) and contained by the alette 28 of the main girders 4a, superiormente and. inferiormente.

[0037] I boards 20 have two functions:

- funtion carrying, as shown in figure 10C, since collegati to the pillars 3 and to the main girders 4 or 4a, whereby they allow of distribuire the action of the forze portanti estendendo the function of pillars to the telai of the whole structure;
- funtion of tamponamento of the aperture reticolari of the structure, with creation of a gap between those inner and those external, and subsequent possibility of inserire of the insulating in the gap formata.

[0038] With reference to figure 10D, are added altresi the girders secondary 15, for completare the structure 2, having the same width of the main uprights 3, and dotati of the grooves 4'. using couples connecting elements to squadra 8 (figure 8), the portions 13 engage with in the grooves 3' of the uprights 3, whereas the portions 13' engage with in the grooves 4' of the girders secondary 15. In way similar to what above described, the tasselli 27 garantiscone the locking in the sottosquadri 25 of the respective grooves 3' and 4'.

[0039] With reference again to figure 1, particular XI, and to figure 11, for causing a copertura to falde 18, oblique girders are provided 16, having the same cross section of the upright 3, or similar. The girders oblique 16 engage with the upper ends of the main uprights 3 and with traverse 17, having for example cross section the same as the girders secondary 15, or similar.

[0040] Per the knot XI of figure 1, the connecting elements used, for example 9 and 10 (figure 11), have the first portion 13 that moves vertically in a respective groove of the upright 3 and second portion 13' folded to angle respectively acute or obtuse to second that vada ad engaging in the portion discendente or ascendente of the girder oblique 16 with respect to the knot, in a special groove 3' of the girder oblique 16 same,

[0041] Concerning, instead, the two girders 16 at the peak of the roof, according to figure 1, particular XII, is

provided the connecting element 10 that allows of unirle (figure 12). In this case the connecting element 10 has the first portion 13 and second portion 13' engaging the respective grooves 3' of said two girders crash 16.

[0042] The same principle for causing the roof can be used for causing the solai intermediate.

[0043] The girders and the uprights, in addition to the setions esemplificate, may have even iftions of other form, obtained for extrusion in aluminium. For example, the sections used for uprights 3 may have cross section elliptical or rectangular with spigoli arrotondati.

[0044] The foregoing description of a specific embodiment will so fully reveal the invention according to the conceptual point of view, so that others, by applying current knowledge, will be able to modify and/or adapt for various applications such an embodiment without further research and without parting from the invention, and it is therefore to be understood that such adaptations and modifications will have to be considered as equivalent to the specific embodiment. The means and the materials to realise the different functions described herein could have a different nature without, for this reason, departing from the field of the invention. It is to be understood that the phraseology or terminology employed herein is for the purpose of description and not of limitation.

Claims

1. A method to provide a self-supporting pre-fabricated framework structure, for the building industry, **characterised in that** of providing the steps of:

   - pre-arranging a basement comprising a plurality of anchorages for main uprights (3) suitable for forming pillars, said main uprights (3) being slotted section rods and having outside a plurality of longitudinal grooves (3') ;
   - connecting said main uprights (3) on said anchorages creating said pillars;
   - introducing connecting elements (5,6,7) in said main uprights (3) at predetermined knots, each connecting element (5,6,7) having a first portion (13) that engages and locks into said grooves (3') and a second portion (13') that protrudes from said grooves (3');
   - connecting to each other said main uprights (3), at said knots, through the use of main girders (4) having outside a plurality of longitudinal grooves (4') in which engage and lock second portions (13') of said connecting elements (5,6,7).

2. Method to provide a self-supporting pre-fabricated framework structure according to claim 1, comprising the steps of; application of further uprights (14,14a) and/or girders secondary (15) having same width of said uprights (3) and main girders (4), said secondary uprights (14,14a) having height the same as the distance between two main girders (4) consecutive and said girders secondary (15) having length the same as the distance between two main uprights (3) consecutivi.

3. Method to provide a self-supporting pre-fabricated framework structure according to claim 2, wherein said secondary uprights and/or girders (14,14a) have profiles (26) suitable for engaging to click in the grooves (3', 4') of said uprights and main girders (4).

4. Method to provide a self-supporting pre-fabricated framework structure according to claim 1, wherein is provided the application of supporting boards (20) modular external and in the framework structure formed by the together of said uprights (3) and main girders (4) and secondary (14,14a,15), said supporting boards (20) having inside flanged elements that engage said main uprights (3) along their longitudinal edges and being impegnati superiormente and inferiormente from said girders (4).

5. Method according to claim 1, wherein said anchorages are protruding elements (12) protruding from said basement (11) and having cross section equal and complementary to the inner channel of said main uprights (3), the connecting being executed introducing said uprights (3) on said protruding elements (12) and bloccando the matching with bolts.

6. Method according to claim 2, wherein said or each connecting element (5,6,7) has said portions (13,13') formed by at least two orthogonal rods integral to each other, having said rods (13,13') cross section suitable for engaging in said groove (3', 4') profilata of said main uprights and/or girders (4), said rods being fissabili in the grooves (3', 4') of said main girders and uprights (3) by means of locking quick (27).

7. Method according to claim 1, wherein, for causing the tetto, oblique girders are provided (16) suitable for engaging with the upper ends of said uprights (3), said connecting elements (9,10) having said first portion (13) that moves vertically in a respective groove (3', 4') of a upright, whereas said second portion (13') is folded to angle respectively acute or obtuse to second that vada ad engaging in the portion discendente or ascendente in the groove (3', 4') of the girder oblique (16) with respect to the knot, being provided connecting elements (10) for unire two girders (16) at the peak of the roof, having a first and a second portion (13') engaging the respective grooves (3', 4') of said two girders crash.

8. Method according to claims 5, 6, 7 wherein said grooves (3', 4') profilate have an opening accesso the same as the dimension of said portions (13,13'), and a sottosquadro inner (25) parallel to opening accesso, every portion of said connecting element comprising at least a tassello (27) movable between a first position wherein said tassello scompare in each portion (13,13') and a second position wherein said tassello protrudes from the surface of each portion, in said first position said tassello not ostacolando the free passage of said portion in the opening accesso of said groove (3', 4') profilata, in said second position said tassello being suitable for engaging ad incastro in said sottosquadro inner, whereby said portion is bloccata in said groove (3', 4') profilata.

9. Self-supporting structure pre-fabricated building framework, for building industry, **characterised in that** of being executed with the method of which to the claims from 1 to 9.

10. A profilato to provide a self-supporting structure pre-fabricated building framework, for building industry, **characterised in that** of being a rod profilata slot and having a plurality of facce longitudinal, each faccia having at least a groove (3', 4') longitudinal with art opening accesso and at least a sottosquadro inner (27) parallel to opening accesso, in said groove (3', 4') being suitable for engaging a first portion (13) of an connecting element having at least another portion (13') protruding from said groove (3', 4'), each portion (13,13') of said connecting element comprising at least a tassello (27) movable between a first position wherein said tassello scompare in each portion (13,13') and a second position wherein said tassello protrudes from the surface of each portion (13,13'), in said first position said tassello not ostacolando the free passage of said portion (13,13') in the opening accesso of said groove (3', 4') profilata, in said second position said tassello being suitable for engaging ad incastro in said sottosquadro inner (25), whereby said first portion (13) is bloccata in said groove (3', 4').

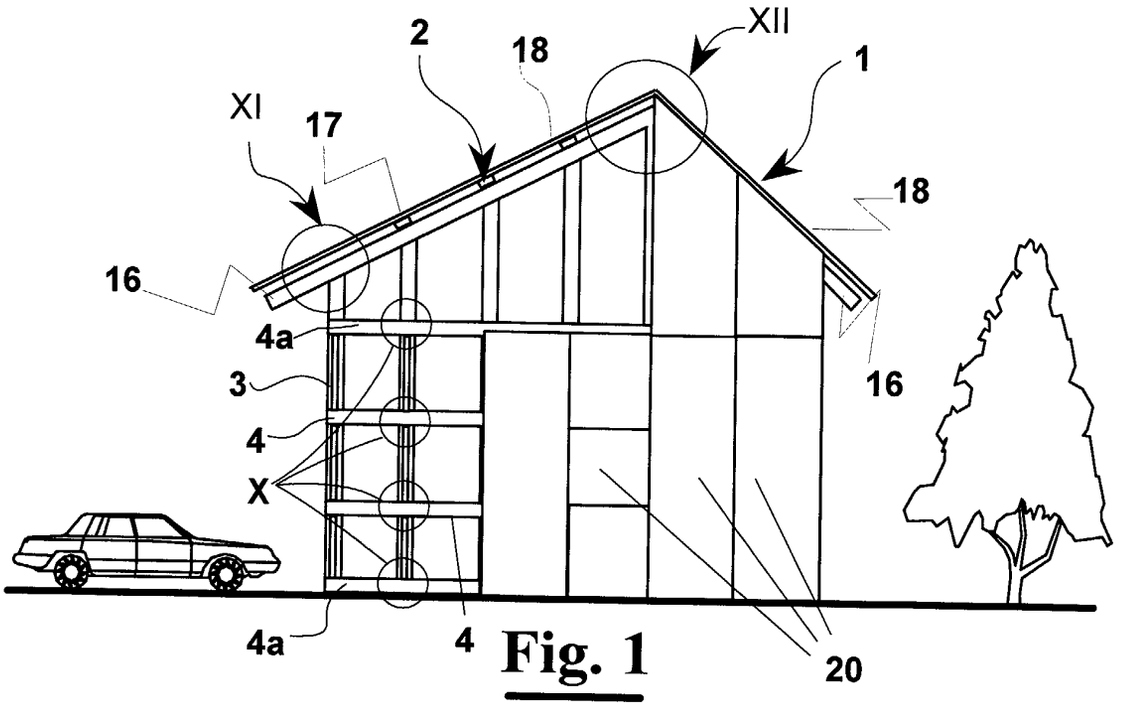

Fig. 1

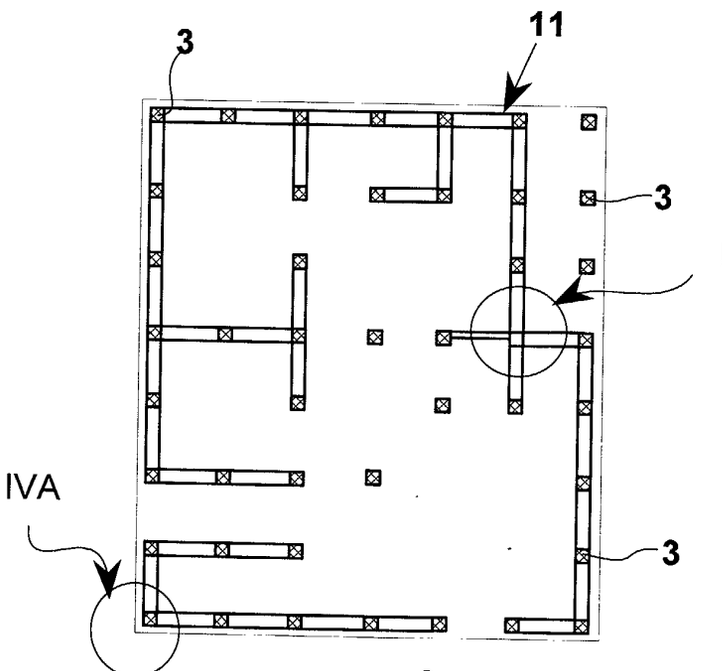

Fig. 2A

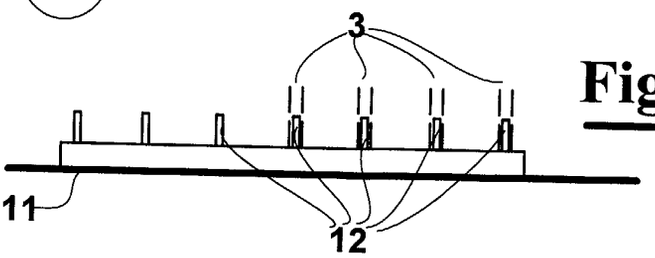

Fig. 2B

Fig. 3A

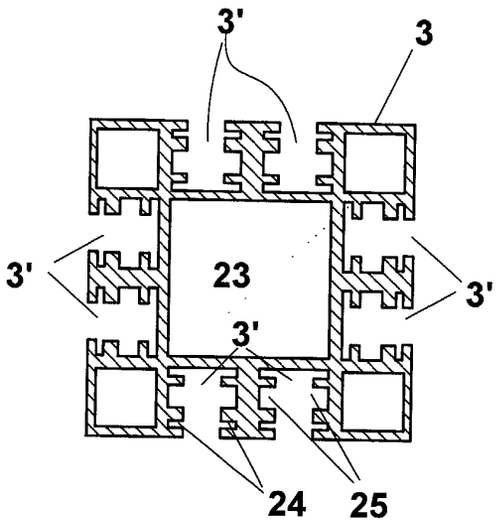

Fig. 3B

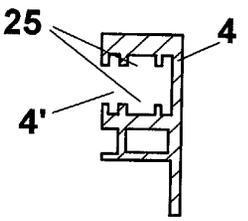

Fig.3C

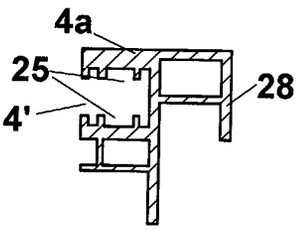

Fig. 3D

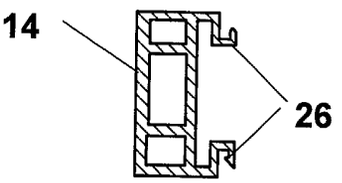

Fig. 3E

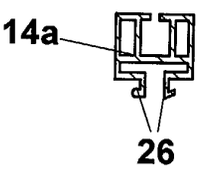

Fig. 3F

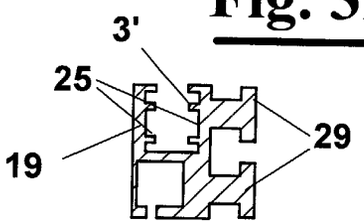

Fig. 3G

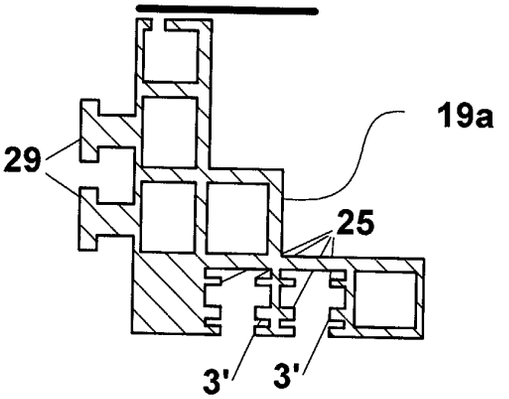

Fig. 3H

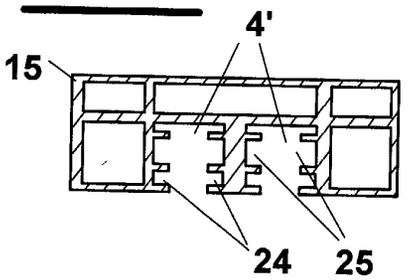

Fig. 4A

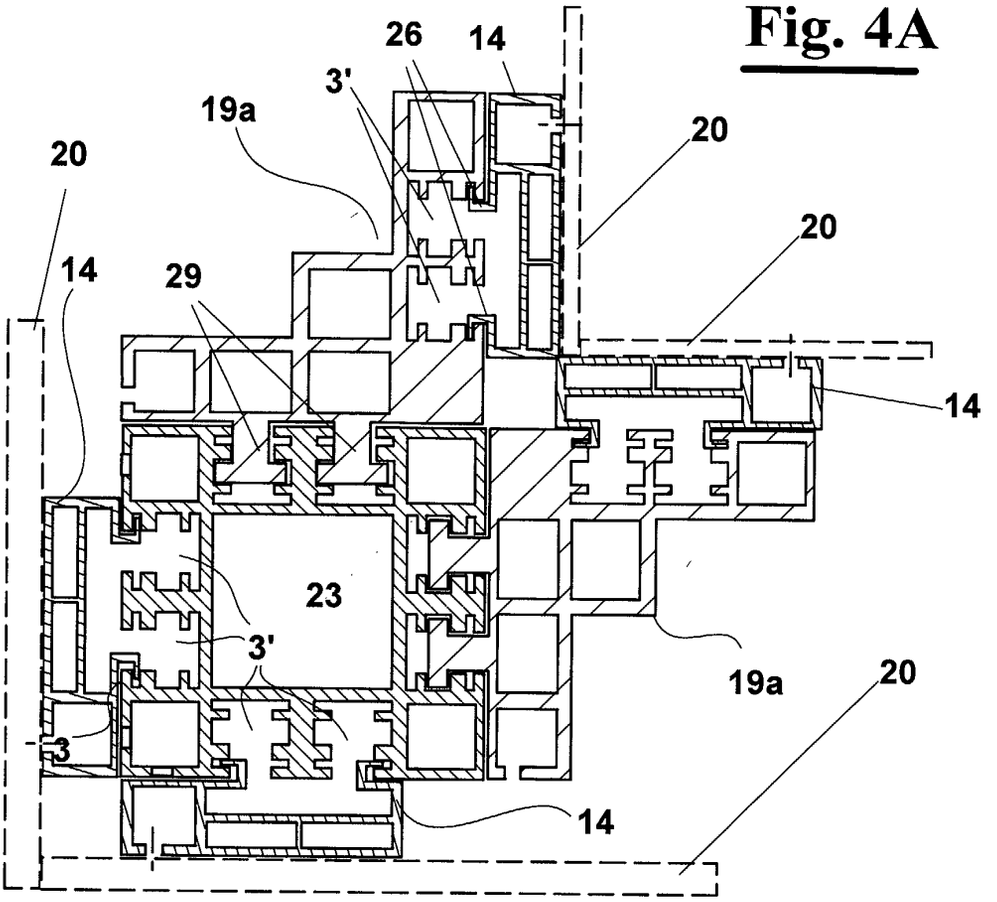
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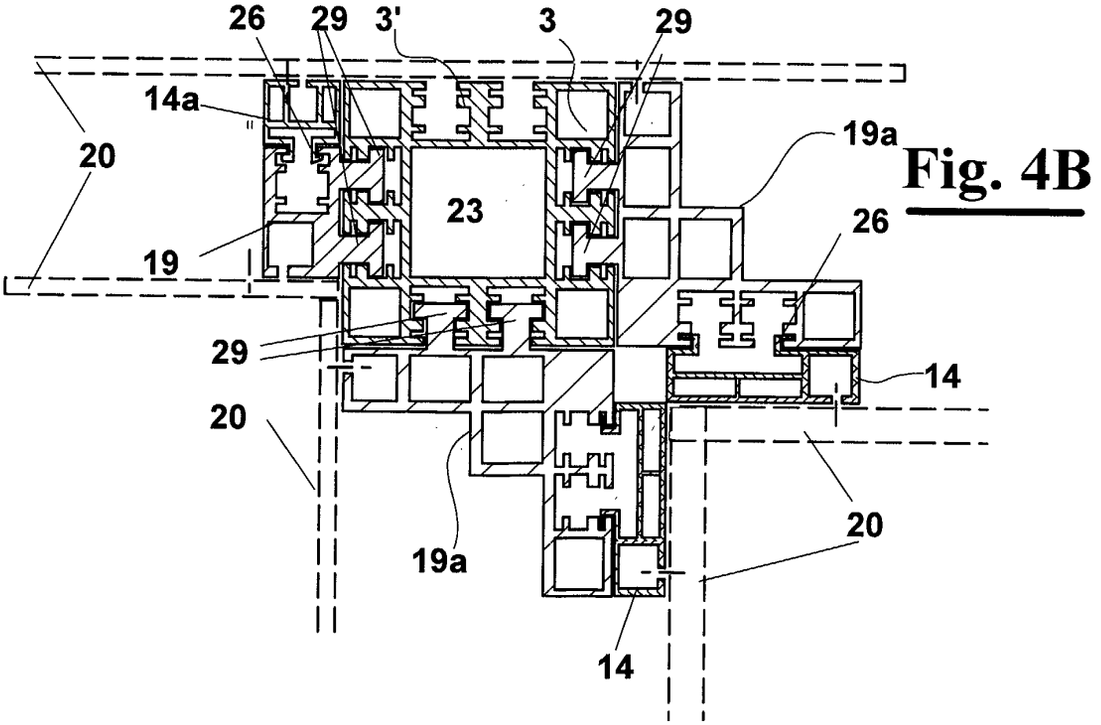
Fig. 4B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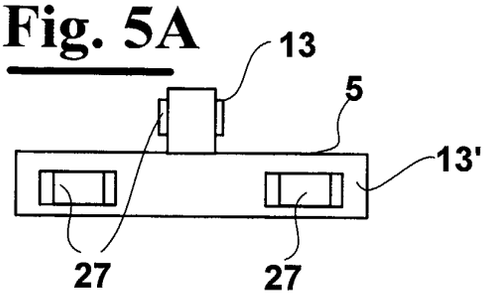
19a
20
14

Fig. 5A



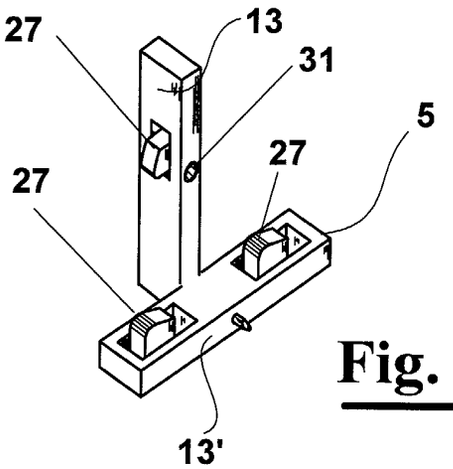


Fig. 5B

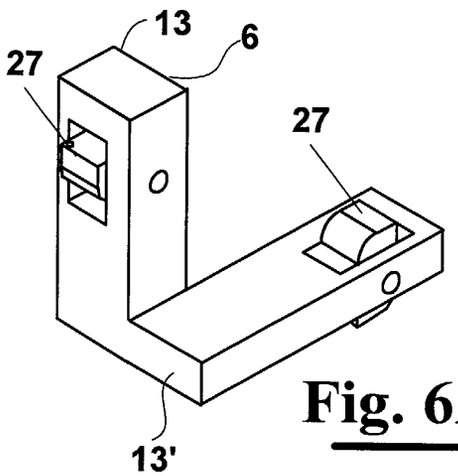
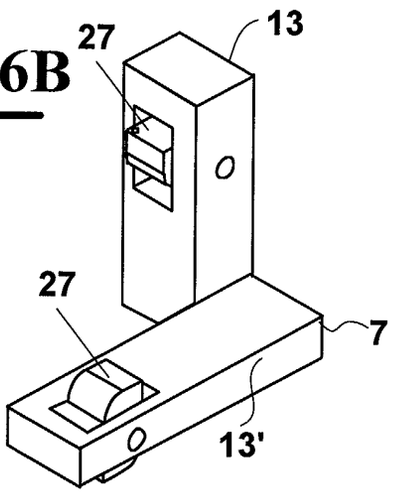


Fig. 6A

Fig. 6B



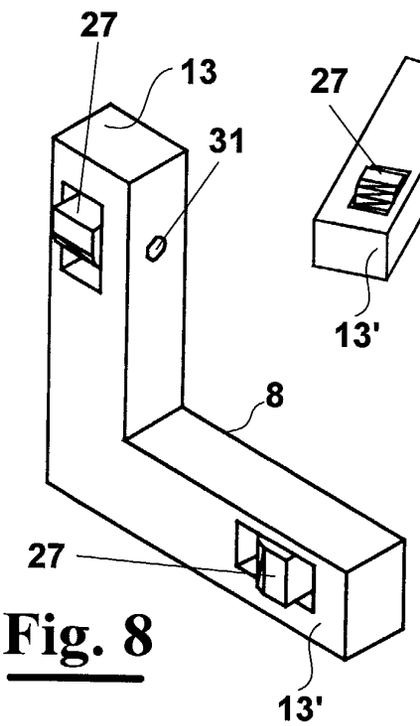


Fig. 8

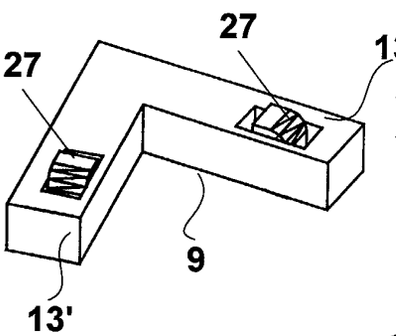


Fig. 7

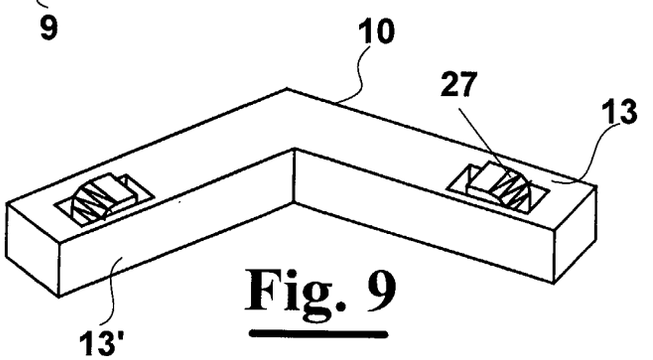


Fig. 9

Fig. 10

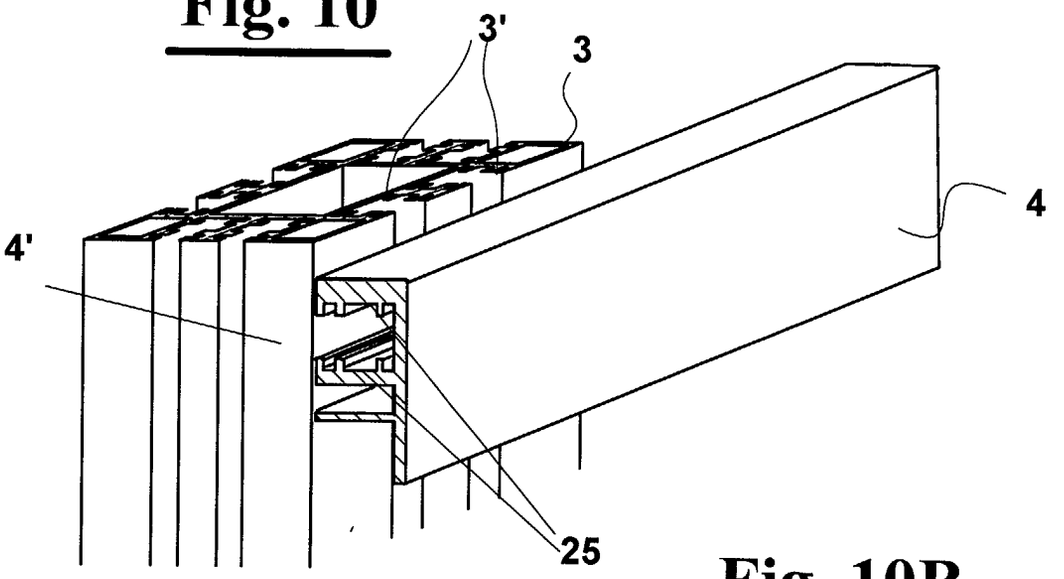


Fig. 10A

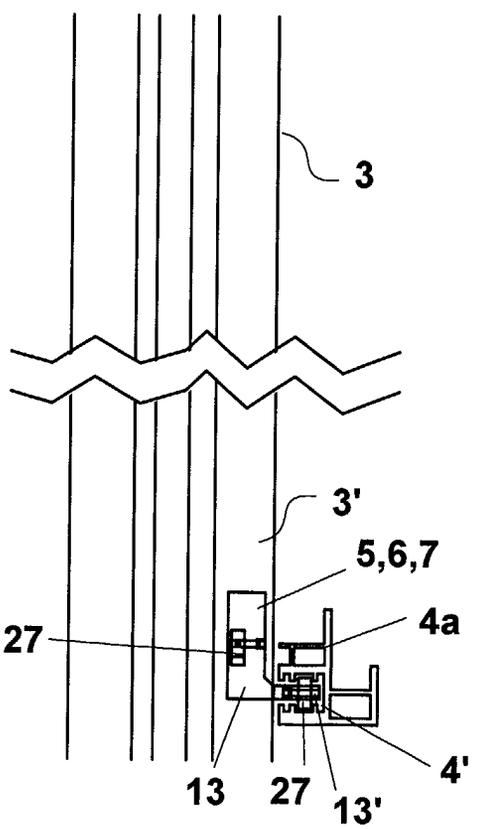


Fig. 10B

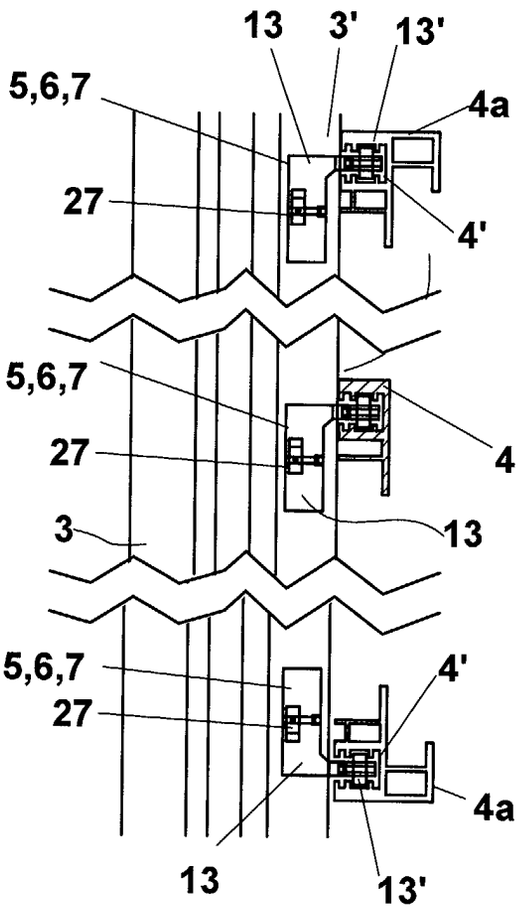


Fig. 10C

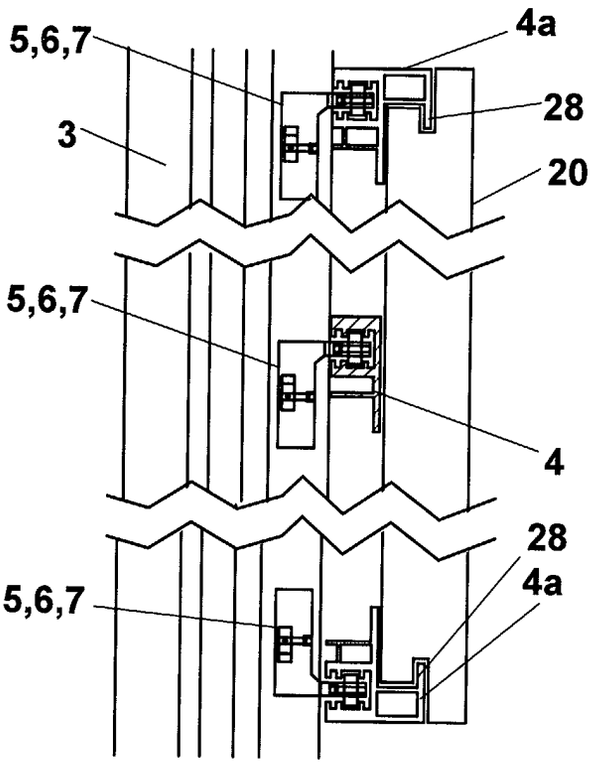


Fig. 10D

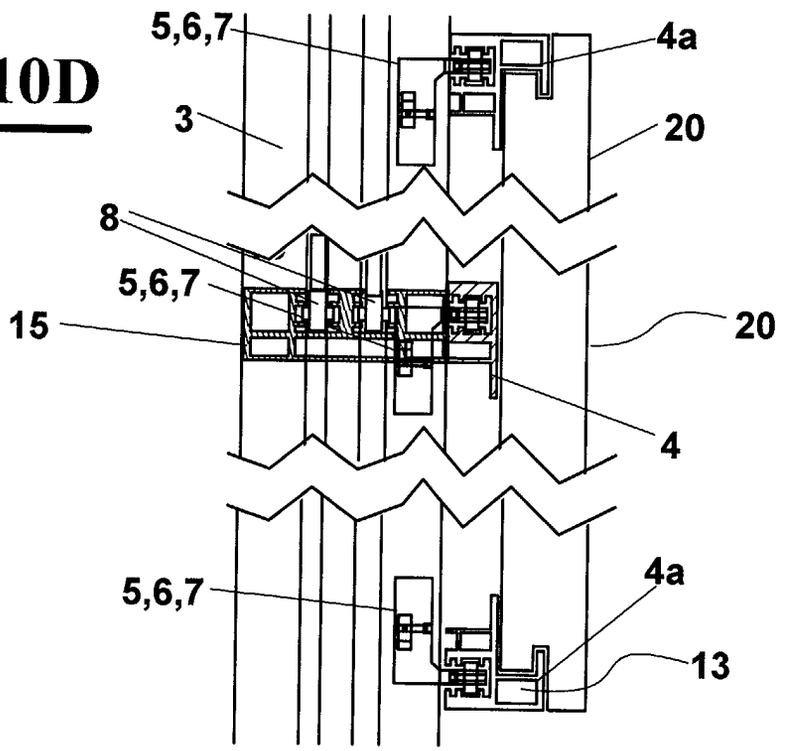


Fig. 11

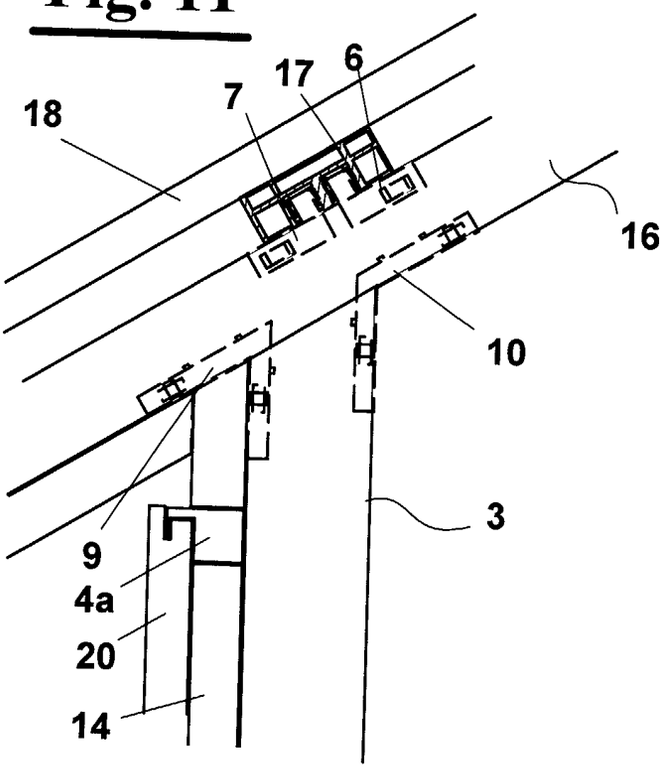
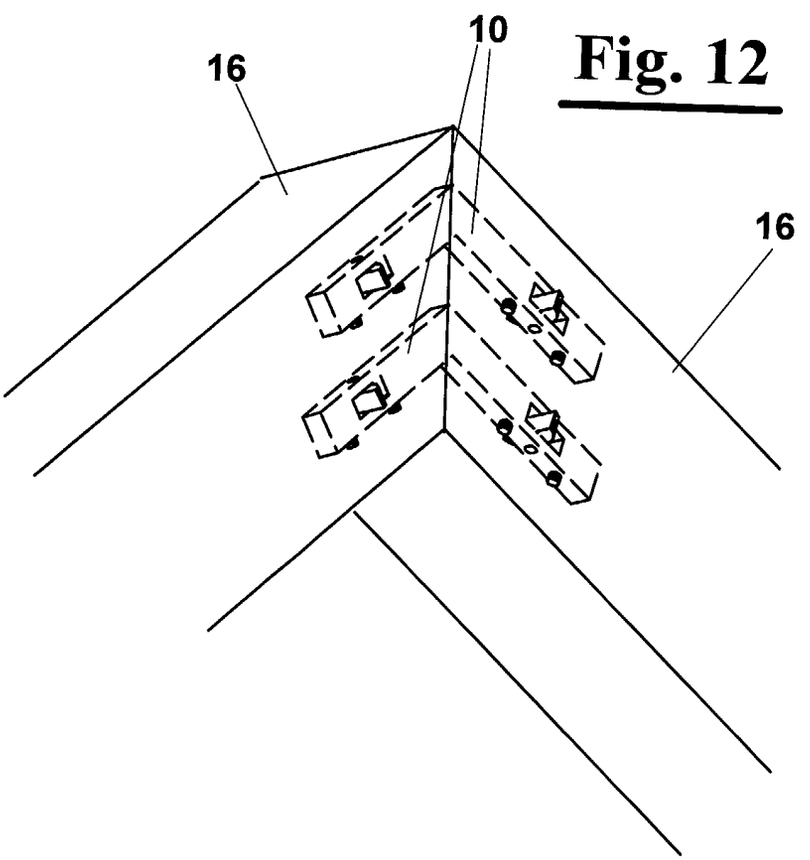


Fig. 12



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EUROPEAN SEARCH REPORT

Application Number
EP 01 83 0802

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E04B
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The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	24 September 2002	Delzor, F

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