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(54) **Method of constructing a building, such building, and wall element for use therein**

Verfahren zum Erstellen eines Gebäudes, Gebäude, und Wandelement hierfür

Procédé de construction d'un bâtiment, ce bâtiment, et élément de mur pour ceux-ci

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Description

[0001] The invention relates to a method of constructing a building, a building preferably constructed according to this method and wall and floor elements for use therein.

[0002] In the prior art, several building methods are known in which lightweight wall elements are used. In most cases, the wall elements are made of expanded polystyrene. Examples of these methods and the resulting buildings are disclosed in US-A-5,353,562, US-A-4,823,534 and US 5,617,686.

[0003] EP 0 727 535 A1 discloses a method of constructing a partition wall, which includes providing a plurality of columns or studs, securing basic face materials to both outer sides of the studs through sound insulation materials and fixing hard gypsum sheets to the outer sides of the corresponding basic face materials, thereby providing a wall structure having fire protecting properties.

[0004] US 5,765,333 discloses a united post and panel building system, in which a post is placed on a flooring system, a rigid foam panel, consisting of one or more layers of rigid foam bonded together using adhesives and having a shape to mate with the post, is placed next to the post, and is bonded to the post and the floor, whereafter the next post is put in place and bonded to the same panel etc. Furring strips may be embedded in the surfaces of the panels to allow common attachment of plasterboard on the inside of the panel wall system or siding on the outside.

[0005] An object of the present invention is to provide an improved method of constructing a building.

[0006] For this purpose the invention provides a method of constructing a building in accordance with claim 1.

[0007] In this manner, there is provided a method which is simple and which leads to a high quality building with low building costs, but also leads to a building which can conform at least to fire safety regulations without costly additional measures. Preferably, the building wall according to the invention conforms to all basic requirements of building regulations, such as compressive strength, wind resistance etc, without costly additional measures.

[0008] Preferably, large wall elements are used, such that a story high wall element completely fills the space between two adjacent upright building elements, such as columns or dividing walls. If the adjacent wall elements abut at the position of the upright building element, it is automatically covered. In case of a column, the other, preferably inner, side of the column may be covered by a separate panel to close off the space around the column. Preferably, the wall surfaces on both sides of the building wall are flat, but for example at the position of the columns, the wall surface may be interrupted by protruding sections, or recessed sections. The columns may be prefabricated from wood, steel, or concrete or any combination thereof, but it is also possible to cast columns in situ by closing the space around the desired columns and to use the wall elements and panel as shuttering to form the column from structural fill-material, such as concrete. In case of row houses or terraced houses in which the upright building elements are at least partially formed by dividing walls, the walls may be formed in situ or may consist of prefab walls which are erected before the wall elements are placed.

[0009] After the (outer) building walls of the building have been constructed, the walls may be processed, preferably cut, to form openings and recesses in the walls to take up doors, windows, lines and pipes etc. Since the columns and/or dividing walls take up the majority of forces in the building, the openings in the wall elements may be created as desired without deteriorating the structural integrity of the building wall. As the wall elements are hardly loaded, they are not deformed and this obviates the need for frames around windows which are normally intended to protect the glass from forces in the wall. This reduces the building costs further. Frames are only necessary for supporting movable windows. Since there is a great freedom in making openings in the walls and since these openings could be made only after constructing the walls of the building, the design of the building may be changed in a late stage of the building process. This makes the building concept very flexible.

[0010] As an alternative, the wall elements can be prefabricated, with all windows, doors, lines and/or other accessories mounted in the production facility. It is even conceivable to prefabricate complete (one storey) facades or even the complete building before it is transported to the construction site.

[0011] The invention also includes a building in accordance with claim 8.

[0012] Preferably, the covering layer includes a reinforcement layer, such as a woven mat, netting, mesh or the like, and preferably a fibre reinforced layer.

[0013] This reinforcement layer provides added strength to the wall elements in order to provide resistance against external forces, such as wind or the like. A reinforcement layer on the inner side of the building may also provide added strength for mounting purposes inside the house, for example for hanging objects to the walls.

[0014] The invention also includes a wall element in accordance with claim 14.

[0015] The wall element will generally be plane, but it may also be curved around one or more axes.

[0016] Floors in the building are preferably made by placing and interconnecting lightweight, heat insulating floor elements, supporting them if necessary, and pouring structural fill-material, such as concrete or the like, onto the floor elements to form the floor. For interconnecting the floor elements use is preferably made of thin steel profile sections.

[0017] The invention will hereafter be elucidated with reference to the drawings, showing embodiments of the invention by way of example.

Fig. 1 is a sectional plan view of a part of a building wall in accordance with an embodiment of the present invention.

Fig. 1a, 1b and 1c are sectional plan views of columns that can be used of the building of Fig. 1.

Fig. 2 is a sectional side view of a part of the building of Fig. 1.

Fig. 3 is a perspective view of the parts making up the building wall of Figs. 1 and 2.

Fig. 4 is a perspective view of the parts making up the building floor.

Fig. 5, 6 and 7 are a front view (smaller scale) and sectional views along the lines VI-VI and VII-VII in Fig. 5 showing a wall element from the building of Fig. 1 and 2.

Fig. 8 is a larger scale sectional view of a portion of the wall element of Fig. 5 - 7, illustrating the structure thereof.

Fig. 9 is a sectional plan view of two elements according to another embodiment of the invention.

Fig. 10 is a cross-sectional view of a floor element from the building of Fig. 2.

Fig. 11 is a cross-sectional view of a steel section profile used with the floor element of Fig. 10.

Fig. 12 is a front perspective view of another skeleton of a building together with a plan sectional view of another embodiment of a wall element according to the invention.

Fig. 13 is a perspective view of the wall element for use in the building skeleton of Fig. 12, on a larger scale.

Fig. 14 are cut away details of the wall elements of Fig. 13 when built in the building of Fig. 12.

Fig. 15 shows in a perspective view the connection between a horizontal beam and a vertical auxiliary column as used in the building of Fig. 14.

Fig. 16 is a horizontal sectional view of a building wall as used in the building of Fig. 12.

[0018] The drawings, and in first instance Fig. 1 - 3 show a part of a building wall in accordance with the present invention. This building may be a house, but also buildings like offices or other utility buildings are conceivable. Figs. 1 and 2 show that the building wall comprises a skeleton including upright building elements, in this case columns 1, and wall elements 2 filling the space between the columns 1. As is shown in Figs. 1a, 1b and 1c the columns may consist of steel (Fig. 1a), wooden (Fig. 1b) or concrete (Fig. 1c) columns 1a, 1b, 1c. The concrete columns may be prefab columns or may be poured in situ. The wall elements 2 preferably have such dimensions, that they completely fill the space between the columns of one storey, so that there is only one wall element 2 between each adjacent pair of columns 1. This obviates the need for complicated (mechanical) connections between wall elements.

[0019] Figs. 5 - 7 show the shape of one wall element 2. From Fig. 5 it is clear that the wall element 2 is rectangular. In this embodiment, the width of wall element 2 is 2.5 m, the height 3.0 m and the thickness 0.3 m, but such dimensions may of course be varied in accordance with the particular application and requirements. Figs. 6 and 7 show that only the part of the wall element 2 that is intended to be placed on the outside of the building wall has the dimensions as indicated above. The remainder of the wall element 2 is smaller. Due to these reduced dimensions, there is formed a rim 3 on all four edges of the wall element 2. This rim 3 is flush with the outside surface of the wall element 2 and may have a thickness of circa 60 mm. The length of the rim may for example be circa 90 mm.

[0020] Adjacent to the opposite surface, intended to form the inner wall surface of the building wall, there is formed a recess 4 having substantially the same dimensions as the rim 3. This recess 4 is also formed on all four sides of the wall element 2. In this way the edges of the wall elements 2 have a stepped configuration of which middle step has a height preferably corresponding to the thickness of the columns 1, while the depth of the first and last step preferably corresponds to half the width of the projected columns 1.

[0021] If two wall elements 2 are positioned next to each other, in an abutting relationship, there is formed a recess having three sides of 200 mm, which is intended for accommodating the columns, as is shown in Fig. 1. As the steel or wooden columns 1 will not exactly have these dimensions, they are provided with inserts 5 which are placed against the particular columns 1 in order to substantially fill the recess between the wall elements 2. A cover panel 6 may be positioned in the recesses 4 at the two adjacent edges of the wall elements 2 in order to close the recess between two wall elements, so that not only on the outside of the building wall, but also on the inside of the building wall a closed and continuous wall surface is formed. These closed and plane wall surfaces may be covered by covering layers 7 and 8 on the outside and inside of the building wall.

[0022] If columns are used which have larger dimensions, in particular a greater thickness, several situations may be created: first, wall elements having a greater thickness are used so that again completely plane wall surfaces can be obtained, furthermore, the column and/or a covering attached thereto may project on the inside and/or outside of the wall so that the wall surface has interruptions at the position of the columns.

[0023] Fig. 8 shows more a detailed section of the building wall at the position of a wall element 2. This wall element 2 forms the core of the building wall and is formed of a lightweight, heat insulating and preferably fire retarding, non-shrinking and stabile material in order to give the proper quality to the building wall. This material may for example be modified and pressed cardboard (e.g. as is disclosed in EP-A-1 180 564) or some expanded polymer, such as EPS (expanded polystyrene), for example that as offered by Unidek under the name Unidek EPS which is modified according to NEN 6065/6066 in order

to obtain fire retarding properties.

[0024] The covering layer 7 on the outside of the building wall includes a first or base layer 9, preferably of modified resin mortar as is known in the art. This base layer 9 is an adhesive layer in order to properly attach a second or top layer 10, which may be a layer of mineral mortar for example, which has properties to resist weather conditions and other influences which may exist on the outside of a building. Such mineral mortar is also known in the art.

[0025] On the inside of the building wall, the covering layer 8 includes a first or base layer, preferably of modified resin mortar 11, and a second or top layer 12, for example formed by plaster mortar. The total thickness of the covering layers 7 and 8 may be in the range of 20-30 mm, preferably 22-25 mm. In this covering layers 7, 8 there is accommodated a reinforcement layer 13, 14, which may be a woven mat, netting, mesh or the like, for example a glass or carbon fibre reinforced mesh or non-woven material. Preferably, at least one of the reinforcement layers 13, 14, in this case the reinforcement layer 14 on the inside, is positioned near the surface of the covering layer 8 in order to be at the maximum distance from the neutral bending line of the wall element 2 in order to give maximum bending resistance, for example when a wind force is exerted on a building wall. Another advantage of this position of the reinforcement layer 14 is that it provides strength to this layer 8 so that the wall can be used to anchor fixing means, such as nails, screws, and the like in order to attach objects to the wall.

[0026] The expanded polystyrene material can be obtained in different qualities and in this embodiment, the wall element 2 may be formed of a standard quality, whereas the inserts 5 and cover panel 6 may be formed of higher compression material to provide additional heat insulation and strength around the columns 1 in order to obtain a substantially uniform heat-insulation quality through the entire wall.

[0027] Fig. 9 shows a variation on the building wall of Figs. 1 and 2, in which the wall elements 2 are curved around a vertical axis to form a circular wall.

[0028] Fig. 2 shows a sectional side view of the building of Fig. 1 illustrating not only the structure of the building wall, but also the floors of the building. The floor structure is also shown in Fig. 4.

[0029] In this case there is shown a ground floor 15, a storey floor 16 and a roof floor 17. The structure of the floors 15 - 17 is similar, except for some differences in finishing. Each floor comprises floor elements 18 which are interconnected and are formed from similar material as the wall elements 2, i.e. from lightweight, insulating and fire retarding material. The floor elements 18 are interconnected by steel profiles 19 which may be formed from steel sheet, for example with a thickness of 1 mm. Recesses 20 are formed in the sides of the floor elements 18 in order to enable engagement of protruding parts of the steel profiles 19 to ensure proper attachment of the profiles to the floor elements. The floor elements 18 have lower rims 21 and these rims 21 of adjacent floor elements 18 are placed in abutting relationship to form a closed continuous lower surface of the floor. The upper part of the floor element 18 is smaller and has a trapezoid cross section. In order to form the floor, the floor elements 18 are connected and are supported by stays in order to resist the weight of structural fill-material, such as concrete 22, fibre reinforced resin or the like, which is poured onto the floor elements 18. Before the fill-material 22 is poured, steel reinforcements 23 are placed on the floor elements 18. If necessary, inserts 25 placed in recesses that might still visible after constructing the floors 15-17. A floor finishing 26, a ceiling finishing 27 and the covering layer 8 on the walls are provided, preferably in the final stage.

[0030] An embodiment of a method of constructing a building is as follows.

[0031] First of all, there is formed a foundation in and/or on the underground, if necessary at all. This foundation can be relatively light since the building will be much lighter than a traditional building. If a skeleton from steel or wood is used, the steel or wood columns 1 are placed on their foundation in the correct position. Inserts 5 are placed around the respective columns to create column dimensions to fit with the wall elements.

[0032] The wall elements 2 are then placed against the columns 1, such that the rims 3 are of the wall elements 2 are placed against the outside of the columns 1 and are positioned in abutting relationship with the next wall element 2. Glue may be used to fix the wall elements 2 to the columns 1 and to each other, but other fixing means are conceivable. A cover panel 6 is positioned in the recesses 4 of the wall elements 2 to cover the last side of the column 1. In the corners of the building inserts 28 are provided to fill any remaining gap. Then, the inserts 25 are mounted and the floor elements 18 are positioned on the lower inserts 25. Adjacent floor elements 18 are connected to each other by the profiles 19 and are supported on temporary supports. After placement of the reinforcements 23, the fill-material 22 is poured on the floor elements 18, on the profiles 19, on the upper side of the wall elements 2 and the columns positioned below.

[0033] If in this building method concrete columns are used that are cast in situ, the wall elements 2 are placed before the columns 1 are formed. Only a reinforcement for the concrete columns 1 is mounted within the recess formed by the adjacent wall elements 2. The cover panels 6 are mounted to form a formwork or shuttering for the concrete which is then poured in the closed recess so that a column of concrete or other structural fill-material, is formed between the wall elements 2.

[0034] From the foregoing it will be clear that the invention provides a building method and a building that is cost effective. The resulting building may be so light that it can be moved in its entirety, or storeys may be built on the ground and lifted to its position afterwards. The energy- and maintenance cost are relatively low due to the high heat insulation and the low need for maintenance.

The flexibility of the building is high due to the light construction which makes it easy to rebuild or extend parts of the building. In this respect, openings may be closed again by closing or replacing a wall element and new openings may be created after completion of the building. The building can be demounted again and the building materials can be reused. Therefore, the building method is also environmentally friendly. The wall elements may be used in an burglary alarm by integrating parts thereof in the wall elements, for example light conducting fibres, or electrically conducting wires.

[0035] As an alternative to the floors comprising floor elements and cast concrete, it is for example possible to construct a floor from steel sections, wooden beams, an insulation layer and a cement finishing layer.

[0036] Figs. 12-16 show a further embodiment of the building and method according to the invention. Fig. 12 shows a skeleton of a building, including separating or partition walls 29 and floors 30. The dividing walls 29 function as a lightweight building element and separate in this case individual homes which are built in a row. The ends of the dividing walls which are positioned at the outer side of the building more or less act as columns for the outer wall. In this embodiment, the wall element 2 forms a complete façade or outside wall between two adjacent dividing walls 29 and floors 30. Between adjacent dividing walls 29 there are provided one or more auxiliary columns 31, in this case in the form of steel sections, which are attached to the floor and ceiling 30. These auxiliary columns 31 may be integrated in the wall elements 2 or may be installed in the skeleton before the wall elements 2 is mounted to the skeleton.

[0037] Figs. 13-16 show an embodiment of a wall element 2 which fits between two adjacent dividing walls 29. Therefore such wall element may be sized up to a length of 5 or 6 meters or more. In the embodiment shown, this wall element 2 has a laminate structure including layers 32, 33, 34 which are attached, for example glued together. Each layer 32, 33, 34 may be formed of different parts. The (relative) thickness of the various layers may be varied in accordance with the respective requirements. Preferably, the layers are each formed of different parts and the parts of the different layers being provided in an overlapping relationship so that they support each other. Integrated in the central layer 33 are in this case two horizontal beams 35, 36 made from wood or another suitable material such as plastic or the like. These horizontal beams are incorporated into the wall element 2 during the laminating process. These beams 35, 36 provide rigidity to the large wall element 2 and provide a means for attaching the wall element 2 to the auxiliary columns 31 and any window to the wall element 2. In Fig. 14 it is shown that an opening 37 is already left open in the layers 32 and 34 so that after placement of the wall element 2 only layer 33 should be processed in order to finish the wall opening 37 to be able to mount the window. The window or window frame can be mounted to both beams 35 and 36.

[0038] As mentioned before, the beams 35 and 36 can also be used to attach the wall element 2 to one or more auxiliary columns 31. In Fig. 13 it is shown that the inner wall layer 34 is recessed at the position where an auxiliary column 31 should be mounted to the wall element 2. In this recess 38 the beams 35 and 36 are visible and the auxiliary column 31 can be mounted to the beams 35, 36 by means of self tapping screws or the like which are inserted through a hole in the auxiliary column 31. Other types of attachments are conceivable.

[0039] If a door opening is to be made in the wall element 2, the lower horizontal beam 36 has to be interrupted and cut off at the door opening. The doorframe could be attached to the upper horizontal beam 35. Generally, an auxiliary column 31 will be positioned next to a door opening in order to provide additional support for the wall element at the position of the door. The door frame could also be attached to an adjacent auxiliary column 31. The covering layer 7 or 8 on the outside or inside of the building may be provided on the wall elements 2 before the windows and/or doors are positioned in the respective openings in the wall element 2. This is advantageous as the windows and doors are preferably mounted in the wall elements 2 as late as possible in order to avoid damage to these parts. This covering layer 7 or 8 will be provided within the opening 37 up to the position where the window frame will be positioned.

[0040] Fig. 16 shows that the recess 38 is filled with an insert 39 to cover the auxiliary column 31 and to fill the recess 38 in order to create a flush inner wall which can be covered by a continuous covering layer 8.

[0041] The joint 40 between adjacent wall elements 2 will be filled with a filler material, preferably PUR glue which does not only fill the joint but also connects the adjacent wall elements 2 in a secure manner.

[0042] The large joint 41 between the wall elements 2 and the dividing wall 29 (or between the wall elements 2 and the floor 30 as shown in Fig. 13) is filled with a sound insulating material forming a barrier against the transmittal of sound around the dividing walls 29 or floor 30.

[0043] From the foregoing it is apparent that the invention provides a wall element, in particular an outside wall element, which is durable, yet lightweight, fire resistant and easy to handle so that buildings may be constructed in an simple and quick manner. No extensive scaffolding is necessary, a light mobile device is sufficient to place wall elements above the ground floor.

[0044] The invention is not limited to the embodiments shown in the drawings and described above and may be varied in different manners within the scope of the invention as defined by the appended claims. For example, the wall elements may be provided with (meandering) recesses to accommodate heating tubes of a wall and/or floor heating assembly.

Claims

1. A method of constructing a building, comprising the following steps:

   providing a skeleton for the building, said skeleton including at least upright building elements (1; 29), such as columns or dividing walls,
   placing at least one, lightweight, heat insulating and fire retarding wall element (2) between each adjacent pair of said upright building elements which are positioned before the wall elements are placed, such that the wall elements completely fill the space between the upright elements,
   providing on the inside and the outside of the wall elements (2) and at least externally of the upright building elements (1; 29) a covering layer (7, 8) to provide at least a substantially closed wall surfaces, said covering layer having properties so as to provide at least fire-resistance to the complete wall.

2. The method of claim 1, wherein the upright building elements are prefab, such as steel, wood or prefab concrete, columns (1) which are positioned before the wall elements are placed, adjacent wall elements preferably abutting to form a closed wall surface, in particular on the outside of the building.

3. The method of claim 2, wherein inserts (5) are placed adjacent to the columns (1') to fill any gap between the columns and the wall elements.

4. The method of one of the preceding claims, wherein lightweight, heat insulating floor elements (18) are placed and interconnected, and supported if necessary, and thereafter structural fill-material, such as concrete, is poured onto the floor elements to form a floor.

5. The method of one of preceding claims, wherein, after the outer walls have been constructed, the walls are processed, for forming openings and recesses in the walls to take up doors, windows, lines etc.

6. The method of claim 1, wherein the upright building elements are dividing walls (29) between adjacent building spaces, the lightweight wall elements (2) spanning the space between the dividing walls.

7. The method of claim 6, wherein auxiliary columns (31) are attached to the building skeleton and are integrated in the wall elements (2).

8. A building, comprising:

   a skeleton for an outer building wall of the building, said skeleton including at least upright building elements (1; 29),
   at least one lightweight, heat insulating fire retarding wall element (2) between each adjacent pair of said upright building elements, thereby completely filling the space between the upright building elements,
   a covering layer (7, 8) provided on each side of said wall elements and at least externally of the upright building elements to provide substantially closed wall surfaces, said covering layer having properties so as to provide at least fire-resistance to the complete wall, the covering layer on the inside wall surface including a base layer of modified resin mortar and preferably a top layer of plaster mortar, the covering layer on the outside wall surface including a base layer of modified resin mortar and preferably a top layer of mineral mortar.

9. The building of claim 8, wherein the covering layer includes a reinforcement layer, such as a woven mat, netting, mesh or the like, and preferably a fibre reinforced layer.

10. The building of claim 8 or 9, wherein the covering layer on the inside wall surface includes a base layer of modified resin mortar, and preferably a top layer of plaster mortar, while the covering layer on the outside wall surface may include a base layer of modified resin mortar and preferably a top layer of mineral mortar.

11. The building of claim 9 and 10, wherein the reinforcement layer on the inside wall surface is accommodated in the top layer, while the reinforcement layer on the outside wall surface is accommodated in the base layer.

12. The building of one of claims 8 - 11, comprising openings between the upright building elements, said openings being closed by doors, windows or the like.

13. The building of one of claims 8 - 12, comprising a floor, constructed from interconnected lightweight insulating fire retarding floor elements and structural fill-material concrete poured onto the floor elements, the interconnection being preferably made by means of thin steel profile sections.

14. Wall element for a building according to any one of claims 8 - 13, wherein the wall element is constructed of lightweight insulating fire retarding material, such as modified polystyrene or cardboard, the wall element having a thickness of ca. 200 - 400 mm, preferably ca. 300 mm, and being substantially rectangular having a height and width of more than 2 m, preferably ca. 3 x 2,5 m to 3 x 6 m, the element being

provided on all edges with a rim extending laterally from the element and being flush with one side of the element, the edges of the wall element having a stepped configuration including at least two steps.

Patentansprüche

1. Verfahren zum Errichten eines Gebäudes, das die folgenden Schritte aufweist:

Bereitstellen eines Skeletts für das Gebäude, wobei das Skelett mindestens aufrechte Gebäudeelemente (1; 29), wie Säulen oder Trennwände aufweist,
Anordnen mindestens eines leichten, wärmedämmenden und feuerhemmenden Wandelements (2) zwischen jedem benachbarten Paar der aufrechten Gebäudeelemente, die angeordnet werden, bevor die Wandelemente angeordnet werden, so daß die Wandelemente den Raum zwischen den aufrechten Elementen vollständig füllen,
Bereitstellen auf der Innenseite und der Außenseite der Wandelemente (2) und mindestens außerhalb der aufrechten Gebäudeelemente (1; 29) einer Deckschicht (7, 8), um mindestens eine im wesentlichen geschlossene Wandoberfläche bereitzustellen, wobei die Deckschicht Eigenschaften aufweist, um der gesamten Wand mindestens eine Feuerbeständigkeit zu verschaffen.

2. Verfahren nach Anspruch 1, wobei die aufrechten Gebäudeelemente vorgefertigte, wie Stahl-, Holz- oder vorgefertigte Betonsäulen (1) sind, die angeordnet werden, bevor die Wandelemente angeordnet werden, wobei benachbarte Wandelemente vorzugsweise aneinanderstoßen, um eine insbesondere auf der Außenseite des Gebäudes geschlossene Wandoberfläche zu bilden.

3. Verfahren nach Anspruch 2, wobei Einsatzstücke (5) benachbart zu den Säulen (1) angeordnet werden, um jeden Spalt zwischen den Säulen und den Wandelementen zu füllen.

4. Verfahren nach einem der vorhergehenden Ansprüche, wobei leichte, wärmedämmende Deckenelemente (18) angeordnet und miteinander verbunden, und falls notwendig gestützt werden, und danach Baufüllmaterial, wie Beton, auf die Deckenelemente gegossen wird, um eine Decke zu bilden.

5. Verfahren nach einem der vorhergehenden Ansprüche, wobei die Wände bearbeitet werden, nachdem die Außenwände errichtet worden sind, um Öffnungen und Aussparungen in den Wänden zu bilden, um Türen, Fenster, Leitungen usw. aufzunehmen.

6. Verfahren nach Anspruch 1, wobei die aufrechten Gebäudeelemente Trennwände (29) zwischen benachbarten Gebäuderäumen sind, wobei sich die leichten Wandelemente (2) über den Raum zwischen den Trennwänden erstrecken.

7. Verfahren nach Anspruch 6, wobei Hilfssäulen (31) am Gebäudeskelett angebracht werden und in die Wandelemente (2) integriert werden.

8. Gebäude, das aufweist:

ein Skelett für eine Außengebäudewand des Gebäudes, wobei das Skelett mindestens aufrechte Gebäudeelemente (1; 29) aufweist,
mindestens ein leichtes, wärmedämmendes feuerhemmendes Wandelement (2) zwischen jedem benachbarten Paar der aufrechten Gebäudeelemente, wodurch der Raum zwischen den aufrechten Gebäudeelementen vollständig gefüllt wird,
eine Deckschicht (7, 8), die auf jeder Seite der Wandelemente und mindestens außerhalb der aufrechten Gebäudeelemente vorgesehen ist, um im wesentlichen geschlossene Wandoberflächen bereitzustellen, wobei die Deckschicht Eigenschaften aufweist, um der gesamten Wand mindestens eine Feuerbeständigkeit zu verschaffen, wobei die Deckschicht auf der Innenwandoberfläche eine Basisschicht aus modifiziertem Harzmörtel und vorzugsweise eine obere Schicht aus Gipsmörtel aufweist, wobei die Deckschicht auf der Außenwandoberfläche eine Basisschicht aus modifiziertem Harzmörtel und vorzugsweise eine obere Schicht aus Mineralmörtel aufweist.

9. Gebäude nach Anspruch 8, wobei die Deckschicht eine Verstärkungsschicht, wie eine Gewebematte, ein Geflecht, eine Masche oder dergleichen, und vorzugsweise eine faserverstärkte Schicht aufweist.

10. Gebäude nach Anspruch 8 oder 9, wobei die Deckschicht auf der Innenwandoberfläche eine Basisschicht aus modifiziertem Harzmörtel und vorzugsweise eine obere Schicht aus Gipsmörtel aufweist, während die Deckschicht auf der Außenwandoberfläche eine Basisschicht aus modifiziertem Harzmörtel und vorzugsweise eine obere Schicht aus Mineralmörtel aufweist.

11. Gebäude nach Anspruch 9 und 10, wobei die Verstärkungsschicht auf der Innenwandoberfläche in der oberen Schicht untergebracht ist, während die Verstärkungsschicht auf der Außenwandoberfläche in der Basisschicht untergebracht ist.

12. Gebäude nach einem der Ansprüche 8 - 11, das Öffnungen zwischen den aufrechten Gebäudeelementen aufweist, wobei die Öffnungen durch Türen, Fenster oder dergleichen verschlossen werden.

13. Gebäude nach einem der Ansprüche 8 - 12, das eine Decke aufweist, die aus miteinander verbundenen, leichten dämmenden feuerhemmenden Deckenelementen und Baufüllmaterialbeton aufgebaut ist, der auf die Dekkenelemente gegossen wird, wobei die gegenseitige Verbindung vorzugsweise mittels dünner Stahlprofilabschnitte hergestellt wird.

14. Wandelement für ein Gebäude nach einem der Ansprüche 8 - 13, wobei das Wandelement aus leichtem dämmenden feuerhemmenden Material, wie modifiziertem Polystyrol oder Pappe aufgebaut ist, wobei das Wandelement eine Dicke von ca. 200 - 400 mm, vorzugsweise ca. 300 mm aufweist und im wesentlichen rechteckig ist, wobei es eine Höhe und Breite von mehr als 2 m, vorzugsweise ca. 3 x 2,5 m bis 3 x 6 m aufweist, wobei das Element an allen Kanten mit einem Rand versehen ist, der sich seitlich vom Element erstreckt und mit einer Seite des Elements bündig ist, wobei die Kanten des Wandelements eine abgestufte Gestaltung aufweisen, die mindestens zwei Stufen aufweist.

Revendications

1. Procédé de construction d'un bâtiment, comprenant les étapes suivantes consistant à :

fournir une charpente pour le bâtiment, ladite charpente comprenant au moins des éléments (1 ; 29) montants de bâtiment, tels que des colonnes ou des cloisons de démarcation,
placer au moins un élément (2) de paroi, léger, calorifuge et ignifuge entre chaque paire adjacente desdits éléments montants de bâtiment qui sont positionnés avant que les éléments de paroi ne soient placés, de sorte que les éléments de paroi remplissent complètement l'espace entre les éléments montants,
fournir à l'intérieur et à l'extérieur des éléments (2) de paroi et au moins à l'extérieur des éléments (1 ; 29) montants de bâtiment une couche de revêtement (7, 8) pour fournir au moins une surface de paroi sensiblement fermée, ladite couche de revêtement ayant des propriétés pour à fournir au moins une résistance au feu à tout le mur.

2. Procédé selon la revendication 1, dans lequel les éléments montants de bâtiment sont préfabriqués, tels que l'acier, le bois ou le béton préfabriqué, les colonnes (1) qui sont positionnées avant que les éléments de paroi ne soient placés, les éléments de paroi adjacents de préférence en appui pour former une surface de paroi fermée, en particulier à l'extérieur du bâtiment.

3. Procédé selon la revendication 2, dans lequel des inserts (5) sont placés adjacents aux colonnes (1) pour remplir tout espace entre les colonnes et les éléments de paroi.

4. Procédé selon l'une quelconque des revendications précédentes, dans lequel des éléments (18) de sol légers, calorifuges sont placés et reliés entre eux, et soutenus si nécessaire, et par la suite un matériau de remblayage structurel, tel que du béton, est versé sur les éléments de sol pour former un sol.

5. Procédé selon l'une quelconque des revendications précédentes, dans lequel, après que les parois extérieures ont été construites, les parois sont travaillées, pour former des ouvertures et des cavités dans les parois pour élever des portes, des fenêtres, des galeries, etc.

6. Procédé selon la revendication 1, dans lequel les éléments montants de bâtiment sont des cloisons de démarcation (29) entre des espaces de bâtiment adjacents, les éléments (2) de paroi légers remplissant l'espace entre les cloisons de démarcation.

7. Procédé selon la revendication 6, dans lequel des colonnes auxiliaires (31) sont fixées à la charpente du bâtiment et sont intégrées dans les éléments (2) de paroi.

8. Bâtiment comprenant :

une charpente pour une paroi de bâtiment extérieure au bâtiment, ladite charpente comprenant au moins des éléments montants (1 ; 29) de bâtiment,
au moins un élément (2) de paroi léger, calorifuge et ignifuge entre chaque paire adjacente desdits éléments montants de bâtiment, remplissant ainsi entièrement l'espace entre les éléments montants de bâtiment,
une couche (7, 8) de revêtement fournie sur chaque face desdits éléments de paroi et au moins à l'extérieur des éléments montants de bâtiment pour fournir des surfaces de paroi sensiblement fermées, ladite couche de revêtement ayant des propriétés pour fournir au moins une résistance au feu à toute la paroi , la couche de revêtement sur la surface de paroi interne comprenant une couche de base en mortier de résine modifiée et de préférence une couche supérieure en mortier de plâtre, la couche de couverture sur la surface de paroi externe comprenant une couche

de base en mortier de résine modifiée et de préférence une couche supérieure en mortier minéral.

9. Bâtiment selon la revendication 8, dans lequel la couche de couverture comprend une couche de renforcement, telle qu'un tapis tissé, du grillage, du treillis ou similaire, et de préférence une couche renforcée de fibres.

10. Bâtiment selon la revendication 8 ou 9, dans lequel la couche de revêtement sur la surface de paroi interne comprend une couche de base en mortier de résine modifiée, et de préférence une couche supérieure en mortier de plâtre, tandis que la couche de couverture sur la surface de paroi externe peut comprendre une couche de base en mortier de résine modifiée et de préférence une couche supérieure en mortier minéral.

11. Bâtiment selon les revendications 9 et 10, dans lequel la couche de renforcement sur la surface de paroi interne est située sur la couche supérieure, tandis que la couche de renforcement sur la surface de paroi externe est située sur la couche de base.

12. Bâtiment selon l'une quelconque des revendications 8 à 11, comprenant des ouvertures entre les éléments montants de bâtiment, lesdites ouvertures étant fermées par des portes, des fenêtres ou similaires.

13. Bâtiment selon l'une quelconque des revendications 8 à 12, comprenant un sol, construit à partir d'éléments de sol légers, calorifuges et ignifuges reliés entre eux et du béton comme matériau de remblayage versé sur les éléments de sol, l'interconnexion étant de préférence effectuée au moyen de fines sections de profil en acier.

14. Élément de paroi pour un bâtiment selon l'une quelconque des revendications 8 à 13, dans lequel l'élément de paroi est construit en matériau léger, calorifuge et ignifuge, tel que le polystyrène ou le carton modifié, l'élément de paroi ayant une épaisseur d'environ 200 à 400 mm, de préférence d'environ 300 mm, et étant sensiblement rectangulaire ayant une hauteur et une largeur de plus de 2 m, de préférence d'environ 3x2,5 m à 3x6 m, l'élément étant fourni sur tous les côtés avec un bord s'étendant latéralement depuis l'élément et affleurant d'un côté de l'élément, les côtés de l'élément de paroi ayant une configuration étagée comprenant au moins deux étapes.

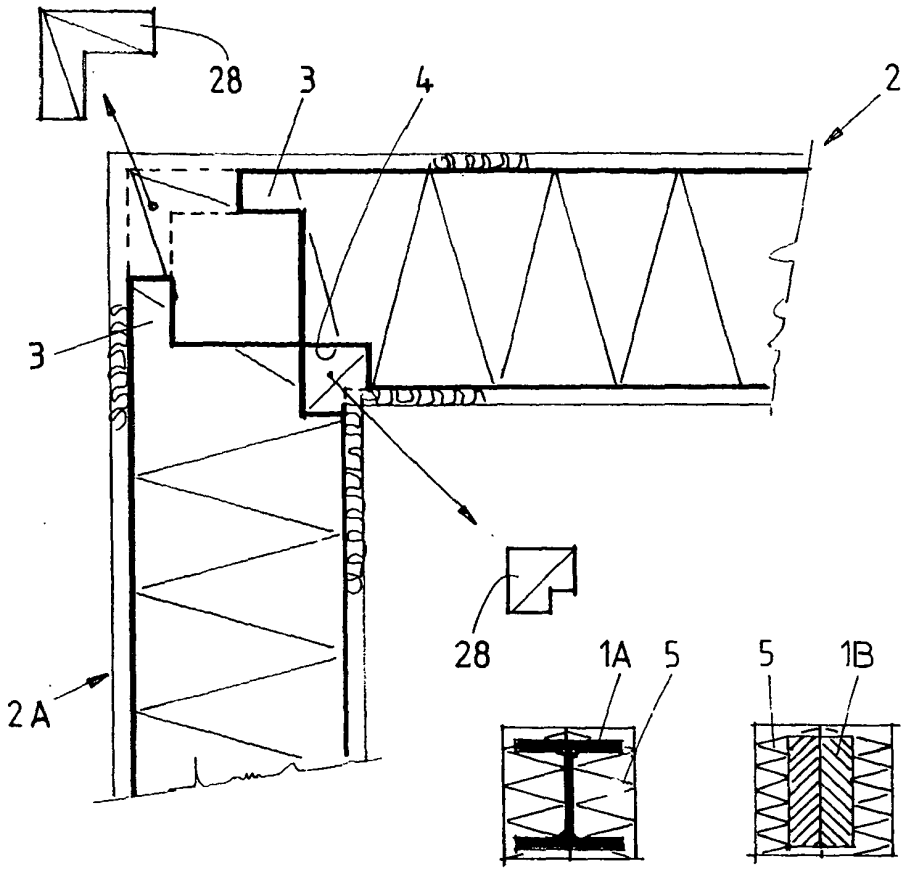

Fig.1a

Fig.1b

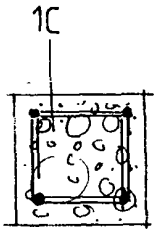

Fig.1c

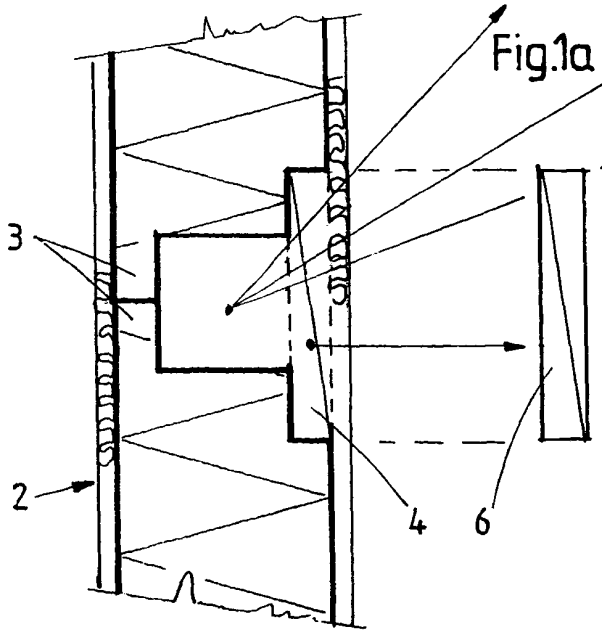

Fig.1

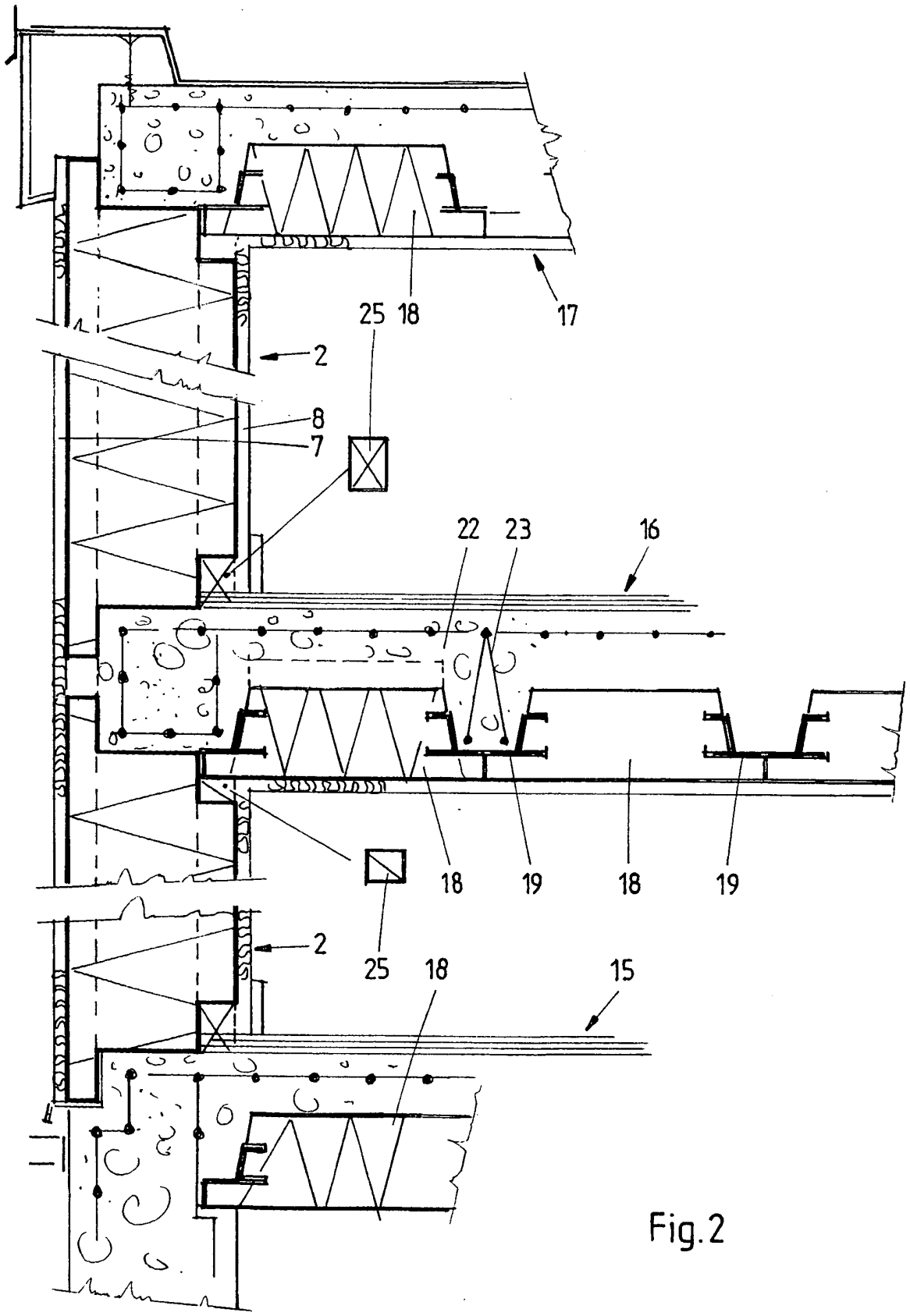

Fig.2

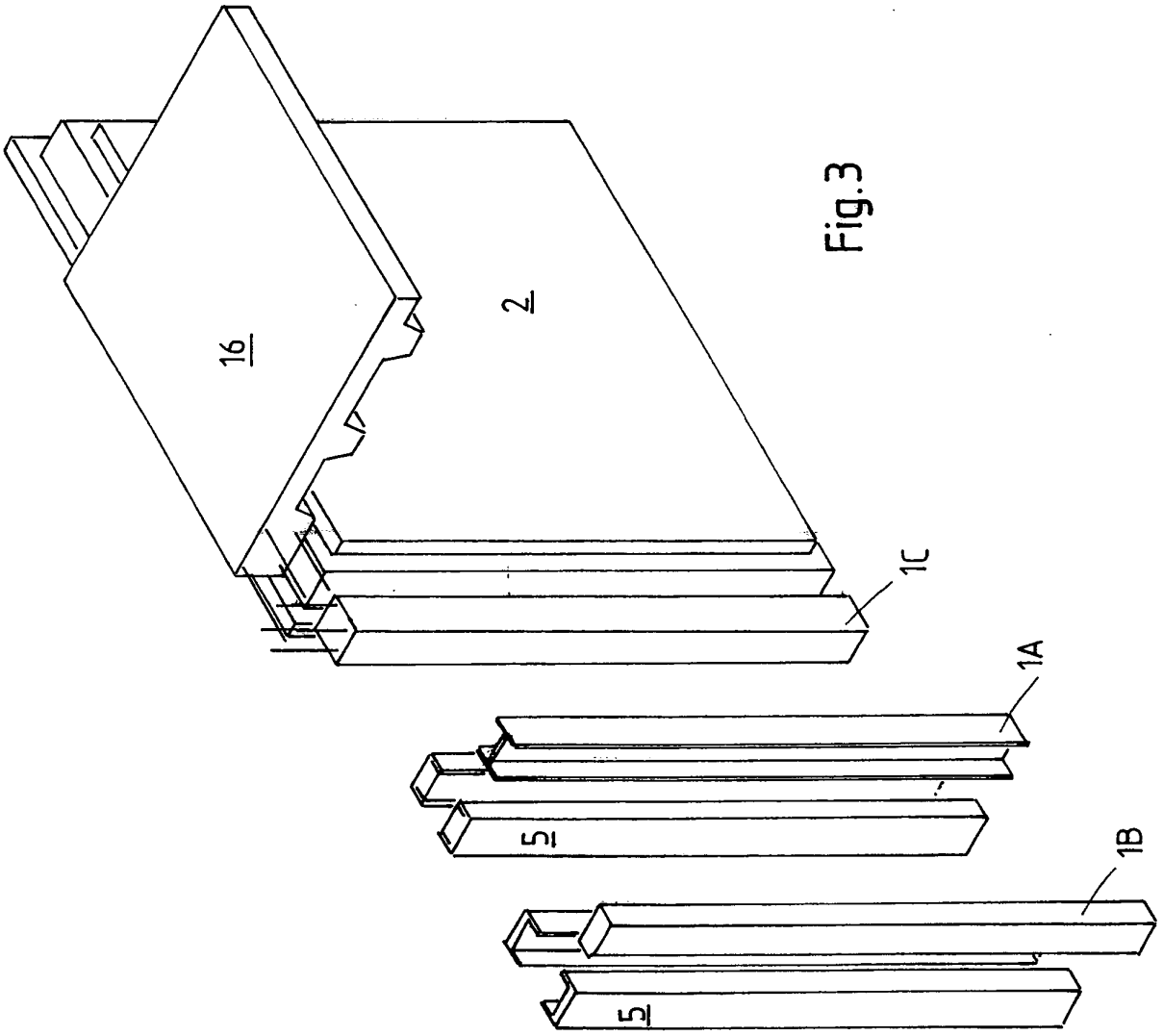

Fig.3

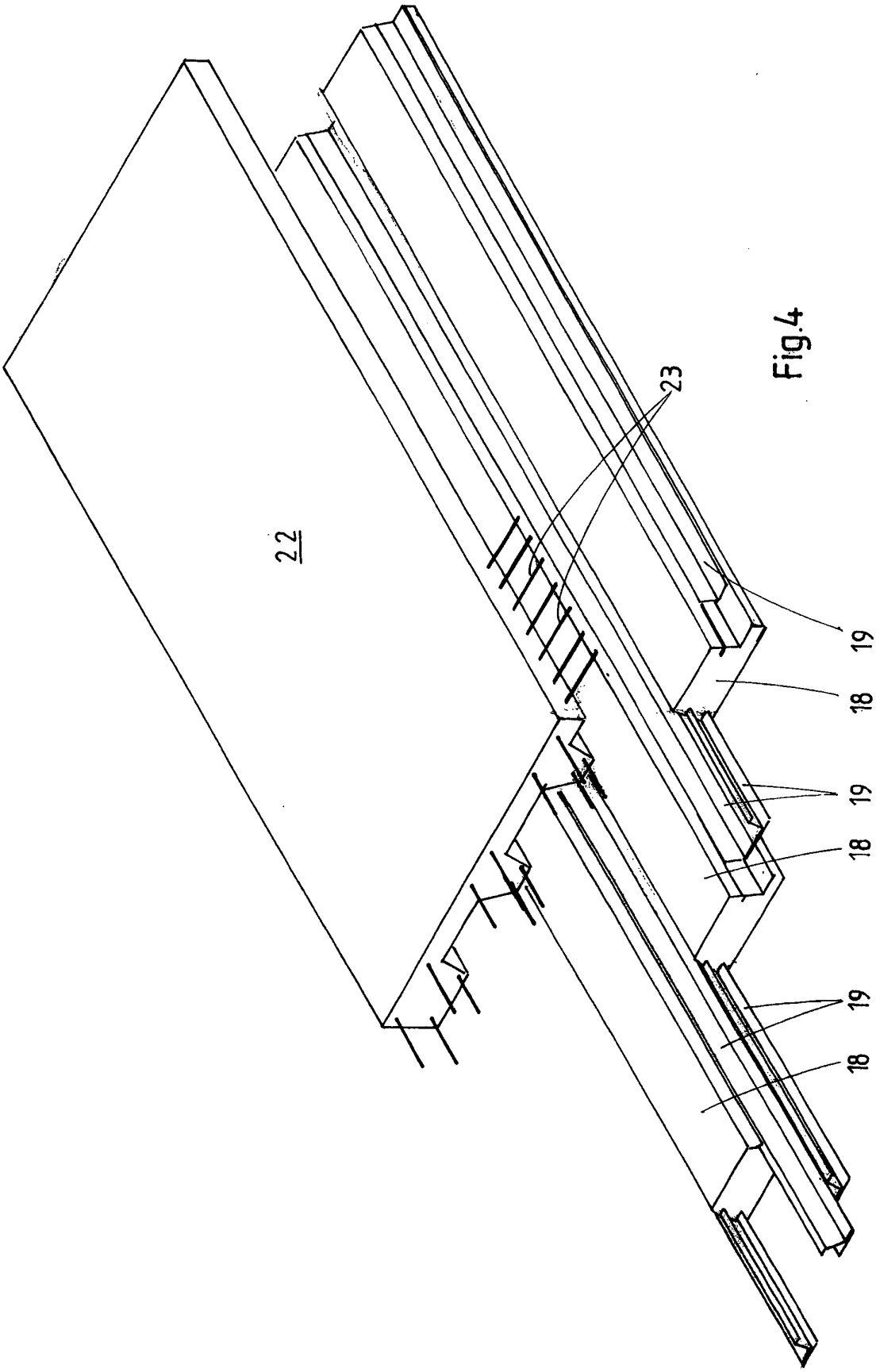

Fig.4

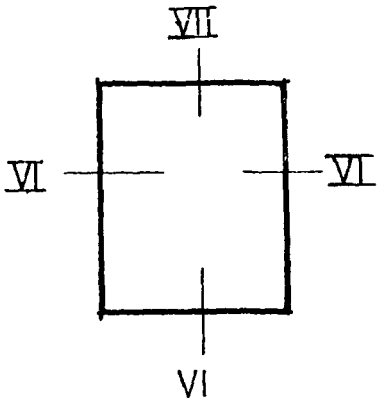

Fig.5

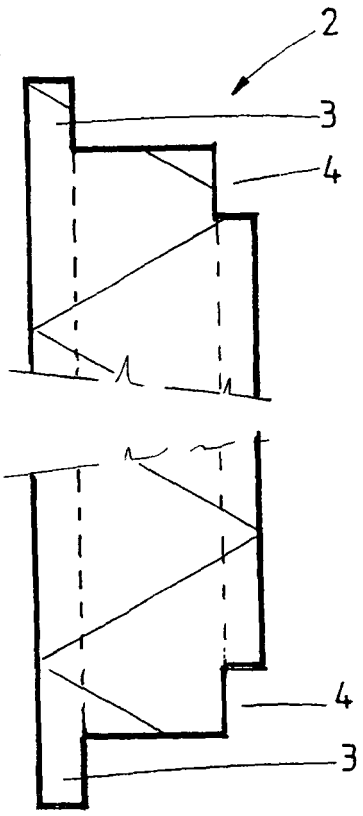

Fig.7

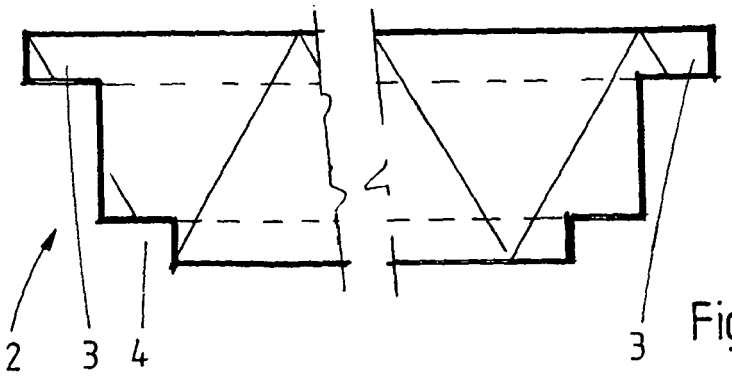

Fig.6

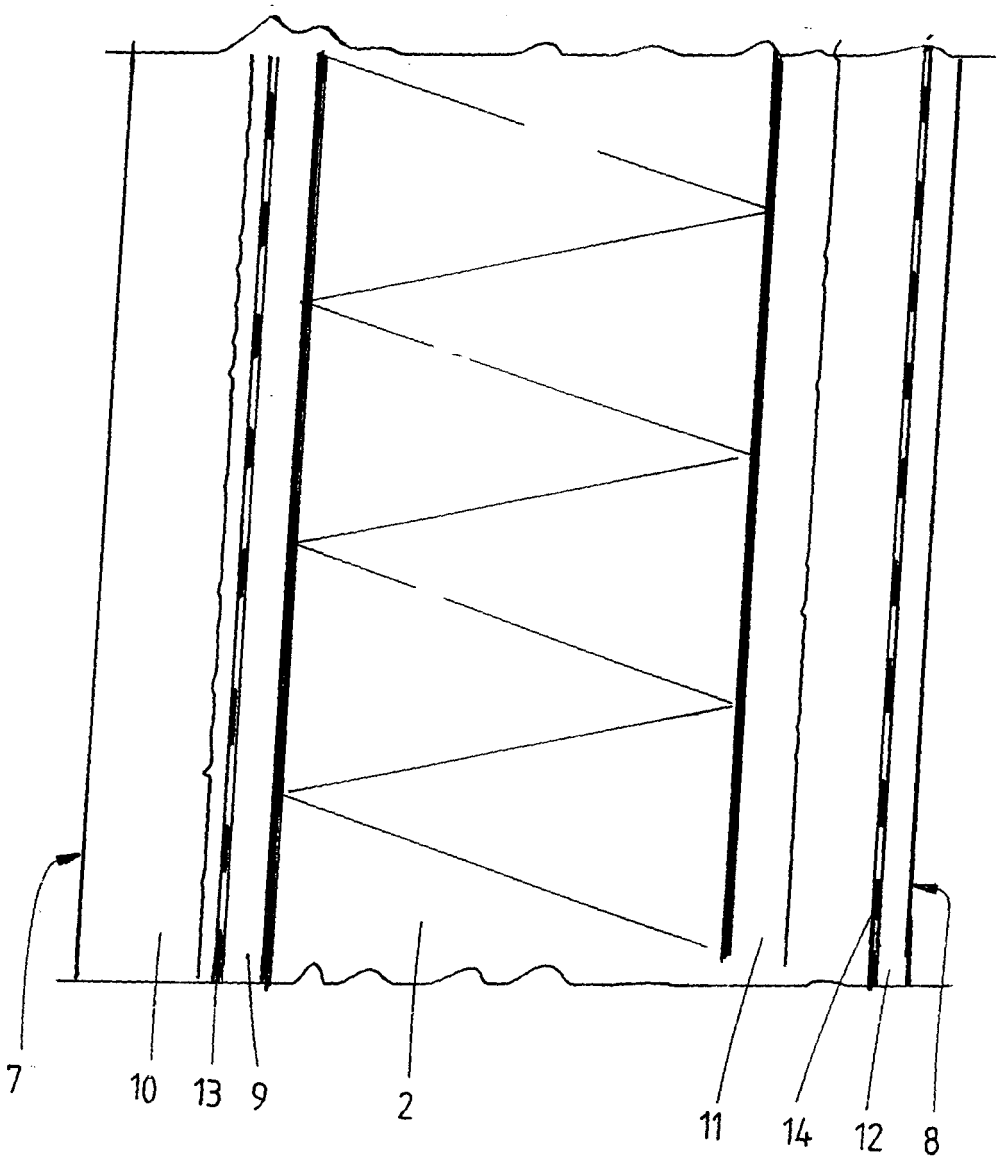

Fig.8

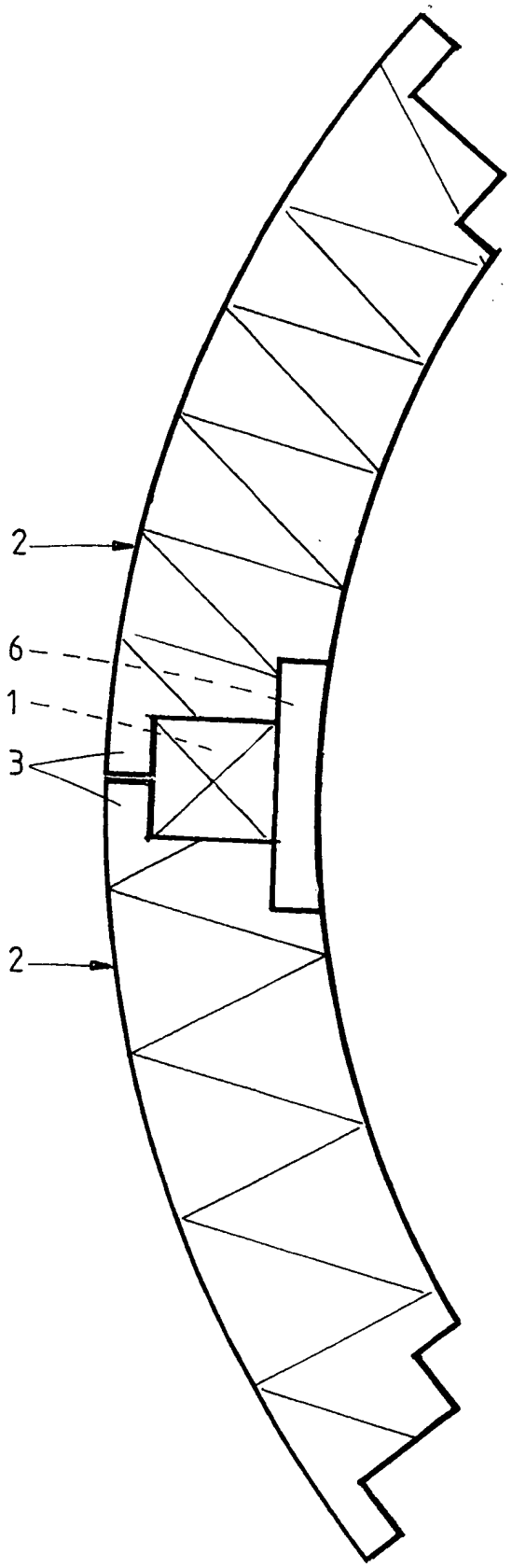

Fig.9

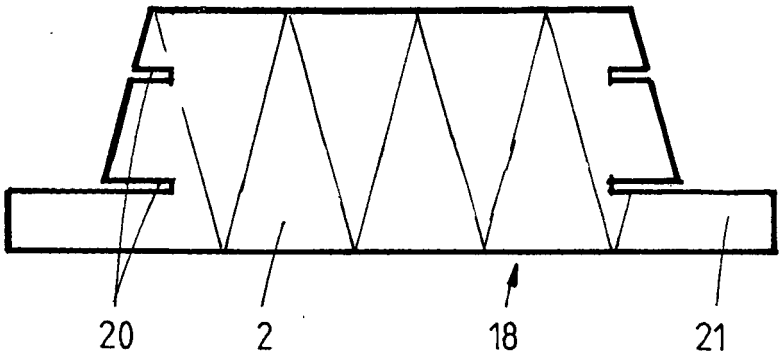

Fig.10

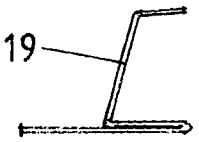

Fig.11

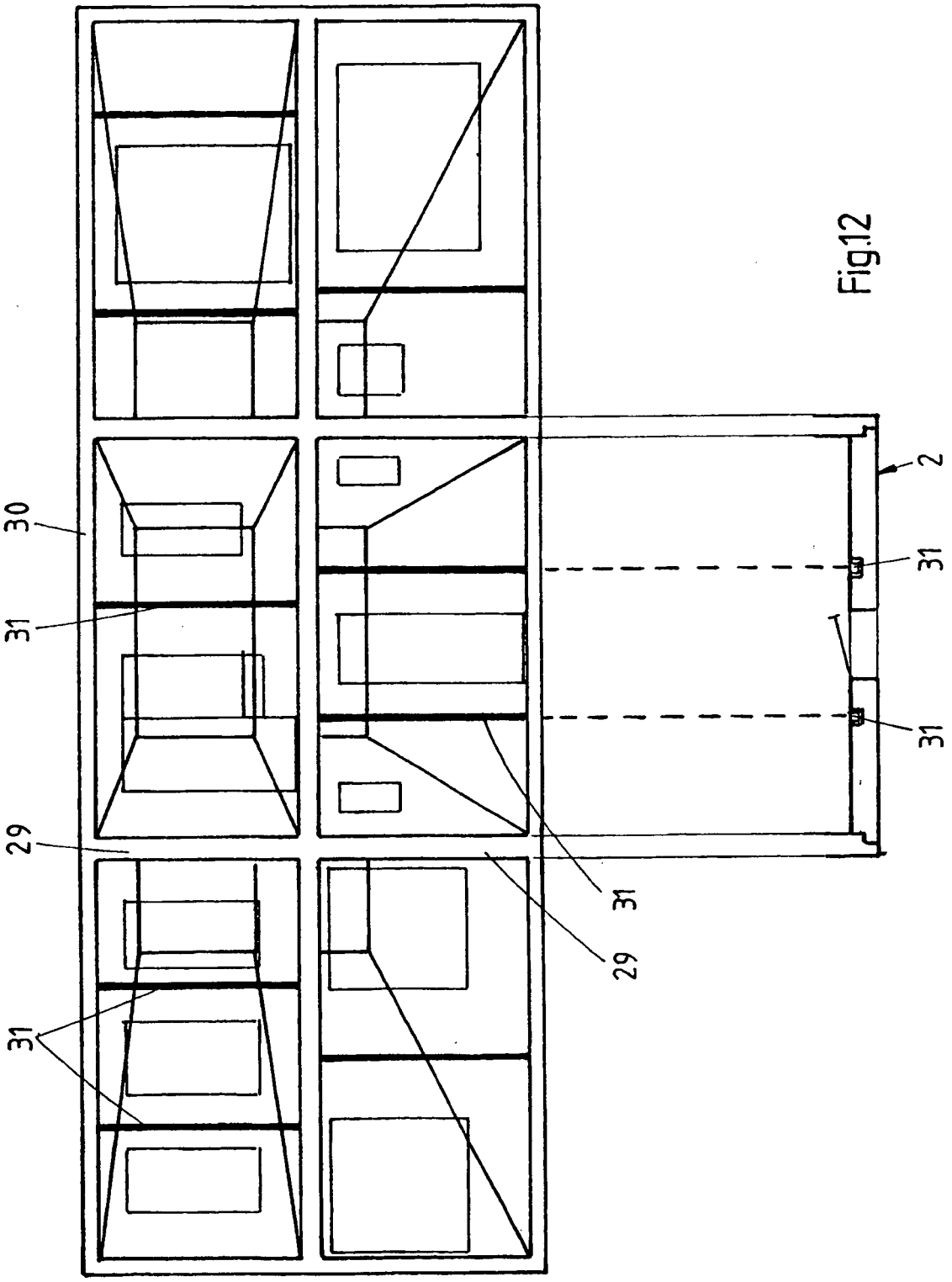

Fig.12

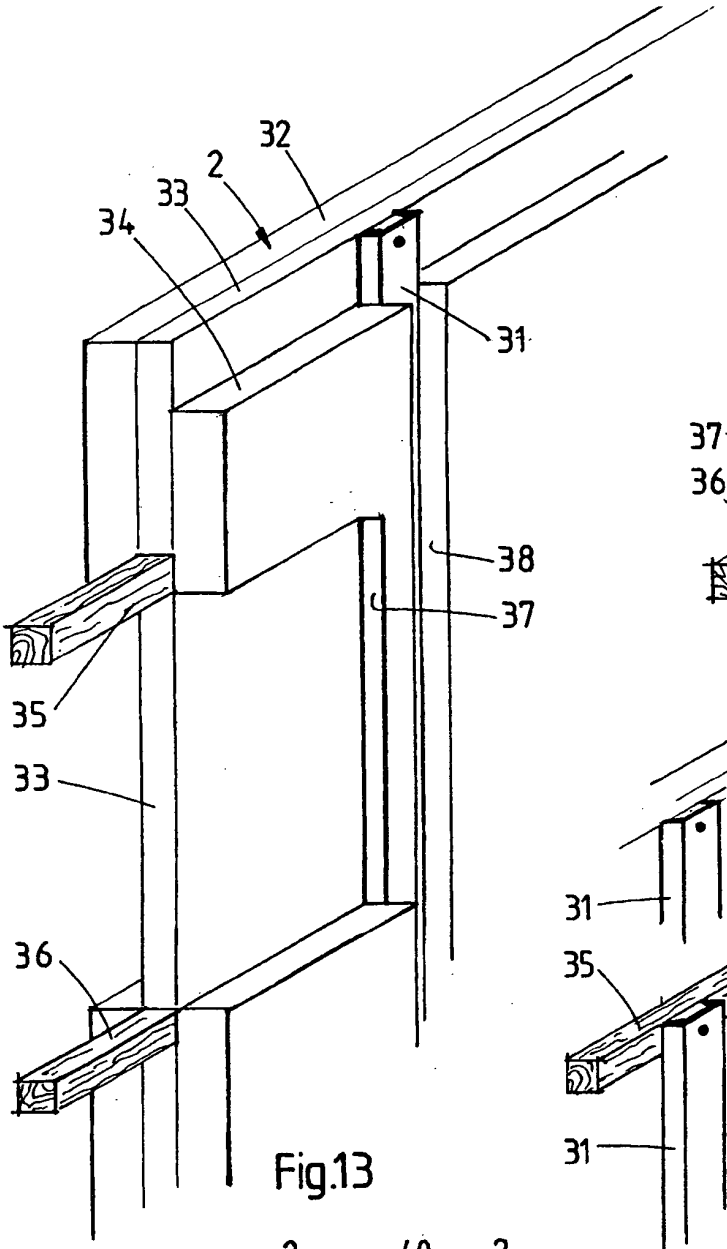

Fig.13

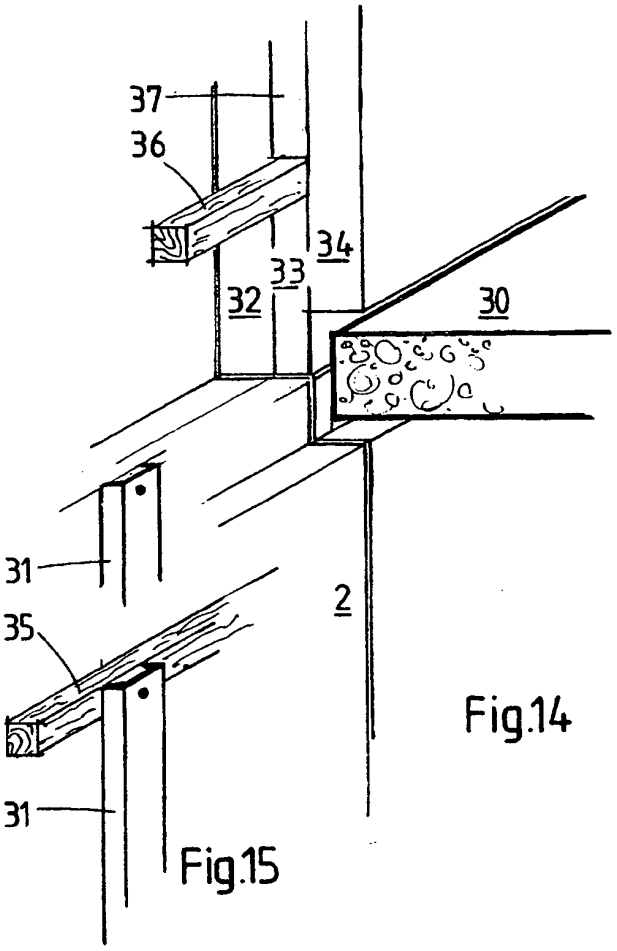

Fig.14

Fig.15

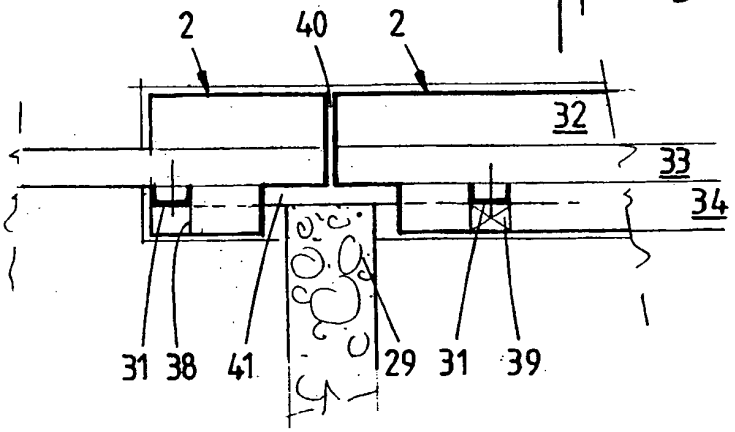

Fig.16

REFERENCES CITED IN THE DESCRIPTION

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