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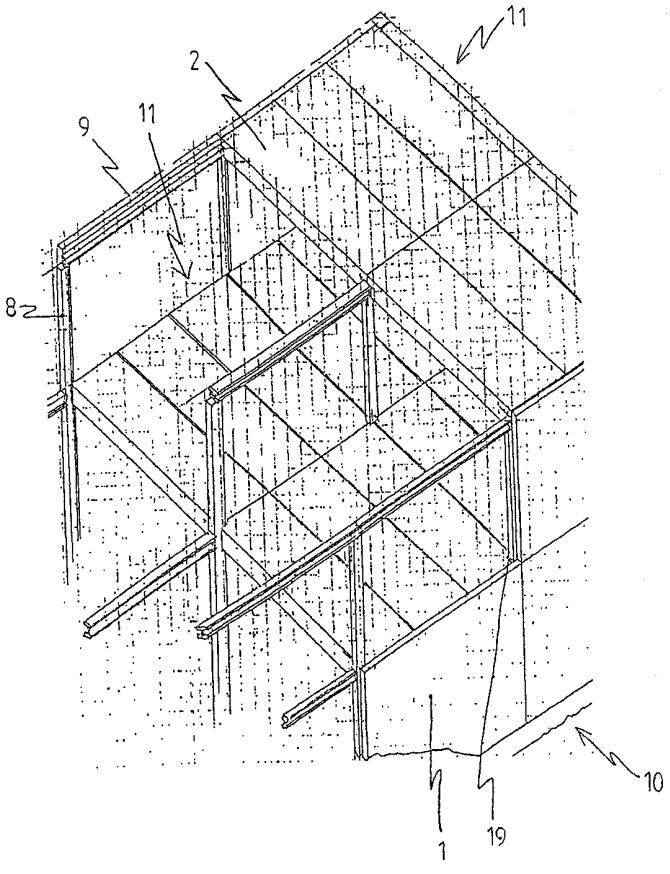
(54) Title: METHOD AND ARRANGEMENT FOR ERECTING BUILDING UNITS

(57) Abstract

The invention relates to a method and an arrangement for erecting building units (1 and 2) such as wall units (1) and floor units (2) on a framework of steel (3) comprising substantially vertical columns (8) and substantially horizontal girders (9). In the arrangement of the invention the building units (1 and 2) are supported on the framework of steel (3) and on each other so as to form a building comprising walls (10) and floors (11). The framework of steel (3) is encapsulated at the joints (12) between the building units (1 and 2) so that the framework of steel (3) is at least substantially built into the walls (10) and floors (11) of the building.



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METHOD AND ARRANGEMENT FOR ERECTING BUILDING UNITS

BACKGROUND OF THE INVENTION

The invention relates to a method for erecting building units such as wall units and floor units on a framework of steel comprising substantially vertical columns and substantially horizontal girders, the building units being erected on the framework of steel so that the building units are supported on the framework of steel and on each other so as to form a building comprising walls and floors.

The invention also relates to an arrangement for erecting building units such as wall units and floor units on a framework of steel comprising substantially vertical columns and substantially horizontal girders, the building units being supported on the framework of steel and on each other so as to form a building comprising walls and floors.

Different solutions for erecting building units on a framework of steel are previously known in the art. A characteristic feature for the prior art solutions is that the framework of steel is at least partly visible, thus causing problems.

If the substantially horizontal girders that support the floor units are totally or partly visible, the design, the division of rooms and the shaping of the ceiling become more difficult. Another problem is that the visible horizontal girders of steel and the vertical columns of steel involve high risks of impact and airborne sounds from spreading from one storey to another and from one room or apartment to another along these visible horizontal girders of steel and the vertical columns of steel. Another problem is that the visible girders of steel and the vertical columns of steel must be insulated against fire, which brings about additional costs. Visible steel columns at the exterior walls impede the installation of cables and pipes. The joints between the different building parts are often visible which is an esthetic and technical problem.

BRIEF DESCRIPTION OF THE INVENTION

It is an object of the invention to solve the above problems.

The problems above can be solved with a method, characterized in that as the building units are erected the framework of steel is encapsulated at the joints between the building units so that the framework of steel is at least substantially built into the walls and floors of the building.

The arrangement of the invention is characterized in that the framework of steel is encapsulated at the joints between the building units so that the framework of steel is at least substantially built into the walls and floors of the building.

The preferred embodiments of the arrangement are disclosed in the dependent claims 3 to 10.

Since the framework of steel is built into the walls and floors of the building, the arrangement of the invention provides a good sound insulation, as impact and airborne sounds cannot spread through the framework of steel from one storey to another or from one room to another in a building.

As the framework of steel is built into the walls and floors of the building, the arrangement of the invention provides a good fire resisting capacity.

Since the framework of steel is built into the walls and floors of the building the arrangement of the invention provides an esthetic appearance for the building.

As the framework of steel is built into the walls and floors of the building, the non-bearing partitions can easily be rearranged, for example, when renovating. A solution of the invention also enables a flexible design that allows wishes concerning the division of rooms, for example, to be easily taken into account when erecting the building.

A further advantage with the invention is that a building can be rapidly erected using the solution of the invention, as prefabricated building units are used. The building units are preferably formed so as to encapsulate the framework of steel as well as possible. As a result, the number of components to be used during the building phase is reduced. Consequently, only some of the material will be wasted at the building site, the building time will be short and efficient and the building itself will be economical.

In a solution according to the present invention the building units are preferably fastened using mechanical fastening means to the framework.

As the joints in the building unit are encapsulated, the framework can be covered with a fire-resistant insulating material which is preferably covered with cover plates also joining the building units to one another.

If the framework of the building is covered with a fire-resistant insulating material which is covered with cover plates, the cover plates are also fastened using mechanical fastening means to the framework and/or to the

building units. A solution of the invention therefore enables what is known as dry building, since the building units do not have to be attached by casting or welding them to one another or to the framework.

BRIEF DESCRIPTION OF THE DRAWINGS

In the following the invention is described in greater detail by means of preferred embodiments and with reference to accompanying drawings, in which

Figure 1 is a perspective view showing an arrangement of the invention,

Figure 2 is a cross-sectional side view showing an arrangement of the invention before jointing the joints between the building units,

Figure 3 is a cross-sectional side view showing an arrangement of the invention after jointing the joints between the building units,

Figure 4 is a cross-sectional top view showing a joint between two wall units before jointing the joint between the wall units,

Figure 5 is a cross-sectional top view showing a joint between two wall units after jointing the joint between the wall units, and

Figure 6 is a cross-sectional side view showing an arrangement of the invention after jointing the joints between the building units.

DETAILED DESCRIPTION OF THE INVENTION

Figure 1 is a perspective view showing an arrangement of the invention for erecting or mounting building units 1 and 2, such as wall units 1 and floor units 2 on a framework 3 of steel, hereinafter referred to as the framework 3, which is a bearing framework.

Examples of the wall units 1 and floor units 2 are light dry wall units and floor units.

Figure 2 shows such wall units 1 and floor units 2 which comprise two substantially parallel plates 4 between which an insulating layer 5 is arranged. The plates 4 and the insulating layer 5 are preferably composed of fire-resistant material.

The wall units 1 preferably comprise two plane sides 6 and four edges 7. The Figures show substantially plane, rectangular wall units 1, both sides 6 of which being substantially parallel. Alternatively the wall units 1 may be of another form.

The floor units 2 preferably also comprise two plane sides 6 and four edges 7. The Figures show substantially plane, rectangular floor units 2, both sides 6 of which being substantially parallel with one another. Alternatively the floor units 2 may also be of another form.

The framework 3 comprises substantially vertical columns 8 and substantially horizontal girders 9. The substantially vertical columns 8 and substantially horizontal girders 9 of the framework may, for example, be joined together using a bolt joint (not shown).

The building units 1 and 2, i.e. the wall units 1 and the floor units 2, are supported on the framework 3 and on each other so as to form a building comprising walls 10 and floors 11.

In an arrangement of the invention the framework 3 is encapsulated at the joints 12 between the building units 1 and 2 so that the framework 3 is at least substantially built into the walls 10 and floors 11 of the building. The framework is preferably entirely built into the walls 10 and floors 11 of the building. Since the framework 3 is at least substantially built into the walls 10 and floors 11 of the building, the framework is simultaneously substantially sound and fire insulated.

The walls 10 are preferably formed of such wall units 1 in which the substantially vertical columns 8 are built into the walls 10. Figures 4 and 5 show an example of how a substantially vertical column 8 can be built into the joint 12 between two wall units 1. Since the wall unit 1 in the Figure is broader than the substantially vertical column 8, said column can be built into the wall 10. Alternatively the substantially vertical column 8 can be built into the walls 10 in another way.

At least one of the edges 7 of the floor units 2 is preferably formed so that at least one substantially horizontal girder 9 is at least partly encapsulated in the floor unit 2.

Each of the edges 7 of the floor unit 2 supported on a substantially horizontal girder 9 preferably comprises a first recess 13 which is formed so that the substantially horizontal girder 9 lies at least partly in the first recess 13, the floor unit 2 thus being supported on the substantially horizontal girder 9 through a support surface 17 which is formed in the first recess 13 as shown, for example, in Figures 2 and 3.

Figure 3 also shows how a substantially horizontal girder 9 can be encapsulated between a second recess 14 formed at the edge 7 of a wall unit

1 and a first recess 13 formed at the edge of a floor unit 2. Figure 3 also shows how another substantially horizontal girder 9 can be encapsulated between the edge 7 of a wall unit 1 and two first recesses 13 formed at the edge 7 of two floor units 2.

The framework 3 is preferably built into the walls 10 and floors 11 of the building so as to form such walls 10 and floors 11 that comprise substantially uniform and plane surfaces.

The framework 3 is preferably at least partly encapsulated with a fire-resistant insulating material 15 which at least partly fills the joint 12 between two or more building units 1 and 2. However, it is preferable to omit the fire-resistant insulating material 15 from the support surface 17 between a substantially horizontal girder 9 and a floor unit 2.

The fire-resistant insulating material 15 is preferably at least partly covered with cover plates 16 between or inside the joints 12 between the building units 1 and 2. The cover plates 16 are preferably made of a fire-resistant material, and can, for instance, be made of the same material as the plates 4 of the wall units 1 and floor units 2. The cover plates 16 are preferably formed so as to be fastened by mechanical fastening means (not shown), such as screws, rivets or the like, to the building units 1 and 2 and so as to form together with the building units 1 and 2 a substantially plane and uniform surface as shown in Figure 5, for example.

Figure 5 shows an arrangement in which the joint 12 between two wall units 1 is covered with two cover plates 16 so that one cover plate 16 is arranged on each side of the joint 12. In Figure 5 the cover plate 16 is preferably arranged in relation to the surfaces of the wall units 1 so as to form a substantially plane and uniform surface.

As mentioned above each of the edges 7 of a floor unit 2 supported on a substantially horizontal girder 9 preferably comprises a first recess 13 as shown in Figure 2, for example. The floor unit 2 is preferably placed on the horizontal girder 9 so that the horizontal girder 9 lies at least partly in the first recess 13 and so that the floor unit 2 is supported on the horizontal girder 9 through a supporting surface 17 formed in the first recess 13.

The supporting surface 17 is preferably parallel with an upper side 6 of the floor unit as shown in the Figures.

The first recess 13 preferably comprises a substantially rectangular cross section as shown in the Figures.

The first recess 13 preferably extends substantially along the entire edge 7 of the floor unit.

The height of the first recess 13 preferably exceeds the height of the substantially horizontal girder 9 as shown, for example, in Figure 2.

Figure 2 shows such an arrangement in which each floor unit 2 comprises two first recesses 13 whereof the first is formed at one edge 7 of the floor unit 2 and the second is formed at the opposite edge 7 of the floor unit 2.

Figure 6 shows an alternative solution for mounting floor units 2 onto the substantially horizontal girders 9. In the Figure the thickness of the floor unit 2 substantially corresponds with the height of the substantially horizontal girder 9. At least one supporting unit 18 is arranged on the bottom side 6 of the substantially horizontal girder 9 so that the supporting unit 18 forms a supporting surface 17 on at least one side of the substantially horizontal girder 9, the floor unit 2 being supported on the substantially horizontal girder 9 through said supporting surface 17.

A combination of the solution shown in Figure 2 and the solution shown in Figure 8 is obviously also possible.

The floor unit 2 preferably comprises at least a third recess 19 for a substantially vertical column 8, as shown in Figure 1.

The third recess 19 is preferably formed in one of the corners of the floor unit 2 so that the third recess 19 extends from the upper side 6 of the floor unit 2 to the bottom side 6 thereof.

The floor unit 2 preferably comprises at least two third recesses 19 as shown in Figure 1.

An arrangement of the invention may also comprise an installation ceiling (not shown) arranged on the bottom side 6 of the floor unit 2. An arrangement of the invention may also comprise an installation floor (not shown) arranged on the upper side of the floor unit 2.

As mentioned above at least one of the wall units 1 preferably comprises at least a second recess 14 which is formed at one of the edges 7 of the wall unit 1 so that the wall unit 1 is placed in relation to one of the horizontal girders 9 so that the horizontal girder 9 lies at least partly in the second recess 14.

The second recess 14 preferably comprises a substantially rectangular cross section.

The second recess 14 is preferably formed at the upper edge of the wall unit 1, as shown in the Figures. Alternatively the lower edge of the wall unit 1 may comprise a second recess 14. Both the upper edge and the lower edge of the wall unit 1 may eventually comprise a second recess 14.

The height of the second recess 14 preferably exceeds the height of the substantially horizontal girder 9.

The floor unit 2 preferably extends partly into a second recess 14 in a wall unit 1 as shown in Figures 2 and 3.

The second recess 14 preferably extends substantially along the entire edge 7 of the wall unit 1.

The building units 1 and 2 are preferably fastened by means of mechanical fastening means (not shown) to the framework 3. If the framework 3 is covered with a fire-resistant insulating material 15 and this is covered with cover plates 16, then the cover plates 16 are preferably fastened by mechanical fastening means to the framework 3 and/or to the building units 1 and 2.

The invention further relates to a method for erecting or mounting wall units 1 and floor units 2 on a framework of steel 3 comprising substantially vertical columns 8 and substantially horizontal girders 9.

In the method wall units 1 and floor units 2 are erected on a framework 3 so that the wall unit 1 and the floor unit 2 are supported on the framework of steel 3 and on one another so as to form a building comprising walls 10 and floors 11.

In the method the framework of steel 3 is encapsulated by the wall units 1 and the floor units 2 so that the vertical columns 8 and the horizontal girders 9 are at least substantially built into the walls 10 and floors 11.

It is obvious for those skilled in the art that as technology progresses the basic idea of the invention can be implemented in various ways. The invention and the various embodiments thereof are therefore not restricted to the above examples but may vary within the scope of the claims.

CLAIMS

1. A method for erecting building units (1 and 2) such as wall units (1) and floor units (2) on a framework of steel (3) comprising substantially vertical columns (8) and substantially horizontal girders (9),

the building units (1 and 2) being erected on the framework of steel (3) so that the building units (1 and 2) are supported on the framework of steel (3) and on each other so as to form a building comprising walls (10) and floors (11),

characterized in that

as the building units (1 and 2) are erected the framework of steel (3) is encapsulated at the joints (12) between the building units (1 and 2) so that the framework of steel (3) is at least substantially built into the walls (10) and floors (11) of the building.

2. An arrangement for erecting building units (1 and 2) such as wall units (1) and floor units (2) on a framework of steel (3) comprising substantially vertical columns (8) and substantially horizontal girders (9),

the building units (1 and 2) being supported on the framework of steel (3) and on each other so as to form a building comprising walls (10) and floors (11),

characterized in that

the framework of steel (3) is encapsulated at the joints (12) between the building units (1 and 2) so that the framework of steel (3) is at least substantially built into the walls (10) and floors (11) of the building.

3. An arrangement as claimed in claim 2, **characterized** in that at least one of the edges (7) of the floor unit (2) is formed so that at least one substantially horizontal girder (9) is at least partly built into the floor unit (2).

4. An arrangement as claimed in claim 3, **characterized** in that

the edge (7) of the floor unit (2) comprises a first recess (13),

the floor unit (2) is placed on a horizontal girder (9) so that the horizontal girder (9) lies at least partly in the first recess (13), and that

the floor unit (2) is supported on the horizontal girder (9) through a supporting surface (17) which is formed in the first recess (13).

5. An arrangement as claimed in claim 2, **characterized** in that

the thickness of the floor unit (2) substantially corresponds with the height of the substantially horizontal girder (9),

at least one supporting unit (18) is arranged on the bottom side of the substantially horizontal girder (9),

the supporting unit (18) comprising a supporting surface (17) on at least one side of the substantially horizontal girder (9), and that

the floor unit (2) is supported on the supporting surface (17).

6. An arrangement as claimed in claim 2, **characterized** in that at least one of the edges (7) of the wall unit (1) is formed so that at least one substantially horizontal girder (9) is partly encapsulated in the wall unit (1).

7. An arrangement as claimed in claim 6, **characterized** in that

the edge (7) of the wall unit (1) comprises at least a second recess (14), and that

the wall unit (1) is placed in relation to one of the horizontal girders (9) so that the horizontal girder (9) lies at least partly in the second recess (14).

8. An arrangement as claimed in claim 7, **characterized** in that at least one floor unit (2) extends partly into a second recess (14) in a wall unit (1).

9. An arrangement as claimed in claim 2, **characterized** in that the framework of steel (3) is at least partly encapsulated with a fire-resistant insulating material (15) at the joints (12) between the building units (1 and 2).

10. An arrangement as claimed in claim 9, **characterized** in that the fire-resistant insulating material (15) is at least partly covered with cover plates (16) at the joints (12) between the building units (1 and 2).

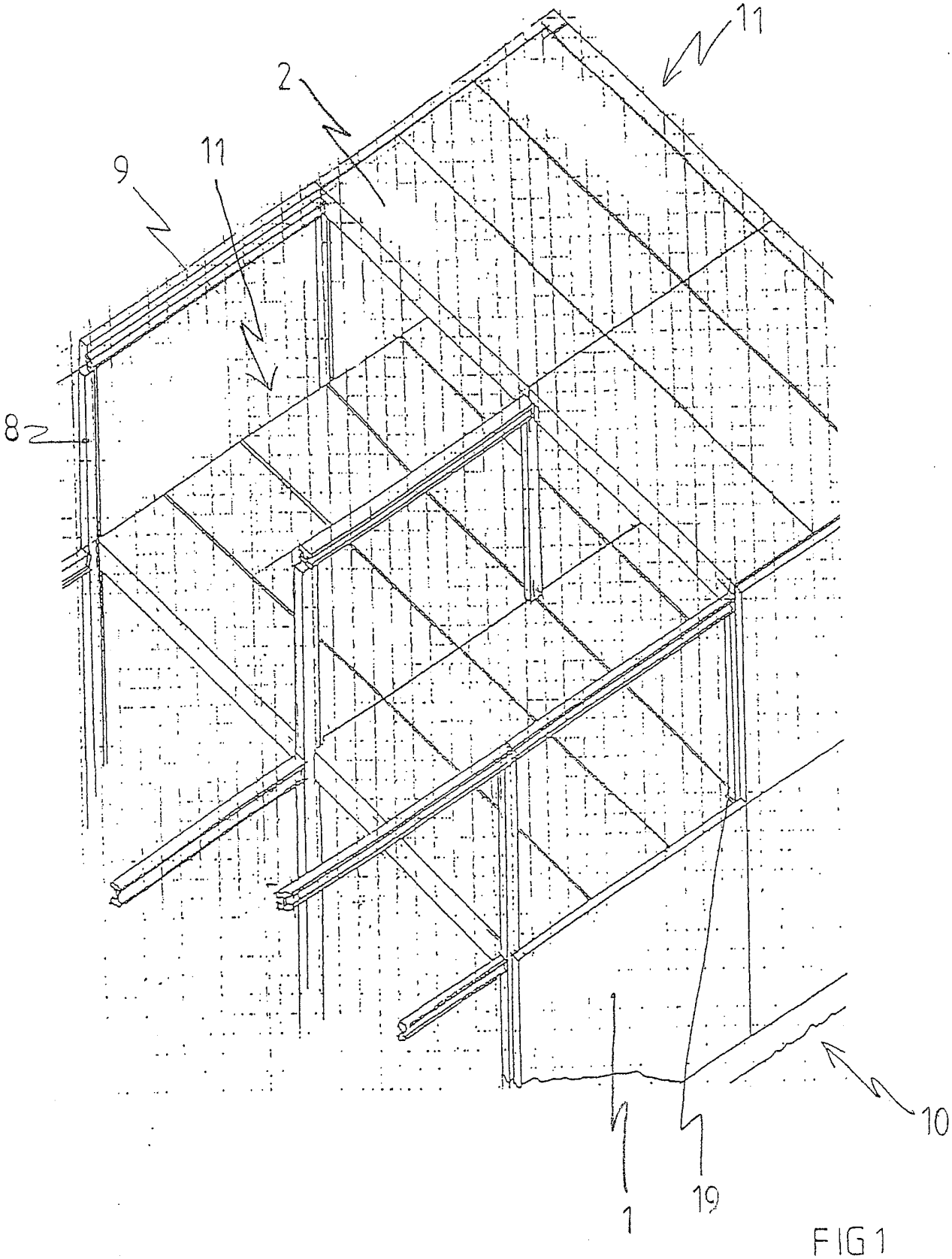


FIG 1

FIG 2

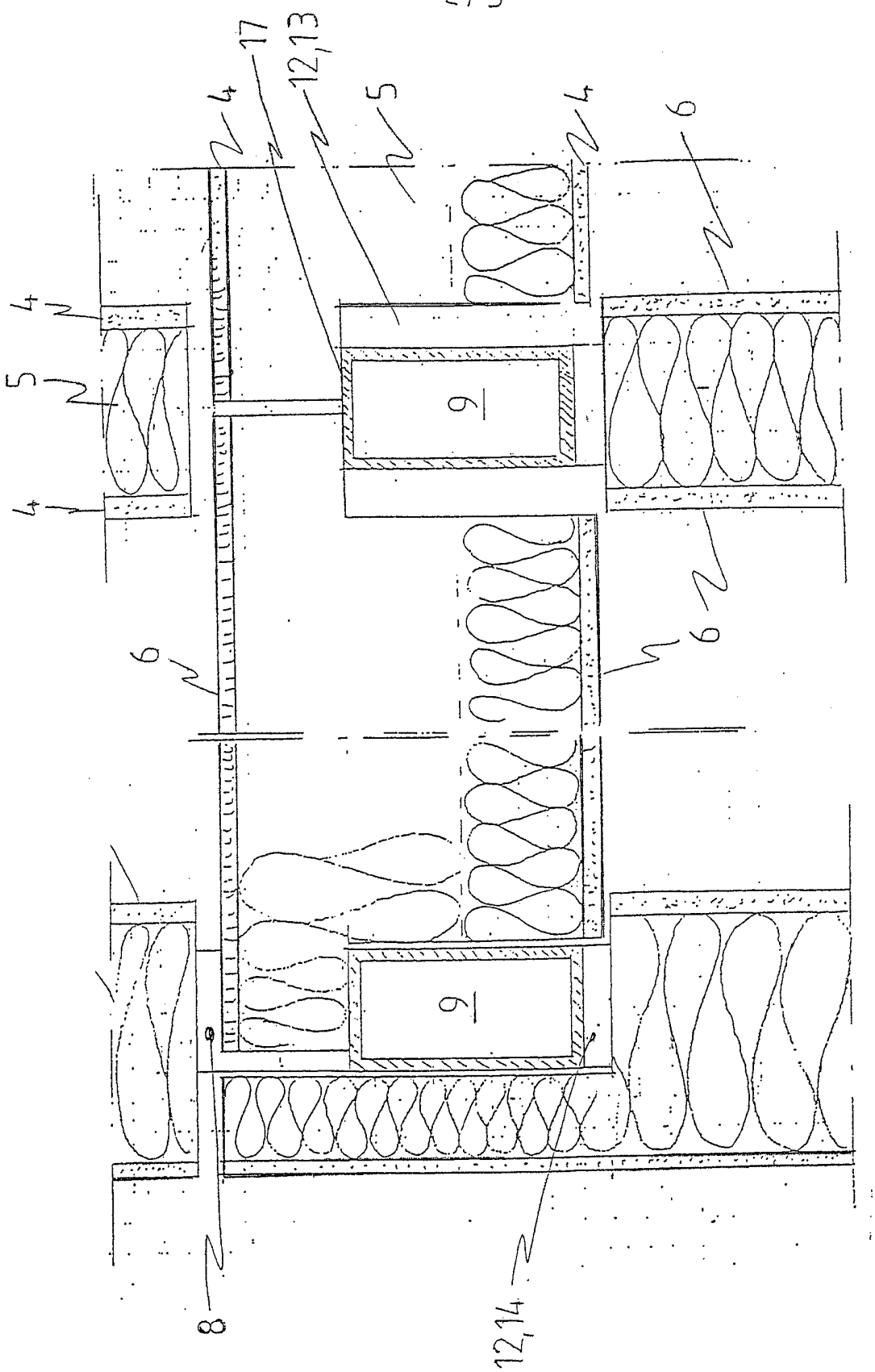
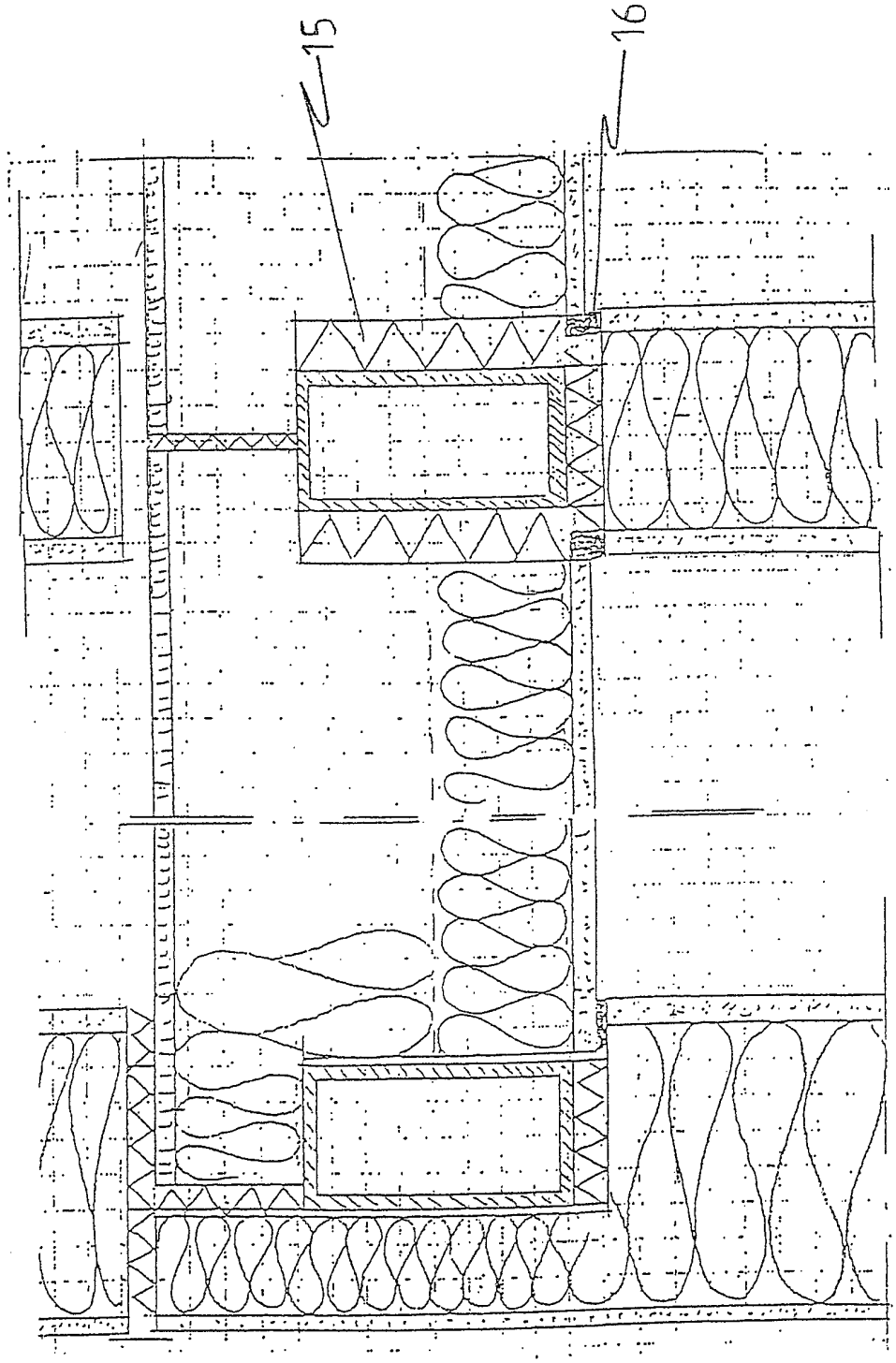


FIG3



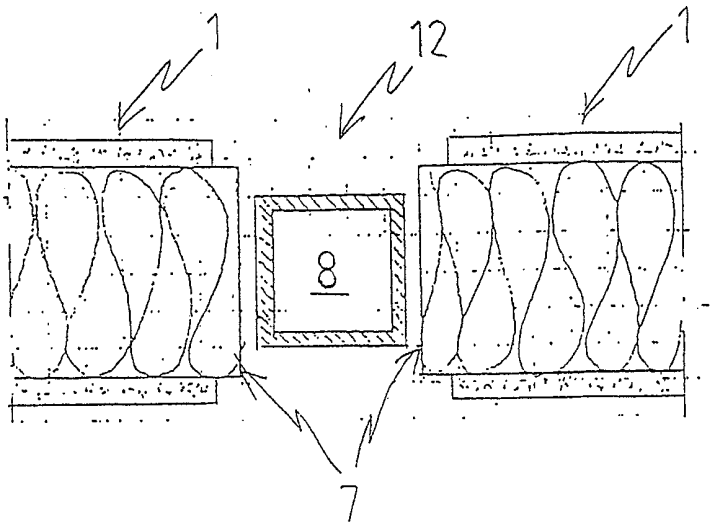


FIG4

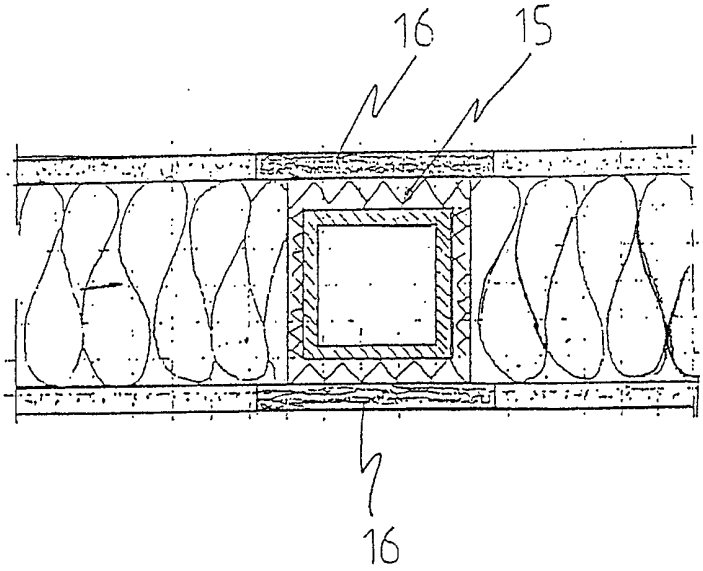


FIG5

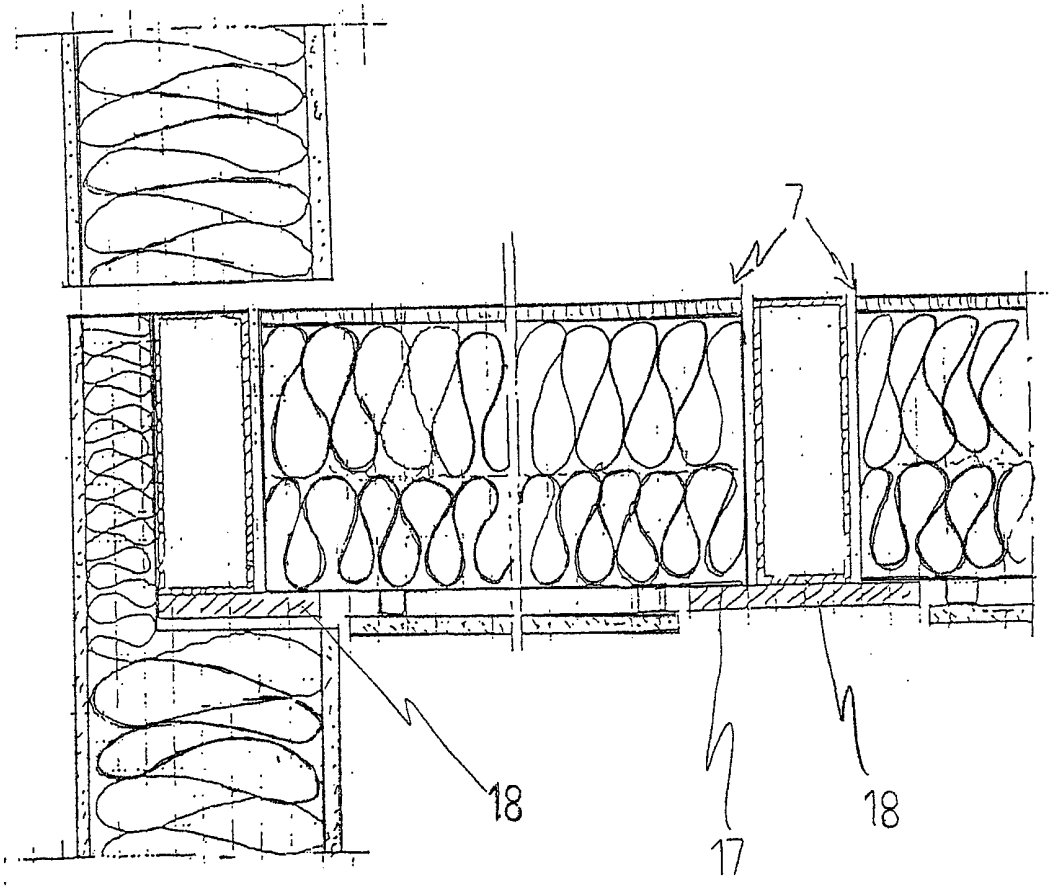


FIG6

INTERNATIONAL SEARCH REPORT

International application No.
PCT/FI 00/00222

A. CLASSIFICATION OF SUBJECT MATTER

IPC7: E04B 1/24
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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7: E04B

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

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

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X	WO 8102175 A1 (KNUTSSON, Å.), 6 August 1981 (06.08.81), page 6, line 12 - line 31; page 8, line 14 - page 9, line 18, figures 1-4 --	1-4,6-10
X	WO 8401792 A1 (SÖRELIUS, S.A.), 10 May 1984 (10.05.84), figures 9-12, abstract --	1-10

[X] Further documents are listed in the continuation of Box C. [X] See patent family annex.

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INTERNATIONAL SEARCH REPORT

International application No.
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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

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