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

(11) EP 2 707 550 B1

(12) **EUROPEAN PATENT SPECIFICATION**

(45) Date of publication and mention of the grant of the patent:
04.04.2018 Bulletin 2018/14

(21) Application number: **12730662.9**

(22) Date of filing: **14.05.2012**

(51) Int Cl.:
E04B 1/16 *(2006.01)* ***E04B 2/68*** *(2006.01)*
E04B 2/86 *(2006.01)*

(86) International application number:
PCT/NL2012/050337

(87) International publication number:
WO 2012/158031 (22.11.2012 Gazette 2012/47)

(54) **METHOD FOR CONSTRUCTING A BUILDING**

VERFAHREN ZUM ERRICHTEN EINES GEBÄUDES

PROCÉDÉ DE CONSTRUCTION D'UN BÂTIMENT

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC MK MT NL NO PL PT RO RS SE SI SK SM TR

(30) Priority: **13.05.2011 NL 2006783**

(43) Date of publication of application:
19.03.2014 Bulletin 2014/12

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Description

[0001] The present disclosure relates to a wall construction and a building having such a wall construction. The invention relates to a method for constructing a building, as defined by claims 1 and 2. Methods for constructing a building are known in the art. Document US4532745 discloses a method for constructing a wall for a building, where building blocks with preformed through holes are placed on a base with anchoring means. Reinforcing means are placed in the preformed through holes, which are then filled with a curable construction material.

[0002] Another example follows from NL 1008128, which describes a method wherein prefabricated EPS (expanded polystyrene) building blocks are placed on a foundation and glued together. Said building blocks are provided with through holes. The holes in the stacked-together building blocks must be positioned in line with each other. After a wall has been formed from said building blocks, a curable material is introduced into the holes and allowed to cure. The columns thus formed of the curable material impart strength to the wall, so that a support structure is obtained.

[0003] This known technique has the advantage that the building blocks must be stacked together in carefully aligned relationship upon construction of the building. Furthermore, separate building blocks must be produced for the positions where a window opening, a door opening or the like is planned. This leads to high costs and a difficult construction process.

[0004] Another drawback is that the strength provided by the columns is limited. It is therefore impossible, or very difficult, to construct a building in which the support structure of the building is solely made up of the columns.

[0005] The object of the invention is to provide an improved method in which the above drawbacks hardly occur, if at all.

[0006] The object of the invention is in particular to provide a method that can be carried out in a simpler and more flexible way and at lower cost than the known methods. The term "flexible" as used herein is understood to mean that it is readily possible to make modifications to a basic design of the building both during the design stage and during the construction stage.

[0007] Another aspect of this disclosure is to provide a building that can be constructed at lower cost than the buildings constructed so far. This disclosure also has for its object to provide a building whose design can be changed even during or after the construction stage.

[0008] In addition to that it is an aspect of the present disclosure to provide a method (not claimed) in which the logistics concerning the construction materials to and at the building site are simpler.

[0009] At least one of the above objects is achieved with the wall construction according to the present disclosure. Said wall construction comprises a wall, which wall is provided with a multitude of building blocks stacked together on a base, through which multitude of building blocks a through hole extends from a bottom surface of the wall up to a top surface of the wall. The wall construction further comprises anchoring means in the aforesaid base, which anchoring means extend from the base into the aforesaid through hole. The wall further comprises column reinforcing means placed in the through hole, which touch or nearly touch a part of the anchoring means that projects into said through hole. The column reinforcing means and the projecting part are interconnected in that the through hole is filled with a curable construction material for forming a reinforced supporting column that is attached to the anchoring means.

[0010] According to the present disclosure, a wall is thus provided which is strengthened by means of one or more supporting columns. The supporting columns are reinforced, the reinforcing means being connected to the projecting part of the anchoring means. Since the anchoring means are in turn anchored in the base, the bearing capacity of the supporting columns, and thus of the wall, is significantly increased. It is noted in this regard that within the context of the present invention a connection between the column reinforcing means and the anchoring means does not require that the two are actually connected together. Those skilled in the art will appreciate that even if a small distance exists between the two, the reinforcing effect of the column reinforcement and the anchorage on the supporting column will be hardly different than in the case of an actual connection.

[0011] The anchoring means comprise a screw anchor, for example, which is anchored in the base.

[0012] The base may comprise a foundation, with the anchoring means comprising reinforcing means placed in the foundation. The part of the anchoring means that projects into the through hole comprises a length of rebar forming part of the reinforcing means of the foundation.

[0013] The building blocks may be made of a thermally insulating material, such as expanded polystyrene (EPS) or polyurethane. Furthermore, the curable construction material may comprise cement, preferably concrete.

[0014] According to another aspect, the present disclosure provides a building comprising a multitude of wall constructions disposed adjacent to each other, which wall constructions are configured as defined above. Each wall construction is provided at the top surface thereof with a recess extending in a longitudinal direction of the wall, in which recess the through hole terminates.

[0015] The recesses in the top surfaces of the walls disposed adjacent to each other can form a closed channel, which is filled with a curable construction material for forming an integral construction of the supporting column or supporting columns in each wall, wherein the curable construction material filled in the channel is preferably identical to the curable construction material filled in the through hole of the wall constructions. As a result, walls disposed adjacent to each other, and in particular the supporting column(s) in said walls, are interconnected by means of the beam-like structure formed in the

closed channel.

[0016] According to another aspect, the invention provides a method for constructing a building, as defined by the subject-matter of claim 1. In the method according to claim 1, the column reinforcing means are connected to anchoring means already provided for forming the wall, such as a length of rebar or a screw anchor. It is also possible, however, to realise such anchorage after at least a number of the building blocks have been placed.

[0017] The invention to that end provides a method for constructing a building, as defined by the subject-matter of claim 2. In said latter method, the anchoring means are preferably provided through the first opening after the placement of only the first building block. This does not exclude that such anchoring means are not provided until further building blocks have been placed as well. Furthermore, the anchoring means are preferably provided prior to the placement of the column reinforcing means.

[0018] The anchoring means may comprise a screw anchor which is or will be anchored in the base.

[0019] According to another possibility, the base comprises a foundation and the anchoring means comprise reinforcing means placed in the foundation. The outwardly projecting part of the anchoring means in that case comprises a length of rebar forming part of the foundation reinforcing means.

[0020] In both methods it is possible to provide the through hole in that the first building block and the further building blocks placed thereon, or some of said blocks, are provided with prefabricated openings. According to another possibility, however, the forming of the through hole takes place after the placement of the further building blocks. Mixed forms are not excluded. According to the invention, the forming of the through hole comprises the forming of openings contiguous to each other in the further building blocks. This is achieved by moving a heating element or a cutting or drilling element down from the upper side. The first opening extends through the first building block, with the first opening and the openings arranged contiguous to each other jointly forming the through hole. It is also possible, however, for the first opening to comprise a blind bore. In that case the forming of the through hole comprises the provision of openings contiguous to each other in the further building blocks and the first building block up to the aforesaid blind form so as to form the through hole.

[0021] The above methods have the advantage that the supporting columns can be provided at any desired position, depending on the building's design. The columns need not be provided with a fixed spacing between them, but only at those positions where they are needed so as to impart a required strength. If a single-storey building is constructed, fewer or thinner supporting columns can be used than in cases in which a multi-storeyed building is constructed and in which the supporting columns in the walls of the lowermost storey must in any case support one or more further storeys. Furthermore, a smaller number of relatively thick supporting columns may be provided instead of a larger number of relatively thinner supporting columns.

[0022] The building blocks can be placed on the foundation just like that, there being no need to take into account an accurate alignment of the building blocks. The method according to the invention can thus be carried out more quickly and at lower cost. Also the fact that according to the invention building blocks having a simple shape are always used leads to a method in which inexpensive building materials can be used.

[0023] It is in particular preferable if the wall is provided with: - a bottom surface abutting the foundation or the base, - main surfaces located opposite each other and facing away from the bottom surface and from the foundation, and - a top surface located opposite the bottom surface, which joins the main surfaces, and wherein the through hole extends from the bottom surface to the top surface or to a part of one of the main surfaces that is located near the top surface. In this way a method is provided by means of which strong supporting columns can be obtained, whilst the method can nevertheless be carried out in a very flexible manner.

[0024] It is furthermore preferable if a longitudinal direction of the wall extends in a direction parallel to the main surfaces and the bottom surface, and wherein the method also comprises the step of forming a recess extending in a longitudinal direction of the wall in the top surface, wherein at least some of the through holes formed terminate in the recess. In said recess, a beam can be formed by filling the recess with concrete, preferably with reinforcing means provided therein. Reinforcing means provided in the supporting columns will preferably be connected to the reinforcing means in the beam. The supporting columns thus form a strong support structure which is supported on the foundation or on the base and which is also connected to the beam at the upper side of the wall. Such a structure is suitable for serving as a support unit for a roof structure or a higher building level. In particular if the beam extends over the entire wall, with the wall extending as a continuous wall of the building, a ring beam is formed which imparts greater strength to the building. It is even possible to form two or even more, for example substantially parallel, beams or ring beams.

[0025] The ring beam may be thicker (higher and/or wider) at a position where fewer supporting columns are provided or where a greater load is applied to the ring beam. The recess that is formed in the top surface of the wall can in that case be made deeper, with a correspondingly larger amount of reinforcing means, so that a greater strength is obtained and a greater load can be taken up.

[0026] Because the recess for the beam, for example the ring beam, is formed in the wall and the wall functions as a mould, remaining present after the curing of the concrete, the beam can be configured as a conical beam having a wider bottom side and a narrower upper side. This leads to a beam having a greater deflection resistance, using a smaller amount of concrete, than a purely

rectangular beam.

[0027] The invention also relates to a method comprising the step of placing reinforcing means in the recess, - connecting the reinforcing means in the recess to the reinforcing means in the through holes, - introducing a curable construction material into the recess, and - allowing the curable construction material to pure so as to form a beam, preferably a ring beam. The reinforcing means in the beam impart additional strength to the construction of the building.

[0028] The filling of the curable construction material in the recess and the filling of the curable construction material in the through hole can essentially take place in one operation.

[0029] In addition to that, the invention relates to a method wherein at least one of the through holes extends at an angle deviating from 90° in the longitudinal direction of the wall, preferably at an angle of 40° to 85° with respect to the horizontal, more preferably an angle of 45° to 75°. As a result, at least one support column is inclined in the longitudinal direction of the wall. The cross bonds that are necessary when only vertical supporting columns are used are thus not needed.

[0030] The invention further relates to an embodiment wherein a first part of the through holes extends from the recess in the top surface to a position of the bottom surface relatively close to a first main surface, and a second part of the through holes extends from the ring beam to a position of the bottom surface relatively close to a second main surface. As a result, not all the supporting columns are disposed vertically in the wall, but a first part of the columns, seen from the ring beam, will extend obliquely to a first main surface and a second part of the supporting columns will extend obliquely to a second main surface of the wall. Because of this, higher forces can be withstood than in the situation in which all the supporting columns extend vertically in the wall. It is possible in that case for some of the columns to extend at an angle, whilst other columns extend vertically. According to another possibility, all the columns are positioned at an angle. It may be advantageous, for example, to provide vertical columns on either side of a door opening or a window opening.

[0031] It is also preferable if the method also comprises the step of providing a through opening in the wall for forming a window opening, a door opening or similar opening. Said openings are formed after the wall has been constructed. Forming the openings only after the wall has been constructed provides the advantage that identical building blocks can be used for the entire wall, and consequently for the entire building. In this way errors in the work preparation are excluded. The method can thus be carried out with a greater degree of reliability and at lower cost.

[0032] In addition to that, the invention relates to an embodiment comprising the step of forming recesses in the wall, for example for placing conduits, mounting elements or finishing elements, such as conduits for electricity, water, gas and the like, therein and filling said recesses with a filling material after the placement of said conduits or mounting elements. The filling material may be the same material as the material from which the building blocks are made. The filling material may also be a similar material or a totally different material. One requirement that can be made of the filling material is that it bonds to or can be adhesively connected to the material of the building blocks. In particular, but not exclusively, PUR foam (a polyurethane substance) is a material that is suitable for this purpose.

[0033] The recesses they have a shape suitable for placing a finishing element such as a TV screen therein. The recess may also have a shape of a soap dispenser, a stair handrail, etc. Furthermore, a recess may be provided near a door opening on either side of the door hinge, in which recess the open door can be received. The open door will not take up any space outside the wall in that case.

[0034] Examples of various mounting elements that can be placed in the wall are mounting elements for mounting stair hand rails, soap dispensers, TV screens, monitors, lamps, doors, shower fittings, etc.

[0035] In order to obtain a strong wall surface whilst at the same time improving the overall structural strength of the wall, it is preferable if the method comprises a step of fixing a reinforcing mesh to the wall and providing a finishing layer on top thereof. The finishing layer is preferably capable of taking up pressure forces and tensile forces; it may for example, but not exclusively, be a layer plastered or sprayed thereon. The reinforcing mesh will preferably be provided after the conduits have been placed in the wall and the recesses formed have been filled. The reinforcing meshes on the either side of the wall may for example be connected together by means of tie-rods. By providing the tie-rods under tension, the wall is fixed against the columns, as a result of which the stiffness of the wall will increase significantly.

[0036] With a view to finishing a building so that it is ready to use, the method comprises the step of providing a roof and connecting structural members of the roof to structural members provided in the ring beam. The roof may comprise bearing girders, for example, which are attached to the ring beam by means of structural members. The structural members may consist of a joist anchor or the like. The roof, or the bearing girders of the roof, can be supported on the ring beam or be suspended from the ring beam.

[0037] A very advantageous embodiment is obtained if the roof is covered with photovoltaic panels. This has the advantage that the building can be self-supporting, in particular also because the EPS is a very good thermal insulator. The heating costs in the winter will be very low in that case, whilst in the summer the building will keep out the heat well. In addition, EPS is a very inexpensive material which is suitable, using the method according to the invention, for use in parts that are used as bearing parts in traditional construction. EPS is generally availa-

ble in a flame-retardant form. The roof may for example be lined with insulating boards, for example made of EPS or another insulating material, such as polyurethane, glass wool, rock wool or the like. The roof timbers may be covered with roof sheathing, for example, and boards made of EPS (or another material as mentioned above) can be placed between the roof timbers. Conduits, for example for electricity, can be passed through the EPS boards, whereupon finishing panels, such as plaster boards, can be used for covering the beams and the EPS boards.

[0038] In order to be able to construct the building suitable for use, using the method according to the invention, one embodiment preferably also comprises the step of installing a floor in the building, comprising the steps of: - placing insulating floor elements between the walls of the building, - forming recesses extending between two walls in the floor elements, - placing reinforcing means in said recesses, - placing the reinforcing means in the recesses into contact or close proximity with the foundation or with the reinforcing means present in the foundation, such as lengths of rebar, or with anchoring means in the base, - filling the recesses with a curable construction material, and - allowing the curable construction material to cure. The recesses in the floor elements in that case form reinforced and bearing floor joists. In a corresponding manner it is possible to use a reinforced concrete type which contains fibres and which is used in place of the combination of concrete and reinforcing means provided in advance. The invention in that case relates to a method comprising the installation of a floor in the building, which installation comprises the steps of: - placing insulating floor elements between the walls of the building, - forming recesses extending between two walls in the floor elements, - filling the recesses with a reinforced concrete type and placing the concrete into contact with the foundation or with reinforcing means in the foundation, such as lengths of rebar, or with anchoring means in the base, and - allowing the concrete to cure.

[0039] It is in particular preferable if the building blocks, and preferably also the floor elements, are made of expanded polystyrene. In this way a wall having a high thermal insulation value can be obtained, in which openings can be readily provided for forming the supporting columns. Also other thermally insulating materials such as polyurethane, for example, or the like can be suitably used as long as it can be easily worked for forming an opening therein for the purpose of forming a supporting column.

[0040] The invention provides the major advantage that no substances and materials that are foreign to the construction industry need to be used, so that no tests for new materials are needed.

[0041] The invention will now be explained in more detail with reference to a drawing. In the drawing:

Fig. 1 shows a wall built in accordance with the present invention;

Fig. 2 is a schematic representation of a building constructed in accordance with the present invention; and

Fig. 3 is a schematic representation of a wall according to the invention.

[0042] In the figures, like parts are indicated by the same numerals. However, for the sake of simplicity not all the parts required for a practical implementation of the invention are shown.

[0043] Figure 1 is a schematic representation of a part of a wall 1, which is built up of individual building blocks 2, 2' in the illustrated embodiment. The wall 1 is not completely finished, but shown in partially completed condition in the figure. The building blocks 2 used in this embodiment have a dimension of about 50 x 100 x 200 cm (thickness D x height H x length L). Other dimensions may be used without any restriction, of course, providing they are suitable for use in the construction of a building. In the stacking arrangement shown in figure 1, the thickness D of the wall is 50 cm. The building block 2' as shown in figure 1 is cut through halfway its length, so that a stretcher bond is obtained. The building blocks are glued together so as to obtain sufficient strength. A lowermost row of building blocks 2 is placed on a foundation 3 and preferably attached thereto, for example by glueing, using PUR foam, for example. Said lowermost row of building blocks 2 may be provided with an opening that is arranged over lengths of rebar projecting from the foundation or through which a screw anchor is anchored in the base. In the latter case, a flat recessed base instead of a poured foundation will in many cases suffice. The anchorage provides an adequate hold for providing a support structure for the building. In this way a relatively simple and economical construction method can be obtained.

[0044] The wall 1 has a bottom surface that is placed on the foundation 3. The wall 1 further has two main surfaces 9, 10 located opposite each other (only the surface 9 is shown in Fig. 1), and a top surface 11. Once a wall 1 is completely built up, a chase 6 is formed in the top surface 11. In the illustrated embodiment, said chase 6 is formed along the entire length of the wall 1. In said chase, openings 4, 4', 4'' are formed in the wall 1. As is shown in Fig. 1, the openings 4, 4', 4" can be formed from the chase 6 up to the foundation 3. Subsequently, reinforcing means can be provided in the openings 4, 4', 4", whereupon concrete is poured into the opening 4, 4', 4'', which concrete is subsequently allowed to cure. In this way supporting columns 12, 12', 12'' (refer to Fig. 2 in this connection). Said concrete will also fill the chase 6, which is provided with reinforcing means 11, thereby forming a ring beam 8 disposed in the top surface 11 of the wall. The reinforcing means 5 are preferably connected to the foundation 3 or, more preferably, to reinforcing means in the foundation, such as a length of rebar (not shown), which leads to a very strong connection of the supporting columns formed in the openings 4, 4', 4''. The

openings 4, 4', 4" may be provided in vertical direction, as represented as the opening 4. According to a preferred embodiment, at least some of the openings 4, 4', 4" are formed at an oblique angle in the wall, as is represented for the openings 4', 4". The openings 4, 4', 4" all terminate in the chase 6 at the top surface 11, making it possible to connect the reinforcing means 5 to the reinforcing means 7 in the chase 6. In this way a great strength of the support structure formed by the foundation 3, the supporting columns 12, 12', 12'' and the ring beam 8 is obtained.

[0045] Fig. 3 shows a variant thereof, in which the column 12' is disposed at an angle, seen in the longitudinal direction of the wall 1. This is done to compensate for the cross bonds that are missing in the illustrated embodiment, which cross bonds are necessary if all the supporting columns 12 are disposed vertically.

[0046] A mesh structure 13 is provided on the main surfaces 9, 10 of the wall 1. Said mesh structure is known in the art, it imparts strength to the wall 1. Preferably, the mesh structures on the two surfaces 9, 10 are connected by means of tie-rods. This provides a solid fixation of the mesh structures and sets up a tensile force on the wall surfaces, so that the wall will have a greater strength. In fact, the wall construction obtained in this manner can be compared to a sandwich construction. On the mesh structure, a plaster layer may be provided as a finishing layer.

[0047] Fig. 2 is a schematic view of a building constructed by using the method according to the invention. The building comprises walls 1. Said walls are only partially shown. A number of supporting columns 12 are shown, whilst the enveloping wall 1 and the foundation 3 have been left out at the location of the supporting columns 12 so as to illustrate the invention more clearly. In the embodiment shown in Fig. 2, all the supporting columns 12 are disposed vertically. A window opening 14 is schematically indicated between two supporting columns 12. Said window opening 14 can be formed after the entire wall 1 has been constructed. Upon construction of the wall 1, a closed wall circumference of the building is constructed, after which openings 14 for windows and doors are formed.

[0048] Said operations are easy to carry out in particular if the walls 1 are formed of expanded polystyrene.

[0049] Fig. 3 shows an alternative embodiment of the wall 1, in which part of the mesh structure 13 on the wall 1 has been left out. The surface 15 of the building block 2 is clearly shown therein.

[0050] Another major advantage is the fact that the method is suitable for expanding the polystyrene at the building site, because a simple device that produces building blocks in just one form suffices for constructing a building.

[0051] The invention is not limited to the embodiments described above and shown in the figures. The invention is instead defined by the appended claims.

Claims

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

- providing a base with anchoring means installed therein, which anchoring means project outward from said base,
- providing a first building block (2), which is provided with a first opening at a bottom side thereof,
- placing the first building block (2) on the base with the opening arranged over the outwardly projecting part of the anchoring means,
- placing one or more further building blocks (2') on said building block so as to form a wall (1), providing a through hole (4, 4', 4") through the first building block (2) and the further building blocks (2') placed thereon up to the base, said through hole (4, 4' , 4") comprising the aforesaid first opening,
- placing column reinforcing means (5, 5', 5") in said through hole (4, 4', 4"),
- placing the column reinforcing means (5, 5' , 5") into contact or close proximity with the outwardly projecting part of the anchoring means,
- introducing a curable construction material into the through hole (4, 4', 4"), and
- allowing said curable construction material to cure so as to form a reinforced supporting column (12, 12', 12") connected to the anchoring means;

wherein said providing a through hole (4, 4', 4") comprises the forming of openings contiguous to each other in the further building blocks by moving a heating element or a cutting or drilling element down from an upper side of the wall (1) and in that said first opening extends through the first building block, with the first opening and the openings arranged contiguous to each other jointly forming the through hole.

2. A method for constructing a building, comprising the steps of:

- placing a first building block (2), and possibly one or more further building blocks (2'), on a base,
- providing a first opening through said first building block (2), and the possible one or more further building blocks (2'), up to the base,
- anchoring, through said first opening, anchoring means in the base,
- placing one or more further building blocks on said first building block (2) and the possible one or more further building blocks (2'), so as to form a wall (1), providing a through hole (4, 4', 4") through the first building block (2) and the further

building blocks (2') placed thereon up to the base, said through hole (4, 4' , 4") comprising the aforesaid first opening,
- placing column reinforcing means (5, 5', 5") in said through hole (4, 4', 4"),
- placing the column reinforcing means (5, 5' , 5") into contact or close proximity with the anchoring means,
- introducing a curable construction material into the through hole (4, 4', 4"), and
- allowing said curable construction material to cure so as to form a reinforced supporting column connected to the anchoring means;

wherein said providing a through hole (4, 4', 4") comprises the forming of openings contiguous to each other in the further building blocks by moving a heating element or a cutting or drilling element down from an upper side of the wall (1), wherein the first opening and the openings arranged contiguous to each other jointly forming the through hole.

3. The method according to claim 1 or 2, wherein the anchoring means comprise a screw anchor which is or will be anchored in the base.

4. The method according to claim 3, wherein the base comprises a foundation (3) and the anchoring means comprise reinforcing means placed in the foundation (3), wherein the outwardly projecting part of the anchoring means comprises a length of rebar forming part of the foundation reinforcing means.

5. The method according to any one of previous claims, wherein the wall (1) is provided with:

- a bottom surface abutting the foundation or the base,
- main surfaces located opposite each other and facing away from the bottom surface and from the foundation (3), and
- a top surface (11) located opposite the bottom surface, which joins the main surfaces, and wherein the through hole (4, 4' , 4") extends from the bottom surface to the top surface (11) or to a part of one of the main surfaces that is located near the top surface (11);

wherein a longitudinal direction of the wall (1) preferably extends in a direction parallel to the main surfaces and the bottom surface, and wherein the method also comprises the step of forming a recess extending in a longitudinal direction of the wall (1) in the top surface (11), wherein the through hole (4, 4', 4") formed terminates in the recess, the method preferably further comprising the step of placing reinforcing means in the recess,
- connecting the reinforcing means in the recess to the reinforcing means in the through holes (4, 4', 4"),
- introducing a curable construction material into the recess, and - allowing the curable construction material to pure so as to form a beam, preferably a ring beam, wherein the filling of the curable construction material in the recess and the filling of the curable construction material in the through hole (4, 4' , 4") preferably takes place in essentially one operation.

6. The method according to any one of previous claims, wherein the through hole (4, 4', 4") extends at an angle deviating from 90° in the longitudinal direction of the wall, preferably at an angle of 40° to 85° with respect to the horizontal, more preferably an angle of 45° to 75°; and/or
wherein a first part of several of the aforesaid through holes (4, 4', 4") extends from the recess in the top surface (11) to a position of the bottom surface relatively close to a first main surface, and a second part of the aforesaid several through holes (4, 4', 4") extends from the ring beam to a position of the bottom surface relatively close to a second main surface; and/or
wherein the method also comprises the step of providing a through opening (14) in the wall (1) for forming a window opening, a door opening or similar opening; and/or the method comprising the step of forming a recess in the wall (1), for example for placing a conduit, a mounting element or a finishing element therein and filling said recess with a filling material after the placement of said conduit or mounting element; the method comprising the step of fixing a reinforcing mesh to the wall (1) and providing a finishing layer on top thereof; and/or
the method comprising the step of providing a roof and connecting structural members of the roof to structural members provided in the ring beam.

7. The method according to any one of previous claims, comprising the installation of a floor in the building, which installation comprises the steps of:

- placing insulating floor elements between the walls of the building,
- forming recesses extending between two walls in the floor elements,
- placing reinforcing means in said recesses,
- placing the reinforcing means in the recesses into contact or close proximity with the foundation or with the reinforcing means present in the foundation, such as lengths of rebar, or with anchoring means in the base,
- filling the recesses with a curable construction material, and
- allowing the curable construction material to cure.

8. The method according to any one of the previous claims, comprising the installation of a floor in the building, which installation comprises the steps of:

- placing insulating floor elements between walls of the building formed by using the method according to any one of the preceding claims,
- forming recesses extending between two walls in the floor elements,
- filling the recesses with a reinforced concrete type and placing the concrete into contact with the foundation (3) or with reinforcing means in the foundation, such as lengths of rebar, or with anchoring means in the base, and
- allowing the concrete to cure.

9. The method according to any one of the previous claims, wherein the building blocks are made of expanded polystyrene or another thermally insulating material.

Patentansprüche

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

- Bereitstellen einer Basis mit Verankerungseinrichtungen, die von der Basis nach außen vorstehen,
- Bereitstellen einer ersten Baueinheit (2), die mit einer ersten Öffnung an ihrer Unterseite versehen ist,
- Anordnen der ersten Baueinheit (2) auf der Basis, wobei die Öffnung über dem nach außen vorstehenden Teil der Verankerungseinrichtungen angeordnet wird,
- Anordnen einer oder mehrerer weiterer Baueinheiten (2') auf der Baueinheit, um eine Wand (1) auszubilden,
- Bereitstellen eines Durchgangslochs (4, 4', 4") durch die erste Baueinheit (2) und die weiteren darauf angeordneten Baueinheiten (2') bis zu der Basis, wobei das Durchgangsloch (4, 4', 4") die vorstehend genannte erste Öffnung aufweist,
- Anordnen von Säulenverstärkungseinrichtungen (5, 5', 5") in dem Durchgangsloch (4, 4', 4"),
- Anordnen der Säulenverstärkungseinrichtungen (5, 5', 5") in Kontakt mit oder in nächster Nähe zu dem nach außen vorstehenden Teil der Verankerungseinrichtungen,
- Einführen eines härtbaren Baumaterials in das Durchgangsloch (4, 4', 4"), und
- Zulassen, dass das härtbare Baumaterial härtet, um eine verstärkte Trägersäule (12, 12', 12") zu bilden, die mit den Verankerungseinrichtungen verbunden ist;

wobei die Bereitstellung eines Durchgangslochs (4, 4', 4") das Ausbilden von miteinander zusammenhängenden Öffnungen in den weiteren Baueinheiten aufweist, indem ein Heizelement oder ein Schneid- oder Bohrelement von einer Oberseite der Wand (1) nach unten bewegt wird, und dass die erste Öffnung sich durch die erste Baueinheit erstreckt, wobei die erste Öffnung und die miteinander zusammenhängend eingerichteten Öffnungen gemeinsam das Durchgangsloch bilden.

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

- Anordnen einer ersten Baueinheit (2) und möglicherweise einer oder mehrerer weiterer Baueinheiten(2') auf einer Basis,
- Bereitstellen einer ersten Öffnung durch die erste Baueinheit (2) und die möglicherweise eine oder mehrere weitere Baueinheiten (2') bis zu der Basis,
- Verankern von Verankerungseinrichtungen in der Basis durch die erste Öffnung,
- Anordnen einer oder mehrerer weiterer Baueinheiten auf der ersten Baueinheit (2) und der möglicherweise einen oder den mehreren weiteren Baueinheiten (2'), um eine Wand (1) auszubilden,
- Bereitstellen eines Durchgangslochs (4, 4', 4") durch die erste Baueinheit (2) und die weiteren darauf angeordneten Baueinheiten (2') bis zu der Basis, wobei das Durchgangsloch (4, 4', 4") die vorstehend genannte erste Öffnung aufweist,
- Anordnen von Säulenverstärkungseinrichtungen (5, 5', 5") in dem Durchgangsloch (4, 4', 4"),
- Anordnen der Säulenverstärkungseinrichtungen (5, 5', 5") in Kontakt mit oder in nächster Nähe zu den Verankerungseinrichtungen,
- Einführen eines härtbaren Baumaterials in das Durchgangsloch (4, 4', 4"), und
- Zulassen, dass das härtbare Baumaterial härtet, um eine verstärkte Trägersäule (12, 12', 12") zu bilden, die mit den Verankerungseinrichtungen verbunden ist;

wobei die Bereitstellung eines Durchgangslochs (4, 4', 4") das Ausbilden von miteinander zusammenhängenden Öffnungen in den weiteren Baueinheiten aufweist, indem ein Heizelement oder ein Schneid- oder Bohrelement von einer Oberseite der Wand (1) nach unten bewegt wird, wobei die erste Öffnung und die miteinander zusammenhängend eingerichteten Öffnungen gemeinsam das Durchgangsloch bilden.

3. Verfahren nach Anspruch 1 oder 2, wobei die Verankerungseinrichtungen eine Schraubverankerung

aufweisen, die in der Basis verankert ist oder wird.

4. Verfahren nach Anspruch 3, wobei die Basis ein Fundament (3) aufweist, und die Verankerungseinrichtungen Verstärkungseinrichtungen aufweisen, die in dem Fundament (3) angeordnet sind, wobei der nach außen vorstehende Teil der Verankerungseinrichtungen eine Länge eines Betonstahlausbildungsteils der Fundamentverstärkungseinrichtungen aufweist.

5. Verfahren nach einem der vorhergehenden Ansprüche, wobei die Wand (1) versehen ist mit:

- einer unteren Oberfläche, die auf dem Fundament oder der Basis aufliegt,
- Hauptoberflächen, die einander gegenüberliegend und von der unteren Oberfläche und von dem Fundament (3) weg gewandt angeordnet sind, und
- eine obere Oberfläche (11), die entgegengesetzt zu der unteren Oberfläche angeordnet ist, die die Hauptoberflächen verbindet, und wobei das Durchgangsloch (4, 4', 4") sich von der unteren Oberfläche zu der oberen Oberfläche (11) oder zu einem Teil einer der Hauptoberflächen, die in der Nähe der oberen Oberfläche (11) angeordnet ist, erstreckt;

wobei sich eine Längsrichtung der Wand (1) vorzugsweise in eine Richtung parallel zu den Hauptoberflächen und der unteren Oberfläche erstreckt, und wobei das Verfahren auch den Schritt des Ausbildens einer Aussparung aufweist, die sich in einer Längsrichtung der Wand (1) in der oberen Oberfläche (11) erstreckt, wobei das ausgebildete Durchgangsloch (4, 4', 4") in der Aussparung endet, wobei das Verfahren vorzugsweise ferner den Schritt des Anordnens von Verstärkungseinrichtungen in der Aussparung aufweist,

- Verbinden der Verstärkungseinrichtungen in der Aussparung mit den Verstärkungseinrichtungen in den Durchgangslöchern (4, 4', 4"),
- Einführen eines härtbaren Baumaterials in die Aussparung, und
- Zulassen, dass das härtbare Baumaterial härtet, um einen Träger, vorzugsweise einen Ringträger, zu bilden, wobei das Füllen des härtbaren Baumaterials in die Aussparung und das Füllen des härtbaren Baumaterials in das Durchgangsloch (4, 4', 4") vorzugsweise im Wesentlichen in einem Arbeitsgang stattfinden.

6. Verfahren nach einem der vorhergehenden Ansprüche, wobei das Durchgangsloch (4, 4', 4") sich in einem Winkel, der in der Längsrichtung der Wand von 90° abweicht, vorzugsweise in einem Winkel von 40° bis 85° in Bezug auf die Horizontale, bevorzugter in einem Winkel von 45° bis 75°, erstreckt; und/oder wobei ein erster Teil mehrerer der vorstehend genannten Durchgangslöcher (4, 4', 4") sich von der Aussparung in der oberen Oberfläche (11) zu einer Position der unteren Oberfläche relativ nahe an einer ersten Hauptoberfläche erstreckt, und ein zweiter Teil der vorstehend genannten mehreren Durchgangslöcher (4, 4', 4") sich von dem Ringträger zu einer Position der Bodenoberfläche relativ nahe an einer zweiten Hauptoberfläche erstreckt; und/oder wobei das Verfahren auch den Schritt zur Bereitstellung einer Durchgangsöffnung (14) in der Wand (1) zum Ausbilden einer Fensteröffnung, einer Türöffnung oder einer ähnlichen Öffnung aufweist; und/oder das Verfahren den Schritt des Ausbildens einer Aussparung in der Wand (1), zum Beispiel zum Verlegen eines Kanals, eines Montageelements oder eines Ausrüstungselements darin, und nach der Anordnung des Kanals oder Montageelements des Füllens der Aussparung mit einem Füllmaterial aufweist; wobei das Verfahren den Schritt des Fixierens einer Bewehrungsmatte an der Wand (1) und der Bereitstellung einer Abschlussschicht auf deren Oberseite aufweist; und/oder
wobei das Verfahren den Schritt des Bereitstellens eines Dachs und des Verbindens von Strukturelementen des Dachs mit Strukturelementen, die in dem Ringträger bereitgestellt sind, aufweist.

7. Verfahren nach einem der vorhergehenden Ansprüche, das die Installation eines Bodens in dem Gebäude aufweist, wobei die Installation die folgenden Schritte aufweist:

- Anordnen von isolierenden Bodenelementen zwischen den Wänden des Gebäudes,
- Ausbilden von Aussparungen, die sich zwischen zwei Wänden erstrecken, in den Bodenelementen;
- Anordnen von Verstärkungseinrichtungen in den Aussparungen,
- Anordnen der Verstärkungseinrichtungen in den Aussparungen in Kontakt mit oder in nächster Nähe zu der Basis oder mit den Verstärkungseinrichtungen, wie etwa Längen von Betonstahl, die in der Basis vorhanden sind, oder mit Verankerungseinrichtungen in der Basis,
- Füllen der Aussparungen mit einem härtbaren Baumaterial, und
- Zulassen, dass das härtbare Baumaterial härtet.

8. Verfahren nach einem der vorhergehenden Ansprüche, das die Installation eines Bodens in dem Gebäude aufweist, wobei die Installation die folgenden Schritte aufweist:

- Anordnen von isolierenden Bodenelementen

zwischen Wänden des Gebäudes, die unter Verwendung des Verfahrens nach einem der vorhergehenden Ansprüche ausgebildet wurden,
- Ausbilden von Aussparungen, die sich zwischen zwei Wänden erstrecken, in den Bodenelementen;
- Füllen der Aussparungen mit einer härtbaren Art von Beton und Anordnen des Betons in Kontakt mit dem Fundament (3) oder mit Verstärkungseinrichtungen in dem Fundament, wie etwa Längen von Betonstahl, oder mit Verankerungseinrichtungen in der Basis, und
- Zulassen, dass der Beton härtet.

9. Verfahren nach einem der vorhergehenden Ansprüche, wobei die Baueinheiten aus Polystyrolschaum oder einem anderen wärmeisolierenden Material hergestellt sind.

Revendications

1. Procédé pour construire un bâtiment, comprenant les étapes de :

- la fourniture d'une base avec des moyens d'ancrage installés dans celle-ci, lesquels moyens d'ancrage font saillie vers l'extérieur à partir de ladite base,
- la fourniture d'un premier bloc de construction (2), qui est pourvu d'une première ouverture sur un côté inférieur de celui-ci,
- le placement du premier bloc de construction (2) sur la base avec l'ouverture agencée pardessus la partie faisant saillie vers l'extérieur des moyens d'ancrage,
- le placement d'un ou de plusieurs blocs de construction supplémentaires (2') sur ledit bloc de construction afin de former un mur (1),
- la fourniture d'un trou débouchant (4, 4', 4") à travers le premier bloc de construction (2) et les blocs de construction supplémentaires (2') placés sur celui-ci jusqu'à la base, ledit trou débouchant (4, 4', 4") comprenant la première ouverture susdite,
- le placement de moyens d'armature en colonne (5, 5', 5") dans ledit trou débouchant (4, 4', 4"),
- le placement des moyens d'armature en colonne (5, 5', 5") en contact ou proximité étroite avec la partie faisant saillie vers l'extérieur des moyens d'ancrage,
- l'introduction d'un matériau de construction durcissable dans le trou débouchant (4, 4', 4"), et
- la permission audit matériau de construction durcissable de durcir afin de former une colonne de support renforcée (12, 12', 12") raccordée aux moyens d'ancrage ;

dans lequel ladite fourniture d'un trou débouchant (4, 4', 4") comprend là formation d'ouvertures contiguës les unes aux autres dans les blocs de construction supplémentaires en déplaçant un élément chauffant ou un élément de coupe ou de perçage vers le bas à partir d'un côté supérieur du mur (1) et en ce que ladite première ouverture s'étend à travers le premier bloc de construction, avec la première ouverture et les ouvertures agencées de façon contiguë les unes aux autres formant conjointement le trou débouchant.

2. Procédé pour construire un bâtiment, comprenant les étapes de :

- le placement d'un premier bloc de construction (2), et éventuellement d'un ou de plusieurs blocs de construction supplémentaires (2'), sur une base,
- la fourniture d'une première ouverture à travers ledit premier bloc de construction (2), et le ou les éventuels blocs de construction supplémentaires (2'), jusqu'à la base,
- l'ancrage, à travers ladite première ouverture, de moyens d'ancrage dans la base,
- le placement d'un ou de plusieurs blocs de construction supplémentaires sur ledit premier bloc de construction (2) et le ou les éventuels blocs de construction supplémentaires (2'), afin de former un mur (1),
- la fourniture d'un trou débouchant (4, 4', 4") à travers le premier bloc de construction (2) et les blocs de construction supplémentaires (2') placés sur celui-ci jusqu'à la base, ledit trou débouchant (4, 4', 4") comprenant la première ouverture susdite,
- le placement de moyens d'armature en colonne (5, 5', 5") dans ledit trou débouchant (4, 4', 4"),
- le placement des moyens d'armature en colonne (5, 5', 5") en contact ou proximité étroite avec les moyens d'ancrage,
- l'introduction d'un matériau de construction durcissable dans le trou débouchant (4, 4', 4"), et
- la permission audit matériau de construction durcissable de durcir afin de former une colonne de support renforcée raccordée aux moyens d'ancrage ;

dans lequel ladite fourniture d'un trou débouchant (4, 4', 4") comprend la formation d'ouvertures contiguës les unes aux autres dans les blocs de construction supplémentaires en déplaçant un élément chauffant ou un élément de coupe ou de perçage vers le bas à partir d'un côté supérieur du mur (1), dans lequel la première ouverture et les ouvertures

agencées de façon contiguë les unes aux autres forment conjointement le trou débouchant.

3. Procédé selon la revendication 1 ou 2, dans lequel les moyens d'ancrage comprennent un ancrage à vis qui est ou sera ancrée dans la base.

4. Procédé selon la revendication 3, dans lequel la base comprend une fondation (3) et les moyens d'ancrage comprennent des moyens d'armature placés dans la fondation (3), dans lequel la partie faisant saillie vers l'extérieur des moyens d'ancrage comprend une longueur de partie de formation de barre d'armature des moyens d'armature de fondation.

5. Procédé selon l'une quelconque des revendications précédentes, dans lequel le mur (1) est pourvu de :

- une surface inférieure jouxtant la fondation ou la base,
- des surfaces principales situées les unes en face des autres et tournées dans une direction opposée à la surface inférieure et à la fondation (3), et
- une surface supérieure (11) située en face de la surface inférieure, qui joint les surfaces principales, et dans lequel le trou débouchant (4, 4', 4") s'étend de la surface inférieure à la surface supérieure (11) ou vers une partie d'une des surfaces principales qui est située près de la surface supérieure (11) ;

dans lequel une direction longitudinale du mur (1) s'étend de préférence dans une direction parallèle aux surfaces principales et à la surface inférieure, et dans lequel le procédé comprend également l'étape de la formation d'un évidement s'étendant dans une direction longitudinale du mur (1) dans la surface supérieure (11), dans lequel le trou débouchant (4, 4', 4") formé se termine dans l'évidement, le procédé comprenant de préférence en outre l'étape du placement de moyens d'armature dans l'évidement,

- le raccordement des moyens d'armature dans l'évidement aux moyens d'armature dans les trous débouchants (4, 4', 4"),
- l'introduction d'un matériau de construction durcissable dans l'évidement, et
- la permission au matériau de construction durcissable de durcir afin de former une poutre, de préférence une poutre de ceinture, dans lequel le remplissage du matériau de construction durcissable dans l'évidement et le remplissage du matériau de construction durcissable dans le trou débouchant (4, 4', 4") se font de préférence essentiellement en une opération.

6. Procédé selon l'une quelconque des revendications précédentes,
dans lequel le trou débouchant (4, 4', 4") s'étend à un angle s'écartant de 90° dans la direction longitudinale du mur, de préférence à un angle de 40° à à 85° par rapport à l'horizontale, de façon davantage préférée un angle de 45° à 75° ; et/ou
dans lequel une première partie d'une pluralité des trous débouchants susdits (4, 4', 4") s'étend de l'évidement dans la surface supérieure (11) à une position de la surface inférieure relativement près d'une première surface principale, et une seconde partie de la pluralité des trous débouchants susdits (4, 4', 4") s'étend de la poutre de ceinture à une position de la surface inférieure relativement près d'une seconde surface principale ; et/ou
dans lequel le procédé comprend également l'étape de la fourniture d'une ouverture débouchante (14) dans le mur (1) pour former une ouverture de fenêtre, une ouverture de porte ou ouverture similaire ; et/ou
le procédé comprenant l'étape de la formation d'un évidement dans le mur (1), par exemple pour placer un conduit, un élément de montage ou un élément de finition dans celui-ci et le remplissage dudit évidement avec un matériau de remplissage après le placement dudit conduit ou élément de montage ; le procédé comprenant l'étape de la fixation d'un treillis d'armature au mur (1) et de la fourniture d'une couche de finition par-dessus celui-ci ; et/ou
le procédé comprenant l'étape de la fourniture d'un toit et du raccordement d'éléments structuraux du toit à des éléments structuraux prévus dans la poutre de ceinture.

7. Procédé selon l'une quelconque des revendications précédentes, comprenant l'installation d'un plancher dans le bâtiment, laquelle installation comprend les étapes de :

- le placement d'éléments de plancher isolants entre les murs du bâtiment,
- la formation d'évidements s'étendant entre deux murs dans les éléments de plancher,
- le placement de moyens d'armature dans lesdits évidements,
- le placement des moyens d'armature dans les évidements en contact ou proximité étroite avec la fondation ou avec les moyens d'armature présents dans la fondation, tels que des longueurs de barre d'armature, ou avec des moyens d'ancrage dans la base,
- le remplissage des évidements avec un matériau de construction durcissable, et
- la permission au matériau de construction durcissable de durcir.

8. Procédé selon l'une quelconque des revendications précédentes, comprenant l'installation d'un plancher dans le bâtiment, laquelle installation comprend les

étapes de :

- le placement d'éléments de plancher isolants entre des murs du bâtiment formé en utilisant le procédé selon l'une quelconque des revendications précédentes,
- la formation d'évidements s'étendant entre deux murs dans les éléments de plancher,
- le remplissage des évidements avec un type de béton armé et le placement du béton en contact avec la fondation (3) ou avec des moyens d'armature dans la fondation, tels que des longueurs de barre d'armature, ou avec des moyens d'ancrage dans la base, et
- la permission au béton de durcir.

9. Procédé selon l'une quelconque des revendications précédentes, dans lequel les blocs de construction sont faits de polystyrène expansé ou d'un autre matériau thermiquement isolant.

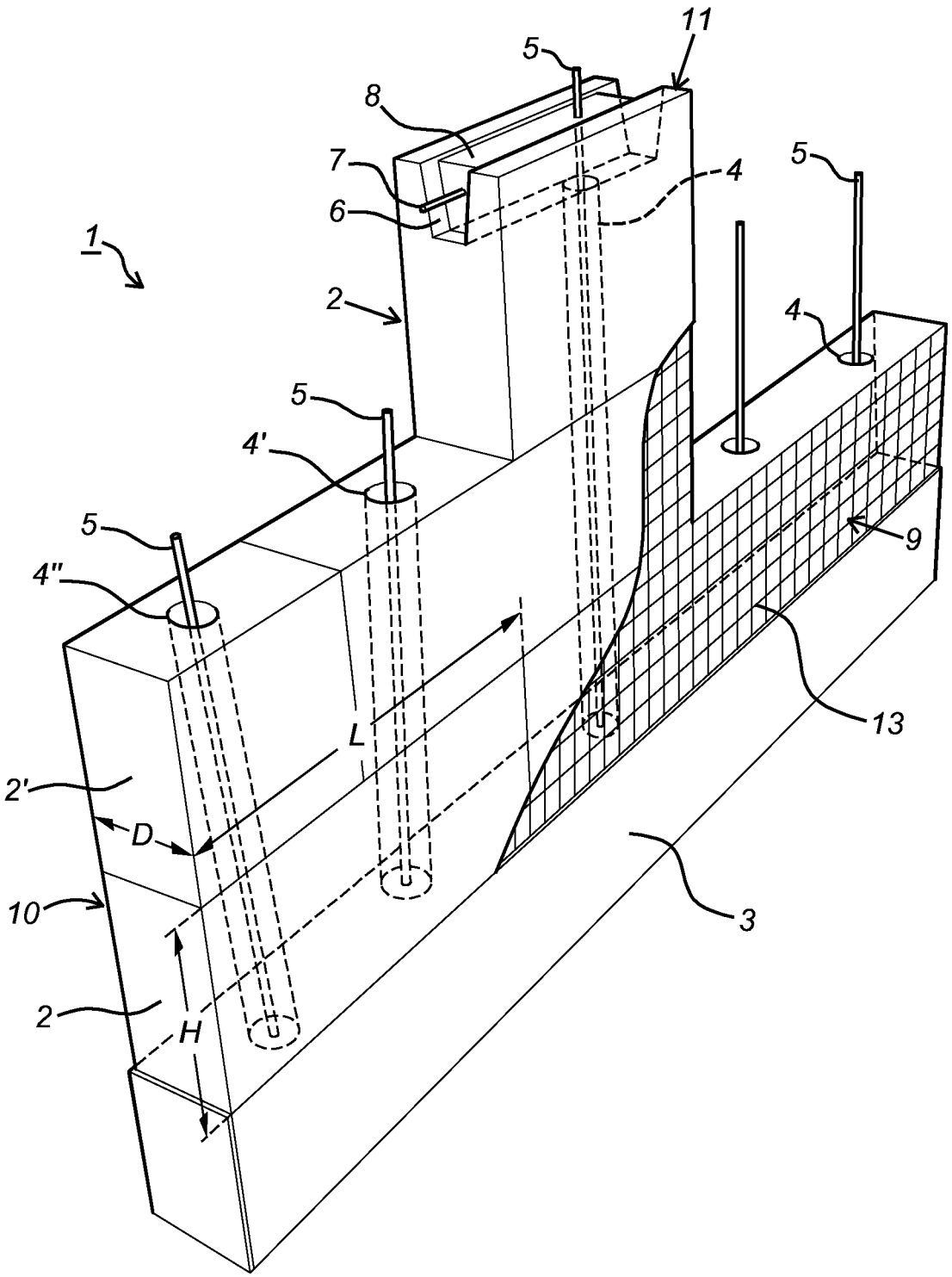

Fig. 1

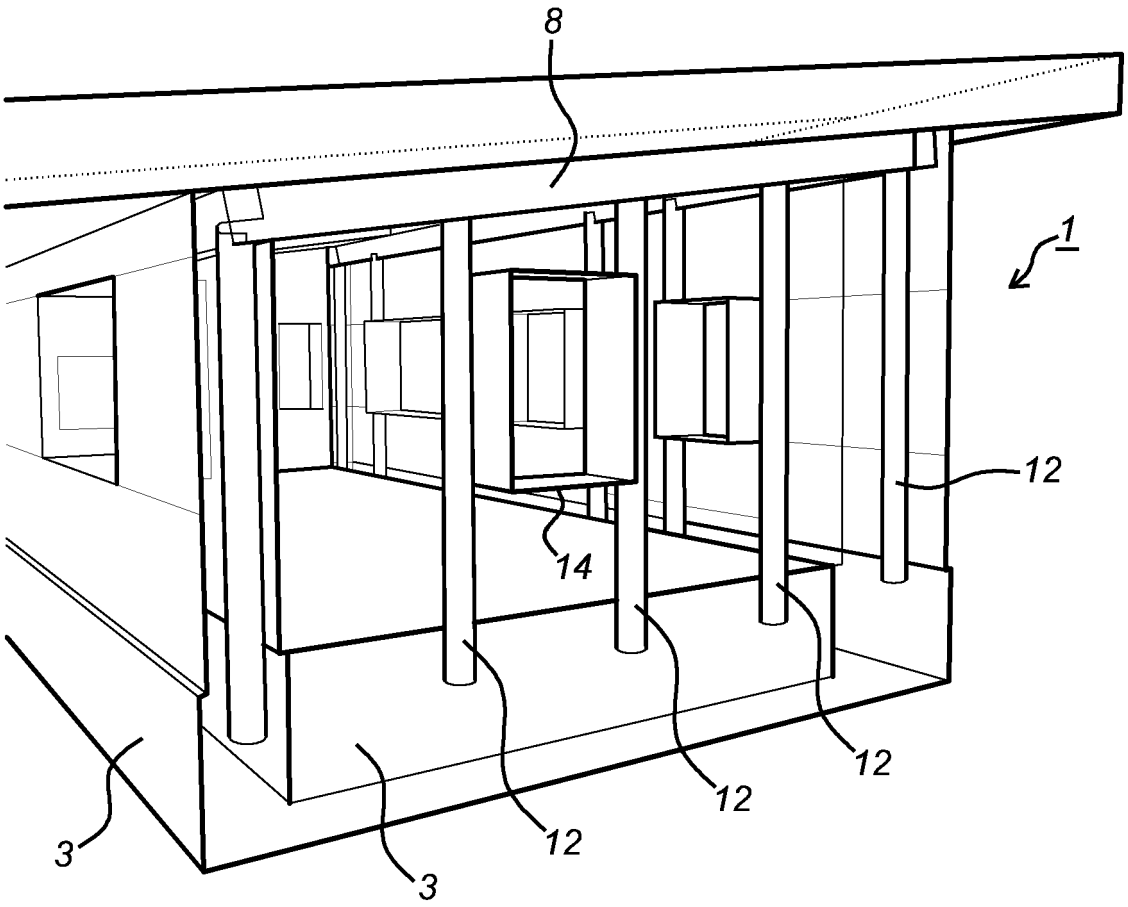

Fig. 2

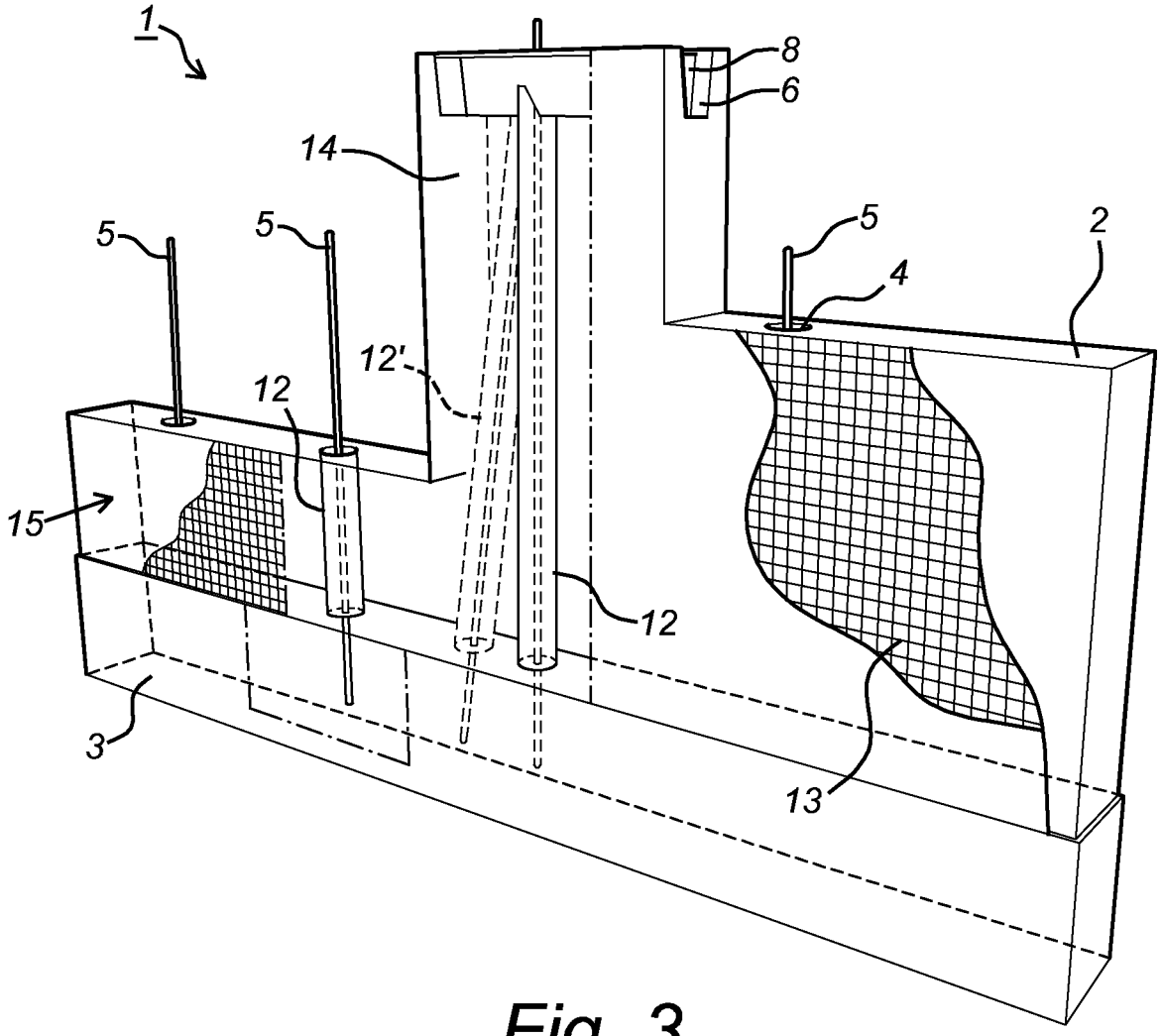

Fig. 3

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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- NL 1008128 **[0002]**