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(54) **BUILDING CONSTRUCTION METHOD AND MODULAR SHUTTERING METHOD**

(57) The mixed construction process combines traditional or non structural construction with structural construction, concrete participating therein both in the walls and floor framing. Starting from a concrete slab (1) as the foundation means, arranged thereon are the rein-

forced structural concrete columns (3), and then obtained by means of formwork boards (7) are the concrete walls, also reinforced by means of electrowelded mesh (6). Also described is a formwork process **characterized by** its savings of materials and manual labor.

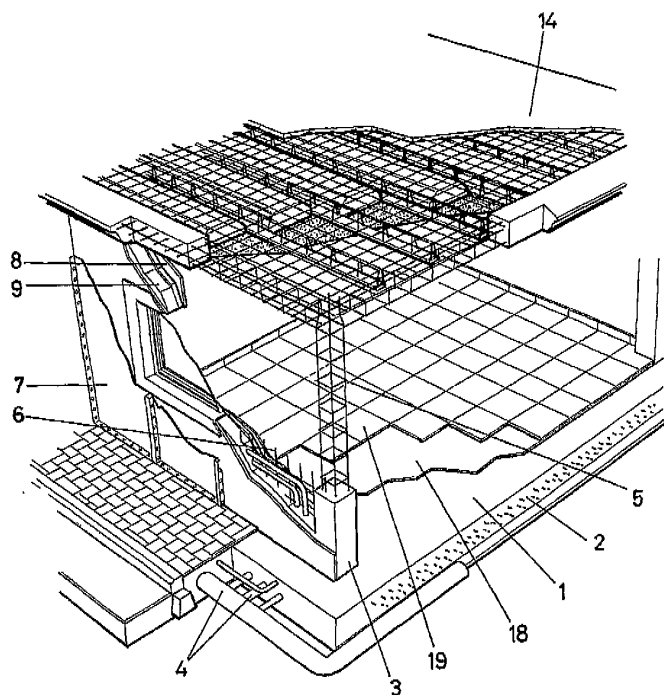


FIG.1

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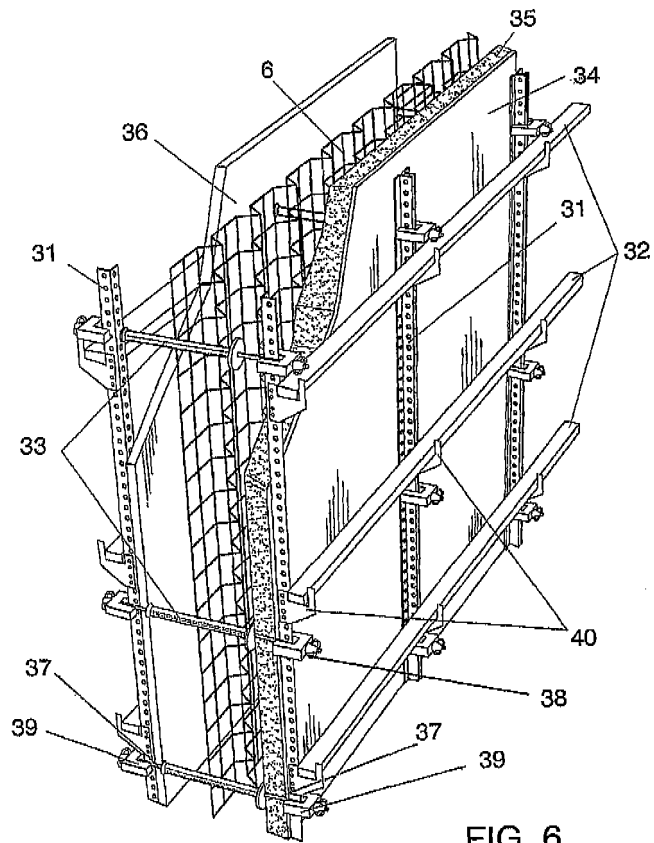


FIG. 6

Description

OBJECT OF THE INVENTION

[0001] The present invention refers to a new building construction process for one or several story buildings intended for any use whether industrial, service or residential, particularly designed to be carried out "in situ" by means of the combination of the traditional way of constructing based on columns and floor framing, but simultaneously carrying out the construction of the exterior enclosure walls and the inside distribution partition walls.

[0002] The invention also describes a modular formwork process for its use preferably in the previous construction method, although its use is also possible in other known construction processes, whether they are intended for buildings or not.

[0003] The object of the invention is to achieve that columns, exterior enclosure walls, interior distribution walls, floor framing, and electrical and sanitary installations are constructed at the same time, obtaining a perfectly finished building with finishes included, requiring only small details or finishing touches, providing the system with the advantages of traditional construction systems and structural construction systems, obtaining a significant reduction in construction time.

BACKGROUND OF THE INVENTION

[0004] As is known, the traditional or non-structural construction system consists of, after the preparation of the corresponding foundation, the construction of a structure based on columns and floor framing, after which, once finished, the exterior walls and partition walls are prepared by means of bricks or other suitable materials, on which wall chases are made for arranging the installations, and which are finally plastered by means of the application of a layer of plaster or the like.

[0005] Apart from this traditional construction, structural construction systems are also known in which structural concrete is used for obtaining walls and floor framing. In these structural construction systems, reinforced concrete walls and floor framing are obtained by means of the use of suitable formworks, in the absence of columns, which must subsequently be lined both at the floor and ceiling level and at the wall level.

[0006] An example of a structural construction system is disclosed in Spanish patent application number ES-2142222-A. Said application discloses a system consisting of arranging a mold on a foundation footing, formed on the basis of formwork panels from which the entire structure of the edification will be obtained, including walls, interior partition walls, ceiling or floor framing, and considering even the spaces for windows or doors. The wire mesh introduced between the formwork panels and which will make up the reinforcement of the walls is completed with electricity and plumbing conduits. Once the panels are arranged, concrete will be poured inside as a

setting material so as to thus obtain a monolithic structure "in situ".

DESCRIPTION OF THE INVENTION

[0007] The main object of the invention refers to a mixed construction system, that is combining, as previously stated, the traditional or non traditional construction with structural construction, following a specific construction process.

[0008] To that end, more specifically and from the foundation footing, first the columns corresponding to the first floor are made on the footing, which columns will be metal columns or preferably reinforced structural concrete and steel columns, and after making said columns, the formwork of the exterior walls and interior partition walls is performed, said columns being included within the formwork, and subsequently pouring concrete, preferably non structural lightweight concrete, into the formwork for the walls and partition walls.

[0009] According to another feature of the invention, it has been provided that at the level of the exterior enclosure walls and placed against the inner face of the formwork, a composite panel is arranged in which a thermal insulation board and another board, preferably a gypsum board participate such that the latter will be visible upon form removal, providing a perfect finish.

[0010] It has also been provided that the thermal insulation boards incorporate on one of their faces, the one in contact with the concrete, a plurality of channels, preferably of dovetail section, to ensure a good adherence with the concrete. Said boards also have tongue and groove joint means on their sides, their opposite sides therefore being different, one with a projection (tongue) and the other one with a recess (groove) for joining successive boards.

[0011] Another object of the present invention refers to a modular formwork process, one of its features being the use of the previously described thermal insulation boards as inner formwork boards, the use of conventional formwork boards not being necessary for concreting of the walls. The steps of this modular formwork process are also described in the building construction method object of the present invention, although said modular formwork process can also be used in other construction methods and independently from the construction process described in the present invention.

[0012] According to another feature of the invention, it has been provided that the formwork panels for interior walls and partition walls can end at their top end in an orthogonal bracing so as to directly connect with the formwork panels forming the horizontal formwork for the floor framing.

[0013] Also provided on these horizontal formwork panels for the floor framing is the arrangement of waterproof gypsum boards on which the polystyrene arches or similar arches will be adhered, and on which the structural concrete of the formwork will then be poured, such

that said gypsum boards will form the visible face of the ceiling, ready to be painted.

[0014] The advantages derived from this construction system are numerous, synthesized in the following aspects:

- The time for carrying out the work is about three times less than with traditional systems since the placement of the formworks is very quick due to the improvement of the assembly and its low weight, each board being able to be handled by a single person, without requiring additional equipment or freight elevators.
- The decreased manual labor is the most significant point of savings of the system since, due to the simplicity and improvement of the assembly, specialized operators are not required for the placement thereof, in addition to the process being notably simplified by means of the elimination of multiple classical operations: ceramic brick wall lifting, parge coating on the inner face, application of the thermal and acoustic insulation, application of a new ceramic brick wall, carrying out channels or grooves for the installation of plumbing pipes and electrical installation conduits, inner plastering finish, etc.
- Cleaning of the system and the practically complete absence of rubble, pallets, packaging, etc., provide, in addition to very considerable cost savings, a very important benefit for the environment in comparison to traditional systems.
- The use of the materials is optimized, eliminating the onsite storage of 80% of the materials used in traditional systems, and the amount of waste of such materials is very significantly reduced.
- It allows the modification of the distribution of the interior partition walls once the edification has concluded and according to the preferences of the owners, given that since these are not load-bearing walls, they allow their shifting, provided the load-bearing columns are respected. Likewise, it is also possible to make openings in the exterior walls.
- The use of preferably lightweight concrete, which has better thermal and acoustic properties than structural concrete, likewise reducing the weight of the distribution thereof with respect to structural concrete.
- The improvement of the surface finish facilitates subsequent application operations and other operations, as the work is done on a screeded surface.
- The machinery and tool costs are largely eliminated.
- The quality of the construction increases as it does not depend on manual labor.

DESCRIPTION OF THE DRAWINGS

[0015] To complement the description being made and for the purpose of aiding to better understand the features of the invention according to a practical preferred em-

bodiment thereof, a set of drawings is attached as an integral part of said description, wherein the following is shown with an illustrative and non-limiting character:

- 5 Figure 1 shows a partial and perspective view of a building carried out according to the construction system forming the object of the present invention, which is multiply sectioned so as to show its inner structure more clearly.
- 10 Figure 2 shows an enlarged detail of a convergence point between a wall and a floor framing, also according to the proposed construction system.
- Figure 3 shows a detail of the joining area between the column of the first floor and the column of the second floor.
- 15 Figure 4 shows a detail of a junction box.
- Figure 5 shows a detail of a junction box fixed to a formwork board.
- 20 Figure 6 shows a perspective view of the formwork of an exterior wall according to the modular formwork process object of the present invention.

PREFERRED EMBODIMENT OF THE INVENTION

- 25 **[0016]** In view of the figures discussed, it can be observed how the construction system proposed by the invention starts from a foundation based on a preferably lightweight concrete slab 1 with reinforcement 2 and reinforced tie beams and clamps on all the edges of the slab and at the points provided for the location of the columns 3. Said columns 3 can be either metal or reinforced concrete columns. The slab 1 can be lightened by means of special plastic troughs or else ceramic or concrete arches, but in any case incorporating duly incased therein the sanitary drains 4 and any other required service conduit.
- 30
- 35

- [0017]** Metal plates have been built into the solid areas on the vertical of the columns 3, on which plates the reinforcing rods 5 of the columns 3 are arranged, the fixing between them being carried out by means of welding or screwing. On the upper end, the columns have anchored thereto a metal crosspiece 20 which is built into the upper floor framing and on which the metal plates will subsequently be located, which will be useful for anchoring thereon the following section of columns 3, both members being able to be welded or screwed together.
- 40
- 45

- [0018]** After making the metal or structural concrete columns 3, the electrowelded meshes 6 are arranged, which will be incased within each exterior wall or interior partition wall, and the conduits 4 for the installations of the building, which converge in the corresponding junction boxes 22 and mechanisms, are fixed to said meshes 6.
- 50

- [0019]** The junction boxes 22 are located and fixed to the formwork boards 7 in a position determined during the construction design stage. Any type of junction box 22 can be fixed, whether for water, electricity or telephone, at the desired height in enclosure walls, interior
- 55

partition walls or anywhere else the location of junction boxes is required.

[0020] The system for fixing the junction boxes 22 to the boards 7 is carried out by means of clamps 23 with a zipper function. These clamps 23 are preferably PVC clamps, although they may also be of another material. The clamps 23 are made up of two planar and elongated members 23a joined at one of their ends by means of a rivet 23b, and a washer is located at the free end of said members, which is responsible for joining them both. On the contact face of both members, there are parallel projections which will fit with one another once both ends are introduced in the washer.

[0021] The junction box 22 is cylindrical and hollow, missing one of its bases. In order to carry out the joining of the box 22 with the formwork board 7, the open base of the box 22 is supported on the inner face of the formwork board 7. The box 22 will have at least one hole on its closed base and the formwork board will also have a hole 24. Then, the two free ends 23a are passed through the hole of the box until the rivet 23b abuts with them, and then said ends 23a are passed through the hole 24 of the board. In order to ensure the position, the two free ends are inserted through the washer which is responsible for fitting together the parallel projections of each end until abutting with the outer face of the formwork board.

[0022] According to the size of the box 22 and its purpose, it may be necessary to use two clamps 23, and it will therefore be necessary to make two holes in the box and two holes in the formwork board.

[0023] Once the box 22 is located on the formwork board 7, the latter is placed in its position prior to the pouring of the concrete. The boxes have holes for inserting the different conduits 4 for the telephone, electricity or water therein, this also being carried out prior to the pouring of the concrete.

[0024] The junction box 22 is therefore completely fixed against the formwork 7 as a result of the clamp 23 for the subsequent pouring of the concrete. Once the pouring is carried out and prior to the form removal or removal of the formwork boards 7, said clamps 23 are cut such that when said boards 7 have been removed, the junction box 22 is perfectly flush in the end wall.

[0025] As a continuation of the construction process, arranged on both sides of each electrowelded mesh 6 and with the suitable spacing according to the thickness provided for each wall or partition wall are placed said formwork boards 7 which will allow the subsequent pouring of the preferably lightweight concrete, but with the special particularity, as previously mentioned, that it is possible to adapt to the inner face of the formwork 7 corresponding to each exterior wall a board made up of boards 8 with different finishes, such as gypsum board for example, preferably Pladur® type boards, and immediately inside of each board, an expanded polystyrene panel 9 or of another similar material, with suitable thermal and acoustic features.

[0026] The inner formwork board 7 and the gypsum-

finished board 8 can be replaced by a single plate incorporating a board 34 defining the practically finished inner surface for said walls, being able to use different materials for the visible inner face of the wall, such as gypsum plaster, for example, as well as a polystyrene board 35, carrying out acoustic and thermal insulation functions.

[0027] The face of the expanded polystyrene panels 9 or boards 35 intended for coming into contact with the preferably lightweight concrete mass 10 is provided with channels 11 of a dovetail profile in order to ensure a perfect grip of the polystyrene 9 and the lightweight concrete 10.

[0028] In turn, a sheet or plate 12 can be arranged between the concrete 10 and the outer formwork boards, which allows the easy removal of the formwork boards, without needing to use form removal materials.

[0029] In order to make the structural concrete or the metal of the columns independent from the preferably lightweight concrete of the walls which will subsequently be poured, since both have different constructive features and therefore react differently to the same pressures and temperatures, the columns are lined with a polyethylene foam material with a density of 60 or slightly greater and 1 cm thick which functions as a contraction joint between the lightweight concrete and the material of the column.

[0030] The formwork boards 7 have the particularity of being provided with orthogonally bent extensions 13 at the level of the upper end of the walls and partition walls which allow connection with the formwork boards corresponding to the floor framing 14 without interruption.

[0031] Once all the formwork boards of the exterior walls and interior partition walls are arranged, the preferably lightweight concrete is poured, which will for the exterior walls and vertical partition walls, leaving an empty unfilled space during the vertical concreting, approximately the last three centimeters. The purpose of this measurement is to allow inserting in said space an elastic material in order to provide the necessary sealing against possible air and water filtrations. The enclosure walls and partition walls are also made independent from the distribution of the floor framing which will be arranged on them by means of said joint.

[0032] For the construction of said first floor framing, which will form the ceiling of the ground floor of the building and the ground of the first floor (in the case that the columns are metal columns), the horizontal metal formwork is arranged at a specific distance from the lower face of the end plate of the columns 3, about 5 centimeters above it, which have already been incased within the lightweight concrete forming the enclosure walls and partition walls.

[0033] Arranged on the formwork boards corresponding to the floor framing are waterproof gypsum boards 15 which will finally form the visible face of the floor framing corresponding to ceilings, boards on which there are arranged classic polystyrene arches or coffers 16 so as to improve the acoustic and thermal insulation and lighten

the weight of the floor framing. Said polystyrene coffers 16 can be replaced with concrete or ceramic coffers, or the like. Said coffers are arranged by forming alignments which give rise to channels 17 in which metal reinforcement rods are introduced and after the pouring of the concrete, they will form one-way or two-way joists. The pre-wired electrical and hydraulic installation conduits are also built into their final position.

[0034] Once the previous operations have concluded, the last operation consists in pouring the structural concrete on the formwork for the construction of the described floor framing.

[0035] If a second floor in the edification is to be built on this floor framing simultaneously to location of the reinforcement of the floor framing, it is possible to arrange the metal columns of the second section or first floor on the plates of the columns of the first section or ground floor and already incased in the concrete. The joining between the plate of the end of the first section of columns with the plate of the beginning of the second section of columns can be carried out by means of screws 21 or welding.

[0036] For the construction of the enclosures of said second floor and once the vertical columns are arranged, it will be necessary to repeat the construction steps described previously, i.e. arrange the vertical formworks with the pre-installation inside and the subsequent concreting of said vertical formworks. The arrangement of the walls and partition walls of said first floor may vary with respect to those of the ground floor.

[0037] The process for creating the floor framing of said first floor which will form the ceiling of the first floor and the ground of the second floor must subsequently be repeated.

[0038] The previous step is repeated as many times as there are floors to be constructed.

[0039] As is also conventional, the floor lining 19 is arranged on the concrete slab 1 and with the aid of a fast-drying cement layer 18, the lining will be based on ceramic tiles, for example, while at the same time openings will be arranged in the wall formworks, with their corresponding casings, for obtaining the necessary openings corresponding to doors and windows.

[0040] As an alternative to the formwork process used above, it is possible to use a modular formwork process also object of the present invention, applicable to the construction method object of the present invention or to other known construction processes.

[0041] The first optional step of the modular formwork process consists of placing angular guides anchored in the ground for the configuration of the perimeter of the building to be constructed. Subsequently to arranging said guides, and using these, inner horizontal panels are placed for the horizontal formwork, joined to one another laterally and preferably by means of tongue and groove.

[0042] Said inner horizontal panels 34, 35 can preferably be formed by a board formed by a gypsum board 34 and a preferably polystyrene thermal insulation board

35, the thickness of said board being enough to resist the pressure of the concrete which will subsequently be poured between the inner and outer formwork panel. Said gypsum board, which is the visible face of the construction, can be replaced by another material with another surface finish. The board forming each inner horizontal panel can also be a conventional formwork panel.

[0043] Once the inner panels are placed and located, the vertical aligners 31, preferably four in each vertical aligner 31, are arranged placed against the inner face of the vertical panels 34, 35. Said vertical aligners 31 consist of preferably metal bodies or straight guides with two orthogonally arranged surfaces having holes throughout said surfaces, all the holes being separated from one another by a given distance and which may vary. Said vertical aligners 31 are arranged spaced from one another a given distance throughout the vertical panels 34, 35, said distance preferably being 1.20 meters.

[0044] To maintain the union between the vertical panels 34, 35 and the vertical aligners 31, tie rods 37 are introduced, which traverse the vertical aligners 31 and the vertical panels 34, 35, ensuring the union between both members. Fixing means 39 combined with stop members 38 are used to ensure said union. The tie rods 37 consist of cylindrical bodies or bars with a thread on their surface, the length of which will vary according to the thickness of the wall to be constructed. Said fixing members 39 are traversed by the tie rod 37 and are fixed to the vertical aligners 31, ensuring the position of the tie rod by means of a stop member 38 screwed to the free end of the tie rod 37 projecting from the fixing member 39. Preferably four tie rods 37 are arranged for each vertical aligner 31.

[0045] A wire mesh 6 is subsequently placed and fixed on the outer side of the vertical panels 31 and along their entire length and surface by means of suitable means, for example wires or clips. As in the previously described construction process, the purpose of said wire mesh is to facilitate the distribution of the concrete when it is poured between the outer and inner formwork members.

[0046] In order to ensure the stability of the vertical panels 34, 35, aligner supports 40 are located in the vertical aligners 31 for the subsequent support of horizontal aligners 32. The horizontal aligners 32 are fitted between the aligner supports 40 and the vertical aligners 31. The aligner supports 40 consist of preferably metal planar members of little thickness having holes on one of their sides for the fixing thereof to the vertical aligners 31, and having a partial U-shape on the side opposite to the fixing side, suitable for fixing the horizontal aligners 32. Said horizontal aligners 32 are made up of straight bars of bodies with a preferably rectangular section.

[0047] The aligner supports are located along the vertical aligners 31, separated from one another by a given distance. The first horizontal aligner 32 will preferably be at a distance which is one sixth of the upper portion of the vertical aligner 31, the second horizontal aligner 32 will be located at the mid portion of the vertical aligner,

and the third and last horizontal aligner 32 will be located at one sixth of the lower portion of the vertical aligner 31. These distances can obviously be modified according to the construction requirements.

[0048] Fixed next to the inner mesh 6 are the different necessary installations, such as the plumbing and electrical installations, including the placement of the different distribution boxes or junction boxes which are necessary for proper distribution of the different installations.

[0049] Prior to placing the outer formwork panels 36, each one of the preferably threaded tie rods 37 is introduced in a spacer 33. Said spacer 33 will determine the width of the wall to be constructed, and as mentioned, it will preferably be screwed to the tie rod 37, said spacer 33 made up of a preferably steel tubular member, and as indicated, having an internal thread for being screwed to the tie rod 37.

[0050] Once the spacers 33 are placed on the tie rods 37, the outer formwork panels 36 will be positioned next to the corresponding vertical aligners, aligner supports and horizontal aligners. The outer formwork panels 36 will be traversed by the tie rods 37, as well as the exterior vertical aligners. For fixing the tie rods 37 on the side corresponding to the outer formwork panels, the same process is used as that for the inner panels 34, 35.

[0051] To ensure that the width of the wall is constant along its entire length, it will be necessary to screw on the tie rods 37 as tightly as possible with the aid of the stop members 38.

[0052] The formwork for the outside enclosure is thus ready for the concrete to be poured.

[0053] It is worth pointing out that the inner panels 34, 35 and the outer panels 36 as well as the wire mesh 6 are provided with openings prior to their assembly provided on the façade in the way of windows, doors, terraces and balconies, according to the design of the tarade. The outer formwork panels 36 may likewise have any finish, such as wood, brick or any other type, on their visible face, the outer face.

[0054] Prior to pouring the concrete, the formwork for the interior partition walls of the building or distribution partition walls is prepared, and the previous process is repeated for this but the vertical aligners 31 of the interior partition walls are located facing the vertical aligners 31 of the exterior enclosure wall. After the construction of the internal partition walls, half joists or elongated metal members, which will be useful as support for the fixing panels for the subsequent framing, will be located on the upper ends of the vertical aligners 31 of the exterior enclosure wall and of the interior partition walls which are facing one another. Said panels may have a varying finish on its visible lower face, such as plaster or wood, among others. At this point the concrete can be poured between the formwork panels.

[0055] Bracing will be carried out in the necessary sites for the construction of the framing, and the process used in the previously described construction process is followed.

[0056] Once the concrete is dry, all the materials used in the construction for the formwork can be reused for the construction of a second floor of the building or for the construction of another building, with the exception of the spacers, which remain incased in the concrete.

Claims

1. A building construction process, of the type in which, starting from a concrete slab acting as a foundation, walls and/or partition walls project, also obtained in concrete, by means of formwork, receiving in the upper portion the corresponding floor framing, the building being able to progress to any height, **characterized in that** the construction process for each one of the floors of the building comprises the following phases;
 - construction of the columns of the building,
 - construction of the enclosure walls and/or partition walls in concrete by means of formwork, incasing the previous columns,
 - construction of the floor framing in concrete by means of formwork, and
 - form removal of the enclosure walls and partition walls and floor framing.
2. A process according to claim 1, **characterized in that** arranged on the walls, preferably on the exterior enclosure walls and on the inner face of the formwork boards, are gypsum boards which, after form removal, define a practically finished inner surface for said walls, and immediately inside said gypsum boards, and in contact with the concrete, there are arranged panels of a thermal insulating material for thermal and acoustic insulation of the wall.
3. A process according to claims 1 and 2, **characterized in that** the inner formwork board of the walls or partition walls is replaced by a board incorporating a gypsum board which defines the practically finished inner surface for said walls, as well as a polystyrene board carrying out the functions of acoustic and thermal insulation.
4. A process according to claim 3, **characterized in that** the thickness of the gypsum and polystyrene boards is the thickness necessary for resisting the pressure of the concrete once it has been poured between the formwork members.
5. A process according to claims 2 and 3, **characterized in that** the expanded polystyrene panels or of a similar material incorporate channels on their face which is in contact with the concrete so as to enhance the grip between both members.

6. A process according to claim 5, **characterized in that** said channels have a dovetail profile.
7. A process according to claim 2, **characterized in that** the expanded polystyrene panels incorporate gypsum boards adhered thereto.
8. A process according to claim 1, **characterized in that** included inside the vertical formworks are wire meshes for distributing the concrete, the different installations being distributed on said wire meshes.
9. A process according to claim 3, **characterized in that** said installations are electrical, water and telephone.
10. A process according to claim 1, **characterized in that** the vertical formwork boards incorporate orthogonal braces at the level of the upper end of walls and partition walls which define a connection without interruption between the vertical formwork and the horizontal formwork, the latter for obtaining the formworks corresponding to the floor framing.
11. A process according to claim 1, **characterized in that** arranged on the horizontal formwork corresponding to the floor framing are waterproof gypsum boards which at the same time make up the visible ceiling once the floor framing is constructed and the formwork boards are removed.
12. A process according to claim 1, **characterized in that** the columns are reinforced concrete columns.
13. A process according to claim 1, **characterized in that** the columns are metal columns.
14. A process according to claim 8, **characterized in that** the different installations converge in junction boxes which in turn are fixed to the formwork boards by means of at least one clamp prior to the assembly of the formwork boards.
15. A process according to claim 14, **characterized in that** the junction boxes are cylindrical without one of their bases, said open base being supported on the inner face of the formwork board for the subsequent insertion of the clamp through holes made on the closed base of the junction box and the formwork board.
16. A process according to claim 1, **characterized in that** arranged between the concrete and the outer formwork boards is a board 12 which allows the easy removal of the formwork boards without needing to use form removal materials.
17. A process according to claim 1, **characterized in that** the walls or partition walls are carried out in lightweight concrete.
18. A process according to claim 1, **characterized in that** the floor framing is carried out in structural concrete.
19. A modular formwork process, applicable to different types of construction, **characterized in that** the construction of the formwork of the exterior closure walls comprises the following steps:
- placing inner horizontal panels for the vertical formwork, laterally joined to one another,
 - placing vertical aligners against the inner face of the vertical panels and separated from one another a given distance,
 - inserting tie rods which traverse the vertical aligners and the vertical panels, and fixing them to the vertical aligners by means of suitable fixing means,
 - placing and fixing a wire mesh on the outer side of the vertical panels and along the entire surface and length thereof,
 - placing and fixing aligner supports on the vertical aligners, separated a given distance from one another,
 - arranging horizontal aligners fitted between the horizontal aligner supports and vertical aligners,
 - inserting the tie rods inside spacers, and
 - placing the outer formwork panels next to the corresponding vertical aligners, aligner supports and horizontal aligners, as well as fixing them by means of the tie rods and fixing means on the outer side of the outer formwork panels.
20. A process according to claim 19, **characterized in that** prior to placing the inner horizontal panels, angular guides anchored on the ground are located for the configuration of the perimeter to be constructed.
21. A process according to claim 19, **characterized in that** the inner horizontal panels are formed by a board made up of a board with a particular finish and a thermal insulation board, the thickness of which is enough so as to resist the pressure of the concrete which will subsequently be poured between the formwork panels.
22. A process according to claim 19, **characterized in that** the outer formwork panels have a visible face with a wood, brick, or any other finish.
23. A process according to claim 19, **characterized in that** the inner and outer formwork panels as well as the mesh have spaces provided on the facade in the manner of windows, doors, terraces and balconies.

24. A process according to claim 19, **characterized in that** prior to arranging the outer formwork panels, the necessary installations such as the plumbing and electrical installations, including the placement of the different distribution boxes or junction boxes, are fixed to the wire mesh. 5
25. A process according to claim 19, **characterized in that** in order to construct inner partition walls inside the building or distribution partition walls, the process for the exterior enclosure wall is repeated, placing the vertical aligners of the inner partition walls facing the vertical aligners of the outer enclosure wall to subsequently join the upper ends of said vertical aligners facing one another by means of half joists or elongated metal members, located fixing panels on said half joists for the floor framing. 10 15
26. A process according to claim 25, **characterized in that** the fixing panels of the floor framing have a gypsum, wood or any other type of finish on their lower side. 20
27. A process according to claim 19, **characterized in that** the inner horizontal panels are joined by means of tongue and groove. 25
28. A vertical aligner according to claim 19, **characterized in that** it is made up of a straight guide with two orthogonally arranged surfaces, both surfaces having holes along them, all the holes being separated from one another. 30
29. A tie rod according to claim 19, **characterized in that** it is a cylindrical elongated body with a thread on its surface and variable length. 35
30. An aligner support according to claim 19, **characterized in that** it is a planar part of little thickness with holes on one of its sides for the fixing thereof to the vertical aligners and on the side opposite to the fixing side, it has a partial u shape for housing the horizontal aligners. 40
31. A horizontal aligner according to claim 19, **characterized in that** it is a straight body with a preferably rectangular section and varying length. 45
32. A spacer according to claim 19, **characterized in that** it is a tubular body. 50
33. A spacer according to claim 32, **characterized in that** is internally threaded. 55

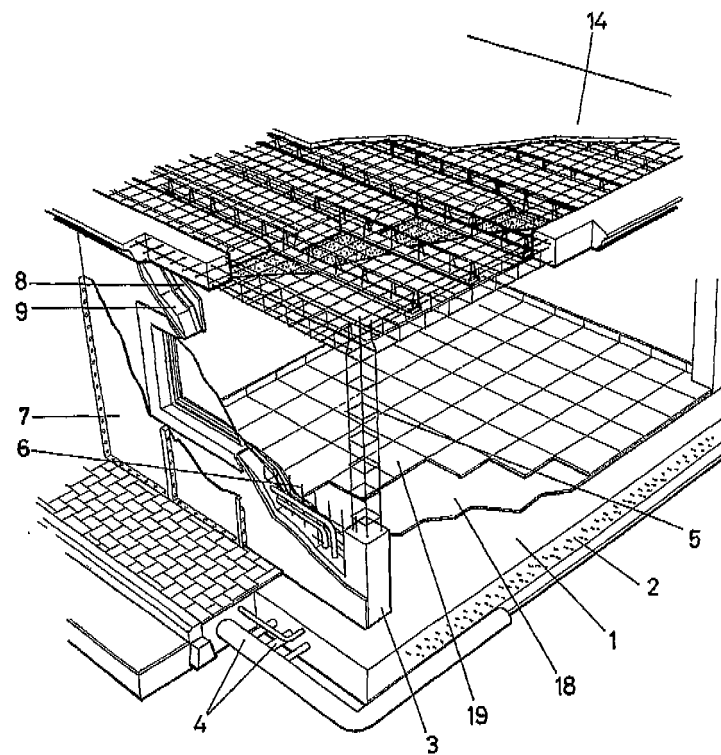


FIG.1

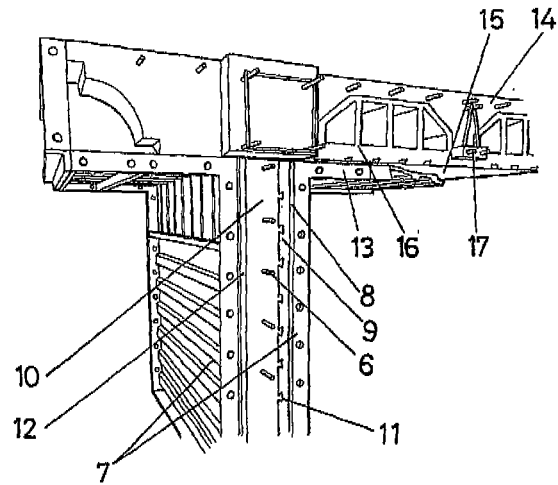


FIG. 2

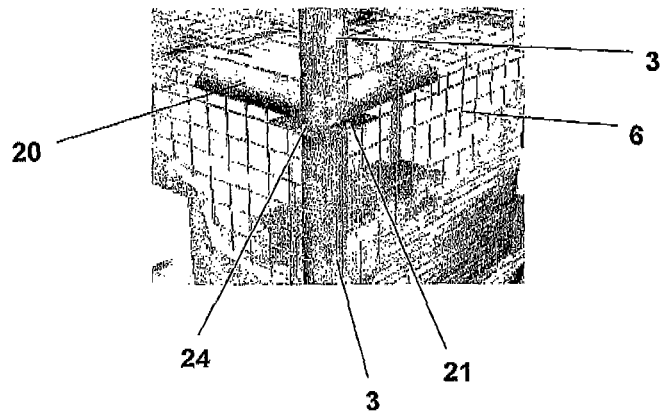
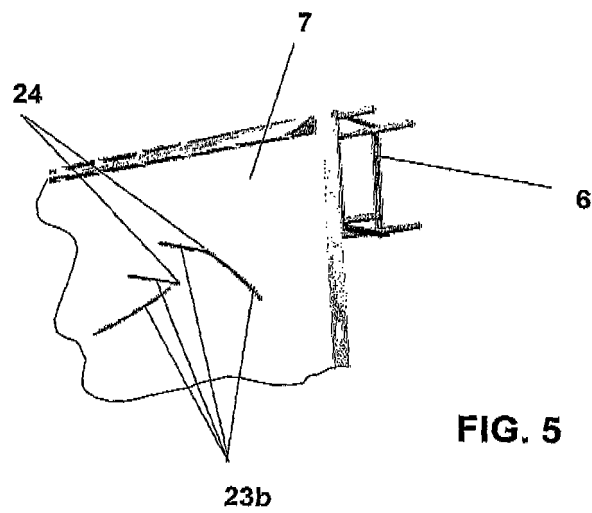
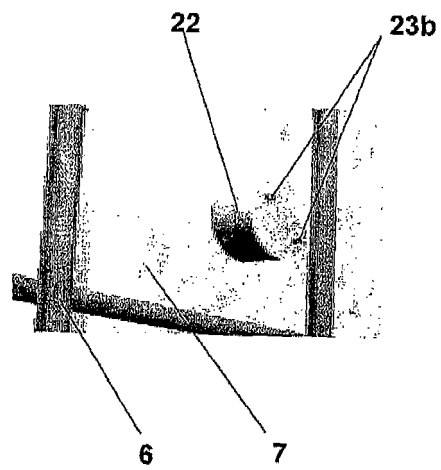


FIG. 3



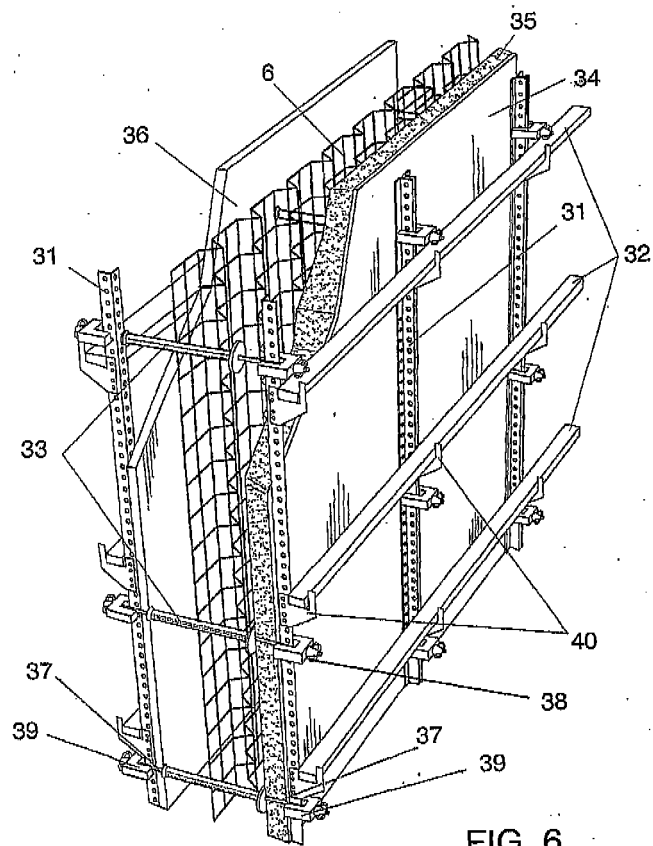


FIG. 6

INTERNATIONAL SEARCH REPORT

International application No.

PCT/ ES 2004/000382

A. CLASSIFICATION OF SUBJECT MATTER

IPC7 E04B1/35, E04B1/16, E04B2/86, E04G11/10

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC7 E04B1/35, E04B1/16, E04B2/86, E04G11/10

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

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

CIBEPAT, EPODOC, PAJ, PILLAR, COLUMN, GYPSUM, PLASTER, INSULAT, ISOLAT, ...

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	GB-2323404-A 23.09.1998 Avenue Research & Developed Limited.	1,13
Y	the whole document	2,3,6-8
Y	ES-1052257-U 01.12.2002 Hilayes, S.L. the whole document	2,3,7
Y	DE-3413550-A 05.06.1985 Schaefer Reinhold. abstract, figures	3,5-7
Y	US-4426061-A 17.01.1984 Taggart. the whole document	7,8
A		1-3,14,19-23,26,28-33
Y	EP-751262-A 02.01.1997 Sebald. abstract, figures	8,9,14,15
A		19,20,24
A	US-4669234-A 02.06.1987 Wilnau. the whole document	19,28-33
A	JP-2002191112 (MIRAI) 05.07.2002(abstract) (in line)	1,8,14,24
	(from 06.10.2004) (from EPOPAJ Database	
A	GB-2065192-A 24.06.1981 Collins the whole document	1

☐ Further documents are listed in the continuation of Box C.☐ See patent family annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search

11 October 2004 (11.10.04)

Date of mailing of the international search report

30 November 2004 30.11.04)

Name and mailing address of the ISA/

S.P.T.O.

Authorized officer

Facsimile No.

Telephone No.

INTERNATIONAL SEARCH REPORT
 Information on patent family members

 International Application No
 PCT/ ES 2004/000382

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Form PCT/ISA/210 (patent family annex) (July 1992)