Title: "CONCRETEWALL": AN ASSEMBLED STRUCTURAL ELEMENT

Abstract: The "Concretewall" is a structural element, in various dimensions, formed in moulds that can be assembled (coupled) and bolted with adjacent "Concretewalls" for the construction of various structural works (buildings, staircases, etc.) This is achieved because the "Concretewall" has the following characteristics: It features along the length of each of its two continuous lateral sides a protrusion, whereas it also features along the other two sides an incision of dimensions equal to those of the aforementioned protrusion, similar to the boards used for wooden floor, although slightly conical in shape it bears transverse holes along the length of its perimeter, located at certain distances apart of each other and at a certain distance from the edge of the perimeter, where small tubes made of a strong synthetic materials are fitted (such as the "wall plugs") Thus, "Concretewalls" instead of being built (as walls constructed using conventional materials such as bricks, etc.) they are assembled and bolted together for the construction of structural works.
For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.
"CONCRETEWALL" : AN ASSEMBLED STRUCTURAL ELEMENT

A. The invention refers to the manufacture of a structural element, the "Concretwall", which is formed in moulds, has a rectangular shape and features along each of two continuous lateral sides a protrusion at their middle, whereas it features along the other two sides an incision of dimensions equal to the aforementioned protrusion so that during assembly for the development of technical works (e.g. buildings), the incisions of one "Concretwall" couple with the protrusions of the next one.

There are two principal characteristics of the "Concretwall":

a) its incisions and protrusions have a certain form (of a conical shape as will be detailed in the sequel) for easy coupling of two elements together

b) it bears transverse holes along the length of its perimeter, located at certain distances apart of each other and at a certain distance from the edge of the perimeter, where small tubes made of a strong synthetic materials are fitted, such as "wall plugs" through which bolts pass that grab together adjacent "Concretwalls" (i.e. the two different sides of two adjacent walls, one featuring an incision and one featuring a protrusion)

So far, various structural elements are known that are used for the development of technical (structural) works.

Between them, are, for example:

The bricks

Cinder Blocks

Ready made Walls mainly for pre-fabricated houses, etc.
For the first two cases, buildings (and other constructions) are built that satisfy the desired design, however, though, the cost, the duration and other construction requirements (scaffolding, building materials, rubbles, etc.) render them disadvantageous compared to the “Concretewall”, as the latter will be presented in the sequel.

On the other hand, the third element, i.e. the ready-made walls, whereas they can be easily assembled can only satisfy a small number of designs which have been pre-selected, whereas the “Concretewall” can be used for satisfying any design.

The “Concretewall” covers all disadvantages of various “typical” structural elements, providing the capability to construct technical and other works fast, easily and economically, without the annoyance that is associated with and observed in constructions at present.

A detailed description of the “Concretewall” follows:
I. "Concretewall" FOR BUILDING WALLS

1 Drawing 1 illustrates a variation of a "Concretewall" in detail, as viewed from the top (as it will be built); the dimensions for this example are (length x height x width) 30 cm x 20 cm x 16 cm. The following are observed in this drawing:

5 a In the middle and along the length of the upper and the right side, a protrusion is observed, of the following dimensions:

   - Length of protrusion equal to the length of the sides
   - Width of 4 cm
   - Height from the level of the side, 4 cm

10   - Two inclined planes to the right and to the left which descend from the plane of the protrusion to the plane of the wall-side

   - Width of each inclined plane in projection to the plane of the wall-side of 1 cm.

   - As the overall width of the Concrete wall is 16 cm, then the width remaining to the left and to the right of the protrusion are 5 cm (16-4-2 = 10 /2 = 5).

15 b The left side features an incision of the same dimensions with the protrusions. The same occurs with the lower side.

 c A system is illustrated at the left part of the "Concretewall" for bolting the "Concretewall" with the one on its left, the protrusion of the latter covering the incision, as seen to the left. The following are observed in the system of the bolt:

20   - The transverse hole running from one side of the "Concretewall" to the other, illustrates:

   - A strong cylindrical synthetic material (as the material that wall plugs are made from) between the broken and the solid lines,
The gap between the solid lines shows the hole through which the bolt will pass, tightening the plastic parts of the two "Concretewalls" and rendering their junction robust,

The drawing illustrates the nut at the end of the hole that can be fitted on either side,

The head of the bolt is visible further than the nuts

The black frame around the head of the bolt illustrates the space available for turning the key,

d The square (shaded) frame in the middle of the "Concretewall", of dimensions of 4 x 10 cm, illustrates a void channel for cables, tubes, etc.

Drawing 2 illustrates the same "Concretewall" as viewed from the internal part of the wall (as will be "built"), where:

a The useful plane is plane $\alpha \beta \gamma \delta$, as the rest, as protrusions, will penetrate the respective incisions of adjacent elements

b The plane $\epsilon \zeta \eta \theta \iota \beta \varepsilon$, represents the upper and right protrusions.

c The plane $\alpha \delta \gamma \iota \kappa \varepsilon \alpha$ represents the incisions (not visible and hence their limits are illustrated with broken lines

d The drawing shows at the left the bolt system as previously described.

The circular point at the centre illustrates the center of the hole and is at a distance of 2cm from the left side and 2 centimeters from the lower side.

The hole system is repeated in the Concretewall (as in all Concretewalls illustrated in the sequel) at distances of 10 cm apart of each other, exactly, and, of course, in the protrusion parts. The other points illustrate the centres of each hole.

Thus, when the "Concretewalls" are assembled, the dimensions of which are
multiples of 10 cm (regarding width and height), the holes of incisions and protrusions match perfectly for the bolts to pass through.

3 Dimensions of the Concretewall for erecting walls.

As the thickness of a Concretewall used for erecting an exterior wall has been selected at 16 cm, the remaining dimensions (width, height) can be selected as illustrated in the accompanying table, so that:

- The application satisfies any design with flat surfaces
- The implementation of the construction can be fast with large pieces

### Dimensions of “Concretewall” used for wall erection

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4 Special Features

The “Concretewalls” of a height of 60 cm., as well as those of a length of 20 and 30 cm., bear a channel of dimensions of 4 x 10 cm for electrical, television, audio wires to pass, as well as for tubes for water and solar systems.
II Other types of “Concretewalls” necessary for building a house are illustrated in drawings 3 to 14 (with a very brief description of their application).

Drawing 15 illustrates a plan view of the connection of an corner pillar (as in drawing 3) with a “Concretewall” for building an external wall (to the right) and a “Concretewall” for building an internal wall (lower part).

Drawing 16 illustrates a random arrangement of most “Concretewalls” (their numbers corresponding to the number of the drawings) for developing walls, corner walls, sliding window and door frames, etc.

B. It is evident that a building can be erected with the “Concretewalls” as presented in the invention. For example:

a According to any design (should it require flat surfaces), with a deviation that does not exceed 10 cm, whereas ready-made walls for pre-fabricated houses fail to cover any but a few certain designs.

b The construction is effected easily, as the crane vehicle that transports the “Concretewalls” will raise them, fit them in their position and technicians will assemble them. During the assembly, the lateral surfaces may be coated (with the use of a brush or roll) with some insulating or welding materials for additional rigidity.

c The construction is effected fast, due to the easiness of construction discussed earlier and the fact that large wall pieces are used (e.g. 220 x 300 cm).

d The building also becomes more economical, as:

- It is effected fast and easily with minimum labour requirements
- The channels for wiring and tubes are ready before the assembly
The external and internal surfaces can be ready before the assembly from the plant (e.g. plaster, lath, relief), so that when the last "Concretwall" is assembled, the building will only require a coat in the junctions and the last paint coat to be applied.

The annoying features present in buildings at present will be omitted. Such features include:

- Scaffolds
- All types of building materials
- Wood pieces for supporting works
- Tools
- Machines
- Rubble

If design elements are provided to a computer program, the series of assembly of all pieces of "Concretewalls" can be provided (with an easy codification) so that they are loaded on the crane vehicle in a reverse order.

If the design of the building is supported by a computer program, all door and window frames and the roof will be prepared in-plant, without any on-site measurements, as according to the invention the implementation will strictly follow the design.

The budget of a construction project implemented with the use of the invention, will match the actual final costs, closer than if implemented with any other method, as everything is controlled.

C. Materials, Reinforcements, Insulation

The "Concretewalls" will be manufactured in moulds of a great degree of accuracy, and their material will be selected depending on their use, desired strength against pressures, vibrations, roll, etc. Thus, they can be made of compact concrete, or some part of their thickness be made of concrete and
another part from other materials, such as pumice stone, normal plaster, gypsum, or even one or two parts of insulating material or void spaces may be present. Similarly, they can be reinforced or not. However, protrusions will also feature two protruding iron pieces for lifting and transporting them.

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**D. Other Applications: Staircase**

A large variety of technical works can be implemented with the invention of the "Concretewall", apart from buildings, fences and walls in general.

For example, another application is a staircase: The staircase built with "Concretewalls" is effected in a similar simple, fast and economical manner as a building and take various forms, such as:

- a straight staircase developing from the bottom to the top, with or without a landing pace.

- A "Z-shape" staircase which turns at right angles to the right and then to the left.

- A "II- shaped "staircase which turns to the right and then again to the right.

- A composite form, where always turning is effected at right angles.

In order to construct a staircase (as in previous cases) certain parts of the staircase frame are formed in a mould, such as one-, two-, three-, five- steps parts, etc, as illustrated in drawing 17 (to the right with the double broken line).

To the left of the line, a staircase is illustrated, assembled with the same method as that for a residential building and consisting of an one-step frame to which a two-step frame has been applied, followed by a three-step frame and then a five-step frame.

Each part of a (staircase) frame is supported on the other side with the already known "Concretewalls" of a width of 20 cm and the necessary height. Simply, in
the case of a staircase, “Concretewalls” of a smaller height than 20 cm will be required, i.e. 10, 12, 14, 16 and 18 cm.

E. Base “Concretewall”

In order that a home building or a staircase is supported, an array of special “Concretewalls” (of the desired design) must be supported first; these are base “Concretewalls” which are fastened with concrete or mortar and are wider (for strength), whereas they feature an incision at their left side and a protrusion in the upper horizontal as well as the right side, as the common “Concretewalls”.

For light constructions, e.g. staircases, if the base is ready, e.g. if concrete is laid, then the base of the staircase (of the first step) is modified by accommodating a frame (of a peripheral width of 4 cm.) and is then bolted to the concrete with hems. The same can be effected with the bases of other parts of the frame of the staircase, with pillars, balconies, etc.

F. It is thus shown that with the use of the invention of the “Concretewall”, i.e. the method of designing and assembling structural materials that are made in moulds, feature protrusions, incisions and forms that match and can be assembled together in a simple manner, a large number of different works can be constructed, such as:

- Homes
- Fences
- Staircases
- Wells
- Balconies, etc.
CAPTIONS OF THE ATTACHED DRAWINGS

Drawing 1: "ConcreteWall" used for wall erection (Plan View)
Drawing 2: "ConcreteWall" used for wall erection (Front View)
Drawing 3: "ConcreteWall used for wall erection / Corner Pillar
Drawing 4: "ConcreteWall for wall erection / Pillar / crossover

Note: Drawings 5 to 14, which concern "ConcreteWalls" for sliding doors and windows are not submitted.

Drawing 15: Assembly of "ConcreteWalls for wall erection (ConcreteWalls' corner for internal and external walls)

Drawing 16: Assembly of various "ConcreteWalls"

"ConcreteWalls for building the frame of a staircase:

Left part: Staircase Assembled using various steps (side view)

Right part: Parts of various steps.
CLAIMS

"CONCRETEWALL": AN ASSEMBLED STRUCTURAL ELEMENT

1. The "Concretewall" is a structural element in various dimensions that can be assembled, that is formed in moulds and features the following characteristics:
   
   a. It is rectangular in shape

   b. It features a protrusion along the length and in the middle of each of two adjacent lateral sides, whereas it features an incision of dimensions equal to those of the protrusion along the length of the two other sides, resembling partly the wooden boards for constructing a wooden floor, with the difference that the incisions and protrusions are slightly conical in shape (as illustrated in Drawing 1, page 10 of the description of the invention)

   c. it bears transverse holes along the length of its perimeter, located at certain distances apart of each other and at a certain distance from the edge of the perimeter, where small tubes made of a strong synthetic materials are fitted (such as the "wall plugs")

2. The "Concretewall" as described in claim 2 can feature an empty channel running from the middle of one side to the opposite one or in a cross formation (as illustrated with the shaded part of Drawing 1, page 10 of the Description of the Invention), in order that the tubes and wires of the building pass through.
CONCRETE WALL USED FOR WALL ERECTION
(FRONT VIEW)
**INTERNATIONAL SEARCH REPORT**

**A. CLASSIFICATION OF SUBJECT MATTER**

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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)**

| IPC    | E04B E04C |

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

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

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<td>WO 99 01625 A (HARTKAMP) 14 January 1999 (1999-01-14) figures 1,3</td>
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* Special categories of cited documents:

- "A" document defining the general state of the art which is not considered to be of particular relevance
- "E" earlier document but published on or after the international filing date
- "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another document or other special reason (as specified)
- "O" document referring to an oral disclosure, use, exhibition or other means
- "P" document published prior to the international filing date but later than the priority date claimed

- "I" 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
- "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
- "8" document member of the same patent family

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Date of mailing of the international search report: 21/01/2002

Name and mailing address of the ISA
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Authorized officer
Mysliwetz, W
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