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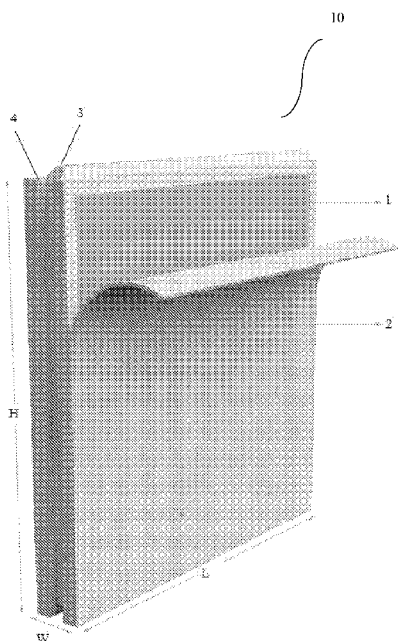
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Declarations under Rule 4.17:

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- as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))
- as to the applicant's entitlement to claim the priority of the earlier application (Rule 4.17(iii))
- of inventorship (Rule 4.17(iv))

(54) Title: CELLULAR LIGHTWEIGHT SOLID CEMENT PARTITION PANELS

FIG. 1 illustrates the CLC concrete panel of the present invention



(57) Abstract: Disclosed herein is a cellular lightweight concrete composition panel (10) made by mixing fly ash with Portland pozzolana cement, a number of other binders and fiber. The concrete panel (10) has CLC core inside (1) and cement pozzolana mortar outside (2) as shown in FIG 1. The tongue (3) and groove (4) of the panel (10) are moulded and covered with the same components. The component used in outer mortar plastering (2) is used in the installation process as filler bond between the tongue (3) and groove (4) to make it seamless and monolithic in structure.

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CELLULAR LIGHTWEIGHT SOLID CEMENT PARTITION PANELS

FIELD OF THE INVENTION:

The present invention relates generally to construction material and more particularly, it relates to a light weight concrete panels as a potential construction material and a method for the production thereof.

BACKGROUND:

Construction materials form the basis of any building. The concrete used in building construction can be modified to get desired properties and density, which is done by modifying the mixing ratio of concrete ingredients. The basic ingredients such as concrete-sand, coarse aggregate, cement and water are mixed with many chemicals, mineral admixtures, industrial by-products or the like to improve its properties.

Conventionally mixtures of calcium oxide, silicon dioxide and water are autoclave-hardened, which are accompanied by the addition of foam, or in the foamed stated. With the advent of recent technologies, lightweight building materials based on lime and cement are widely used in construction instead conventional bricks / block masonry.

Many systems and methods are known in the existing art and few references are considered as background to the presently disclosed subject matter and are listed below:

German Patent number 2352843 to Dahmit Brenn U Baustoffgesel, et al. entitled "Building Panel - With Outer Layers of Tensile-Stress-Absorbing Material Fresh Bonded in Successive Stages" relates to a multilayer, plate-shaped component consisting of a core layer of lightweight concrete with a piled porous configuration, such as expanded clay concrete, pumice-concrete, etc. with two outside closed layers, with all the materials fully mechanically built in, and with the whole thickness of the slab being statically effective. The outer sealed layers are pref. or mortar cement with embedded corrosion-resistant fibers or similar material, accommodating the tensile stresses occurring in corresponding strength.

Korean Patent Number 101637978 to Hyundai Eng and Construct Co Ltd., et al. entitled “Light-weight foamed concrete composite for floor using foamed cubes and floor structure having middle layer made of the same” relates to a lightweight aerated concrete composition and a floor structure, wherein the floor structure comprises: a base layer composed of a concrete slab; a middle layer composed of the lightweight aerated concrete composition, and placed on the base layer; and a finishing layer composed of a finished mortar, and placed on the middle layer.

German Patent publication number 19644312 to D.D.C. PLANUNGS, et al. entitled “Method For Manufacturing A Lightweight Moulding Body” relates to a method for manufacturing a moulding body from lightweight concrete, wherein a favourable density distribution of a lightweight concrete molding body is achieved by mixing the water with gas and the mixture is subjected to a sono-chemical treatment step before and/or after being admixed to the concrete mechanical mixture such that before completely setting of the liquid concrete mix. The mix is then undergoes an increase in volume, whereby the density of the manufactured moulding body is reduced. The resulting lightweight concrete moulding body has low density and firm outer walls.

Patents and Publication numbers CN108930356, SU687049, DE7536211, CN202139750, KR20180114679, DE4212442 and JP3172862 are relate to the formation of light weight concrete layers with core layers using different density products. These light weight concrete layers are configured for various applications like heat insulation, low water absorption, etc.

Though the existing prior art discloses the lightweight concrete panels, there is a need of ideal substitute for normally used clay and bricks to make the construction easier, speedier and even ready for instant use.

SUMMARY:

An objective of the present invention is to provide a cellular light weight solid cement partition panels having a Cellular Light Weight Concrete (CLC) Bricks/ Blocks core inside and cement pozzolana mortar outside.

Another objective of the present invention is to provide all the tongue and groove of concrete panels by moulding and covering with cement pozzolana mortar plastering throughout the panel.

Yet another objective of the present invention is to provide seamless and monolithic structure by using outer mortar plastering as filler between tongue and groove joint during installation.

To achieve the above objectives, a cellular light weight concrete block is made by mixing fly ash with Portland pozzolana cement, a number of other binders and fiber. The concrete panel has CLC core inside and cement pozzolana mortar outside. The tongue and groove of the panel are moulded and covered with the same components. The component used in outer mortar plastering is used in the installation process as filler bond between the tongue and groove to make it seamless and monolithic in structure.

According to the present invention, the proposed panel is an ideal substitute for the normally used clay and cement bricks which are widely used in construction activities. It does not require curing time, cement plastering and even cement paste for joining the tiles. Also, it is superior to clay tiles in strength. As it has polished surfaces no plastering or putty work is required and can be painted directly.

In one aspect of the present invention, the binder is a semi solid binder to bind the panels together and to the floor.

In another aspect of the present invention, the binder is dense liquid binder to join the grooves of the panels.

The objectives, aspects and advantages of the present invention will become more evident from the following detailed description when taken in conjunction with the accompanying drawings.

REFERENCCE NUMERALS:

- 10: CLC concrete panel
- 1: CLC core
- 2: Pozzolana outer plaster
- 3: Tongue
- 4: Groove
- 5: Tongue and groove joint
- L: Length of concrete panel
- H: Height of concrete panel
- W: Width of concrete panel
- Ts: Tongue slope
- TI: Tongue length
- Th: Tongue height
- Gs: Groove slope
- GI: Groove length
- Gv: Groove volume
- Pw: Pozzolana layer width

BRIEF DESCRIPTION OF DRAWINGS:

The objective of the present invention will now be described in more detail with reference to the accompanying drawings, in which:

FIG. 1 illustrates the CLC concrete panel of the present invention;

FIG. 2a illustrates the plan view of concrete panel;

FIG. 2b illustrates the side view of concrete panel;

FIG. 3a illustrates the isometric view of the concrete panel;

FIG. 3b illustrates the detailed cross sectional view of tongue;

FIG. 3c illustrates the detailed cross sectional view of groove;

FIG. 3d illustrates the detailed cross sectional view of tongue and groove joint; and

FIG. 4 illustrates the constructional arrangement of concrete panels.

DETAILED DESCRIPTION OF THE INVENTION:

The present invention provides a lightweight solid cement partition panel and method for the production thereof. The concrete panel described herein facilitate the production of low cost, lightweight solid cement panel by mixing the fly ash with Portland pozzolana cement, fiber reinforcements, forming agent and water.

According to the present invention, the concrete panel has a cellular light weight concrete inside and pozzolana mortar cement outside. The corners of the panels are provided with tongue and groove for easy installation. The tongue and groove are moulded and covered with the same component throughout.

In the present invention, the concrete panel (10) is a composite, cellular light weight concrete block that is made by mixing fly ash with Portland pozzolana cement, a number of other binders and fiber reinforcements, where the fly ash is the main ingredient. The concrete panel (10) has inner CLC core (1) and outer pozzolana cement plaster (2) as shown in FIG. 1. The composite panel (10) has the size of 600mm x 600mm x 75mm. The inner core (1) of the concrete panel (10) has 50mm thickness and outer core has 12.5mm thickness of composite plastering (2) around the panel. The tongue (3) and groove (4) of the panel (10) is provided with binder for easy installation in a continuous manner. The superior quality, geometric and smooth / uniform surface design takes away tension of plastering.

FIG. 2a illustrates the plan / top view of concrete panel of the present invention, which has 600mm of height (H) and 75mm of width (W). FIG. 2b illustrates the side view of the concrete panel having 600mmx600mm of length (L) and height (H) respectively.

According to FIG. 3a, it illustrates the isometric view of the concrete panel (10), where the inner circle shows the exploded view of tongue (3) and groove (4). The cross sectional view of tongue is illustrated in FIG. 3b. The tongue (3) of the concrete panel (10) has the tongue length (Tl), tongue height (Th) and tongue slope (Ts) of about 19mmx12mmx3mm respectively. The pozzolana outer plaster (2) has around 25mm of width (Pw).

Referring to FIG. 3c, it illustrates the detailed cross sectional view of groove (4), which has the groove volume (Gv), groove length (Gl) and groove slope (Gs) of about 20mmx19mmx3mm respectively. Also, it has the pozzolana outer plaster of about 25mm of width (Pw). The arrangement of tongue (3) and groove (4) is shown in FIG. 3d, where the concrete panels (10) are connected to each other in continuous manner using binders, which forms tongue and groove joint (5).

In one aspect of the present invention, the binder is a semi solid binder to bind the panels together and to the floor.

In another aspect of the present invention, the binder is dense liquid binder to join the grooves of the panels.

Semi Solid Binder:

The semi solid binder is prepared by mixing 1 kg of powder binder with 1.5 liters of water. This semi solid binder is used for binding the panels together. This is also used at bottom of the first panel which is linked to the floor. The time frame of compound is the technique. This compound should prepare within 3 mins and should be applied immediately for binding. Its bonding property will be completed in 10 mins.

Dense Liquid Binder:

The dense liquid binder is prepared by mixing 1 kg of powder binder with 2 liters of water. Pour the dense liquid binder between grove joints of the composite panels vertically and repeat the process at every joints. The compound should prepare within 3 mins and should complete the application process within 12 mins.

The gray white colored lightweight concrete panel composite (10) is an ideal substitute for the normally used clay and cement bricks, which are widely used in construction activities. The proposed panels (10) does not require curing time, cement plastering and even cement paste for joining the tiles. It has superior quality in strength than clay tiles. As it has polished surfaces, no plastering or putty work is required and can be painted directly.

During installation process, the same component used in outer mortar plastering is used as filler bond between the tongue (3) and groove (4) to make the tongue and groove joint (5) to be seamless and monolithic in structure.

Few the technical specification of lightweight composite panel of the present invention as follows:

PROPERTIES	UNIT	VALUE	REMARKS/REFERENCE
Weight	Kg/sq.m	76	Normal
Compressive strength	Kg/sq.cm	110	Typical test result
Bending test (4pts UDL)	Kg/sq.m	96	
Flexural Strength/Module of rupture	Kg/sq.m	84	Typical test result
Thermal conductivity	w/m Deg K	0.3	Typical test result
Sound transmission coefficient	Db	41	IS 9901 (part III) 1981
Fire rating	Minutes	240	BS 476 part 20-22
Surface spread of flame		Class 1	BS 476 part 7-1971

Fire Propagation index	I	3.7	BS 476 part 6-1981
Ignitability		Class P	BS 476 part 8-1968

In accordance with the present invention, the constructional view of concrete panel (10) is illustrated in FIG. 4. The tongue and groove joint (5) of the panel (10) helps workers to easily fix the panel in a speedy way after applying the binder on the joints. This reduces the construction time considerably and saves labour costs. It can be used for construction of interior partition walls as well as exterior partition walls of all type of buildings. The interior partition walls can be of residential buildings, office, workstations, malls, educational institutions, hotels, restaurants, industrial factories and other partition walls as well exterior partition walls like security cabin, site offices, ablution cabin, boundary walls, fencing and other exterior non-load-bearing walls of all types of buildings.

Thus, the present invention provides a lightweight concrete panel, which makes construction become easier and speedier when compared to use of conventional bricks and blocks. It has low thickness and higher in size as compared to normal bricks, hence it saves space and costs. It can be easily installed and easy to fix since, it involves simple three step installation process. Hence, an ordinary person without any masonry skill can make wall using this panel. Once the panel is installed, the utility services such as electrical connection and plumbing can be done through these walls in a concealed way. Doors, windows and other joineries can be attached to these walls easily, since it has low thickness.

The conventional cladding with wall tiles can also be done on these walls. Since, the panel uses fly ash as major ingredient, which makes it light in weight and eco-friendly. It has heat resistant and sound insulating properties. Also, it is termite resistant. In addition, it can be easily dismantled and reused. The composite panel has high strength and durability than the conventional panels and it is non-toxic in nature.

By referring to all the above explanations and descriptions, the present invention has following non-limiting advantages in comparison with the existing art:

- The mode of installation is unique as it is easy and time saving

- The wall constructed by using this product will be ready for subsequent works like painting, tiling, concealed plumbing and electrical works etc and thereby enabling the immediate use of the product without causing any delay.

While the foregoing written description of the invention enables one of ordinary skill to make and use what is considered presently to be the best mode thereof, those of ordinary skill will understand and appreciate the existence of variations, combinations, and equivalents of the specific embodiment, method, and examples herein. The invention should therefore not be limited by the above described embodiment, method, and examples, but by all embodiments and methods within the scope and spirit of the invention as claimed.

WE CLAIM:

1. A composite material panel (10) comprising:
 - a) a cellular lightweight concrete core (1) and a cement pozzolana mortar outside (2);
 - b) a tongue (3) and groove (4) structure, wherein the tongue (3) is placed in one end of the panel (10) and groove (4) is placed in another end of the panel (10); and
 - c) a binder between tongue (3) and groove (4) to fix the panel (10).
2. The panel (10) as claimed in claim 1, wherein the tongue (3) and groove (4) is moulded and covered with same component.
3. The panel (10) as claimed in claim 1, wherein the panel (10) is 600mm x 600mm x 75mm in size.
4. The panel (10) as claimed in claim 1, wherein the outer mortar plastering (2) is filled between the tongue (3) and the groove (4) during installation.
5. The panel (10) as claimed in claim 1, wherein the binder is semi solid binder or dense liquid binder.

FIG. 1 illustrates the CLC concrete panel of the present invention

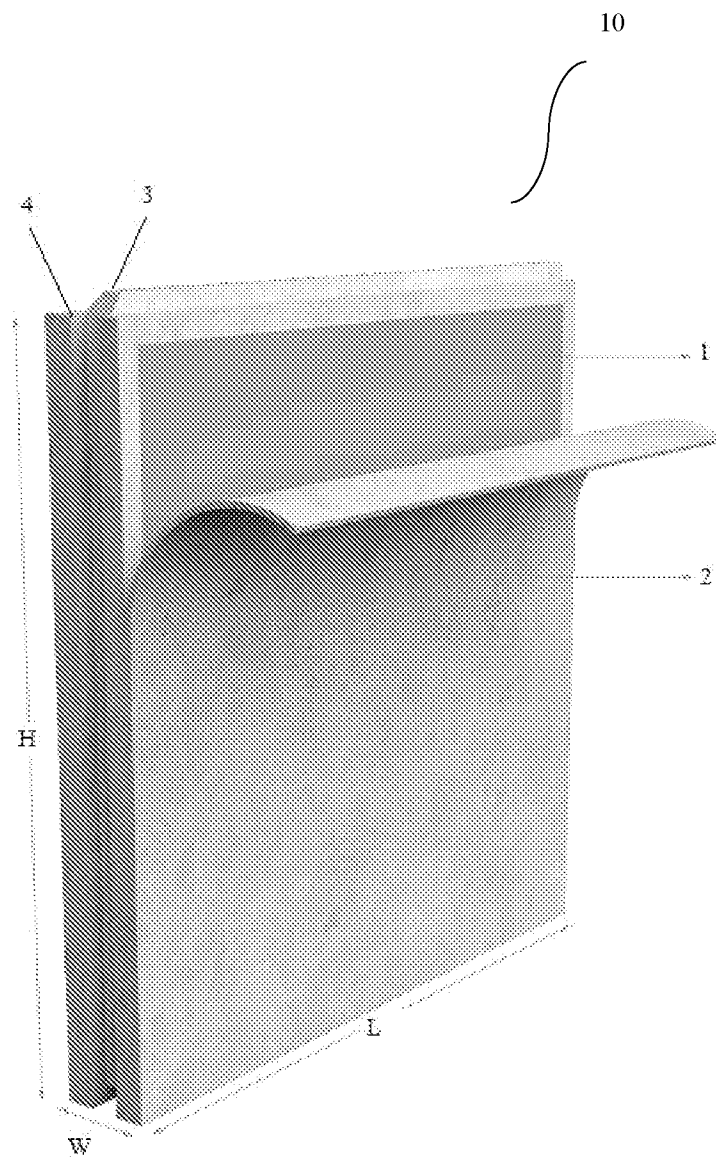


FIG. 2a illustrates the plan view of concrete panel

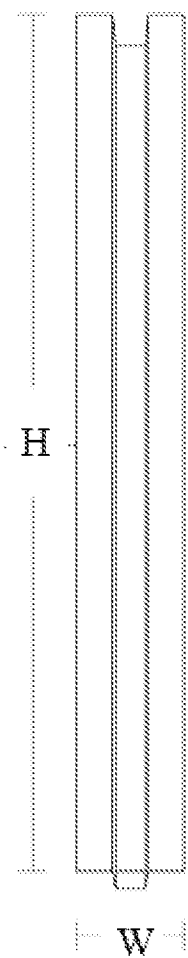


FIG. 2b illustrates the side view of concrete panel

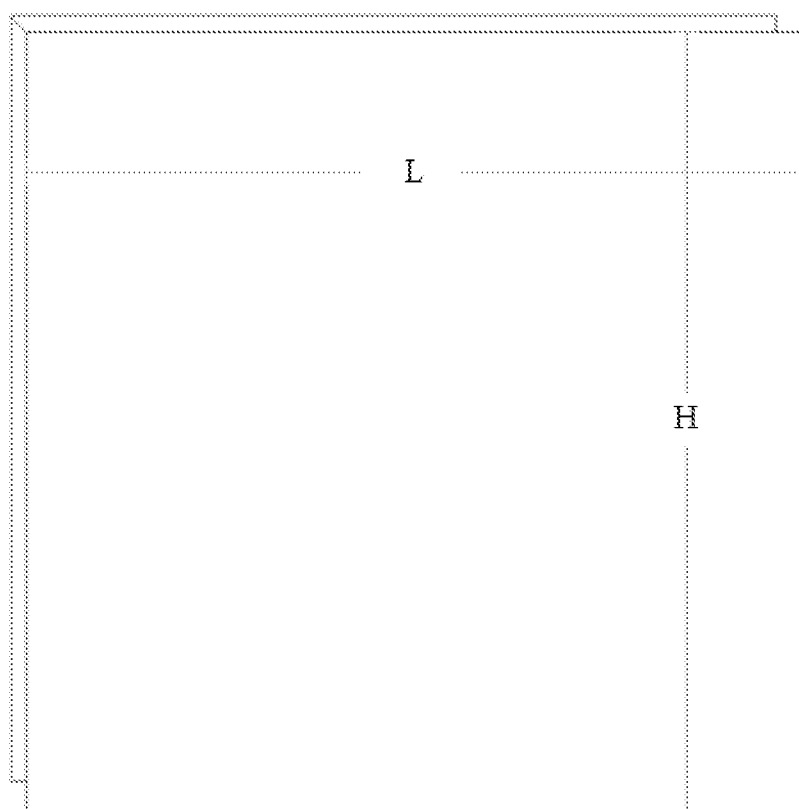


FIG. 3a illustrates the isometric view of the concrete panel

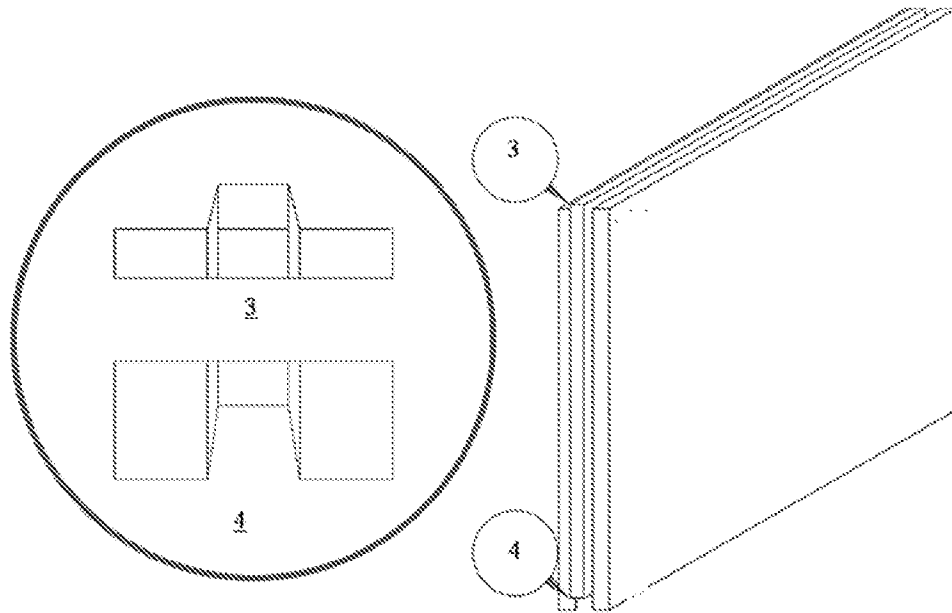


FIG. 3b illustrates the detailed cross sectional view of tongue

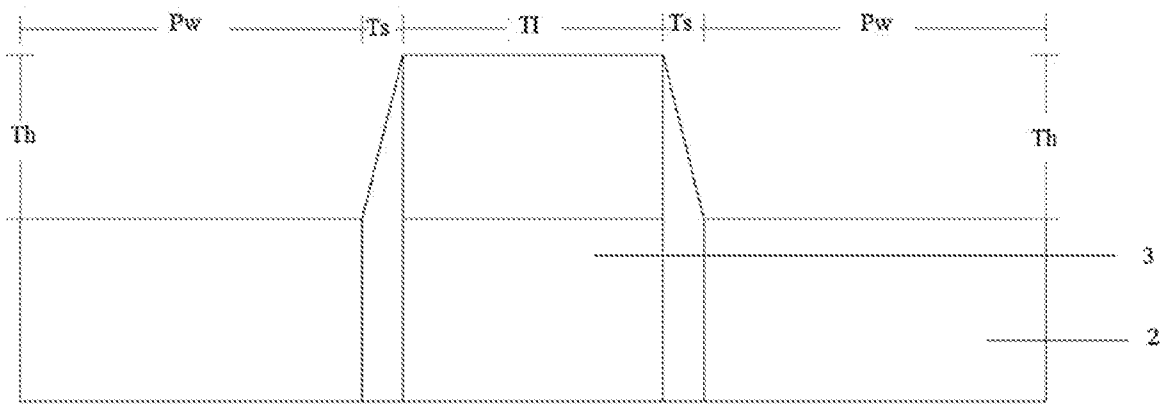


FIG. 3c illustrates the detailed cross sectional view of groove

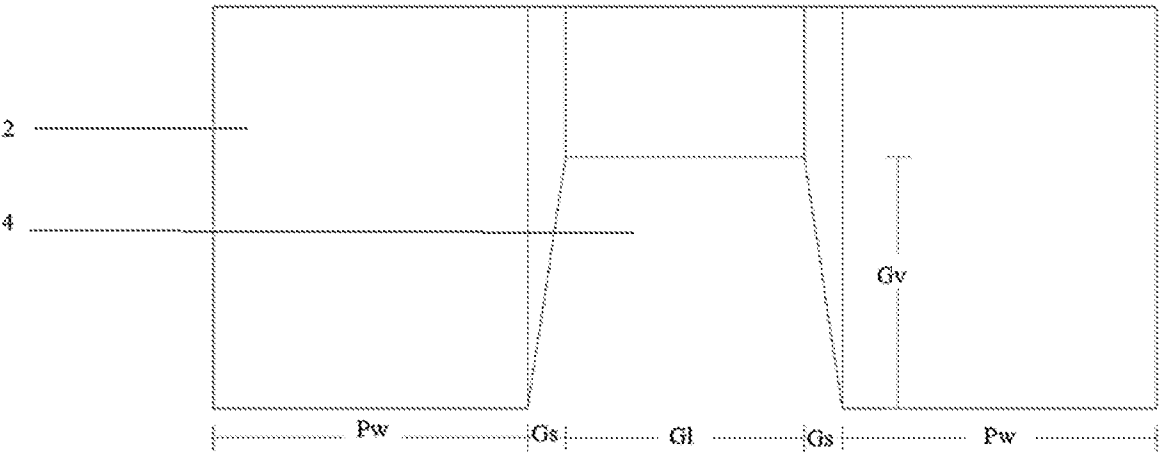


FIG. 3d illustrates the detailed cross sectional view of tongue and groove joint

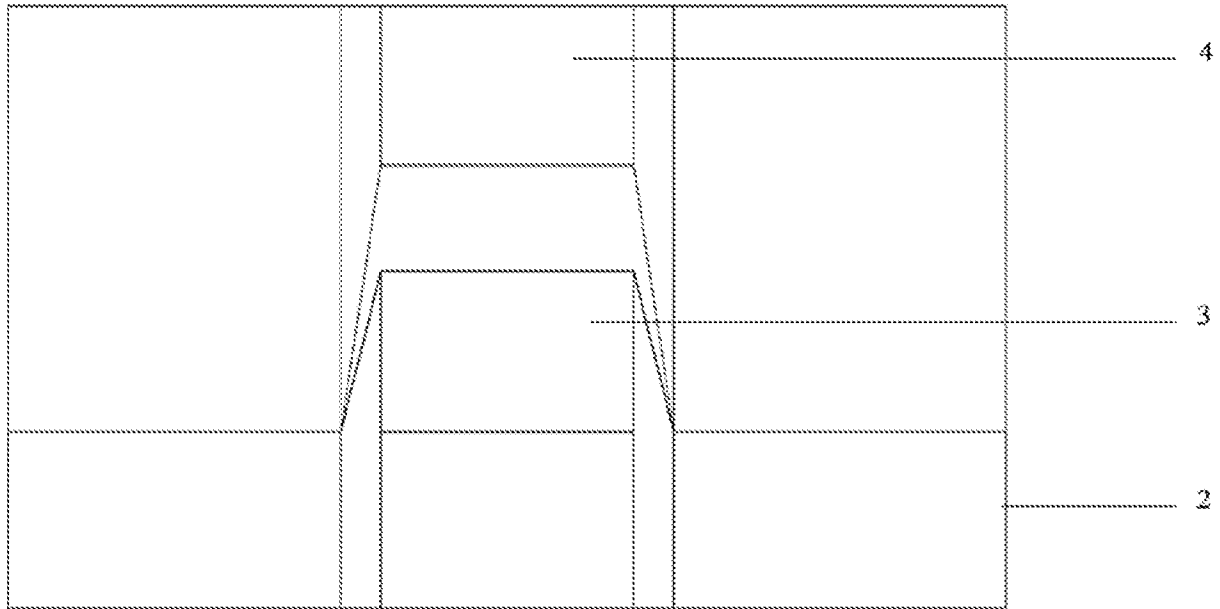
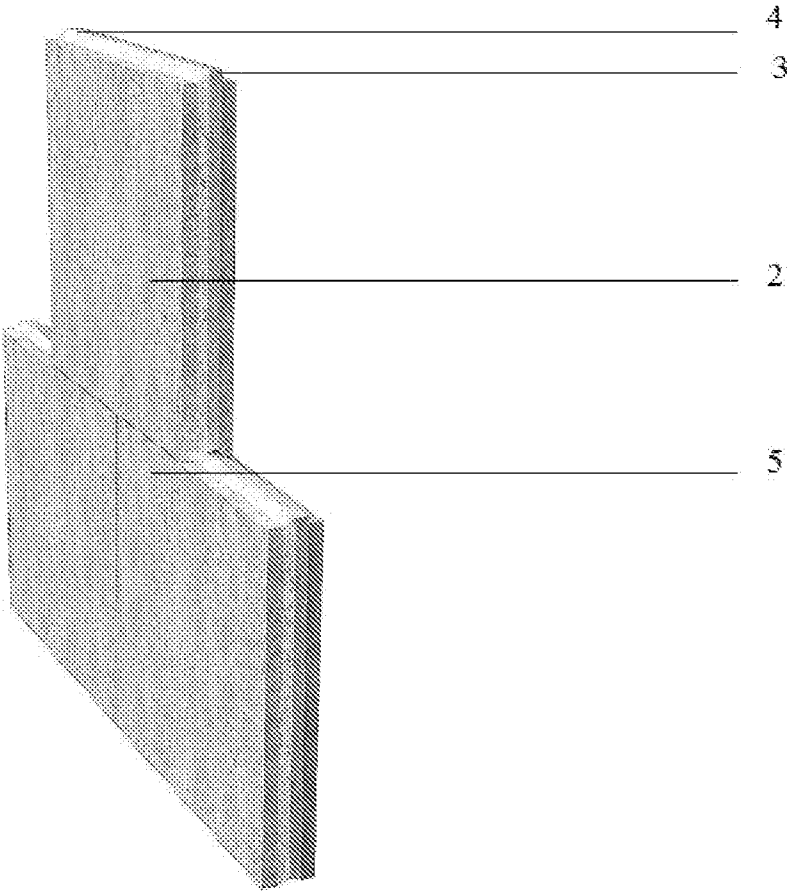


FIG. 4 illustrates the constructional arrangement of concrete panels



INTERNATIONAL SEARCH REPORT

International application No.
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A. CLASSIFICATION OF SUBJECT MATTER

E04B1/04, E04B1/61, E04B2/08 Version=2020.01

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)

E04B1/04, E04B1/61, E04B2/08

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)

TotalPatent One, IPO Internal Database

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US20180058074 (A1) (CIUPERCA ROMEO ILARIAN [US]) 01 March 2018 Description Page 13 Column 2 Line 8 in Paragraph [00123] and Page 14 Second Column Line 10 in Paragraph [00124] -----	1-5
Y	US6216410 (B1) (HABERMAN KURT EVAN [US]) 17 April 2001 Description Page 23 Column 6 Line 33	1-5



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents:

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INTERNATIONAL SEARCH REPORT
Information on patent family members

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Citation	Pub.Date	Family	Pub.Date
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