BUILDING BLOCK FOR USE IN CONSTRUCTING A BUILDING

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Publication Classification

Int. Cl.  
E04C 1/39 (2006.01)  
E04C 1/40 (2006.01)

U.S. Cl.  
CPC: E04C 1/397 (2013.01); E04C 1/40 (2013.01)  
USPC: 52/309.17; 52/606; 52/604

ABSTRACT

The invention is related to a building block for use in interlocking with a plurality of similar building blocks for constructing a building. The building block includes a front face, a rear face, an upper face, a lower face, a first end and a second end. The building block also includes at least one substantially vertical hollow (web) and at least one substantially horizontal channel, wherein the at least one horizontal channel is disposed along one of the upper face and the lower face. In addition, each of the first end and the second end includes at least one header face, wherein at least one the header face can be one of a substantially planar face, a male header face and a female header face. Each of the male header face and the female header face includes one or more patterns for interlocking.
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FIELD OF THE INVENTION

[0001] The invention generally relates to a building block for use in construction. More specifically, the invention relates to a building block for use in interlocking with similar blocks for constructing a building.

BACKGROUND OF THE INVENTION

[0002] Building blocks are widely used in the building and construction industry. The building blocks are mainly used as load-bearing and non-load bearing materials, wherein they are laid on stack or running bond using cementitious materials. This is due to properties of the building blocks such as, but not limited to, high strength, toughness, stability and high chemical durability. Interlocking building blocks are used in constructing buildings due to numerous advantages over conventional building blocks.

[0003] The building blocks are produced using different processes. Modern clay blocks are formed using processes such as, but not limited to, soft mud process, dry press, and extrusion. The dry press method is similar to mud blocks but starts with a much thicker clay mix and therefore it forms more accurate, sharper-edged blocks.

[0004] Currently, the blocks are manufactured using a fixed set of materials which are expensive. The processes used in manufacturing the blocks are also rigid and there is little scope for changing the processes. For some applications, the properties of the block may not satisfy all the requirements.

[0005] Currently, assembling interlocking building blocks requires significant amount of effort. There are also several design issues which hinder the assembly of the interlocking building blocks. Also, the interlocking building blocks need extra support such as, an adhesive and a rebar for strengthening the construction. Also, the usability of the interlocking blocks is limited due to the inefficient designing of male and female interconnects to interlock a plurality of interlocking blocks.

[0006] Therefore, there is a need to develop an interlocking block, which is functional, easy to construct and cost effective.

BRIEF DESCRIPTION OF THE FIGURES

[0007] The accompanying figures, where like reference numerals refer to identical or functionally similar elements throughout the separate views and which together with the detailed description below are incorporated in and form part of the specification, serve to further illustrate various embodiments and to explain various principles and advantages all in accordance with the invention.

[0008] FIG. 1 illustrates an exemplary representation of an upper isometric view of a building block in accordance with an embodiment of the invention.

[0009] FIG. 2 illustrates an exemplary representation of a lower isometric view of the building block in accordance with an embodiment of the invention.

[0010] FIG. 3 illustrates an exemplary representation of a plan view of the building block in accordance with an embodiment of the invention.

[0011] FIG. 4 illustrates an exemplary representation of an elevation view of the building block in accordance with an embodiment of the invention.

[0012] FIGS. 5A-5D illustrate different perspective views of a corner block in accordance with an embodiment of the invention.

[0013] FIGS. 6A-6F illustrate different perspective views of a T-block, in accordance with an embodiment of the invention.

[0014] FIGS. 7A-7B illustrate different perspective views of a cross block, in accordance with an embodiment of the invention.

[0015] FIGS. 8A-8F illustrate different perspective views of a connecting block, in accordance with an embodiment of the invention.

[0016] FIG. 9 illustrates a perspective view of a building wall constructed using a plurality of similar building blocks in accordance with an embodiment of the invention.

[0017] FIG. 10 illustrates a perspective view of a network of horizontal channels and vertical channels within the building wall constructed using the plurality of similar building blocks in accordance with an embodiment of the invention.

[0018] Skilled artisans will appreciate that elements in the figures are illustrated for simplicity and clarity and have not necessarily been drawn to scale. For example, the dimensions of some of the elements in the figures may be exaggerated relative to other elements to help to improve understanding of embodiments of the invention.

DETAILED DESCRIPTION OF THE INVENTION

[0019] Before describing in detail embodiments that are in accordance with the invention, it should be observed that the embodiments reside primarily in different aspects of a building block for use in constructing a building. Accordingly, the different aspects have been represented where appropriate by conventional symbols in the drawings, showing only those specific details that are pertinent to understanding the embodiments of the invention so as not to obscure the disclosure with details that will be readily apparent to those of ordinary skill in the art having the benefit of the description herein.

[0020] In this document, relational terms such as first and second, top and bottom, and the like may be used solely to distinguish one entity or action from another entity or action without necessarily requiring or implying any actual such relationship or order between such entities or actions. The terms “comprises,” “comprising,” or any other variation thereof, are intended to cover a non-exclusive inclusion, such that a process, method, article, or apparatus that comprises a list of elements does not exclude only those elements but may include other elements not expressly listed or inherent to such process, method, article, or apparatus. An element proceeded by “comprises . . . a” does not, without more constraints, preclude the existence of additional identical elements in the process, method, article, or apparatus that comprises the element.

[0021] Generally speaking, pursuant to various embodiments, the invention provides details regarding the structure of a building block for use in interlocking with a plurality of similar building blocks for constructing a building.

[0022] Referring to the figures and in particular to FIGS. 1-4, wherein FIG. 1 illustrates an exemplary representation of an upper isometric view of a building block 100 in accordance with an embodiment of the invention, FIG. 2 illustrates a lower isometric view of building block 100 in accordance with an embodiment of the invention, FIG. 3 illustrates a plan view of building block 100 in accordance with an embodi-
Building block 100 further includes an upper face and a lower face such as an upper face 106 and a lower face 108 as shown in FIG. 1. The upper face can be a horizontally inclined planar surface as shown in FIG. 1. In an embodiment, the upper face can include one or more horizontal surfaces at different elevations. For example, the upper face includes a first portion 118 and a second portion 120, where first portion 118 is placed at an elevated level relative to second portion 120, as shown in FIG. 1. In an exemplary embodiment, the lower face is substantially complementary to the upper face, as shown in FIG. 2. In some embodiments, the upper face and the lower face of building block 100 are suitably modified to form an interlocking bond with a corresponding lower face and upper face of cooperating building blocks when stacked upon each other, wherein the cooperating building blocks are similar to building block 100. The upper face and the lower face can have one or more patterns in order to facilitate interlocking between the cooperating building blocks. In an embodiment, the one or more patterns include one of, but not limited to, a running pattern, a crossed pattern and a lobed pattern.

In accordance with various embodiments of the invention, building block 100 includes at least one substantially vertical hollow (web) such as, but not limited to, a vertical hollow (web) 110a and a vertical hollow (web) 110b. Further, the at least one substantially vertical hollow (web) extends from the upper face to the lower face of building block 100 as shown in FIG. 1. In various embodiments, parameters such as shape and size of the at least one substantially vertical hollow (web) can be customized as desired. For example, the at least one substantially vertical hollow (web) can be designed to have a shape such as, cylindrical, cuboidal, semi cylindrical shape and the like. For example, the at least one substantially vertical hollow (web) has a cuboidal structure as shown in FIG. 1. In accordance with the embodiment, the at least one substantially vertical hollow (web) is designed to be perpendicular to the upper surface and the lower face of building block 100. The aforementioned design of the at least one substantially vertical hollow (web) facilitates in the formation of vertical channel, when a plurality of building blocks, similar to building block 100, are stacked upon each other. Further, in accordance with the embodiment shown in FIG. 1, building block 100 includes two substantially symmetrical vertical hollows (webs). It will be apparent that building block 100 can include different numbers of substantially vertical hollows (webs). For instance, building block 100 can include one substantially vertical hollow (web). Alternatively, building block 100 can include three or more than three substantially vertical hollows (webs).

Building block 100 further includes at least one substantially horizontal channel such as, but not limited to, a horizontal channel 112. Horizontal channel 112 is disposed along at least one of the upper face and the lower face of building block 100. The at least one substantially horizontal channel can be designed as one or more structures such as, a concave structure, a concave polygonal structure and the like. Variations in design of the at least one substantially horizontal channel would be apparent to those ordinarily skilled in the art. In an exemplary embodiment, the at least one substantially horizontal channel has a concave structure as shown in FIG. 1. In an exemplary embodiment, the at least one substantially horizontal channel is disposed on at least one of the upper face and the lower face of building block 100. In accordance with the embodiment, the at least one substantially horizontal channel is disposed between the front face and the rear face of building block 100. In an exemplary embodiment, the at least one substantially horizontal channel is disposed at the center portion of at least one of the upper face and lower face. In the embodiment illustrated in FIG. 1, building block 100 includes two substantially horizontal channels as shown, wherein each of the upper face and the lower face comprises one substantially horizontal channel that is of a concave structure. It is possible that building block 100 includes only one substantially horizontal channel, wherein the at least one substantially horizontal on one of the upper face and the lower face of building block 100. Further, the at least one substantially horizontal channel is designed such that when a first building block and a second building block similar to building block 100 are stacked, the upper face of the first building block mates with the lower face of the second building block resulting in the formation of a horizontal channel such as a horizontal channel 152 as shown in FIG. 4.

Building block 100 further includes a first end and a second end (not numbered in figures). At least one of the first end and the second end includes at least one header face. The header face is one of a substantially planar face, a male header face such as a male header face 126 and a female header face such as a female header face 128. Each of the first end and the second end can include one or more header faces. For example, the first end can include one male header face and the second end includes one female header face as shown in FIG. 1. The male header face protrudes outwards at one of the first end and the second end of building block 100. For instance, the male header face protrudes outwards at the first end as shown in FIG. 3. The female header face protrudes inwards at one of the first end and the second end of building block 100. For instance, the female header face protrudes inwards at the second end of building block 100 as shown in FIG. 3. The design of the male header face and the female header face is such that the male header face of one building block can interlock with the male header face of a cooperating building block, wherein the blocks are identical or similar to building block 100. In various embodiments, the male header face and the female header face include one or more patterns in order to facilitate interlocking between the cooperating building blocks. In an embodiment, the one or more patterns include one of, but not limited to, a running pattern, a crossed pattern and a lobed pattern. In an embodiment, the male header includes a first stepped pattern projecting outwards as shown in FIG. 3. In an embodiment, the first stepped pattern includes a central contact surface such as a central contact surface 130 and other contact surfaces disposed symmetrically about the central contact surface such as, but not limited to, a first contact surface 132 and a second contact surface 134 as shown in FIG. 3. In an embodiment, the female header face includes a second stepped pattern substantially complementary to the male header face. In an embodiment, the second stepped pattern includes a central groove such as a central groove 136 and other grooves disposed symmetrically
about the central groove such as, but not limited to, a first groove 138 and a second groove 140 as shown in FIG. 3. It will be apparent that there could be numerous variations in the design of the first stepped pattern and the second stepped pattern and as such those variations would be apparent to those ordinarily skilled in the art. For instance, the number of steps could be different than those illustrated in the figures. Alternately, the design of the first stepped pattern and the second stepped pattern can be other than that illustrated in the figures.

[0027] In accordance with various embodiments of the invention, when a first building block and a second building block similar to building block 100 are mated adjacent to each other the interlocking bond is formed. Precisely, when the male header face of the first building block is mated with the female header face of the second building block, the interlocking bond is formed due to the complementary nature of the patterns between the male header face and the female header face. In an exemplary embodiment, the interlocking bond is formed when contact surfaces such as central contact surface 130, first contact surface 132 and second contact surface 134 of the male header face mate with grooves such as central groove 136, first groove 138 and second groove 140 of the female header face. In an exemplary embodiment, interlocking the plurality of building blocks similar to building block 100 forms a network of vertical and horizontal channels (described in conjunction with the description of FIG. 10). In an exemplary embodiment, at least one of the vertical and horizontal channels is designed to be used for inserting at least one of a plurality of water pipes and a plurality of electrical conduits.

[0028] Building block 100 as illustrated in FIGS. 1-4 is a normal building block for use in constructing the building in accordance with various embodiments. There could be numerous variations in the design of building block 100 based on end-use of building block 100. In various embodiments of the invention, building block 100 is used to construct the normal portions of a building such as, but not limited to, corners, intersections, crossings and connections. Depending on the end-use, building block 100 has a particular design, wherein building block 100 can be designed as one of, but not limited to, a corner block, an intersection block, a cross block and a connection block. For instance, if building block 100 is designed to be used for constructing a corner portion of the building, building block 100 is designed as a corner block as illustrated in FIGS. 5A-5D. FIGS. 5A-5D illustrate different views of the corner block, wherein FIG. 5A illustrates an isometric view of a left corner block 510 in accordance with an embodiment of the invention. FIG. 5B illustrates a plan view of the left corner block 510 in accordance with an embodiment of the invention. FIG. 5C illustrates an isometric view of a right corner block 520 in accordance with an embodiment of the invention, and FIG. 5D illustrates a plan view of the right corner block 520 in accordance with an embodiment of the invention. In accordance with various embodiments of the invention, the header face at the first end of the corner block is at right angles to another header face at the second end as shown in FIG. 5A. Further, the header face at one of the first end and the second end is one of the male header face and the female header face. For instance, the corner block can have header faces as illustrated in FIGS. 5A-5D. In an exemplary embodiment, the header face at the first end of the corner block can be aligned at one or more of, a left side and a right side with respect to the header face at the second end as shown in FIG. 5A and FIG. 5C.

[0029] In another instance, building block 100 can be designed to be used at one or more three way (T) intersections while constructing the building. For example, building block 100 is designed as a T-block that can be used at the one or more T intersections as shown in FIGS. 6A-6F. Referring now to FIGS. 6A-6F, which illustrate different views of the T-block in accordance with various embodiments of the invention. In particular, FIGS. 6A and 6B illustrate an isometric view and a plan view of a left T-block 600, FIGS. 6C and 6D illustrate an isometric view and a plan view of a right T-block 610, and FIGS. 6E and 6F illustrate an isometric view and a plan view of a normal T-block 620. In an exemplary embodiment, the T-block includes an additional header face at one of the first end and second end. Further, the additional header face is disposed at right angles to the header face at one of the first end and second end, as shown in FIGS. 6E. The additional header face can be one of a male header face and a female header face based on a requirement. In an exemplary embodiment, the additional header face is a female header face disposed at right angle to a female header face 604 at the first end of the T-block, while the second end includes the male header 606 as shown in FIG. 6A. The T-block can have one or more variations such as, but are not limited to, a left T-block as shown in FIG. 6A and a right T-block as shown in FIG. 6C. The T-block is used at one or more T-intersections while constructing the building. In an exemplary embodiment, the additional header face is placed at an angle of 180 degrees to the header face at one of the first end and the second end, as shown in FIG. 6E and FIG. 6F. Other variations in design of the T-block will be apparent to those ordinarily skilled in the art.

[0030] In yet another instance, building block 100 can be designed to be used at one or more four way intersections while constructing the building. For example, building block 100 can be designed as a cross block to be used at the one or more four way intersection as illustrated in FIGS. 7A-7B, which illustrate different views of the cross block in accordance with various embodiments of the invention. In particular, FIG. 7A illustrates an isometric view of the cross block, and FIG. 7B illustrates a plan view of the cross block. In an exemplary embodiment, the cross block includes two additional header faces at one of the first end and the second end, wherein the two additional header faces are at right angles to one of the male header face and the female header face at the first end, as shown in FIG. 7A. The two additional header faces can be one or more of a male header face and a female header face similar to the male header and the female header face of building block 100. In an exemplary embodiment, a first end of the cross block includes a first female header face 702, a second female header face 704 and a third female header face 706 as shown in FIG. 7A. In accordance with the embodiment shown in FIG. 7A, second female header face 704 and third female header face 706 are aligned at right angles to first female header face 702. Furthermore, the second end of the cross block includes a male header face 708 as shown in FIG. 7A. In an exemplary embodiment, the cross block is used at one or more four-way intersections during the construction of the building.

[0031] In still another instance, building block 100 can be designed to be used at one or more connecting points during the construction of the building. In an example, building block 100 is designed as a connecting block to be used at one
or more connecting points. The one or more connecting points include, but not limited to, gaps of different dimensions at points of termination while constructing the building. Turning now to FIGS. 8A-8F, which illustrate perspective views of the connecting block in accordance with various embodiments of the invention. In particular, FIG. 8A illustrates an isometric view of a normal connecting block 800 while FIG. 8B illustrates a plan view of normal connecting block 800. FIG. 8C illustrates an isometric view of a negative connecting block 810, while FIG. 8D illustrates a plan view of negative connecting block 810. FIG. 8E illustrates an isometric view of a positive connecting block 820, while FIG. 8F illustrates a plan view of positive connecting block 820. The connecting block can be at least one of a normal connecting block, a positive connecting block and a negative connecting block. In an exemplary embodiment, the normal connecting block, as shown in FIG. 8A and FIG. 8B, is a compact version of building block 100 and includes a single substantially vertical hollow (web) such as the substantially vertical hollow (web) of building block 100. In another exemplary embodiment, the positive connecting blocks (similar to that shown in FIGS. 8E-8F) and negative connecting blocks (similar to that shown in FIGS. 8C-8D) include identical header faces at the first end and the second end. In an exemplary embodiment, the identical header face can be one of a male header face (as shown in FIGS. 8E-8F) and a female header face (as shown in FIGS. 8C-8D). In an exemplary scenario, the one or more connecting blocks are used to fill small uneven gaps created at the one or more points of termination while constructing the building.

[0032] Building block 100 can also be designed to be an end block (not illustrated in figures), wherein one of the first end and the second end includes a header face that is a substantially planar face. Further, in such a design one of the upper face and lower face can be a substantially planar face. In addition, in such a design only one of the upper face and the lower face includes the substantially hollow (web) channel. Numerous variations in design of building block 100 are possible and as such those variations would be apparent to those ordinarily skilled in the art.

[0033] Referring now to FIG. 9, which illustrates a perspective view of the building wall constructed using the plurality of similar building blocks in accordance with various embodiments of the invention. In order to enable the construction of the building wall, one or more types of building block 100 are used. In an exemplary construction of the building wall shown in FIG. 9, building blocks similar to, but not limited to, a normal building block for use at a normal position such as a normal position 902, a corner block for use at a corner position such as a corner position 904, a T-block for use at an intersection such as an intersection 906a and an intersection 906b, a cross block for use at a crossing such as a crossing 908 and a connecting block for use at a connecting position such as a connecting position 910a, connecting position 910b and connecting position 910c. In an embodiment of the invention, a plurality of building blocks similar to building block 100, are designed to be used for constructing one of a stocking bond and a running bond without the use of cementitious materials.

[0034] Referring now to FIG. 10, which illustrates the perspective view of a network of horizontal channels and vertical channels within the building wall constructed using the plurality of similar building blocks in accordance with various embodiments of the invention. In an exemplary scenario, at least one horizontal channel such as a horizontal channel 152 is formed when the upper face of building block 100 interlocks with the lower face of another building block similar to building block 100. This occurs when the building blocks are stacked upon each other as shown in FIG. 4. In another exemplary scenario, the at least one substantially vertical hollow (web) of building block 100 matches with the at least one substantially vertical hollow (web) of the plurality of building blocks, similar to building block 100, concentrically when stacked upon each other, thereby creating at least one vertical channel such as a vertical channel 150 as shown in FIG. 10. The network of the vertical channels and the horizontal channels is used for adding at least one of horizontal and vertical reinforcements such as, but not limited to, water pipes and electrical conduits.

[0035] In accordance with various embodiments, building block 100 can be produced using one or more of materials such as, but are not limited to, natural raw materials, recycled materials, polymers, clay, sand-cement, concrete, silica-lime, geopolymer and composite materials. Further, in accordance with various embodiments, building block 100 is produced using techniques such as, but are not limited to, uniaxially cold pressing, biaxial cold pressing, dry pressing, semi-dry pressing, compacting, cold isostatic pressing, hot pressing, extrusion molding, injection molding, compression molding, gel casting, slip casting and tape casting.

[0036] Various embodiments of the invention described different structural aspects of a building block for use in constructing a building wall. The building block offers a convenient way to construct buildings and structures. The building blocks interlock with a plurality of similar building blocks and create a strong bond without using cementitious materials. The plurality of building blocks when assembled, readily form a network of vertical and horizontal channels for installing reinforcements such as electrical conduits and water pipes. The building blocks can be manufactured using a variety of materials which enables a user to use an appropriate material according to a desired application, thereby reducing cost of the structure.

[0037] Those skilled in the art will realize that the above recognized advantages and other advantages described herein are merely exemplary and are not meant to be a complete rendering of all of the advantages of the various embodiments of the invention.

[0038] In the foregoing specification, specific embodiments of the invention have been described. However, one of ordinary skill in the art appreciates that various modifications and changes can be made without departing from the scope of the invention as set forth in the claims below. Accordingly, the specification and figures are to be regarded in an illustrative rather than a restrictive sense, and all such modifications are intended to be included within the scope of the invention. The benefits, advantages, solutions to problems, and any element (s) that may cause any benefit, advantage, or solution to occur or become more pronounced are not to be construed as a critical, required, or essential features or elements of any or all the claims. The invention is defined solely by the appended claims including any amendments made during the pendency of this application and all equivalents of those claims as issued.

1. A building block for use in interlocking with a plurality of similar building blocks for constructing a building, the building block comprising:
a front face;
a rear face;
an upper face;
a lower face;
at least one substantially vertical hollow;
at least one substantially horizontal channel disposed along
at least one of the upper face and the lower face;
a first end, an entirety of the first end comprising a solid
surface forming a male header face; and
a second end, the entire second end comprising a solid
surface forming a female header face;
wherein the male header face comprises a first stepped
pattern projecting outwards at the first end,
wherein the female header face comprises a second
stepped pattern projecting inwards at the second end,
wherein the second stepped pattern is substantially
complementary to the first stepped pattern,
wherein the male header face of the building block is
designed for interlocking with a female header face of a
cooperating interlocking building block without form-
ing a vertical opening between the male header face and
the female header face, and
wherein the cooperating interlocking building block is sub-
stantially similar to the building block.

2. The building block of claim 1, wherein the at least one
substantially vertical hollow is substantially cuboidal and
extends from the upper face to the lower face of the building
block.

3. The building block of claim 1, wherein the at least one
substantially horizontal channel is substantially concave.

4. The building block of claim 1, wherein the at least one
substantially horizontal channel is disposed substantially at a
central portion of at least one of the upper face and the lower
face.

5. The building block of claim 1, wherein the building
block and the plurality of similar building blocks are designed
to interlock to form a network of vertical and horizontal
channels.

6. The building block claim 5, wherein at least one of the
vertical and horizontal channels is designed to be used for
addition of at least one of a plurality of water pipes and a
plurality of electrical conduits.

7. The building block of claim 1, wherein the building
block is at least one of an end block, a T-block, a cross block,
a corner block and a connecting block.

8. The building block of claim 7, wherein the building
block is a corner block and the first end of the corner block is
substantially perpendicular to the second end of the corner
block.

9. The building block of claim 7, wherein the building
block is a T-block and at least one of the first end and the
second end of the T-block comprises two header faces,
wherein each of the two header faces is a female header face.

10. The building block of claim 7, wherein the building
block is a cross block and at least one of the first end and
the second end of the cross block comprises three header faces,
wherein each of the three header faces is a female header face.

11. The building block of claim 7, wherein the building
block is a connecting block and each of the first end and the
second end of the connecting block comprises one header face,
wherein the header face is one of a male header face and a
female header face.

12. The building block of claim 1, wherein the building
block is designed to be interlocked with the plurality of simi-
lar building blocks to form a building wall.

13. The building block of claim 12, wherein the building
block and the plurality of similar building blocks are designed
to be used for constructing one of a stacking bond and a
running bond by using at least one of polymer based cemen-
titious materials, and geopolymer based cemenitious mate-
rials.

14. The building block of claim 12, wherein the building
block and the plurality of similar building blocks are designed
to be used for constructing one of a stacking bond and a
running bond without using at least one of polymer based
cementitious materials and geopolymer based cementitious
materials.

15. The building block of claim 1, wherein each of the male
header face and the female header face of the building blocks
comprises a complementary stepped pattern for interlocking
with a complementary header face.

16. The building block of claim 1, wherein the building
block is produced using at least one of uniaxially cold
pressing, biaxial cold pressing, dry pressing, semi-dry press-
ing, compacting, cold isostatic pressing, hot pressing, extru-
sion molding, injection molding, compression molding, gel
casting, slip casting and tape casting.