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(54) **BUILDING BLOCK SYSTEM**

(75) Inventor: **Daniel A. L. Boot**, Nt. Saanich (CA)

Correspondence Address:
EDWARDS ANGELL PALMER & DODGE LLP
P.O. BOX 55874
BOSTON, MA 02205 (US)

(73) Assignee: **Habitera Building Solutions, Inc.**, Sidney, BC (CA)

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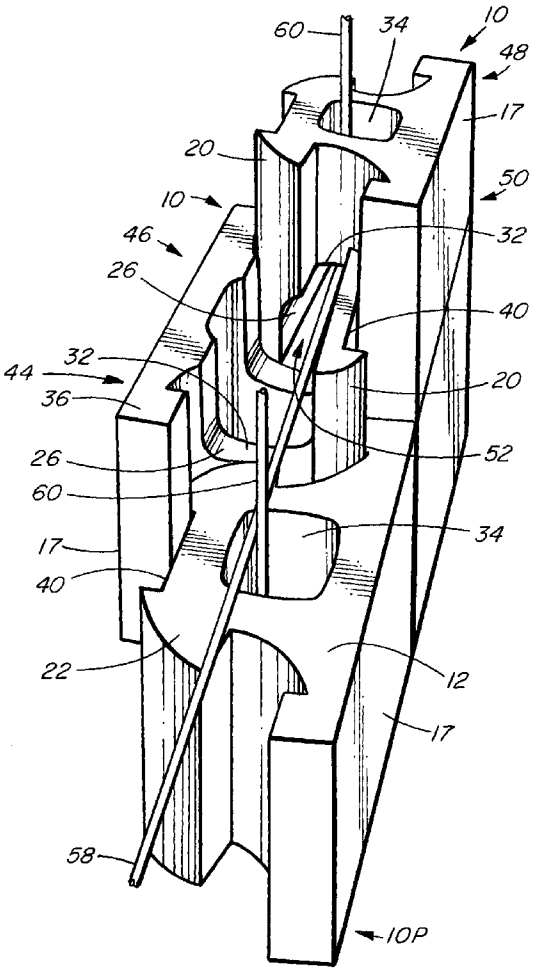
(57) **ABSTRACT**

An interlocking concrete block for forming horizontal wall-channels for reinforcement of block walls of dry-stack, vertically-offset, double-wythe construction. The block has an outer block wall on one side and a head portion extending to the opposed side. The head portion has a connecting portion which interfits with a receptacle of a similar block. The block has a channel extending generally parallel to the outer block wall. In a block wall, two vertically-adjacent series of the blocks form a horizontal wall channel which can hold a reinforcing bar and in-filled concrete, for horizontal reinforcement of the wall.



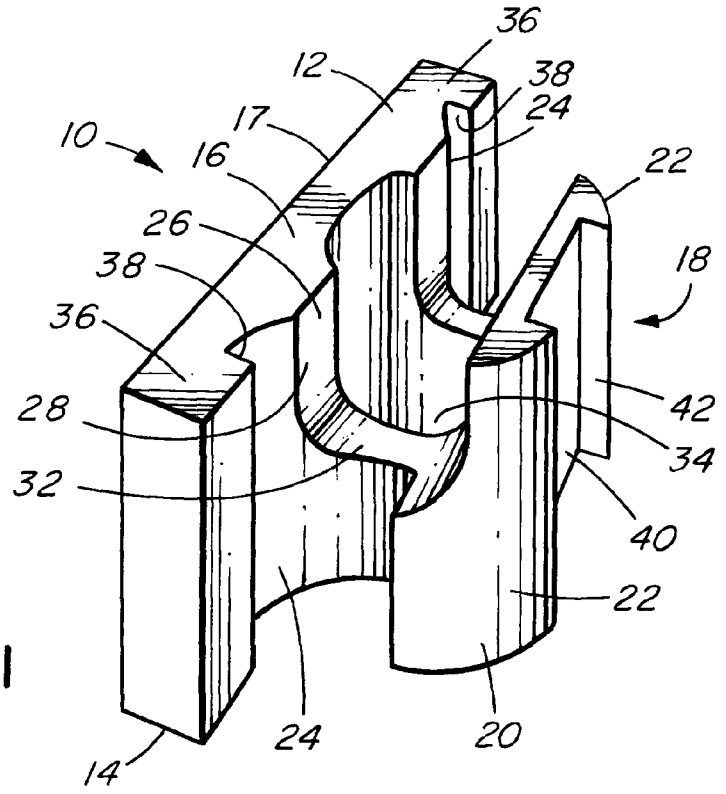

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FIG. 1

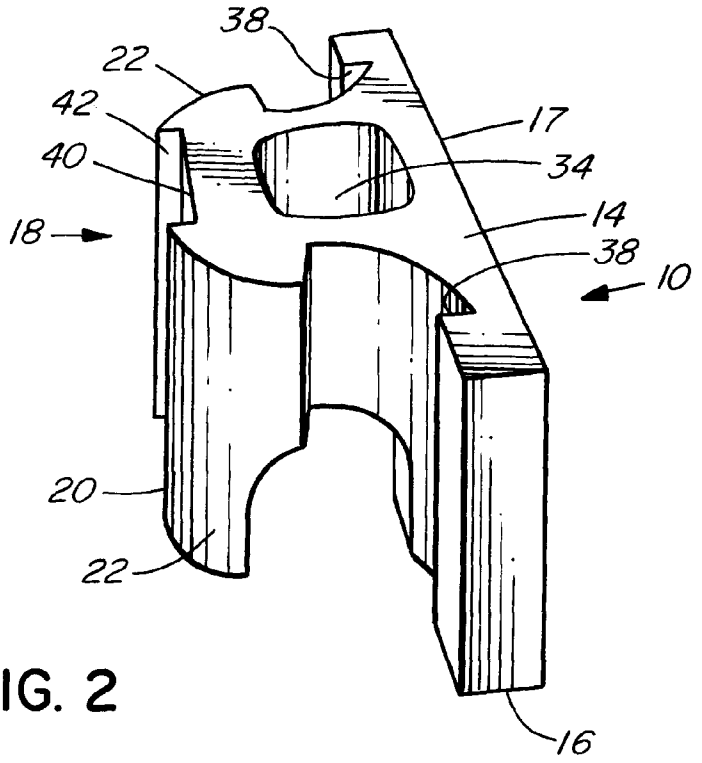
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FIG. 2

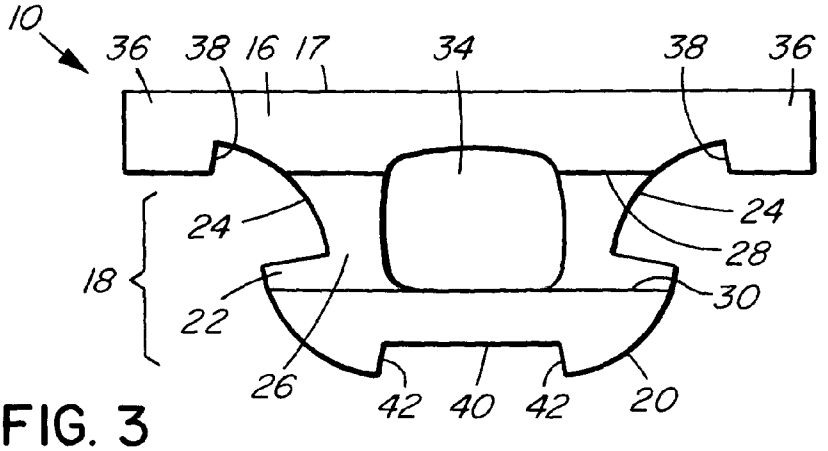

FIG. 3

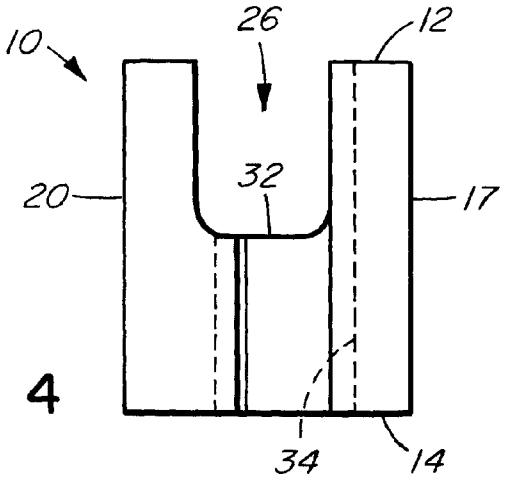

FIG. 4

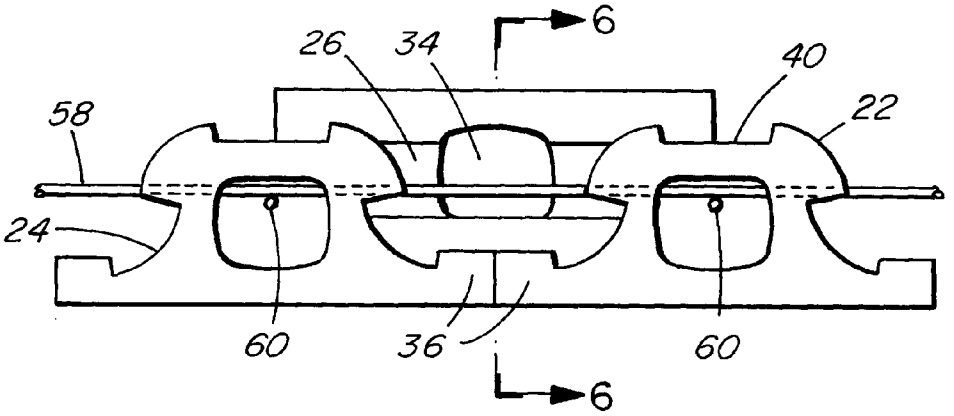

FIG. 5

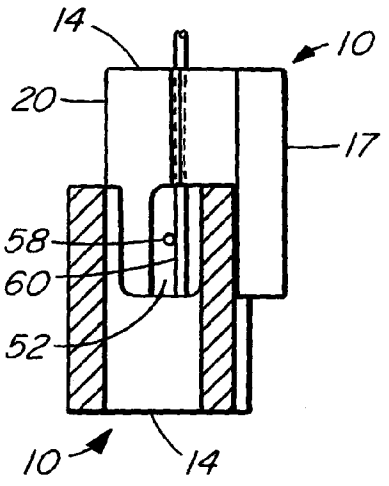
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FIG. 6

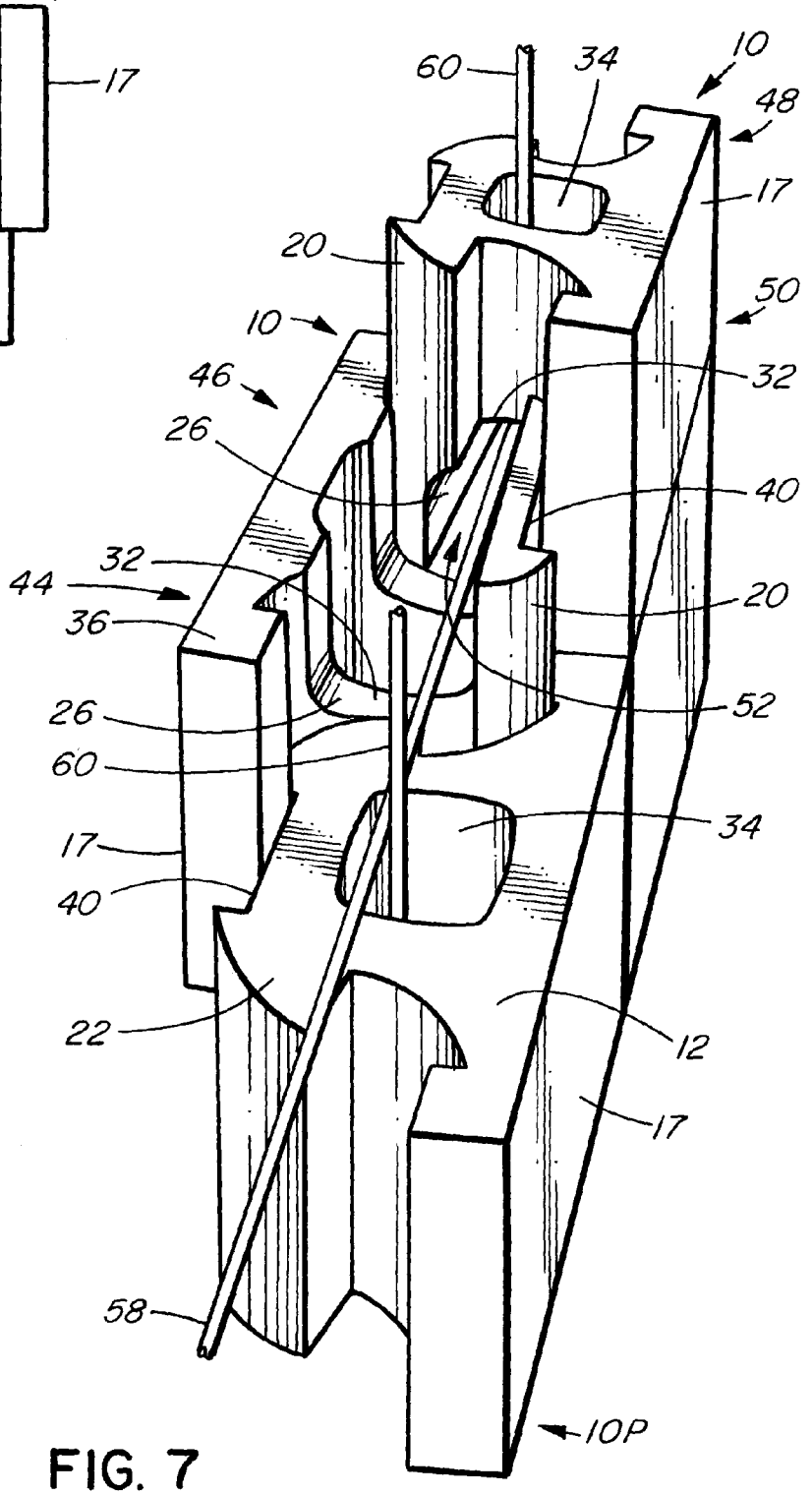
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FIG. 7

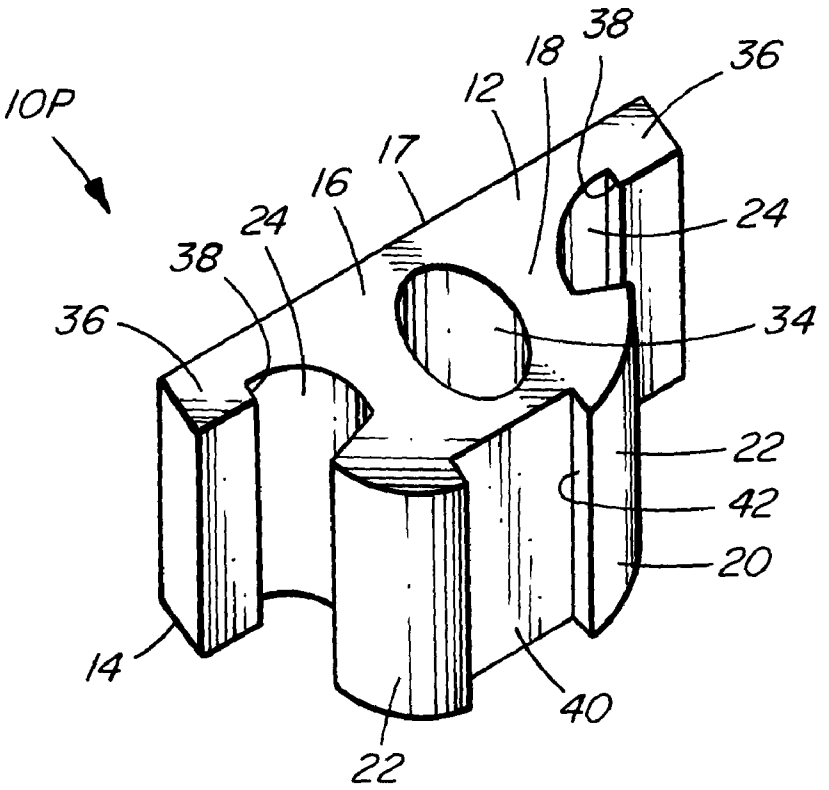

FIG. 8 (PRIOR ART)

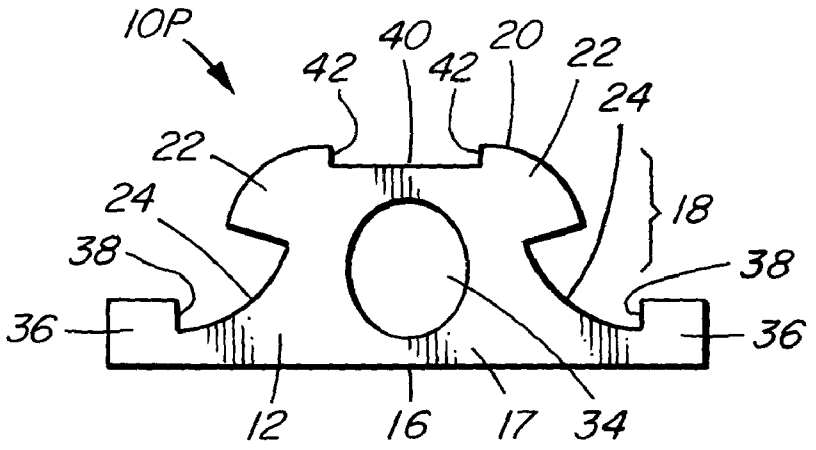

FIG. 9 (PRIOR ART)

BUILDING BLOCK SYSTEM

FIELD OF THE INVENTION

[0001] This invention pertains to interlocking blocks for use in constructing buildings and the like. More particularly, it pertains to interlocking blocks that form horizontal channels in a building wall. The channels can be used for reinforcement of the wall.

BACKGROUND OF THE INVENTION

[0002] It is known in the art of building with concrete blocks to make double-wythe walls which comprise two vertically-offset series of blocks, one series of which forms one wall face and the second series of which interlocks with the first series and forms the opposed wall face. U.S. Pat. No. 6,508,041 Boot and U.S. Pat. No. 4,704,832 Vassiliadis show examples of this type of wall system. It is used in the dry-stack construction of load-bearing and non-load-bearing walls.

[0003] Walls made using these systems can be reinforced by vertical members but they do not provide for horizontal means of reinforcement, which limits their strength and stability.

SUMMARY OF THE INVENTION

[0004] The invention provides a form of block for vertically-offset double-wythe wall construction, which blocks are arranged to form generally horizontal wall channels. The wall channels can accommodate reinforcing members and concrete in-fill for the purpose of reinforcing the block walls. Buildings made with such horizontal reinforcement are considerably stronger than buildings made using prior art block systems lacking such reinforcement. In general terms, the block has an outer block wall that defines a first side surface of the block and an interlocking section for attachment to the interlocking section of a cooperating interlocking block whose first side surface is opposite to the first side surface of the block, and a channel that is open to the top surface of the block.

[0005] The invention provides a block comprising an outer block wall on one side of the block and a head portion extending towards the opposed side surface of the block. The head portion has a connecting portion which interfits with a receptacle of a similar cooperating block that is positioned with its outer block wall opposite to that of the first block. The block has a channel extending generally parallel to the outer block wall.

[0006] The invention further provides a building wall which includes such blocks arranged so as to form a horizontal wall channel.

[0007] According to one preferred embodiment of the invention, there is provided a block for use in interlocking with similar blocks in forming a substantially horizontal channel in a building wall. The block comprises a top surface, a bottom surface, an outer block wall defining a first side surface of the block and a head portion extending from the outer block wall towards an opposed, second side surface. The head portion defines at least one connecting portion. The block has at least one receptacle substantially matching in shape the connecting portion for receiving in interlocking relationship the connecting portion of a cooperating interlocking block whose first side surface is opposite to the first side surface of the block. The block has a channel open to the block top surface extending generally parallel to the outer block wall and having two opposed channel side walls and a channel bottom wall.

[0008] According to another preferred embodiment of the invention, there is provided a block for use in interlocking with other similar blocks in forming a substantially horizontal channel in a building wall, which block comprises a top surface, a bottom surface, an outer block wall defining a first side surface of the block, and a head portion extending from the outer block wall toward an opposed, second side surface. The block has two connecting portions each on a respective side of the head portion. The block has two abutment portions each at a respective end of the outer block wall and each defining a respective abutment shoulder. There is a central groove in the head portion at a position thereon opposite to the outer block wall, the groove at opposite ends thereof defining two inwardly facing shoulders each for engaging and retaining the abutment portion of a respective one of two abutting blocks such that the abutment portions are retained end to end within the central groove. There is defined between the abutment portion and the connecting portion a receptacle substantially matching in shape the connecting portion for receiving in interlocking relationship the connecting portion of a cooperating interlocking block. The block defines a channel open to the block top surface extending substantially parallel to the outer block wall and having two opposed channel side walls and a channel bottom wall.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] In drawings which illustrate an exemplary embodiment of the invention:

[0010] FIG. **1** is a top perspective view of a block according to one embodiment of the invention;

[0011] FIG. **2** is a bottom perspective view of the block of FIG. **1**;

[0012] FIG. **3** is a top plan view of the block of FIG. **1**;

[0013] FIG. **4** is an end view of the block of FIG. **1**;

[0014] FIG. **5** is a top plan view of three interlocking blocks;

[0015] FIG. **6** is a cross-sectional view on the line **6-6** of FIG. **5**;

[0016] FIG. **7** is a perspective view of a portion of a building wall having two series of the blocks of FIG. **1** forming a horizontal wall channel; and

[0017] FIGS. **8** and **9** are a perspective and plan view respectively of a prior art block.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0018] Referring to FIGS. **1** to **4**, which illustrate an exemplary embodiment of the invention, the block **10** has a top surface **12**, a bottom surface **14**, an outer wall **16** and a head portion **18**. The block outer wall **16** defines one side surface **17** of the block. The head portion **18** extends to the opposed, second side surface **20**. The head portion has a lobe-shaped connecting portion **22** on each side thereof. The outer block wall **16** has an abutment portion **36** at each end thereof, each defining an abutment shoulder **38**. Two concave receptacles **24**, each between a respective connecting portion **22** and abutment shoulder **38**, have a shape corresponding to that of a connecting portion **22** and are sized to receive a connecting portion **22** of a second block in interlocking relationship therewith. The head portion **18** has a central groove **40** at a

position opposite to the outer block wall **16**. The groove **40** defines two shoulders **42** which engage the abutment portions **36** of two abutting interlocking blocks.

[0019] A channel **26** in the block is open to the top surface **12** of the block and has opposed side walls **28**, **30** and a bottom wall **32**. The channel **26** extends generally parallel to the outer block wall **16**. The channel bottom wall **32** is spaced from the bottom surface **14** by a distance that is greater than the distance between the channel bottom wall and the top surface **12**, as explained below.

[0020] A hole **34** extends through the block from the top surface to the bottom surface.

[0021] FIGS. **8** and **9** illustrate a prior art block **10**P as disclosed in U.S. Pat. No. 6,508,041 Boot. The shape and size of the block **10** is such that it interlocks with the prior art block **10**P, which prior art block is similar to the block **10** but it does not have any channel. In the illustration of the prior art block **10**P in FIGS. **8** and **9**, corresponding and like elements to those of the block **10** are indicated by the same reference numerals.

[0022] When used in the construction of a wall, the blocks **10** are intended to be used in forming horizontal channels at selected heights, for example at a height of four feet in an eight-foot high wall. The blocks **10** are not intended for construction of the entire wall, as horizontal wall channels at every course are not necessary. It is intended that the remainder of the wall below and above such wall channel would be constructed using the prior art blocks **10**P.

[0023] In constructing a double-wythe wall using the blocks **10** and the prior art blocks **10**P, a first course of prior art blocks **10**P is made on a suitable footing along the perimeter of the structure. To do this, a series of the prior art blocks **10**P is placed at the external side of the wall to begin the external wythe and a series of half height blocks (identical to blocks **10**P except one half the height) is placed at the internal side of the wall to begin the internal wythe, interlocking with the blocks of the first series. After this first course, all subsequent courses consist of full height units (except where levelled at window sills and at the wall top, where half height blocks are used). The external series and the internal series of blocks are always offset from each other by one half of a block height as a result of placing half height blocks in the first course.

[0024] FIGS. **5-7** show the blocks **10** interfitting with like blocks. As best seen in FIG. **7**, at a selected height in the construction of a wall, say four feet, the blocks **10** of the present invention are employed to form a channel for horizontal reinforcement of the wall. A first series **44** of the blocks **10** is laid to interlock with the uppermost course of the prior art blocks **10**P. This series **44** of blocks **10** is laid with the channels **26** facing upward. The connecting portions **22** of the uppermost course of the prior art blocks **10**P are received in the respective receptacles **24** of the blocks **10**, and the abutment portions **36** of the abutting blocks **10** are fitted in respective central grooves **40** of the prior art blocks **10**P.

[0025] Before placing a reinforcing bar **58** in the horizontally-extending space formed by the channels **26** of the series **44** of blocks **10**, the holes **34** in the prior art blocks **10**P and in the blocks **10** that will lie under the reinforcing bar are plugged sufficiently to retain the concrete that is later in-filled around the bar. The plugging can be done, for example, using crushed sheets of newspaper. Any holes **34** that will be used for vertical reinforcing bars **60** and in-filling of concrete are not plugged.

[0026] A reinforcing bar **58** is then placed in the horizontally-extending space formed by the channels **26**, resting on the bottom wall **32** of the channels **26**. It will be apparent that, because the channel bottom wall **32** is higher than the vertical midpoint of the block, the channel bottom wall **32** of the blocks **10** is higher than the top surface **12** of the uppermost course of prior art blocks **10**P, so the reinforcing bar **58** does not rest on such top surface **12** but is supported only by the relatively narrow parts of the channel bottom wall that are on either side of the hole **34**. This feature permits the concrete which is filled into the wall channel, as discussed below, to more completely surround the reinforcing bar and therefore to better bond to it.

[0027] The horizontal reinforcing bars **58** are adjacent to the vertical reinforcing bars **60** that are positioned in holes **34** at selected spacing (for example 120 cm spacing) and can be affixed thereto by means of twisted wire or the like.

[0028] After the reinforcing bar **58** is laid in position, a second series **48** of the blocks **10** is laid in interlocking arrangement with the first series **44** to form the wall channel **52**. The second series is placed with the channels **26** facing downward. The connecting portions **22** of the blocks **10** of the second series **48** are received in the respective receptacles **24** of the blocks **10** of the first series **44**, and the abutment portions **36** of abutting blocks **10** of the second series **48** are fitted in respective central grooves **40** of the blocks **10** of the first series **44**. The top surface **12** of the blocks of the second series **48** faces downward and abuts the top surface **12** of the uppermost course of the prior art blocks **10**P. The channel bottom wall **32** of the blocks of the second series **48** is accordingly spaced from and opposed to the channel bottom wall **32** of the blocks of the first series **44**, and the channels **26** of the blocks of the first and second series collectively form a wall channel **52** extending generally horizontally through the wall. It will be noted that the channel **26** in each block **10** is sufficiently wide and is so positioned relative to the width of the block that the channels **26** of the blocks of one series overlap in longitudinal extension with those of the second series so that a continuous passageway through the wall, i.e. wall channel **52**, is formed by the block channels **26**.

[0029] At this point in the construction of the wall, concrete is in-filled into the wall channel **52** through the holes **34** in the blocks **10** of the second series **48**, and into selected vertical channels (i.e. the channels comprising aligned holes **34** in vertically positioned blocks **10** and **10**P). Once the concrete has set, construction of the wall continues with a series of prior art blocks **10**P fitted to the second series **48** of the blocks **10**, and so on to the desired wall height.

[0030] It will be apparent that the first side surface **17** of the blocks **10** of the first series **44** forms part of one vertical side surface **46** of the building wall **54**, and the first side surface **17** of the blocks **10** of the second series **48** forms part of the second, opposed vertical side surface **50** of the wall. These parts are continuous with the respective side surfaces of the wall formed by the prior art blocks **10**P that are below and above the first and second series **44**, **48** of the blocks **10**.

[0031] Walls and buildings constructed using the blocks **10** can include end blocks for ending a wall and corner blocks for making corners in walls, as described in U.S. Pat. No. 6,508,041 Boot.

[0032] The block **10** of the invention is made of concrete, or alternatively of clay or other suitable material. It is nominally 40 cm long, 20 cm high and 15 cm wide.

[0033] Apart from the use of concrete in the horizontal wall channels and in selected vertical channels, concrete is not used in the building of the walls as the construction is dry-stack type, the blocks not being mortared in place.

[0034] Although the invention has been described in terms of specific embodiments, it is not intended that the invention is limited to those embodiments. Various modifications within the scope of the invention will be apparent to those skilled in the art. The scope of the invention is defined by the claims that follow.

What is claimed is:

1. A block (**10**) for use in interlocking with other similar blocks in forming a substantially horizontal channel (**52**) in a building wall (**54**), the block comprising:
- a top surface (**12**);
- a bottom surface (**14**);
- an outer block wall (**16**) defining a first side surface (**17**) of the block;
- an interlocking section for attachment to the interlocking section of a cooperating interlocking block whose first side surface is opposite to the first side surface of the block; and
- a channel (**26**) open to the block top surface (**12**) extending generally parallel to the outer block wall and having two opposed channel side walls (**28**, **30**) and a channel bottom wall (**32**).

2. A block (**10**) for use in interlocking with other similar blocks in forming a substantially horizontal channel (**52**) in a building wall (**54**), the block comprising:
- a top surface (**12**);
- a bottom surface (**14**);
- an outer block wall (**16**) defining a first side surface (**17**) of the block;
- a head portion (**18**) extending from the outer block wall towards an opposed, second side surface (**20**);
- the head portion defining at least one connecting portion (**22**);
- at least one receptacle (**24**) substantially matching in shape the connecting portion (**22**) for receiving in interlocking relationship the connecting portion of a cooperating interlocking block whose first side surface is opposite to the first side surface (**17**) of the block (**10**); and
- a channel (**26**) open to the block top surface (**12**) extending generally parallel to the outer block wall and having two opposed channel side walls (**28**, **30**) and a channel bottom wall (**32**).

3. A block (**10**) for use in interlocking with other similar blocks in forming a substantially horizontal channel (**52**) in a building wall (**54**), the block comprising:
- a top surface (**12**);
- a bottom surface (**14**);
- an outer block wall (**16**) defining a first side surface (**17**) of the block;
- a head portion (**18**) extending from the outer block wall toward an opposed, second side surface (**20**);
- two connecting portions (**22**) each on a respective side of the head portion;
- two abutment portions (**36**) each at a respective end of the outer block wall and each defining a respective abutment shoulder (**38**);
- a central groove (**40**) in the head portion at a position thereon opposite to the outer block wall (**16**), the groove at opposite ends thereof defining two inwardly facing shoulders (**42**) each for engaging and retaining the abutment portion of a respective one of two abutting blocks such that the abutment portions (**36**) are retained end to end within the central groove (**40**);
- wherein there is defined between the abutment portion and the connecting portion a receptacle (**24**) substantially matching in shape the connecting portion (**22**) for receiving in interlocking relationship the connecting portion of a cooperating interlocking block; and
- wherein the block defines a channel (**26**) open to the block top surface (**12**) extending substantially parallel to the outer block wall (**16**) and having two opposed channel side walls (**28**, **30**) and a channel bottom wall (**32**).

4. A block according to claim **1**, **2** or **3** wherein the channel bottom wall (**32**) is spaced from the block bottom surface (**14**) by a distance that is greater than the distance between the channel bottom wall and the block top surface (**12**).

5. A block according to any one of claims **1**-**4** wherein the block defines a hole (**34**) extending therethrough generally perpendicular to the block bottom surface.

6. A building wall (**54**) comprising: a plurality of interlocking blocks (**1**), at least some of the blocks each comprising: a top surface (**12**); a bottom surface (**14**); an outer block wall (**16**) defining a first side surface (**17**) of the block; a head portion (**18**) extending from the outer block wall toward an opposed, second side surface (**20**); a connecting portion (**22**) on the head portion;
- two abutment portions (**36**) each at a respective end of the outer block wall (**16**); a receptacle (**24**) substantially matching in shape the connecting portion; a channel (**26**) open to the block top surface (**12**) extending substantially parallel to the outer block wall and having two opposed channel side walls (**28**, **30**) and a channel bottom wall (**32**);
- the blocks being arranged to define a first series (**44**) of the blocks in which the first side surface (**17**) of each of the first series of blocks is arranged to form a first vertical side surface (**46**) of the wall, and a second series (**48**) of the blocks in which the first side surface (**17**) of each of the second series of blocks is arranged to form a second vertical side surface (**50**) of the wall opposite to the first vertical side surface (**46**);
- the blocks being interlocked such that: two abutment portions (**36**) each of a respective one of two adjacent blocks of the second series (**48**) are positioned end to end; two abutment portions each of a respective one of two adjacent blocks of the first series are positioned end to end ; the receptacle (**24**) of each of the first series of blocks receives in interlocking relationship a respective connecting portion (**22**) of the second series of blocks; the receptacle of each of the second series of blocks receives in interlocking relationship a respective connecting portion of the first series of blocks; the channel bottom wall (**32**) of each of the blocks of the first series is spaced from and opposite to the channel bottom wall of a respective one of the blocks of the second series; and the channels (**26**) of the blocks of the first series and of the second series together form a wall channel (**52**) extending generally horizontally through the building wall (**54**).

7. A building wall (**54**) comprising: a plurality of interlocking blocks (**10**), at least some of the blocks each comprising: a top surface (**12**); a bottom surface (**14**); an outer block wall (**16**) defining a first side surface (**17**) of the block; a head portion (**18**) extending from the outer block wall toward an

opposed, second side surface (**20**); two connecting portions (**22**) each on a respective side of the head portion; two abutment portions (**36**) each at a respective end of the outer block wall (**16**) and each defining a respective abutment shoulder (**38**) on a face of the outer block wall opposite to the first side surface thereof; two receptacles (**24**) each arranged between a respective one of the abutment portions (**36**) and a respective one of the connecting portions (**22**); a central groove (**40**) in the head portion at a position thereon opposite to the outer block wall, the groove at opposite ends thereof defining two inwardly facing opposed shoulders (**42**); and a channel (**26**) open to the block top surface (**12**) extending substantially parallel to the outer block wall and having two opposed channel side walls (**28**, **30**) and a channel bottom wall (**32**);

the blocks being arranged to define a first series (**44**) of the blocks in which the first side surface (**17**) of each of the first series of blocks is arranged to form a first vertical side surface (**46**) of the wall and a second series (**48**) of the blocks in which the first side surface (**17**) of each of the second series of blocks is arranged to form a second vertical side surface (**50**) of the wall opposite to the first vertical side surface (**46**);

the blocks being interlocked such that: two abutment portions (**36**) each of a respective one of two adjacent blocks of the second series (**48**) fit into the central groove (**40**) in an opposed one of the blocks of the first series (**44**) such that the abutment portions are retained end to end within the central groove; two abutment portions each of a respective one of two adjacent blocks of the first series fit into the single central groove in an opposed one of the blocks of the second series such that the abutment portions are retained end to end within the single groove; each receptacle (**24**) of each of the first series of blocks receives in interlocking relationship a respective one of the connecting portions (**22**) of the second series of blocks; each receptacle of each of the second series of blocks receives in interlocking relationship a respective one of the connecting portions of the first series of blocks; the channel bottom wall (**32**) of each of the blocks of the first series is spaced from and opposite to the channel bottom wall of a respective one of the blocks of the second series; and wherein the channels (**26**) of the blocks of the first series and of the second series together form a wall channel (**52**) extending generally horizontally through the building wall (**54**).

8. A building wall according to claim **6** or **7** further comprising a reinforcing member (**58**) extending through the wall channel (**52**).

9. A building wall according to claim **8** further comprising mortar in said wall channel.

* * * * *