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(54) Building unit for integral masonry

(57) The unit has been designed for use in all types of wall, be they retaining walls, load bearing walls, facings or partitions and to allow the reinforcement of the same by both vertical and horizontal reinforcement. The units may be employed in exposed walling or rendered or faced walling, with or without reinforcement. As such the unit (1b) is provided with yielding lines (5d) set on one of its stretcher faces, which enable access to internal holes (11d) of different sizes by which to house the said vertical reinforcement. The access to the hole is made by the removal of detachable side sections (6d) set within yield lines (5d). The considerable width of the holes (llc) permits the simultaneous reinforcement of both ends of the unit without affecting the external face (13) or the exposed face of the wall. Internal radial dividers (15) set within the holes (lid) are tapered towards both the central core and the perimeter of the hole (5e) to enable their easy removal when vertical reinforcement is required, and serve as mortar savers when no such reinforcement is required.

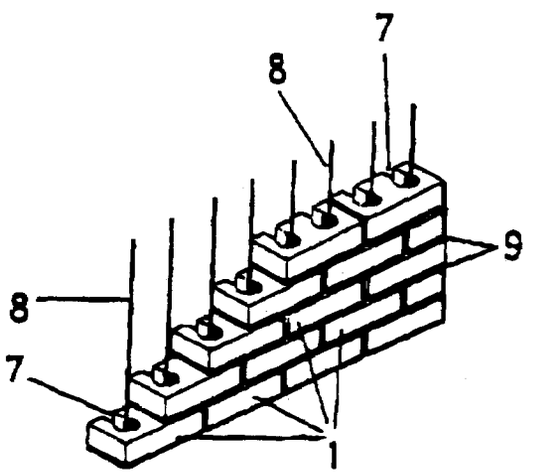

FIG.-3

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Description

OBJECT OF THE INVENTION

The invention consists of a building unit which can be used in load bearing walls, retaining walls, facings or partition walls. The unit is characterised by the fact that it enables the three-dimensional reinforcing of the wall, but can also be used in the same way as any conventional building unit in walls without reinforcement, and as a unit in exposed facing walls. The unit may, therefore, be employed universally without any negative repercussions in terms of cost or technical capabilities.

BACKGROUND OF THE INVENTION

When constructing a masonry wall and particularly when using prefabricated blocks for the same, the standard practice, to date, is to reinforce the wall in two directions with steel bars or wire trusses laid in the horizontal masonry bed joint, but no vertical reinforcement is provided.

This is due to the fact that the solidity of the wall demands that the bricks or blocks be keyed or bonded, that is to say abutted or set quincuncially. This arrangement while providing horizontal courses of brick or blockwork has no provision for vertical "courses" and as such there are no rectilinear joints in this direction which would allow the placement of vertical reinforcement.

An apparently obvious solution to this problem is to design building components with large perforations through their bases, however, this is impractical in masonry employing units of little depth, as the small height of the course between the mortar beds means that the mortar begins to set after only a few courses have been laid, thus, impeding the placing of a minimum length of reinforcing bars through the central perforations of the blocks, and this is only aggravated in successive courses by mortar droppings within the voids which on setting prevent the placement of the said reinforcement.

It is very difficult, at present, to employ three-dimensional reinforcement in walls. In walls built with concrete blockwork with large perforations, it is possible to insert vertical reinforcement, but this would mean threading the reinforcement vertically from the top of the wall, on the completion of the same, and then concreting the voids containing the reinforcement. This technique would be closer to that of reinforced concrete than reinforced masonry and the blocks employed would have to be specially made for the said technique.

One alternative is that of the German Utility Model G9403323.4 in which a building block is provided with two holes which may house the reinforcing bars. The said holes are set centro-symmetrically to each other within the cross-section of the block and both stretcher faces of the block are provided with detachable areas next to the holes, said detachable areas being formed by respective pairs of grooves, one of them going through the wall into the hole.

As both faces of the block are provided with grooves it cannot be employed in exposed blockwork for reasons of aesthetics and watertightness, and this limits its application to rendered or plastered walling.

Furthermore, when the reinforcing holes are very small they only permit two bar reinforcement, one next to the outer face and one next to the inner, both of which having to be placed in a specific area. When the holes are very large they can accept different types of reinforcement but the unreinforced blockwork requires considerable backfilling with mortar.

With regards to workmanship it is much more complicated to lay this type of block or brick than conventional masonry as it requires the alternate turning over of bricks from one course to another, and this can give rise to errors due to lack of concentration. Furthermore, it is impossible to reinforce corners with this type of blockwork.

The reduced size of the holes which is required in order to limit the amount of mortar employed, given that the masonry is generally unreinforced, means that the said voids cannot receive other types of building elements, such as downpipes, and conduits etc.

DESCRIPTION OF THE INVENTION

The proposed building unit clearly avoids all the aforementioned inconveniences, and may, therefore, be employed in load bearing walls, facings and partitions, etc., and may be used in all types of exposed walling as well as those to be rendered or faced; however they allow the installation of vertical reinforcement where required.

As such the integral masonry unit provided with vertical holes is characterised by the fact that only the stretcher face set opposite to the exposed face of the wall and, optionally, also one or both of the header faces, are provided with detachable portions to gain access to the said internal vertical holes. This enables the units to be used both in the construction of walls vertically reinforced through the said side openings or in the construction of conventional walls without reinforcement, since the proportion of voids of the conventional masonry units of the same material is maintained.

The said holes should preferably affect the major portion of the width of the unit, thereby allowing the use of different thicknesses and shapes of reinforcement which simultaneously affect both the external and internal sides of the wall.

A further characteristic of the invention is that each of these holes is internally partitioned .The partitions walls or at least some of them being provided with weaken portions, easy to be broken in order to make them easily detachable by manual or mechanical fracture when vertical reinforcement is required. In this way the effective section of the hole may be suited to the specific requirements of the reinforcement employed. However,

when vertical reinforcement is not required the said partitions effectively close off the hole, thereby acting as a mortar saver and maintaining the compressive strength of the unit.

The proportion of voids within the unit may be similar to that of conventional perforated brick or block, and therefore offer no disadvantages whatsoever with regards to the latter when employed in walls without reinforcement, either in terms of economy, mortar consumption, handling or strength.

The block, therefore, consists of one stretcher face and two header faces which are perfectly smooth or decorated and free of any groove or notch. That is to say, it is a unit of the thickness, continuity, insulation and mechanical strength necessary in exposed walling, enabling the exposed bonding of corners within the said facade and the construction of columns, the means of access to the internal holes within the blockwork being set only on the internal and unexposed side of the wall. Due to the arrangement, size and interior finishing of the said holes, these can be used to house any type of reinforcement, downpipe or conduit, etc., where necessary, and require a minimum amount of mortar when the same are not required.

DESCRIPTION OF THE FIGURES

A set of figures are enclosed, to help to describe the preferred embodiment of the invention. These figures, which should be taken to be illustrative and by no means limiting, represent the following:

Figure 1.- Shows a perspective drawing of a building block for integral masonry made in accordance with the specifications of the present invention, indicating the parallels between the said block and a traditional building block.

Figure 1a.- Shows a cross-sectional detail of the block indicated in Fig. 1, following the sectional line A-B of the said figure.

Figure 1b.- Shows a cross-sectional detail of the block indicated in Fig. 1, following the sectional line C-D of the said figure.

Figure 2.- Shows a perspective drawing of an integral masonry building brick made in accordance with the specifications of the present invention.

Figure 2a.- Shows a plan of the brick indicated above after having made a lateral opening in the same and the central housing for subsequent reinforcement.

Figure 3.- Shows a plan diagram of a further variation on the brick indicated in Fig. 2

Figure 3.a Shows the same brick given in Fig. 3 after making a side opening in one of the two housings of the same for different types of vertical reinforcement.

PREFERRED EMBODIMENT OF THE INVENTION

From these figures it may be seen that the invention is applicable to different types of building components, be they blocks, as shown in Fig. 1, or bricks, as indicated in Figs. 2 and 3, regardless of material.

The basic blockwork units are made up of a parallelepiped body (1) with a rectangular base, and internal voids (2) separated by one or more internal partitions (3), said voids being optionally closed at the upper part of the block by a thin wall (4) easily breakable.

When taking this basic and conventional structure, the object of the invention is based on the fact that the said unit (1) is provided on one of its stretchen faces with a set of weakening or yield lines (5) located at each of the aforementioned voids (2), said weakening or yield lines are made on the inner or the outer side of the wall or produced by small perforations in the wall and they outline detachable areas or portions (6), which do not, in principle, affect the structure of the unit, and therefore allow the element to be used as any other conventional masonry unit, but which may be removed where necessary, thereby forming a lateral opening directly connected with other similar openings in the adjacent blocks of the upper and lower courses of the wall, giving rise to vertical channels. These vertical channels may then house steel bars or any other element of vertical reinforcement, which will, obviously work in conjunction with conventional bed joint reinforcement arranged on the horizontal joints between each course.

These yielding lines (5) may be also placed on either one or both headers of the block. In the latter case at least one of the headers should be provided with yield lines on the internal face of the block's wall so that it will remain unexposed when used in blockwork at the corners of the wall.

The same essential characteristics apply when the building unit is made in the form of a brick as shown in Figs. 2 and 3, though the internal partitions to the void may be shaped in all manner of forms.

In the example shown in Figs. 2 and 2.a, the brick (1a) is provided with the prescribed internal partitions (9) and as in the block shown in Figs. 1, 1a and 1b, disposes of yielding lines (5a) which outline detachable areas (6a) which allow access to the adjacent voids (11) and (11'). In the case where the voids adjacent the detachable areas are not large enough to accept the desired vertical reinforcement, on having made a lateral opening (7) by removing the corresponding detachable area, there are then further internal fracture lines (5b) which may be employed to remove the central core of the brick, thereby leaving ample space to house central vertical reinforcement, which, in turn, may be easily

placed through the aforementioned lateral opening (7). If an external opening is made by removing a lateral detachable area (6a') the internal partition (12) may then be removed to reveal an ample lateral opening (11b).

In the example given in Fig. 1, the yield lines (5) are shown as external, V-shaped grooves, while the unit shown in Fig. 2 shows some of the multiple possibilities of forming these lines. The said yield lines may be internal (5a) or external (5a'), be in the form of holes (5c) within the brick's wall itself, holes combined with grooves, etc. It is even possible that the said weakening be made by chemical process by applying a chemical product to the area of the unit in question which then reduces the strength of the same and makes the detachable area (6) more fragile.

Figure 3 shows a further example of the building unit, in this case again a brick (1b), which shares the same characteristics as the previous examples in that its exposed faces (13) and (13') are perfectly continuous. However, in this case there are two wide circular holes (11c) and (11d) centred on the brick's longitudinal axis and at quarter length from each header face. The brick (1b) is provided on the unexposed stretcher face (16) with weakening grooves (5d) which allow the easy removal of the detachable pieces (6d) and access to the centre holes (11c) and (11d). A central core (14) is set within each hole and from said central core a number of arms or radial partitions (15) extend to form smaller holes (11c) and (11d), each of these radial arms or partitions being tapered towards their ends (5e) to make them easily detachable in order to leave the hole (11c, 11d) totally or partially free to receive the corresponding reinforcement, as indicated in Fig. 3a.

All the above goes to show the building unit shown in Fig. 1 as well as those shown in Figs. 2 and 3, may be employed in the construction of all types of wall be they load bearing walls, facings or partitions, etc., and may be used with or without vertical reinforcement and in both exposed walling as well as rehdered or faced walling, and thereby may be considered as a universal building unit.

Claims

1. An integral masonry building unit, which may be used either in the construction of walls with vertical reinforcement or as a conventional building unit without reinforcement, and is provided with internal vertical holes, characterized in that only the stretcher face (16) set opposite to the exposed face of the wall and, optionally, also one or both of the header faces (16') are provided with detachable portions (6, 6a, 6a', 6d), giving access to the internal vertical holes (2, 11, 11', 11a, 11b, 11c, 11d), which allows the lateral access of the vertical reinforcements to the internal vertical holes if the building units are used for the construction of vertically reinforced walls, said units being also suitable for the construction of walls without vertical reinforcement, in the same conditions as a conventional building unit provided with holes, since they present voids in the same proportion as conventional units of the same material, without detriment to the compressive strength.

2. An integral masonry building unit, according to claim 1, characterized in that the internal vertical holes extend across the width of the unit in such a way that the installation of the reinforcements may take place at both sides of the middle plane of the unit or at said middle plane.

3. An integral masonry building unit, according to claims 1 and 2, characterized in that, in the case where the holes set adjacent the detachable portions of the outside wall of the unit do not provide enough space to receive reinforcement, some partition walls (10, 12, 15) of the internal partitioning (9) which defines the various holes, are provided with weaken portions, easy to be broken (5b, 5c), thereby allowing the creation of larger voids (11a, 11b, 11c) within the building units.

4. An integral masonry building unit, in accordance with claims 1 to 3, characterized in that the detachable portions are outlined by yielding lines in the form of grooves on the exterior (5) or interior (5a) of the unit's outer wall.

5. An integral masonry building unit, in accordance with claims 1 to 3, characterized in that the detachable portions are defined by yielding lines in the form of perforations (5c) within the outer wall of the unit.

6. An integral masonry building unit, in accordance with claims 1 to 3, characterized in that the detachable portions are formed by means of a chemical treatment which weakens the material in the corresponding area of the unit.

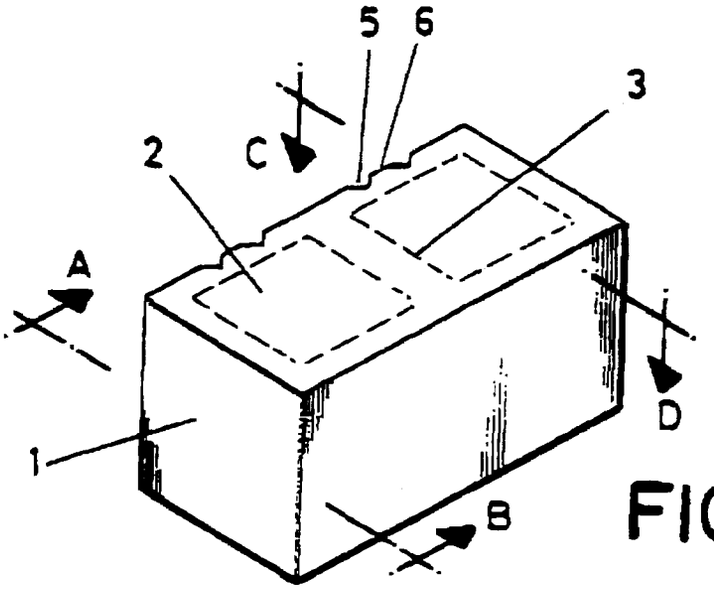
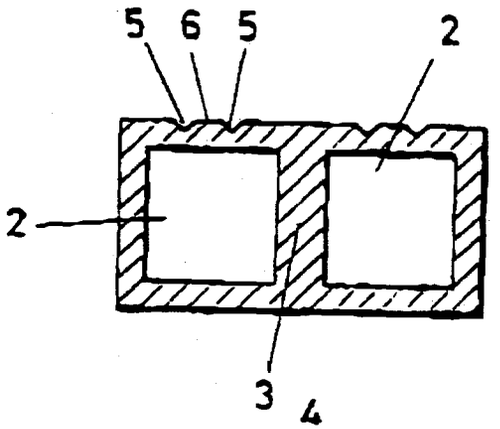
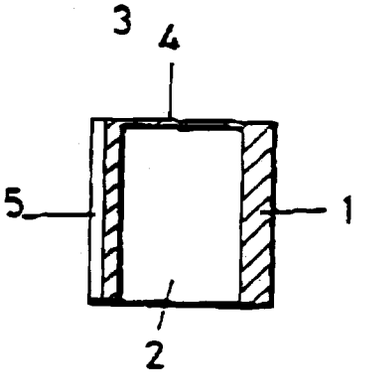


FIG.-1



A-B

FIG.-1a



C-D

FIG.-1b

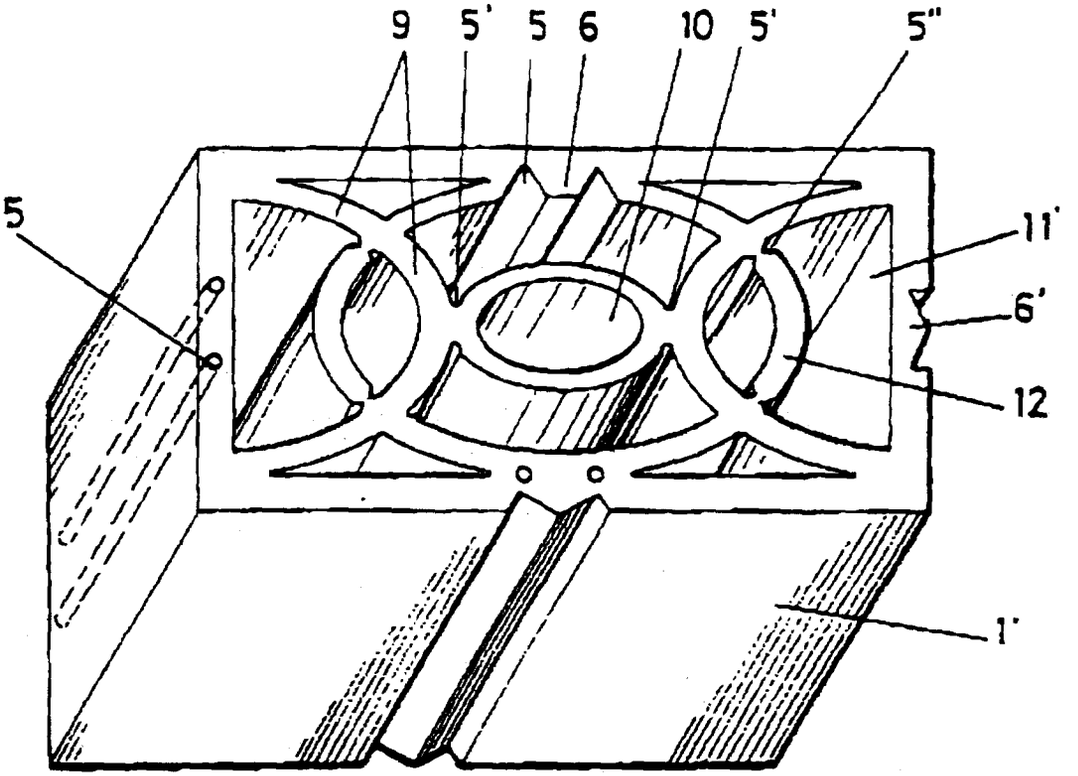


FIG.-2

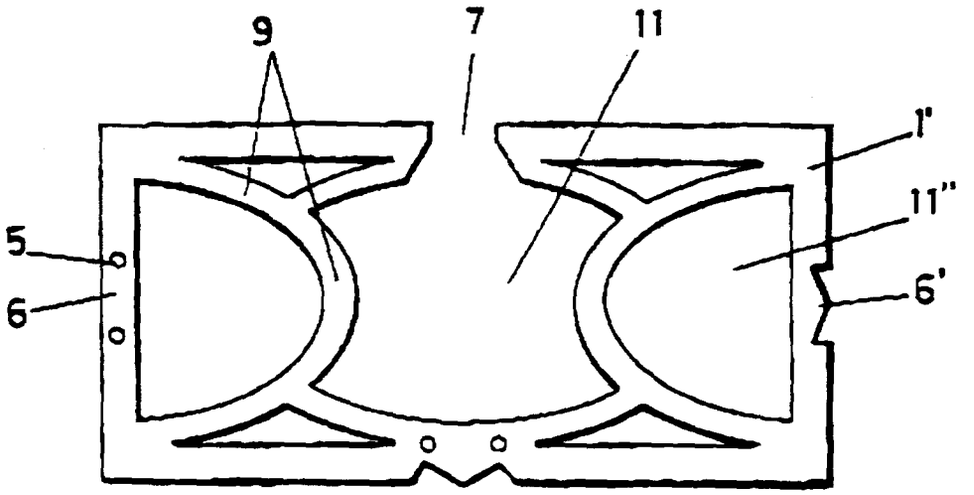


FIG-2a

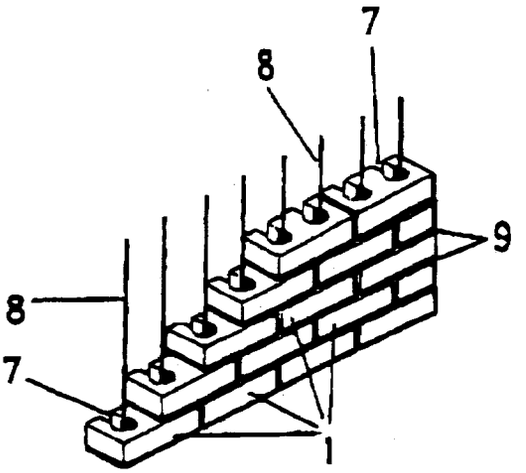


FIG.-3

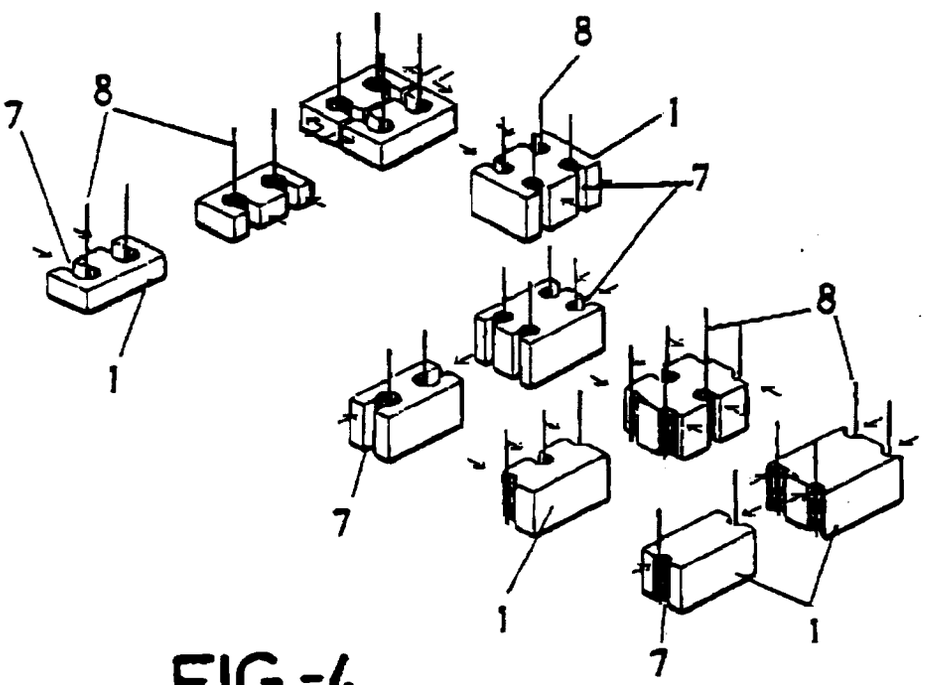


FIG.-4

European Patent Office

EUROPEAN SEARCH REPORT

Application Number
EP 96 50 0133

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X Y	FR-A-1 025 607 (DELOUPY) * the whole document * ---	1-4 5	E04B2/02
Y	US-A-2 737 801 (BARNHART) * column 4, line 1 - line 58; figures 1-3 * ---	5	
X	FR-A-1 061 400 (CHINI ET AL.) * the whole document * ---	1,4	
X	GB-A-614 059 (GILSON) * the whole document * -----	1-4	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6) E04B

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	13 December 1996	Mysliwetz, W

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
Y : particularly relevant if combined with another document of the same category
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