

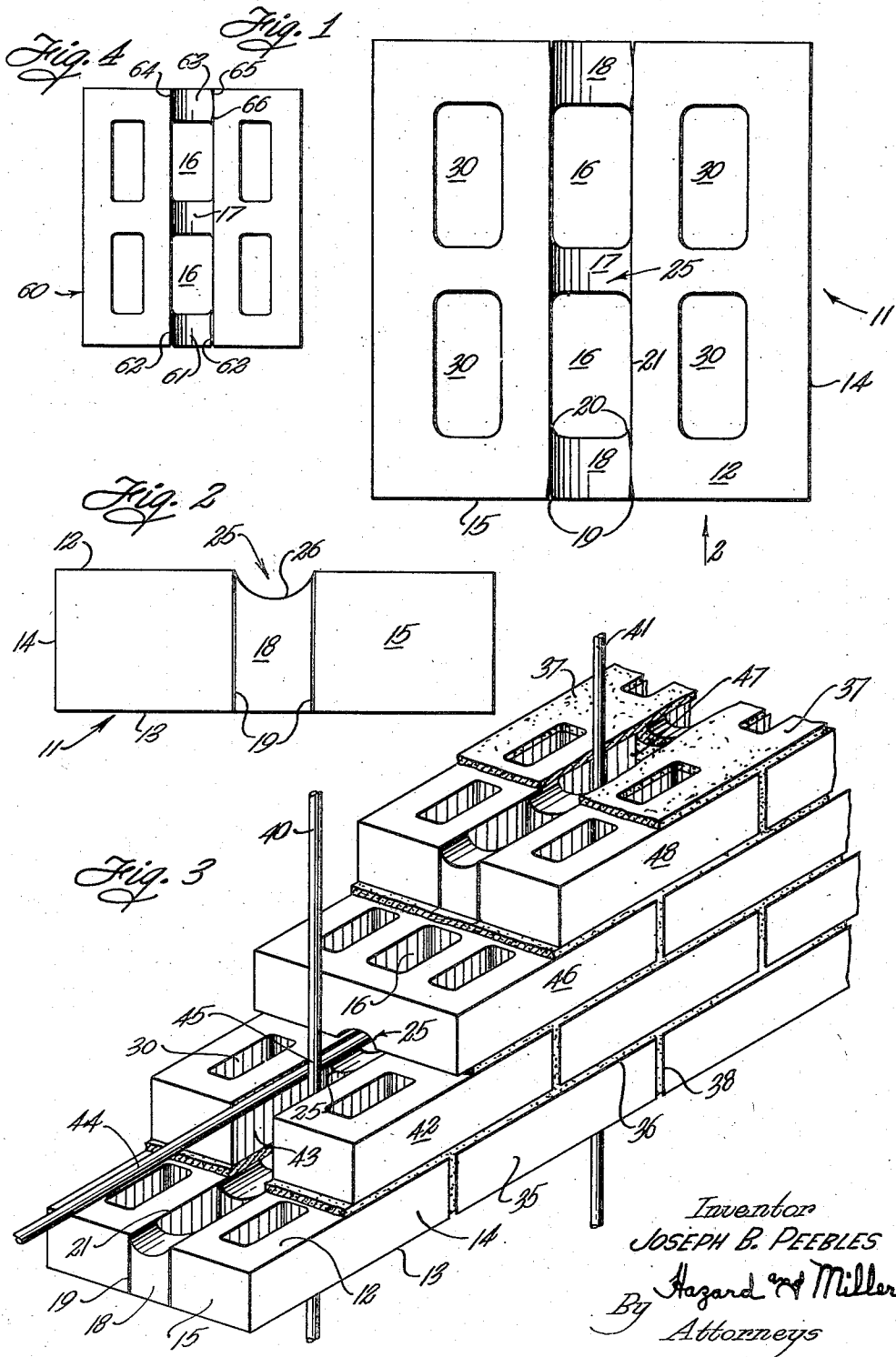
April 29, 1941.

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2,239,930

HOLLOW BRICK BUILDING BLOCK AND REINFORCED BRICK WALL

Filed Dec. 5, 1939



UNITED STATES PATENT OFFICE

2,239,930

HOLLOW BRICK BUILDING BLOCK AND
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Application December 5, 1939, Serial No. 307,618

6 Claims. (Cl. 72-41)

My invention relates to a type of hollow brick made in the form of a building block particularly designed to facilitate construction with metal reinforcement. In many approved forms of wall construction particularly where hollow cement blocks, hollow tiles or hollow bricks are used, it is the custom to have steel reinforcing bars arranged vertically and horizontally, the vertical rods passing through central openings in the blocks and the horizontal rods usually becoming embedded on substantially the lines of horizontal joints in the different tiers of blocks or bricks and this type of metal reinforcement. The rods are then usually embedded by flowing a cement grout into the openings of the hollow bricks or blocks through which the metal reinforcement extends, thus securely bonding the reinforcement in position establishing a bond with the brick or block and in addition, providing a stiff and rigid central core when the grout sets.

One of the difficulties which has arisen in the conventional type of hollow brick or block, especially for the vertical reinforcement rods is that in the preferred and better practice the rods are secured to and embedded in either the foundation or footing portions of the wall or in the lower tiers of the blocks forming the wall. The rods therefore extend upwardly to a considerable height usually to the full height of the wall. Therefore it has been the practice to lift the blocks upwardly having a high platform or working stage and then lowering the hollow blocks downwardly in effect threading the vertical reinforcement rod upwardly through the hollow central space of the particular block as this is lowered. The brick layer or cement mason must then apply his mortar to the lower tier and bed the block which has been lowered from the mortar bed. This is a somewhat difficult operation and of course is most decidedly inconvenient as it is necessary to lift all of the blocks through which the vertical reinforcement extends and then lower these into place. Of course as the reinforcement usually does not extend through each and every block lengthwise of a wall, all of the blocks do not have to be so elevated, and lowered. Nevertheless considerable difficulty arises on such type of construction in laying the blocks or bricks to form a proper vertical face. Other difficulties are in having the cement grout flow properly to make a complete filling in the openings or holes in the block surrounding the vertical reinforcement and to flow lengthwise into the other openings which do not have the vertical reinforcement.

Another trouble arising in a conventional hol-

low brick or building block is in placing the horizontal reinforcing rods lengthwise of the wall. Even when these are located to align with central and vertical openings through the blocks, the horizontal and vertical rods must cross each other at a right angular intersection which necessitates displacing one of the rods slightly from the true center of the brick or block. Then again there is insufficient space left between the top of one block and the bottom of the block of the next tier to properly locate and embed the horizontal reinforcing bars.

My invention seeks to solve these difficulties firstly as to the vertical reinforcement by providing the blocks with readily knock-out plugs in the end on the opposite ends of each block, thus the blocks are made with central openings in alignment preferably with the longitudinal center of the block and to present adequate strength there are preferably two or more of these openings spaced apart by an integral partition structure between adjacent openings. The readily removable plugs for the ends are also made integral with the brick but with score cuts extending preferably inwardly from the end of the block and also extending outwardly from the opening adjacent thereto. Such plugs thus have a weakened line and may be readily broken out by the brick or tile setter. Therefore the construction when a plug is broken out at the end is that the brick presents an opening or slot from one end communicating directly with the vertical opening or perforation adjacent thereto, therefore presuming the vertical reinforcement rod has its lower portion embedded either in the foundation or lower tiers of a wall and in laying a particular brick, this may be moved lengthwise, the end portion straddling the vertical rod until this is located in the desired position as to the opening of the block and the block is in its proper horizontal and vertical alignment with the remaining portion of the wall. Such block is then bedded on a horizontal mortar joint and such blocks are usually set up in the conventional manner with vertical mortar joints between adjacent blocks.

To improve the second feature of fitting the horizontal reinforcement rods, the partition portions and the top of the end plugs are concaved downwardly below the upper surface of the block, this concave portion being of a sufficient depth to accommodate the usual horizontal reinforcement rods and allow sufficient room for vertical and horizontal rods to intersect. The horizontal depressions also have another purpose in providing horizontal openings extending longitudinally

through a built up wall for the flow of the cement grout lengthwise in the wall when it is poured down one of the central openings to embed the vertical reinforcement and in addition the horizontal reinforcement rods. It is the usual practice to have the bricks with plane upper and lower surfaces and parallel with the concave depressions only in the partitions and end plugs at the top, therefore where the horizontal reinforcement rods are located, the brick of a lower tier has the concave depressions face upwardly and the brick of the next tier above has such depressions facing downwardly thus giving more room for the horizontal reinforcement rods and for the horizontal and lengthwise flow of the cement grout.

My invention is illustrated in connection with the accompanying drawing, in which:

Fig. 1 is a plan or top view of the hollow brick.

Fig. 2 is an end view taken in the direction of the arrow 2 of Fig. 1.

Fig. 3 is a perspective view of a wall built up with the bricks to illustrate the manner of inserting the bricks after removal of the knock-out plug.

Fig. 4 is a plan view of a modified form of block with an end plug having complete cuts instead of scores.

The block designated by the assembly numeral 11 is indicated as having plane top and bottom surfaces 12 and 13, similar rectangular sides 14 and similar rectangular ends 15. A block in the axial center considered longitudinally is shown with at least two openings or depressions 16 separated by a central partition 17. At the outer end of each of the openings 16 there is a removable plug 18, the partitions and plugs being molded integral with the material of the brick. In order to facilitate the ready knocking out of the plug, there are a pair of score cuts 19 extending inwardly from the outer ends of the block and a pair of inner score cuts 20. The score cuts are preferably formed aligned with the inner vertical sides 21 of the perforations 16. For the sake of facility of molding the block, the vertical corners of the perforations have the usual slight fillet.

A horizontal channel designated by the assembly numeral 25 is formed by concave upper surfaces 26 in the center partition 17 and the end plugs 18, these all preferably being on the same curvature and thus of the same depth. It is not necessary that these be curved to any definite radius. It is unnecessary also to have the channel on the upper and lower faces of the brick as such a channel formed on one face only is sufficient as bricks can be placed face down if desired, that is, with the channel facing downwardly. For sake of insulation properties, the block is also formed with a plurality of marginal vertical perforations or openings designated 30, these being of the same size cylindrical as to the longitudinal axial center of the block. It will thus be seen that the block has sufficient strength, the portions on the opposite side of the axial center vertical plane and having the openings 30 are connected by the substantial center partition 17 and the end plugs 18. Even when one of the plugs 18 is removed by breaking this out on the line of the score cuts, the block still has sufficient transverse strength on account of the central partition 17 and the plug 18 at the opposite end being left intact. These plugs are readily removed by a brick layer or tile setter using his trowel or other implement on account of the score cuts forming a weakened line and

as the respective pairs of score cuts 19 and 20 are in alignment, a clean cut or break is left when the plug is removed.

In Fig. 3 I illustrate one manner of using the hollow bricks above described. Several tiers of bricks are shown, the tiers being indicated by the numeral 35 with the mortar bedding joints 36. In applying the mortar the brick layer or tile setter usually lays two strips indicated at 37 on each side of the channels 25 and it is immaterial whether or no he plasters over the openings 30. Usually the mortar is sufficiently stiff to form a plug for such openings, however, in laying up successive tiers the individual openings or insulation spaces 30 are placed out of alignment and thus the wall has a large number of small air enclosing spaces. Between individual bricks of the tier there are vertical mortar joints 38. In the illustration there are shown two vertical reinforcing rods 40 and 41 and it will be noted that the brick identified as 42 has an end plug 18 at one end removed thus leaving an opening 43 whereby the brick may be fitted in a straddling manner sideways over the rod 40, the rod thus being introduced into the openings or perforations 16 through such open end, therefore such construction avoids threading the brick downwardly over the top of the reinforcing rod. The horizontal rod reinforcement 44 is fitted into the space formed by the channel 25 having the concave depressions 26 at the end plugs 18 and the central partition 17. There is thus sufficient room for the cross over intersection of the reinforcement rods at the position indicated at 45, however to give more space the next tier above the tier having the brick 42 and identified as 46 is placed with the upper side down, therefore the two channels 25 are placed opposite each other giving quite a large longitudinal space or opening continuing preferably the full length of the horizontal reinforcement rod 44. In the position illustrated of the vertical reinforcing rod 41, the end plug designated 47 is knocked out or removed on the brick indicated at 48, thus this brick may be fitted in a straddling manner as to the vertical rod 41. It is of course obvious that if desired as usually only one of the plugs 18 requires to be knocked out, that the block will be made with only one end plug removable; however it is much more convenient to have both plugs on the opposite ends of the brick readily removable as this facilitates the work in laying up the brick by the brick layer or tile setter.

When a few tiers of brick have been built up, the cement grout is preferably poured downwardly and this may be in all of the openings or spaces 16 of the uppermost tier of brick, the cement flows downwardly through the opening 16 in successively lower tiers which overlay sufficiently for the downward flow of the grout. Such grout also flows horizontally through the channels 25 formed by the concave upper surfaces 26 of the central partitions and end plugs, therefore for instance where the bricks of a lower and upper tier are reversed and have their channels facing towards each other with a reinforcing rod such as 44 extending therethrough, the cement grout completely fills in around and completely embeds the horizontal rods. On account of the entrance to the lateral openings or spaces 30 being closed either by the mortar joint or by the overlap of the bricks, practically no grout enters these spaces leaving them open or hollow for purposes of insulation. Even where there are

succeeding tiers of bricks each having the channels facing upwardly with no horizontal reinforcement of the horizontal joints, nevertheless the space formed by the concave surfaces 26 at the center partitions 17 and end plugs 18 is sufficient for the horizontal flow of the cement grout. It will thus be seen that by this construction a central solid core wall is built up after the cement grout is set and this includes the grout itself, the central partitions 17 as to all of the bricks and the end plugs 18 which are left intact in the bricks. The grout being poured from the tops and thus developing a hydraulic head as to the lower tiers fills all of the cavities and hence forms a good bond with the interior sides of the open spaces 16, the upper surfaces of the partitions and plugs 18 and the underside of such partitions and plugs. As the reinforcement both vertical and horizontal is embedded in the cement grout which forms a core wall, a strong wall is produced having a satisfactory bonding and resistance to earthquake shocks.

In Fig. 4 I illustrate another construction of the plug designated by the assembly numeral 60. This may have similar openings to that of the block of Fig. 1 with the longitudinal openings 16, the center partition 17 and preferably a solid end plug at one end and a removable plug 61 at the opposite end. This removable plug is made by having parallel cuts 62 completely through the end partition forming the plug from top to bottom of the block and from the end surface to the inside opening 16. These cuts are made while the clay is soft in part of the operation of making the block, however the plug remains in position and in the manufacture is not displaced, hence as the block is burnt in the kiln in the usual procedure of brick making, the plug restricts the clay from shrinking at the end but does not again bond with the clay on opposite sides of the cut 62, however the plug is held in place by the slight but sufficient adherence of such plug to the end portions of the block. Such plug is hence readily removed when setting up in a wall.

One of the advantages of having the completely cut removable plug is that as the cut is made on straight lines providing thus smooth surfaces on opposite vertical sides of the plug, it is readily knocked out of place without bringing any strain on the central partition 17 or on the plug at the opposite end. Where the plug is only partly scored through as in the construction of Fig. 1, if the brick mason is not careful in knocking out the plug, he may cause it to break in such a manner that it has rougher jagged edges and therefore in the complete removal of the scored plug sometimes the partition 18 and the plug at the remote end of the brick is broken, therefore there are certain advantages to the use of the pre-cut plug. As in the scored blocks it is only necessary to have the plug at one end readily removable, in both forms of construction either the scored plug or completely cut and separate plug, it is sometimes desirable to have this only at one end of the block. This leaves the full strength not only of the center partition but of the opposite end wall of the block.

In certain cases it is of advantage to have the end plug readily movable but still partly attached at least on one side to the end of the brick. Such construction is illustrated in connection with Fig. 4. The removable plug 63 is formed by a complete cut 64 severing one edge of the plug from the remaining structure of the

brick. The opposite side has two aligned score cuts 65 and 66, these however not meeting so that there is a narrow integral portion between the body of the brick and the plug. By this construction the brick can be handled in the kiln in transportation and in building into a wall without any particular danger of the plug becoming displaced but if there is only a small section to sever to remove the plug, this can readily be done without great danger of breaking the brick.

A further feature of my invention as it relates to the brick of Fig. 4 resides in making the cuts 62 completely through the end wall to a vertical perforation in the plastic clay in which the brick is molded, however in this cutting the plug is left in position in the end wall, such plug on its joint faces with the end wall having a sufficiently close frictional contact and adhesion to retain the plug in position. The brick including the plug is then burnt to produce the hard brick in the normal manner, the plug still being retained in position and in effect resisting a certain amount of shrinkage of the clay body of the brick. This normal shrinkage retains the plug tightly in position in the end wall of the brick during normal transportation and handling of such brick but the plug may be readily removed when setting the brick up in a wall.

Various changes may be made in the details of the construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. A building block having a plurality of transverse perforations between the top and bottom of the block, one of the ends having a removable plug in line with one of the perforations, the outside end face of the plug being in alignment with the end surface of the block whereby the blocks may be built up into a wall with end surfaces of contiguous blocks separated only by a vertical mortar joint of constant thickness.

2. A building block having a plurality of transverse perforations from the top to the bottom, score cuts forming a removable plug in alignment with one of the perforations, the outside surface of the plug being in alignment with an end surface of the block forming a plane end surface whereby the block may be built up into a wall with other blocks, the end surfaces being separated only by a vertical mortar joint of constant thickness.

3. A building block having a plurality of vertical perforations between the top and the bottom, a removable plug in an end in line with one of the perforations and held in place by friction only, the block being adapted for building into a wall with other blocks with the end surfaces of the blocks and the plugs separated only by a vertical mortar joint of constant thickness.

4. A building block having a plurality of transverse and longitudinal perforations from top to bottom with transverse partitions between the longitudinal perforations, at least one end of the block having a removable plug in line with one of the perforations, the exposed end surfaces of the block and the end surface of the plug being in alignment.

5. A building block having a plurality of transverse and longitudinal perforations from top to bottom, the longitudinal perforations being separated by a solid partition, at least one end having score cuts in line with one of the perforations to form a readily removable plug, the end

surface of the block at the score cuts forming a plane surface from side to side and top to bottom.

6. A building block having a plurality of transverse and longitudinal perforations from top to bottom, the longitudinal perforations being spaced apart by solid partitions, one end of

the block having a plug leading to one of the perforations, the plug being held in place only by friction, the end surface of the plug and of the block being in the same plane from side to side and from top to bottom.

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