June 1, 1943. W. H. WILLIS 2,320,690

BUILDING WALL CONSTRUCTION

Filed July 30, 1940 2 Sheets-Sheet 1

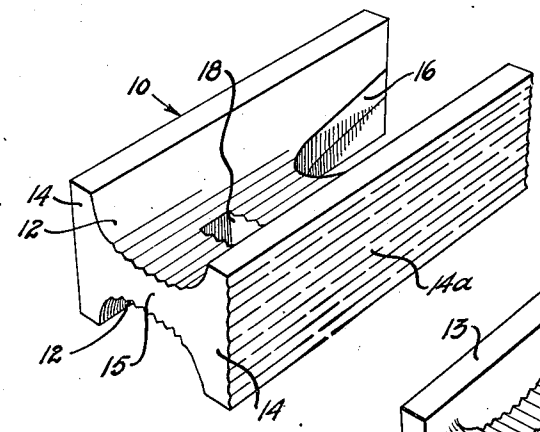

Fig. 1.

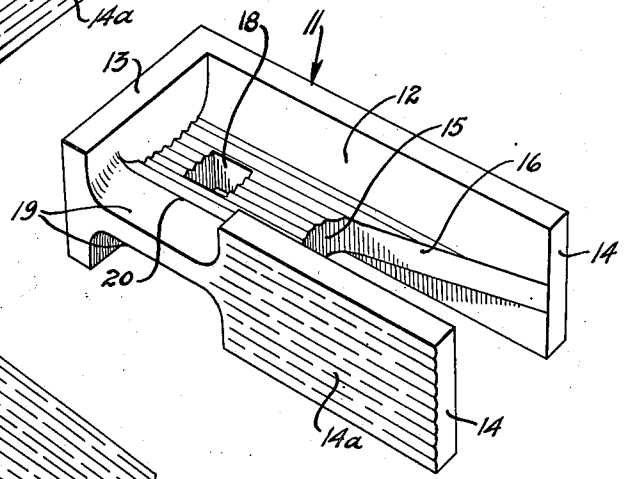

Fig. 2.

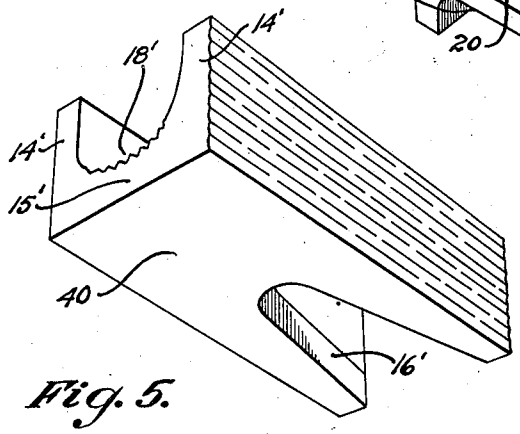

Fig. 5.

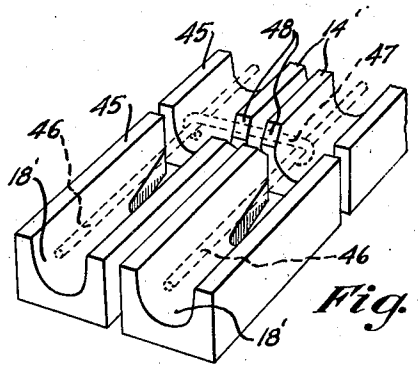

Fig. 6.

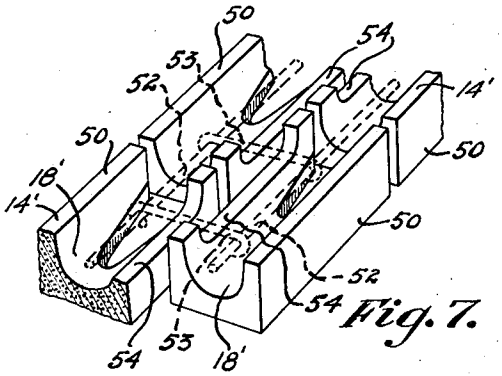

Fig. 7.

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BUILDING WALL CONSTRUCTION

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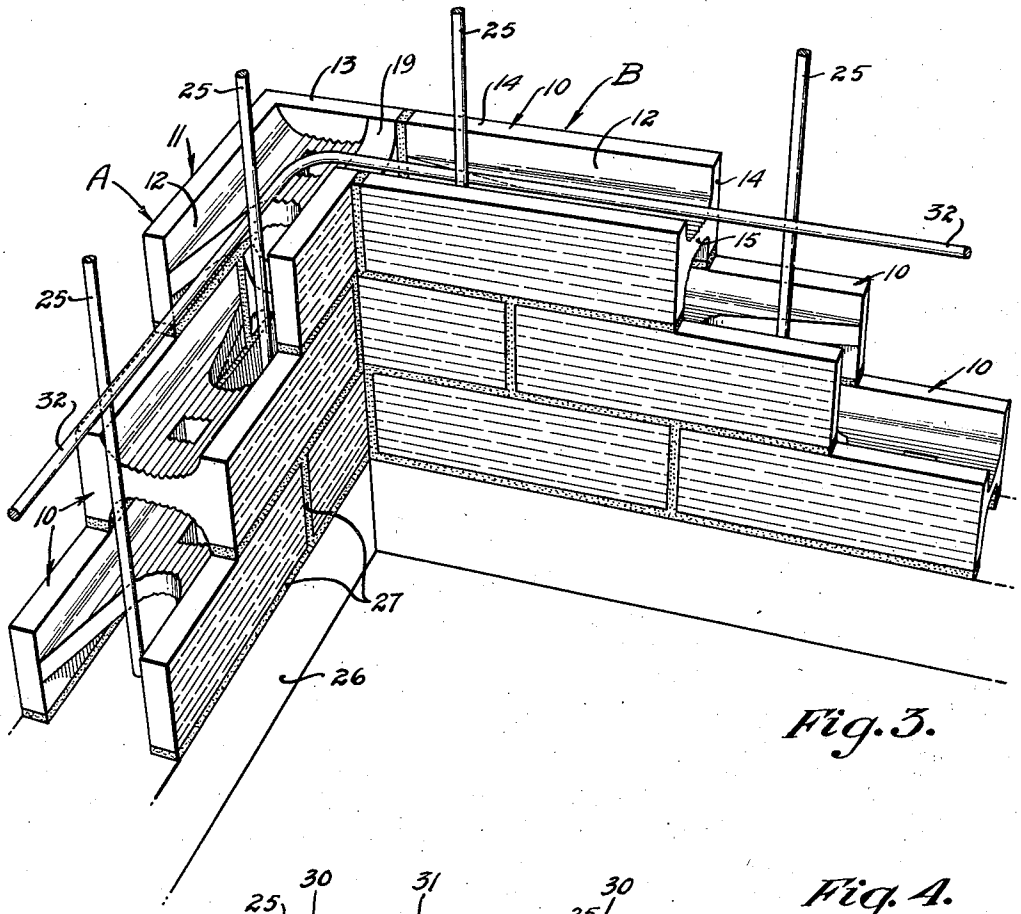

Fig. 3.

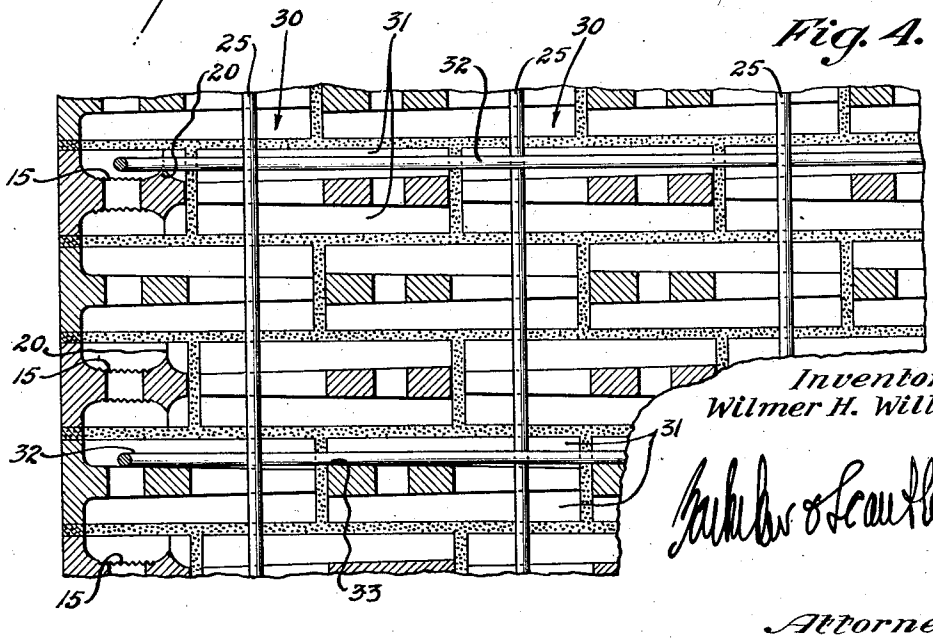

Fig. 4.

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BUILDING WALL CONSTRUCTION

Wilmer H. Willis, Los Angeles, Calif.

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2 Claims. (Cl. 72—30)

This invention relates generally to wall construction for buildings and the like, and more particularly to building blocks or bricks designed for construction of composite brick and reenforced concrete walls.

The general objects of the invention are to provide a composite brick and reenforced concrete wall construction of greater inherent strength than heretofore known, to provide a type of recessed brick which may be laid about and in interlocking relation with steel reenforcing bars with facility and speed, and to provide a recessed brick construction which will permit rapid pouring or placement of the fill-in mortar, grout or concrete.

The present invention provides a building block or brick having a recess or notch extending inwardly from one end, so that the brick may readily be placed about previously erected vertical reenforcing bars. When the wall is assembled, these recesses also form vertical passageways through the staggered brick for passage and fill-in of mortar, grout, or the like. The bricks are also recessed horizontally from end to end, to provide both for horizontal reenforcing bars, and for passage and fill-in of mortar or grout in a horizontal direction. When the bricks are built into a wall, these several recesses form intercommunicating vertical and horizontal passages for reception of the steel reenforcing bars and for the grout. The grout may be poured or placed after laying each course, though the continuous and intercommunicating vertical and horizontal passages permit pouring after any number of courses of the wall have been assembled, to obvious advantage.

Other objects and accomplishments of my invention will appear and be described in the course of the following detailed description of certain illustrative forms of my invention, reference for this purpose being directed to the accompanying drawings, in which:

Fig. 1 is a perspective of a preferred form of brick in accordance with the invention;

Fig. 2 is a perspective of a preferred form of corner brick in accordance with the invention;

Fig. 3 is a perspective of a portion of a wall formed of bricks of the type of Figs. 1 and 2, the view showing a corner construction;

Fig. 4 is a longitudinal vertical section through a wall formed of bricks of the type of Figs. 1 and 2, the left hand end of the wall being at a wall corner;

Fig. 5 is a modified type of brick in accordance with the invention;

Fig. 6 shows a double thickness wall construction; and

Fig. 7 is a view similar to Fig. 6 but showing a modification.

The brick 10 of Fig. 1 may be referred to as an intermediate brick to distinguish it from the corner construction brick 11 of Fig. 2. The bricks 10 and 11, which may be molded or cast of brick or tile clay, or of concrete, or the like, have certain general features in common, with certain modifications in the instance of brick 11 to adapt it to the requirements of corner construction, as will appear. For convenience of description and understanding, corresponding parts and features of the intermediate and corner bricks 10 and 11, respectively, will be designated by like reference numerals.

The bricks 10 and 11 are each of rectangular outline, and in the instance of the preferred illustrative form of Figs. 1 and 2, are longitudinally recessed on both upper and lower horizontal surfaces as indicated at 12, the recesses being preferably concavely curved as seen in transverse section. The recess 12 in the instance of brick 10 extends from end to end of the brick, but in the instance of corner brick 11, the recess 12 is closed at one end of the brick by an end wall or flange 13. The longitudinally recessed bricks 10 and 11 may be regarded as comprising longitudinal vertical side flanges 14 and an intermediate or central connecting web 15, the web preferably, and as here shown, being no thicker than substantially one-third the vertical height of the block, so that the longitudinal recesses will be comparatively deep. The exterior surfaces 14a of flange 14 on one side of the bricks 10 and 11 may be grooved or roughened for plaster application and correspond to the interior face of the wall, while the exterior surface of the opposite flange 14, as well as the exterior surface of flange 13 of brick 11, correspond to the exterior face of the wall, and may be either plain or ornamentally mottled.

Web 15 is notched in from the end to form a recess as at 16, for approximately half the length of the brick, the recess wall beginning at the inside surfaces of flanges 14 and preferably tapering toward the inner end as illustrated. In the instance of corner brick 11, the recess 16 of course is formed in the end of the brick opposite the end having the closure flange 13. Thus the bricks are adapted to straddle vertical reenforcing bars as shown in Fig. 3, and as will be described later.

The upper and lower surfaces of web 15 are

preferably grooved or roughened so as to enhance bonding with interior mortar or grout, and are longitudinally tapered toward their recessed end, as seen in vertical longitudinal section (Fig. 4). The web 15 of each brick is preferably formed near the end remote from the recessed end with an aperture 18, for a purpose that will appear later.

One side flange 14 of corner brick 11 is recessed at 19, immediately adjacent end flange 13, to provide for passage of a horizontal reenforcing bar 32, and also of mortar or grout, around the corner of the construction. Ribs 20 extending across recesses 19, at an elevation superior to webs 15, are adapted to support the horizontal reenforcing rods in spaced relation above webs 15 (see Fig. 4). The thicker ends of webs 15 also support the horizontal rods in position spaced above the major portions of the webs.

Bricks 10 and 11 are both symmertical about a horizontal medial plane so that they may be turned end over end for placement.

The procedure for constructing corner-abutting walls from the bricks of Figs. 1 and 2 is as follows: Vertical reenforcing rods 25 are first erected from the foundation 26, then the first course of bricks is laid with the notched ends straddling the vertical reenforcing bars and with their notches all facing in one direction for each wall. The bricks may be set up "dry," though it is preferred that they be set in mortar applied at their edges as indicated at 27. The second course is then laid, with the notched ends of the bricks facing in the opposite direction, and again straddling the vertical rods 25, the bricks of the two courses being placed in overlapping or staggered relation as shown. The method of use of the corner bricks 11 will be clearly evident from Figs. 3 and 4, alternate courses of each of the two abutting walls A and B terminating in a corner brick 11, abutted by an intermediate brick 10 of the other course, as illustrated. Thus the end flange 13 of the corner brick 11 of one wall is flush with the outside flange 14 of the adjacent intermediate brick 10 of the other wall, and the side recesses 19 of the corner bricks register with the longitudinal recesses 12 of the intermediate bricks of that other wall.

As will appear, the recessed ends of the bricks of the overlying courses define vertical passages 30 extending vertically through the courses to foundation 26, and in these vertical passages the vertical reinforcing rods 25 are positioned in spaced relation to the webs 15 and the flanges 14. Continuous horizontal passages 31, intersecting the vertical passages 30, are defined by the longitudinal recesses 12 in intermediate bricks 10 and corner bricks 11, being continued around the corners of the abutting walls via the side recesses 19 in the corner bricks. At suitable vertically spaced intervals, horizontal reenforcing rods 32 are laid in the horizontal passages, and are continued around the corners of the abutting walls A and B via the recesses 19 in the manner shown in Fig. 3. The open longitudinal recesses 12 greatly facilitate the placement of the horizontal rods 32, which are simply laid in the recesses. These horizontal reenforcing rods 32 are supported above the flanges 15 of corner bricks 11 by the aforementioned ribs 20 of the corner bricks, and are supported above the surfaces of the webs 15 of intermediate bricks 10 both by the ribs 20 of corner bricks 11, and by the elevated edges 33 of the thick ends of the webs 15 of intermediate bricks 10 (see Fig. 4).

At any time during the construction of the wall, either after laying one course, or after laying a number of overlying courses, the continuous and intercommunicating vertical and horizontal passages 30 and 31 may be filled with concrete, preferably a free flowing cementitious grout. This may be poured from above into the vertical spaces 30 from which it flows into the horizontal spaces 31, entirely surrounding both the vertical and horizontal reenforcing members, and bonding to the interior of the webs 15 and flanges 14 of the bricks. The aforementioned apertures 18 in the webs prevent the formation of air pockets below the webs and assure complete filling of the horizontal passages.

The result is a wall construction composed of a composite of brick and reenforced concrete, characterized by great inherent strength, and at the same time relatively easy as well as inexpensive to construct.

Fig. 5 shows a modified brick or block, consisting of side flanges 14' and a deep longitudinal recess 18' in its top side only, forming a web 15' and a flat bottom surface 40, the web again being preferably no thicker than substantially one-third the height of the block. A notch 16' is formed in one end of web 15', corresponding to the notch 16 of the forms of Figs. 1 and 2. It will be evident that the form of Fig. 5 has in common with the form of Fig. 1 a longitudinal recess extending from end to end, for the same purpose as the longitudinal recesses of the form of Fig. 1, and a recess in one end for passage of a vertical reenforcing bar, and for definition in conjunction with other bricks of the assembled wall of a vertical passage for the concrete or cementitious fill. The form of Fig. 5 is especially adapted to the placement of the concrete or cementitious or mortar fill following or during the laying of each course. Thus, having laid a course of such bricks as shown in Fig. 5, the longitudinal recess 18' and the end recess 16' of each brick will be filled in with the cementitious or mortar material. The next course of bricks is then laid, and the flat bottom surfaces 40 of the bricks of that course come into contact with and bond to the material filled in the recesses 18' of the first mentioned course. The necessary modification of the type of brick illustrated in Fig. 5 to form a corner brick will be obvious and need not be detailed.

Fig. 6 shows a wall construction of double thickness, constructed in this instance of the type of brick shown in Fig. 5, and with cross ties between the horizontal reenforcing bars of the two rows of bricks. The two rows are each made up of bricks 45, properly spaced end to end for mortar to be placed therebetween, and the two rows are spaced for mortar or a cementitious fill as illustrated. In this instance of Fig. 6, the bricks of the two rows are alined with one another, rather than staggered. Horizontal reenforcing bars extending through the recesses 18' of the two rows of brick are indicated at 46, and the two bars 46 are hooked together by cross ties 47 at the joints between abutting bricks, the adjacent flanges 14' being notched or relieved at the corners as indicated at 48 to pass the rods 47. The vertical reenforcing rods, which are not illustrated in Fig. 6 for sake of simple illustration, bear the same relation to the bricks as in Figs. 3 and 4.

Fig. 7 shows a modified double thickness wall construction, made up of the type of brick shown in Fig. 5, modified as to be described. Each row

is again made up of bricks **50**, placed end to end, with a suitable spacing therebetween for mortar, and the two rows are also preferably spaced for cementitious fill or mortar, but the bricks of the two rows are in this instance staggered, so that the joints between abutting bricks of one row come midway of the bricks of the adjacent row. Horizontal reenforcing bars extending longitudinally of the recesses **18'** are indicated at **52**, and these are hooked together by cross ties indicated at **53**. To provide for passage of the cross ties, the adjacent flanges **14'** of the two rows of bricks are formed with recesses **54**, which preferably terminate short of the ends of the brick in order to leave portions of the flanges for support of the next course of brick above.

From the foregoing descriptions of double-walled structures formed of bricks of the form of Fig. 5, it will be apparent, without the necessity of detailed description, how such a double-walled structure may be formed with the bricks shown in Figs. 1 and 2, merely by notching their side flanges to accommodate the cross ties.

While I have now described and illustrated certain present preferred and illustrative forms of my invention, it will be understood that this is for illustrative purposes only, and that various changes in design, structure and arrangement may be made without departing from the spirit and scope of the invention or of the appended claims.

I claim:

1. A wall construction comprising overlaid courses of building blocks, each said block having a longitudinal recess sunk in a horizontal surface from end to end of the block so as to form two vertical side flanges and a connecting web, and having a notch in and vertically through said web and extending inwardly to a substantial depth from the end of the block, the blocks of alternate courses being staggered and being laid with their notches facing in opposite directions, and the notches in the blocks being of sufficient depth that when the blocks are so laid the notches in the blocks of each overlaid course aline with the notches of the courses below it to form vertical passages, said webs having high points at their ends remote from their recessed ends, the longitudinal recesses in the blocks forming horizontal passages intercommunicating with said vertical passages, vertical reenforcing bars in certain of said vertical passages, horizontal reenforcing bars in certain of said horizontal passages resting on said high points of said webs, and mortar or the like filled in said vertical and horizontal passages around said vertical and horizontal reenforcing bars and bonded to the surfaces of said blocks defining said vertical and horizontal passages.

2. A wall construction embodying a building block of rectangular outline having a longitudinal recess in a horizontal surface and extending from end to end, so as to form two side flanges and a connecting web, and having a notch in said web extending inwardly from one end of the block to a substantial depth, and a second building block of rectangular outline having a longitudinal recess in a horizontal surface and extending from one end of the block to a point just short of the other end of the block, so as to form two side flanges, an end flange, and a connecting web, the first mentioned block being placed in an abutting relation to the side of the second block and in a position adjacent the flanged end of the second block, a notch in the side flange of the second block adjacent the end flange of said block, said notch coming opposite the end of the first block, a high point on the web of the second mentioned block at a position opposite said flange notch, a horizontal reenforcing bar positioned in the pasageway formed by said longitudinal recesses in said blocks and said notch in the side flange of the second block and supported by said high point on the web of the second mentioned block at an elevation superior to the remainder of said web, and the notches in the webs of said blocks forming vertical passages for reception of vertical reenforcing bars and/or cementitious grout.

WILMER H. WILLIS.