Nov. 16, 1926. 1,607,583

K. BADER

CONCRETE WALL AND BLOCK CONSTRUCTION

Filed Jan. 18, 1926

FIG. 1

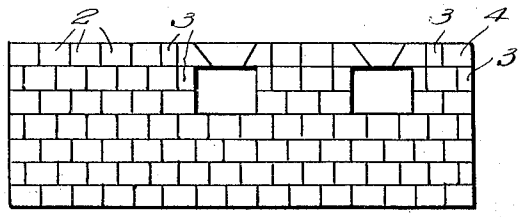


FIG. 2

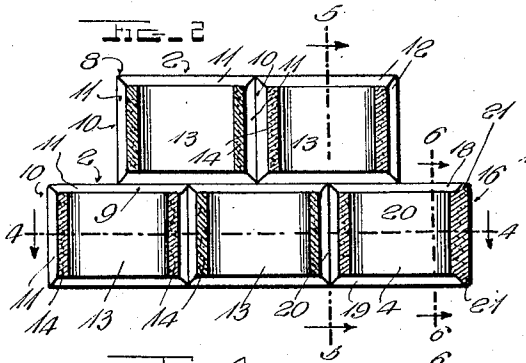


FIG. 3

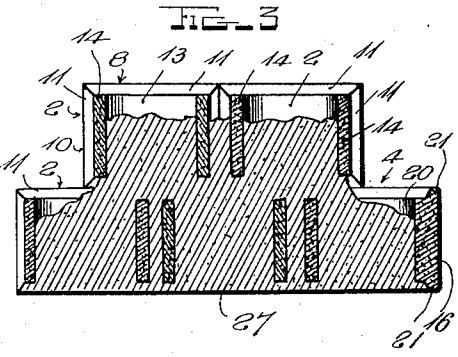


FIG. 4

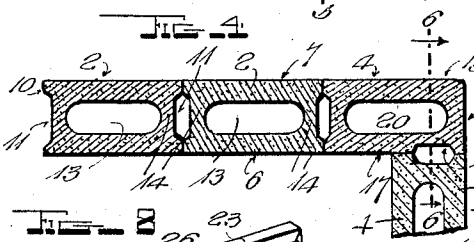


FIG. 5

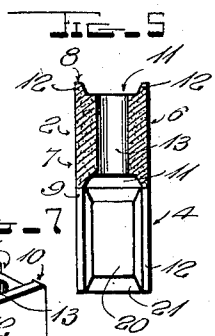


FIG. 6

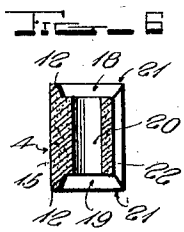


FIG. 8

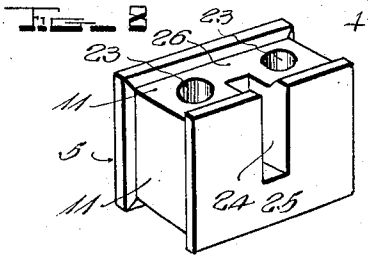


FIG. 7

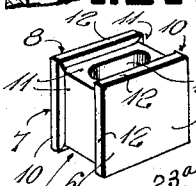


FIG. 10

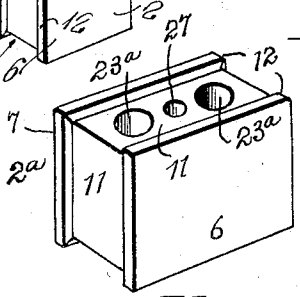
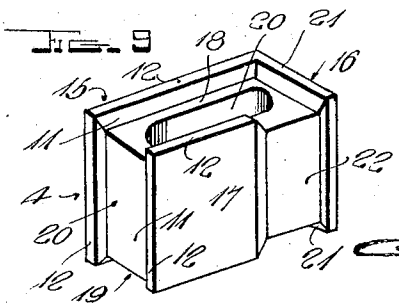


FIG. 9



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UNITED STATES PATENT OFFICE.

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CONCRETE WALL AND BLOCK CONSTRUCTION.

Application filed January 18, 1926. Serial No. 82,063.

This invention relates to certain new and useful improvements in concrete wall constructions and to blocks for use in the erection of such walls.

The primary object of my invention is to provide a novel construction of building blocks or units whereby a concrete wall of superior type and durability may be produced without the use of skilled labor, and in which wall the component parts are so bound and interlocked as to secure maximum reinforcement, allowing a wall of great strength to be made with the use of a minimum amount of material and without the necessity of making the wall of undue thickness, as compared with walls constructed of brick or other building materials.

A further object of the invention is to provide a wall construction composed in part of preformed blocks and in part of concrete molded in situ within and between the blocks themselves so as to form an internal binding and reinforcing structure whereby the opposed surfaces of the individual blocks of the same and adjacent courses are not only cemented together but the blocks of the courses throughout are internally united by a skeleton wall of the material molded in situ, the laid blocks being so constructed as to constitute the mold in which said internal reinforcing wall is formed.

A still further object of the invention is to provide a construction of the blocks which will permit of the use and ready and free introduction of ordinary concrete in wet or plastic condition for the formation of the internal reinforcing wall, and whereby an internal reinforcing wall of sufficient inherent strength to provide against fracture may be produced, and one which will be self-sustaining without the use of metal reinforcing or with the use of a minimum amount of reinforcing means of such character.

A still further object of the invention is to provide for the construction of corner angles without the use of angular corner blocks.

The invention consists of the features of construction, combination and arrangement of parts, hereinafter fully described and claimed, reference being had to the accompanying drawing, in which:—

Figure 1 is a side elevation of a portion of a wall formed of blocks constructed in accordance with my invention.

Figure 2 is a vertical longitudinal section through a portion of the wall on an enlarged scale showing the same before the interstices between the blocks are filled by the internal concrete binder or reinforcement.

Figure 3 is a view similar to Figure 2 showing the binder material filled in.

Figure 4 is a horizontal section on line 4—4 of Figure 2.

Figure 5 is a vertical section on line 5—5 of Figure 2 through a corner portion of the wall.

Figure 6 is a detail section on line 6—6 of Figure 2.

Figure 7 is a perspective view of one of the ordinary full-sized wall blocks.

Figure 8 is a similar view of a special block.

Figure 9 is a similar view of a corner block.

Figure 10 is a similar view of a modified form of block.

Referring now more particularly to the drawings, 1 designates a portion of a wall structure built of concrete blocks or units and with an internal reinforcement in accordance with my invention. The blocks or units, as shown, consist of ordinary full length blocks 2, half blocks 3, corner blocks 4 and special floor beam supporting blocks 5. In addition to these, there may be employed keystone blocks, sill blocks and other special blocks as commonly employed in wall constructions and to suit varying conditions in the erection of specifically different designs of walls or buildings.

All the blocks are preformed or molded from concrete. Each block 2 is of rectangular formation and is provided with front and rear faces 6 and 7 which may be smooth or have any desired rough surface configuration. The top 8, bottom 9 and ends 10 of the block are formed with grooves or recesses 11

extending the length thereof, said grooves or recesses intersecting at the corner of the block and forming a groove or recess which extends continuously around the block. These grooves or recesses are pointed at the sides of the portions of the block on which they are formed by the marginal flanges 12, which are of comparatively narrow width so that each groove will be comparatively wide in order that it may receive an effective amount of binding material, as hereinafter described. The grooves are preferably slightly flared in the direction toward the body of the block, so that the inner surface of each flange 12 slopes on a gentle incline toward the block body, thus making each flange of increasing thickness toward its base for strengthening purposes, while at the same time avoiding the formation of any sharp angles liable to cause cracking of the blocks under unequal expansion and contraction of different portions of the formed wall. Provided in the body of each block 2 is a slot 13 extending from top to bottom of the block between the upper and lower grooves 11. This slot 11 is coextensive in width with the groove and is of a length somewhat less than the length of the body portion of the block, leaving at the ends of the block wall portions 14 separating the slot 13 from direct communication with the end grooves 11, the portions 14 constituting bridge walls between the front and rear face portions of the block.

Each half block 3 may be and preferably is of the same structural formation as the blocks 2, differing therefrom only in size, the blocks 3 being used at points in the wall construction where intervening spaces are to be filled of a length shorter than the full length blocks. Similar blocks of other reduced sizes may also be used in the erection of walls or buildings deviating to a greater or less extent from the unitary principles of measurement of the blocks.

Each block 4 is a corner block of special structure designed for use in connection with the blocks 2, 3 and 5 in the production of a wall embodying the characteristic features of my invention, while enabling the use of angular corner blocks to be dispensed with. As shown, each block 4 is provided with a smooth or rough finished front surface 15, a plain or finished end surface 16, a rear surface 17, and grooved top, bottom and end surfaces 18, 19 and 20 having the grooves 11 and flanges 12 conforming to the grooves and flanges of the blocks 2, and also provided with a slot 20 conforming to the slot 13. The only difference in general construction between the block 2 and block 4 is that the top and bottom grooves of the block 4 are closed at the end 16 by end flanges 21, and said block 4 is provided in its rear face with a groove 22 disposed at one side of its vertical center, which groove intersects the top and bottom grooves 11 adjacent to the face 16, the top and bottom flanges 12 being cut away at such points a distance equal to the width of the groove 22.

Each block 5 is similar in general construction to the blocks 2 in the provision of the top, bottom and end grooves and flanges, like faces of the blocks being indicated by corresponding reference characters, but in lieu of the slot 13 the block 5 is provided with a pair of vertical openings 23 disposed on opposite sides of its vertical center and intersecting the top and bottom grooves 11 thereof. The block 5 is also provided with a recess 24 opening through its rear face and through the top of the block and closed at its base by a wall portion 25. The blocks 5 are designed to form elements of courses in a wall from which floor beams are supported, the ends of the beams extending into the recesses 24 and being supported on abutment shoulders formed by the wall portions 25. In this block structure an integral web 26 lies between the openings 23 and into this web 26 the recess 24 extends, allowing a beam receiving recess of required depth to be formed in the block without unduly weakening the latter.

In the operation of constructing a wall from blocks made in accordance with my invention, the blocks are laid, like brick, in courses as usual, with the blocks of the superimposed courses arranged to break joint with each other. In general the full length blocks 2 are employed exclusively in each course, except where the nature of the case requires the use of the half blocks 3, the blocks 4 being placed at the corners of the structure and the blocks 5 set in the required course or courses between blocks 2 at the points where the ends of the floor beams, joist or the like are to be received and supported.

In the erection of such a wall, the blocks 2 or 2 and 3 when laid will have their end portions abutting so that their top and bottom grooves 11 lie in the longitudinal alinement and so that their end grooves 11 will be closed at the front and rear by abutting contact of the end flanges 12 and will form a vertical passage between the grooves at the top and bottom of the adjoining blocks. The horizontal grooves in the top and bottom of each course of blocks will also register with grooves of the underlying and overlying courses, which will be closed by the top and bottom flanges at the front and rear of the blocks and will form longitudinal passages communicating with the vertical passages between the ends of the block. The arrangement of the blocks to break joint will also so dispose the blocks that the slots 13 of the blocks 2 and 3 or the passages 23 of the blocks 5 will connect with the ver-

tical and longitudinal passages between the top and bottom faces and end faces of the staggered blocks of adjoining courses. The courses when laid will thus have communicating passages between all the surfaces of the blocks thereof, and these passages, because of the special formation of the blocks above-described, will be comparatively large sized so that a filler of a binding material 27 may be received therein. This filler may consist of a wet or plastic concrete mixture, of such a consistency as to prevent shrinkage, which may be introduced after each course is laid or after two or more courses are laid according to the degree of the fluidity or plasticity of the mixture used. The mixture employed may be of proper plasticity to permit it to be applied by means of trowels, a pump or force gun or other suitable means or implements or other consistency to adapt it to be poured in place. By reason of the structural formation of the blocks, however, the passages are of such size as to permit of the ready introduction of concrete of ordinary character or ordinary richness, so that mixtures as rich as grout need not be employed, and whereby an efficient binding action may be obtained by the use of an economical kind of binder. This is a desirable and important advantage of my construction, but, of course, a rich binding mixture may be used if desired. When the wall is erected and the binding medium sets, it will be seen that a wall construction is provided in which the wall is formed partly of assembled preformed or molded concrete units and partly of an inferior unitary mass molded in situ within the blocks, the blocks themselves forming a mold in which such mass is shaped to provide a skeleton internal binding and reinforcing structure. This internal binding and reinforcing structure will, by reason of the block structures described, extend between all the faces of the blocks as well as through the blocks, so that manifold surfaces of the blocks will be embedded therein and bound thereby. A wall structure of great simplicity is thereby produced which is of composite concrete type, the block units giving proper dimensions and surface finishes and configurations to the walls, while the internal bracing structure locks all the assembled units together and forms a skeleton framework which is itself self-sustaining and supported, adding greatly to the strength of the formed wall. The advantage of such a wall construction is that the elements to be assembled may be set up by the use of unskilled labor, and no special skill is required in the filling in of the binding medium, so that such a wall may be erected at a very low cost. The construction of the block units, in addition to adapting them to be employed with a reinforcing binder in the manner described, also enables blocks of light weight and containing a comparatively small amount of material to be made, ensuring cheapness of production as well as a reduction of cost in handling and shipment. It will be observed that the described formation of the grooves, slots or passages and the flanges and parting walls of the blocks is such that grooves and slots or passages of large size are provided, so that, if desired, a coarse binder may be used and will readily pass therethrough and thereinto, while at the same time permitting a greater amount of the lower cost binding material to be used with the result of securing greater economy in the construction of the wall.

It will be readily understood from the foregoing that the passages 23 of the blocks 3 register with the slots and passages formed by the end grooves of certain of the overlying and underlying blocks of adjoining courses bearing joint therewith.

In the use of the corner blocks 4 these blocks, by reason of their construction, may be laid at the corners so that they will form full blocks in one wall side and half blocks at the intersecting wall side, this use being permitted by reason of the fact that the surface 16 of the block is of one-half the width of the surface 15. Hence, as occasion may require, the corner block may be arranged so that it may be interchangeably used as a full block or half block to face in either direction at the juncture of two wall sides. When disposed so that its face 15 is used at one wall side, in which it is employed as a full block its end face 16 will be exposed as a half block at the adjoining wall side, and its recess 22 will be disposed to aline with the grooved end of a terminal block on the latter-named wall side, thus enabling it to be employed in conjunction with the other blocks and united in the wall structure by the binding material. Such construction of the corner blocks is advantageous, not only from the foregoing standpoints, but also because by their use the use of angular corner blocks which are awkward to handle, pack and ship, and subject to ready breakage, may be dispensed with and a corner block of the same general external configuration as the other blocks employed, so that all the blocks may be handled and transported with greater convenience and economy.

Figure 10 shows a form of block 2^a which may be used under some conditions, such block being similar in general construction to the block 3, but having, in lieu of the slot 13, a pair of vertical openings 23^a and a central opening 27, the former being of greater diameter than the latter. With this construction the opening 27 is designed to register with the passages between the grooved ends of blocks of an overlying or underlying

course and the openings 23ª to register with the similar openings 23ª of overlying or underlying blocks or with slots 13 of blocks 2 if the two forms of blocks are used in the wall construction.

My invention provides a wall construction which admits of the laying of blocks either with their flanges 12 and 16 lying directly in contact for the formation of a smooth-surfaced wall without mortar showing at the joints, or with their said flanges spaced to show mortared joints of any desired depth, while at the same time securing a firm bonding of all the blocks at both the sides and corners of the wall. This is due to the general formation of the blocks and particularly to the novel and peculiar construction of the corner blocks 4. When it is desired to lay a smooth-surfaced wall, the top and bottom faces of superposed tiers of blocks are laid with their opposed flanges 12 and 16 in contact the mortar in this case being filled in to occupy the openings 13, 20, 23, 23ª and 27 and the grooves in the abutting block faces. With this construction it will be seen that as the openings and grooves in the blocks of the side walls communicate with each other, a monolithic inner wall formed by the mortar or cement will be produced which will bond all the blocks together. In addition, as the rear grooves 22 of the corner blocks 4 open into their top and bottom grooves 11, these grooves 22 will connect said grooves 11 of the corner blocks in one side of the wall with the end grooves and top and bottom grooves of blocks 2 and 3 of another side of the wall, where the walls have a corner or angle-intersection, thus binding the blocks of the sides across the corner or angle intersection, which, in this manner of laying, would not be the case if the grooves 22 of the corner blocks were not in communication with the top and bottom grooves of said blocks. The same effect is obtained when the blocks are spaced to a greater degree for a face showing of the mortar at the joints, except that a still greater cross bonding action is obtained by the increased depth of the mortar. By this means the monolithic interior construction is rendered continuous and without break, even at the corners, so that full sized blocks may be used at the corners without bonding break, whereby a wall of superior appearance and greater than usual strength may be built without added cost.

Any suitable number of blocks in a wall may be provided with anchor members 28 (see Figure 4) consisting of wooden blocks or strips to which metallic or other lathing or supports therefor may be nailed, when an air space or double wall structure is to be provided or a building sheathed and plastered.

Having thus fully described my invention, I claim:—

1. In a building construction, a block of rectangular formation having longitudinally extending grooves in its top and bottom faces and a groove in one of its end faces opening into the top and bottom grooves at one end only of the block, said top and bottom grooves being closed at the opposite end of the block, a passage extending through the body of the block between the top and bottom grooves, and a groove in the rear face of the block opening into the top and bottom grooves on one side of the center of the block adjacent to said closed ends of said top and bottom grooves.

2. In a building construction, a block of rectangular formation having longitudinally extending grooves in its top and bottom faces, a vertical groove in one of its end faces intersecting the top and bottom grooves, a passage extending through the body of the block between the top and bottom grooves, a vertical groove in the rear face of the block, longitudinally extending top and bottom flanges at the front of the block forming the front walls of the top and bottom grooves, vertical flanges at the front and rear of the grooved end of the block forming the front and rear walls of said groove at such end of the block, horizontal transverse top and bottom flanges at the opposite ends of the block closing the top and bottom grooves at that end of the block, said top and bottom grooves being continuous between said transverse flanges and the first-named grooved end of the block, a vertical flange at the rear of the block continuous with said top and bottom transverse flanges and forming the outer wall of the vertical groove in the rear face of the block, and horizontal longitudinal top and bottom flanges at the rear of the block continuous with the vertical flanges at the grooved end of the block and forming the inner walls of the top and bottom grooves, said rear longitudinal flanges being cut away to form lateral passages connecting the ends of the vertical rear groove with the longitudinal top and bottom grooves.

3. A building block having grooves in its top, bottom and one of its ends intersecting each other at said end of the block, and a vertical groove in the rear face of the block, between the center and opposite end of the block and opening at its upper and lower ends into the said grooves in the top and bottom of the block.

4. In a wall construction, a wall comprising main wall blocks and corner blocks, said blocks being of rectangular formation and each main wall block being provided in its top, bottom and end faces with grooves continuous with each other and intersecting

each other at the corners of the block, and each corner block having its top and bottom faces and one of its end faces provided with grooves intersecting at such end face of the block, said bottom and top grooves being closed at the opposite end of the block, and each corner block being provided in its rear face with a vertical groove lying between its transverse center and the latter-named end of the block, said vertical groove being in direct communication at its upper and lower ends through lateral passages with the adjacent ends of the top and bottom grooves of the block.

In testimony whereof I affix my signature.

KURT BADER.