Jan. 3, 1967 D. R. DIXON 3,295,281

BUILDING BLOCK CONSTRUCTION WITH SPACER AND METHOD OF FABRICATING THE BLOCK

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Fig. 1.

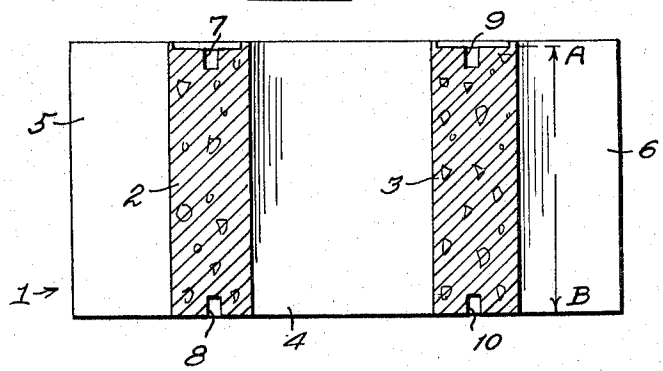


Fig. 2.

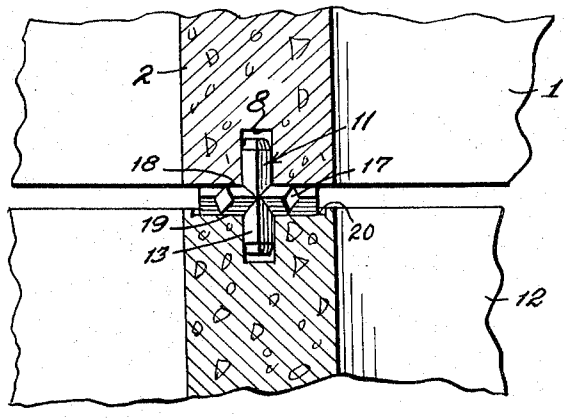
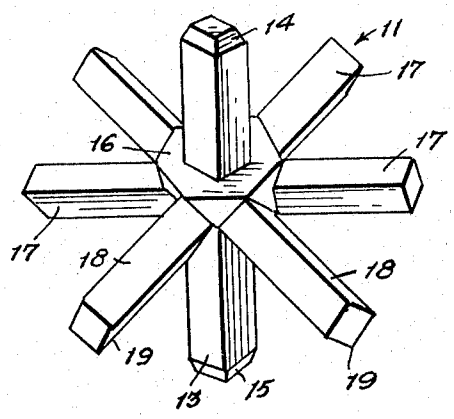


Fig. 3.



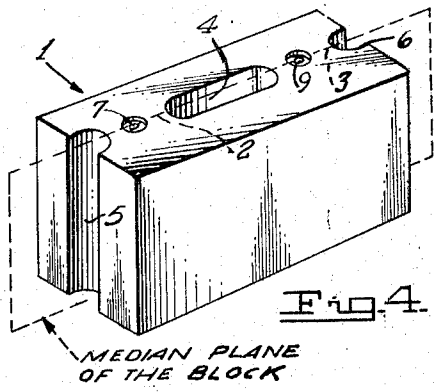


Fig. 4.

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BUILDING BLOCK CONSTRUCTION WITH SPACER AND METHOD OF FABRICATING THE BLOCK

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This invention relates to masonry and concrete structures and, more particularly, to building blocks of cementitious material and combined key, dowel and spacer means by which the blocks of a wall are uniformly spaced both in the vertical and in two mutually-normal horizontal directions, that is, longitudinally and transversely.

In my prior copending application Serial Number 695,993, filed November 12, 1957, now Patent Number 3,036,407, which, in turn, is a continuation in part of application Serial Number 536,239, filed September 23, 1955, now abandoned, I have disclosed a wall of cement, cinder or like blocks. Each block has a pair of dowel holes symmetrically positioned in its central vertical plane and extending completely through the block between the top and bottom faces thereof. In the completed structure each hole has therein a dowel pin comprising a shank sized to fit loosely within the dowel hole of its block, with an enlargement at one end, shown as the lower end, and having an interal flange intermediate the ends of the enlargement.

The enlarged end of each dowel is sized to have a snug fit within the aligned dowel holes of two superposed blocks, while the flange contacts the lower face of its block. The dimensions of the dowel pins are such that when a shank is slipped upwardly into a dowel hole, with its flange contacting the lower face of the block, the upper end of the shank is below the top face of the block. That portion of the enlarged lower end above the flange, has a snug fit in the lower end of the dowel hole in one block, while that portion of the enlargement below the flange has a snug fit in the top end of the aligned hole of the underlying block and with its depending end in contact with the top end of the dowel pin in the aligned hole of the underlying block.

The construction thus provided affords a continuous series of dowel pins in end-to-end contact in the aligned holes. Therefore, the aforementioned flanges are spaced with absolute uniformity. Since each flange positively determines the vertical position of its block resting thereon, the blocks and the courses formed thereby are vertically spaced with a very high degree of accuracy; and the dowel pins also assure that the blocks are equally accurately spaced in the horizontally transverse and longitudinal directions. Further, spacing between courses is determined by the flanges of the dowel pins and their end to end contact, rather than by the arbitary thickness of mortar between courses, as in ordinary wall constructions.

It is the principal object of the present invention to provide an improved combined dowel and spacer unit or element for wall constructions of the type aforesaid.

Another object is to provide an improved combination of block with a dowel pin and spacer which results in a highly accurate placement of blocks in three mutually perpendicular directions, and a strong, neat, uniform and attractive wall.

A still further object of the invention is to provide a combined dowel and spacer which, in addition to its function of determining the precise location in horizontal directions, of each block relatively to those previously laid, also cooperates with the superposed blocks to effect accurate placement in the vertical direction.

Yet another object is to provide a dowel pin which cooperates in a novel and useful way with two superposed blocks to establish a constant uniform spacing between courses.

A still further object is to provide an improved dowel and spacer unit which promotes rapid, time-saving and relatively low-cost assembly of building blocks, by workmen who are not required to have any special skill, training or experience.

Another object is to provide a method of block construction which ensures improved accuracy of block positioning in the completed wall.

Other objects and advantages of the invention will become apparent to those skilled in the art after a study of the following detailed description in connection with the accompanying drawing.

In the drawing:

FIGURE 1 is a longitudinal vertical cross section in the central median plane, of a cement block constructed in accordance with the invention;

FIGURE 2 is a sectional detail view to an enlarged scale, showing a pair of superposed blocks with one of the improved dowel-and-spacer pins in place;

FIGURE 3 is a perspective view to a still large scale, of the improved dowel-spacer pin, and

FIGURE 4 is a perspective view of a building block constructed in accordance with the invention and depicting in dotted lines the median plane of the block.

Referring in detail to the drawing, **1** identifies generally, a cement or cinder block shown as of substantially conventional form and construction, including transverse vertical webs **2** and **3** integrally connecting the two sides of the block to define a central vertical passage **4** and vertical channels **5** and **6** at the respective ends of the block.

As is well known, such blocks are cast in a mold which includes a smooth lower plate, so that the resulting blocks have uniform, smooth, planar and accurately-formed lower faces. The upper faces, however, are likely to embody imperfections which result in slightly uneven surfaces and material variations in over-all thickness. Such imperfections are caused by variations in the volume of mix added to the mold, non-uniform tamping, shaking or vibrating, and imperfect or careless screeding.

The upper and lower faces of web **2** are cast with dowel holes **7** and **8**, respectively all of which holes have their central longitudinal axes lying in the median plane of the block as defined in the penultimate paragraph of the specification and as depicted upon FIGURE 4. Likewise, web **3** is provided on its top and bottom faces with dowel holes **9** and **10**, all holes having their axes in the median plane of the block, with each pair, such as **7** and **8**, in vertical alignment.

In my invention, after the block has cured, it is accurately ground over an area of the top of each web which areas are generally centered on and extend about the respective dowel holes. There are several ways of performing this step. One convenient way is to perform the operation in a specially-equipped drill press using a grinding or carbide-tipped facing tool. The platform or work support of the press is equipped with a jig to properly locate each block as it is mounted thereon; and the depth stop of the press is set so that distance A–B, FIGURE 1, that is, the distance from the planar lower face of the block as cast, to the finished or ground surface of each web, is a fixed and precise value for all blocks. Using a locating jig and, if desired, a two-spindle press, the aforesaid grinding or surfacing of the blocks is a rapid and inexpensive production-line procedure.

The combined dowel and spacer **11**, shown in detail at FIGURE 3, and in emplaced position between blocks **1** and **12** in FIGURE 2, comprises a central dowel **13** which

may be triangular or square in cross section and sized to have a snug fit within the dowel holes **7**, **8**, etc. Beveled ends as indicated at **14** and **15**, FIGURE 3, facilitate location and insertion.

At its midlength the dowel has an integral circular or hexagonal hub **16**, from which radially project a plurality of equiangularly-spaced arms **17** shown, by way of illustration, as six in number, each integrally connected with or attached to the hub.

The radial arms **17** are preferably identical in length and cross sectional shape. This cross section is preferably of diamond or lozenge shape to form upper and lower radial sharp edges **18** and **19**. The arms are so dimensioned that the vertical distance between these edges **18** and **19** is the desired predetermined spacing between contiguous courses of blocks, which distance will also determine the vertical dimension or axial thickness of hub **16**. In short, the aforesaid radial arms have substantially line contact with the web surfaces of the subjacent and superposed blocks.

In use, after the foundation course has been laid in the usual way, one of the dowel units is tapped or pressed into each of the upwardly-facing holes of the blocks forming the foundation course, until the lower edges **19** of the radial arms contact the machined or ground areas of the webs of the blocks. In this connection it will be understood that each of the ground areas will preferably be circular and have a radius a little greater than the maxium radius of the arms, as indicated at **20**, FIGURE 2, so that all knife edges **19** will contact the area throughout their lengths.

After binding mortar has been spread over the exposed areas of the blocks of the underlying course, the next block to be laid is lowered with its holes fitting over the upwardly-protruding ends of the dowels in the adjacent holes of two contiguous blocks of the underlying course, and tapped or pressed down until its lower face contacts the upper edges **18** of the dowel arms **17**. Since the vertical dimension A–B, FIGURE 1, between the accurately-formed lower face of the block, and the faced surfaces of the upper areas of the block, is precise and constant and, added to the accurate vertical dimension between upper and lower knife edges **18** and **19** of the radial arms, determines the center-to-center distance between courses, it follows that each block is positioned with a high degree of accuracy in both longitudinal and transverse horizontal directions as well as in the vertical direction. Furthermore, all courses are uniformly spaced. In this regard it is to be noted that the particular shape of the radial arms of the dowel units effects a new result in that the sharp edges thereof cut through and disperse any mortar on the underlying machined or ground surfaces of the blocks and make certain that these edges are actually in contact with the blocks. Consequently accurate positioning of the blocks in all directions is automatically assured.

If desired, each hole **7**, **8**, etc. may be counterbored for a short distance from its end to make sure that the hubs **16** have no effect upon spacing of the courses. Such counterbores would have a radius a little greater than the maximum radius of the hub and a depth a trifle more than one-half the vertical dimension of the hub and, of course, would have no effect upon the functioning of the arms **17** or on the horizontal positioning function of the shank or sterm portion **13**. The dowel holes themselves as well as the aforesaid counterbores may be drilled after the blocks have cured. The hub **16** may be cylindrical in form.

In the claims the term "median plane" of the block means a plane midway between and parallel to the two opposite side faces of the block. The term "grinding" or "ground" is to be interpreted as inclusive of drilling, routing or other known ways of material removing to form accurate planar areas parallel with the lower face of the block.

The expression "normally horizontal" refers to the position of the block as emplaced in a vertical wall.

Numerous changes in shape, form, dimensions and substitutions of equivalent structure will readily occur to those skilled in the art after a study of the foregoing description. Consequently this description should be taken in an illustrative rather than a limiting sense. It is my desire and intention to reserve all changes, modifications and substitutions within the scope of the subjoined claims.

Having now fully disclosed the invention, what I claim and desire to secure by Letters Patent is:

1. The method of producing a building block comprising, forming the block with one normally horizontal face planar, forming a pair of longitudinally-spaced dowel holes opening through the face of the block opposite said plane face, and removing material of the block over predetermined areas centered about each said pair of holes to form planar surfaces parallel with and spaced the same accurate predetermined distance from said planar face.

2. The method of production of a building block comprising, forming the block with a planar lower face and a first pair of longitudinally-spaced dowel holes opening through said lower face, forming a second pair of longitudinally-spaced dowel holes opening through the face of the block opposite said lower planar face and each in vertical alignment with a respective one of the holes therein, and grinding limited areas only of said opposite face of the block to form planar surfaces each generally centered about a respective one of the second pair of holes, each said surface being parallel with and the same fixed predetermined distance from the planar lower face of the block.

3. A building block having first and second pairs of longitudinally-spaced dowel holes opening through its lower and upper faces, respectively, one face of said block being planar, the holes opening through the other face of said block being counterbored a short distance to form planar surfaces of limited areas surrounding each hole of said second pair, each said surface being spaced a predetermined vertical distance from and parallel with the opposite face of the block, the vertical distances of said planar surfaces from said opposite face of the block, being equal.

4. A building block generally parallelepipedal in form and having first and second pairs of dowel holes opening through its lower and upper faces, respectively, all said dowel holes lying in the median plane of the block, each hole of one pair being vertically aligned with a corresponding hole of the other pair, one said face being planar, the other said face being surfaced over limited areas only, each said area surrounding a respective one of the dowel holes therein, to define limited planar surfaces, each parallel with and a fixed predetermined distance from said planar face, the distances of said planar surfaced areas from said planar face of the block being equal.

5. A building block of cementitious material and generally parallelepipedal in form to define upper and lower faces, there being first and second pairs of dowel holes in said block, each pair opening through a respective one of said faces, all said holes lying in the median plane of the block, each said hole of one pair being in vertical alignment with a corresponding hole of the other pair, the lower face of said block being planar, the upper face of said block being machined over limited areas only to remove material and thereby define surfaces parallel with and a fixed predetermined distance from said lower planar face, each said area being generally centered on and encompassing the dowel holes in said upper face.

6. In a building construction, a pair of superposed blocks each having generally parallel upper and lower faces and first and second pairs of longitudinally-spaced dowel holes opening through said faces, respectively, each hole of one said pair being in vertical alignment with a

corresponding hole of the other said pair, a dowel pin comprising a shank sized to have a smooth fit within said holes and a plurality of coplanar arms integral with and extending radially from the midportion of said shank, each said arm having a diamond-shaped transverse section in planes parallel to said shank defining uppermost and lowermost edges each in line contact with the corresponding face of a respective one of said blocks, the vertical distance between said edges being fixed and predetermined, and accurately determining the spacing between said blocks, all said arms of each said dowel pin lying in a common plane normal to the axis of the shank thereof, and mortar between and uniting said blocks.

7. A building block of cementitious material having upper and lower, generally parallel plane faces, there being first and second pairs of dowel holes spaced longitudinally of the block and in each said face, respectively, each hole of one pair being in vertical alignment with a corresponding hole of the other pair, each hole of one said pair being counterbored for a short distance to form a plane surface of limited area surrounding it, said surfaces being parallel with and spaced a predetermined vertical distance from the plane surface of the opposite face of the block, the vertical distances of said planar surfaces from said opposite face of the block being equal.

8. A combined dowel pin and spacer for relatively positioning two superposed building blocks comprising, a straight shank of polygonal cross section, and a plurality of arms fixed with and extending radially from the midportion of said shank, each said arm being polygonal in transverse section to provide first and second, uppermost and lowermost ridges when said shank is vertically positioned, said ridges making line contact with areas of the superposed and subjacent blocks to positively determine the vertical spacing therebetween, the cross section of said arms being diamond shaped, said first ridge being vertically positioned over said second ridge.

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