Jan. 3, 1950 A. J. ARCHAMBAULT 2,493,435

BUILDING BLOCK

Filed May 31, 1946

Fig. 1

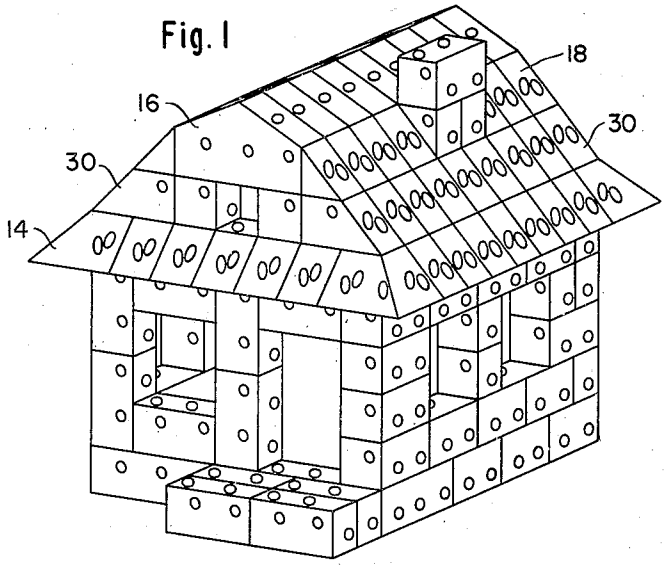
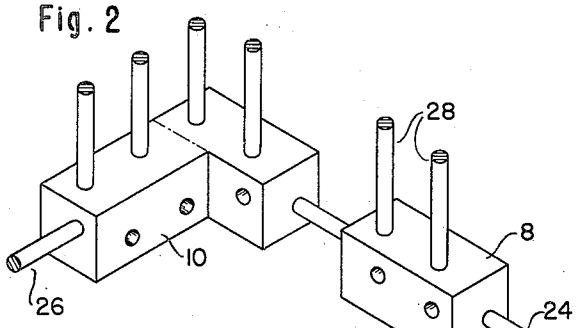


Fig. 2



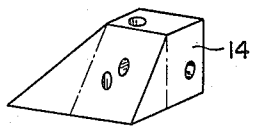


Fig. 5

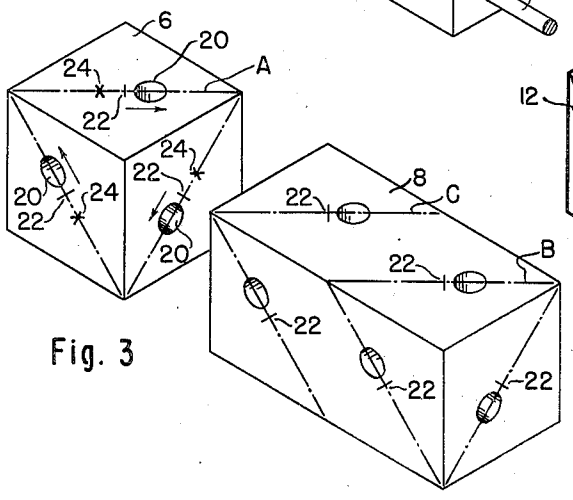
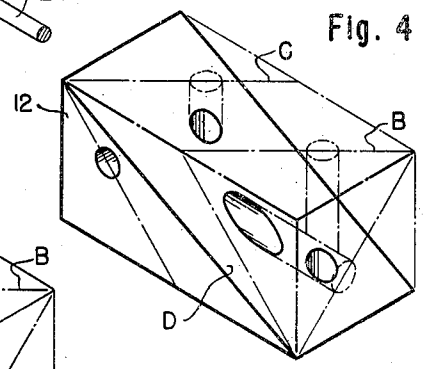


Fig. 3

Fig. 4



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BUILDING BLOCK

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4 Claims. (Cl. 46—26)

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The present invention relates to building blocks.

The object of the invention is to provide a set of toy building blocks which can be used to provide a rigid structure in simulation of any desired design and which will afford amusement and instruction in the process of assembly.

With this object in view the invention comprises the blocks hereinafter described and particularly defined in the claims.

In the accompanying drawings Fig. 1 is a perspective view of a typical structure built with blocks of the present invention; Fig. 2 illustrates the manner of joining the blocks; Fig. 3 is a diagram illustrating the manner in which the holes are placed; and Figs. 4 and 5 are views of special blocks for roof structures and the like.

The invention comprises a series of blocks having holes arranged parallel to mutually perpendicular axes but offset in such a manner that the holes no not intersect. It is thus possible to key the structure together by means of dowels extending in all three dimensions. The fundamental unit of the system comprises a cube indicated at 6 in Fig. 3. Other types of blocks are the double cube 8 of Fig. 3 for which the length is twice each end dimension, a corner block 10 shown in Fig. 2, and the special wedge blocks 12 and 14 of Figs. 4 and 5. Still other types comprise the ridge blocks 16 and half-cubes 18 of Fig. 1.

The manner of boring the holes is first illustrated in connection with the cube 6. As shown in Fig. 3, the cube is provided with three holes 20, the centers of which are diagonally offset from the centers 22 of the faces of the cube. The manner of the offset is important in order that the blocks may be made to register for proper insertion of the dowels in the building of the structure. Thus, the dot-and-dash lines shown on the cube 6 extend through the center 22 of each face and the center of the adjacent hole. It will be noted that the three dot-and-dash lines lie in a single plane A which is oblique to the planes of the cube faces. The amount of offset of each hole from the center 22 is not important except that the offset should be sufficient so that the holes do not intersect. In any event, the hole centers at the surface lie in a single oblique plane determined by the dot-and-dash lines. For the double cube 8 of Fig. 3, it will be observed that the sets of holes likewise have their centers on lines which form oblique planes B and C. These planes are all parallel. The planes are analogous to the cleavage planes of certain

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crystals, and are here termed "determinant" planes. For joining two blocks, such as the blocks 6 and 8 of Fig. 3, it is essential that the determinant planes be parallel in order that holes of the two blocks will register to permit insertion of a securing dowel. It is necessary for the builder to orient the blocks in the proper manner for alignment and this promotes accuracy in visualization of three-dimensional bodies.

To facilitate the start of the first course, a number of corner blocks 10 of Fig. 2 may be provided. These are not essential since each comprises a single block which is the same as two of the blocks 8 arranged in the proper manner at the corner.

The orientation of the holes is important. For the cube 6, there are two possible orientations. It will be observed that in following around the line A, the holes 20 are offset clockwise from the face centers 22. It would be possible to offset the holes so that their centers would be displaced counter-clockwise from the face centers. Such hole centers would appear at the positions indicated by the crosses 24. Either the clockwise or counter-clockwise displacement order may be used, but the invention contemplates that all of the blocks in the set be provided with holes offset in the same order around the determinant planes. In the set herein shown, the clockwise order is used. When a single order is used, the simple cubical block is unique, that is, it may always be turned in such a direction that it will key with any adjacent block.

The multiple cube, typified by the double cube 8, is also unique, in that one single form can be used throughout. Any number of such blocks can be keyed together in all three dimensions. It is only essential that the determinant planes of all the blocks be parallel (subject to the condition that the displacement order of the hole centers be the same for all the blocks, as above described). Since the determinant planes are preferably not indicated by any marking on the blocks, some experimentation may be required to find the correct position of any block, and this promotes interest in building even a simple structure.

The corner blocks 10 are not of unique construction. As heretofore noted, each corner block 10 is the equivalent of two double cubes 8, but there are several ways in which two blocks 8 may be joined to form a corner block, even though parallelism of the determinant planes is maintained. One such corner block is preferably included in the set as a starting block for one

corner, and is preferably marked to show that one face should be started down; this is done to limit the necessary number of roof blocks, as will be explained later. If desired, two or four composite corner blocks may be provided, but they must be made with a proper relation of their components so that they can be keyed together by dowels passed through the holes in all four directions.

The start of the building is indicated in Fig. 2 showing how the rectangular block is fitted adjacent to the corner block **10**. The blocks are keyed together by horizontal dowels **24** and **26**. Vertical dowels **28** may be applied to the blocks to hold the adjacent courses. It will be understood that after a course has been applied to the dowels **28**, horizontal dowels may then be passed through the horizontal registering holes of the second course. The additional blocks may be keyed to the structure in a three-dimensional fashion by passing dowels through the third set of holes in any of the blocks.

The wedge or pitch-roof block **12** is what would be obtained by dividing a double cube **8** on a diagonal plane D. Since the diagonal plane D does not correspond with any of the determinant planes A, B, etc., there are four possible planes like D along which the cut can be made. Thus there are four possible hole arrangements for a wedge block **12**. To make a pitch roof only two of these forms are needed, if the building is started with a certain type of the starting corner block **10**. The same applies to the half-cubes **18** and the special blocks **30** which may be termed "one-and-half cubes." If the starting course were not formed with a definite hole arrangement, it might be found that neither of the two forms would key with the side wall, and this would require that the set be supplied with all possible arrangements of wedges, half-cubes, and one-and-half cubes.

The ridge blocks **16**, being symmetrical, may be considered unique; that is, one form will serve for most arrangements. The eave blocks **14** are asymmetrical in all directions; each block comprises four cubes, three of which are slabbed off on diagonal planes. If a block **14** is placed at each corner, four different hole arrangements are obviously required.

The set is flexible in that many different types of buildings may be constructed. The first course is started as shown in Fig. 2, and additional courses are added as desired. The structure may be keyed firmly by dowels passed through the holes in any or all of the three dimensions. It is not usually necessary to put dowels through all of the holes. Window and door openings may be left, as shown in Fig. 1, and the structure will have sufficient rigidity from the dowels which pass through the blocks forming the window and door frames.

As hertofore noted, the basic unit is the cube, which is unique if a clockwise or counterclockwise displacement order has been decided upon. The centers **22** of the cube faces may be taken as the points of emergence of a set of mutually perpendicular coordinate axes from the cube. The centers of the holes **20** are disposed on the line A which is the intersection of the determinant plane with the cube faces.

All other blocks in the set may be considered as variations of the simple cube. Thus other blocks may be made by simply combining cubes, and still others by cutting the cube combinations

on diagonal planes. Blocks of cylindrical or other curved contours may likewise be formed. In each case, the positions of the holes are determined by intersections of the oblique determinant planes with the faces of the elemental cubes. It will be understood that the description of hole placement by reference to the intersection of the determinant plane with the cube faces is for purposes of description only; it is not necessary to construct a composite block out of elemental cubes and thereafter cut or turn the block to the desired shape, since the block may be initially formed in the desired shape and the holes bored afterward, so long as the hole placement is determined by the principles above outlined.

Although round holes are preferably used for convenience of manufacture, holes (and dowels) of other shapes may be used if desired.

Having thus described the invention, I claim:

1. A set of building blocks comprising a plurality of blocks having holes therethrough in three directions, the axes of the holes being mutually perpendicular but non-intersecting, the centers of three corresponding holes, where they appear at the surface, being offset from the face centers along diagonals lying in an oblique plane, and dowels to pass through registering holes of several blocks to hold together a structure built from the blocks.

2. A set of building blocks comprising a plurality of blocks having holes therethrough in three mutually perpendicular directions but non-intersecting, each block including an elemental cube, the hole centers at the cube faces lying in oblique determinant planes passing through corners of the cube, the hole centers being displaced from the face centers in the same direction.

3. A set of building blocks comprising a plurality of blocks having holes therethrough in three mutually perpendicular directions but non-intersecting, each block being constructed of elemental cubes in each of which the centers of the holes at the cube faces are disposed in oblique determinant planes passing through corners of the cube, whereby a number of said blocks having parallel determinant planes may be keyed together by dowels passed through the holes.

4. A set of building blocks comprising a plurality of blocks having holes therethrough in three mutually perpendicular directions but non-intersecting, the several blocks comprising cubes and blocks including elemental cubes, in each of which the centers of the holes at the cube faces are disposed in oblique determinant planes passing through corners of the cube, whereby a number of said blocks having parallel determinant planes may be keyed together by dowels passed through the holes.

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