May 15, 1962 G. K. CHRISTIANSEN 3,034,254

TOY BUILDING SETS AND BUILDING BLOCKS

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FIG. 1.

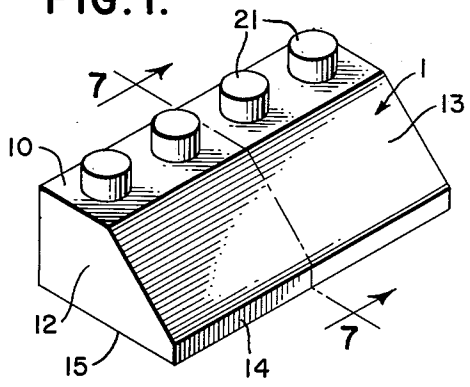

FIG. 2.

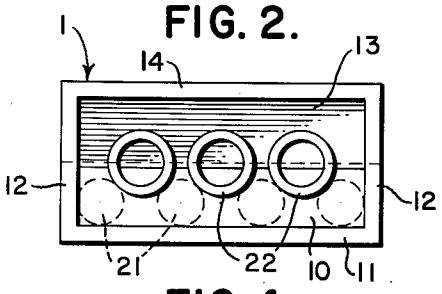

FIG. 3.

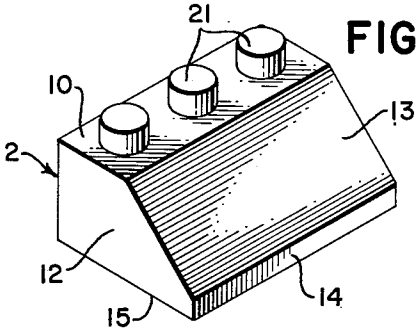

FIG. 4.

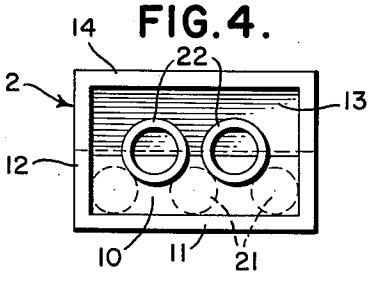

FIG. 5.

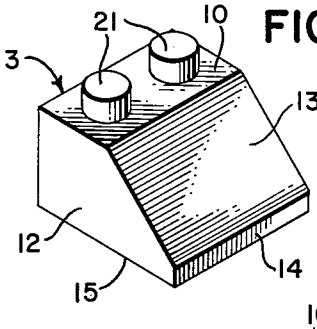

FIG. 6.

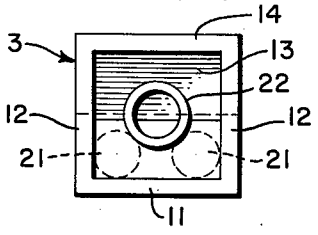

FIG. 7.

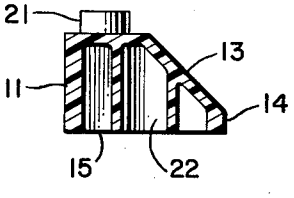

FIG. 8.

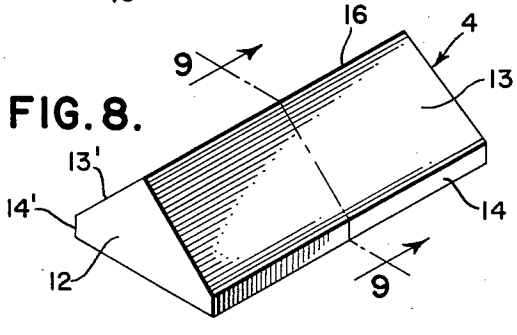

FIG. 9.

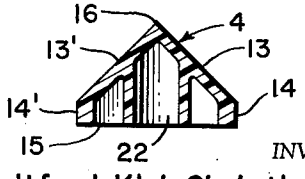

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FIG. 10.

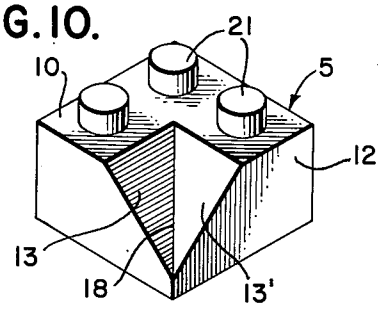


FIG. 11.

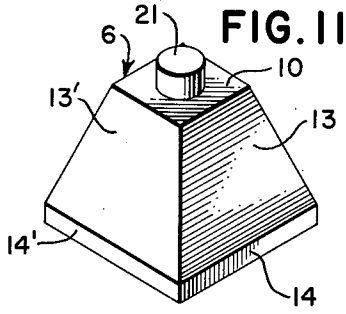


FIG. 12

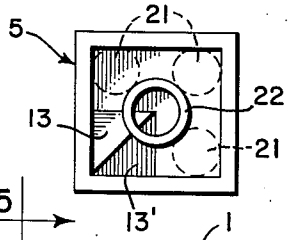


FIG. 13.

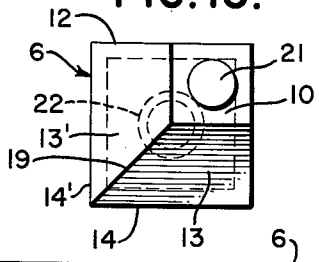


FIG. 14.

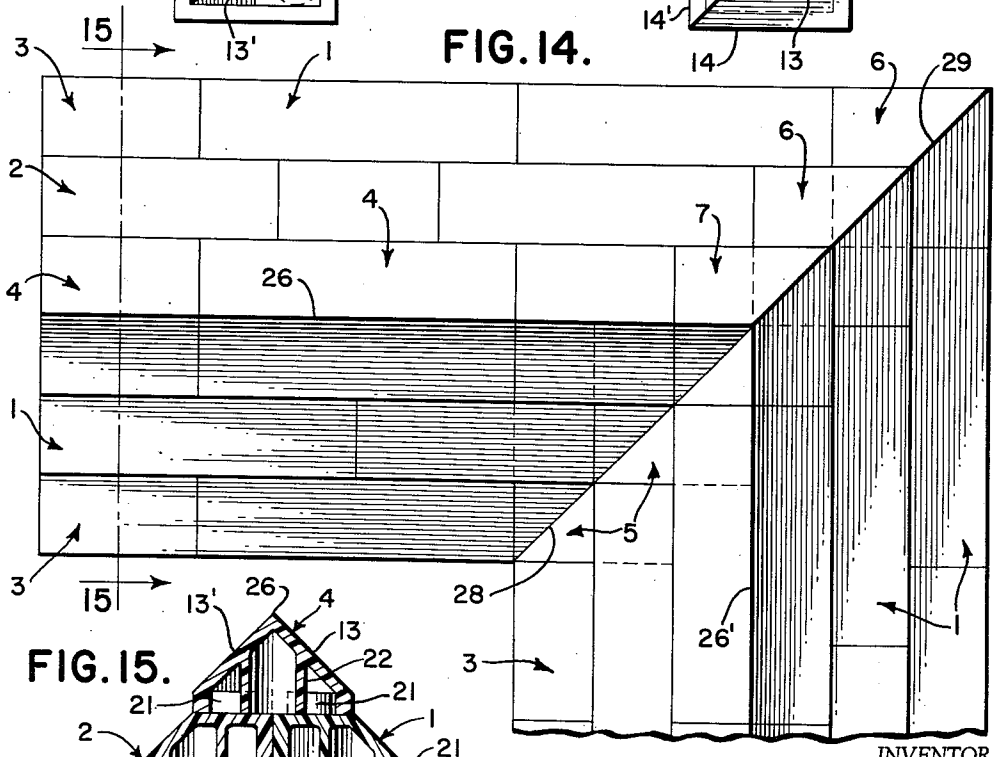
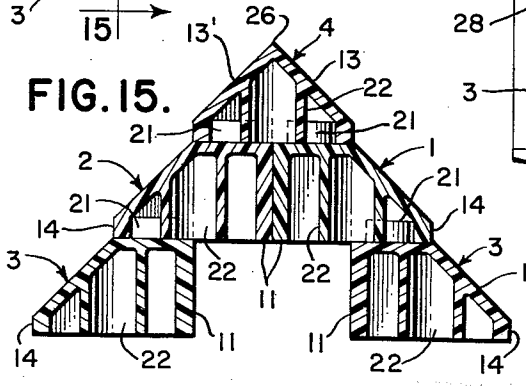


FIG. 15.



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3,034,254

TOY BUILDING SETS AND BUILDING BLOCKS

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5 Claims. (Cl. 46—25)

This invention generally relates to toy building sets comprising a plurality of building elements and, more particularly, to toy building bricks or blocks comprising a hollow body open at one face and provided with at least one inclined face. The blocks are adapted to be connected together by means of projections extending from the faces of the blocks and arranged so as to engage protruding portions of an adjacent block when assembling such blocks for building a roof construction wherein the inclined faces of the blocks define the roof surfaces.

The principal object of the invention is to provide improved coupling means for clamping such building blocks together in any desired relative position thus providing for a vast variety of combinations of the blocks for making roof structures of many different kinds and shapes.

Toy building sets comprising a plurality of hollow blocks open at one face and provided with projections or bosses symmetrically disposed on the face opposite the open face are well-known per se. In these previously known blocks the said bosses or projections—which will hereinafter be referred to as "primary projections"—are arranged in two parallel rows and in transverse pairs, so that the primary projections are uniformly spaced apart in both longitudinal and transverse directions. Moreover, the arrangement is such that the overall dimension over each pair of projections closely approximates the width of the cavity of the block and the overall dimension of each row of projections closely approximates the length of the cavity.

With this arrangement of the primary projections relatively to the dimensions of the cavity two identical blocks may be interlocked in staggered or offset relation.

Moreover, in another type of hollow building blocks, which are likewise provided with outwardly extending projections on the side opposite the open face, there are provided inwardly extending projections arranged coaxially with the outwardly extending projections, the arrangement being such that the outwardly extending projections are provided with recesses adapted to receive the ends of the inwardly extending projections of another block.

Thus, hollow building blocks provided with inwardly extending projections within the cavity of the block are likewise well-known per se, and such projections will hereinafter be referred to as "secondary projections."

The building set and blocks according to the present invention comprises features of both of the above mentioned types of blocks, but the mere juxtaposition of primary and secondary projections would not solve the problem of providing improved coupling means for interlocking adjacent blocks provided with inclined faces for making a roof construction. In fact, in order to solve this problem the relative dimensions and positions of the primary and secondary projections must be interrelated in a specific manner, and according to the main characterising feature of the invention the positions and dimensions of the secondary projections relatively to the positions and dimensions of the primary projections are such that, in a pair of assembled blocks A and B, the lateral face or faces of at least one primary projection of one block A will be clamped against the lateral face or faces of at least one secondary projection of the adjacent block B.

Fundamentally, the projections need not necessarily be of cylindrical shape but if, as in a preferred embodiment, both the primary and the secondary projections are of cylindrical shape, it is possible to define the diameter Ds of the secondary projections by the diameter Dp of the primary projections and the width w of the cavity of the hollow block.

According to the invention, this definition is given by the equation

$$Ds=\sqrt{2}w-Dp(1+\sqrt{2})$$

This relation between the diameters (Dp and Ds) of the primary and secondary projections and the width (w) of the cavity provides a frictional engagement between the primary projections of one such block and the secondary projections and the inside surfaces of another such block as explained more fully below.

The advantages obtained by the particular interrelation of primary and secondary projections, which essentially characterise the present invention and various embodiments thereof, will be described with reference to the accompanying drawings, in which:

FIGURES 1, 3, 5, 8, 10 and 11 show a series of blocks **1**, **2**, **3**, **4**, **5** and **6**, respectively, provided with one or more inclined faces and at least one primary projection and/or secondary projection in accordance with the invention, the like parts of which are indicated by the same reference numerals;

FIGURES 2, 4, 6 and 12 are plan vews, respectively, looking into the cavity of blocks **1**, **2**, **3** and **5** shown in FIGURES 1, 3, 5 and 10;

FIGURE 13 is a top plan view of block **6**, shown in FIGURE 11;

FIGURES 7 and 9 are transverse sections along the lines **7** and **9**, respectively, of the blocks shown in FIGURES 1 and 8;

FIGURE 14 is a top plan view which illustrates more or less diagrammatically the application of the building elements **1**, **2**, **3**, **4**, **5** and **6**, for the construction of a roof, the tiles of which are formed by the inclined surfaces of said elements;

FIGURE 15 is a detailed transverse view along the line **15** showing the assembly of a plurality of blocks so as to form part of the roof structure.

In the embodiment shown in FIGURE 1 the building element **1** consists of a box-shaped hollow body, having a bottom face **10**, a vertical side wall **11** at right angles to the bottom face **10**, vertical end walls **12**, **12**, and an inclined side face **13**. Inclined face **13**, is intersected by a relatively low vertical wall **14** extending parallel to the opposed vertical wall **11**. This construction is further illustrated in FIGURE 7, a transverse view along the line **7** of FIGURE 1. The basic area **15** opposite wall **10** is open. On the outside on the bottom face **10** there are coupling members in the form of cylindrical projections, the primary projections **21**, and the element is also provided with internal coupling members in the form of tubular projections, the secondary projections **22**. The width (w) of this element represents the length of end wall **12** within the cavity between the inner faces of the adjoining side walls. The primary projections **21** are disposed in the median plane of the rectangular bottom face **10** opposite the open rectangular face **15** of the block as indicated by the circles in broken lines and the secondary projections **22** are disposed in the median plane of the open face, and positioned in such a manner relative to the primary projections that the cross-section of each secondary projection in the plane of the bottom face touches the cross-sections of two adjacent primary projections, as illustrated in FIGURE 2. With this arrangement of primary and secondary projections having

the relative diameters defined hereinabove, two of these blocks may be readily coupled together by inserting the primary projections of one block into the open face of the second block between the secondary projections and the internal surfaces thereof.

Blocks 2 and 3 are the same as block 1, differing therefrom only in length as shown by FIGURES 3–6. Whereas element 1 has four primary projections and three secondary projections, element 2 has three primary and two secondary projections, and element 3 has two primary projections and but one secondary projection. This smallest element 3 is square corresponding to the unit width (w).

As will be seen, each of the building elements in FIGS. 1, 3 and 5 has three walls at right angles to the base face 10 of the element and a side wall 13 forming an acute angle to the face 10.

The characteristic feature of the embodiments shown in FIGS. 8, 10 and 11 is that the element has in this case two walls at right angles to the basic area and two obliquely positioned walls 13 and 13'.

In the embodiment shown in FIGURE 8, the inclined side walls 13 and 13' are disposed symmetrically with regard to the vertical plane through the center line of the basic area, forming a ridge 16. In the embodiment of the invention shown in FIGURE 11, the two obliquely positioned walls 13 and 13' are located in such a manner that they intersect each other along an edge 19 extending from one corner of the basic area 15 to the bottom face 10 of the element. As in block 1, 2 or 3, each inclined face 13 terminates in the relatively low vertical wall 14. This permits a frictional engagement between the primary projections of one element and a secondary projection and the inner surface of any adjacent wall of a second element.

In the embodiment shown in FIG. 10 the element is formed as a box-shaped hollow body with four walls at right angles to the base 10, and according to the invention this element has two triangular inclined faces 13, 13' which together form a wedge-shaped notch 18 at one corner of the element. Like blocks 3 and 6, this embodiment has a square basic area.

In the roof structure illustrated in FIGURE 14, the numerals 1 to 6 designate the several forms of elements 1–6, respectively, illustrated and described herein. A special form of block to provide for the intersection of the two ridges 26, 26' is indicated at 7, which combines the four inclined faces of elements 5 and 6, the outer exposed surfaces consisting of two intersecting trapeziform inclined walls and two intersecting triangular inclined faces, the latter forming a wedge-shaped notch at one corner of the element.

FIGURE 15 shows how this roof structure is built up by the assembly of a plurality of elements 1, 2 or 3, and prismatically shaped ridge element 4.

The valley and hip of the roof structure are here indicated by the lines of intersection 28, 29 between the oblique faces of the roof, which are formed by the abutting inclined faces 13 of the relatively offset elements, 1–7, coupled together by means of the primary projections and the secondary projections 21 and 22.

The hip of the roof structure designated by 29 is formed by the building elements 6 and 7, and in the same way the valley 28 is formed by the elements 5 and 7.

I claim:

1. In combination, a pair of hollow toy building blocks interconnected to form the apex of the roof of a toy building, one of said hollow blocks comprising a prismatically shaped hollow body, said prismatically shaped body having an open rectangular face and having at least one projection disposed inside said body with its axis disposed in a plane extending normally to said open face and through an apex of said prism, the other of said blocks comprising a hollow body having an open face extending parallel to the open face of said first mentioned block, and having a solid face parallel to said open faces and abutting the open face of said first mentioned block, and further having a second projection extending from said solid face of said second mentioned block and frictionally engaging the side of said first mentioned projection and the inside surface of said prismatically shaped hollow body.

2. A toy roof structure comprising a pair of interconnected hollow toy building blocks, each block having a bottom face and a plurality of lateral faces which define a rectangular shaped open face paralel to said bottom face, at least one of said lateral faces being inclined with respect to said bottom face, at least one cylindrical secondary projection on said bottom face, the axis of said secondary projection being in the median plane of said open face and extending from the internal surface of said block in a direction normal to said bottom face, at least one cylindrical primary projection on the outer surface of said bottom face and normal thereto, the axis of said primary projection being in the median plane of said bottom face, said primary and secondary projections being so positioned that the periphery of said primary projection is tangent to the periphery of said secondary projection when said projections are geometrically extended to a common plane, the bottom face of one of said blocks abutting the open face of the second block and having at least one primary projection within the cavity of said second block in frictional engagement with the inner surfaces of said second block at three points, one of said points being a secondary projection of said second block.

3. A toy roof structure as set forth in claim 2 in which the second block has two inclined lateral faces, said faces intersecting each other at a right angle.

4. A toy roof structure as set forth in claim 2 in which one of said blocks has four primary projections disposed equidistant along the median plane of its bottom face and three secondary projections disposed equidistant along the median plane of its open face.

5. A toy roof structure as set forth in claim 2 in which the rectangular open face of one of said blocks is square and said block has one secondary projection disposed coaxially with the center of said square open face.

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Disclaimer

3,034,254.—*Godtfred Kirk Christiansen*, Billund, Denmark. TOY BUILDING SETS AND BUILDING BLOCKS. Patent dated May 15, 1962. Disclaimer filed Mar. 31, 1978, by the assignee, *Interlego A.G.*

Hereby enters this disclaimer to claims 1, 2, 3, 4 and 5 of said patent.

[*Official Gazette May 23, 1978.*]