

Jan. 6, 1970

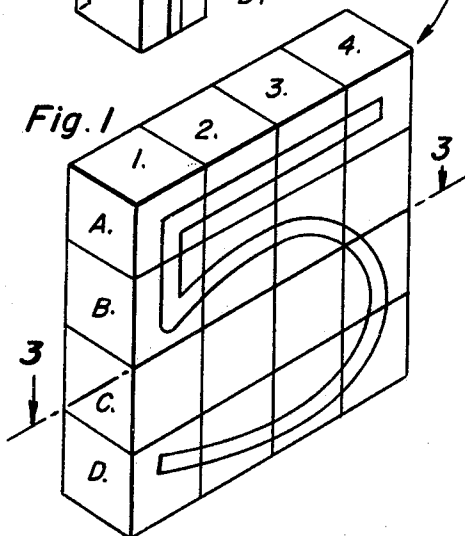
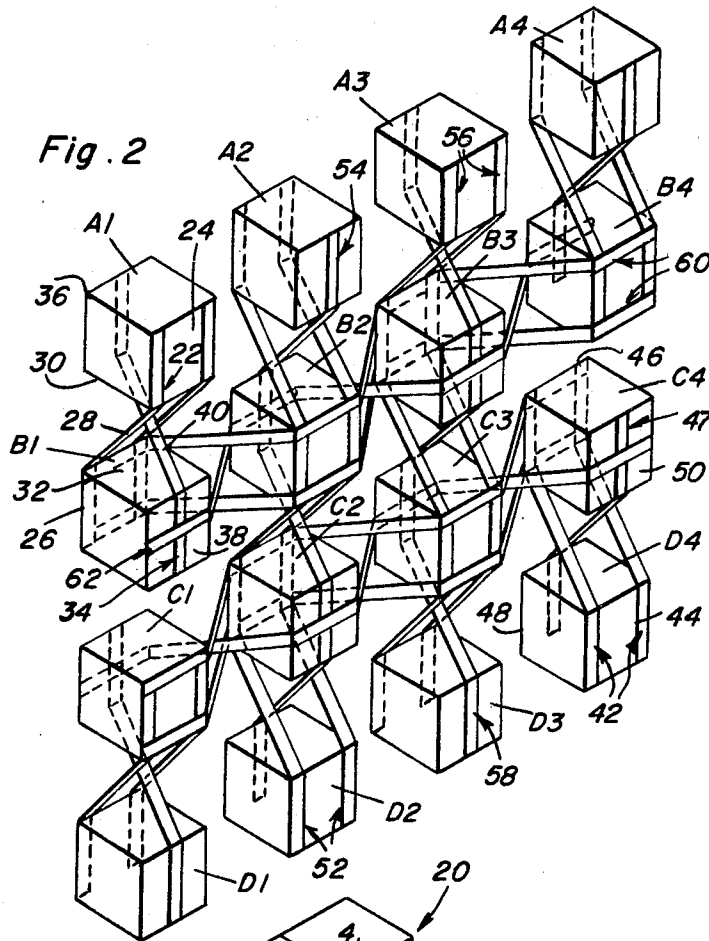
J. SUDERMANN

3,487,578

ARRAY OF BLOCKS JOINED BY DOUBLE-ACTING HINGE MEANS

Filed April 20, 1967

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3

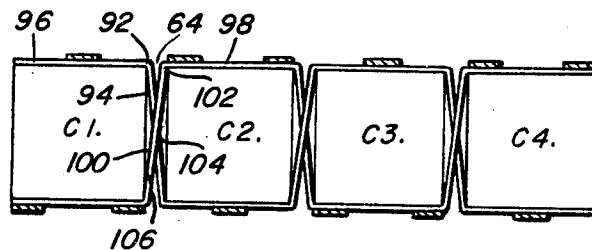


Fig. 4

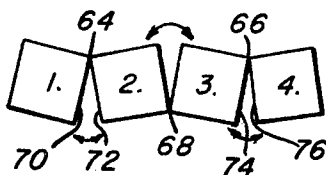


Fig. 5

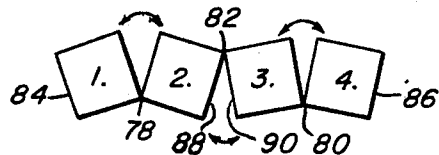


Fig. 6

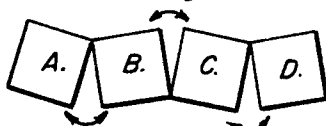


Fig. 7

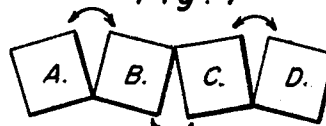


Fig. 8

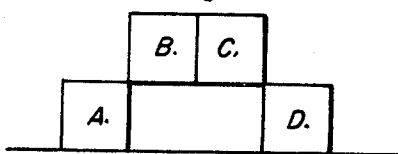


Fig. 9

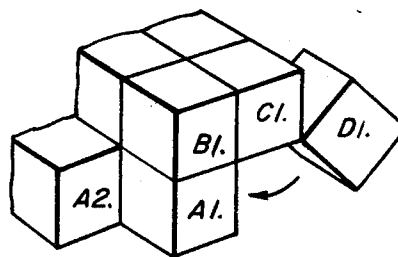
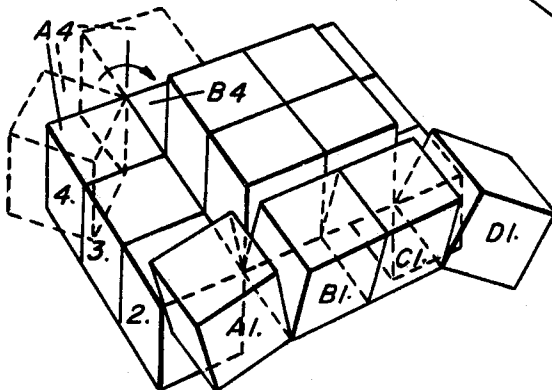


Fig. 10



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3,487,578

ARRAY OF BLOCKS JOINED BY DOUBLE-ACTING HINGE MEANS

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7 Claims

ABSTRACT OF THE DISCLOSURE

A unit comprising a plurality of cubic blocks hingedly interconnected, to one or more adjacent blocks, for pivotal movement in two planes in conjunction with the adjacent blocks for defining a plurality of different configurations and/or the alignment of various of the block faces for the display of matter appearing thereon.

The instant invention is concerned with an articulate unit composed basically of a plurality of cube-like members hingedly interconnected and arranged, in one basic form, in both horizontal rows and vertical columns, the members being manipulatable, relative to the adjacent members, in two planes so as to enable the assumption, by the unit, of a plurality of both generally planar and three-dimensional configurations.

It is a significant object of the instant invention to provide an articulated block construction which, because of the variety of configurations achievable through a manipulation thereof, is uniquely adapted for use as a toy of amusement device, either of a size wherein the entire unit can be hand held and manipulated, or of a substantially greater size whereby children can form climbable structures or integral enclosures.

Another object of the instant invention is to provide a basic articulated block unit which is also adaptable for use in the formation of convertible furniture or the like, the manipulation of the individual blocks or members enabling the selective formation of chair and couch-like units.

Furthermore, it is an object of the instant invention to provide a device, which when utilized as a toy or amusement means, presents a substantial challenge to the user.

Basically, the unit of the instant invention comprises sixteen cubic blocks hingedly interconnected by fixed length flexible straps or tapes arranged so as to enable a manipulation of each block, relative to the adjoining blocks to which it is fixed, for selective engagement with three sides of the adjacent block, this manipulation occurring in either of two planes.

These together with other objects and advantages which will become subsequently apparent reside in the details of construction and operation as more fully hereinafter described and claimed, reference being had to the accompanying drawings forming a part hereof, wherein like numerals refer to like parts throughout, and in which:

FIGURE 1 is a perspective view of the unit of the instant invention arranged in one basic form;

FIGURE 2 is a perspective view wherein the blocks have been exploded relative to each other and the connecting tapes elongated for purposes of illustration;

FIGURE 3 is a cross-sectional view taken substantially on a plane passing along line 3—3 in FIGURE 1;

FIGURES 4-7 are schematic views illustrating one series of manipulations; and

FIGURES 8, 9 and 10 illustrate further possible manipulations of the articulated blocks.

Referring now more specifically to the drawings, reference numeral 20 has been used to generally designate the unit or article comprising the instant invention. As

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will be best appreciated from the exaggerated or exploded view of FIGURE 2, the unit 20 consists of a plurality, normally sixteen, of cubes or cubic blocks interconnected by elongated substantially fixed length flexible straps or tapes.

FIGURE 1 illustrates one basic arrangement of the blocks of the units 20, the unit 20 being illustrated in this basic arrangement in order to simplify the explanation of the various components thereof and the interrelationship therebetween. In the arrangement of FIGURE 1, it will be noted that four vertical columns, designated by the numbers 1, 2, 3 and 4, and four horizontal rows, designated by the letters A, B, C and D, are provided and form a square configuration having a depth equal to the thickness of a single block. Utilizing the particular column and row designations, each individual block will be hereinafter designated by its appropriate coordinates. For example, the upper left hand block of FIGURE 2 will be referred to as block A1, while the lower right hand block will be referred to as D4.

Attention is now specifically directed to FIGURE 2 wherein the blocks, aside from the exploded relationship therebetween, have been illustrated in the same arrangement set forth in FIGURE 1. Referring initially to block A1, it will be noted that this block is hingedly secured solely to the vertically adjacent block B1, this being effected by a pair of tapes 22 overlying and being permanently bonded, as by adhesive, to the front face 24 of the block A1 and the rear face 26 of the block B1 vertically along the opposite vertical edges thereof. The intermediate portions 28 of the pair of tapes 22 lie freely between the horizontal abutting faces 30 and 32 of the superimposed blocks A1 and B1. In addition, a single centrally located tape 34 has the opposed end portions thereof permanently fixed to the rear face 36 of the block A1 and the front face 38 of the block B1 vertically thereacross, the intermediate portion 40 of the tape 34 lying horizontally between the abutting faces 30 and 32 of the blocks A1 and B1 centrally between the intermediate portions 28 of the pair of tapes 22. The lower right hand block D4 is similarly secured solely to the vertically adjacent block C4. That is a pair of straps 42 have the opposite end portions rigidly affixed to the forward face 44 of the block D4 and the rear face 46 of the block C4, while a single strap 47 has the opposite end portions thereof affixed to the rear face 48 of the block D4 and the front face 50 of the block C4, the intermediate portions of the straps 42 and 47 freely lying between the abutting faces of the blocks D4 and C4. The two remaining corner blocks, D1 and A4, are both secured to their vertically adjacent block, C1 or B4, in a manner exactly reverse from that noted with regard to the blocks A1 and D4. For example, the double straps or tapes are affixed to the rear faces of the blocks D1 and A4 and the front faces of the vertically adjacent blocks C1 and B4, while the single straps are secured to the front faces of the blocks D1 and A4 and the rear faces of the vertically associated blocks C1 and B4.

Referring now specifically to column 2, it will be noted that a continuous pair of securing tapes or straps 52 are provided. These straps 52, lying adjacent the vertical edges of the corresponding blocks, are rigidly affixed, as by means of adhesive, to the rear face of blocks A2 and C2, and to the front faces of blocks B2 and D2 with the portions of the parallel straps 52 between the vertically adjacent blocks lying freely across the horizontal abutting faces. With continued reference to column 2, it will be noted that a single centrally located tape 54 is permanently affixed to the front face of blocks A2 and C2 and to the rear face of blocks B2 and D2, the unsecured intermediate portions of the tape 54 also freely lying

between the horizontal abutting faces of the vertically adjacent blocks in column 2.

Column 3 differs from column 2 in that the orientation of the pair of tapes 56 and the single tape 58, relative to the blocks, is just the reverse of the tapes 52 and 54 associated with column 2. The upper and lower blocks A2, A3, D2 and D3 in the columns 2 and 3 are secured solely to their vertically adjacent blocks, and not to the horizontally adjacent blocks.

Referring now to horizontal row B, it will be noted that the blocks therein are integrally interconnected by a continuous pair of tapes 60 which are rigidly affixed to the rear face of blocks B1 and B3, and to the front face of blocks B2 and B4, with the intermediate portions of tapes 60 between the adjacent blocks lying freely between the vertical abutting faces thereof. A single tape 62 also extends along row B and has portions thereof fixed to the front face of blocks B1 and B3, and the rear face of blocks B2 and B4, the intermediate portions of the single tape 62 also lying freely between the vertical abutting faces of the adjacent blocks in row B.

Row C differs from row B solely in a reversing of the pair of tapes and the single tape as will be readily apparent from FIGURE 2. It will be noted that the end blocks in rows B and C, that is blocks B1, C1, B4 and C4 are not secured to each other, but on the contrary are secured solely to the vertically adjacent corner blocks and the horizontally adjacent interior blocks. Finally, it will be noted that all four interior blocks are integrally engaged with the four blocks which border thereabout.

At this point it might be well to note that while flat tapes or straps have been referred to and illustrated in the drawings, the instant invention also contemplates the utilization of any type of elongated flexible fixed length members, such as string or wire, the flat ribbon-like straps being preferred in that only a minimum amount of space will be taken up between the blocks with the blocks having the abutting faces therebetween for all practical purposes actually abutting each other. By the same token, while continuous tapes have been indicated as extending along the columns 2 and 3 and rows B and C, these tapes can be discontinuous and merely extend between adjacent blocks, as with the straps 22 and 34 between the blocks A1 and B1. Finally, those portions of the various straps which are secured to the specific faces of the individual blocks need not completely overlie these faces, but may, if preferred, only overlap these faces a sufficient amount so as to enable a rigid affixation thereto in order that a pivoting point be provided adjacent or at each edge of each block to which a free edge of a tape or pair of tapes extends.

Turning now to FIGURE 3, the blocks illustrated therein, this being the blocks of row C, have been shown, in conjunction with the associated tapes, in a relationship substantially as they will appear in the actual unit, these blocks being longitudinally separated to the slight degree which will be permitted by the relatively slack-free tapes, the small degree of slack present facilitating the desired pivotal movement of the blocks.

As one example of the versatility of the unit 20, attention is directed to FIGURES 4 and 5 which illustrate schematic top plan views of the arrangement illustrated in FIGURE 1 with the columns being partially moved to present modified arrangements. Initially noting FIGURE 4, it should be appreciated that a pivoting of columns 1 and 2 relative to each other about the rear corner 64 therebetween as indicated by the arrows, along with a simultaneous pivoting of the columns 3 and 4 about the rear corner 66 therebetween and the columns 2 and 3 about the front corner 68 therebetween will result in the presentation of an article shaped just like the article of FIGURE 1 but presenting the previously inner faces 70, 72, 74 and 76 of the columns as the front face of the article.

With reference to FIGURE 5, it will be noted that by pivoting the columns 1 and 2 about the front corner 78, the columns 3 and 4 about the front corner 80, and the columns 2 and 3 about the rear corner 82, a square article as illustrated in FIGURE 1 will be presented wherein the front face thereof is comprised of the side faces 84 and 86 of the columns 1 and 4 and the inner faces 88 and 90 of the columns 2 and 3. As suggested in FIGURE 1, these selectively exposable faces can form portions of numerals which, when properly pivoted, will present the completed numeral. Starting with the basic arrangement illustrated in FIGURE 2, and following the manipulative steps suggested in FIGURES 4-7, five different front faces can be formed.

Incidentally, while it is believed that the actual manner in which the blocks pivot or rotate relative to each other will be readily apparent to one familiar with the art from FIGURES 2 and 3, attention is specifically directed to FIGURE 3 for a brief explanation of the specific mechanics involved. Initially, assume a pivoting of the blocks C1 and C2 relative to each other about the rear corner, designated as 64 in FIGURE 4. A rearward pivoting of the block C1 will be effected about the end 92 of the free tape segment 94 with the rear face 96 of the block C1 becoming positioned on the rear face 98 of the block C2. At the same time, the tape segment 100 will swing about its rear end 102 away from the side face 104 of the block C2 so as to overlie the now exposed side face 106 of the block C1. The reverse occurs when pivoting the block C1 in the manner suggested in FIGURE 5 about the front corner 78. From this, it will also be appreciated that the block C1 can selectively overlie any one of three faces of the block C2. This holds true for all of the blocks relative to each of their adjoining blocks.

Referring now to FIGURE 8, another form which may be assumed by the unit 20 has been illustrated. This form is basically achieved by retaining the rows B and C adjacent each other and pivoting the end rows A and D outwardly and downwardly. The resultant configuration is that of an elongated covered tunnel or, if so desired, a pair of opposed benches or seats, depending upon the specific size of the individual cubic blocks.

FIGURE 9 illustrates a form or arrangement wherein the "tunnel" of FIGURE 8 can have one end thereof closed off so as to define, as an example, a play cave or house for children, again assuming blocks of a substantial size. This closing of the end of the "tunnel" can be effected by merely pivoting the two end blocks A1 and D1 downwardly into subjacent positions relative to the intermediate raised blocks B1 and C1.

FIGURE 10 suggests the formation of a centrally domed structure formed by initially pivoting the blocks A1 and D1 up alongside the raised intermediate blocks B1 and C1, and subsequently pivoting the entire column 1 downwardly into the position indicated by column 4.

FIGURE 10 is also significant in indicating, noting the block A4 shown in phantom lines, the manner in which the corner blocks can be rotated so as to provide a form which is in effect six blocks long, the block A4 overlying the now outer face of the block B4 when pivoted as indicated by the phantom lines showing, along with a similar pivoting of the blocks D4, A1 and D1.

As will be appreciated from the foregoing, the blocks of the unit 20 are capable of being manipulatively moved so as to achieve a great variety of shapes as well as a variety of similar configurations wherein different faces are presented in combination with each other. Further, as will be recognized, depending upon the particular size of the unit, the device can be utilized as a hand held amusement toy, or large construction toy for children, or further, as a means for providing collapsible or convertible chairs, couches or the like. In the latter instance, the blocks would be in the nature of cushioned members. In achieving the various configurations or shapes, it will be appreciated that the individual blocks are movable in two

planes at right angles to each other with each block, in each of the planes, being capable of engaging against any one of three faces of each of the blocks to which it is hingedly engaged.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described.

What is claimed as new is as follows:

1. An articulate article formed of a plurality of blocks and means hingedly interconnecting said blocks for a selective movement of each block relative to adjoining blocks in two right-angularly related planes, each block being directly hingedly engaged with at least one adjacent block, each block having faces thereon selectively abutable with three faces of each block to which it is directly hingedly engaged, said plurality of blocks comprising sixteen equal sized cubic blocks, said blocks, in one selected arrangement of the article, comprising four vertical adjacent parallel columns of four blocks each and four horizontal adjacent parallel rows of four blocks each whereby a square is defined, each of the blocks in both the top and bottom rows being directly secured to one adjacent block, each of the four internal blocks being directly secured to the four adjacent blocks surrounding it.

2. The article of claim 1 wherein the means hingedly interconnecting the blocks comprises a plurality of substantially fixed length flexible members, said members having end portions secured to the opposite faces of mutually adjacent joined blocks and intermediate portions lying freely between the abutting faces of said last-mentioned blocks which are hingedly secured together.

3. The article of claim 2 wherein said flexible members comprise, in connection with each hinged joining of a pair of adjacent blocks, a pair of tapes and a single tape, said pair of tapes being secured to respective ones of an opposed set of faces of said pair of blocks while said single tape is secured to respective ones of said opposite opposed set of faces of said pair of blocks.

4. An articulate article formed of a plurality of blocks, said blocks each being defined by six generally equal size rectangular faces, said blocks, in one arrangement, being arranged in adjacent parallel vertical equal height columns of an equal number of blocks with corresponding blocks in the columns aligning horizontally and defining adjacent

parallel horizontal rows of equal length and of an equal number of blocks so as to define a rectangular configuration, said configuration being one block thick, hinge means directly connecting adjacent columns for a selective movement of each column as a unit into superimposed relation with each of two diametrically opposed faces of one adjacent column while retaining the parallel relationship therebetween, and hinge means directly connecting adjacent rows for a selective movement of each row as a unit into superimposed relation with each of two diametrically opposed faces of one adjacent row while retaining the parallel relation therebetween.

5. The article of claim 4 wherein the blocks in the top and bottom rows are directly connected to only one adjacent block and are individually manipulatable.

6. The article of claim 5 wherein the blocks of said rows and columns include at least one internal block surrounded by the top and bottom rows and the two end columns of blocks and directly hingedly secured to the four adjacent blocks surrounding it.

7. An articulate article formed of a plurality of blocks, said blocks each being defined by six generally equal size rectangular faces, said blocks, in one arrangement assumable by the articulate article, comprising intermediate blocks in face-to-face abutment with each other and surrounding peripheral blocks in face-to-face abutment with both each other and the surrounded intermediate blocks, each of said intermediate blocks having four faces thereof engaged by four adjacent blocks surrounding it, and means directly hingedly securing each intermediate block to the four adjacent surrounding blocks engaged thereagainst, selected ones of said peripheral blocks being directly hingedly engaged with only two adjacent blocks, and other selected ones of said peripheral blocks being directly hingedly secured solely to one adjacent block, whereby a series of manipulative movements can be effective between the blocks.

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F. BARRY SHAY, Primary Examiner

U.S. Cl. X.R.

273—155; 40—28