United States Patent

Nichols

[54] **PATTERN FORMING PUZZLE AND METHOD WITH PIECES ROTATABLE IN GROUPS**

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[22] Filed: Mar. 4, 1970

[21] Appl. No.: 16,473

[52] U.S. Cl. ....273/153 R, 46/25
[51] Int. Cl. A63f 9/08
[58] Field of Search..................273/155, 156, 157 R, 153 R;
35/22 R; 46/24, 25

[56] **References Cited**

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Attorney—Richard P. Crowley and Richard L. Stevens

[57] **ABSTRACT**

Eight cube-type pieces are magnetically engaged to form a cube-type assembly with educational and entertaining features. The cubes are adapted to rotate in complementary sets of four about one of three mutually perpendicular axes. Each cube has colored surfaces and when properly arranged one distinct color on each of the six faces is presented. Each set which shares one face of the assembly may be rotated in multiples of 90° with respect to the other set. If the assembly is initially arranged properly and then disarranged by a random sequence of rotations, it then serves as a device whose object is the restoration of the original arrangement.
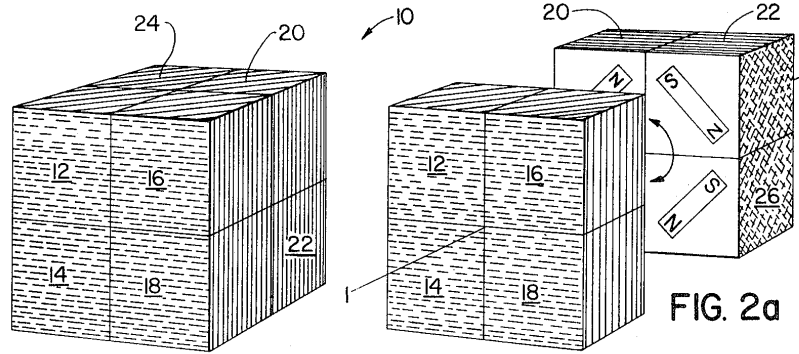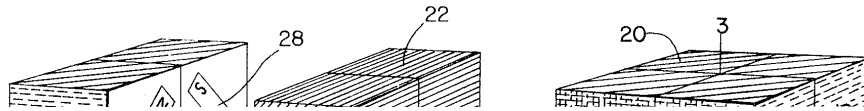
10 Claims, 6 Drawing Figures

FIG. I
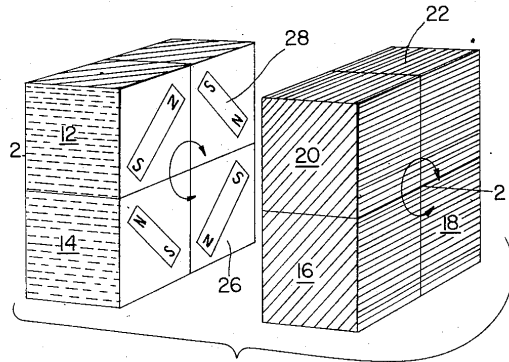
FIG. 2a

PATTERN FORMING PUZZLE AND METHOD WITH PIECES ROTATABLE IN GROUPS

SUMMARY OF THE INVENTION

This invention relates to a device which may be utilized as a new form of puzzle in which portions of an assembly of engaged mobile pieces are rotated relative to one another about various axes in an effort to achieve certain predetermined arrangements of the pieces. Aside from its entertaining aspects, the device also finds application in the educational field to demonstrate the effect of repetitive operations on symmetrical structures, and particularly to demonstrate noncommutative operations in which the final result depends on the order of the individual steps; such noncommutative operations are fundamental to modern mathematics and science. The device may also be used to provide practice in the comprehension and visualization of complex spatial structures and to promote training in the application of algorithms to problem solving; it

In FIG. 2a, the cubes 12, 14, 16, and 18, and the cubes 20, 22, 24, and 26 comprise respectively a first and second set which may be disengaged from one another and rotated about the axis shown by line 1—1. As shown in FIG. 2a, the second set has been twisted 90° counterclockwise from its position in FIG. 1. In FIG. 2b the cubes 16, 18, 20 and 22 form a third set and the cubes 12, 14, 24 and 26 form a fourth set, these sets being adapted to rotate about a second axis shown by line 2—2. As shown in FIG. 2b, the fourth set has been twisted 90° counterclockwise from its position in FIG. 1. Similarly referring to FIG. 2c, the cubes 12, 16, 20 and 24 form a fifth set and the cubes 14, 18, 22 and 26 form a sixth set each set again, as the others, magnetically engaged and adapted to rotate about the third axis shown by line 3—3. As shown the fifth set has been twisted 90° counterclockwise from its position in FIG. 1.

The allowed twists include rotation of any of the six sets as defined in FIGS. 2a, 2b, and 2c through 90°, 180°, or 270° with respect to its complementary set.

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3. A method for restoring a preselected pattern from sets of pieces which pieces have constantly exposed and constantly nonexposed surfaces, the exposed surfaces adapted to be combined to form the preselected pattern, which sets when in random engagement fail to display said preselected pattern which comprises:

    a. engaging eight cube pieces as a composite cube;

    b. rotating a first set of cube pieces comprising four cubes about a first axis;

    c. rotating a second set of four cubes about a second axis; and

    d. repeating steps (b) and (c) until the preselected pattern is achieved.

4. The method of claim 3 which includes rotating sets of cubes about one of three mutually perpendicular axes with reference to the composite structure.

5. The method of claim 3 wherein the sets of cubes are rotated through multiples of 90°.

6. A puzzle comprising at least eight pieces, visually distinquishable indicia on at least one face of each piece with the eight pieces together having at least two visually distinct indicia, means associated with each of the remaining faces only of each of the pieces releasably maintaining the pieces in assembled relationship forming a composite structure, said maintaining means enabling three interaffiliated groups of four contiguous pieces each to be rotated respectively about three mutually perpendicular axes, the two distinct indicia

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being so located on the respective pieces that the groups can be rotated to effect the display of at least two distinct indicia of the composite structure.

7. The puzzle of claim 6 wherein the composite structure is a sphere and the visually distinguishable indicia is on the exposed face only on each piece.

8. The puzzle of claim 6 wherein the means to releasably maintain the pieces in assembled relationship includes magnets.

9. A puzzle comprising eight cubes, visually distinquishable indicia on three faces only of each cubes with the eight cubes together having six visually distinct indicia,

    means associated with each of the remaining faces only of each of the cubes releasably maintaining the cubes in assembled relationship forming a composite cube, said maintaining means enabling three interaffiliated groups of four contiguous cubes each to be rotated respectively about three mutually perpendicular axes,

    the six distinct indicia being so located on the respective cubes that the cube groups can be rotated to effect the display of a distinct indicia on each of the six faces of the composite cube.

10. The puzzle of claim 13 wherein the means releasably maintaining the cubes in assembled relationship includes magnets.

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Disclaimer

3,655,201.—*Larry D. Nichols,* Arlington, Mass. PATTERN FORMING PUZZLE AND METHOD WITH PIECES ROTATABLE IN GROUPS. Patent dated Apr. 11, 1972. Disclaimer filed Apr. 25, 1983, by the assignee, *Moleculon Research Corp.*

Hereby enters this disclaimer to claims 1 and 2 of said patent.

[*Official Gazette September 13, 1983.*]

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,655,201

DATED   : April 11, 1972

INVENTOR(S) : Larry D. Nichols

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 4, line 11, "each cubes" should read -- each cube --.

Column 4, line 23, "claim 13" should read -- claim 9 --.

Signed and Sealed this

Eighth Day of November 1983

[SEAL]

Attest:

GERALD J. MOSSINGHOFF

Attesting Officer   Commissioner of Patents and Trademarks

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

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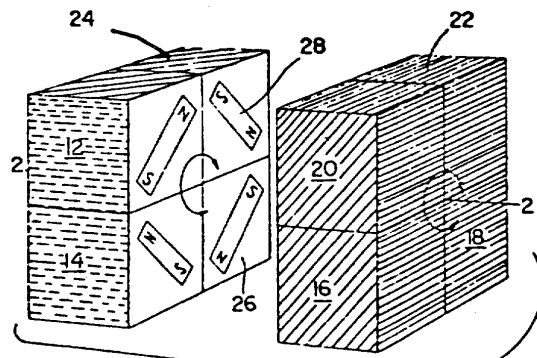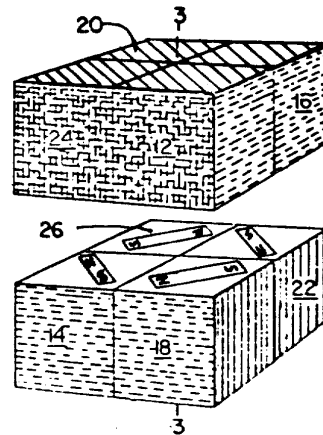In the drawings, figures 2b and 2c should appear as shown below:

FIG. 2b

FIG. 2c

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 3,655,201   Page 2 of 2

DATED   : April 11, 1972

INVENTOR(S) : Larry D. Nicholas

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

Column 2, line 9, "fourth" should read -- third --.

Signed and Sealed this

Twenty-seventh   Day of   March 1984

[SEAL]

Attest:

GERALD J. MOSSINGHOFF

Attesting Officer   Commissioner of Patents and Trademarks