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3,222,072

BLOCK PUZZLE

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2 Sheets-Sheet 1

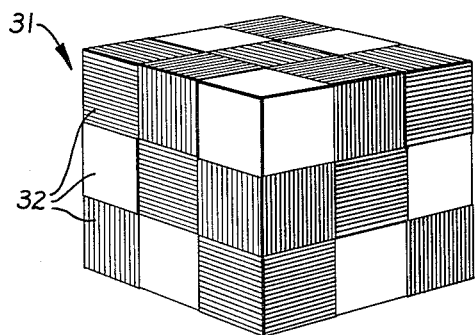


FIG. 1.

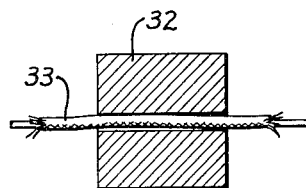


FIG. 6.

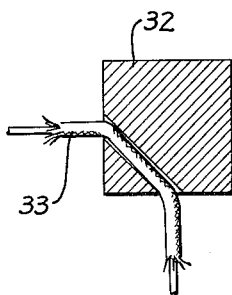


FIG. 7.

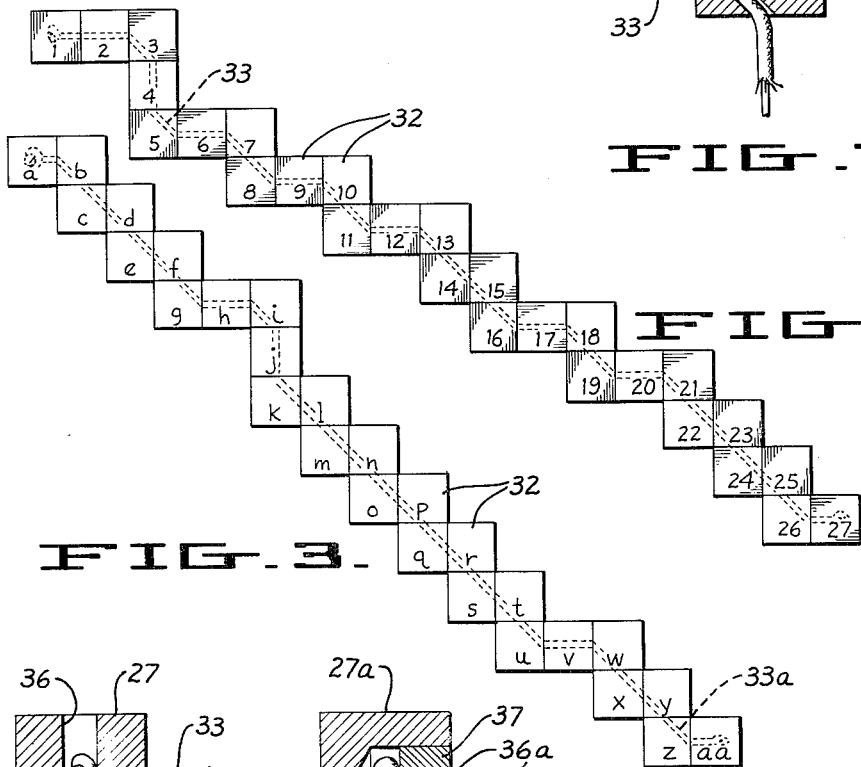


FIG. 2.

FIG. 3.

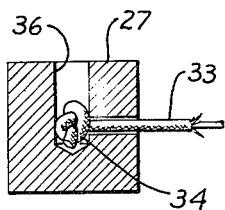


FIG. 8.

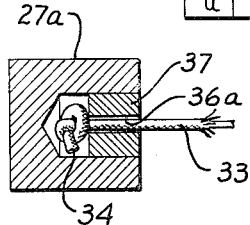


FIG. 9.

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2 Sheets-Sheet 2

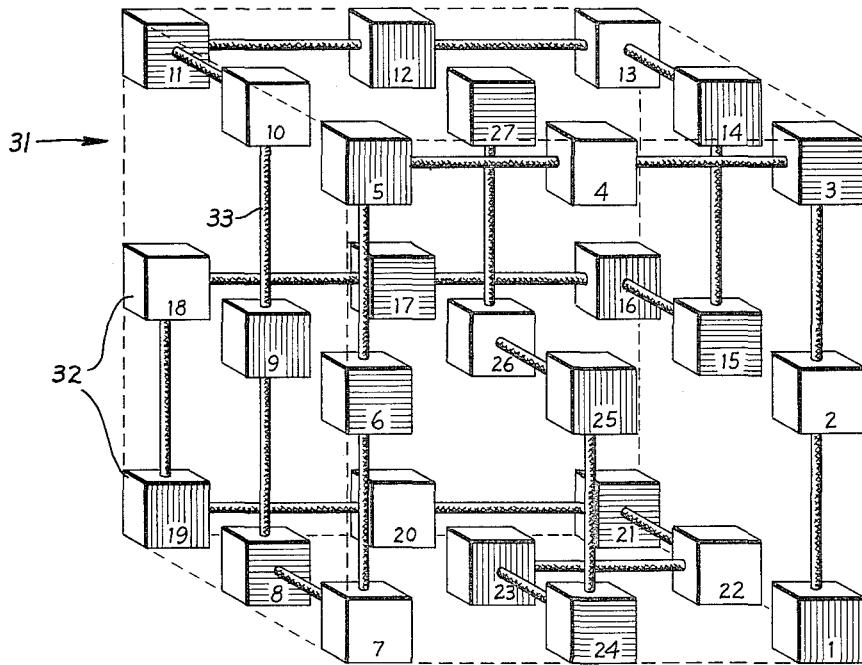


FIG. 4.

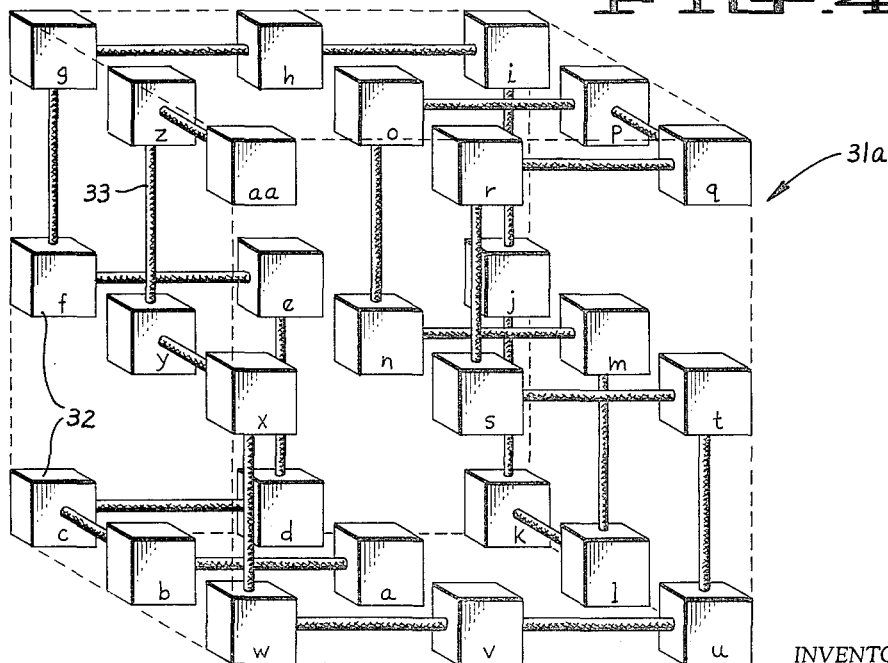


FIG. 5.

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BLOCK PUZZLE

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 12 Claims. (Cl. 273—157)

The present invention relates to improvements in a block puzzle and more particularly to a puzzle in which the player is required to achieve a given position for the solution thereof.

Certain puzzles are known in which the player is required to position a plurality of parts or pieces together to provide a solution thereto and such puzzles have provided a considerable amount of entertainment. These puzzles include jig-saw puzzles in which pieces are fit together to provide a given solution, and puzzles in which wires or nails are bent into a fixed configuration and various units must be put together to provide the solution thereto.

The present invention relates to a somewhat different type of puzzle, which nevertheless provides entertainment through manipulation by the operator or player until a single given solution is achieved. However, the parts of the present puzzle are held together by an elastic member or equivalent structure so as to provide a composite unit and the puzzle is solved by changing the position of these parts of the composite unit until the solution position is obtained.

Thus the puzzle of the present invention has the advantage of being a unitary structure in which the component parts are held together and are not likely to get lost, yet the puzzle provides amusement as great as or better than the heretofore known manipulative puzzles, and of entirely different character.

Accordingly, it is the primary object of the present invention to provide a block puzzle in which the puzzle is in the form of a composite unit that may be manipulated by the player from any of various positions or shapes into a single composite shape representing the solution to the puzzle.

Another object of this invention is to provide a puzzle which may be played by a single individual or by individuals in competition, and which may be played in any location so as to provide amusement during periods which require waiting or otherwise would be lost to the player.

A further object of this invention is to provide a puzzle in the form of a single unit which does not come apart and which contains durable parts that provide a long and useful life.

Still another object of the invention is to provide a puzzle in which a plurality of swivel actions are provided so that the puzzle may be manipulated by rotating any one part of the puzzle with respect to any other part of the puzzle so as to provide a considerable amount of play and provide a challenge to the player in arriving at the proper solution.

A still further object of this invention is to provide a puzzle utilizing 27 small cubes of substantially the same size which are held together by a single elastic strand in such a way that the cubes are rotatable around the strand into a number of different shapes and yet which may be positioned to provide a composite cube.

Further objects and advantages of my invention will become apparent as the specification proceeds, and the new and useful features of my invention will be fully defined in the claims hereto attached. The preferred form of my invention is illustrated in the accompanying drawing forming parts of this description, in which:

FIGURE 1 is a perspective view of a preferred form of this invention as it appears when the puzzle is in solved

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position and illustrating how a color design may be used to assist the puzzle solver;

FIGURE 2, a view of the puzzle shown in FIGURE 1 when the puzzle is stretched out and in a position preparatory to being solved by the player;

FIGURE 3, a view of a puzzle similar to that shown in FIGURE 2 except that it contains a different solving pattern and does not contain the color configuration that provides a design in the final solution;

FIGURE 4, an expanded view of the puzzle shown in FIGURES 1 and 2 as it appears expanded from the solved position shown in FIGURE 1 in order to illustrate the manner in which the parts are held together;

FIGURE 5, a view similar to that shown in FIGURE 4 except that it illustrates the embodiment of FIGURE 3;

FIGURE 6, a cross-sectional view of an intermediate cubical block of the puzzles shown in FIGURES 1 through 5 illustrating the preferred manner of attachment where the adjacent pieces are to be held against opposite faces of the cubical puzzle piece;

FIGURE 7, a cross-sectional view similar to that shown in FIGURE 6 except that it illustrates a preferred form of holding adjacent pieces to adjacent faces of a puzzle piece;

FIGURE 8, a view illustrating one form of terminal puzzle piece that may be used in this invention; and

FIGURE 9, a cross-sectional view of an alternate form of terminal puzzle piece.

While I have shown only the preferred form of my invention, it should be understood that various changes or modifications may be made within the scope of the claims hereto attached, without departing from the spirit of the invention.

In its broad aspect, the puzzle of this invention comprises a plurality of blocks and means for rotatably holding a face of each block to a face of an adjacent block at the centers of said faces. The puzzle is obtained primarily by rotational movement of the blocks relative to each other with rotational movement of any given block resulting in rotational movement of all blocks attached thereto. In this way the blocks may be moved through a three dimensional configuration to provide a novel and amusing form of play. Preferably, the blocks are all congruent with each other and in the shape of a regular polyhedron. In this way, all of the faces of the various blocks are of a matching size and shape. This adds to the confusion of various movements and positions so that the player must be alert to avoid repeating similar patterns that do not lead to the correct solution.

The desired solved shape should be an easily recognizable shape which is three dimensional, that is, a form which contains more than one block in each of the three dimensions. Conveniently, a solved block may be a regular polyhedron such as a cube or an icosahedron. When a cubical form is used for the solution, the blocks should also be cubical and the number of blocks will depend upon the size cube desired or on the difficulty of puzzle desired. Thus the cube could be made up from the cube of a whole number from say 2 to 5. This provides a total number of blocks of 8, 27, 64 or 125. However, it is found that the 27 block cube provides the most desirable degree of difficulty. When an icosahedron is used for the final solution, 20 regular tetrahedrons would be required to arrive at this final solution, however they would not provide the perfect match obtained by the cubical structures.

Although various shapes are embraced in the spirit of this invention, the preferred cubical form is illustrated in the drawings and will serve to teach the broad forms of the invention as well as to illustrate the preferred form in detail. For example, in the preferred form, whole blocks are held together to form a composite unit with

the face of each block held against the face of each adjacent block by an elastic member, but it should be appreciated that other means may be used to provide the same function as this elastic member. Thus a plurality of independent holding means, each extending from the center of the face of one block to the center of a face of another block designed to hold the blocks rotatably together, could be used. However, it is desirable that such members be somewhat elastic and to be sufficiently permanently attached that the unit tends to be kept intact.

Referring to the drawings in detail, there is shown in FIGURE 1 a composite unit in the form of a single cube 31 which comprises 27 individual cubical blocks 32, nine of which are red, nine being white, and nine being blue. As shown in FIGURE 2, blocks 1, 5, 9, 12, 14, 16, 19, 23 and 25 are red; blocks 2, 4, 7, 10, 13, 18, 20, 22 and 26 are white; and blocks 3, 6, 8, 11, 15, 17, 21, 24 and 27 are blue.

In one form of the puzzle, the blocks are arranged on an elastic string-like member 33, which extends between terminal blocks 1 and 27 and passes through intermediate blocks 2 through 26. As shown in the drawing, the elastic member extends through openings in the centers of the faces of the respective cubes. Specifically, it extends through one face of each of the terminal blocks 1 and 27, and through two faces of the remainder of the blocks 2 through 26. In the embodiment illustrated in FIGURE 2, the elastic member extends through opposite faces of cubes 2, 4, 6, 9, 12, 17 and 20 and extends through adjacent faces of cubes 3, 5, 7, 8, 10, 11, 13, 14, 15, 16, 18, 19, and 21 through 26.

With the configuration shown in FIGURE 2, it is necessary for the player to rotate adjacent faces of the blocks about the elastic element as an axis until the position shown in the expanded view of FIGURE 4 is achieved. Although FIGURE 4 shows an expanded view, it should be understood that the elastic member is not sufficiently stretchable to arrive at the position shown, but instead holds the blocks fairly close together with only a slight stretch being possible so that groups of blocks can be folded inwardly on rotation of the group as a whole about the face of one of the blocks.

As best seen in FIGURES 2 and 4, a player will usually begin at one end and proceed as follows in order to solve the puzzle problem. Rotation should be effected either between blocks 3 and 4 or between blocks 4 and 5 so as to bring blocks 1, 2, and 3 around 180° with respect to blocks 5, 6 and 7 so that blocks 1 through 7 lie in a common plane and in U-shaped fashion as shown in the solution in FIGURE 4. Then blocks 7 and 8 are rotated with respect to blocks 1 through 5 by rotating them 90° from the position shown in FIGURE 2 either between faces 5 and 6 or faces 6 and 7 so as to provide another layer. After this move, rotation is effected between blocks 7 and 8 so as to bring blocks 8, 9 and 10 against blocks 5, 6 and 7 and make adjacent tiers. Blocks 11, 12 and 13 are kept in a different plane from blocks 8, 9 and 10 but are rotated so as to provide the relative position shown in FIGURE 4 with blocks 11, 12 and 13 also providing an edge of the cube. In similar fashion, rotation is effected between blocks 13 and 14 and other positions until blocks 14 through 27 are positioned as shown in the solution in FIGURE 4, and a final composite cube is obtained.

From the above description, it is seen how the blocks are moved relative to each other simply by rotation along the elastic as an axis between various of the faces and that a considerable permutation of possibilities can be obtained with only one actual solution being possible. Accordingly, it is necessary for the player to visualize certain spatial relationships and understand certain necessary factors such as the requirement for blocks 5, 6 and 7 which are in groups of three to lie within the final cube being made. In other words, any selection of a position for these three blocks which would lie outside

of the proposed cube could not possibly lead to the right solution and has to be avoided.

Other hints may be provided if desired by the color design such as that shown in FIGURES 1, 2 and 4. As there shown, the colors red, white and blue provide a symmetrical design with each row containing exactly one red, one white and one blue block. However, even with this hint, the block is not easily solved and provides many hours of amusement. Continued play is also provided because even though a player has solved the puzzle once, he will generally not be able to remember the moves made to arrive at the solution, and will find continued enjoyment in solving the puzzle over and over again.

In FIGURES 3 and 5, there is shown another puzzle in which a slightly different solution is provided. In other words, the blocks are put together in a slightly different configuration from that shown in FIGURE 2, nevertheless the assembly is formed to provide a composite cube when the blocks are rotated to the relative positions illustrated in FIGURE 5.

Thus in FIGURE 3 there is shown a puzzle composed of a series of cubical blocks 32 all of the same size, shape and color. The puzzle comprises two terminal blocks *a* and *aa*, an elastic string-like element 33 terminating therein, and intermediate blocks *b* through *z* having the elastic element 33 extend through each block and extend through two faces of each block either from adjacent or from opposite faces, as shown in FIGURES 3 and 5. However, as here shown, only blocks *h*, *j* and *v* have the elastic element extend through opposite faces while the remainder of intermediate blocks have the elastic element extend through adjacent faces. This provides a fairly difficult puzzle, yet one which may still be solved by the player.

As explained above, puzzles could be similarly constructed from more or less blocks, but when the cubical form is utilized, it is found that eight blocks will usually provide a puzzle too simple for any players except small children, while puzzles containing 64 or 125 blocks would provide such a difficult puzzle that only the most persevering players would want to attempt to solve it. Accordingly, it has been found that 27 blocks are the most suitable for both children and adult players.

Other variations are possible, for example, the solution could be a parallelepiped rather than a cube as shown and still be made up of cubical pieces. In this way, a puzzle comprising 36 pieces which contains rows of three, three and four blocks could be used as well as other forms. Similarly, the blocks might be of different shapes, but it is preferred to use regular polyhedrons such as regular tetrahedrons or cubes in order to provide blocks having similar faces all around.

The material from which the blocks and elastic element are constructed may vary widely and many materials are suitable. For example, the blocks may be made from ordinary wood or any other suitable construction material that may be easily fabricated and is preferably durable and of low cost. The elastic element is preferably a string-like element with only a slight amount of stretch to it, so that the player will not pull the puzzle too far out of shape while solving it. In other words, the elastic should normally hold all of the block faces together with sufficient play being provided so that groups of blocks may be slightly twisted as the block group is rotated so as to get around an obstruction during the rotational movement. However, in the final form, the elastic should hold the puzzle compositely as shown in FIGURE 1.

Thus, any suitable string-like elastic element having these properties may be used, and many elastic strands are available on the market. It is also preferred to use a strand which is sufficiently strong that it may not be broken by hand and thereby prevent any inadvertent breakage of the toy during use.

When wooden blocks are used, holes are drilled through the blocks so as to provide intermediate blocks as shown in FIGURES 6 and 7. For example, when the elastic string-like member 33 is to extend through the centers of opposite faces of the cubical blocks, a hole may simply be drilled through the block as shown in FIGURE 6. However, when the elastic element is to extend from the centers of adjacent faces, the holes are drilled through the centers of said faces either to the center (not shown), or a diagonal or curved path may be drilled into the block as shown in FIGURE 7. Obviously, other ways of achieving this desired result may be utilized and any method of fabrication is embraced by the present invention. Preferably, the string-like element extends through the face of the block at the surface thereof in a direction normal to the surface to provide freer rotation.

FIGURES 8 and 9 illustrate two methods of anchoring the elastic element into terminal blocks such as blocks 1 and 27 or blocks *a* and *aa*. Thus, as shown in FIGURE 8, block 27 is drilled into the center at 36, and the end of elastic element 33 is anchored therein by means of knot 34. The drilled hole 36 may then be left open or closed by any suitable means, if desired. Alternatively, the block could be fabricated as shown in FIGURE 9. As there shown, a block 27 has a hole 36a drilled therein, and the elastic member 33 is knotted against a plug 37 with the plug being wedged and/or glued into the hole 36a.

Although FIGURES 8 and 9 are shown to illustrate certain possible methods, it should be understood that many other methods of anchoring the elastic string-like element in the terminal members may be used. It should also be understood that other means may be used for holding the adjacent blocks in position for relative rotation which might be equivalent to elastic string-like element 33 in function. Accordingly, it should be understood that the invention is to be limited only by the spirit and scope of the claims attached hereto.

Another material which is suitable for fabricating the puzzle of this invention is any one of the plastic materials. When plastic materials are used, they may be formed as solid blocks and fabricated as explained above where wooden blocks are used, or may be made hollow and fabricated by other means. For example, when the blocks are hollow, the elastic string-like member 33 is threaded through the intermediate member as is done with solid blocks, but may be tied to an inner surface of a wall of a terminal block with the remainder of the walls then glued thereto. Other methods of fabrication will be apparent to those skilled in the art when considered in the light of the examples given.

Where plastic blocks are used, it is also possible to use transparent blocks and to provide the string-like element as a prominently colored material so that the player may see the position of the string as it appears during the solution of the problem and in the final puzzle as it appears in the solved position.

From the foregoing description, it is seen that I have provided a novel puzzle which is solved by a unique swivel action and which is capable of many variants all contributing to the amusement of the player. It is also seen that my puzzle is a single composite unit which is easily portable for use in any desired location, yet which does not have any loose pieces that may become lost. Similarly, it is seen that my puzzle may be made of rugged construction which will have a comparatively long useful life, yet which is easily fabricated from comparatively inexpensive materials.

I claim:

1. A block puzzle comprising a plurality of blocks all congruent with each other and in the shape of a regular polyhedron, and holding means for rotatably holding a face of each block to a face of an adjoining block at the centers of said faces, said means extending into only one face of two of said blocks and through two faces of the

remainder of the blocks with at least some blocks having said means on adjacent faces, the faces of each block being unrelieved except for the faces having said holding means extending therethrough, said holding means being formed to retain all of the blocks in a single composite unit in a manner permitting orientation of all the blocks into a regular polyhedron with only said unrelieved faces of said blocks exposed.

2. The block puzzle defined in claim 1, in which the blocks are cubical and the number of blocks is the cube of a whole number from 2 to 5, said holding means being disposed in such a way that the entire block puzzle may be formed into one composite cube.

3. The block puzzle defined in claim 2, in which the number of blocks is 27.

4. A block puzzle comprising a plurality of blocks all congruent with each other and in the shape of a regular polyhedron, and an elongated elastic string-like element extending between two terminal blocks and passing through the remainder of the blocks, said elastic string-like element being of such a length that it normally holds all adjacent blocks together while leaving them free for relative rotation around the string-like element as an axis, the faces of each block being unrelieved except for the faces having said elastic string-like element extending therethrough whereby all of the blocks may be oriented into a regular polyhedron with only said unrelieved faces of said blocks exposed.

5. A block puzzle comprising a plurality of blocks all congruent with each other and in the shape of a regular polyhedron, said blocks being present in a number sufficient to form a three dimensional structure having all dimensions larger than those of each block, and an elongated elastic string-like element extending between two terminal blocks and passing through the remainder of the blocks, said elastic string-like element being of such a length that it normally holds all adjacent blocks together while leaving them free for relative rotation around the string-like element as an axis, the faces of each block being unrelieved except for the faces having said elastic string-like element extending therethrough whereby all of the blocks may be oriented into a regular polyhedron with only said unrelieved faces of said blocks exposed.

6. A block puzzle comprising a plurality of blocks all congruent with each other and in the shape of a regular polyhedron, and an elongated elastic string-like element extending between two terminal blocks and passing through the remainder of the blocks for rotatably holding a face of each block to a face of an adjacent block at the centers of said faces, said elastic string-like element being of such a length that it normally holds all adjacent blocks together while leaving them free for relative rotation around the string-like element as an axis, the faces of each block being unrelieved except for the faces having said elastic string-like element extending therethrough whereby all of the blocks may be oriented into a regular polyhedron with only said unrelieved faces of said blocks exposed.

7. A block puzzle comprising a plurality of cubical blocks of substantially the same size, and an elongated elastic string-like element extending between two terminal blocks and passing through the remainder of the blocks for rotatably holding a face of each block to a face of an adjacent block at the centers of said faces, said elastic string-like element extending into only one face of each of the two terminal blocks and through two faces of the remainder of the blocks and being of such a length that it normally holds all adjacent blocks together while leaving them free for relative rotation, the faces of each block being unrelieved except for the faces having said elastic string-like element extending therethrough whereby all of the blocks may be oriented into a regular polyhedron with only said unrelieved faces of said blocks exposed.

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8. The block puzzle defined in claim 7, in which the number of blocks is a cube of a whole number from 2 to 5, and the elastic string-like element is disposed through said blocks in such a way that the blocks may be positioned into a single composite cube.

9. The block puzzle defined in claim 8, in which the number of blocks is 27.

10. A block puzzle comprising 27 cubical blocks of substantially the same size, and an elongated elastic string-like element extending between two terminal blocks of said 27 blocks and passing through the remaining 25 of said 27 blocks, said elastic string-like element extending through certain of said blocks so as to pass through the centers of opposite faces thereof and extending through certain other of said blocks so as to pass through the centers of adjacent faces thereof with the entire path being designed so that the blocks may be rotated into a single position representing a single composite cube, the faces of each block being unrelieved except for the faces having said elongated elastic string-like element passing through the centers thereof whereby only said unrelieved faces of said block will be exposed when said blocks are

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rotated into said single position representing a single composite cube.

11. The block puzzle defined in claim 10, in which the cubes are made of different colors so as to provide a predetermined regular pattern of colors in the exposed faces of the composite cube and assist the player in solving the puzzle.

12. The block puzzle defined in claim 10, in which the blocks are composed of a transparent plastic material and the string-like element is prominently colored so that the player may observe the position of the string-like element and thereby receive assistance in solving the puzzle.

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