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(54) Triangle hinged puzzle.

(57) A string of sixteen or more equilateral rectangular triangles, each having two equal edges which are flexibly coupled to one another at the equal edges of said triangles forming thus an endless chain of triangular shaped flat puzzle elements. The chain of said triangles can be configured to form a multiple of shapes among which a square having two faces of eight nicely fitted said triangles, which can be printed with figures or text thereon in such a way that at least four complete pictures or text can be printed on both sides of the square when properly configured. After disassembly of the said square the objective of the puzzle is to reassemble the four different figures or text on the two faces of the square in a proper sequence of folding moves. The said string of sixteen rectangular triangles can be further extended to form a plurality of shapes of various complexity and thus extending the challenge of solving the puzzle.

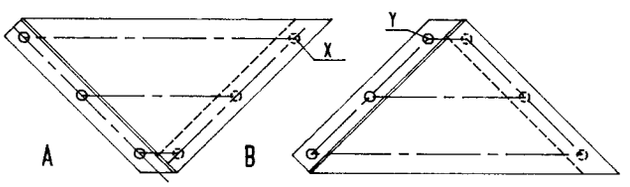
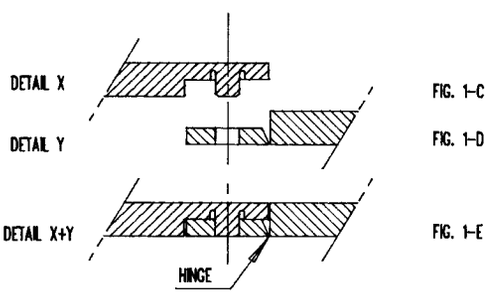


FIG. 1



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SUMMARY OF THE INVENTION

The invention relates to a puzzle comprising sixteen or more equilateral right angle triangles with two equal sides, flexibly coupled at the equal edges of the said triangles to one another forming an endless chain of triangular shaped puzzle elements. The top corner of the said triangle is rectangular (90°) having two equal length sides with a length "a" rendering the base of the said triangle with a length "a $\sqrt{2}$" and two base corners of 45°. The value "a" of the said triangle can be any practical value, preferably between 20 and 50 mm.

Each of the said triangles has at least one flexible element at one of the equal sides in such away that said flexible element can be connected to the next triangle by little pins.

In this way a string of flexible triangular puzzle elements is created, forming a loop or endless chain.

The said sixteen flexibly coupled triangles can be configured in a sequence of folding moves to a square having two faces formed by eight nicely fitted triangles each. Both faces of the said square will be printed with images, figures or text over the boundaries of the said triangles forming the said square.

After disassembly of the said printed squares the objective of the puzzle is to reassemble the figures or text on the two faces of the said squares.

This modular concept of said right angular triangles with integral hinge enables the puzzle to be extended to larger constructions with many shapes or patterns. The complexity of the puzzle increases drastically when more than sixteen of said triangles are used.

BACKGROUND OF THE INVENTION

The purpose of the invention is to form a puzzle for entertainment, games or intelligence tests, using a plurality of triangular flat pieces of a material which are hinged together by a set of flexible connections to a string of triangles such that each triangle has in the assembled form two hinges forming thus an endless chain. One such a construction of flexible puzzle elements is known from the U.S. patent description 588,842 by H. ZIPPERLEN of November 10, 1944 no. 22197 who uses six uniformly shaped three dimensional bodies enclosed by four flat sides in the form of a triangular pyramid, hinged together at two edges of the said pyramid, whereby the hinges are perpendicular to each other. Another puzzle or play set is known from the European patent application 0 185 628 by Giorgy Giogio. In this case the play set comprises a plurality of pieces having a fixed shape each of which ideally made up of a number of variously disposed cubes and a variable piece made up of a number of cubes variously matchable between them for taking up a number of shapes. This variable element holds together by means of an elastic band which goes through the individual pieces. This play set can be used to generate various spatial patterns. The triangular hinged puzzle, subject of this invention, differs in many respects from previous disclosures in that both disclosures uses three dimensional puzzle elements, rendering a puzzle of a complete different nature, whereby the ultimate shape of the puzzle is a spatial body rendering the solution of the puzzle. For the latter disclosed puzzle the elements are interconnected by an elastic band through the cubic shaped puzzle elements, which elements are completely different from the subject invention, while for the first described invention the puzzle elements are pyramids with hinges perpendicular to one an other. The present invention uses flat pieces of material in the shape of triangles, rendering an essentially flat two dimensional puzzle with images or pictures rather than the voluminous puzzles described by the previous disclosures. Another remarkable difference exist between the previous described disclosures that they are failing to anticipate the puzzle according to the present disclosure.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Modular flat units of right-angled triangles, each such element having an integrally built-in hinge and coupling, enabling the joining together of any number of element triangles, forming flat linear strips or closed loops of triangles.

Parts of several pictures (images, patterns, text or else) are printed on one side of such loops, a complete picture split on two or more triangles, and the parts of the split pictures placed in a mixed and seemingly random unrecognizable pattern along the loops.

In such structures each of the joints between two element triangles allows folding in one direction only, in the extent of 180 degrees, each such fold ending in a flat structure of two triangles at a right-angle, with their printed sides on both sides. Depending on the size of the strips or loops and folding them in succession a very great number of different shapes, patterns can be formed among them as solutions the complete pictures, etc.

For example, a simple 16-triangle loop with four pictures (each picture split on six triangles or parts thereof) can be folded in a considerably great number of ways into a two-by-two square configuration (the short side of triangular element taken as an unit), and folding in a proper sequence, allows

in succession to recreate the four pictures as the solution of the multiple puzzle.

The present invention relates to the category of basically two-dimensional folding modular structures with the specific objective of creating a novel puzzle and creative pattern-making concept enabling the creation of a whole range of such objects in different sizes, complexities and levels.

In one of its embodiments, using sixteen flat triangular modular elements, hinged together by specially designed flexible connections into a string of triangles joined together to form a closed loop, it can be folded into a flat square which can show on each side any of four different pictures as a solution to a puzzle problem, etc.

Mainly because of it puzzle-oriented basic concept, this invention involves many subtle and possibly novel features over existing folding structures, both in design and extremely simple though powerful combinatorial mechanism, enabling the creation of puzzles with manifold outcomes and solutions, as well as creative pattern-making activities, achieved so far only by means of much more complex and elaborate mechanisms.

Joining together a bigger number of triangular elements, more elaborate puzzle objectives can be incorporated, up to extending the basic two-dimensional concept of the invention into three-dimensional puzzle structures as well.

Various embodiments of the triangular hinged puzzle are conceivable in size, colors, overprints etc. The invention will now be further explained with reference to the preferred embodiment given in the drawings.

In Fig. 1 two puzzle elements are shown A and B each having one hinge integrally connected that fits together at the opposite part of the matching triangle. The triangle shape is of a type with one rectangle (90°) corner and two opposite corners of 45° rendering two equal length sides and one side that has a length of $\sqrt{2}$ times the length of the other two sides. The said hinges are made on the shorter side of the triangle, of which detail solution is shown in figure 1C and 1D, while in Fig. 1E the assembled hinge is shown.

In Fig. 2 a composite of several puzzle elements is shown with the said hinges shown at locations "a", while the first and last puzzle elements can be connected to form a loop or endless chain.

In Fig. 3 all sixteen triangular puzzle elements are interconnected through the said hinges forming a loop or endless chain of flexible puzzle elements.

Fig. 4 (A through H) shows the many shapes the puzzle can adapt of which one being a square (H) with two equal faces, each comprising eight nicely fitted triangles each.

Although forming a square from the sixteen uniform triangles may in itself already be a puzzle of certain complexity, the puzzle complexity and challenge is extensively increased by printing images, figures or text on to the two faces of the square shaped puzzle over the boundaries of the individual puzzle elements, such as usually done with jig saw puzzles.

Arbitrarily figures or text can be printed on each of the faces of the square of Fig. 5 (A through D) on the areas as indicated by the numbers 1 through 6 and 7 through 12 on one face and 13 through 18 and 19 through 24 on the other side of the said square. By rearranging the puzzle it becomes quite difficult to reassemble the original figure as shown in Fig. 5 (A through D) which is part of the challenge of the subject invention.

In Fig. 6 the number of said triangles has been enlarged to sixty four, giving a very complex puzzle with many pictures, images or text printed on the face of the composite square.

Fig. 7 shows another method of hinging the triangles flexibly together using a simple peace of tape attached to the opposite face of the triangle not used for printing figures or text. The thus described puzzle can be used for many applications such as toys, intelligent tests, entertainment, information carrier for business promotion gifts or premiums etc.

Claims

1. A puzzle composed of sixteen equal triangles having colored faces or markings thereon, wherein each triangle of certain thickness having one rectangular top corner and two equal sides, is flexibly coupled to one another at their two respective sides of equal length forming thus a loop or endless chain of puzzle elements, wherein the said endless chain can be configured to a square having two faces of eight nicely fitted triangularly shaped puzzle elements each.

2. Each of the two faces of the said square of claim 1 in its assembled form is distinguishably colored or printed with figures or text over the boundaries of the triangular puzzle elements, wherein the proper assembly of the said figures or text on the two faces of the square form a solution of the puzzle.

3. The two faces of the said square of claim 2 can hold a multiple of complete images or pictures when folded in a variety of different shapes or patterns.

4. The flexible coupling of claim 1 can be an integral hinge casted to the modular triangular puzzle elements enabling the said puzzle to be extended to form larger integrated puzzles of many patterns, thus increasing the size of the puzzle, the complexity of the solutions and the number of complete images or pictures on the face of the various, said puzzle patterns.

5. The puzzle according to claim 1, wherein the said flexible coupling between the said triangles could be a piece of tape on the back side of the triangular puzzle elements not used for printing.

6. The said hinge of claim 4 being of a type that is integral casted to one side of the said triangle puzzle elements and pressed on to the matching triangle puzzle elements by means of a snap connection.

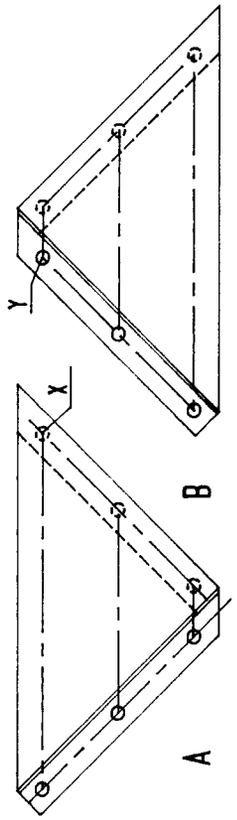
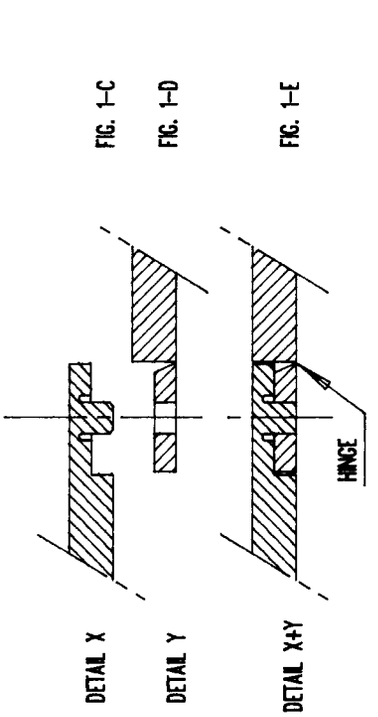


FIG. 1



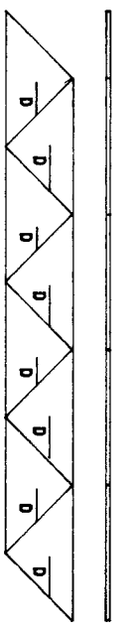


FIG. 2

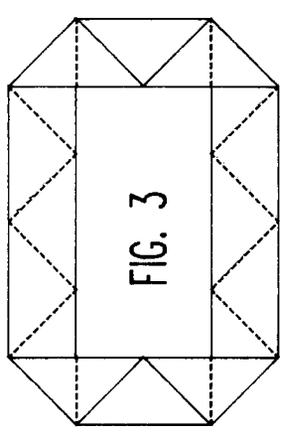


FIG. 3

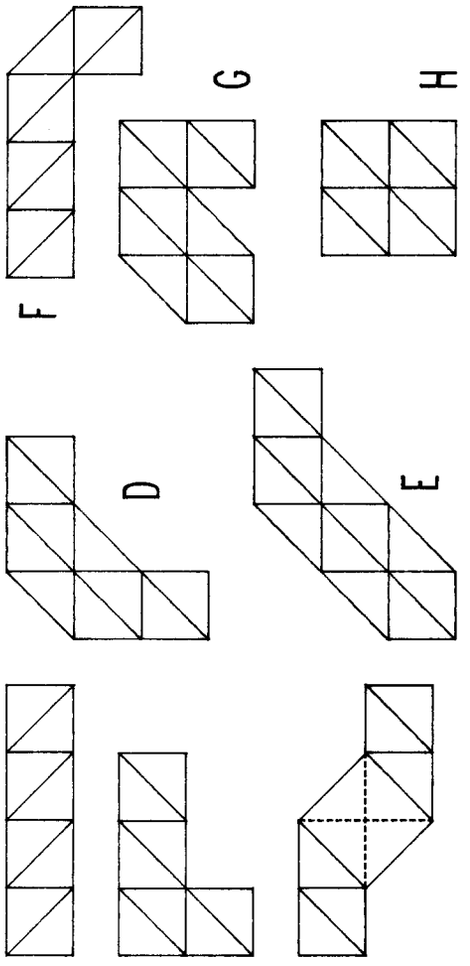


FIG. 4

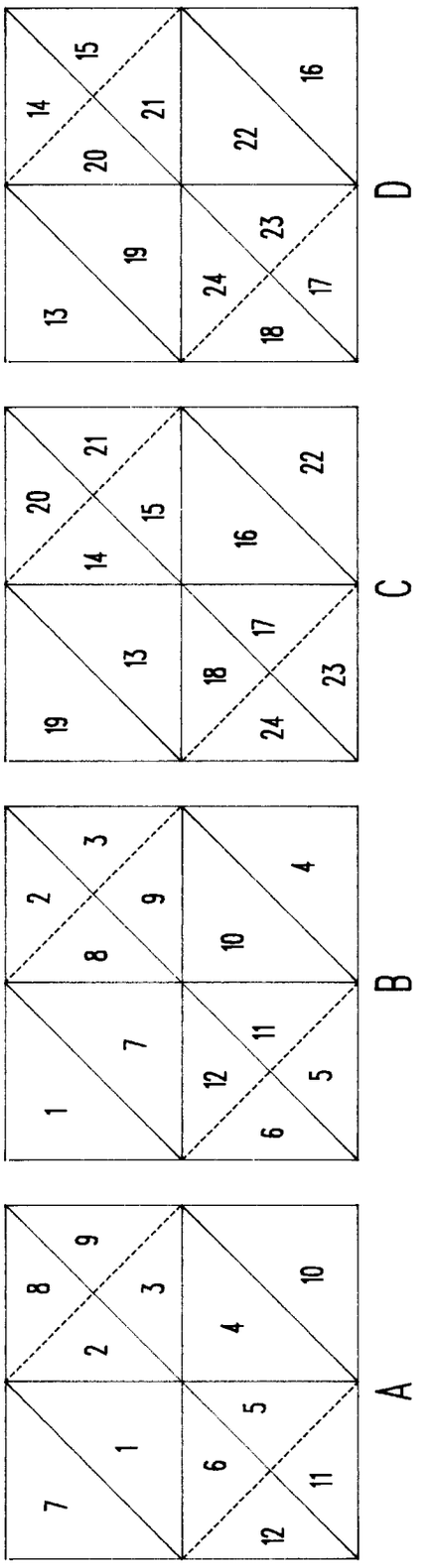


FIG. 5

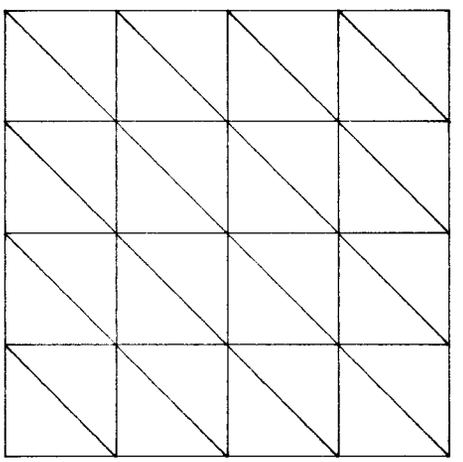
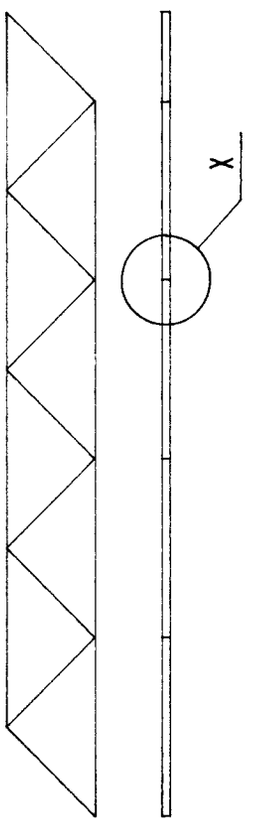


FIG. 6



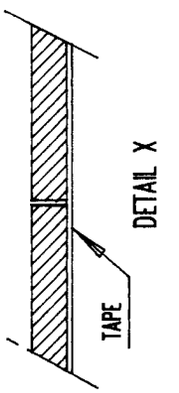


FIG. 7

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EUROPEAN SEARCH REPORT

Application Number

EP 93 20 2492

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl.5)
X Y	US-A-2 327 875 (EDBORG) * page 1, column 1, line 40 - line 55; figures 1,2,7 *	1-4 5,6	A63F9/08
X	US-A-4 993 989 (GIDWANI) * column 2, line 46 - line 47 * * column 3, line 58 - line 65 * * figures 1,3,5 *	1-5	
Y	FR-A-2 220 981 (MOREAU) * claims 2,5 *	5	
Y	GB-A-2 219 216 (POLYDRON U.K. LTD) * claim 1 * * page 2, line 1 - line 13 * * figures 2,3 *	6	
A	GB-A-2 108 395 (KARRAN PRODUCTS LTD) * figure 5 *	6	
A	US-A-4 095 366 (BUCK ET AL.) * column 2, line 64 - line 68 * * figures 2,4 *	6	TECHNICAL FIELDS SEARCHED (Int. Cl.5) A63F A63H

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	27 OCTOBER 1993	PAPA E.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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E : earlier patent document, but published on, or after the filing date
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