

[54] **BLANK AND METHOD USING INDICIA FOR DIRECTING THE MANNER AND SEQUENCE OF FOLDING**

Thereon, 1971.

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[57] **ABSTRACT**

[52] U.S. Cl. **46/1 L**

A folding construction game comprises a sheet of foldable material bearing a plurality of paired indicia at preselected locations. The paired indicia are sequentially coded to enable positive repeatable placement of each member of a coded pair into contact with the corresponding member of the pair in their predetermined sequence to provide a finished construction. Also described are methods for constructing finished three-dimensional articles such as toys or figures from a sheet of foldable material and for teaching the oriental art of origami or paper folding.

[51] Int. Cl. **A63h 33/16**

[58] Field of Search..... **46/1 L, 11, 157; 229/16 D**

[56] **References Cited**
UNITED STATES PATENTS

578,029	3/1897	Russell.....	46/157
2,327,049	8/1943	Kner	46/11
2,327,876	8/1943	Edborg	46/157
3,386,196	6/1968	Razzolini.....	46/1 L X

OTHER PUBLICATIONS

Cooper—Foldable Figure Toy with Instructions Printed

13 Claims, 17 Drawing Figures

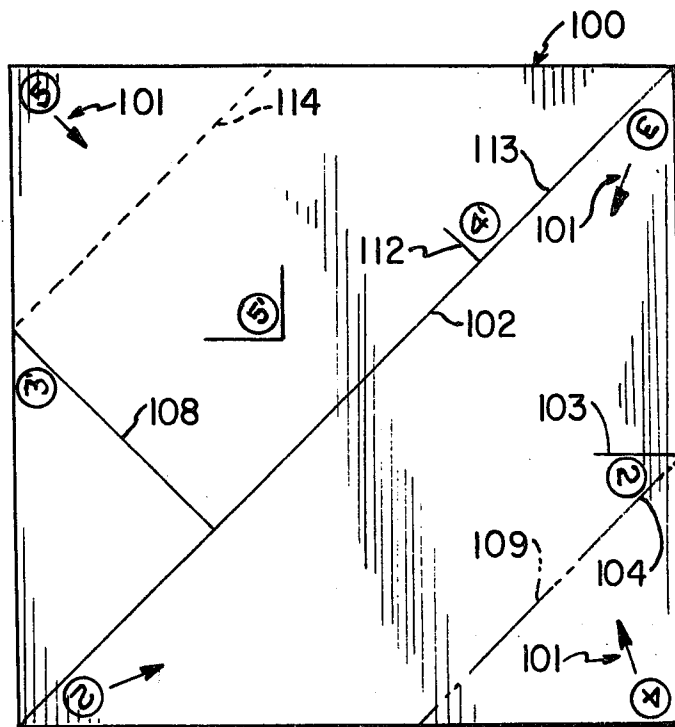


FIG. 1

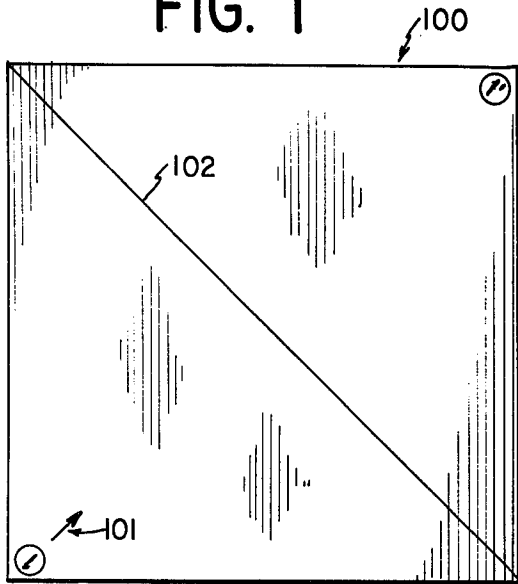


FIG. 2

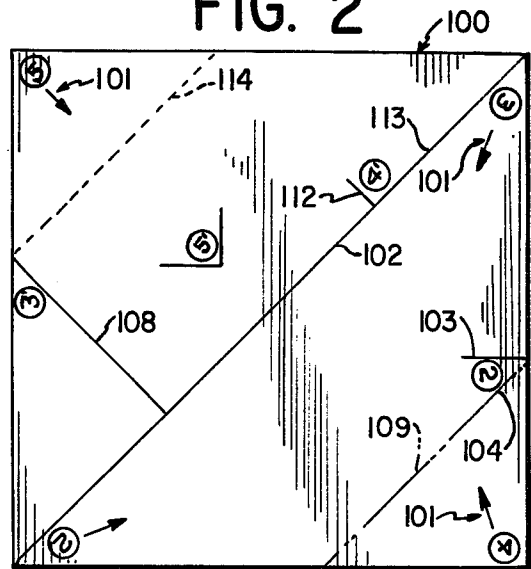


FIG. 3

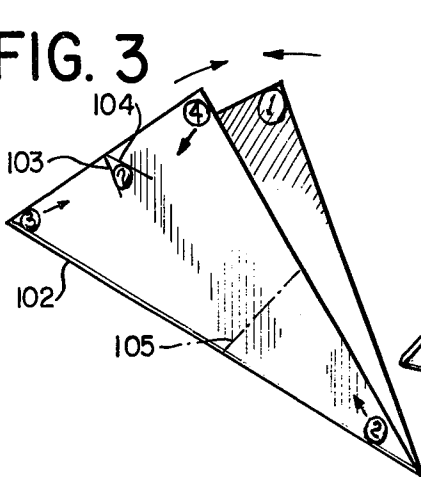


FIG. 4

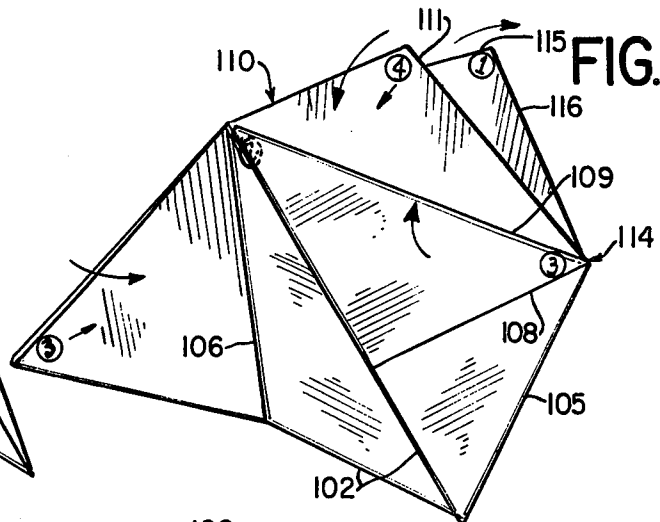


FIG. 5

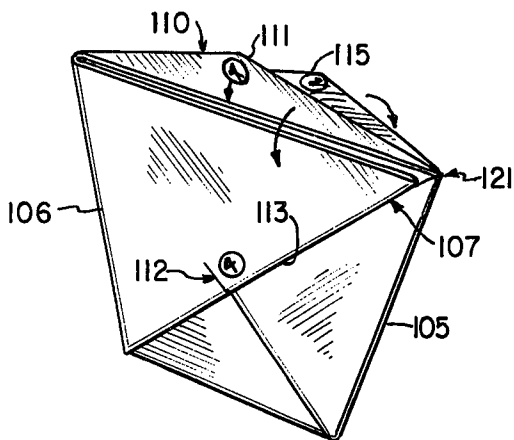


FIG. 6

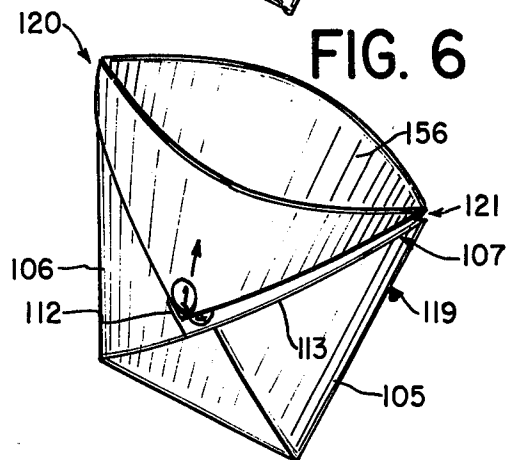


FIG. 7

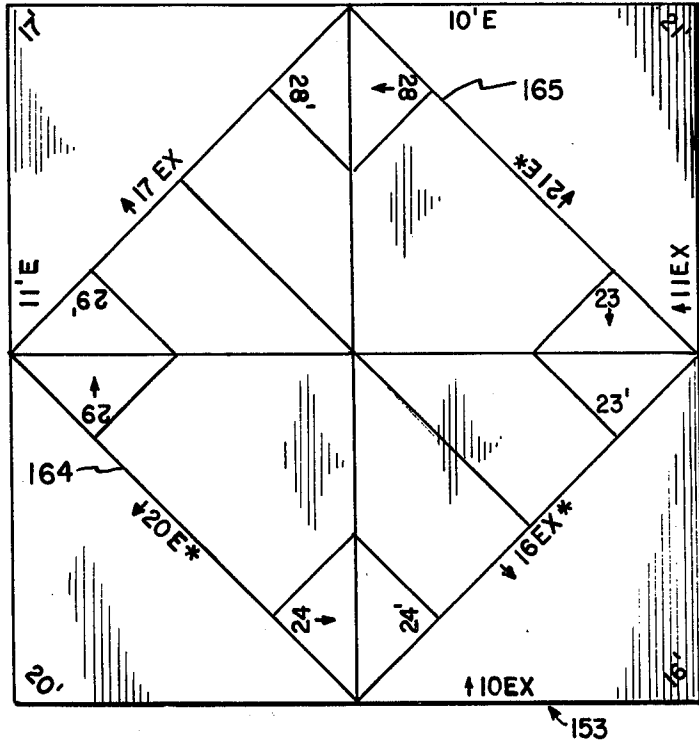


FIG. 8

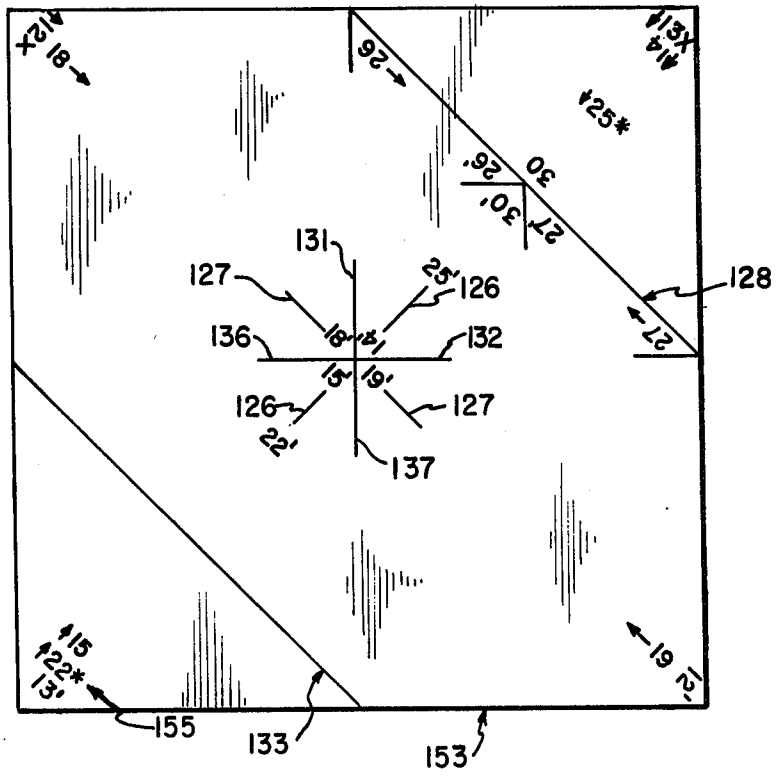


FIG. 9

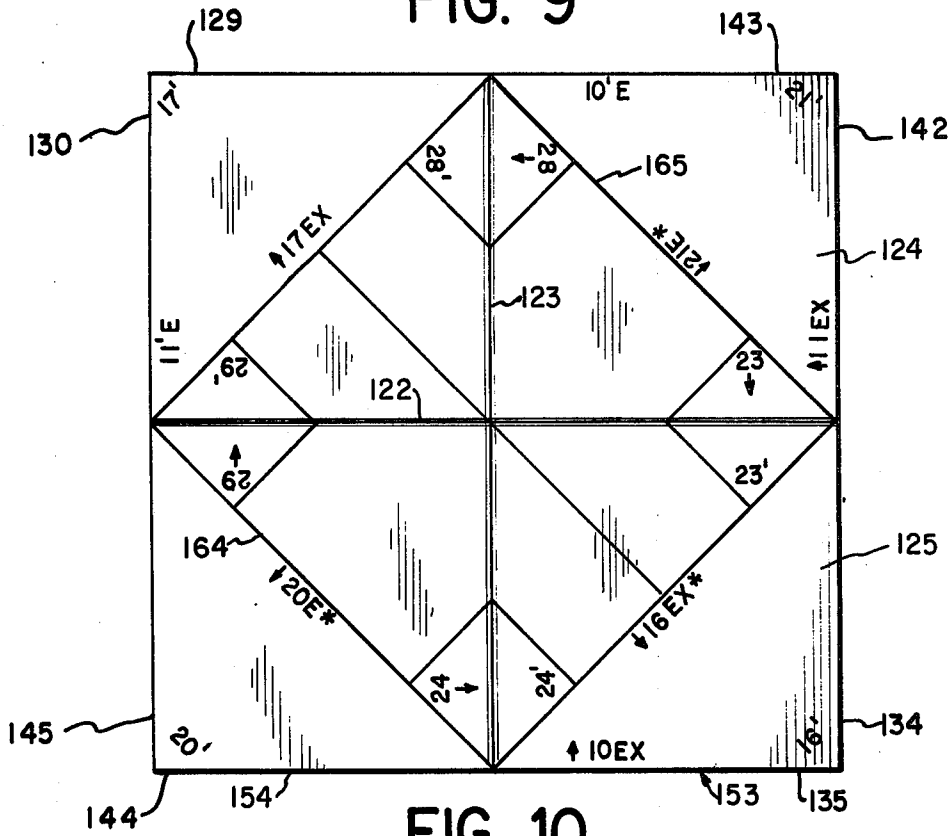


FIG. 10

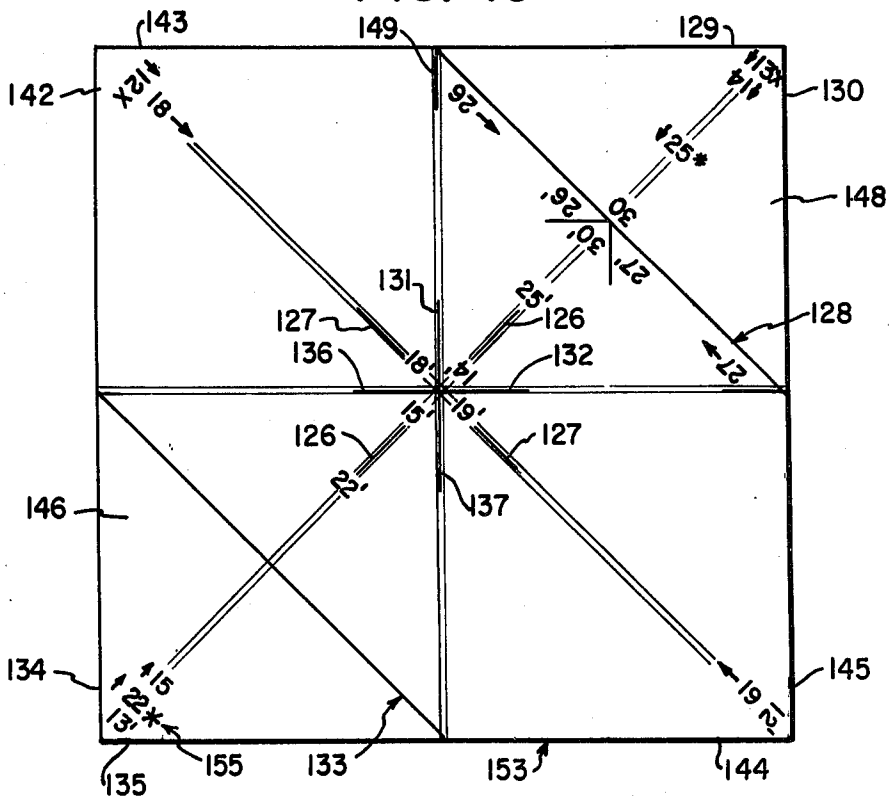


FIG. 11

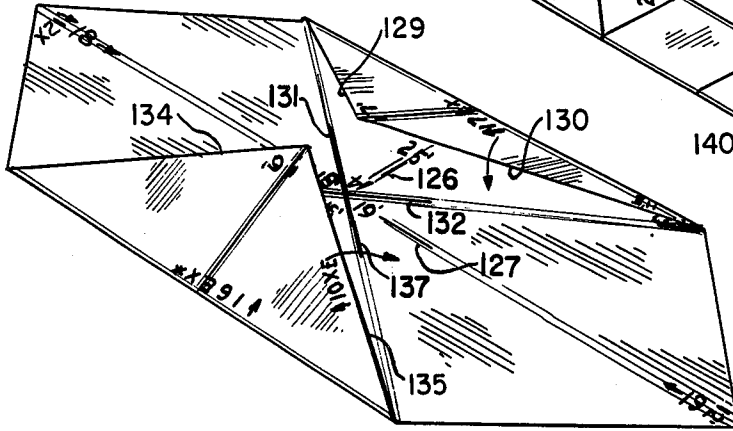


FIG. 12

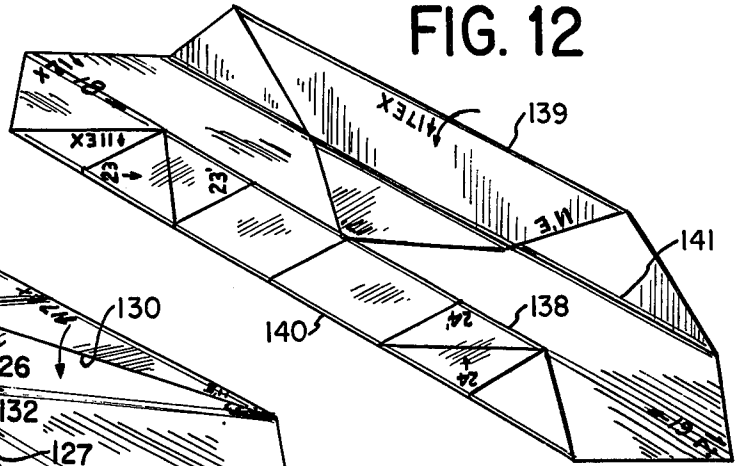


FIG. 13

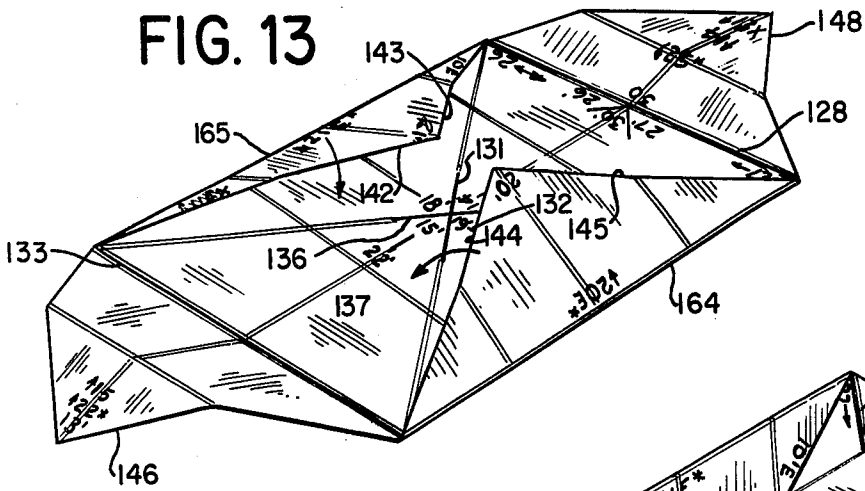


FIG. 14

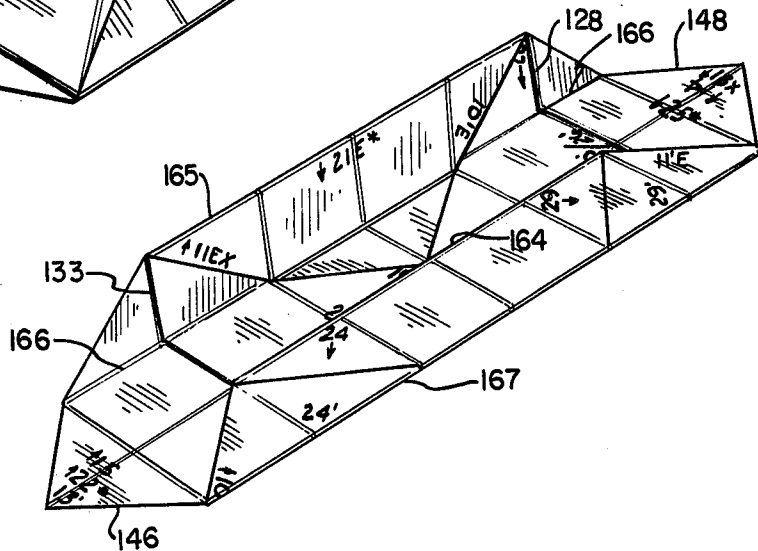


FIG. 15

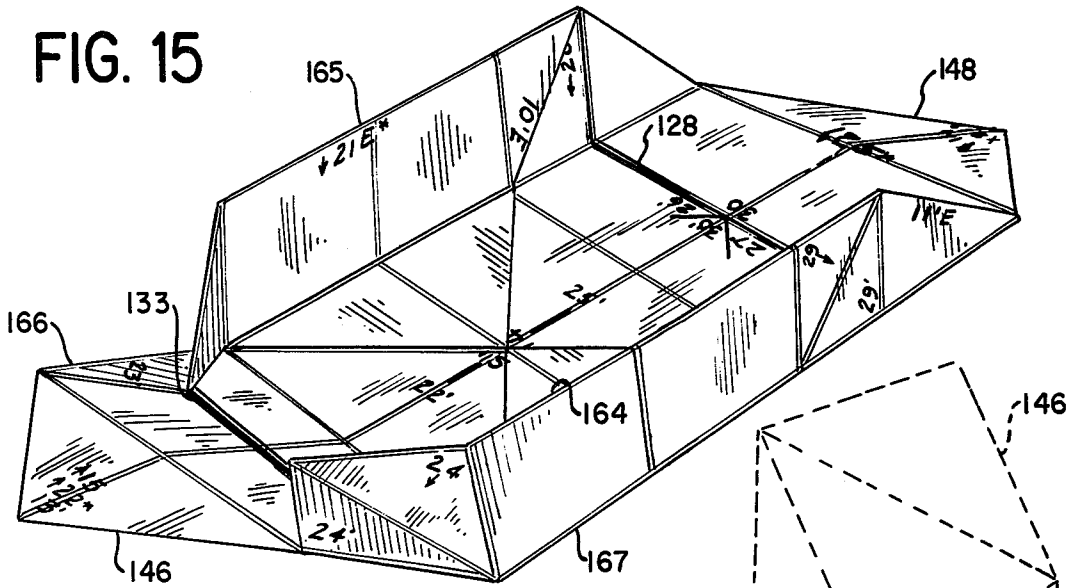


FIG. 16

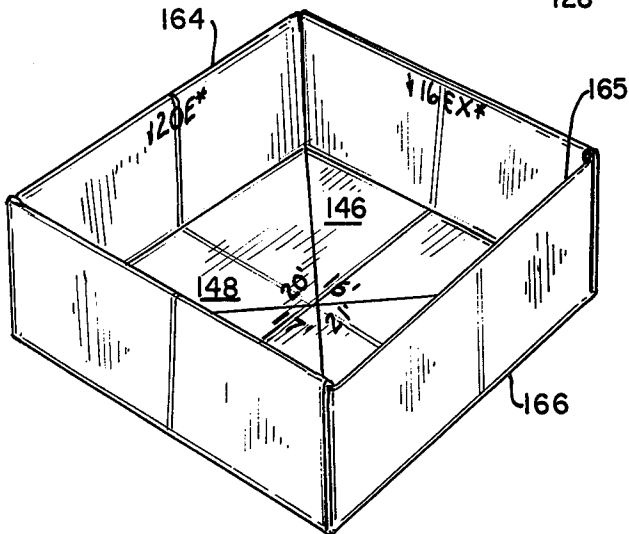
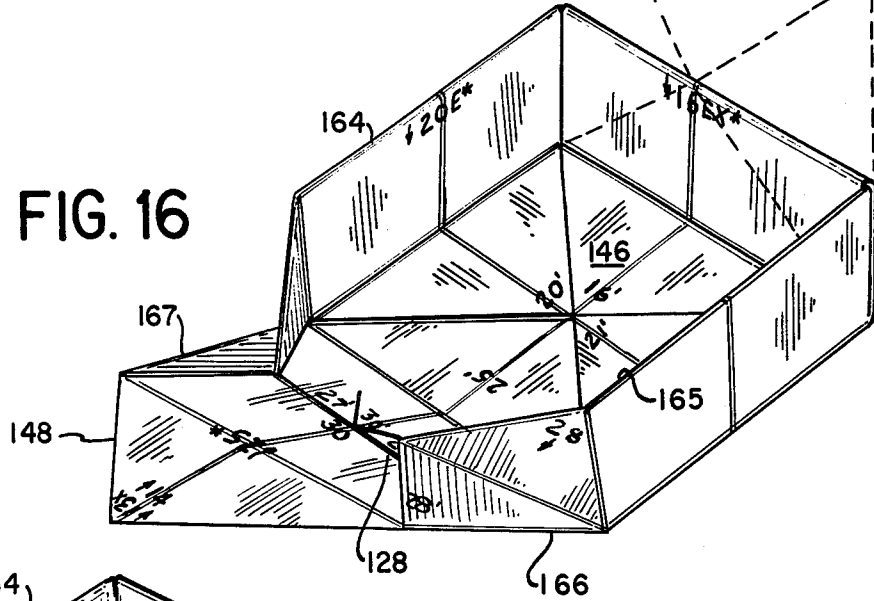


FIG. 17

BLANK AND METHOD USING INDICIA FOR DIRECTING THE MANNER AND SEQUENCE OF FOLDING

This invention relates to a construction game and more specifically to an educational construction game wherein a sheet of foldable material bearing sequentially coded indicia pairs is folded and creased in a predetermined order to bring corresponding members of the sequentially coded indicia pairs into superimposing contact with one another for construction of a finished article. Also, this invention relates to a method of teaching the oriental art of origami or paper folding.

Origami, the oriental game of constructing objects by folding single sheets of material, has been known for many centuries. Briefly summarized, it involves manipulation of a sheet of foldable material by folding and creasing selected edges and corners into juxtaposition with one another in a sequence of steps to construct a finished three-dimensional article. Geometrical shapes, toys, games, figures and containers of various shapes and configurations are among the finished articles which may be constructed by folding and creasing a sheet of foldable material in proper sequential fashion, the particular sequence depending upon the finished article which it is desired to construct.

More recently, it has been recognized that such games and manipulations which involve construction of finished articles by folding and creasing a sheet of material possess significant educational and therapeutic value. For example, such games have been found to be beneficial in imparting manual dexterity and coordination skills to children suffering from emotional, psychological and neuromuscular disorders. Simple folding construction games have also proved to be of therapeutic value in treating emotionally retarded children, the games providing an opportunity for the child to build self-confidence and manipulative skills while creating a desired toy or game which may be the subject of additional learning experience. They are also highly useful in relieving the tedium of bedridden or confined persons. A particular advantage of such games and toys is that they are relatively inexpensive, involving only a generally readily available sheet of paper or similar foldable material and requiring no special implements, and are especially suited for simultaneous use by a group of individuals under the supervision of a counselor or teacher.

One problem that has prevented more widespread use of these construction games is the difficulty in teaching and learning the particular steps of folding and creasing and their sequence involved in constructing the different figures and articles which can thus be prepared from a sheet of foldable material. Different sequences and combinations of folding, unfolding, creasing or pleating steps are required to construct relatively different arrangements such as cups, boats, airplanes, pinwheels, animal or bird figures, baskets, containers and the like. Without individualized and time-consuming instruction, it is usually difficult for an instructor to explain to a group, e.g. a class of retarded children, the steps required to construct a given article from a flat sheet of foldable material. The difficulty in learning and instructing is compounded as the shape and design of the final article become more complex, certain designs requiring a multiplicity of intricate, juxtaposed, bending, folding and creasing operations.

The means currently available for group instruction or self-teaching of sheet-folding construction generally employ the same technique, in which the student is provided with a book containing detailed written instructions laying out the sequential folding, creasing and unfolding operations required to construct a finished article. The written instructions are usually supplemented with a drawing which depicts with dotted lines the axes along which certain creases and folds must be made in order to create the desired finished article. This method of instruction is complicated and has several drawbacks. The student must continually refer back and forth from the drawings to the printed instructions and then to the sheet being worked upon, thereby making it difficult to establish an effective uninterrupted learning pattern. The written instructions are often incomplete or ambiguous, unless expensive detailed illustrations are provided. Further, since only the fold axes are illustrated on the drawing, it is possible for a pupil to fold the sheet material in the wrong sense, thereby frustrating further effective construction of the desired article.

Another drawback is that such teaching methods are not suitable for use in a therapeutic program for developing and improving manual dexterity skills of children. This is especially true when the children to be instructed consist of children who are either emotionally disturbed or suffering from motor coordination disorders. A further complication, applicable to adults as well as children, is that certain constructions require the execution of non-folding steps, e.g., extraction of a folded flap, formation of a pleat or unfolding a single one of several folds. It is often difficult, even for individuals accomplished in sheet-folding crafts, to execute such special instructions by reference only to written instructions and illustrations of fold axes.

The present invention overcomes the foregoing drawbacks and disadvantages by providing a blank of foldable material bearing corresponding pairs of sequentially coded indicia. By folding and creasing the sheet to bring one preselected member of each pair of coded indicia into superimposing contact with its corresponding pair-mate in a predetermined sequential order, the user of the game will readily construct a finished article. In addition to the sequencing code, an indicium may also contain directions for further manipulation of the sheet as well as indicate special coded instructions for performing an unusual construction operation, such as unfolding or pleating. The invention also includes a simple method for constructing finished three-dimensional articles from foldable sheet materials.

It is a principal object of the present invention to provide a foldable blank or sheet bearing pairs of coded indicia which can be juxtaposed in a predetermined order for construction of a preselected finished article.

Another object of the invention is to provide a new and improved method of constructing an article from a specially marked blank or sheet of foldable material.

A still further object of the invention is to provide an uncomplicated and effective method of teaching construction of three-dimensional objects from a sheet of foldable material to groups of individuals and especially children.

These and other objects of the invention will be readily appreciated by reference to the following detailed description of preferred forms of the invention

when considered in connection with the accompanying drawings wherein:

FIG. 1 is a plan view of the face side of a blank of foldable material bearing sequentially coded indicia pairs for construction of a simple device (here a drinking cup) in accordance with the invention.

FIG. 2 is a plan view of the obverse side of the blank of FIG. 1.

FIG. 3 is a perspective view of the blank of FIG. 1 after the first folding operation.

FIG. 4 is a perspective view of the sheet of FIG. 3 illustrating subsequent folding and creasing operations.

FIG. 5 is a perspective view of the sheet of FIG. 4 illustrating the final folding and creasing operations.

FIG. 6 is a perspective view of a drinking cup constructed from the foldable blank of FIGS. 1 and 2 in accordance with the invention.

FIG. 7 is a plan view of the face side of another blank of foldable material bearing sequentially coded indicia pairs, in this instance for construction of a gift box.

FIG. 8 is a plan view of the obverse side of the blank of FIG. 7.

FIG. 9 is a plan view of the blank of FIG. 7 laid flat after preliminary folding, creasing and unfolding operations.

FIG. 10 is a plan view of the blank of FIG. 8 laid flat after completion of further preliminary folding, creasing and unfolding operations.

FIG. 11 is a perspective view of the blank of FIG. 10 after a further preliminary folding operation.

FIG. 12 is a perspective view of further preliminary folding, creasing and unfolding operations on the blank of FIG. 11.

FIG. 13 is a perspective view of a folding and creasing operation on the blank of FIG. 12, after it has been completely unfolded.

FIG. 14 is a perspective view indicating a subsequent folding operation on the blank of FIG. 13.

FIG. 15 is a perspective view illustrating construction of three walls of the gift box.

FIG. 16 is a perspective view of FIG. 15 rotated 180° in space to further illustrate the final steps in construction of the gift box.

FIG. 17 is a perspective view of the completed gift box.

In the following description, the indicia marked on the device are generally in the form of numbers, of one or two digits, although other indicia of pre-established sequence (such as alphabetic letters) may also be used. Reference members used to aid in the description are given three digits to distinguish them from the marked indicia.

In FIG. 1 is illustrated the face side of a blank of foldable material, generally of a square shape. The blank may be made of any sheet material capable of retaining a crease or fold. Suitable materials from which the blanks of this invention may be made include sheets of coated and uncoated paper stock such as construction paper, newspaper, kraft paper, butcher paper and cardboard. Synthetic foldable plastic sheet materials including polyethylene terephthalate (mylar), vinyl and polyvinyl chloride are also suitable. Metallic foils such as aluminum foil may also be employed as the foldable sheet materials of this invention. In a simple and inexpensive form, the blanks are made from construction paper.

Referring to FIGS. 1 and 2, it will be seen that the blank of foldable material 100, in this case a sheet of construction paper, bears a plurality of paired sets of indicia or characters 101 and fold lines 102, 113, 114.

Although not so illustrated, the indicia may be enclosed within bounding enclosures, e.g., circles or squares, for ease of identification and positioning. In order to facilitate performing the game and construction of the desired article, the indicia pairs are sequentially coded in a predetermined fashion. The code in this illustration is simply the sequence of numerals in increasing order, beginning with 1 and here extending through 5. One member of each pair of indicia is the numeral itself, while the other is the same numeral with a "prime" designation, so that the pairs are 1, 1'; 2, 2'; etc. The pair mates may be designated in other ways, such as 1a, 1b; 2a, 2b; etc. Although numerals have been used as the sequential indicia or characters on the blank illustrated in FIG. 1, the invention is not limited to use with numerals, and letters or any other characters which may be simply and readily progressively ordered in sequential fashion are equally suitable for the indicia coding system of the invention. Each character is positioned in a predetermined location on the blank such that when its pair-mate is placed face-to-face on it, in the sequence indicated on it, by appropriate folding and creasing, the desired article will have been constructed.

Simple instructions provided with the same may advise the player that the corresponding characters are to be matched together and folded into abutting contact with one another in the order (here, numerical) established by the coded sequencing of the characters. Unless otherwise specified in a special instruction, all folds are creased along fold lines also indicated on the blank.

With further reference to FIGS. 1 and 2, it will be seen that one of each related pair of characters has an information marking, in this case an arrow (101), adjacent to its position on the blank. The information marking serves a two-fold purpose. First, the marking is associated with the character which must be grasped by the individual and folded into contact with its pair-mate bearing the same numeral. In other words, the information marking adjacent to a given character advises automatically that the surface of the blank on which this particular character is located should be moved into contact with the surface bearing the matching character. For purposes of description, the latter character may be referred to herein as the "stationary" character, while the former may be called the "moving" character. The information marking also points out the general location of the corresponding paired character, to facilitate locating the paired one. For example, by reference to FIG. 1, it can be seen that the arrow adjacent to indicia numeral 1 points directly towards the corresponding indicia 1' located at the diagonally opposite corner of the blank. As in the case of the sequential indicia code, the information symbol need not be in any specific configuration, although preferably it is a form such as an arrow, a triangle or a teardrop shape capable of directly visually conveying directional information.

Certain standard construction information is also conveyed by means of markings associated with characters to which such information may be applicable.

In those instances where the operator is only to precrease the blank along a predetermined fold line (i.e., fold corresponding indicia into contact with one another, crease along the fold line and then unfold the

blank), this operation is indicated by the appearance of a special symbol, for this operation in association with the indicia in question. Any suitable numeral, letter or other symbol which is not easily confused with the other markings appearing on the blank, may be used to identify this operation. For purposes of illustration in connection with the description of the invention, the symbol X appearing in association with a specified character indicates that a pre-creasing operation (i.e., fold, crease and unfold) must be carried out in conjunction with the corresponding character. Thus, an operator encountering the X symbol in conjunction with a given character proceeds to fold this character into contact with its pair-mate. This being done, the operator would then crease the blank in the usual manner along the fold line formed by the preceding step (which line may be marked on the blank for ease of understanding). Finally, the operator would complete the pre-creasing operation by unfolding the crease. As an alternative, a separate sequence of characters may be used to designate such pre-creasing operations. If the normal sequence is provided by numbers, the pre-creasing sequence may be indicated by use of letters, or roman numbers, or other distinguishable ordered array of symbols.

In similar fashion, appearance of another marking, such as the letter E, adjacent to a sequence character advises that it is the edge of the blank adjoining that character which is to be folded and creased into contact with its matching character.

In most instances where one member of a character pair is identified as referring to an edge of the blank, its pair-mate will also bear the edge identification symbol, indicating that the two edges are to be folded and creased into alignment. Some construction situations may involve folding and creasing an edge of the blank into contact with a point. In this case, only the character referring to the edge need be marked with the edge-indicating symbol. Proper alignment of the crease line produced by the folding operation will be insured in such cases if the corresponding sequence characters are maintained in superimposed contact during the creasing step.

Performance of the game and construction of a finished article from the foldable blank according to the invention is generally carried out by joining the coded indicia pairs together by folding the blank to place each member of the pair into superimposing contact with its mate, in sequential order. The symbols adjacent to one member of each pair of coded indicia indicate which part of the blank is to be moved in the folding operation. As shown below, in FIGS. 1 and 2, the indicia have been arrayed on the blank such that when the portions of the blank have been folded and creased to place each pair of corresponding characters in superimposing contact with one another, in the predetermined sequence, a three-dimensional paper cup will have been constructed.

The folding operation is further simplified by the provision of fold guidelines and edge markings adjacent to selected stationary indicia members. The guidelines and markings facilitate correct alignment of the movable edges and points of the blank in relation to the stationary portions. Since the stationary indicia member is often hidden from view in folding, the guidelines provide a visible outline of the proper position for the edge or point portion of the blank at the moving indicia

member. Alignment of the exterior edges of the blank with proper guidelines also insures that the two paired indicia members will be properly superimposed in contact with one another.

In certain construction situations, the operator must execute a special instruction in order to proceed with the next step in the construction sequence. The special instruction may require that an edge be pleated and then unfolded, or that a flap be extracted from within a portion of a partially constructed item. The present invention keeps the necessity for such instructions to a minimum by incorporating most instructions into the nature of the character, or by associating suggestive or readily rememberable symbols with the characters. However, when by the nature of the special instructions this cannot be done practicably, the special instructions may be set forth in an instruction sheet supplied along with the pre-coded blanks of the invention, or alternatively, such instructions may be carried directly on the surface of the blank. The necessity to refer to a special instruction is indicated by an identifying notation or symbol associated with the sequentially coded characters carried by the blank. The special instruction designator selected for purposes of illustrating the present invention is an asterisk (*) shown at 155 in FIG. 7. The asterisk is located adjacent to each member of the character pair in those instances where a special instruction is applicable to that pair. The presence of this designator in association with the character apprises that some special instructions are applicable to manipulation of the blank portions designated by that particular indicia pair, and possibly also to succeeding pairs. Upon noting the presence of an asterisk, reference is made to the special instructions applicable to the construction at hand and, more specifically, to those special instructions preceded by the same character as that adjacent to the special instruction designator on the blank. The written special instructions will then tell the required construction procedure to be followed.

Operation of the game and of the preceding manipulative features will be more clearly illustrated with reference to the following examples which describe the steps required to construct the completed drinking cup illustrated in FIG. 6 and the gift box illustrated in FIG. 17.

Assembly of the paper cup blank whose face and obverse sides are illustrated in FIGS. 1 and 2 is carried out by first laying the foldable blank 100 on a flat surface with the side (that is, the side bearing the lowest numbers in the sequence series) facing up, as in FIG. 1. The operator then grasps the portion of the blank bearing moving indicia number 1 and moves it in the direction of its associated arrow 101, until the character 1 is positioned directly over the matching character 1'. The folded blank is then creased along the printed fold line 102 which extends diagonally across the face side of blank 100. It is not necessary that the fold line be visible, and the folding and creasing operation will be properly carried out if the characters 1 and 1' are held in superimposed contact with one another while the creasing operation illustrated in FIG. 3 is completed. By placing circles around the characters, the proven juxtaposition of the characters is simplified, by merely placing one circle over the other. Referring to FIG. 3, it will be seen that the preceding operation has exposed one facet of the obverse side of blank 100 bearing the

next character in the coded sequence, in this case indicia 2 and 2'.

If for some reason during the folding or creasing procedure the operator had improperly oriented the blank after the initial folding operation, he would be immediately aware of this situation since the next indicia in the sequence would not be visible. Thus, the operator would proceed to search on another facet of the folded blank for the next successive indicia, in this case number 2.

The blank portion carrying number 2 is now folded in the direction of its associated arrow into contact with its corresponding paired character 2', care being taken to see that the edges of the blank defined adjacent to character 2 are positioned within the borders of the guidelines 103, 104 arrayed about character 2'. After this fold has been creased along fold line 105, the construction has the configuration illustrated in FIG. 4.

Construction is continued by moving the next-in-sequence "moving" character 3 in the direction of its arrow about crease line 106 into superimposing contact with its corresponding stationary character 3'. As in the preceding operation, proper positioning of the indicia is facilitated by alignment of the edge 107 adjacent to the moving character 3 with the printed guideline 108.

The cup is completed by folding the arrow-bearing character 4 into contact with its corresponding stationary character 4' about crease line 109 as illustrated in FIGS. 4 and 5. Proper execution of this folding step is facilitated by lining up edges 110 and 111 in alignment with printed guidelines 112 and 113. The same operation is then carried out with indicia 5 and 5' as indicated in FIGS. 4 and 5. In this operation, proper positioning of moving character 5 into superimposed contact with its corresponding character 5' by folding about crease line 114 (illustrated in dot-dash fashion in FIG. 2) is facilitated by alignment of edges 115 and 116 located on either side of character 5 within the boundaries of guidelines 117 and 118. Construction of the cup is now complete. The operator may prepare the cup for use by grasping the completed construction in the palm of his hand with point 120 positioned in the crook of the index finger and point 121 positioned against the thumb and urging these respective fingers inwardly toward one another to open the mouth 156 of the cup to the approximate shape illustrated in FIG. 6.

A second and more complicated example of a construction prepared in accordance with the instant invention is the gift box illustrated in FIG. 17. As in the case of the cup construction previously described, the gift box is constructed from a blank bearing corresponding pairs of sequentially coded indicia or characters, 10, 10' to 30, 30', arrayed on both sides in pre-established positions, shown in FIGS. 7 and 8. The gift box is also assembled by matching, folding and creasing a portion or flap of the blank carrying one member of a pair of pre-coded indicia to place that pair member into superimposing contact with its corresponding pair member, in a precoded sequential order which is inherently instructed by the nature of the indicia used. The gift box embodiment differs from that first described primarily in requiring the operator to execute special instructions detailing construction operations other than matching indicia, folding and creasing. This aspect of the invention will be more clearly understood in connection with the following description of the construc-

tion of the gift box illustrated in its three-dimensional assembled form in FIG. 17.

Referring to FIG. 7, there is illustrated the face side of a foldable blank 153 bearing pairs of sequentially coded indicia at preselected positions for construction of the box of FIG. 17. The first moving character 10XE (referring to edge 154 at the bottom of FIG. 9) is moved into contact with its stationary counterpart 10'E at the top of the FIGURE along crease line 122 (FIG. 9). Since the X symbol appears in conjunction with moving character 10, after creasing along crease line 122, the respective panels 124 and 125 are unfolded. Moving character 11 (at the right of FIG. 9) also bearing the E and EX markings is pre-creased in the same manner as with number 10 by folding to place the moving character into contact with its corresponding stationary number 11' along crease line 123 (FIG. 9), creasing and then unfolding the respective panels.

The blank is now turned over to the obverse side illustrated in FIG. 10 so as to reveal the next number (12) in the construction sequence. The next sequentially coded character 12X (in the upper left-hand corner of FIG. 10) is moved in the direction of its arrow into contact with its stationary counterpart 12' (in the lower right-hand corner), the fold is creased along the printed crease line 126 and the blank is unfolded (as taught by the X). Only part of crease line 126 need be marked on the blank, which in this instance reduces any confusion which might arise from the numerous lines which might appear in the blank. The same operation is carried out with paired indicia 13X (in the upper right corner) and 13' (in the lower left corner) which are similarly matched, and the blank creased along the printed crease line 127, and finally unfolded. At this point, the two faces of the now pre-creased blank if flattened have approximately the configuration depicted in FIGS. 9 and 10.

Proceeding with the construction, indicia 14 (in the upper right of FIG. 10) and 14' (in the center) are placed into contact with one another, and the resulting fold is creased along the printed fold line 128. Positioning of the indicia, which are hidden from the operator's view during the latter part of this operation, is facilitated by alignment of exterior blank edges 129 and 130 respectively with the printed guidelines 131 and 132. Indicia 15 (lower left) and 15' (center) are then placed into abutting contact with one another in the same manner as in the preceding step, and the fold creased along printed crease line 133. As in the preceding fold, proper juxtaposition of the indicia during the creasing operation is facilitated by positioning exterior blank edges 134 and 135 within the boundaries established by printed guidelines 136 and 137.

As seen in FIG. 11, the preceding operations will have exposed character 16EX* (lower left) which includes the special instruction symbol (asterisk). Reference to the corresponding character (16) on the special instruction list reveals that the edge adjoining the character 16EX* is to be folded over to place 16EX* into abutting contact with its corresponding character 16' and with the edge aligned with the printed diagonal center line 127. This fold forms an interior crease line 138 and an exterior crease line 140 (see FIG. 12). The instructions also indicate that the opposing edge bearing the next moving indicia in the sequence, 17EX, is to be folded in a similar manner to form interior crease line 141 and exterior crease 139. The respective exte-

rior blank edges formed by crease lines 140 and 139 are aligned to meet at the diagonal center line 127. The preceding folds illustrated in FIG. 12 are then creased well along crease lines 138, 139, 140 and 141. The presence of the X adjacent to moving indicia 16 and 17 indicates that once the preceding folding and creasing steps have been completed, the blank is to be entirely unfolded and construction continued.

Proceeding to the next character number in the coded sequence, indicia 18 and 18' (FIG. 10, upper left and center) are placed into contact with one another. Positioning of this fold during creasing is expedited by alignment of the exterior blank edges 142 and 143 adjacent to indicia 18 with the printed guidelines 136 and 131. Moving character 19 (lower right) is then matched with its corresponding stationary character 19' (center), and the blank is folded and creased. Proper creasing of this fold is facilitated by alignment of the blank edges 144 and 145 with the printed guidelines 137 and 132. These folding and creasing operations are illustrated in FIG. 13.

Moving character 20E* (FIG. 13), which refers to the adjacent edge formed by crease line 164, is now folded and creased into contact with its corresponding character 20' in accord with the direction given by the *-referenced special instruction.

The special instruction for this indicia is similar to the previous one, and teaches that the edge formed by crease line 164 is to meet the guideline 126 and the corresponding edge formed by crease line 165 at the midline of the blank when moving character 21E* is similarly folded and creased into contact with its corresponding character number 21' as illustrated in FIG. 14.

Construction of the gift box is continued by referring to the next moving character 22* in the sequential code. This character also includes the asterisk indicating that a special instruction is applicable to its manipulation. The corresponding special instruction advises that completion of the final steps in the box construction will be facilitated if the flap 146 which bears character 22* is pointed toward the operator, the left finger placed under the blank edge carrying moving character 23 and the right finger placed under the blank edge carrying moving character 24. At this point, moving character 23 is folded and creased into contact with its corresponding character 23', and moving character 24 is folded and creased simultaneously into contact with its corresponding character 24' by pulling both moving character bearing panels forward and pressing them in a downward direction. This lifts the main part of the article; the edges formed by crease lines 164 and 165 will have been elevated to a vertical position by these operations. Moving character 22* is then folded into contact with its corresponding stationary character 22' by lifting flap 146 bearing the moving indicia 22* while folding and creasing it forward and down about crease line 133 into superimposing contact with its stationary counterpart 22' on the floor of the box, as in FIGS. 15 and 16 (after turning around, with flap 146 upward).

The partially erected box is then rotated until the remaining flap 148, bearing moving character 25*, is pointing toward the operator (see FIGS. 15 and 16) as indicated in the special instruction referred to in conjunction with these indicia. Moving character 26 is folded and creased into contact with its corresponding character 26' about crease line 166 as in FIG. 16. Mov-

ing character 27 is then folded and creased into contact with its corresponding character 27' about crease line 167. The fingers are then placed behind moving characters 28 and 29 and they are both pulled forward and down to match their stationary counterparts 28' and 29'. Creasing is not required to complete the final manipulation of indicia 22-25 and 28-29, the necessary crease lines having already been formed during the earlier pre-creasing stage of construction. Moving character 30 is then folded into contact with its corresponding character 30' by lifting up the pointed flap 148 and folding it over along crease lines 151 and 152 (FIG. 16) so that moving character 25 reaches and matches the corresponding character 25' at the bottom of the box.

The completed box construction illustrated in FIG. 17 is a three-dimensional article whose use may be enhanced by providing the surfaces of the inner and outer faces of the various flaps and panels of the foldable blank with designs, messages, pictures or the like to provide pleasing decorative effects.

Preferably, the indicia are oriented in accordance with the arrow designating the direction of movement, and so that the two members of the pair (or their surrounding circles or other boundaries) will be in coincidence when properly juxtaposed. This gives a psychological assist in instructing how to accomplish the desired step. As illustrated, printed lines are used to designate crease lines, and as guides for locating the proper positions of edges of the blank (either original edges or edges formed by previous foldings).

It will be understood that the proper superposition of said indicia pairs, after folding, may be indicated by other means, such as a dot placed adjacent each member of the pair, or a dot placed adjacent one member of the pair and a matching hold adjacent its pair-mate, so that centering of the dot in the hole will indicate proper positioning. In a similar way, a small hole at each member of the pair may serve as a locating means.

While only two examples of folding constructions have been illustrated, the concept of the invention may be applied to any article which can be assembled by folding and creasing a single sheet of material.

While various procedures may be followed in laying out the indicia on the blank, as one such procedure, an unmarked blank is successively folded and creased as needed to form the desired article, either by following known steps, or by originating such steps. After completing the article, it is unfolded, and folded crease lines are drawn in, either partially or in full, as desired. If desired, pre-creasing lines (i.e., those where the blank is unfolded after creasing) may be separately indicated, as by dotted lines. Wherever two points or two edges or an edge and a point of the blank were juxtaposed in a particular step of forming the article, a pin may be placed through the juxtaposed blank portions to show the desired locations of the two characters to be matched by juxtaposition. The pinhole can serve as the center of a circle to be drawn within which the character is to be placed, the characters are marked in sequence, corresponding to the sequence of steps being followed, and appropriate additional symbols (e.g. E, X, and *, arrows or the like) are included as described above. Similarly, guidelines other than fold lines are drawn at each step, where desirable to facilitate construction.

In this way, a blank can be marked with the necessary indicia and guidelines, on both faces, to serve as a mas-

ter for final drafting and reproduction. Registration marks to assure, that both faces are in exact registry can also be added.

What is claimed as the invention is:

1. An article of manufacture for use in constructing a three-dimensional object by folding and creasing, comprising a manipulatable blank of foldable and creasable material having a pair of surfaces and bearing means for directing a user in manipulation of said blank, said means comprising a plurality of mutually registerable indicia pairs, with at least one said indicia pair on each of said surfaces, a plurality of said indicia pairs comprising a first pair member positioned at a first predetermined location on one of said surfaces of said blank and a second pair member registerable with said first pair member and positioned at a second predetermined location on the same surface of said blank, said indicia pairs being sequentially coded for guiding a user to manipulate said blank according to a predetermined order of steps corresponding to a sequence of foldings and creasings which result in the construction of the object, the corresponding pair members of certain of said pairs being juxtaposed one over the other in the final article made by folding and creasing said blank, whereby said three-dimensional object may be constructed by superposing one member of each of said indicia pairs over the other member of the same pair.

2. An article of manufacture as recited in claim 1 wherein said sequentially coded indicia comprise a sequence of numerals.

3. An article of manufacture as recited in claim 2 wherein said sequentially coded indicia comprise a sequence of letters of the alphabet.

4. An article of manufacture as recited in claim 1 comprising means located adjacent to one preselected member of each indicia pair for directing manipulation of the portion of said blank bearing said indicia member into superimposing contact with said second indicia member to cause substantial coincidence of said pair of indicia with one another.

5. An article of manufacture as recited in claim 1 comprising an information character located adjacent to selected ones of said indicia pairs, each of said information characters providing an instruction for manipulation of one of said portions of said blank about a predetermined fold line to place said first and second indicia pair members in superposition with one another.

6. An article of manufacture as recited in claim 1

comprising means arrayed about preselected points on at least one surface thereof to guide a predetermined portion of said blank to a proper position after folding said portion about a preselected fold line.

7. An article of manufacture as recited in claim 5 wherein each said information character comprises means for directing the superimposition of said corresponding first and second indicia members followed by the subsequent separation and return of said indicia members to their original positions.

8. The method of constructing a three-dimensional article from a blank of foldable material which has a pair of surfaces and a series of sequentially coded pairs of mutually registerable indicia thereon in predetermined locations on both of said surfaces, a plurality of said pairs being on the same surface of said blank, said method comprising the steps of manipulating said blank to cause the mutually registerable indicia of the sequentially first pair of said series to be placed in superimposing contact with one another, and creasing said blank along a line transverse to the direction of said manipulation, then manipulating said blank to cause the mutually registerable indicia of the sequentially second pair of said series to be placed in superimposing contact with one another.

9. The method of claim 8 which comprises unfolding the portions of said blank bearing said paired indicia after said creasing operation in response to recognition of a precoded symbol associated with one member of said indicia pair.

10. The method of claim 8 which comprises rotating one member of each indicia pair into contact with the other member of said pair about a predetermined fold line.

11. The method of claim 8 which comprises coding said indicia pairs in ascending sequential order, and positioning said coded indicia at preselected locations on the surfaces of said blank, said locations being coordinated to the folding operations required in the construction of said three-dimensional article.

12. The method of claim 8 which comprises coding each of said indicia pairs in ascending numerical order.

13. The method of claim 11 which comprises positioning the members of said sequenced indicia pairs at preselected locations for superposition of the members of said pairs in sequential order to form a desired article.

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