United States Patent

Odier

[15] **3,687,455**

[45] **Aug. 29, 1972**

[54] **SET OF PLAYING PIECES**

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[22] Filed: **June 22, 1970**

[21] Appl. No.: **47,969**

[30] **Foreign Application Priority Data**

June 26, 1969	France	6921629
July 9, 1969	France	6923414
July 11, 1969	France	6923664
Jan. 1, 1970	France	7000840

[52] **U.S. Cl.** ..... **273/137 AE,** 273/137 D, 273/157 R

[51] **Int. Cl.** **A63f 9/20**

[58] **Field of Search** 273/137

[56] **References Cited**

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[57] **ABSTRACT**

The present invention is concerned with various improvements in the game forming the subject of copending U.S. Pat. Application, Ser. No. 787,162, filed Dec. 26, 1968, in which the game described comprises a set of polygonal playing pieces similar in shape and in dimensions, each apex of each piece carrying a conventional value chosen from a plurality of possible values, the number of pieces of the set being such that all the possible combinations of said values are reproduced once and only once. According to one of these improvements, the playing pieces also carry a further conventional value in at least one additional point, known as site, intermediate between two of their apices. In one embodiment of the invention the pieces have the form of a regular trapezoid with the long base twice the length of the small base and the oblique sides, the site being located on the long base. In another embodiment the pieces are isosceles triangles with two equal sides twice the length/of of the third side and each having a site located thereon.

2 Claims, 3 Drawing Figures

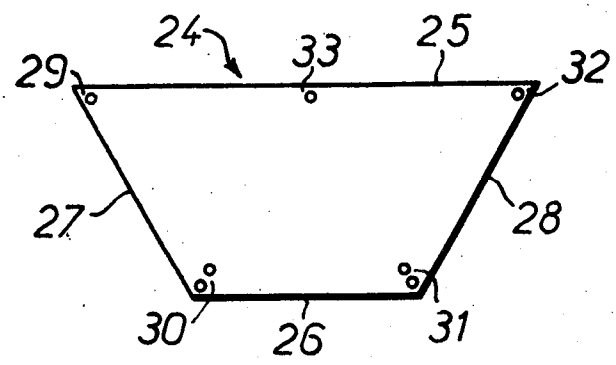


FIG. 1

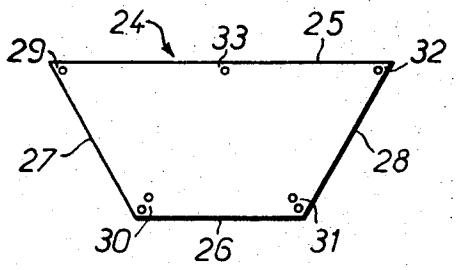


FIG. 2

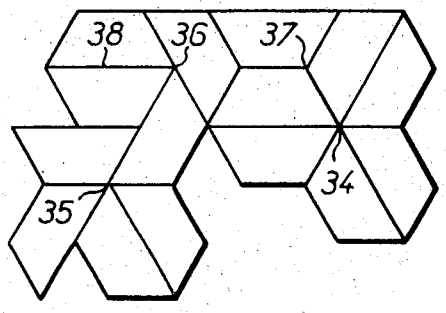
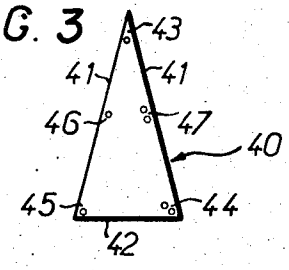


FIG. 3



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SET OF PLAYING PIECES

The present invention has for its objects various improvements in the game described in the co-pending U.S. Application, Ser. No. 787,162.

In that Patent Application, there has been described a game comprising at least one set of polygonal playing pieces with N apices, all having the same dimensions and the same polygonal shape, each apex of each piece bearing, in a conventional form, a value taken from M possible values arranged in a pre-determined conventional order, the N values carried by the N apices of a single piece defining a sequence to be read in a pre-determined conventional direction of reading, and the number of pieces of the set considered being just sufficient for all the combinations of M values taken N by N to be reproduced once and once only by the whole of the sequences carried by the pieces of the said set, in the said direction of reading and respecting the order of the said values.

The rule of the game consists of juxtaposing each piece with at least one side common with respect to the pieces already laid down, in such manner that at least two identical values are located facing each other.

The improvement forming the object of the present invention consists of providing the arrangement of a conventional value in at least one additional point of at least one of the pieces, this additional point, known as a site, being located on one side of the piece between two apices of this piece.

To this end, the present invention has for its object a game comprising at least one set of pieces with N apices and N sides, identical in shape and in dimensions, each piece carrying on each of its N apices and in at least one point P, known as a site, a value taken from M possible values arranged following a pre-determined conventional order, each site of one piece being arranged on one side of this latter, the distance on one side of a piece separating two adjacent values being identical for all the values of all the pieces, each piece thus carrying $Q = N + P$ values defining a sequence to be read in a given conventional direction of reading, and the number of pieces of the set considered being just sufficient for all the combinations of M values taken Q by Q to be reproduced once and once only by all the sequences carried by the pieces of the said set, taken in the said direction of reading and respecting the order of the said values.

This improvement permits the advantageous development of the possibilities of the game described in the above-mentioned Patent Application, while respecting the general rule of this latter, as has been briefly recapitulated above.

The objects of the invention, and their characteristic features and advantages, will be further brought out in the description which follows below, given by way of examples with reference to the accompanying diagrammatic drawings, in which:

FIG. 1 discloses one form of construction according to the present invention;

FIG. 2 shows a surface design obtained with a plurality of pieces according to FIG. 1; and

FIG. 3 shows an alternative form of the present invention.

In the co-pending U.S. Pat. Application, Ser. No. 787,162, there has been described a game composed of

flat pieces of polygonal shape chosen with N apices permitting the continuous covering of a surface, all the pieces of a game set having the same shape and the same dimensions, but each piece being different from the others by conventional values carried by each apex of a piece and taken from M possible values. The whole set of playing pieces forms a complete logical series such that each of the possible sequences of the M chosen conventional values taken N by N is obtained once and once only in this set of pieces.

By way of example, the above-mentioned Patent Application has more particularly described the case of a game composed of pieces in the form of equal equilateral triangles, the three apices of which each carry a conventional value chosen from four possible values which can be represented by the figure symbols **1, 2, 3** and **4** (rather than **0, 1, 2** and **3**), as is more particularly described in said Patent Application.

All the combinations of these four values taken three by three can be expressed by 24 successions of three figures from 111 to 444. There are thus 24 pieces which are all different and amongst these 24 pieces there exist:

four triple pieces each comprising three identical values;

12 double pieces each comprising two identical values;

eight single pieces each comprising three values different from each other.

These eight single pieces may be divided into two sub-groups of four pieces each, known here respectively as A and B. By giving each piece from the apex carrying the smallest numerical value and by reading the values of the other apices in the direct trigonometrical direction, Table I indicates the characteristic sequences of the four pieces A and the four pieces B.

TABLE I

Sub-Group A	Sub-Group B
123	132
124	142
134	143
234	243

According to a first improvement forming the object of the present invention, there is chosen as the polygonal figure for all the playing pieces a polygon enabling a surface to be completely covered, and in addition such that a common unit of length is present a whole number of times in the length of each side of the polygon; this whole number should be small and may be equal to **1, 2** or **3**.

In other terms, the polygonal form for the pieces of a game according to the invention is chosen so that each of its sides has a length equal to **1, 2** or **3** times a constant unit of length. This arrangement makes it possible for example to consider the center point of a single side formed by two units of length as the apex of an angle equal to 180°, which may be termed a "site", and to attribute to this center point or site one of the conventional values also distributed to the other apices of each piece.

FIG. 1 shows a first form of the invention in which each of the pieces **24** is an isosceles trapezoid, the large base **25** of which is twice the length of the small base **26** and twice the length of each oblique side **27, 28**. Each

piece **24** has four apices **29, 30, 31, 32** ($N = 4$), and a site **33** ($P = 1$) in the center of the large base **25**. The five apices and site ($Q = N + P$) each carry a conventional value chosen for example from two possible values "1" and "2" ($M = 2$); all the combinations should be present once and once only. Table II indicates the different sequences of the 32 pieces forming the game. Each piece is designated by orientating its large horizontal side upwards, starting from the left-hand apex of this large side and following the direct trigonometric direction.

TABLE II

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
11111	11112	11121	11122	11211	11212	11221	11222
22222	22221	22212	22211	22122	22121	22112	22111
(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
12111	12112	12121	12122	12211	12212	12221	12222
21222	21221	21212	21211	21122	21121	21112	21111

According to the denomination adopted here, the piece **24** shown in FIG. **1** is the piece **12211**.

The whole of the 32 pieces thus mathematically defined permits the continuous covering of a surface, observing the agreement of the values facing each other on all the apices and sites of the various juxtaposed pieces. The advantage of this type of game is due to the diversity of the assemblies, of which examples are given diagrammatically in FIG. **2** without the indications of conventional values. In actual fact, while still observing the facing values on the apices or sites of the juxtaposed pieces, a surface covering having an angular opening of 360° can be obtained:

either by six pieces assembled together at the point **34** for example;

or by five pieces joined together at the point **35** for example;

or by four pieces joined together at the point **36** for example;

or by three pieces joined together for example at the point **37**;

or by two pieces joined together along the line **38** for example.

The variety of the assemblies which can be obtained while observing the conditions of proximity associated with the various values carried by each apex or site, makes it possible to obtain games of patience or puzzles forming geometric and/or emblematic outlines which may be complex and may require either the correct juxtaposition of the 32 pieces or the juxtaposition of a smaller number of pieces. Collective games similar to those described in the above-mentioned Patent Application can also be obtained.

FIG. **3** illustrates a particular example of the other illustrated form of the invention. According to this example, each playing piece **40** is an isosceles triangle of which each large side **41** is twice the length of the small side **42**. According to the invention, each piece carries five values distributed on the one hand to the three apices **43, 44, 45** and on the other hand to two sites **46, 47** existing respectively in the center of each large side **41**. Juxtapositions of such pieces can thus be effected, two small sides of two pieces being correctly juxtaposed with a single large side of a piece; strictly speaking, each piece will thus have an apex angle very close to 29°.

If it is desired to be able to form a complete circle with twelve pieces juxtaposed by their large sides, the apex angle should be very close to 30°. According to the present improvement, the playing pieces are given the form of isosceles triangles having the value of apex angle which will substantially satisfy the two preceding conditions, for example by adopting an apex angle value comprised between 29° and 30°. All the pieces preferably have their three apices very slightly rounded so that the geometric error deliberately introduced can in practice hardly be seen.

According to the invention, by means of this form of piece, it is possible to multiply the juxtapositions forming emblematic or other outlines, while always observing the conditions of juxtaposition of adjacent values of different pieces, and therefore the logic of the game. In this example of application of the invention, there can be defined by calculation 32 pieces of identical form, each carrying an original sequence of five values each chosen from two possible values ($N = 3$, $M = 2$, $P = 2$, $Q = 5$).

These 32 pieces correspond to the 32 combinations already specified in Table II.

Whether the playing pieces have the geometrical shapes which have been described above or alternatively shapes derived from the same data, in all cases juxtapositions may be effected with all or part of these pieces. Individual forms of games are possible in the spirit of games of patience, or alternatively puzzles in which silhouettes proposed on one or more game panels are to be reproduced, as has already been described in the above-mentioned Patent Application.

Collective forms of game can also be obtained, as alternatives to those already described. In all cases, the fact according to the invention all the possible combinations of pieces are present once and once only in the game renders possible the development of a "logic" of the game which may be interesting in itself for its applications of an educational nature, for the use of the game for the purposes of scientific tests or studies, etc.

The supports which may be associated with the pieces of the game may be flat, in which case they are panels.

These game supports may also be three-dimensional, that is to say they may have several faces to be covered by playing pieces.

In all cases, these game supports may carry an outline of compartments corresponding to the playing pieces to be placed on the support.

In all sets of pieces obtained according to the invention, an additional piece permits the interest of certain forms of individual or collective games to be increased. This is a piece having a shape and dimensions identical with the set pieces, but of which at least one apex and/or one site bears a particular sign having any value at the will of the player or players.

In all cases, in order to facilitate better understanding of the logic of the various forms of game obtained, it is preferred to indicate on each piece, for example in the center of the face carrying the values, the denomination of the piece.

For each type of piece adopted according to the invention, the method of manufacture may be comparable with those previously described in the above-mentioned Patent Application. In particular, the manufacture of moulded pieces of plastic may take account of the arrangements previously described in the above-identified application.

These pieces of plastic material can preferably stand-up on one of their edges, their thickness being made sufficient for this purpose.

As an alternative, the pieces are of metal.

They may also be of synthetic or natural material, in which a magnetic filler has been incorporated.

In all cases, these pieces are flat.

The claims of the invention for which an exclusive right of property or privilege is claimed, are specified as follows:

1. A game comprising at least one set of identical pieces with N apices and N sides, values taken from M possible values arranged at each one of the N apices of each piece as well as at each one of the sites P arranged along at least one of the sides of the piece, P being equal to at least one, such that the distance separating any two adjacent values of a piece is the same for all the pieces, each piece carrying $Q = N + P$ values defining a sequence having a predetermined reading order, and the number of pieces of said set being such that all the combinations of M values taken Q by Q are reproduced once and only once by the sequences carried by all the pieces of said set, according to said predetermined reading order, said pieces having the form of a regular trapezoid, the small base and the oblique sides of which are equal, the large base having a length twice that of the small base and of the oblique sides, each piece having a site arranged in the center of the large base, and in which for $M = 2$, said game comprises a set of 32 pieces, the sequences of which are all different.

2. A game comprising at least one set of identical pieces with N apices and N sides, values taken from M possible values arranged at each one of the N apices of each piece as well as at each one of the sites P arranged along at least one of the sides of the piece, P being equal to at least one, such that the distance separating any two adjacent values of a piece is the same for all the pieces, each piece carrying $Q = N + P$ values defining a sequence having a predetermined reading order, and the number of pieces of said set being such that all the combinations of M values taken Q by Q are reproduced once and only once by the sequences carried by all the pieces of said set, according to said predetermined reading order, said pieces being in the form of isosceles triangles, the two equal sides of which each have a length twice that of the third side, each piece having two sites arranged respectively in the center of said equal sides, and in which for $M = 2$, said game comprises 32 pieces, the sequences of which are all different.

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