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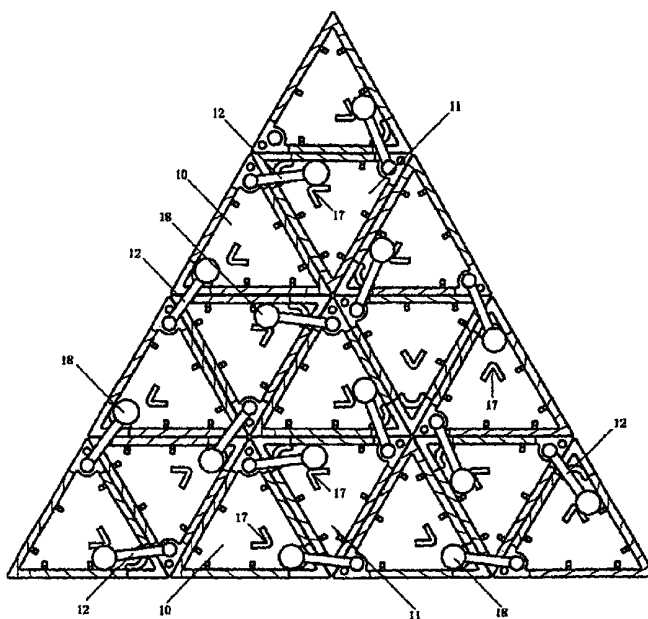
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(54) Title: RECREATIONAL PUZZLE



(57) Abstract: A recreational puzzle comprises a number of identical generally planar equilateral polygon pieces. Two adjacent pieces are joined to one another apex to apex by link. Each link is pivotably connected to one piece and pivotably and slidably connected to adjacent piece. This allows the pieces to swing through a relative arc with respect to the adjacent piece. This also allows a string of pieces that have been manually manipulated to form the aimed composite shapes or desired patterns or pictures. This improves dexterity and provides entertainment.



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*For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.*

## **RECREATIONAL PUZZLE**

### **FIELD OF INVENTION**

The present invention relates to a recreational puzzle for amusement.

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### **BACKGROUND OF THE INVENTION**

It is commonly known that puzzles (or polygons) comprise a plurality of identical square pieces which can fit together to form different shapes and configurations to create particular features and attractive displays. During manipulation, players are benefited from improvement of dexterity and ability in coordination, being amused at the same time. The idea of "puzzle" suggests that a certain amount of skill and experience is required to complete desired pictures or patterns, when manually manipulating the puzzle parts.

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### **BRIEF DESCRIPTION OF THE INVENTION**

It is an object of the invention to provide a novel puzzle for recreational use.

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According to the present invention, there is provided a recreational puzzle comprising a number of generally equilateral polygonal pieces joined together corner to corner by a pivotable link, in which each link is pivotably connected adjacent the corners of adjacent pieces. Each link has a first end that is substantially spherical and a second end that is substantially T-shaped. Alternatively, each link has opposite ends that are both substantially spherical. Each link of the former type is pivotably connected to an equilateral polygon piece at the second end, and pivotably and slidably connected to the adjacent equilateral polygon piece at the first end. While each link of the latter type is connected with respective equilateral polygon piece pivotably and slidably at both ends. For each equilateral polygonal piece, two of its corners are provided respectively with a slot, one of which is used to be connected by one end of the link, while another slot is opened to the interior of the equilateral polygonal piece, whereby the other end of the adjacent link can be inserted into the interior of the equilateral polygonal piece. The size of each slot is big enough to make swinging amplitude of the link so that at the relevant corners one side of two adjacent equilateral polygonal pieces can be rotated to abut against each other.

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Preferably, in the middle of interior of each equilateral polygonal piece, into which a link can be inserted, a protrusive ledge is provided. The protrusive ledge

forms a channel with an inner surface of the respective side of the piece for restraining the sliding of the link, so that the link is trapped at the farthestmost position where the link can enter.

- 5 Preferably, the end that will pivotably and slidably connected to the interior of the adjacent equilateral polygonal piece is spherical slightly larger than the size of the slot in the equilateral polygonal piece.

10 Preferably, the equilateral polygonal pieces are preferably formed of plastics material.

15 Preferably, each equilateral polygonal piece may carry a cover over at least one major face that is decorated. The decoration of each piece may make up part of a distinctive pattern, or a picture when a plurality of pieces are brought together in a closed array.

With the above-mentioned structure, the present invention results in providing puzzles for enhancement of dexterity and amusement.

- 20 A recreational puzzle according to the present invention will now be described by way of example with the reference to the accompanying drawings in which:

#### **BRIEF DESCRIPTION OF THE DRAWINGS**

25 Figure 1 is a sectional plan view of two equilateral triangular pieces of the puzzle in an open configuration;

Figure 2 is a sectional plan view of two equilateral triangular pieces of the puzzle in a closed configuration;

- 30 Figure 3 shows a sectional plan view of a plurality of the equilateral triangular pieces, all in closed positions, together forming a composite regular-shaped triangle;

Figure 4 is a schematic view of puzzles consisted of square pieces, in which four pieces are in the course of forming;

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Figure 5 is a schematic view of puzzles consisted of square pieces, in which a

plurality of pieces form precisely an integral configuration;

Figure 6 is a schematic view of puzzles consisted of hexagonal pieces, in which four pieces are in the course of forming; and

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Figure 7 is a schematic view of puzzles consisted of hexagonal pieces, in which a plurality of pieces form precisely an integral configuration.

### **DETAILED DESCRIPTION OF THE INVENTION**

10 Figures 1, 2 and 3 illustrate puzzles consisted of equilateral triangular pieces. As shown in Figure 3, it is consisted of equilateral triangular pieces that have the same overall dimensions, that is, the pieces are generally identical. Each equilateral triangular piece is joined to one or two adjacent equilateral triangular pieces respectively by a link, and one end 19 of said link 12 is connected to an equilateral  
15 triangular piece, while the other end 18 is pivotably and slidably connected to another equilateral triangular piece. For each equilateral triangular piece, two of its corners are provided respectively with a slot 20, one of which is used to be connected by one end of the link 12, while another slot 20 is opened to the interior of the equilateral polygonal piece, whereby the other end 18 of another link 12 can be inserted into the  
20 interior of the equilateral polygonal piece. The size of each slot 20 is sufficient to allow the link to swing through 120°. This allows the adjacent pieces to swing relative to one another through 240°. Figure 1 and Figure 2 show the process of manipulation, in which each link 12 connects two adjacent equilateral triangular pieces 10 and 11. In particular, the link 12 connects the two adjacent pieces together  
25 through slot 20 in one of the corners of each piece. One end 19 of the link 12 is fitted within the slot 20 in one of the corners of the piece 10, while the other end 18 is inserted into a slot 20 in one of the corners of the piece 11 to form a pivotable and slidable connection. The two adjacent pieces 10 and 11 can swing through 240° relative to each other between two closed configurations, being a first closed position  
30 where one pair of sides 15 and 16 of the respective piece 10 and 11 abuts one another, as shown in Figure 2, while being a second closed position where one pair of sides 13 and 14 of the respective piece 10 and 11 abuts one another, not shown. In figure 1, the pieces are in an open configuration, that is between the first and the second closed  
position.

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The pieces 10,11 and the links 12 are normally made of suitable plastics

material.

The first end 18 of each link 12 is substantially spherical, and the second end thereof is substantially T-shaped (not shown). Alternatively, each link 12 has  
5 opposite ends 18,19 that are both substantially spherical, as shown in the present drawings.

The end 18 of the link 12, inserted into interior of equilateral triangular piece, is designed as a solid sphere with a diameter slightly larger than width of slot 20 in the  
10 corner of the triangular piece. By virtue of resilient deformation plastics, the link 12 is forced into interior of triangular piece, so that these pieces are joined together easily in assembly and not liable to be escaped during playing, but liable to be disassembled for storage.

In the middle of the interior of each equilateral triangular piece where the link can be inserted, a V-shaped protrusive ledge 17 is provided, this together with inner  
15 surfaces of the sides 13 and 15 respectively, provide a channel for restraining the sliding of the link, so that the link is trapped at the farthestmost position where the link can enter so as to position the two pieces in the first or second closed position.

20 Figure 3 shows the puzzle, made up of sixteen equilateral triangular pieces, that has been arranged from a "string" of pieces that are each connected apex-to-apex (corner-to-corner) to adjacent pieces in the string. In effect, the configuration shown in figure 3 represents a solution to a "puzzle" where it is required to form a string of  
25 pieces into some composite regularly shaped triangle. It will be noted that the end 18 of each link 12 is trapped, as it were, being resiliently held against one of the respective ledges 17. This makes easily to manipulate the composite triangle during each stage of assembly and when completely formed, that is, the pieces are swung into their respective precise position of final configuration in turn.

30 The figures do not show top major faces of the pieces, but in normal use links 12 are not externally visible. This makes the manipulation of the pieces as they are swung to chosen closed configurations somewhat less predicable than otherwise. This is because it is not possible to see which end of the link is pivoted and which end  
35 is pivoted and slidably connected. As such, the degree of required manual manipulations skill is higher or at least needs to be learned with practice in order to

form the pieces into different configurations. Normally each piece has a front face decorated in different colors or with picture parts that make up a whole picture when the composite or parts of the composite triangle is obtained. Whereas, the link 12 allows the adjacent pieces to pivot so that either the front or back face of each piece can be arranged to bring together side by side. Thus, both-side faces are needed to be decorated and, number of patterns or pictures to be made up is needed to be increased. In manipulation, it is necessary to choose which piece is used for making up composite triangle or other composite shapes, and, which face is on the top for the aimed shape so as to increase difficulty in manipulation and provide more amusements.

It will be appreciated that, while the links 12 must be slidable to some extent to allow the pieces to swing freely as required, it is possible to arrange for both ends of each or some of the links to be pivotably and slidably connected to the pieces if preferred, so that the extension of the movement of pieces will be larger.

Figure 4 is a schematic view of puzzles consisted of square pieces in the course of forming, in which the structure and the process of manipulation are similar to those of puzzle consisted of equilateral triangular pieces. The completed pattern is shown in figure 5.

Figure 6 is a schematic view of puzzles consisted of equilateral hexagonal pieces in the course of forming, in which the structure and the process of manipulation are similar to those of puzzle consisted of equilateral triangular pieces. The completed pattern is shown in figure 7.

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## CLAIMS

1. A recreational puzzle, **characterized in that**, comprising a number of generally equilateral polygonal pieces joined together corner to corner by a pivotable link, in which each link is pivotably connected adjacent the corners of adjacent pieces. Each link has a first end that is substantially spherical and a second end that is substantially T-shaped; alternatively, each link has opposite ends that are both substantially spherical; each link of the former type is pivotably connected to an equilateral polygon piece at the second end, and pivotably and slidably connected to the adjacent equilateral polygon piece at the first end; while each link of the latter type is connected with respective equilateral polygon piece pivotably and slidably at both ends; two of its corners of each equilateral polygon piece are provided respectively with a slot, one of which is used to be connected by one end of the link, while another slot is opened to the interior of the equilateral polygonal piece, whereby the other end of the adjacent link can be inserted into the interior of the equilateral polygonal piece; the size of each slot is big enough to make swinging amplitude of the link so that at the relevant corners one side of two adjacent equilateral polygonal pieces can be rotated to abut against each other.

2. A recreational puzzle according to claim 1, **characterized in that** in the middle of interior of each equilateral polygonal piece, into which a link can be inserted, a protrusive ledge is provided, which is formed a channel with an inner surface of the respective side of the piece for restraining the sliding of the link, so that the link is trapped at the farthest position where the link can enter.

3. A recreational puzzle according to one of the preceding claims, **characterized in that**, the end that will pivotably and slidably connected to the interior of the adjacent equilateral polygonal piece is spherical slightly bigger than the size of the slot in the equilateral polygonal piece.

4. A recreational puzzle according to one of the preceding claims, **characterized in that**, the equilateral polygonal pieces are preferably formed of plastics material.

5. A recreational puzzle according to one of the preceding claims, **characterized in that**, the links are preferably made up of plastics material.



6. A recreational puzzle according to one of the preceding claims, **characterized in that**, each equilateral polygonal piece may carry a cover over at least one major face that is decorated; the decoration of each piece may make up part of a distinctive pattern, or a picture when a plurality of pieces are brought together in a closed array.

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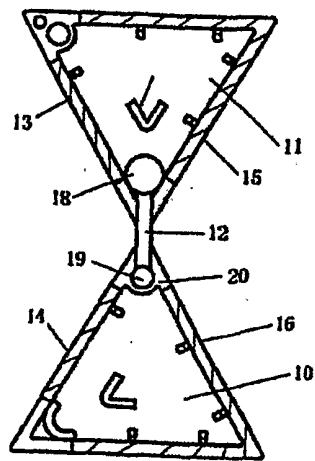


Fig. 1

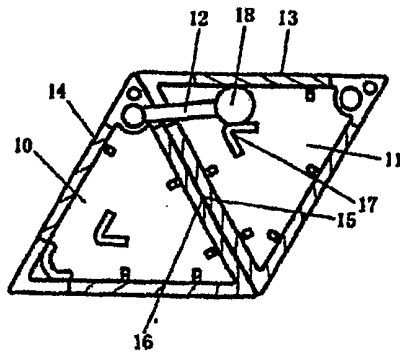


Fig. 2

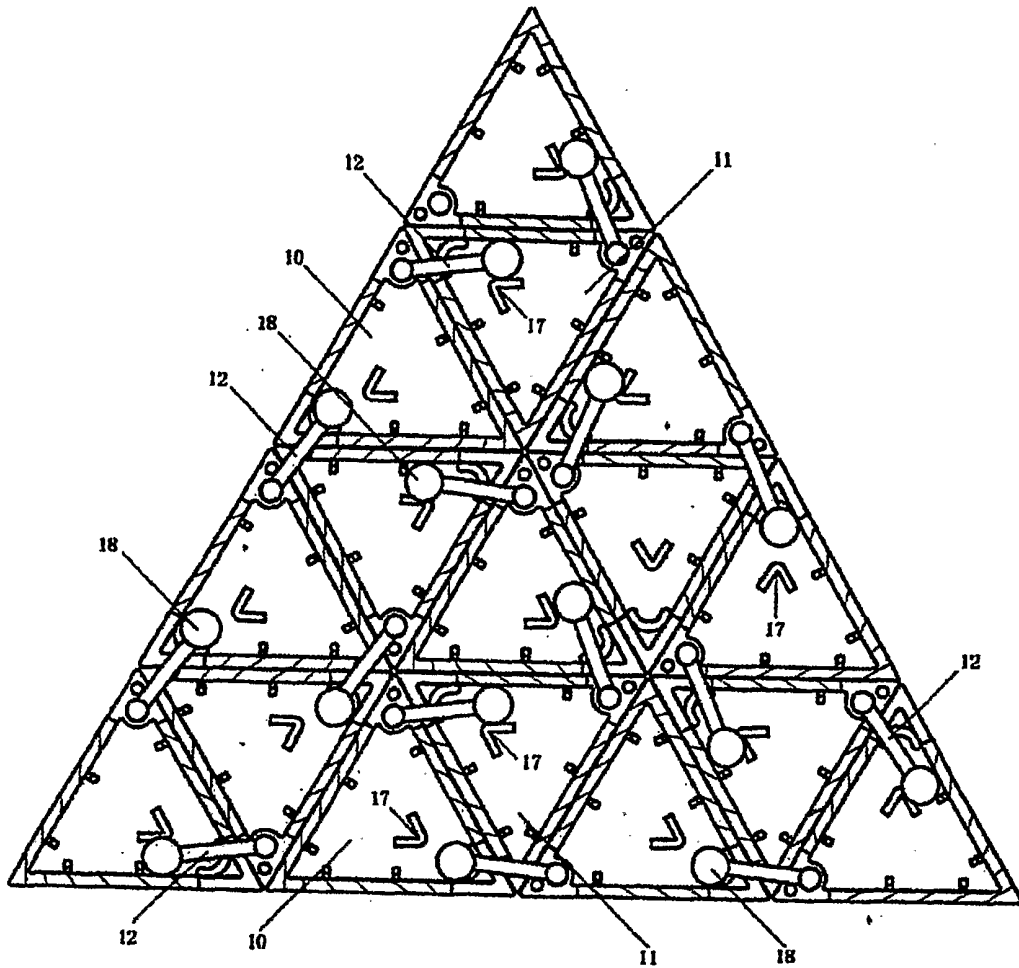


Fig. 3

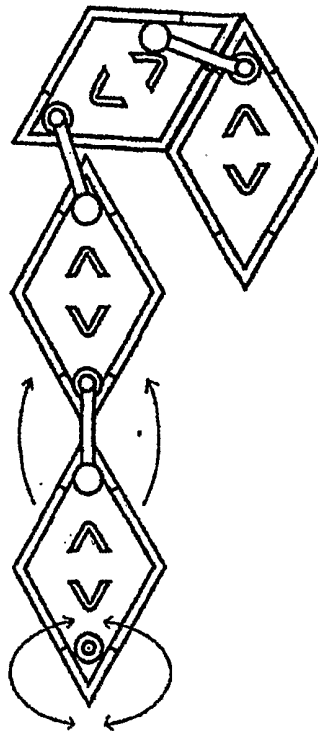


Fig. 4

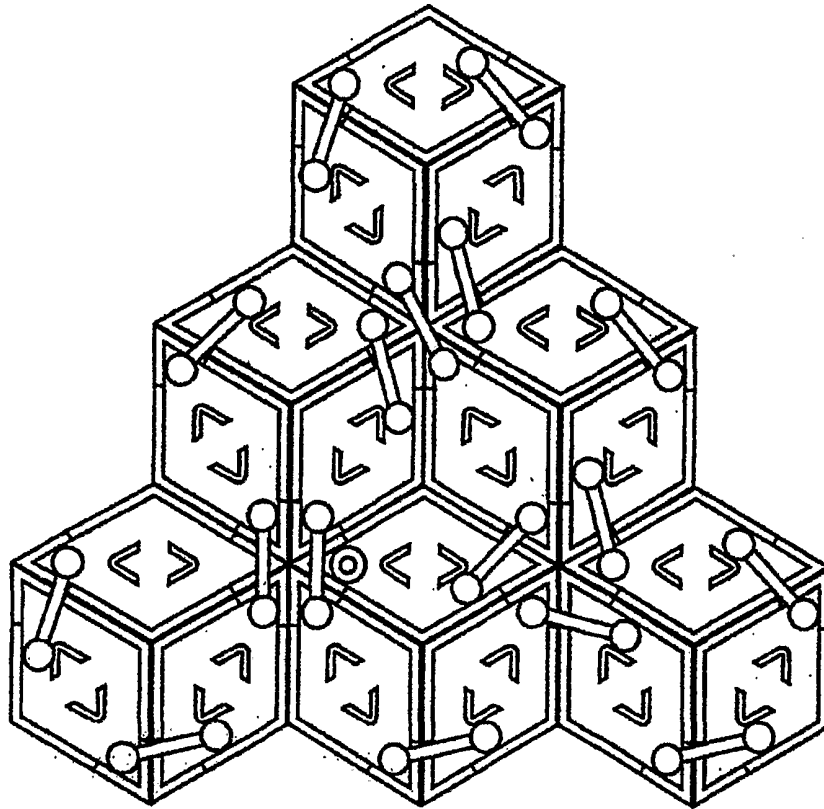


Fig. 5

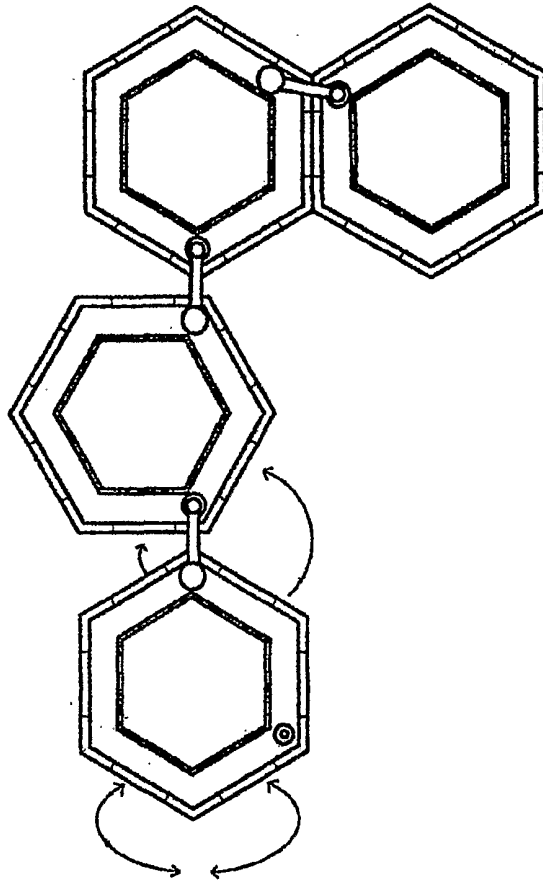


Fig. 6

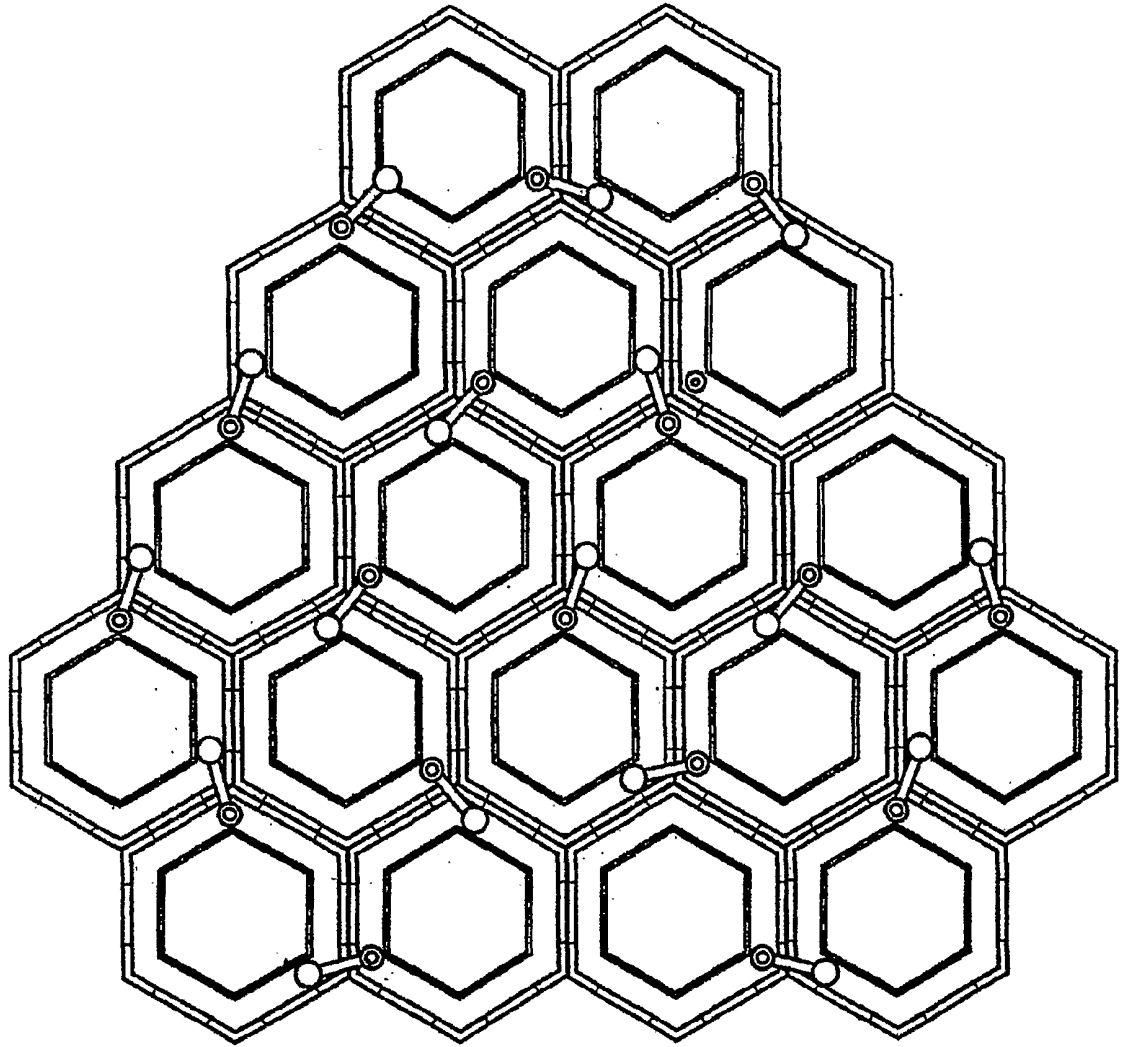



Fig. 7



# INTERNATIONAL SEARCH REPORT

International application No.  
PCT/CN02/00015

<b>A. CLASSIFICATION OF SUBJECT MATTER</b>  <p style="text-align: center;">IPC<sup>7</sup> A63H 33/06</p> <p>According to International Patent Classification (IPC) or to both national classification and IPC</p>		
<b>B. FIELDS SEARCHED</b>  <p>Minimum documentation searched (classification system followed by classification symbols)</p> <p style="text-align: center;">IPC<sup>7</sup> A63H 33/06, 33/04, 33/10</p> <p>Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched</p> <p style="text-align: center;">Chinese Patent Document</p> <p>Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)</p>		
<b>C. DOCUMENTS CONSIDERED TO BE RELEVANT</b>		
Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	CN(U,86206860 GONG SHOUSHAN) 10. FEB. 1988 (10.02.88) Whole document	1-6
A	CN,Y,2341694 (TIANJING DINGSHENG PLASTIC PRODUCT LTD) 06. OCT. 1999 (06.10.99) Whole document	1-6
A	CN,A,1193287 (MORPHUN RESEARCH LTD)16. SEP. 1998 (16.09.98) Whole document	1-6
A	CN,A,1273537 (CONNECTOR SET LP) 15. NOV. 2000 (15.11.00) Whole document	1-6
<input type="checkbox"/> Further documents are listed in the continuation of Box C. <input checked="" type="checkbox"/> See patent family annex.		
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Date of the actual completion of the international search 19. MAR. 2002 (19.03.02)	Date of mailing of the international search report <b>28 MAR 2002 (28.03.02)</b>	
Name and mailing address of the ISA/CN 6 Xitucheng Rd., Jimen Bridge, Haidian District, 100088 Beijing, China Facsimile No. 86-10-62019451	Authorized officer <div style="text-align: right;">XU NIANKANG </div> Telephone No. 86-10-62093963	

**INTERNATIONAL SEARCH REPORT**  
Information on patent family members

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