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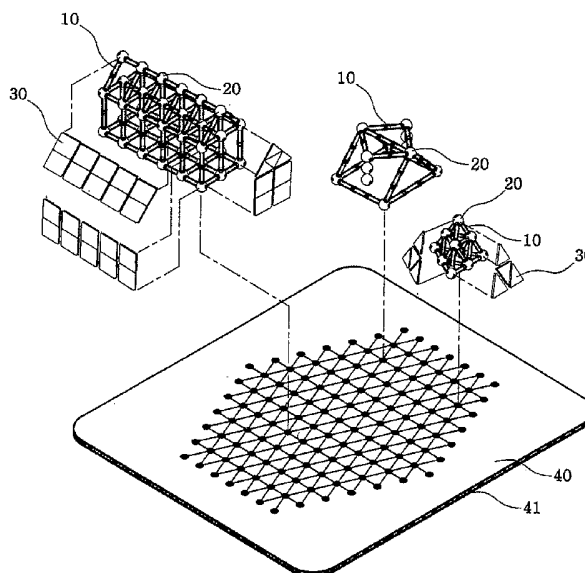
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(54) Title: MAGNETIC BOY



(57) Abstract: A magnetic toy, which is freely structured into various forms, includes magnetic rods (10) each having a cylindrical metal core (11), magnetic end discs (12) placed at opposite ends of the core and a covering (13) made of a synthetic resin to cover the core and the end discs, metal balls (20) attached to opposite ends of each rod by a magnetic force, pad fragments (30) each having a magnetic adhesive layer (31) and coat layers (32) attached to both surfaces of the layer (31), which are formed to correspond to shapes of planes defined by the magnetic rods and the metal balls and removably attached thereto by the magnetic force to cover the planes, and a base pad (40) having a magnetic adhesive layer (41) on which structures constructed by the magnetic rods (10), the metal balls (20) and the pad fragments (30) are mounted by the magnetic force.

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## MAGNETIC TOY

### Technical Field

The present invention relates, in general, to magnetic toys by use of magnetic rods, metal balls, and pad fragments having various shapes. More specifically, the present invention relates to a magnetic toy capable of increasing ability of the user to express creativity by being freely structured into a variety of forms, which comprises magnetic rods each having a cylindrical metal core and a pair of magnetic end discs placed at opposite ends of the metal core, which are covered with a synthetic resin, metal balls attached to opposite ends of each magnetic rod by magnetic forces occurring from the ends of the magnetic rod, pad fragments formed to correspond to shapes of planes defined by the magnetic rods and the metal balls and removably attached thereto by a magnetic force to cover the planes, and a base pad on which structures constructed by the magnetic rods, the metal balls and the pad fragments are mounted and secured by a magnetic force.

### Background Art

Generally, a magnetic toy is composed of a plurality of magnetic rods, each of which includes a cylindrical core, a pair of magnetic end discs placed at opposite ends of the core and a covering made of a synthetic resin to cover the core and the end discs, and a plurality of metal balls. In such cases, the metal balls are attached to opposite ends of each magnetic rod via magnetic forces occurring from the ends of the magnetic rod, to which the magnetic rods are continuously connected by the magnetic force, thereby obtaining desired assembly designs or structures.

A representative magnetic toy is schematically shown in FIGS. 1, 2a and 2b.

FIG. 1 is a perspective view of a conventional magnetic toy when being practically used. Further, FIG. 2a is a sectional view of a magnetic rod, in the conventional magnetic toy of FIG. 1, and FIG. 2b is a sectional view of a basic assembly structure thereof.

5 As for the conventional magnetic toy shown in the above drawings, magnetic rods 4, 4' and 4'' and metal balls 5, 5' and 5'' are connected together by magnetic forces occurring from magnetic end discs 2 and 2' attached to opposite ends of a cylindrical metal core 1 of each magnetic rod, and thus, a desired assembly structure or design can be constructed.

10 That is, the magnetic rod 4 exhibiting the magnetic force includes a cylindrical metal core 1, a pair of magnetic end discs 2 and 2' placed at opposite ends of the metal core 1, and a covering 3 made of a hard synthetic resin to cover the metal core 1 and the end discs 2 and 2'. Further, the metal balls 5 and 5' are attached to the opposite ends of the magnetic rod 4, after which they  
15 may be continuously connected with the other magnetic rods 4' and 4'', thus yielding a plurality of assembly structures.

As for the magnetic toy, the magnetic rods 4, 4' and 4'' per se can exhibit strong magnetic force, by means of the magnetic end discs 2 and 2' placed at the opposite ends of the metal core 1. Accordingly, one end of each  
20 magnetic rod represents N polarity and the other end thereof represents S polarity.

As shown in FIG. 2b, the connection structure of the magnetic rods 4 and 4' and the metal ball 5' is characterized in that the metal ball 5' is attached between the magnetic rods 4 and 4' by a magnetic force, for example, a high  
25 attractive force, resulting from the interaction of the N polarity and the S polarity of the adjacent magnetic rods 4 and 4', respectively. In this case, the metal ball 5' can serve to firmly maintain the connection of the magnetic rods 4 and 4' and act as a connector of other magnetic rods.

The connection structure of the metal balls 5, 5' and 5'' attached  
30 between the N and S polarities of the magnetic rods 4, 4' and 4'' is basically

represented by a triangular shape, as shown in FIG. 2b. Based on such a shape, larger and more complicated assembly structures are completed.

Moreover, upon storing the conventional magnetic toy in a storage case, the magnetic rods are mutually attached by their magnetic force, and thus, the magnetic rods and the metal balls are easily stored together in small volumes.

Meanwhile, in each magnetic rod, the magnetic end discs 2 and 2' attached to the opposite ends of the metal core 1 are made of a neodymium (Nd) magnet having high mechanical strength and excellent corrosion resistance while functioning to reduce the volume and weight of end products by high performance magnetic characteristics thereof. Such a magnet is light, and hence, is suitable for use in a playtoy for children, and is rarely corroded even though being in contact with water.

Also, the Nd magnet is mainly applied for automotive motor parts, machines, servo motors of elevators, sensors, air conditioners, cellular phones, etc., and has a magnetic force amounting to 3000-4000 G (gauss). Therefore, the magnetic end disc made of the Nd magnet, which is attached to each end of the metal core 1, can induce dense magnetic force lines, leading to the magnetic force enhancement of about 1000 G. Eventually, larger assembly structures constructed by a plurality of the magnetic rods and a plurality of the metal balls can be securely maintained by such a magnetic force.

Further, the metal ball 5 has a diameter larger than that of the magnetic rod 4, whereby the magnetic rods 4 may be freely attached centering the metal balls 5 in the angle range of about 60-180°. Therefore, the magnetic rods 4 attached to the metal balls 5 may define any of two-dimensional angles and three-dimensional angles therebetween. In addition, a plurality of the magnetic rods 4 may be attached to a metal ball 5.

However, since relatively simple structures are built using the magnetic rods 4 and the metal balls 5 of the conventional magnetic toy, it is difficult to construct complicated assembly structures. Therefore, larger numbers of the magnetic rods and metal balls are required for construction of more complicated

assembly structures.

Consequently, such increase in the number of the components of the magnetic toy results in a costly magnetic toy, and also, increasing a possibility of losing the constitutive parts of the magnetic toy.

5 Disclosure of the Invention

Accordingly, the present invention has been made keeping in mind the above problems occurring in the related art, and an object of the present invention is to provide a magnetic toy which can be freely structured into various forms using the smaller numbers of the magnetic rods and the metal  
10 balls, as well as the pad fragments, thus increasing ability of the user to express creativity, by comprising magnetic rods each having a cylindrical metal core, a pair of magnetic end discs placed at opposite ends of the metal core and a covering made of a synthetic resin to cover the metal core and the end discs,  
15 metal balls to which the magnetic rods are radially attached at opposite ends thereof by magnetic forces occurring from the ends of the magnetic rod, pad fragments formed to correspond to shapes of planes defined by the magnetic rods and the metal balls and removably attached thereto by a magnetic force to cover the planes, and a base pad on which structures constructed by the  
20 magnetic rods, the metal balls and the pad fragments are mounted by a magnetic force.

Brief Description of the Drawings

The above and other objects, features and other advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

25 FIG. 1 is a perspective view of a conventional magnetic toy in practical use;

FIG. 2a is a sectional view of a magnetic rod, for use in the magnetic toy of FIG. 1;

FIG. 2b is a sectional view of a basic assembly structure which represents a magnetic force relationship between magnetic rods and metal balls,  
5 in the magnetic toy of FIG. 1;

FIG. 3 is an exploded perspective view of a magnetic toy in practical use, by use of magnetic rods, metal balls, pad fragments and a base pad, according to the present invention;

FIG. 4 is an exploded perspective view of the magnetic toy in practical  
10 use, by use of magnetic rods, metal balls and pad fragments, according to the present invention;

FIGS. 5a to 5d are perspective views of pad fragments formed in various shapes, for use in the magnetic toy of FIG. 3;

FIG. 6 is a sectional view of any of the pad fragments of FIG. 5;

FIG. 7a is a sectional view of an assembly structure having a  
15 triangular-shaped plane which represents a magnetic force relationship between the magnetic rods and the metal balls, in the magnetic toy according to the present invention;

FIG. 7b is a sectional view of an assembly structure having a  
20 rectangular-shaped plane which represents a magnetic force relationship between the magnetic rods and the metal balls, in the magnetic toy according to the present invention;

FIG. 8 is a perspective view of a magnetic toy assembled practically by  
25 use of the magnetic rods, the metal balls, and the pad fragments, according to the present invention; and

FIG. 9 is a perspective view of a magnetic toy assembled practically by use of the magnetic rods, the metal balls, the pad fragments, and the base pad, according to the present invention.

### Best Mode for Carrying Out the Invention

Based on the present invention, a magnetic toy is provided, which comprises magnetic rods each including a cylindrical metal core, a pair of magnetic end discs placed at opposite ends of the metal core by a magnetic force and a covering made of a synthetic resin to cover the metal core and the end discs, and metal balls attached to opposite ends of each magnetic rod by magnetic forces occurring through the end discs of the magnetic rod. Further, the magnetic toy comprises pad fragments, each having a magnetic adhesive layer formed of magnetic powders and coat layers attached to both surfaces of the magnetic adhesive layer, which are formed to correspond to shapes of planes defined by the magnetic rods and the metal balls and removably attached thereto by a magnetic force to cover the planes. In addition, the magnetic toy has a base pad having a magnetic adhesive layer therein, on which structures constructed by the magnetic rods, the metal balls and the pad fragments are mounted by a magnetic force.

As for the magnetic rod of the magnetic toy, the cylindrical metal core is covered with the synthetic resin based covering, and a pair of Nd-magnetic end discs are attached to the opposite ends of the cylindrical metal core by the magnetic force, in which the magnetic end disc has a diameter larger than that of the metal core. As such, the covering of the magnetic rod is injection molded to cover about 66% or more, with the exception of the center portions, of the outer end surfaces of the magnetic end discs which are placed at the opposite ends of the metal core.

The magnetic end discs, each of which has different polarities (N and S) at both surfaces thereof, are attached to the opposite ends of the metal core, and thus, the cylindrical metal core is magnetized through the attached magnetic end discs. Thereby, the entire magnetic rod acts as a cylindrical magnet representing the N polarity and S polarity at both ends thereof.

Hence, a plurality of the metal balls and a plurality of the magnetic rods

can be alternately attached, and such a continuous connection leads to desired assembly structures.

In addition, the structures constructed by the magnetic rods and the metal balls via the magnetic force have planes defined by the magnetic rods and the metal balls which have predetermined shapes, such as triangular, rectangular, and circular. The planes of the structures are covered by the pad fragments formed to correspond to the shapes of the above planes.

As such, each of the pad fragments includes a magnetic adhesive layer formed of magnetic powders, and thus, the magnetic force may be induced through the entire surfaces and corners of each pad fragment. Also, at both surfaces of the magnetic adhesive layer of the pad fragment, a cloth material or a synthetic resin material, such as polyethylene (PE), is coated.

Therefore, the magnetic toy of the present invention is characterized by mounting the assembly structures constructed by the magnetic rods, the metal balls, and the pad fragments on the base pad printed with various patterns via the magnetic force of the base pad.

Hereinafter, a detailed description will be given of the magnetic toy of the present invention, in conjunction with the appended drawings.

Referring to FIG. 3, there is shown an exploded perspective view of a magnetic toy which is assembled using magnetic rods, metal balls, pad fragments, and a base pad, according to the present invention. FIG. 4 is an exploded perspective view of the magnetic toy which is assembled using the magnetic rods, the metal balls, and the pad fragments, according to the present invention. Also, FIGS. 5a to 5d are perspective views of the pad fragments of the magnetic toy, and FIG. 6 is a sectional view thereof.

As shown in the drawings, the magnetic toy of the present invention comprises magnetic rods 10, each of which includes a cylindrical metal core 11, a pair of magnetic end discs 12 placed at opposite ends of the cylindrical metal core 11 by a magnetic force, and a covering 13 made of a synthetic resin to cover the cylindrical metal core 11 and the magnetic end discs 12. Also, the



magnetic toy includes steel balls 20 that are attached to opposite ends of each magnetic rod by magnetic forces occurring from the opposite ends of the magnetic rod. Further, each of pad fragments 30 of the magnetic toy has a magnetic adhesive layer 31 formed of magnetic powders and coat layers 32 attached to both surfaces of the magnetic adhesive layer 31, and is formed to correspond to shapes of planes 15 defined by the magnetic rods 10 and the metal balls 20 and removably attached thereto by a magnetic force occurring from the magnetic adhesive layer 31 to cover the planes 15. Furthermore, a base pad 40 of the magnetic toy has a magnetic adhesive layer 41 therein, on which structures constructed by the magnetic rods 10, the metal balls 20 and the pad fragments 30 are mounted by a magnetic force.

In such cases, as for the magnetic rod 10, the magnetic end discs 12, placed at the opposite ends of the cylindrical metal core 11, are formed of an Nd magnet capable of exhibiting strong magnetic force in comparison with sizes, and have a diameter larger than that of the cylindrical metal core 11.

Further, each magnetic rod 10 is formed by covering the cylindrical metal core 11 and the magnetic end discs 12 placed at the opposite ends of the metal core 11 by use of the covering 13 injection molded from the synthetic resin harmless to humans, in which the covering 13 covers an outer circumference area corresponding to  $1/2$  of a radius of each of the outer end surfaces of the magnetic end discs 12 attached to the opposite ends of the metal core 11, with the exception of the center portions of the outer end surfaces of the end discs 12. Thus, such a magnetic rod 10 can be securely attached to the outer surface of the metal ball 20 because the central portion of the outer end surface of the magnetic end disc 12 and an inner circumferential edge of the covering 13 covering the outer end surfaces of the magnetic end discs 12 come into contact with the outer surface of the metal ball 20.

The metal balls 20, placed at the opposite ends of each magnetic rod 10, have a diameter 1.5 to 2 times as large as that of the magnetic end disc 12 of the magnetic rod 10, and are made of steel. Hence, when the metal balls 20 are

attached to the opposite ends of the magnetic rod 10, they are subjected to magnetic force from the magnetic end discs 12 of the magnetic rod 10, and thus, may be continuously connected with a plurality of the magnetic rods 10 and a plurality of the metal balls 20.

5           In addition, a plurality of planes 15 are defined by the magnetic rods 10 and the metal balls 20 connected continuously, which are covered with the pad fragments 30 having shapes corresponding to those of the above planes 15, such as triangular, rectangular or circular shapes.

10           The pad fragments 30 each have a magnetic adhesive layer 31 formed of magnetic powders and coat layers 32 attached to both surfaces of the magnetic adhesive layer 31, in which the magnetic adhesive layer 31 consists of an admixture of synthetic rubbers or natural rubbers and magnetic powders mixed at a predetermined ratio, to provide flexibility to the pad fragment 30.

15           As such, the magnetic powders of the magnetic adhesive layer 31 are composed mainly of ferric oxide ( $\text{Fe}_2\text{O}_3$ ). Further, coat layers 32 are made of cloth, paper, or synthetic resins, such as PE.

20           As the pad fragments 30, use are made of magnetic rubbers cut in predetermined sizes, which may be printed with various patterns or colors through a silk screen process, and also, may be easily subjected to surface printing.

25           The base pad 40, on which the structures constructed by the magnetic rods 10, the metal balls 20, and the pad fragments 30 are mounted by a magnetic force, includes a magnetic adhesive layer 41 formed of magnetic powders in the same structure as the pad fragments 30. Further, the base pad 40 is entirely printed with various play patterns so as to arrange the magnetic rods 10 thereon.

30           Turning now to FIGS. 7a and 7b, there are illustrated sectional views of assembly structures which represent the magnetic force relationship between the magnetic rods and the metal balls, in the magnetic toy according to the present invention. In addition, FIG. 8 is a perspective view of the magnetic toy in

practical use, by means of the magnetic rods 10, the metal balls 20 and the pad fragments 30, according to the present invention. Also, FIG. 9 is a perspective view of the magnetic toy in practical use, by means of the magnetic rods 10, the metal balls 20, the pad fragments 30 and the base pad 40, according to the present invention.

As shown in FIGS. 7a and 7b, the assembly structure of the magnetic rods 10 and the metal balls 20 connected alternately by the magnetic force is formed to have planes of a triangular or rectangular shape. As such, the above assembly structure is characterized in that when two magnetic rods 10 having the same polarity are connected centering the metal balls 20, the metal balls 20 between such magnetic rods 10 have the polarity same to the magnetic rods 10.

Hence, as in FIG. 7b, when the plane 15 having the rectangular shape is formed by use of the magnetic rods 10 having the same polarity centering the metal balls 20, the four metal balls 20 positioned at each corner between the magnetic rods 10 in the above assembly structure can diagonally exhibit the magnetic force having the same polarity. Thereby, the pad fragments 30, which are formed to correspond to the rectangular shapes of the above planes 15 and represent the magnetic force via the magnetic adhesive layers 31 thereof, can cover the above planes 15 defined by the magnetic rods 10 and the metal balls 20, as shown in FIG. 8.

In such cases, the pad fragments 30, which cover the planes 15 defined by the magnetic rods 10 and the metal balls 20, can adhere to outer surfaces of the metal balls 20 while each corner of the pad fragments 30 is magnetized by the magnetic force occurring through the metal balls 20 connecting the magnetic rods 10.

Also, as seen in FIG. 7a, when the plane 15 having the triangular shape is defined by the magnetic rods 10 and the metal balls 20 connected continuously, at least one metal ball 20, among three metal balls 20, does not generate the magnetic force. This is because different polarities, that is, N polarity and S polarity, of both the magnetic rods 10 centering the metal ball 20

are offset by each other. However, the magnetic force occurring from the other two metal balls 20 can allow the pad fragment 30 formed to correspond to the triangular shape of the plane 15 to be firmly attached to the above plane 15.

On the other hand, the structures constructed by the magnetic rods 10, the metal balls 20, and the pad fragments 30 are mounted on the base pad 40 by the magnetic force occurring through the entire surface of the base pad 40. Otherwise, the magnetic rods 10 and the metal balls 20 may be attached according to the patterns printed on the base pad 40, for use in playing a board game.

#### 10 Industrial Applicability

As described above, the present invention provides a magnetic toy, which is composed of magnetic rods each having a cylindrical metal core, a pair of magnetic end discs placed at opposite ends of the metal core and a covering made of a synthetic resin to cover the metal core and the magnetic end discs, metal balls removably attached to opposite ends of each magnetic rod by magnetic forces occurring from the opposite ends of the magnetic rods, pad fragments formed to correspond to the shapes of planes defined by the magnetic rods and the metal balls and removably attached thereto by the magnetic force occurring via the metal balls to cover the planes, and a base pad on which the structures constructed by the magnetic rods, the metal balls and the pad fragments are mounted. Thereby, the magnetic toy can be freely structured into various forms using the smaller numbers of the magnetic rods and the metal balls, as well as the pad fragments, thus increasing the creativity of the user.

Although the preferred embodiment of the present invention has been disclosed for illustrative purposes, those skilled in the art will appreciate that various modifications, additions and substitutions are possible, without departing from the scope and spirit of the invention as disclosed in the accompanying claims.

### Claims

1. A magnetic toy, comprising:

a plurality of magnetic rods, each of which includes a cylindrical metal core, a pair of magnetic end discs placed at opposite ends of the cylindrical metal core by a magnetic force, and a covering made of a synthetic resin to  
5 cover the cylindrical metal core and the magnetic end discs;

a plurality of metal balls made of steel and attached to opposite ends of each magnetic rod by magnetic forces occurring from the opposite ends of the magnetic rod;

10 a plurality of pad fragments, each having a magnetic adhesive layer and coat layers attached to both surfaces of the magnetic adhesive layer, which are formed to correspond to shapes of planes defined by the magnetic rods and the metal balls and removably attached thereto by a magnetic force of the magnetic adhesive layer to cover the planes; and

15 a base pad having a magnetic adhesive layer therein to exhibit a magnetic force onto an entire surface thereof, on which structures constructed by the magnetic rods, the metal balls and the pad fragments are mounted by the magnetic force.

2. The magnetic toy as defined in claim 1, wherein the magnetic  
20 adhesive layer, which is used for the pad fragment and the base pad, comprises an admixture of synthetic rubbers or natural rubbers and magnetic powders mixed in a predetermined ratio, to provide flexibility to the pad fragment and the base pad.

3. The magnetic toy as defined in claim 1, wherein the coat layers  
25 attached to both surfaces of the magnetic adhesive layer of each of the pad fragments are made of cloth, paper, or synthetic resins including polyethylene.

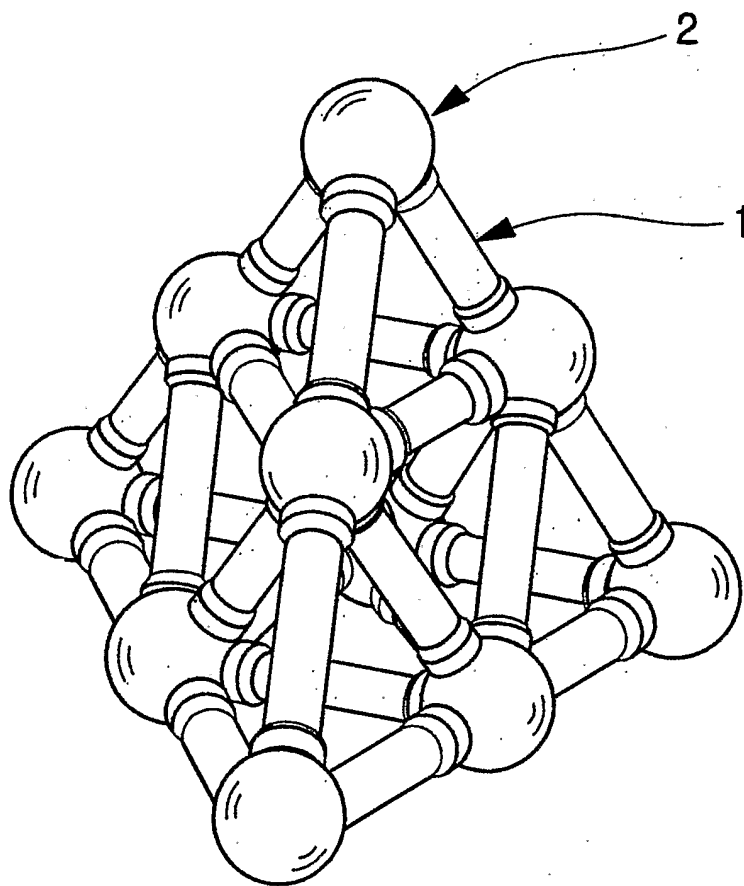
4. The magnetic toy as defined in claim 1, wherein the pad fragments comprise magnetic rubbers cut in predetermined sizes, each having both surfaces printed with patterns or letters.

5. The magnetic toy as defined in claim 2, wherein the magnetic  
5 powders comprise ferric oxide ( $\text{Fe}_2\text{O}_3$ ).

6. The magnetic toy as defined in claim 1, wherein the pad fragments comprise corners which are attached to outer surfaces of the metal balls by the magnetic force of N polarity or S polarity occurring through at least two metal balls placed between the magnetic rods having the same polarity.

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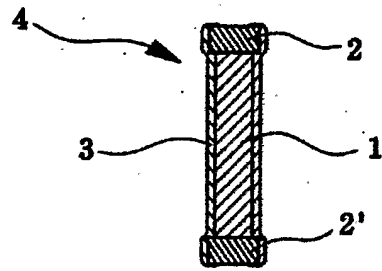
FIG. 1



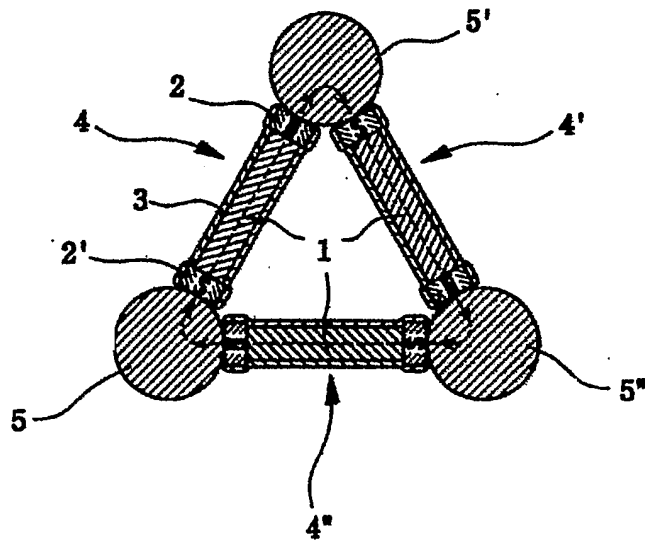
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FIG. 2

(A)



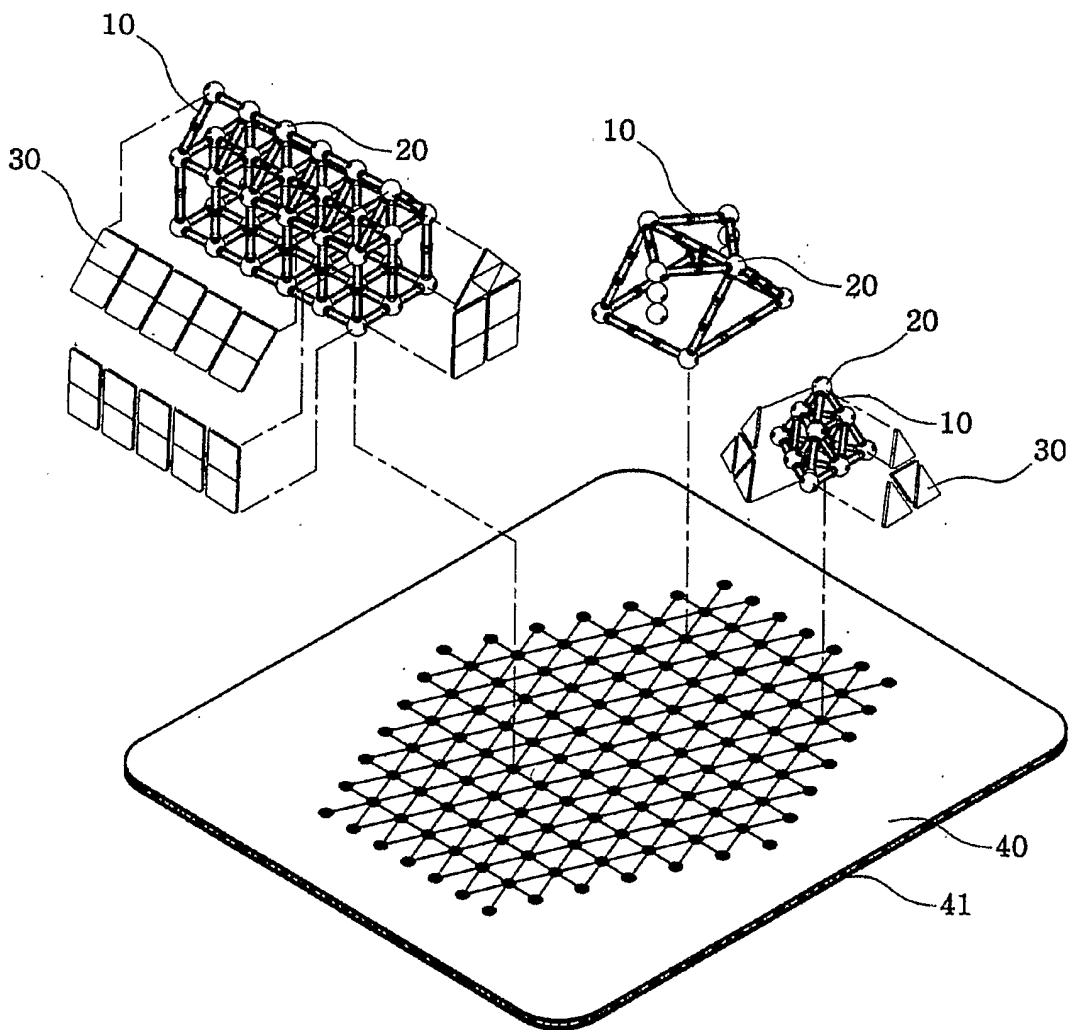
(B)





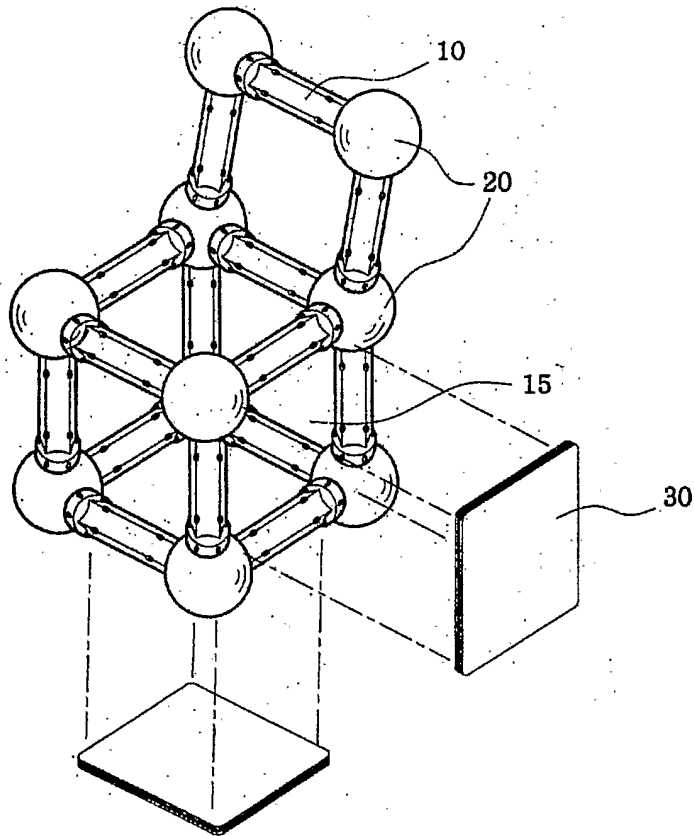
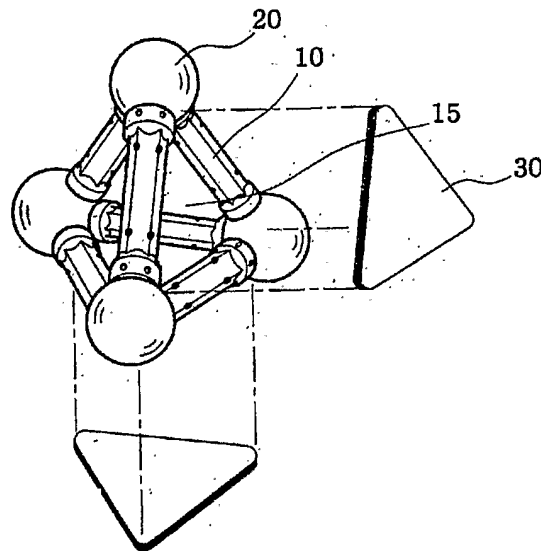
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FIG. 3



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FIG. 4



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FIG. 5

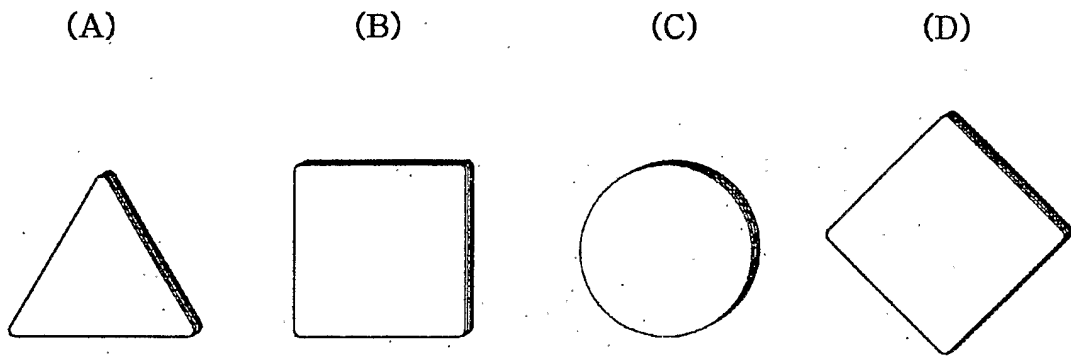
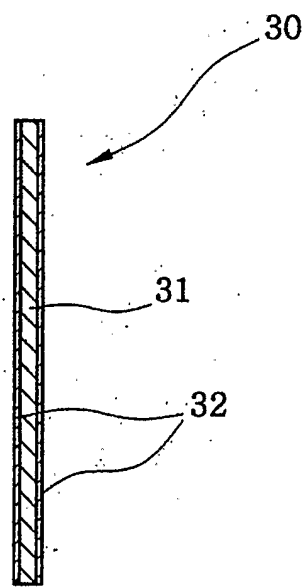
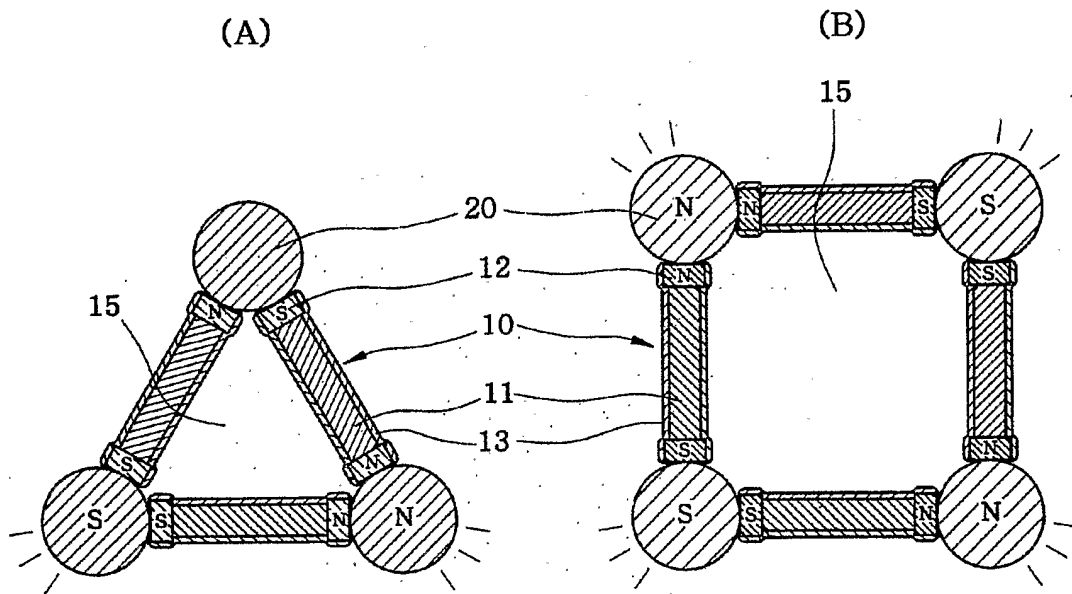


FIG. 6



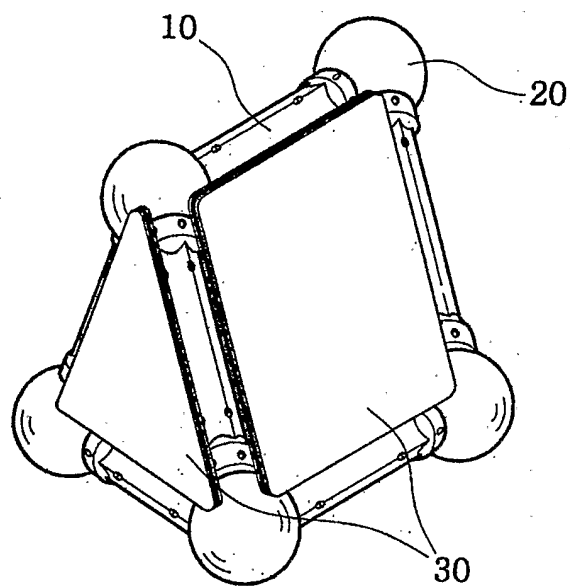
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FIG. 7



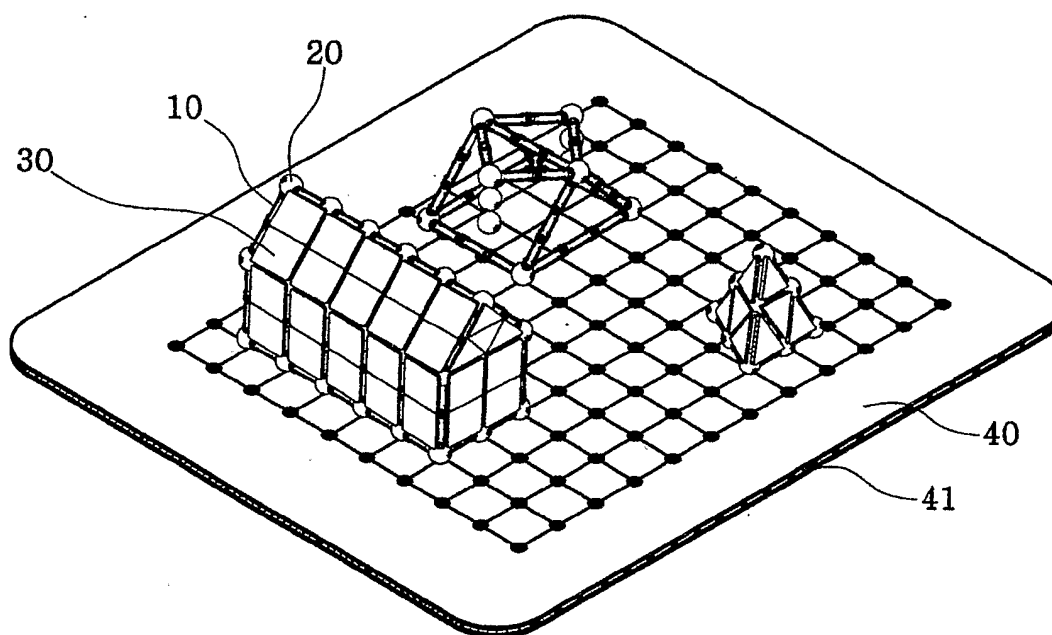
7/8

FIG. 8



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FIG. 9



## INTERNATIONAL SEARCH REPORT

International application No.  
PCT/KR2004/000098**A. CLASSIFICATION OF SUBJECT MATTER****IPC7 A63H 33/10**

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)

IPC7 A63H;

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	KR 305259 Y1 ( Yun, Bong Sek ) 10 FEBRUARY 2003 See the whole document	1-6
Y	KR 299497 Y1 ( An, Jung Ho ) 16 DECEMBER 2002 See the whole document	1-6
Y	US 3,998,004 ( Brent H. Ehrlich ) 21 DECEMBER 1976 See the whole document	1-6
Y	US 5,163,241 ( Blaeser Engineering Services, Inc. ) 17 NOVEMBER 1992 See figures 3, 8 See column 3, line 9-34	1-6

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**29 OCTOBER 2004 (29.10.2004)**

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