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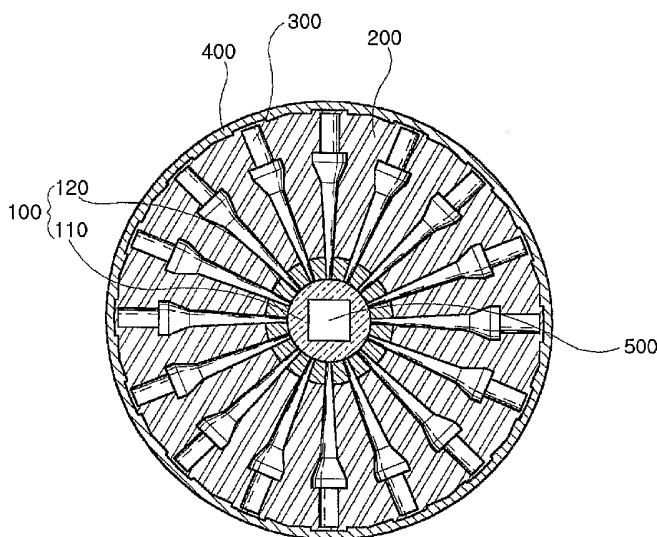
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(54) Title: GOLF BALL



(57) Abstract: The present invention provides an improved golf ball constructed to allow a striking force to be linearly transmitted to an inner central core of the golf ball when the ball is hit and is equipped with a light-emitting capability for providing good visibility. The golf ball comprises: a spherical inner core including therein an inner nucleus and an outer nucleus; an outer core externally positioned of the inner core and filled with synthetic resin material; a surface part used as a finished material at a circumferential surface of the outer core; and a light-emitting member internally disposed at an inner nucleus of the inner core and applied with an electricity for emitting a light when an impact energy exceeding an appropriate amount of pressure is applied. According to the golf ball, an impact energy is directly transmitted to a center of the golf ball to thereby reduce a spin rate, and the golfer easily discern the flying direction of the golf ball and a drop zone thereof.

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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.*

## GOLF BALL

### FIELD OF THE INVENTION

The present invention relates to a golf ball and, more particularly, to a golf ball  
5 constructed to allow a striking force to be linearly transmitted to an inner central core  
of the golf ball when the ball is hit and is equipped with a light-emitting capability for  
providing good visibility.

### BACKGROUND OF THE INVENTION

10 Generally, golf balls are classified into one-piece golf balls, two-piece golf  
balls and three-piece golf balls. The one-piece golf balls consist entirely of high  
resilient composite material made of rubber and resin, and the two-piece golf balls  
include a double structure of a solid core of molded synthetic rubber and a reinforced  
cover covering the solid core. The three-piece golf balls comprise a two-layer core  
15 with rubber threads wound in the central part thereof and a cover covering the core.

Generally, a typical golf ball is formed on its surface thereof with a plurality of  
dimples each having a prescribed pattern which is designed to reduce air resistance  
when the golf ball is hit and to improve flight distance.

As a prior art describing the typical golf ball, Korean Laid-open Publication  
20 No. 2002-7836 is disclosed and illustrated in FIG. 1, where the golf ball comprises a  
resilient inner core (10), a resilient outer core (20) and a cover (30). The outer core

(20) includes a plurality of reinforcing members radially extended from an inner circumference to an outer circumference of the outer core. When a golfer strikes the golf ball with a golf club, the striking force is directly transmitted to the golf ball and no deformation is made at a point where the striking force is applied on the golf ball.

5 As a result, the time gap between the striking of the golf ball and the take-off of the golf ball by the repulsive and resilient force is shortened, thereby improving the flight distance.

The dimple structure of the conventional golf ball thus constructed has been improved without deviating from using the conventional material thereof. However,

10 there is a drawback in that an impact energy is not properly transmitted to an inner core of the golf ball when the golf ball is hit by a golf club, whereby a circumferential shape of the golf ball is deformed upon impact, resulting in a horizontal deflection different from the desired hitting direction of the golfer.

There is another drawback in that the golfer's view is obstructed during night

15 play or when the air is foggy, preventing the golfer from knowing the direction of a hit golf ball and proceeding to further rounds.

#### **SUMMARY OF THE INVENTION**

The present invention is disclosed to solve the aforementioned drawbacks and

20 it is an object of the present invention to provide a golf ball for use in a situation where view is obstructed, thereby allowing the golfer to easily discern the flying direction of

the golf ball, and result in a minimal deformation of the golf ball when the ball is hit by a golf club.

In accordance with one embodiment of the present invention, a golf ball comprises: a spherical inner core positioned in an inner center of a golf ball; an outer  
5 core filled at an appropriate thickness on an external side of the inner core and covered at an external surface thereof by a surface part; and a plurality of impact transmitting members radially provided inside of the outer core for directly transmitting an striking force to the inner core side, wherein each center position of the lower distal end of the adjacent impact transmitting members inserted into the outer core forms a respective  
10 apex of an equilateral triangle.

In accordance with another embodiment of the present invention, a golf ball comprises: a spherical inner core positioned in an inner center of a golf ball; an outer core filled at an appropriate thickness on an external side of the inner core and covered at an external surface thereof by a surface part; a light-emitting member internally  
15 disposed at an inner nucleus of the inner core and applied with electricity for emitting light when an impact energy exceeding an appropriate amount of pressure is applied; and a plurality of conical impact transmitting members radially provided inside the outer core, both distal ends being respectively supported to the inner core and an inner surface of the surface part for directly transmitting a striking force to the light-emitting  
20 member side.

Preferably, the inner core constructed in a dual structure includes an inner

nucleus positioned at an inner central area thereof and an outer nucleus encompassing the inner nucleus.

each center position of the lower distal end of the adjacent impact transmitting members inserted into the outer core forms a respective apex of an equilateral triangle.

5 Preferably, each lower external circular surface of the impact transmitting members is protrusively formed with a plurality of lugs contacting each inner circumferential surface of a guide member.

Preferably, the light-emitting member includes a cubic case internally disposed at a central position of the inner nucleus, a battery internally disposed at an inner  
10 position of the case, a plurality of light-emitting elements disposed at an external side of the case, and a vibration switch for selectively contacting the battery in response to a vibration energy transmitted from the inner nucleus to apply electricity to the light-emitting elements.

Preferably, the vibration switch includes an electrode plate for vertically  
15 mounting an electrode electrically connected to the battery, and a spring member plurally wound on an external surface of the electrode and on the same axis of the electrode and grounded to the light-emitting element via the electrode plate.

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

20 For a better understanding of the nature and objects of the present invention, reference should be made to the following detailed description with the accompanying

drawings, in which:

FIG. 1 is a perspective view of cut-out essential parts for illustrating a three-piece golf ball according to the prior art;

FIG. 2 is a perspective view of a golf ball according to an embodiment of the present invention;

FIG. 3 is a cross-sectional view of an inner structure of a golf ball according to an embodiment of the present invention;

FIG. 4 is a cross-sectional view of an inner structure of a golf ball according to another embodiment of the present invention;

FIG. 5 is a perspective view of essential parts for illustrating a coupled structure of a golf ball according to an embodiment of the present invention;

FIG. 6 is a perspective view of essential parts for illustrating another coupled structure of a golf ball according to an embodiment of the present invention;

FIG. 7 is a perspective view of an assembled condition between an impact transmitting member and a guide member according to an embodiment of the present invention;

FIG. 8 is a perspective view of a light-emitting member according to the present invention;

FIG. 9 illustrates a usage of the present invention; and

FIG. 10 is an exemplary drawing for schematically illustrating a manufacturing process of a golf ball according to the present invention.

**DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT**

The preferred embodiments of the present invention will now be described in detail with reference to the annexed drawings, where the present embodiment is not  
5 limiting the scope of the present invention but is given only as an illustrative purpose.

As illustrated in FIGS. 2 through 9, the golf ball includes a spherical inner core (100) composed therein of an inner nucleus (110) and an outer nucleus (120), an outer core (200) positioned at an external side of the inner core (100) and filled with synthetic resin material, a surface part (400) encompassing the outer core (200), and a  
10 light-emitting member (500) internally disposed at an inner nucleus (110) of the inner core (100) and emitting a light in response to a vibrating force when an impact energy exceeding an appropriate amount of pressure is applied to the golf ball.

Preferably, each center position of the lower distal end of the adjacent impact transmitting members (300), which are inserted into the outer core, forms a respective  
15 apex of an equilateral triangle. This is designed to allow a striking force to be directly transmitted to the center of the golf ball, i.e., the inner core (100) side of the golf ball when a golf ball is hit.

Furthermore, each impact-transmitting member (300) is circumferentially formed with an inclined extended surface (310) of a prescribed angle so that an  
20 external striking energy can be easily transmitted to the inner core (100) side. Preferably, each impact-transmitting member (300) is made of transparent or semi-



transparent synthetic resin material to allow a light generated from the light-emitting member (500) to be illuminated outside through the impact-transmitting member.

Preferably, the impact-transmitting member (300) is shaped of a cone, and as illustrated in FIG. 6, each top center portion thereof is positioned at a vertex of an equilateral triangle at the surface part (400), or as illustrated in FIG. 5, each top center 5 portion thereof is externally protruded from a center of the equilateral triangle to act as a protruding dimple (41).

Preferably, each impact transmitting member (300) is circumferentially coupled with a trigonal guide member (350), and when the impact transmitting 10 member (300) is coupled to the trigonal cubic member (350), both upper and lower distal ends of the impact transmitting member (300) being exposed from the guide member (350) each at a prescribed portion thereof.

Preferably, the guide member (350) is shaped of an equilateral triangle at a distal end surface thereof to define a part of the surface part (400). Each impact- 15 transmitting member (300) is formed at its lower portion with a plurality of circular lugs (330) in the lengthwise direction for coupling with an inner surface of the guide member (350).

Preferably, the outer core (200) is sequentially molded with synthetic resin to form a multi-layer. In addition, the radius from each vertex of the respective 20 equilateral triangle on the surface part to the center portion of the golf ball is constant.

The light-emitting member (500) includes a cubic case (510) internally

disposed at a central position of the inner nucleus (110), a battery (520) internally disposed at an inner position of the case (510), a plurality of light-emitting elements (530) such as Light Emitting Diode (LED), Liquid Crystal Diode (LCD) or the like disposed at an external side of the case (510), and a vibration switch (540) for  
5 selectively contacting the battery (520) in response to a vibration energy transmitted from the inner nucleus (110) to apply electricity to the light-emitting elements (530).

The vibration switch (540), which is a switch provided at an external side of the case (510) which is turned on and off by the vibration energy, includes an electrode plate (544) for vertically mounting an electrode (542) electrically connected to the  
10 battery (520), and a spring member (545) plurally wound on an external surface of the electrode (542) and on the same axis of the electrode (542) and grounded to the light-emitting element (530) via the electrode plate (544).

The operation of an embodiment of the present invention thus constructed will now be described with reference to the drawings.

15 First, a manufacturing process will be briefly explained. As illustrated in FIG. 10, upper and lower inner nucleuses (110) are manufactured by upper and lower respectively symmetrically opposed molds (610,620), and a light-emitting member (500) is installed in an interior space of the inner nucleus (110).

Successively, the upper and lower sides of the inner nucleus (110) are sealed to  
20 allow formation of a spherical shape. The spherical inner nucleus (110) is externally sealed by a bi-sected outer nucleus (120). The support holes (122) of the outer

nucleus (120) are inserted by distal ends of the impact transmitting members (300) and covered by a surface part (400). Thereafter, externally protrusive distal ends of the impact transmitting members (300) are cut and trimmed to obtain the final product of a golf ball.

5 In a golf ball completed by the afore-mentioned manufacturing process according to the present invention, when the golf ball is hit by a golf head of a golf club, a striking force or an impact is transmitted to the inner nucleus (110) side of the inner core (100) via the impact transmitting members (300). The golf ball is flown upwards from the ground by the striking force to receive a lift and a drag.

10 When a striking energy is transmitted to the golf ball from the club head, the energy is transmitted to the inner core (100) side from the surface part (400) at the struck area of the golf ball via the impact-transmitting member (300) and the outer core (200), whereby the impact serves to function as a force necessary for producing the flight of the golf ball.

15 When the impact is transmitted to the inner core (100), a repulsive force against the impact is generated and the repulsive force is transmitted from the inner nucleus (110) side to the outside via the impact-transmitting member (300) such that the shape at the struck area is not changed.

Furthermore, the impact energy is transmitted to the spring member (545) of  
20 the vibration switch (540), whereby the spring member (545) contacts the centrally-positioned electrode (542) and the electric current from the battery (520) is applied to

the light-emitting element (530) via the electrode plate (544) to allow the light-emitting element (530) to emit light.

The light generated by the light-emitting element (530) is transmitted outside via the transparent or semi-transparent impact-transmitting member (300) to allow a golfer to discern the flying direction of a golf ball. The golf ball is again illuminated by an impact force hitting the ground such that the golfer can easily locate the golf ball.

The golf ball according to the present invention is lit for approximately 2 to 10 seconds, the time the electric current is applied to the light-emitting element (530). The lighting time may be prolonged by installation of a separate current collector (550) at the electrode plate (544).

The foregoing description of the preferred embodiments of the present invention has been presented for the purpose of illustration and description. It is not intended to be exhaustive or to limit the invention to the precise form disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from practice of the invention. It is intended that the scope of the invention be defined by the claims appended hereto, and their equivalents.

As apparent from the foregoing, there is an advantage in the golf ball thus described according to the embodiments of the present invention in that the improved golf ball has an illuminating function and an impact energy is directly transmitted to the center of the golf ball such that a circumferential shape of the golf ball is not deformed upon impact and the view of a golfer is not obstructed during a round of golf

at nighttime or when the air is foggy, thereby assisting the golfer in discerning the direction of the golf ball and a drop zone thereof, and proceeding to further rounds.

**WHAT IS CLAIMED IS:**

1. A golf ball comprising:
  - a spherical inner core positioned in an inner center of a golf ball;
  - 5 an outer core filled at an appropriate thickness on an external side of said inner core and covered at an external surface thereof by a surface part; and
  - a plurality of impact transmitting members radially provided inside of said outer core for directly transmitting a striking force to said inner core side,
  - wherein each center position of the lower distal end of said adjacent impact
  - 10 transmitting members inserted into said outer core forms a respective apex of an equilateral triangle.
  
2. The ball as defined in claim 1, wherein each impact-transmitting member is circumferentially formed with an inclined extended surface of a prescribed angle.
- 15
  
3. The ball as defined in claim 1, wherein the inner core comprises dual construction comprising:
  - an inner nucleus centrally positioned therein; and
  - an outer nucleus encompassing said inner nucleus.
- 20
  
4. The ball as defined in claim 1, wherein each impact-transmitting member is

circumferentially coupled with a trigonal guide member.

5. The ball as defined in claim 4, wherein each guide member is mutually abutted against at each lateral side thereof for surface contact therebetween.

5

6. The ball as defined in claim 5, wherein each impact-transmitting member is formed at its lower portion with a plurality of circular lugs in the lengthwise direction for coupling with an inner surface of said guide member.

10 7. A golf ball comprising:  
a spherical inner core positioned in an inner center thereof,  
an outer core filled at an appropriate thickness on an external side of the inner core and finished at an external surface thereof by a surface part;  
a light-emitting member internally disposed at an inner nucleus of said inner  
15 core and applied with electricity for emitting a light when an impact energy exceeding an appropriate amount of pressure is applied; and  
a plurality of conical impact transmitting members radially provided inside  
said outer core for directly transmitting a striking force to said light-emitting member side and for illuminating a light generated by said light emitting-member via said  
20 impact transmitting member .

8. The golf ball as defined in claim 7, wherein said light-emitting member comprises:

a cubic case internally disposed at a central position of said inner nucleus;

a battery internally disposed at an inner position of the case;

5 a plurality of light-emitting elements disposed at an external side of the case;

and

a vibration switch for selectively contacting said battery in response to a vibration energy transmitted from said inner nucleus to apply electricity to said light-emitting elements.

10

9. The ball as defined in claim 8, wherein the vibration switch comprises:

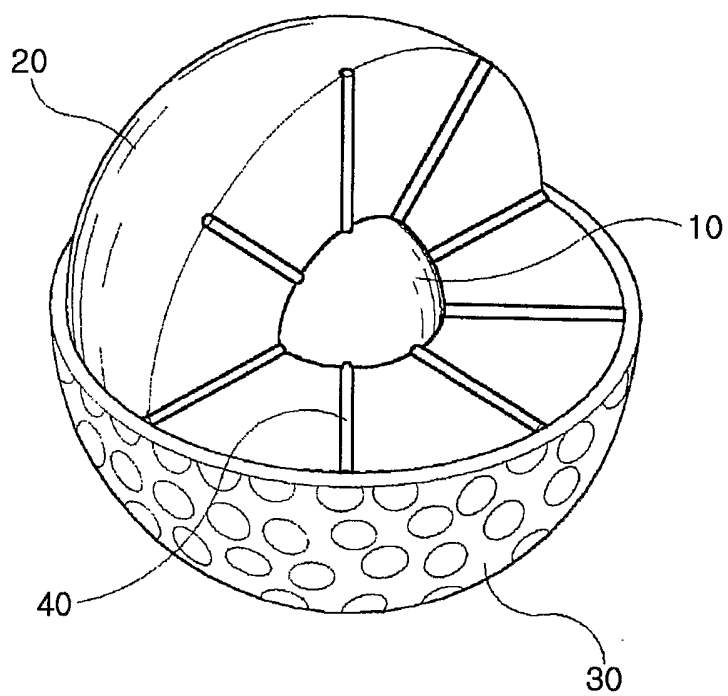
an electrode plate for vertically mounting an electrode electrically connected to said battery; and

15 a spring member plurally wound on an external surface of said electrode and on the same axis of said electrode and grounded to said light-emitting element via said electrode plate.



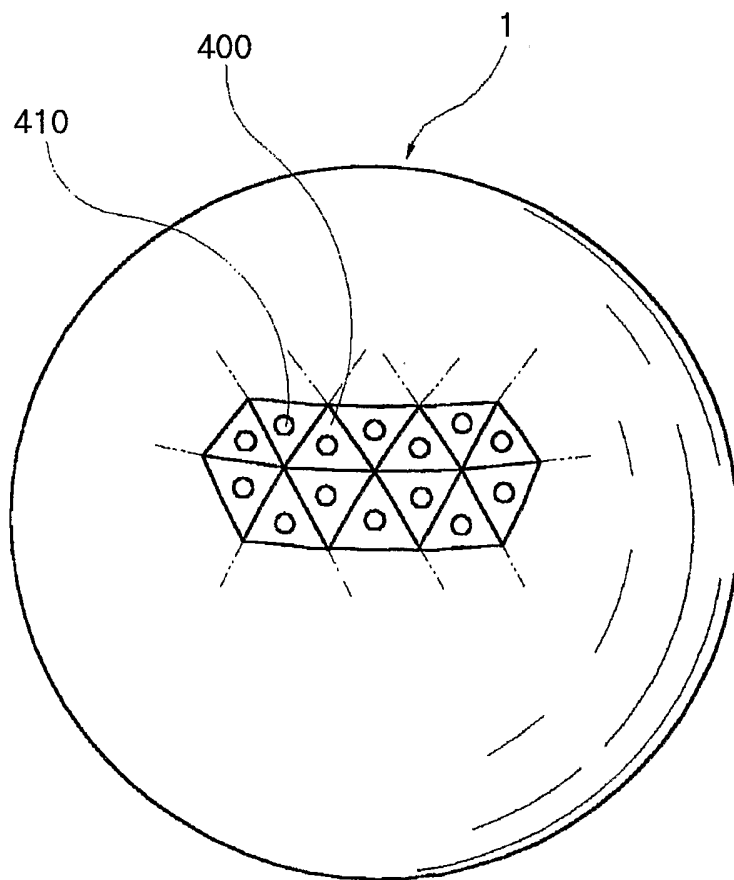
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FIG. 1



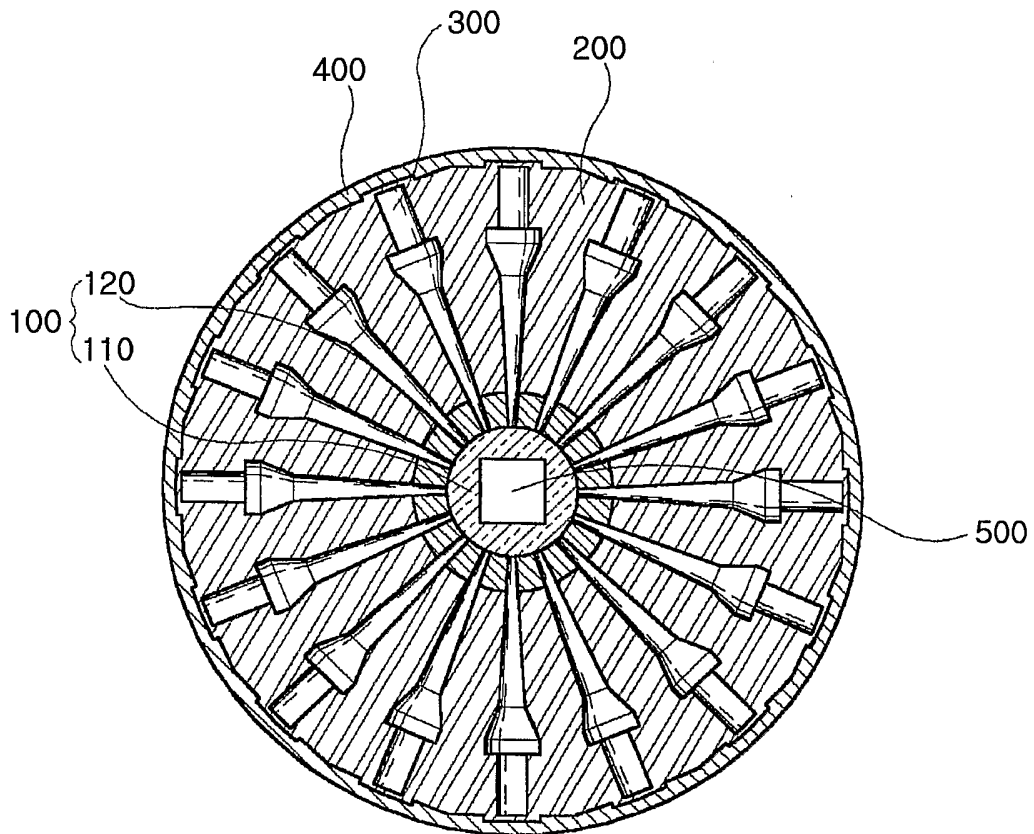
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FIG.2



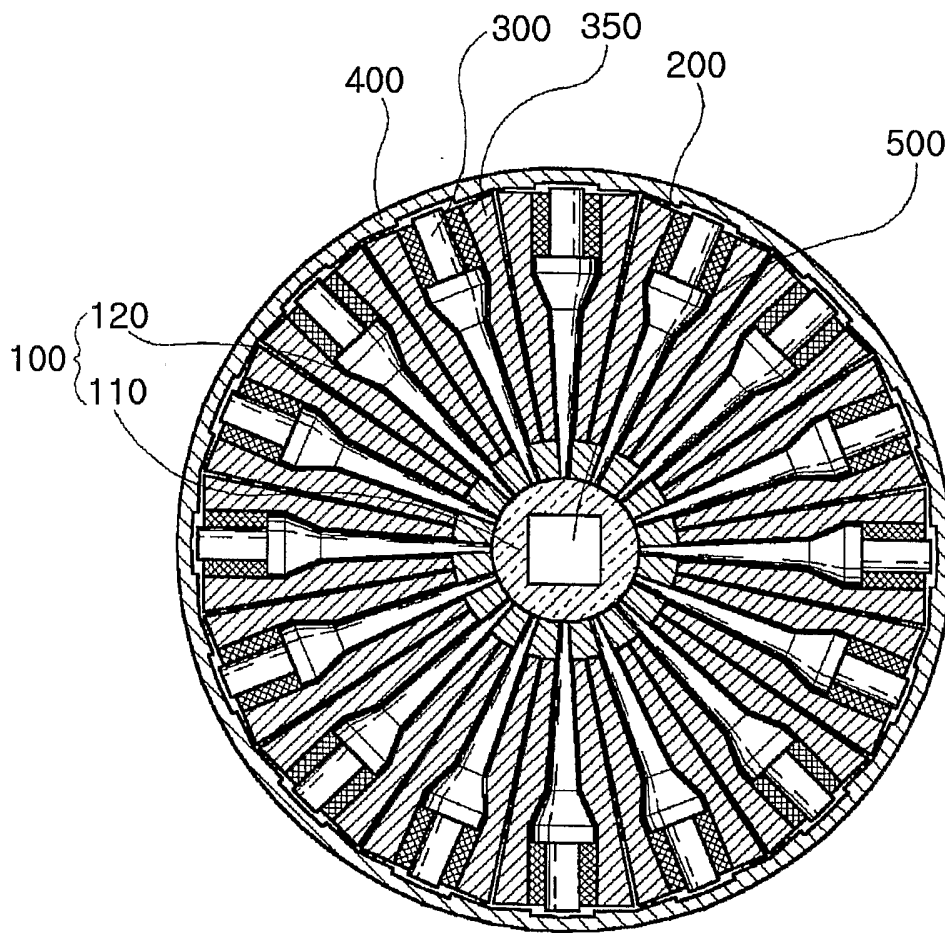
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FIG.3



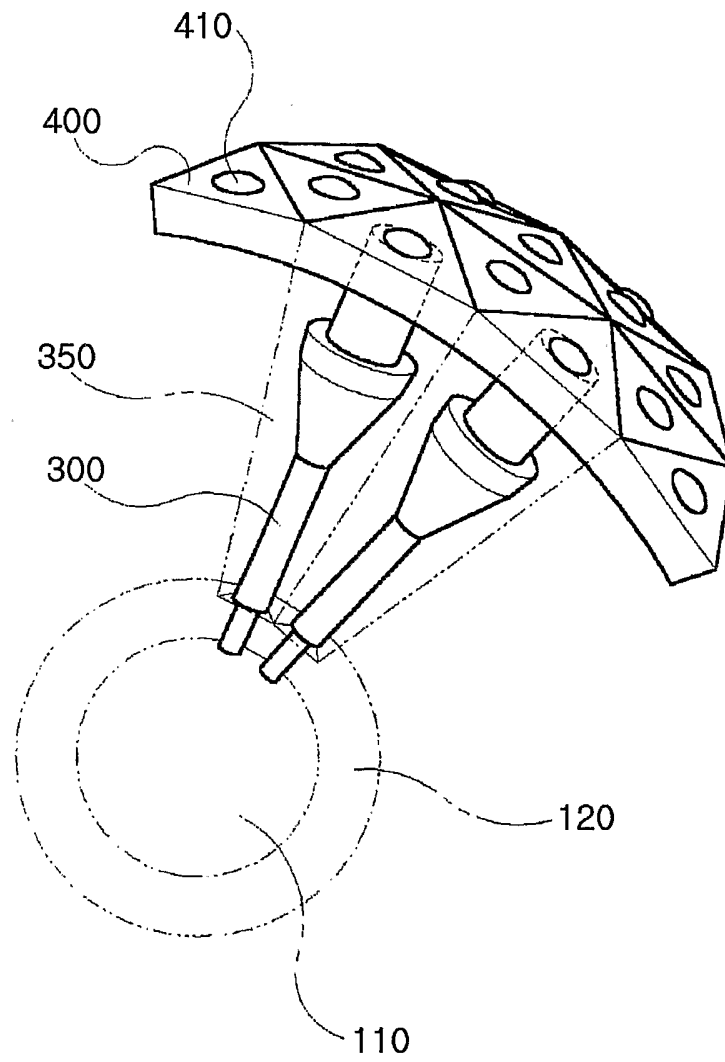
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FIG. 4



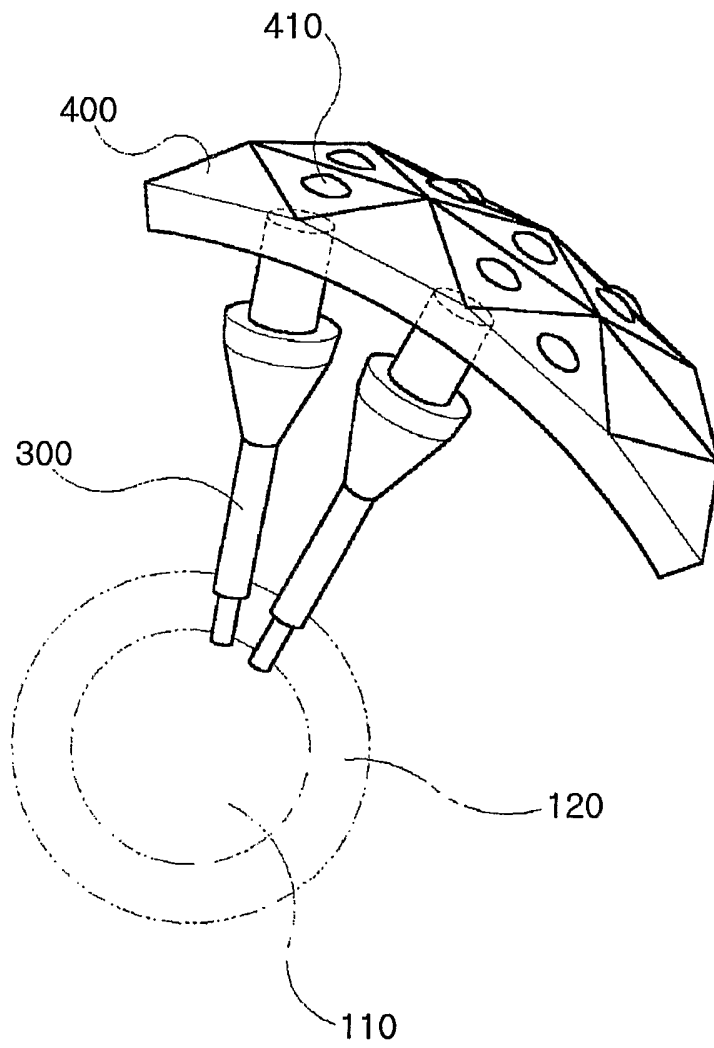
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FIG.5

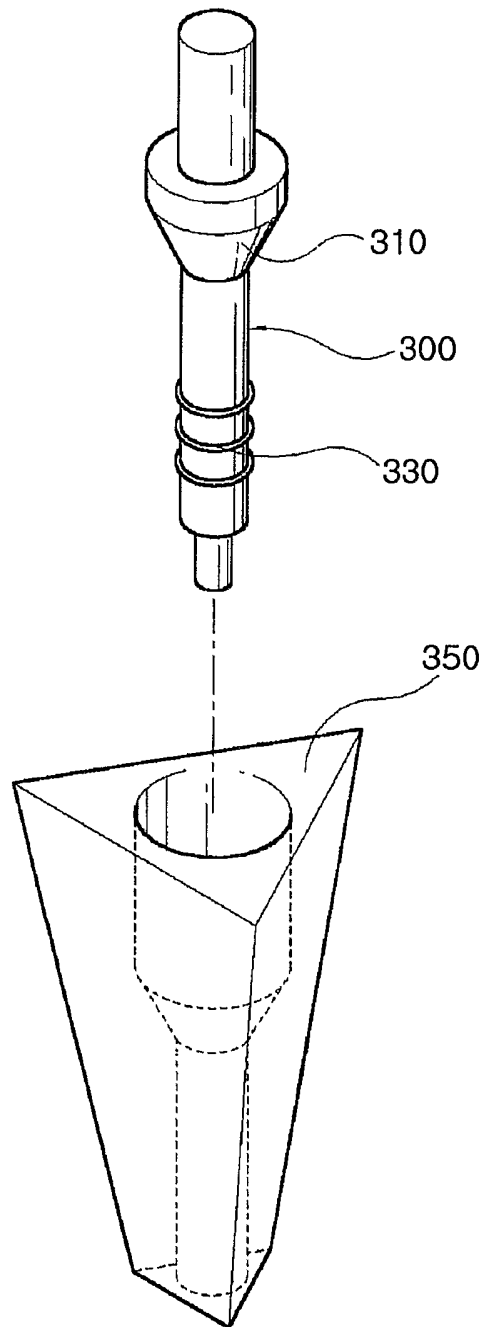


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FIG. 6

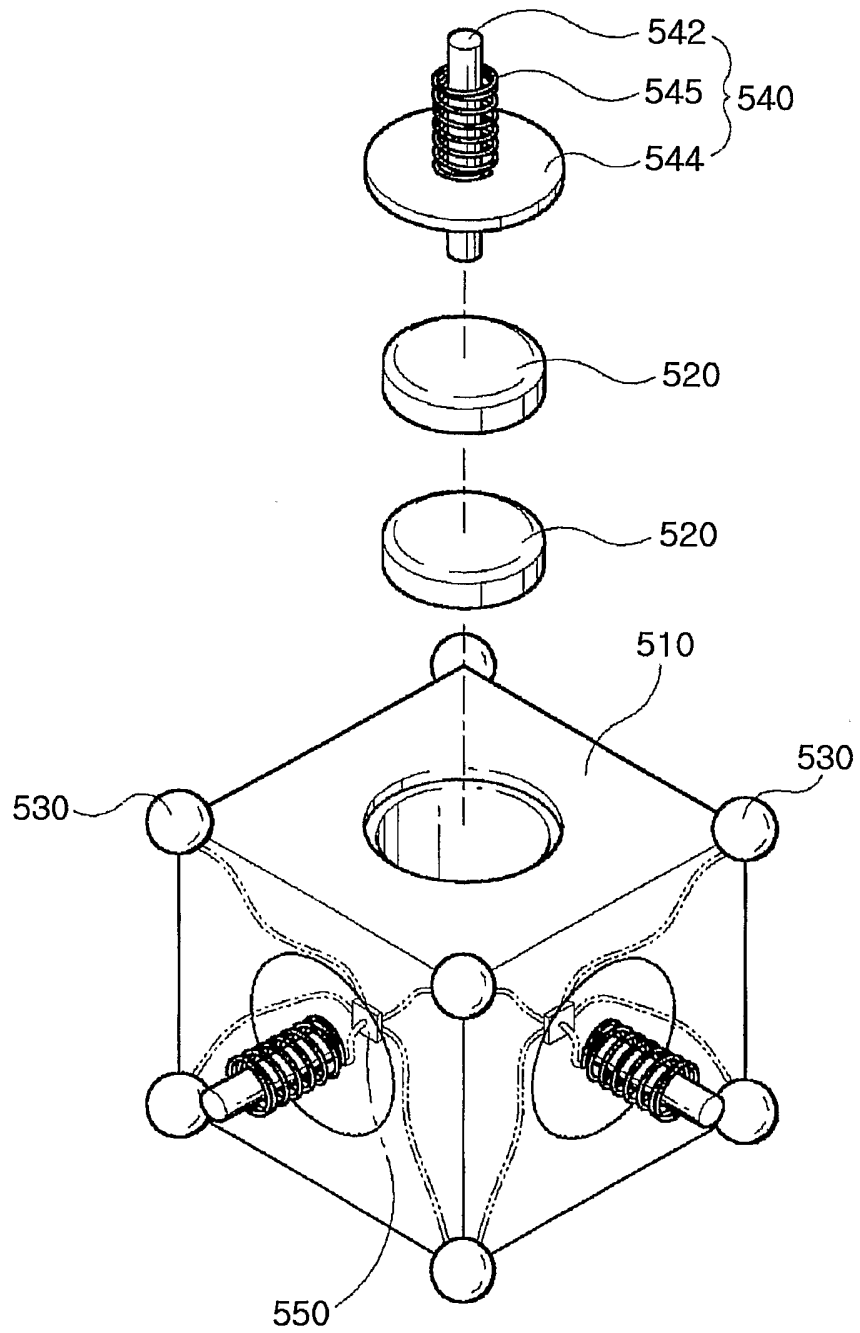


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FIG. 7



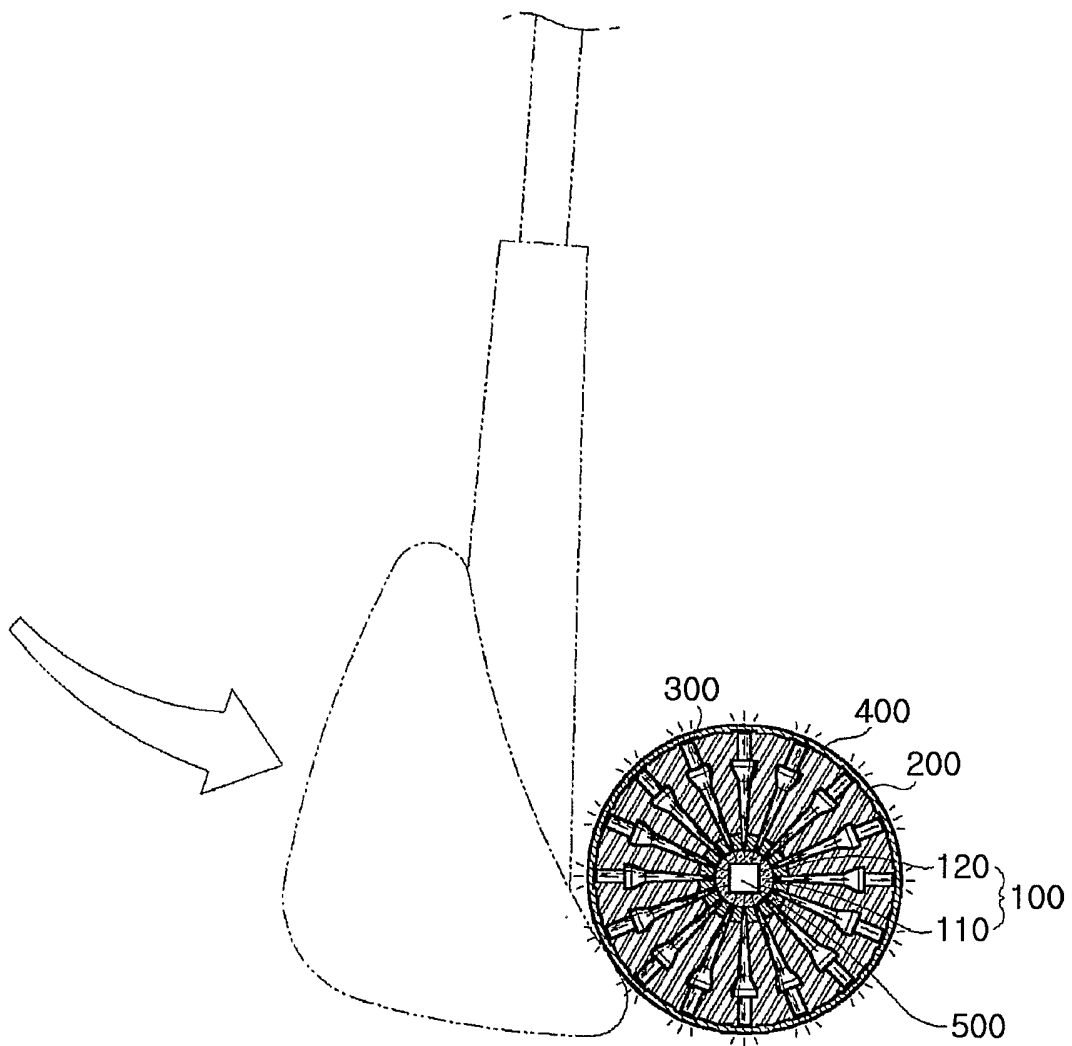
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FIG. 8



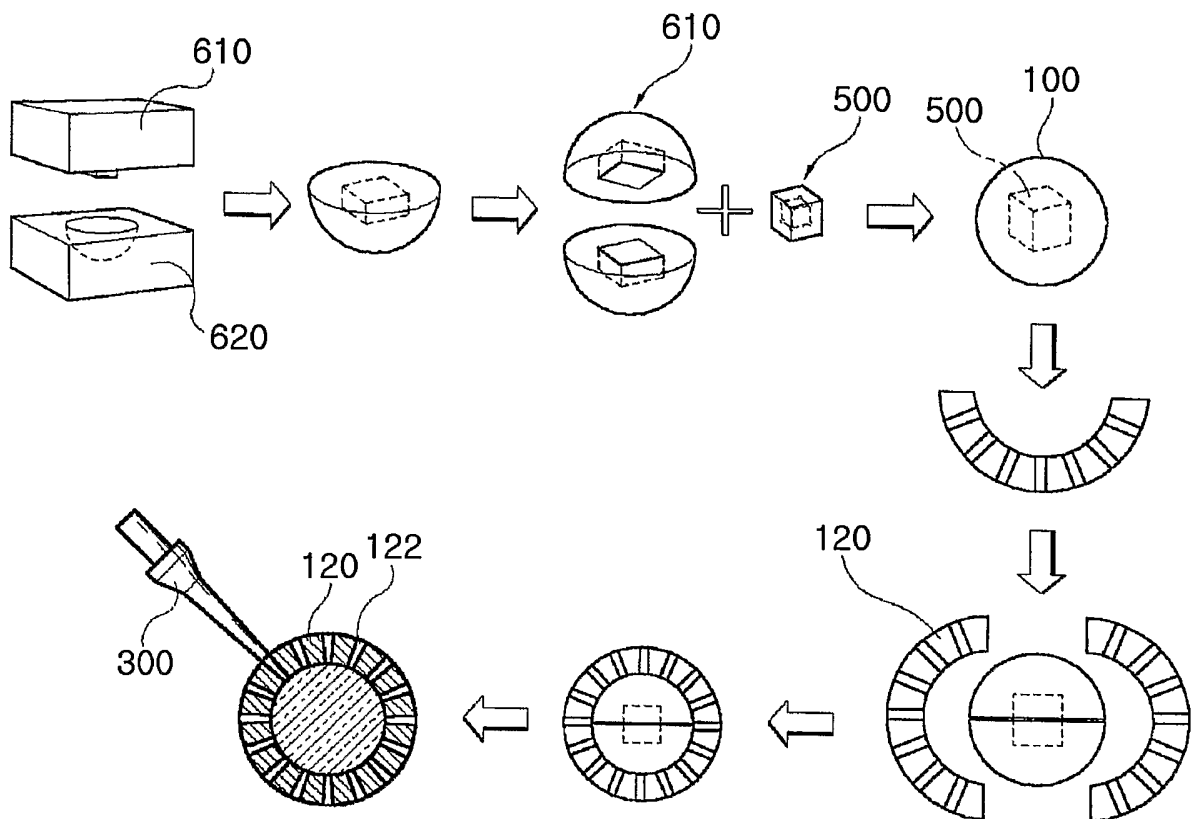


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FIG. 9



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FIG. 10



# INTERNATIONAL SEARCH REPORT

International application No.

PCT/KR2004/000310

**A. CLASSIFICATION OF SUBJECT MATTER**

**IPC7 A63B 37/00**

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 A63B

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

KR, JP : IPC as above

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.
A	KR 2002-7836 A (SIN, DEOK HO) 29 JANUARY 2002 See the whole document	1 - 9
A	US 6,398,667 B1 (WILSON SPORTING GOODS CO.) 04 JUNE 2002 See the abstract and the figures	1 - 9
A	WO 00/07676 A1 (VON DER MARK EBERHARD) 17 FEBRUARY 2000 See the abstract and the figures	7 - 9
A	US 4,957,297 A (NELSON F. NEWCOMB) 18 SEPTEMBER 1990 See the abstract and the figures	7 - 9

Further documents are listed in the continuation of Box C.

See patent family annex.

\* Special categories of cited documents:

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

22 JUNE 2004 (22.06.2004)

Date of mailing of the international search report

22 JUNE 2004 (22.06.2004)

Name and mailing address of the ISA/KR



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Telephone No. 82-42-481-5452



# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.

PCT/KR2004/000310

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 6,398,667 B1	04.06.2002	NONE	
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