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(54) **Light-emitting ball**

Lichtemittierender Ball

Ballon luminescent

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EP 2 163 282 B1

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Description

[0001] The present invention relates to a ball, more particularly to a light-emitting ball.

[0002] Sport activities played with a ball are popular. Examples of such sport activities include baseball, basketball, soccer, volleyball, softball, and so on.

[0003] Referring to Figures 1 and 2, a conventional sports ball 1 includes an inflatable ball bladder 12 and a skin layer 11 that encloses the ball bladder 12. The skin layer 11 has a plurality of interconnected patch segments 111 enclosing the ball bladder 12. Each of the patch segments 111 has a backing layer 112 attached to an outer surface of the ball bladder 12, an intermediate layer 113 disposed on an outer surface of the backing layer 112, and an outer layer 114 disposed on an outer surface of the intermediate layer 113. In order to improve visual effects, patterns or colors on the sports ball 1 can be changed only via the outer layer 114. However, even if the patterns or the colors can be changed, an appearance of the sports ball 1 remains dull.

[0004] Another known ball is disclosed in US 5 888 156 A. Between an inflatable bladder and an outer shell having a translucent portion is disposed an illumination element which may comprise a plurality of light-emitting diodes.

[0005] Therefore, the object of the present invention is to provide a light-emitting ball, which can effectively promote visual effects.

[0006] Accordingly, a light-emitting ball of the present invention comprises an inflatable ball bladder, a transparent skin layer that encloses the ball bladder, and an electrically operable display module that is disposed between the ball bladder and the skin layer and that is operable to generate images visible through the skin layer, whereby said display module includes a plurality of display units, each of which includes a remotely controllable battery-operated power supply unit for supplying electric power thereto.

[0007] Other features and advantages of the present invention will become apparent in the following detailed description of the preferred embodiments with reference to the accompanying drawings, of which:

Figure 1 is a perspective view of a conventional sports ball;

Figure 2 is a fragmentary sectional view of the conventional sports ball;

Figure 3 is a perspective view of a first preferred embodiment of a light-emitting ball according to the present invention;

Figure 4 is a sectional view of the light-emitting ball of the first preferred embodiment taken along line IV-IV in Figure 3;

Figure 5 is a circuit block diagram of a second preferred embodiment of a light-emitting ball according to the present invention;

Figure 6 is a perspective view of a third preferred

embodiment of a light-emitting ball according to the present invention;

Figure 7 is a sectional view of the light-emitting ball of the third preferred embodiment; and

Figure 8 is a circuit block diagram of the light-emitting ball of the third preferred embodiment.

[0008] Before the present invention is described in greater detail, it should be noted that like components are assigned the same reference numerals throughout the following disclosure.

[0009] Referring to Figures 3 and 4, a first preferred embodiment of a light-emitting ball 2 according to the present invention is shown to comprise an inflatable ball bladder 21, a transparent skin layer 222, and an electrically operable display module 223.

[0010] The transparent skin layer 222 encloses the ball bladder 21. The electrically operable display module 223 is disposed between the ball bladder 21 and the skin layer 222, and is attached to an inner surface of the skin layer 222, and is operable to generate images visible through the skin layer 222. The display module 223 has a shape of an annular band in this embodiment, and includes a remotely controllable battery-operated power supply unit 227 for supplying electric power thereto.

[0011] In this embodiment, the skin layer 222 is made of a thermoplastic resin, such as thermoplastic polyurethane (TPU). The display module 223 is a flexible organic light emitting diode (OLED) display module. The material for the skin layer 222 is not limited to the above example as long as light from the display module 223 can pass therethrough.

[0012] The light-emitting ball 2 further comprises a backing layer 224 that is disposed between the display module 223 and the ball bladder 21, and a controller 23 that is disposed on the display module 223, that is coupled to the display module 223, and that is operable to provide image data thereto. The display module 223 is operable to generate the images based upon the image data received thereby, and can be configured to display predetermined images that may be, for example, stored in the display module 223.

[0013] Figure 5 illustrates a circuit block diagram of a controller 23 of a second preferred embodiment of a light-emitting ball 2 according to the present invention.

[0014] In the second preferred embodiment, the controller 23 includes a processor 232 that is electrically coupled to the remotely controllable battery-operated power supply unit 227 and a screen 225 of the display module 223, and a data source 25 that is coupled to the processor 232. The processor 232 is operable to provide the image data to the screen 225 of the display module 223 based upon an output of the data source 25. The data source 25 includes at least one of a gravitational accelerometer 233, a global positioning system (GPS) receiver module 235, and an image library module 251. The gravitational accelerometer 233 is used for measuring acceleration of the ball 2 when moving and converting the measured

acceleration into speed, and may transmit a speed signal to the processor 232, for subsequent display of the ball speed on the display module 223. The GPS receiver module 235 is used for obtaining coordinates of the ball 2, and may transmit a coordinate signal to the processor 232 for subsequent display of the position of the ball 2 on the display module 223 when the speed of the ball 2 is below a threshold value. The image library module 251 may include the predetermined images, which can be accessed by the processor 232 for subsequent transmission to the display module 233.

[0015] Referring to Figures 6, 7, and 8, a third preferred embodiment of a light-emitting ball 2 of the present invention is shown to be similar to the first and second preferred embodiments. The third preferred embodiment differs from the first and second preferred embodiments in the following aspects.

[0016] The display module 223 includes a plurality of display units 253, each of which includes a screen 225 and a remotely controllable battery-operated first power supply unit 227 for supplying electric power thereto. The skin layer 222 includes a plurality of interconnected patch segments 221. Each of the display units 253 is attached to an inner surface of a corresponding one of the patch segments 221. The controller 23 is disposed in the ball bladder 21, and further includes a remotely controllable battery-operated second power supply unit 234 for supplying electric power thereto. The light-emitting ball 2 further comprises a suspension mechanism 24 for suspending the controller 23 in the ball bladder 21. The suspension mechanism 24 includes a frame member 241, a set of first elastic components 242 that interconnect the controller 23 and the frame member 241, and a set of second elastic components 243 that interconnect the frame member 241 and the ball bladder 21. By virtue of the elastic components 242, 243, shock forces that act on the controller 23 when the ball 2 is in use can be reduced.

[0017] The controller 23 is coupled to each of the display units 253, and is operable to provide image data thereto. Each of the display units 253 is operable to generate the images based upon the image data received thereby. The controller 23 further includes a transmitter 231 for transmitting the image data wirelessly to the display units 253, and each of the display units 253 further includes a receiver 226 for receiving the image data from the controller 23 and for providing the received image data to the screen 225. Like the previous embodiment, the controller 23 further includes a processor 232 coupled to the transmitter 231, and a data source 25 coupled to the processor 232. The processor 232 is operable to provide the image data to the display units 253 based upon an output of the data source 25. The remotely controllable battery-operated second power supply unit 234 is for supplying electric power to the processor 232.

[0018] In the third preferred embodiment, the first and second elastic components 242, 243 of the suspension mechanism 24 are not limited to compression springs, and may be other elastic components as long as shock

forces that act on the controller 23 can be reduced.

Claims

1. A light-emitting ball (2) including:

an inflatable ball bladder (21);
a skin layer (222) that encloses said ball bladder (21) and that is transparent; and
an electrically operable display module (223) disposed between said ball bladder (21) and said skin layer (222) and being operable to generate images visible through said skin layer (222);

characterized in that said display module (223) includes a plurality of display units (253), each of which includes a remotely controllable battery-operated power supply unit (227) for supplying electric power thereto.

2. The light-emitting ball (2) as claimed in claim 1, **characterized in that** said skin layer (222) is made of a thermoplastic resin.

3. The light-emitting ball (2) as claimed in any one of the preceding claims, **characterized in that** said display module (223) is attached to an inner surface of said skin layer (222).

4. The light-emitting ball (2) as claimed in any one of the preceding claims, **characterized in that** said display module (223) is a flexible organic light emitting diode (OLED) display module.

5. The light-emitting ball (2) as claimed in any one of the preceding claims, further **characterized by** a backing layer (224) disposed between said display module (223) and said ball bladder (21).

6. The light-emitting ball (2) as claimed in any one of the preceding claims, **characterized in that** said skin layer (222) includes a plurality of interconnected patch segments (221), each of said display units (253) being attached to an inner surface of a corresponding one of said patch segments (221).

7. The light-emitting ball (2) as claimed in any one of the preceding claims, further **characterized by** a controller (23) coupled to each of said display units (253) and operable to provide image data thereto, each of said display units (253) being operable to generate the images based upon the image data received thereby.

8. The light-emitting ball (2) as claimed in claim 7, **characterized in that** said controller (23) includes a transmitter (231) for transmitting the image data

wirelessly to said display units (253), and each of said display units (253) includes a receiver (226) for receiving the image data from said controller (23).

9. The light-emitting ball (2) as claimed in claim 8, **characterized in that** said controller (23) further includes a processor (232) coupled to said transmitter (231) and a data source (25) coupled to said processor (232), said processor (232) being operable to provide the image data to said display units (253) based upon an output of said data source (25).
10. The light-emitting ball (2) as claimed in claim 9, **characterized in that** said controller (23) further includes a remotely controllable battery-operated power supply unit (234) for supplying electric power to said processor (232).
11. The light-emitting ball (2) as claimed in any one of claims 8 to 10, **characterized in that** said controller (23) is disposed in said ball bladder (21) and further includes a remotely controllable battery-operated power supply unit (234) for supplying electric power thereto.
12. The light-emitting ball (2) as claimed in claim 11, further **characterized by** a suspension mechanism (24) for suspending said controller (23) in said ball bladder (21), said suspension mechanism (24) including a frame member (241), a set of first elastic components (242) that interconnect said controller (23) and said frame member (241), and a set of second elastic components (243) that interconnect said frame member (241) and said ball bladder (21).
13. The light-emitting ball (2) as claimed in claim 9, **characterized in that** said data source (25) includes at least one of a gravitational accelerometer (233), a global positioning system receiver module (235), and an image library module (251).

Patentansprüche

1. Lichtemittierender Ball (2), mit:

einer aufblasbaren Ballblase (21);
einer Hautschicht (222), welche die Ballblase (21) umschließt und die transparent ist; und
einem elektrisch betreibbaren Anzeigemodul (223), das zwischen der Ballblase (21) und der Hautschicht (222) angeordnet ist und betätigt werden kann, um Bilder zu erzeugen, die durch die Hautschicht (222) sichtbar sind;
dadurch gekennzeichnet, dass das Anzeigemodul (223) mehrere Anzeigeeinheiten (253) aufweist, wobei jede davon eine fernbedienbare batteriebetriebene Stromversorgungseinheit

(227) aufweist, um diese mit Strom zu versorgen.

2. Lichtemittierender Ball (2) nach Anspruch 1, **dadurch gekennzeichnet, dass** die Hautschicht (222) aus thermoplastischem Harz hergestellt ist.
3. Lichtemittierender Ball (2) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Anzeigemodul (223) an einer Innenfläche der Hautschicht (222) befestigt ist.
4. Lichtemittierender Ball (2) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** das Anzeigemodul (223) ein flexibles organisches lichtemittierendes (OLED) Dioden-Anzeigemodul ist.
5. Lichtemittierender Ball (2) nach einem der vorhergehenden Ansprüche, ferner **gekennzeichnet durch** eine Trägerschicht (224), die zwischen dem Anzeigemodul (223) und der Ballblase (21) angeordnet ist.
6. Lichtemittierender Ball (2) nach einem der vorhergehenden Ansprüche, **dadurch gekennzeichnet, dass** die Hautschicht (222) mehrere miteinander verbundene Flickensegmente (221) aufweist, wobei jede der Anzeigeeinheiten (253) an einer Innenfläche eines entsprechenden der Flickensegmente (221) befestigt ist.
7. Lichtemittierender Ball (2) nach einem der vorhergehenden Ansprüche, ferner **gekennzeichnet durch** eine Steuerung (23), die an jede der Anzeigeeinheiten (253) gekoppelt ist und bedient werden kann, um Bilddaten dorthin zu liefern, wobei jede der Anzeigeeinheiten (253) bedient werden kann, um die Bilder basierend auf den auf diese Weise erhaltenen Bilddaten zu erzeugen.
8. Lichtemittierender Ball (2) nach Anspruch 7, **dadurch gekennzeichnet, dass** die Steuerung (23) einen Sender (231) zum drahtlosen Übertragen der Bilddaten an die Anzeigeeinheiten (253) aufweist, wobei jede der Anzeigeeinheiten (253) einen Empfänger (226) zum Empfangen der Bilddaten von der Steuerung (23) aufweist.
9. Lichtemittierender Ball (2) nach Anspruch 8, **dadurch gekennzeichnet, dass** die Steuerung (23) ferner einen Prozessor (232) aufweist, der an den Sender (231) gekoppelt ist, und eine Datenquelle (25), die an den Prozessor (232) gekoppelt ist, wobei der Prozessor (232) bedient werden kann, um die Bilddaten an die Anzeigeeinheiten (253) basierend auf der Ausgabe der Datenquelle (25) zu liefern.

10. Lichtemittierender Ball (2) nach Anspruch 9, **dadurch gekennzeichnet, dass** die Steuerung (23) ferner eine fernbedienbare batteriebetriebene Stromversorgungseinheit (234) zum Liefern von Strom an den Prozessor (232) aufweist.
11. Lichtemittierender Ball (2) nach einem der vorhergehenden Ansprüche 8 bis 10, **dadurch gekennzeichnet, dass** die Steuerung (23) in der Ballblase (21) angeordnet ist und ferner eine fernbedienbare batteriebetriebene Stromversorgungseinheit (234) zum Liefern von Strom dafür aufweist.
12. Lichtemittierender Ball (2) nach Anspruch 11, ferner **gekennzeichnet durch** einen Aufhängungsmechanismus (24) zum Aufhängen der Steuerung (23) in der Ballblase (21), wobei der Aufhängungsmechanismus (24) ein Rahmenelement (241), einen Satz erster elastischer Komponenten (242), die die Steuerung (23) und das Rahmenelement (241) miteinander verbinden, und einen Satz zweiter elastischer Komponenten (243) aufweist, die das Rahmenelement (241) und die Ballblase (21) miteinander verbinden.
13. Lichtemittierender Ball (2) nach Anspruch 9, **dadurch gekennzeichnet, dass** die Datenquelle (25) mindestens einen Fallbeschleuniger (233), ein globales Positionierungssystem-Empfängermodul (235) und ein Bildbibliothekmodul (251) aufweist.

Revendications

1. Ballon luminescent (2) comportant :
- une vessie de ballon gonflable (21) ;
 - une couche de peau (222) qui enferme ladite vessie de ballon (21) et qui est transparente : et un module d'affichage actionnable électriquement (223) disposé entre ladite vessie de ballon (21) et ladite couche de peau (222) et étant actionnable pour générer des images visibles à travers ladite couche de peau (222) ;
 - caractérisé en ce que** ledit module d'affichage (223) comporte une pluralité d'unités d'affichage (253), chacune d'elles comportant une unité d'alimentation électrique télécommandable à pile (227) destinée à lui fournir une puissance électrique.
2. Ballon luminescent (2) selon la revendication 1, **caractérisé en ce que** ladite couche de peau (222) est réalisée en une résine thermoplastique.
3. Ballon luminescent (2) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit module d'affichage (223) est attaché à une sur-

face interne de ladite couche de peau (222).

4. Ballon luminescent (2) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ledit module d'affichage (223) est un module d'affichage à diode électroluminescente organique (OLED) souple.
5. Ballon luminescent (2) selon l'une quelconque des revendications précédentes, **caractérisé en outre par** une couche de support (224) disposée entre ledit module d'affichage (223) et ladite vessie de ballon (21).
6. Ballon luminescent (2) selon l'une quelconque des revendications précédentes, **caractérisé en ce que** ladite couche de peau (222) comporte une pluralité de segments de renfort interconnectés (221), chacune desdites unités d'affichage (253) étant attachée à une surface interne d'un segment correspondant desdits segments de renfort (221).
7. Ballon luminescent (2) selon l'une quelconque des revendications précédentes, **caractérisé en outre par** une unité de commande (23) couplée à chacune desdites unités d'affichage (253) et actionnable pour fournir des données d'image à celle-ci, chacune desdites unités d'affichage (253) étant actionnable pour générer les images en fonction des données d'image qu'elle a reçues.
8. Ballon luminescent (2) selon la revendication 7, **caractérisé en ce que** ladite unité de commande (23) comporte un émetteur (231) pour transmettre les données d'image sans fil auxdites unités d'affichage (253), et chacune desdites unités d'affichage (253) comporte un récepteur (226) pour recevoir les données d'image depuis ladite unité de commande (23).
9. Ballon luminescent (2) selon la revendication 8, **caractérisé en ce que** ladite unité de commande (23) comporte en outre un processeur (232) couplé audit émetteur (231) et une source de données (25) couplée audit processeur (232), ledit processeur (232) étant exploitable pour fournir les données d'image auxdites unités d'affichage (253) en fonction d'une sortie de ladite source de données (25).
10. Ballon luminescent (2) selon la revendication 9, **caractérisé en ce que** ladite unité de commande (23) comporte en outre une unité d'alimentation électrique télécommandable à pile (234) pour fournir une puissance électrique audit processeur (232).
11. Ballon luminescent (2) selon l'une quelconque des revendications 8 à 10, **caractérisé en ce que** ladite unité de commande (23) est disposée dans ladite vessie de ballon (21) et comporte en outre une unité

d'alimentation électrique télécommandable à pile (234) pour lui fournir une puissance électrique.

12. Ballon luminescent (2) selon la revendication 11, **caractérisé en outre par** un mécanisme de suspension (24) pour suspendre ladite unité de commande (23) dans ladite vessie de ballon (21), ledit mécanisme de suspension (24) comportant un élément de cadre (241), un ensemble de premiers composants élastiques (242) qui interconnectent ladite unité de commande (23) et ledit élément de cadre (241), et un ensemble de seconds composants élastiques (243) qui interconnectent ledit élément de cadre (241) et ladite vessie de ballon (21).
13. Ballon luminescent (2) selon la revendication 9, **caractérisé en ce que** ladite source de données (25) comporte au moins l'un d'un accéléromètre gravitationnel (233), d'un module récepteur de système de positionnement global (235), et d'un module de bibliothèque d'images (251).

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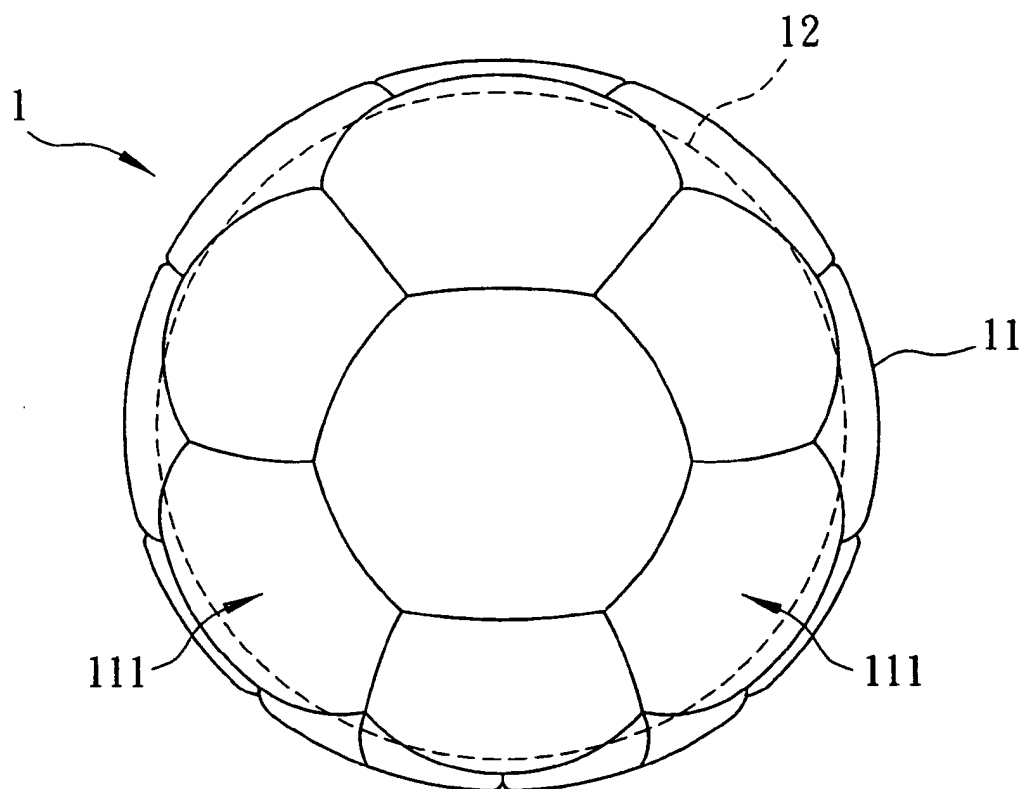


FIG. 1
PRIOR ART

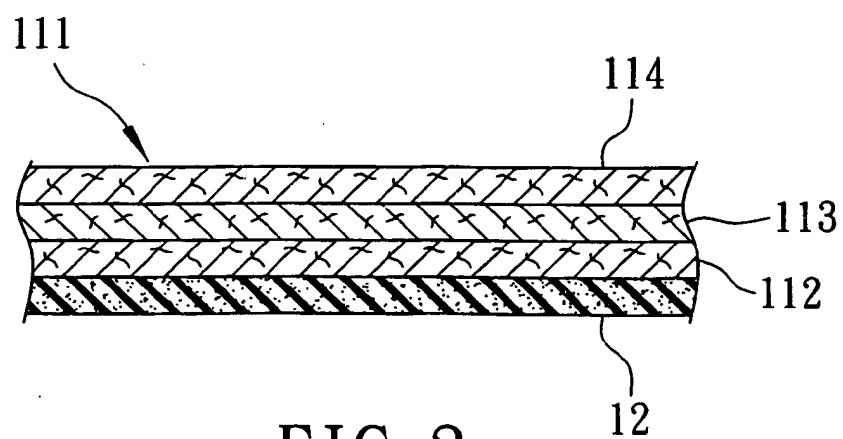


FIG. 2
PRIOR ART

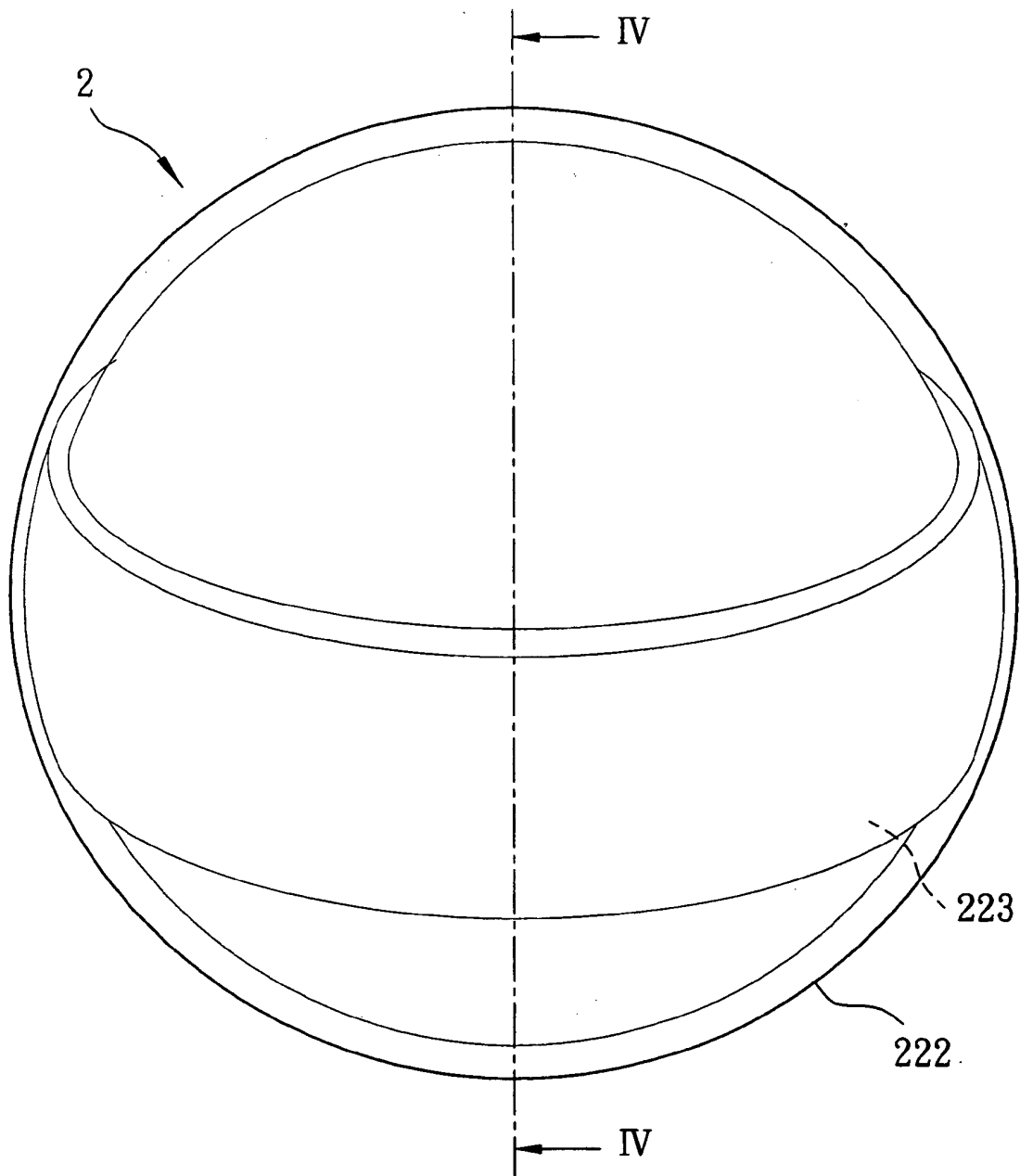


FIG. 3

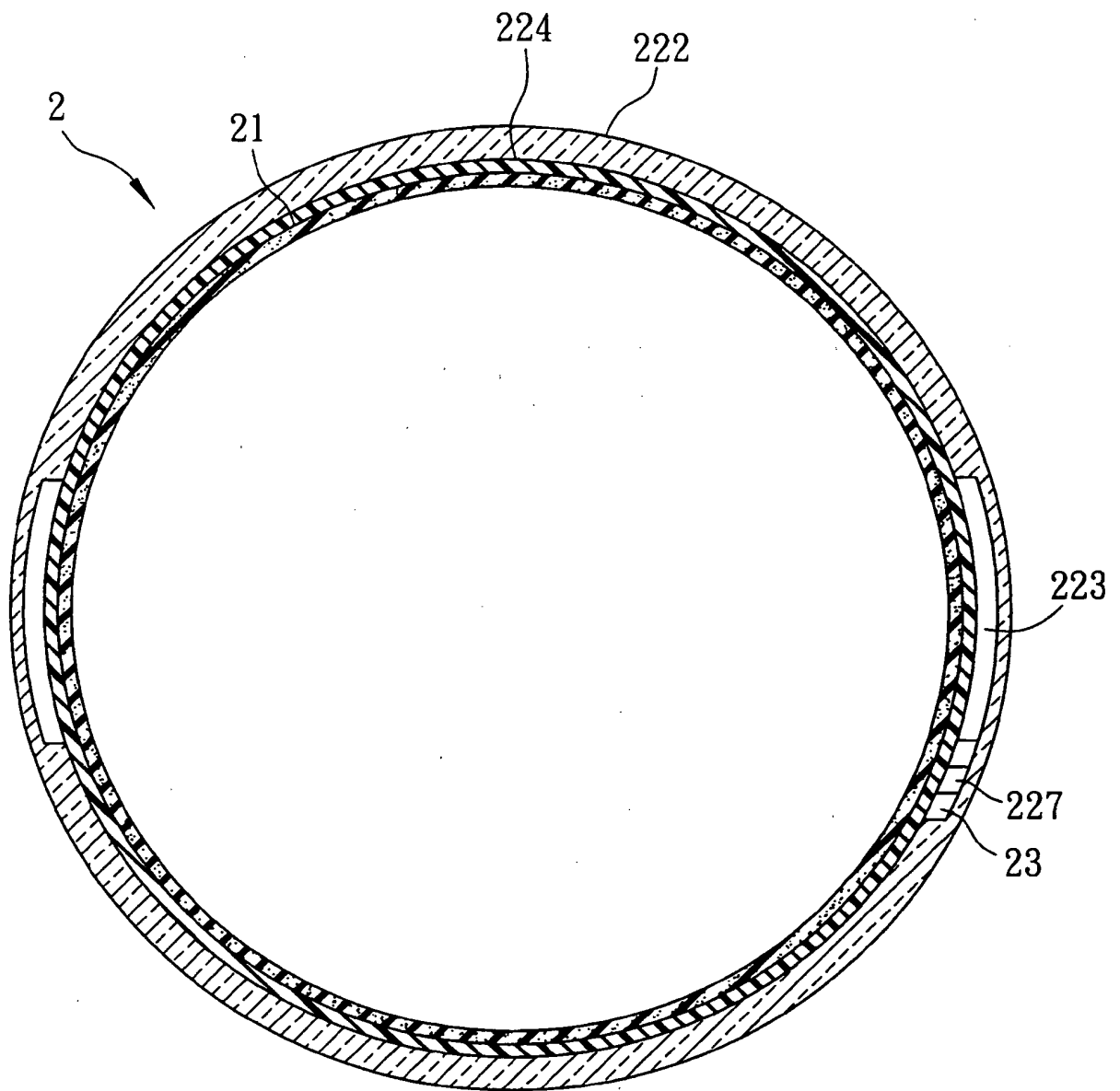


FIG. 4

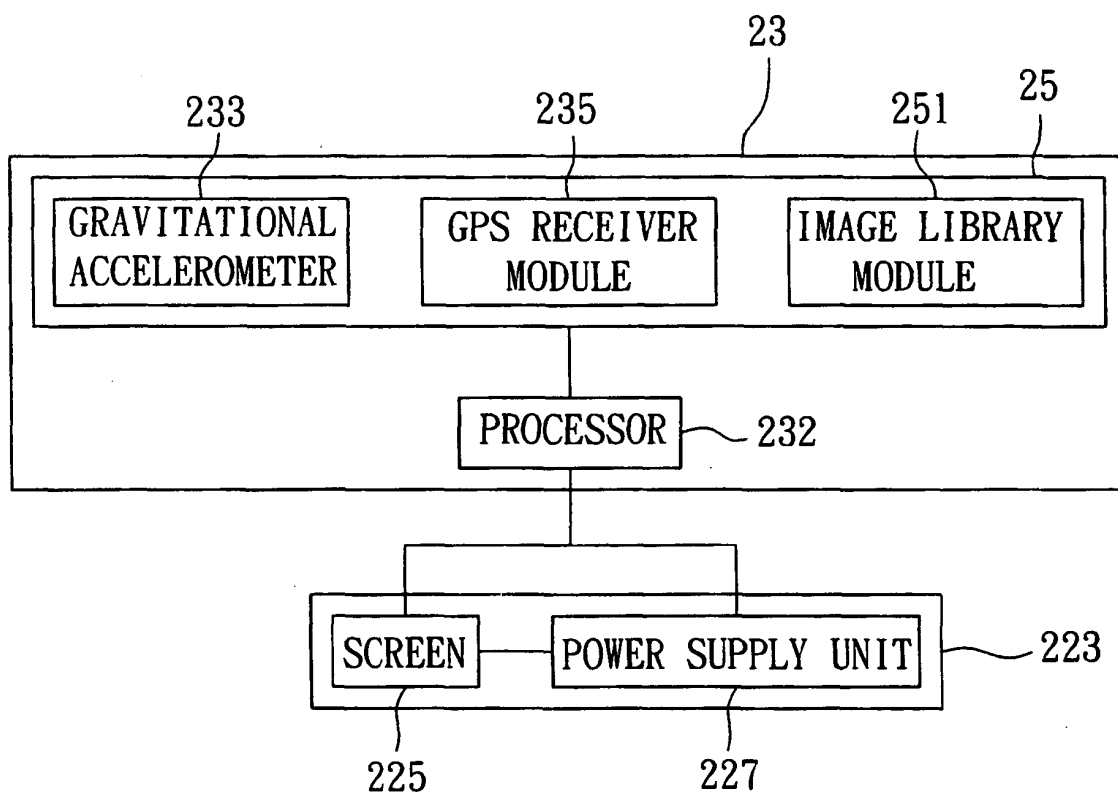


FIG. 5

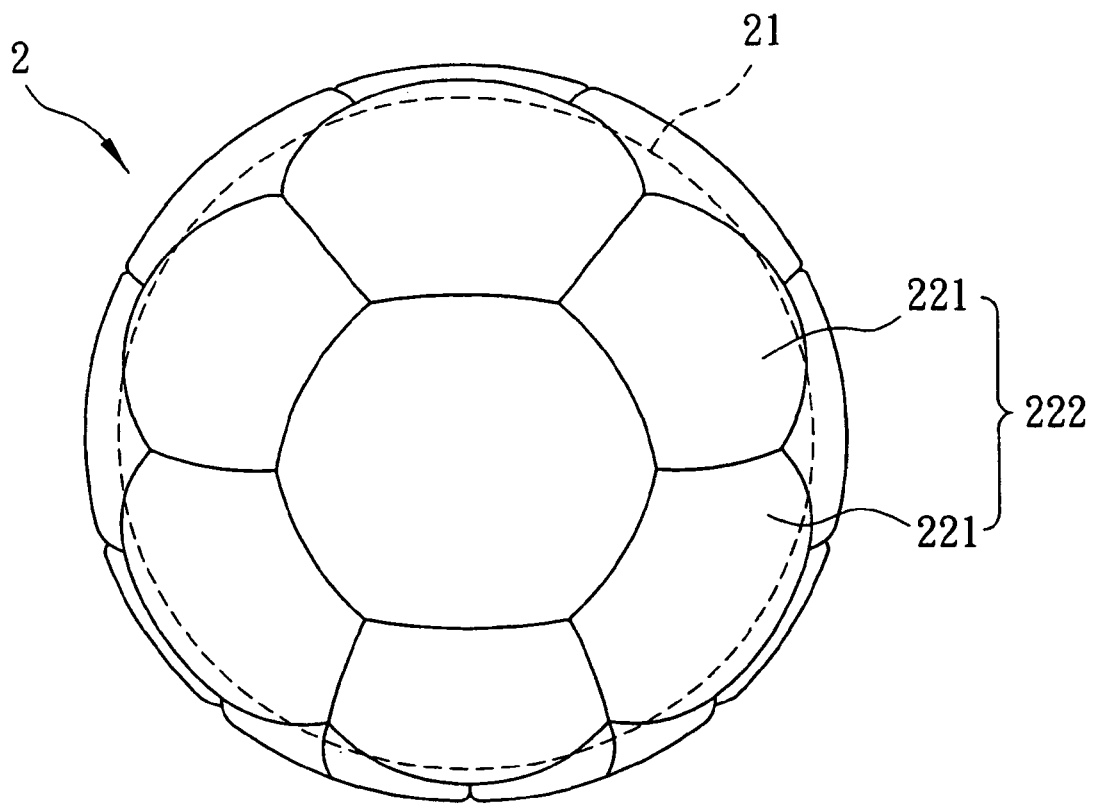


FIG. 6

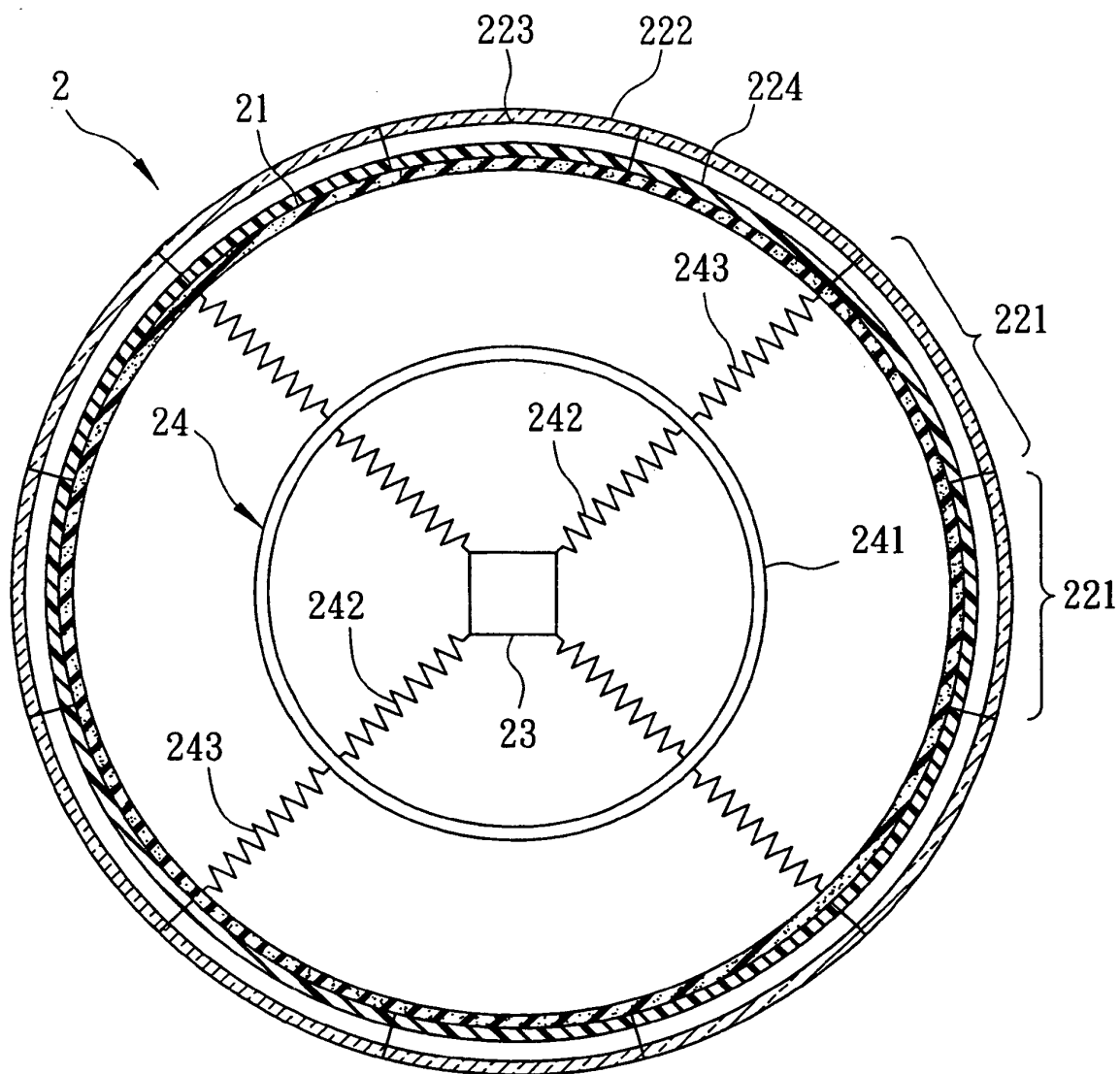


FIG. 7

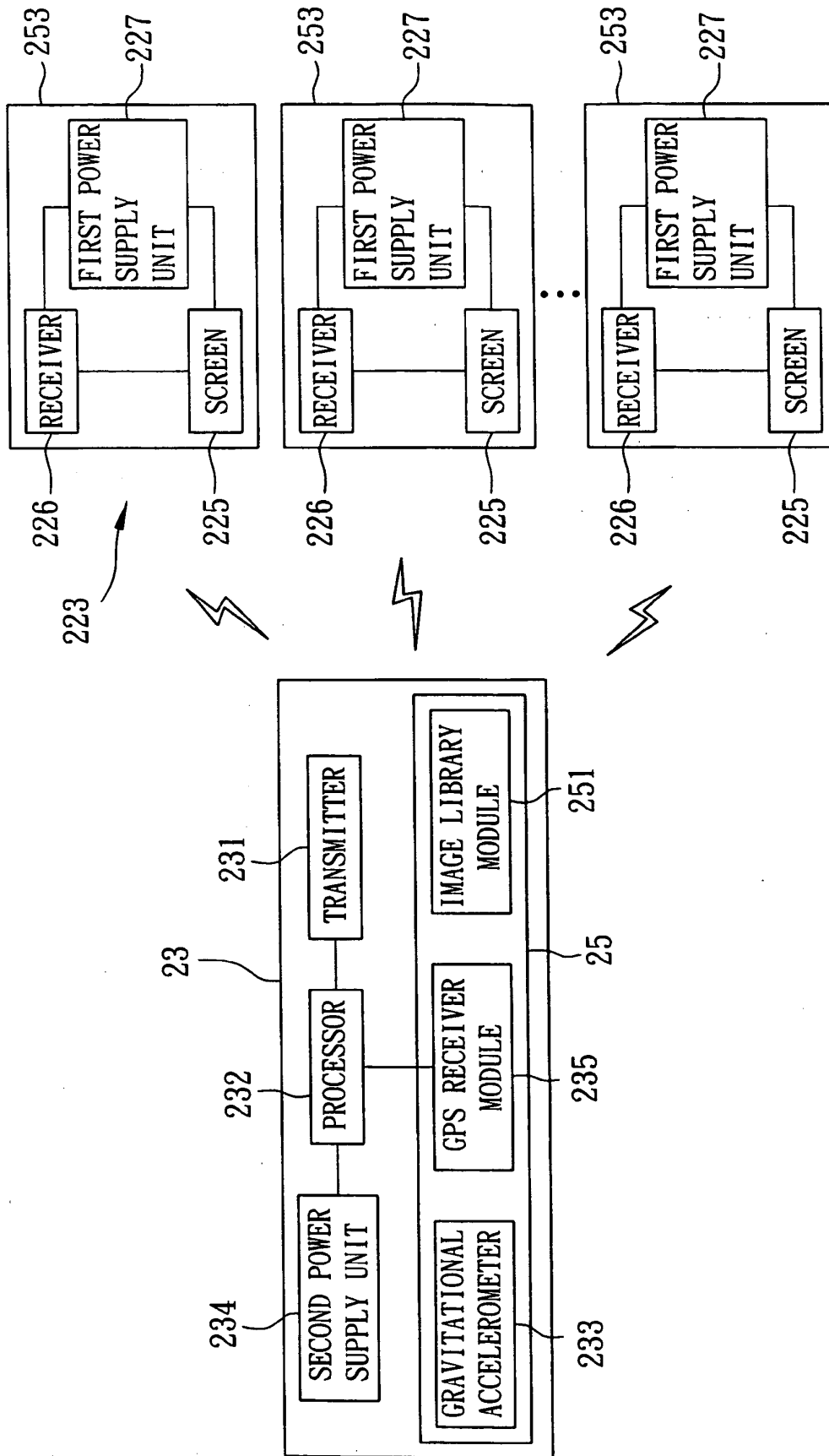


FIG. 8

REFERENCES CITED IN THE DESCRIPTION

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