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(54) ROTOR OF WRIST EXERCISER

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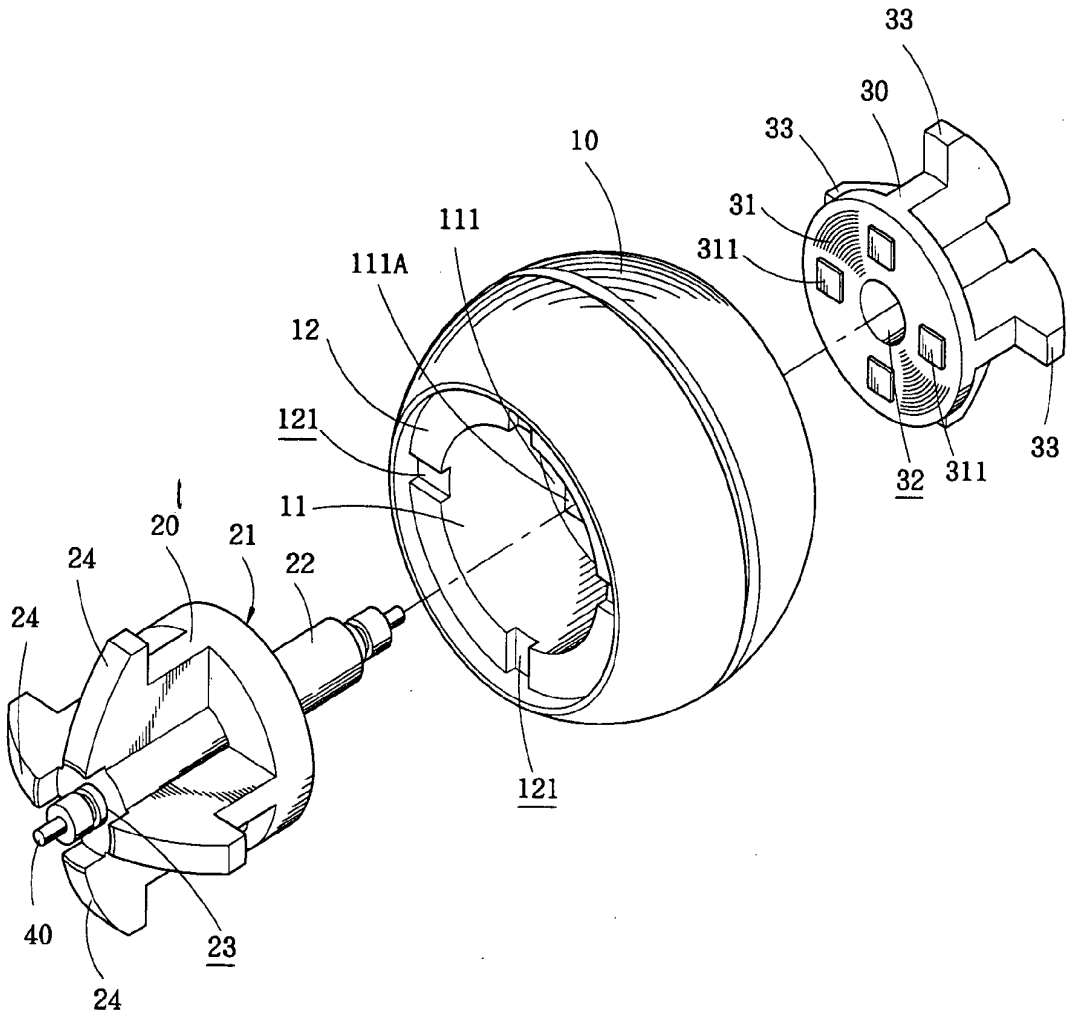
(57) **ABSTRACT**

A rotor is rotatably received in a casing to form a wrist exerciser. The rotor includes a spherical body defining a bore in which an inner flange is formed. First and second weight members are received in the bore on opposite sides of the flange. The weight members have inner end portions releasably attached to opposite surfaces of the flange. Through holes are defined in the first and second weight members to receive an axle of which ends project beyond opposite ends of the body to rotatably engage a support ring of the casing.



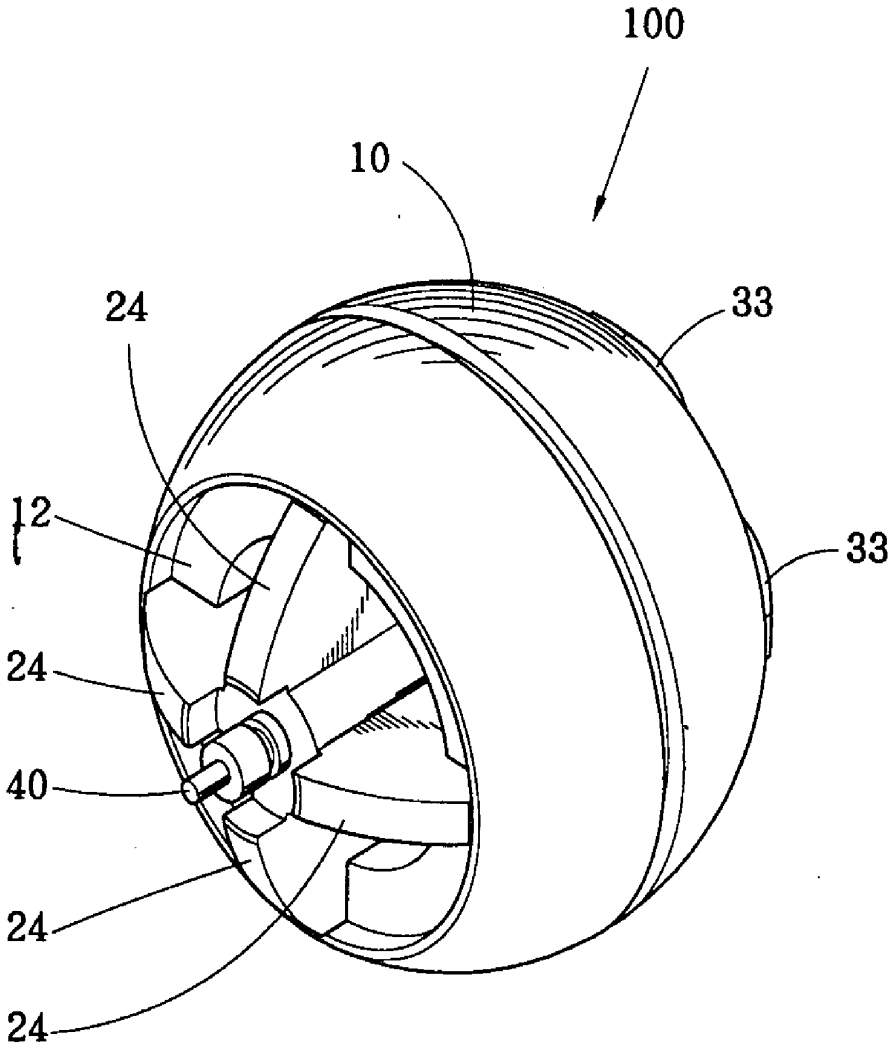


FIG. 1

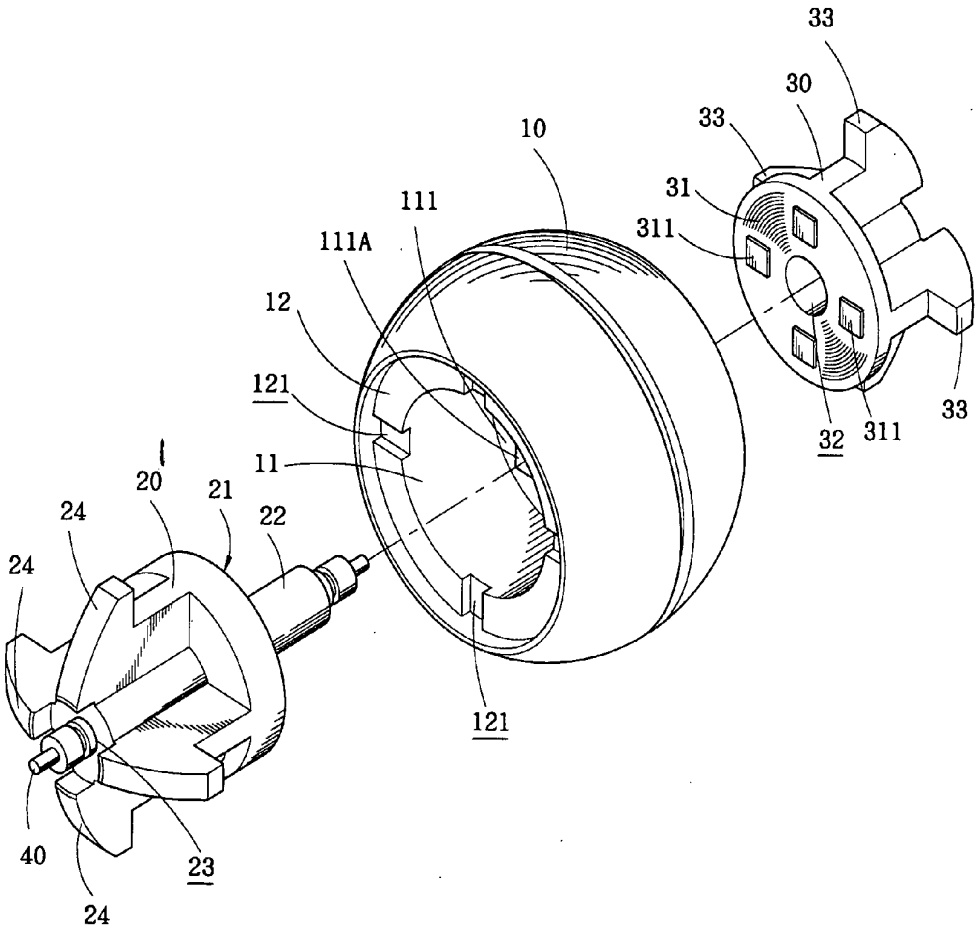

33
30
33
10
31
111
311
111A
12
121
11
20
21
22
24
24
32
311
33
121
40
23
24

FIG.2

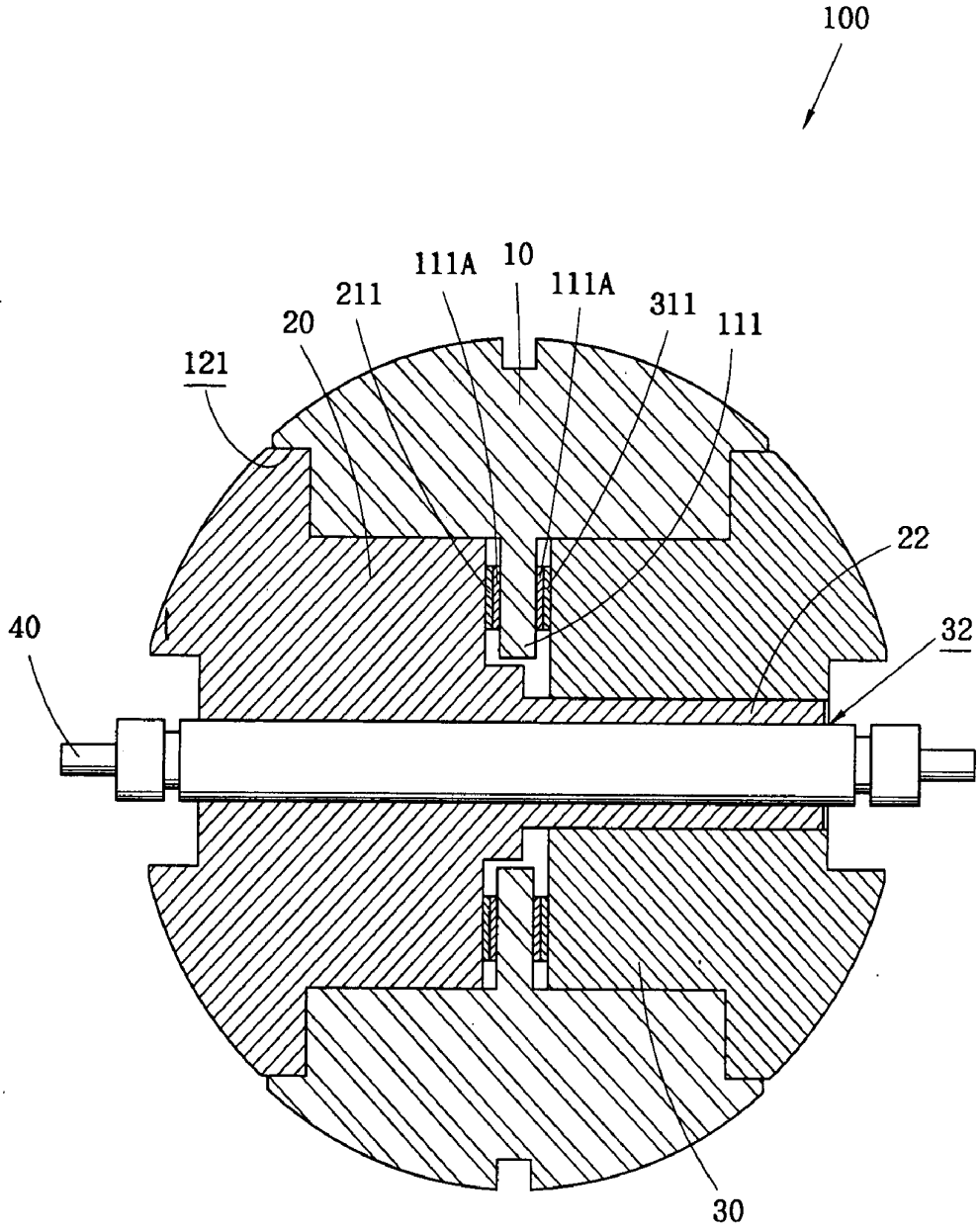


FIG.3

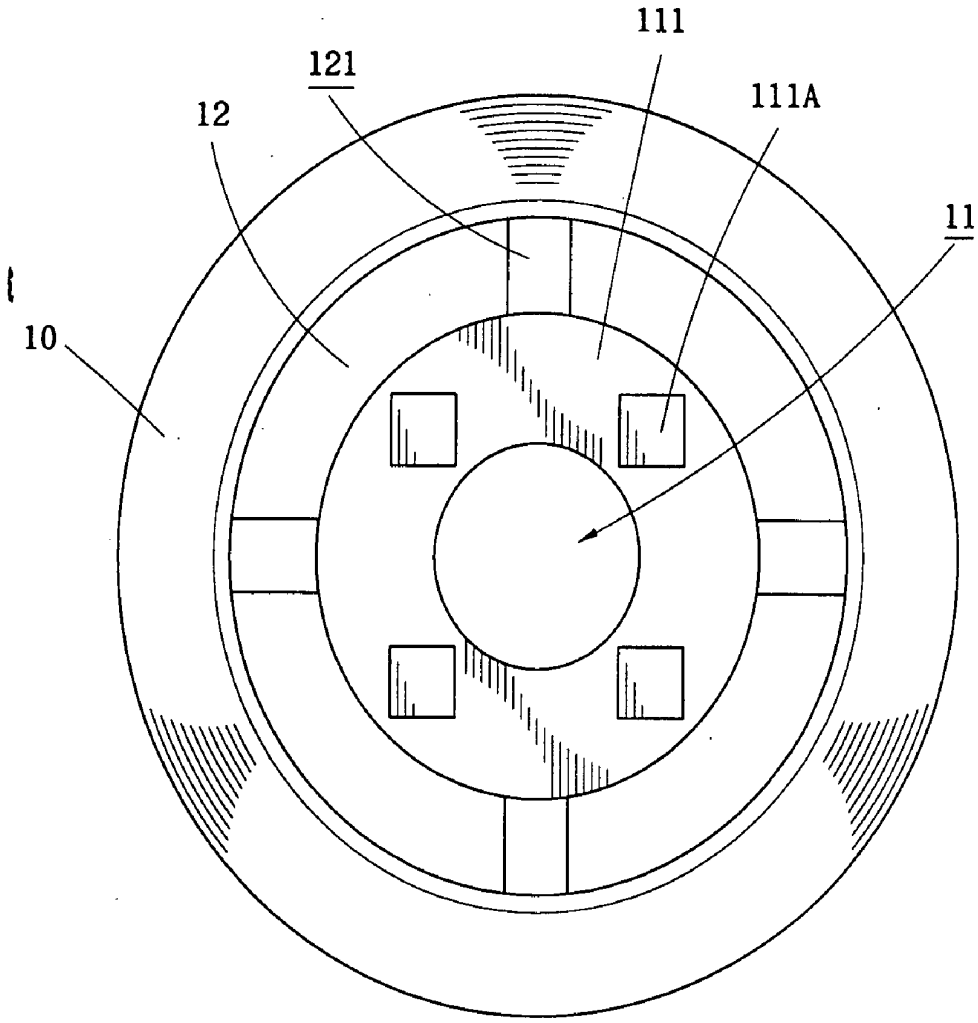


FIG.4

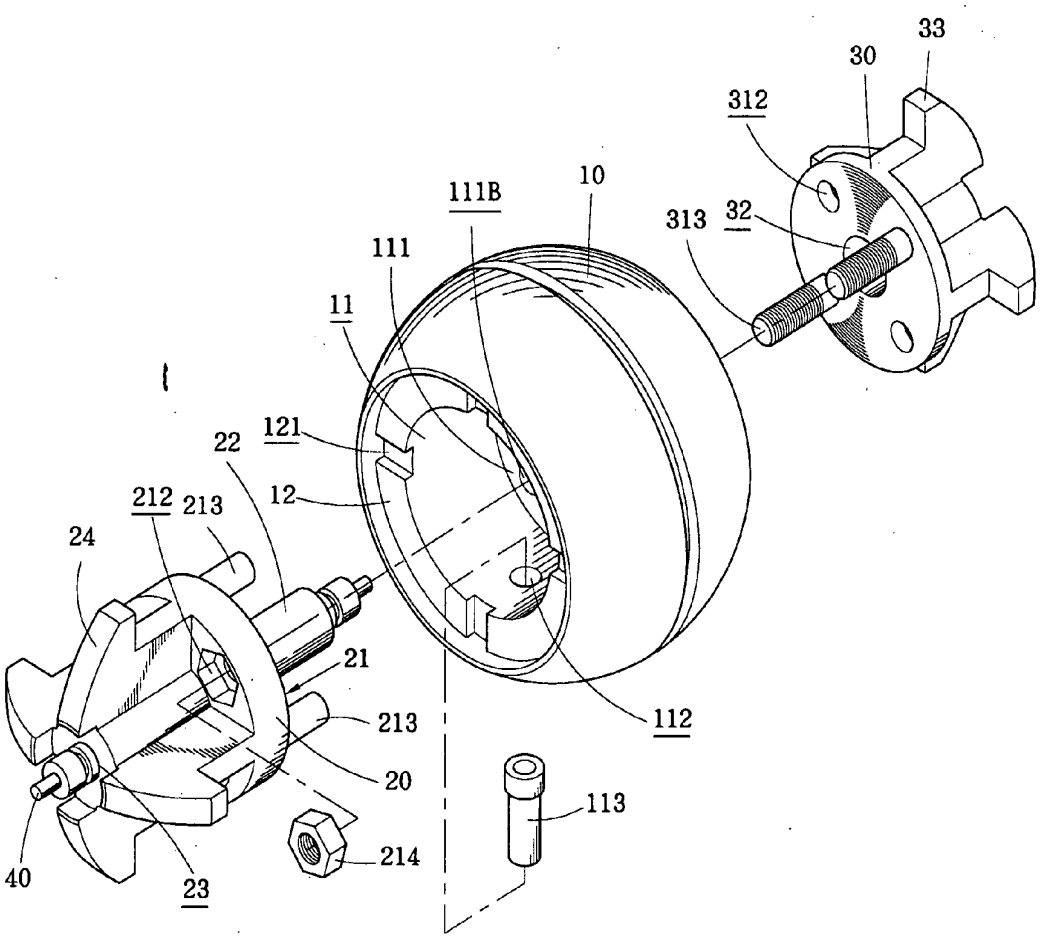

33
30
312
10
111B
313
32
111
11
121
22
12
212
213
24
21
213
112
20
113
214
40
23

FIG.5

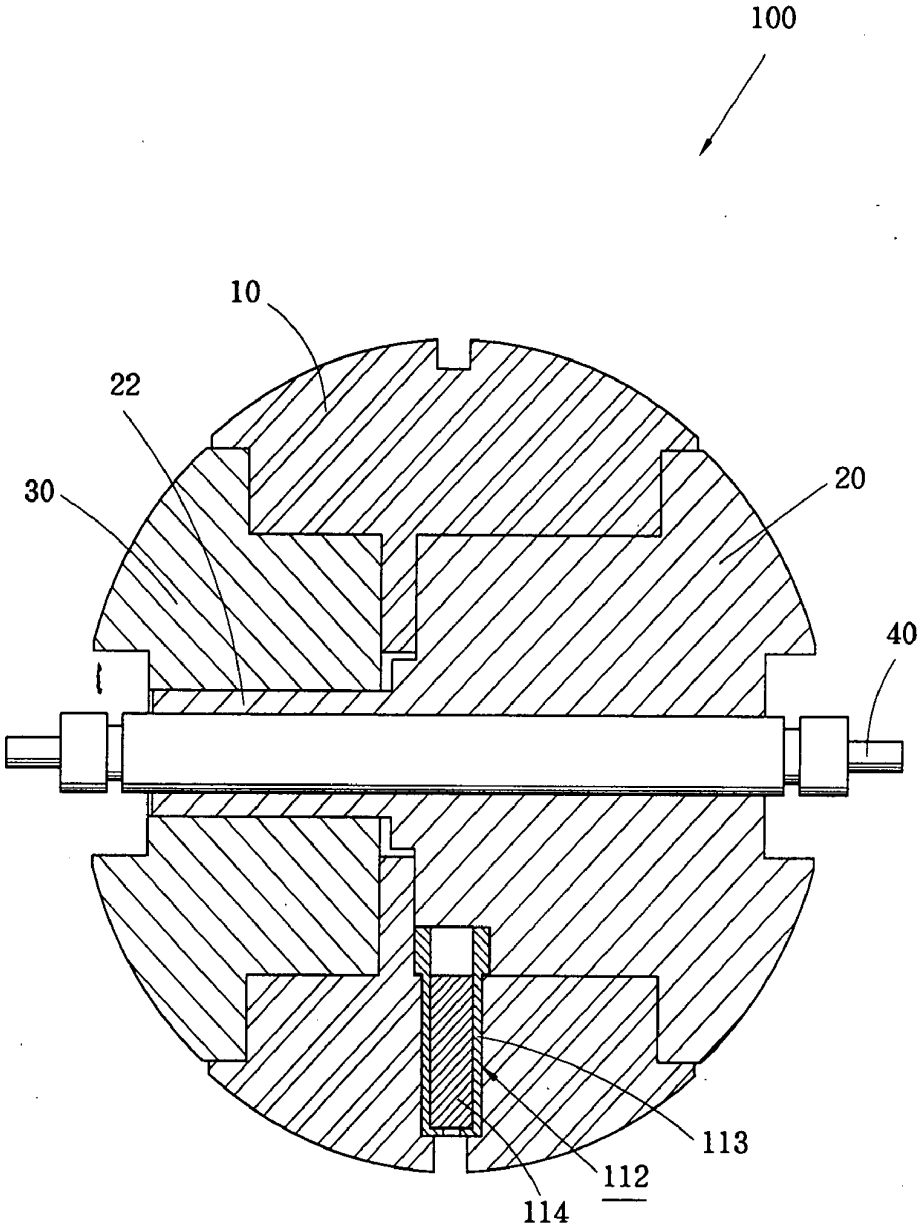


FIG.6

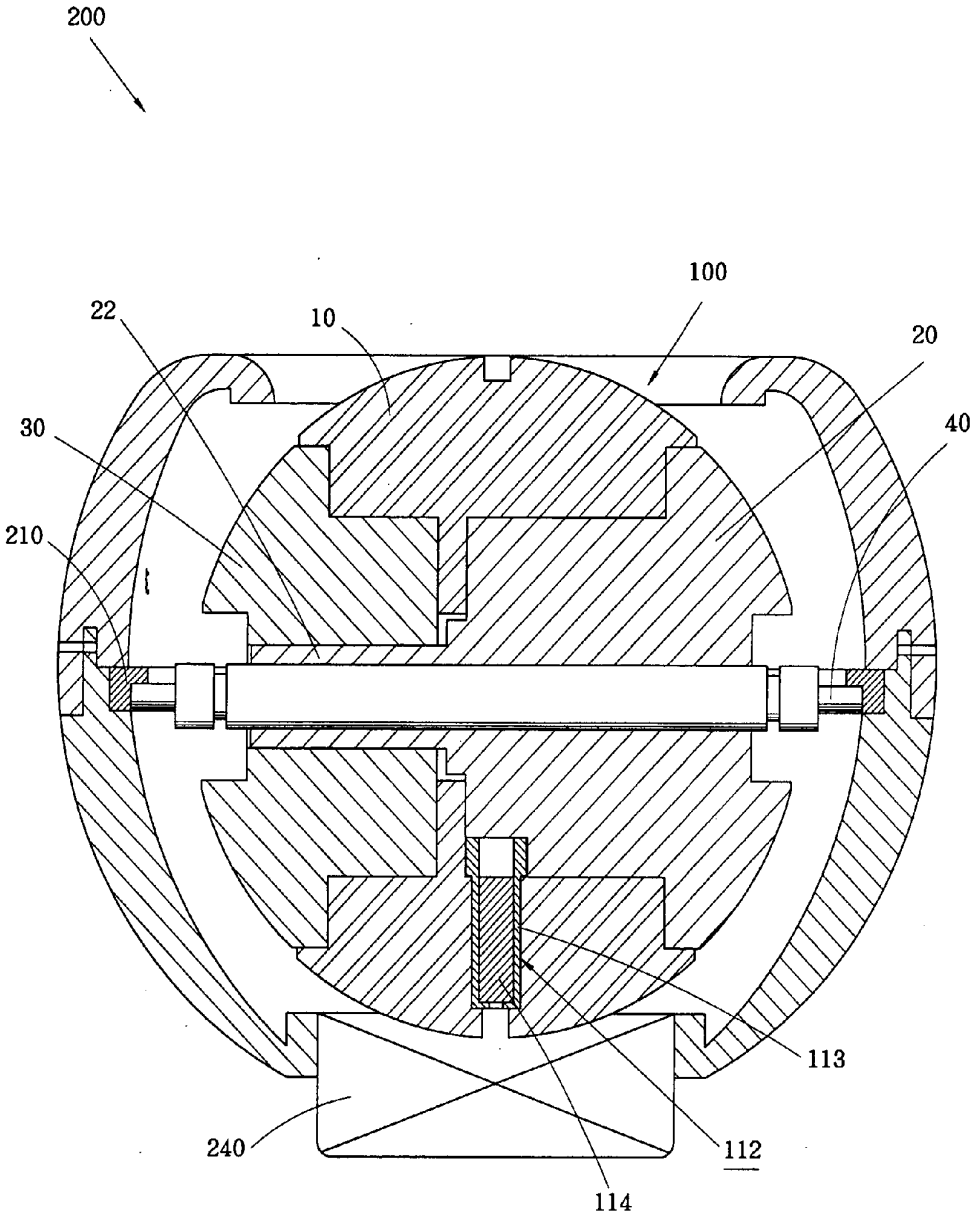


FIG.7

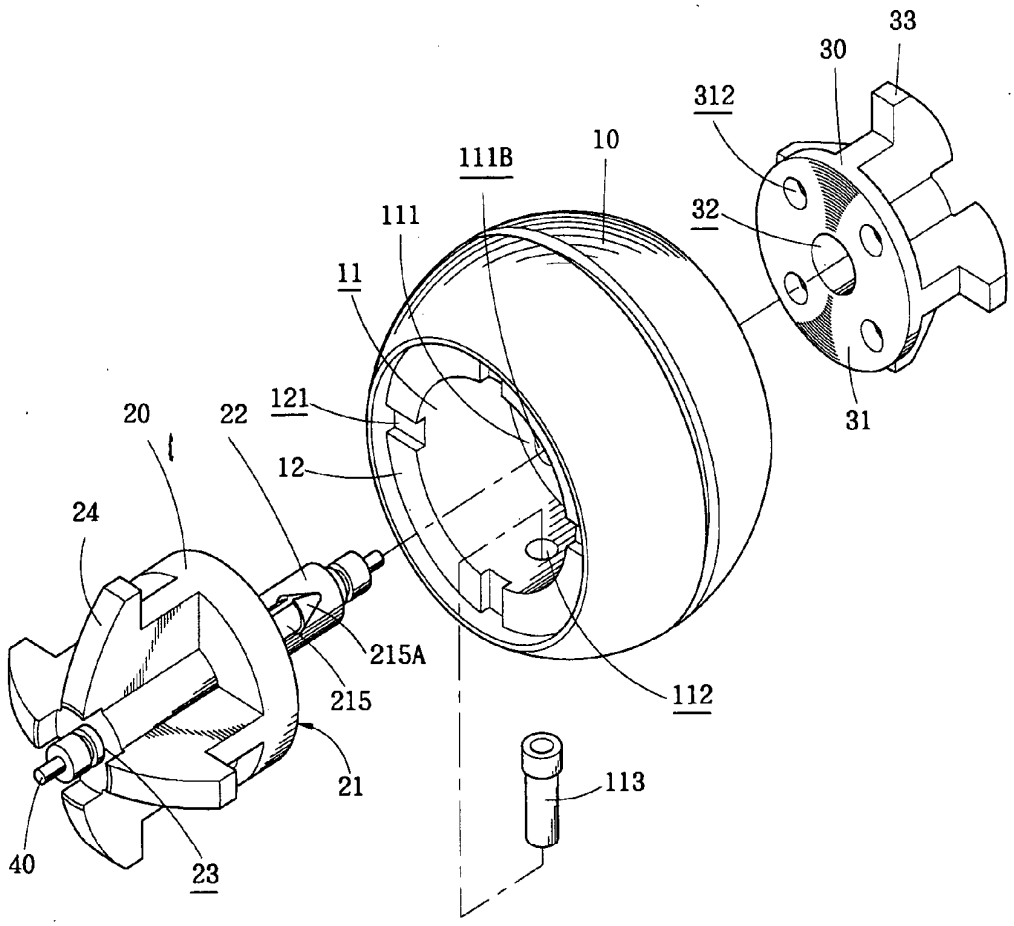

33
30
312
10
111B
32
111
11
121
20
22
12
24
215A
215
112
21
113
40
23
31

FIG.8

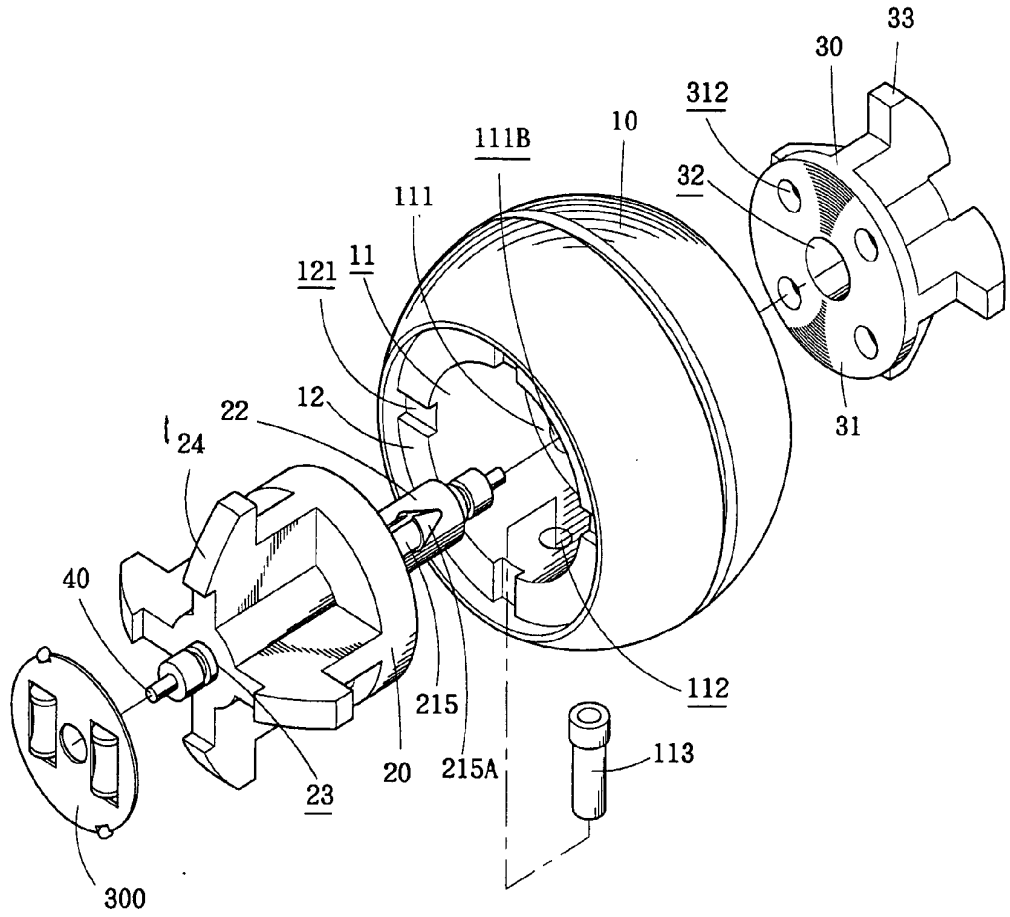

33
30
312
10
111B
32
111
121
11
12
22
24
40
31
112
215
20
215A
113
23
300

FIG.9

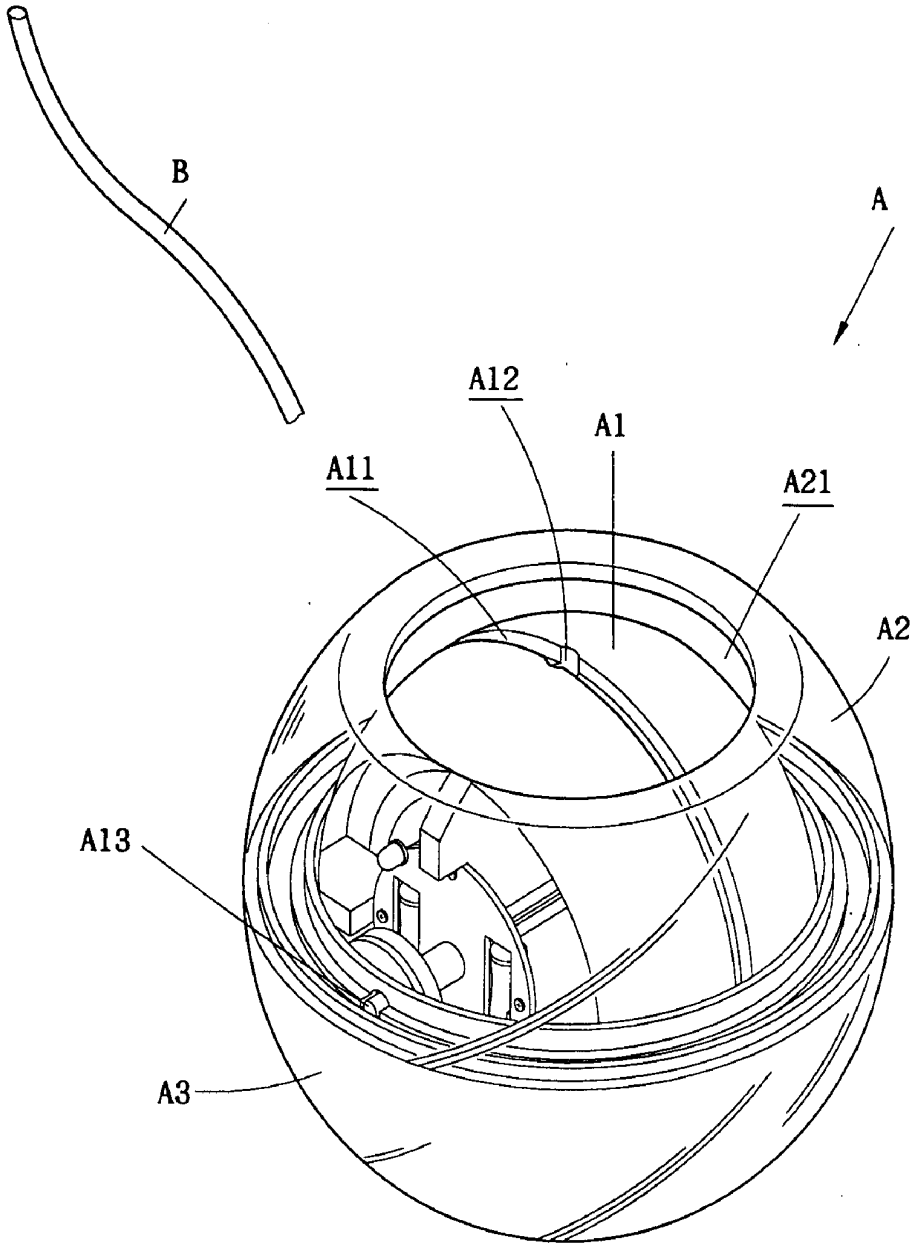


FIG.10

ROTOR OF WRIST EXERCISER

BACKGROUND OF THE INVENTION

[0001] 1. Field of the Invention

[0002] The present invention generally relates to a wrist exerciser that is held by a palm of a user and having an internal rotor that is caused to rotate by the user exercising his or her wrist muscles, and in particular to a wrist exerciser having a rotor structure that allows for exchange with other rotors having different weights.

[0003] 2. The Related Art

[0004] Wrist exercisers are widely known in exercising and training wrist-related muscles, especially for rehabilitation and therapy purposes. An example of the wrist exercisers is illustrated in U.S. Pat. No. 5,800,311, which provides a device that allows a user to exercise his or her wrist by simply rotating the wrist exerciser with the wrist.

[0005] **FIG. 10** of the attached drawings shows a conventional wrist exerciser, which is designated with reference character A, comprising a rotor **A1** encased in a spherical casing constituted by upper and lower hemi-spherical casing members **A2**, **A3**. A circumferential groove **A11** is defined around the rotor **A1**. A hole **A12** is defined in the rotor **A1** inside the groove **A11**. The upper casing member **A2** defines an opening **A21** substantially corresponding in position to the groove **A11** for the extension of a rope B. The rope B is wound around the rotor **A1** by being received in and extending along the groove **A11**. When the rope B is quickly withdrawn out of the rotor **A1**, the friction between the rope B and the rotor **A1** causes the rotor **A1** to rotate inside the casing.

[0006] In order to maintain proper rotation and induce force on the wrist of the user, the rotor **A1** must be of a substantial weight. This is usually done by embedding a metal block or metal plate inside the rotor **A1**, which complicates the manufacturing process of the rotor **A1** and increases manufacturing costs. In addition, such a rotor **A1** has a fixed weight that cannot be readily changed to accommodate players of different strength. For example, an adult and a child may require rotors of different weight in order to avoid under-training or over-training.

[0007] Other known techniques provide rotors made by metal casting. To provide rotors of different weights, different molds are required. This apparently increases the manufacturing costs of the wriest exerciser. In addition, due to the conductivity of the metal rotors, the metal rotors do not allow directly mounting illuminating electronics that gives off light when rotating. Further, adding sensor for counting the turns of rotation to the metal rotors raises another problems for additional machining is needed.

[0008] Thus, it is desired to provide a wrist exerciser having a rotor that overcomes the above deficiencies of the conventional wrist exercisers.

SUMMARY OF THE INVENTION

[0009] Thus, a primary objective of the present invention is to provide a wrist exerciser comprising a rotor that is constituted by a plurality of separable parts whereby by replacing the parts with counterparts of different weights, the wrist exerciser may accommodate rotors of different weights for different users.

[0010] Another objective of the present invention is to provide a wrist exerciser comprising a rotor made of insulation materials whereby illuminating/sounding electronics may be directly attached thereto for giving off light and/or sound during the rotation of the rotor.

[0011] To achieve the above objectives, in accordance with the present invention, there is provided a rotor for a wrist exerciser. The rotor comprises a spherical body rotatably received in a casing of the wrist exerciser. The rotor body defines a bore in which an inner flange is formed. First and second weight members are received in the bore on opposite sides of the flange. The weight members have inner end portions releasably attached to opposite surfaces of the flange. Through holes are defined in the first and second weight members to receive an axle of which ends project beyond opposite ends of the body to rotatably engage a support ring of the casing.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The present invention will be apparent to those skilled in the art by reading the following description of preferred embodiments thereof, with reference to the attached drawings, in which:

[0013] **FIG. 1** is a perspective view of a rotor of a wrist exerciser constructed in accordance with a first embodiment of the present invention;

[0014] **FIG. 2** is an exploded view of the rotor of the present invention;

[0015] **FIG. 3** is a cross-sectional view of the rotor of the present invention;

[0016] **FIG. 4** is an end view of a body of the rotor of the present invention;

[0017] **FIG. 5** is an exploded view of a rotor constructed in accordance with a second embodiment of the present invention;

[0018] **FIG. 6** is a cross-sectional view of the rotor of the second embodiment in accordance with the present invention;

[0019] **FIG. 7** is a cross-sectional view of a wrist exerciser in which the rotor of the second embodiment of the present invention is incorporated;

[0020] **FIG. 8** is an exploded view of a rotor constructed in accordance with a third embodiment of the present invention;

[0021] **FIG. 9** is an exploded view of a rotor constructed in accordance with a fourth embodiment of the present invention; and

[0022] **FIG. 10** is a perspective view showing a conventional wrist exerciser.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0023] With reference to the drawings and in particular to **FIGS. 1-4**, a rotor constructed in accordance with the present invention, generally designated with reference numeral **100**, is to be incorporated in a wrist exerciser **200** (see **FIG. 7**) for rotation therein when the wrist exerciser **200** is operated by a user (not shown). The rotor **100**

comprises a spherical body **10** in which a bore **11** is defined. Removably fixed inside the bore **11** are first and second weight members **20, 30**. An axle **40** extends through both the weight members **20, 30** and has ends projecting beyond opposite ends of the body **10** for rotatably engaging a support ring **210** of the wrist exerciser **200** (**FIG. 7**).

[**0024**] An inner flange **111** is formed inside the bore **11** and extends along an inner circumference of the bore **11**. Releasable securing means is provided between the flange **111** and the weight members **20, 30** to fix the weight members **20, 30** inside the bore **11**. The securing means comprises first parts **111**A that are mounted to opposite surfaces of the inner flange **111** and second parts **211, 311** respectively formed on the weight members **20, 30**. The first parts **111**A are engageable with the second parts **211, 311** of the first and second weight members **20, 30** and thus securing the weight members **20, 30** inside the bore **11** of the body **10**. Examples of the securing means include Velcro fastener and adhesive tapes (especially double-sided adhesive tapes).

[**0025**] The first and second weight members **20, 30**, each having a predetermined weight, are sized to fit, preferably snugly, in the bore **11** of the body **10** from opposite ends of the body **10** and thus located on opposite sides of the flange **111**. The first and second weight members **20, 30** each have an inner end portion **21, 31** forming a surface opposing the flange **111**. The second parts **211, 311** of the securing means are provided on the surfaces of the end portions **21, 31** in correspondence to the first parts **111**A of the securing means. Thus, once the first and second weight members **20, 30** are put into the bore **11** of the body **10** with the second parts **211, 311** of the securing means engaging the first parts **111**A, the first and second weight members **20, 30** are fixed inside the bore **11**.

[**0026**] Each of the first and second weight members **20, 30** also has an outer end portion forming sideway pawls or projections **24, 33** that extend in radial directions and are receivable inside recesses **121** defined in opposite ends of a side wall **12** of the body **10** for properly positioning the first and second weight members **20, 30** inside the bore **11** of the body **10**.

[**0027**] The first weight member **20** defines a first through hole **23** through which the axle **40** extends. Preferably, a cylindrical projection **22** extends from the inner end portion **21** of the first weight member **20** toward the second weight member **30**. The hole **23** extends completely through the cylindrical projection **22**. The second weight member **30** forms a through holes **32** axially aligning with and receiving the cylindrical projection **22** thereby allowing the axle **40** to extend through the second weight member **30**. However, it is apparent to those having ordinary skills to omit the cylindrical projection **22** and directly fit the axle **40** into the hole **32** of the second weight member **30** (with the dimension of the axle **40** modified to snugly fit in the hole **32**). The axle **40** is of such a length that opposite ends of the axle **40** extend beyond the opposite ends of the body **10**.

[**0028**] By means of the releasable engagement between the first parts **111**A and the second parts **211, 311** of the securing means, the first and second weight members **21, 31** can be removed from the body **10** for replacement or exchange with a counterpart having a different weight. This allows for change of the overall weight of the rotor **100**.

[**0029**] Also referring to **FIGS. 5 and 6**, a rotor constructed in accordance with a second embodiment of the present invention, which is also designated with reference numeral **100**, is shown. It is noted that to simplify the description, identical parts of the first and second embodiments of the rotor bear the same reference numerals. The rotor **100** comprises a spherical body **10** defining a bore **11**. A radially extending hole **112** is defined in the body **10** and in communication with the bore **11**. A cylindrical plug **113** is fit in the hole **112**. To prevent the plug **113** from getting off the hole **112**, an inner end of the plug **113** is expanded. A magnet **114** is received and fixed in the plug **113**, which will be further described.

[**0030**] An inner flange **111** is formed in the bore **11** and extends along an inner circumference of the bore **11**. A plurality of holes **111**B is defined in the flange **111**. First and second weight members **20, 30** are received in the bore **11** and fixed on opposite sides of the flange **111**. The first and second weight members **20, 30** each have an inner end portion **21, 31**. Through holes **212** are defined in the end portion **21** of the first weight member **20**. Each hole **212** receives and fixes a nut or an inner-threaded member **214**. Also, positioning pins **213** extend from a surface of the end portion **21** in a direction toward the second weight member **30**. The holes **212** and the pins **213** are located in correspondence to the holes **111**B defined in the flange **111**.

[**0031**] The inner end portion **31** of the second weight member **30** also defines through holes **312**, which correspond to the holes **212** and the pins **213** of the first weight member **20**. In fitting the first and second weight members **20, 30** in the bore **11** of the body **10**, the pins **213** of the first weight members **20** extend through corresponding holes **111**B of the flange **111** and the corresponding holes **312** of the second weight member **30** for positioning the first and second weight members **20, 30** in the bore **11**. Bolts **313** extend through the remaining ones of the holes **312** of the second weight member **30** and engage the nut **214** that are fixed in the holes **212** of the first weight member **20** to releasably fix the first and second weight members **20, 30** in the bore **11**.

[**0032**] The first weight member **20** forms a cylindrical projection **22** and a hole **23** is defined through the first weight member **20** and the projection **22** to receive an axle **40** therein. The second weight member **30** also defines a through hole **32** to receive the projection **22** of the first weight member **20** whereby the axle **40** extends beyond opposite ends of the body **10**.

[**0033**] By loosening the bolt-nut pairs **313, 214**, the first and second weight members **20, 30** can be removed from the bore **11** and replacement or exchange with counterparts having different weights can be performed readily.

[**0034**] Also referring to **FIG. 7**, the rotor **100** of the present invention, both the first and second embodiments, is rotatably received in a casing of a wrist exerciser **200**. The casing is comprised of upper and lower casing members **230, 220** between which a support ring **210** is interposed and fixed. The ends of the axle **40** of the rotor **100** are rotatably supported by the support ring **210** for rotation inside the casing. A magnetism-based counter **240** is attached to a lower portion of the lower casing member **220** at a position corresponding to the plug **113** for magnetically interaction with the magnet **114** whereby the number of turns of the rotor **100** can be counted.

[**0035**] Also referring to **FIG. 8**, a third embodiment of the rotor in accordance with the present invention, also designated with reference numeral **100**, is shown. The rotor of the

third embodiment is similar to that of the second embodiment with the bolt-nut pair of the rotor of the second embodiment replaced by snap-on fasteners. The inner end portion **21** of the first weight member **20** no longer defines through holes to receive and fix nuts and the positioning pins are also omitted. Instead, snap-on fasteners **215** extend from the surface of the end portion **21** of the first weight member **20** in a direction toward the second weight member **30**. Each snap-on fastener **215** has an expanded, conic end in which at least one diametric slit (not labeled) defined to allow for resilient deformation of the expanded end. Corresponding to each snap-on fastener **215**, a hole **312** is defined in the inner end portion **31** of the second weight member **30**. The hole **312** is of such a size to receive the conic end of the corresponding fastener **215** by resiliently shrinking the conic end. The resiliency of the conic end resumes the original shape of the conic end thereby engaging the hole **312**. This fixes the first and second weight members **20**, **30** in the bore **11** of the body **10**. By inward deforming the conic ends of the fasteners **215**, the fasteners **215** are allowed to disengage from the holes **312** thereby separating the first and second weight members **20**, **30** from each other and from the body **10**.

[**0036**] Also referring to **FIG. 9**, a fourth embodiment of the rotor in accordance with the present invention, also designated with reference numeral **100**, is shown. The fourth embodiment is a modification of the third embodiment in such a way that the first and second weight members **20**, **30** of the rotor **100** are made of insulation materials, such as plastics. Electronics are directly mounted to one of the weight members **20**, **30** for giving off light and/or sound during the rotation of the rotor **100**. In the embodiment, the electronics are embodied as a circuit board **300** that is fixed between the pawls **24** of the first weight member **20**. The circuit board **300** comprises an illuminating circuit that can be any known circuit in the art. Thus, when the rotor **100** rotates inside the casing of the wrist exerciser, light is emitted from lighting elements, such as light-emitting diodes, comprised of the illuminating circuit. If desired, sound may be properly given off by incorporating sound-generating elements in the circuit board **300**.

[**0037**] The electronics may be selectively mounted to either one of the weight members **20**, **30**. In the embodiment illustrated in **FIG. 9**, the circuit board comprising the electronics is directly mounted to the first weight member **20**, but it is apparent to mount the circuit board to the second weight member **30** and still having the lighting and sounding effect.

[**0038**] Although the present invention has been described with reference to the preferred embodiments thereof, it is apparent to those skilled in the art that a variety of modifications and changes may be made without departing from the scope of the present invention which is intended to be defined by the appended claims.

What is claimed is:

1. A rotor adapted to be rotatably received in a casing to form a wriest exerciser, the rotor comprising:

a spherical body defining a bore having an inner circumference along which an inner flange extends, the flange having first and second surfaces;

a first weight member received in the bore and having an inner end portion releasably attached to the first surface of the flange, a first through hole defined in the first weight member;

a second weight member received in the bore and having an inner end portion releasably attached to the second surface of the flange, a second through hole defined in the second weight member; and

an axle extending through the first and second through holes of the first and second weight members and having ends extending beyond opposite ends of the body.

2. The rotor as claimed in claim 1, wherein a through hole is defined in the body.

3. The rotor as claimed in claim 2 further comprising a plug received in the through hole of the body.

4. The rotor as claimed in claim 3, wherein the plug receives and fixes a magnet element therein.

5. The rotor as claimed in claim 1, wherein the body has a sidewall having opposite ends in which recesses are defined.

6. The rotor as claimed in claim 1, wherein through holes are defined in the flange of the body.

7. The rotor as claimed in claim 1 further comprising securing means mounted to the first and second surfaces of the flange.

8. The rotor as claimed in claim 7, wherein the securing means comprises Velcro pads and adhesive tapes.

9. The rotor as claimed in claim 1, wherein the first weight member comprises counterpart securing means.

10. The rotor as claimed in claim 9, wherein the counterpart securing means comprises Velcro pads and adhesive tapes.

11. The rotor as claimed in claim 2, wherein the first weight member comprises projection extending from the inner end portion and fitting into the second through hole of the second weight member.

12. The rotor as claimed in claim 1, wherein the inner end portion of the first weight member comprises positioning pins and defines through holes.

13. The rotor as claimed in claim 12, wherein each through hole defined in the inner end portion of the first weight member receives and fixes an inner-threaded member.

14. The rotor as claimed in claim 1, wherein the inner end portion of the first weight member comprises snap-on fasteners.

15. The rotor as claimed in claim 14, wherein each snap-on fastener has an expanded conic end that is deformable.

16. The rotor as claimed in claim 1, wherein the first weight member has an outer end portion forming pawls.

17. The rotor as claimed in claim 16 further comprising a circuit board received and fixed between the pawls.

18. The rotor as claimed in claim 1, wherein the second weight member comprises counterpart securing means.

19. The rotor as claimed in claim 18, wherein the counterpart securing means comprises Velcro pads and adhesive tapes.

20. The rotor as claimed in claim 1, wherein the inner end portion of the second weight member defines through holes.

21. The rotor as claimed in claim 20 further comprising bolts extending through the through holes.

22. The rotor as claimed in claim 1, wherein the second weight member has an outer end portion forming pawls.

* * * * *