Jan. 28, 1969 A. B. DODSON 3,423,872

TRANSPARENT SPHERE WITH ROTATING BALLS THEREIN

Filed Sept. 14, 1964

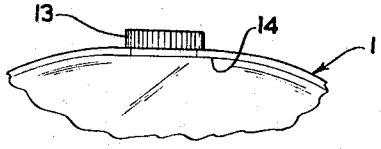

FIG. 3.

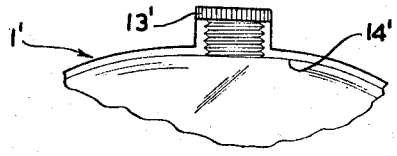

FIG. 4.

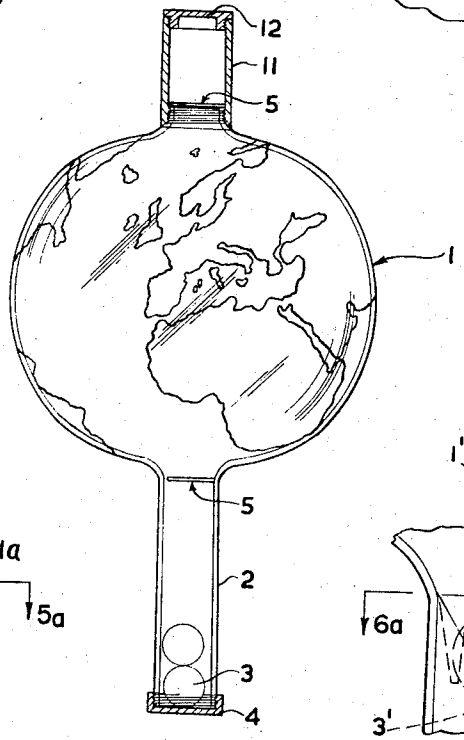

FIG. 1.

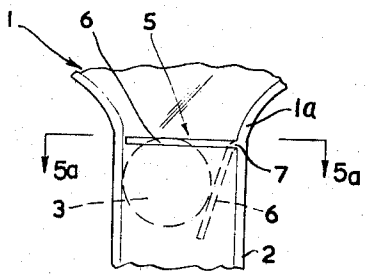

FIG. 5.

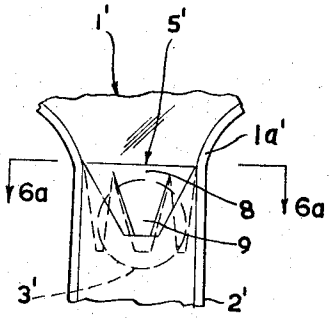

FIG. 6.

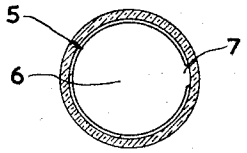

FIG. 5a

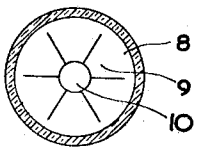

FIG. 6a

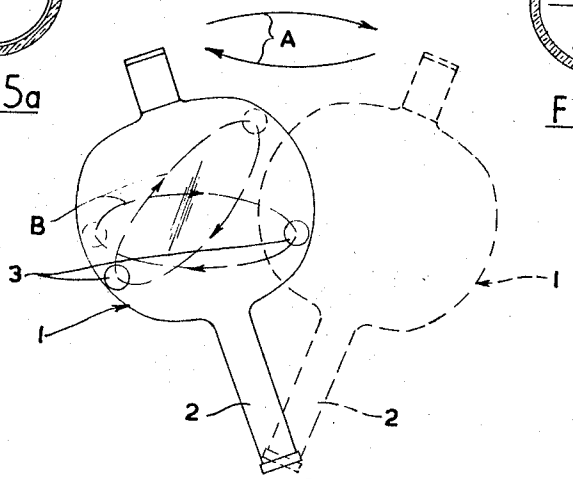

FIG. 2.

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TRANSPARENT SPHERE WITH ROTATING BALLS THEREIN

Ashford B. Dodson, 4 Brook St.,
Nelson, New Zealand

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This invention relates to a device intended for educational or recreational and/or physical culture use and one object of this invention is to provide such a device which is of a relatively simple construction and which may be manufactured and marketed at a relatively low cost, with such device being suitable for use by children and/or adults.

The device is intended to be held in the hand and manipulated by movements of the wrist and/or arms, in combination with body and other limb movements if desired, so as to effect movement of movable objects within the device in a required manner, with such movement requiring an element of skill to attain and maintain, thus providing a device which can provide endless amusement when used for recreational purposes and an incentive to exercise when used for physical culture purposes. In modified forms, the device can also be used as an educational aid or scientific demonstration device.

According to the present invention, the device comprises a hollow body of transparent plastic material and if substantially oblate spheroidal formation, a handle protruding outwardly from one polar region of the body at least one ball or like object within the hollow body, a ball receiving means outside said hollow body, a passage between one polar region of said hollow body and said ball receiving means, and trap means in said passage for passing the ball from said body into said ball receiving means or from said ball receiving means into said body.

The invention will now be described with reference to the accompanying drawings in which:

FIGURE 1 is a view in elevation of one form of the device wherein two balls are contained within the handle, the device illustrated being substantially transparent or semi-transparent and provided with a closure cap (shown in cross section) for the handle and a removable trap unit (also shown in cross section) at the polar region remote from the handle.

FIGURE 2 is a diagrammatic view illustrating how the device may be manipulated and further indicates the orbital movement of the balls with the hollow body.

FIGURE 3 is a fragmentary view of the polar region of the hollow body, remote from the handle thereof, in an arrangement having only one trap means.

FIGURE 4 is a fragmentary view of the polar region of the hollow body, remote from the handle thereof, in an alternative arrangement having only one trap means.

FIG. 5 is a fragmentary view in elevation illustrating one form of trap means.

FIG. 5A is a view taken along the line 5*a*—5*a*, the view looking in the direction of the arrows.

FIG. 6 is a fragmentary view in elevation of another form of trap means, and

FIG. 6A is a view taken along the line 6*a*—6*a* of FIG. 6, the view looking in the direction of the arrows.

In a preferred arrangement of the invention, a hollow body generally indicated **1** is constructed from a transparent or semi-transparent plastic material and is of a substantially oblate spheroidal formation, i.e., a spherical formation which is slightly flattened at its poles. A handle **2** which may or may not be transparent protruding outwardly from the hollow body **1** extends from one polar

region thereof and is substantially in line with the axis of symmetry of the hollow body **1**. The handle **2** may be formed integral with and be permanently secured to the hollow body **1** as shown in the drawings, or may be detachable therefrom and preferably the handle **2** has a hollow interior which may contain a ball or balls **3** and the like objects (as indicated in FIGURE 1). Where the handle **2** is permanently attached to the hollow body **1**, the handle **2** may be provided with a removable cap **4** at its outer end to thereby permit removal of the ball or balls **3** from said handle **2**.

The hollow body **1** may be provided with one or two trap means **5**, a trap means **5** being disposed at the pole from which the handle **2** extends and/or a trap means **5** being disposed at the pole remote from the handle **2**. In the arrangements shown in FIGURES 1 and 2 there is a trap means **5** at both poles of the hollow body **1**. The trap means **5** may be of various forms and in one arrangement, illustrated more particularly in FIGURE 5 of the drawings, may each be in the nature of a one way flap valve consisting of a flap **6**, preferably circular, which has a peripheral edge portion **7** hingedly connected to a wall **1***a* of the device at or near the junction of the handle **2** to the hollow body **1** or (in an arrangement not shown) to a suitable base portion which is attached to the wall **1***a*. In FIGURE 5 the dotted outlines indicate a ball **3** passing through the trap means **5** with the flap **6** pivoted downwards about its hingedly connected portion **7**. In another arrangement illustrated in FIGURE 6, the trap means **5'** has a base portion **8** which is connected to or forms part of the wall **1***a'* of the device and from such base portion **8** extend a plurality of flexible fingers **9** which are normally disposed in a conical or conoidal formation, the apex thereof being directed away from the oblate spheroidal part of the hollow body **1'** to provide an arrangement whereby a ball **3'** can pass through a trap opening **10** in one direction only. In FIGURE 6, the dotted outlines indicate the fingers **9** opened out allowing a ball **3'** to pass through the trap opening **10**. In still further arrangements not illustrated, spring or trigger operated one-way traps may be used.

As previously stated, and as shown in FIGURE 1 a trap means **5** can be disposed in the polar region remote from the handle **2** whereby a ball or balls **3** can be inserted into the hollow body **1** and, in the arrangement shown in FIGURE 1, a detachable trap unit **11** is provided. The unit **11** having the trap means **5** secured therein includes a removable end cap or plug **12**, and the dimensions of the unit **11** are such that at least one of the balls **3** can be received therein. In alternative arrangements, two variations of which are illustrated in FIGURES 3 and 4, a removable cap or plug **13** and an opening to the hollow body **1** are provided at this point for the purpose stated. In FIGURE 3, the cap or plug **13** is a close or snap fit in the opening whereas the cap or plug **13'** in FIGURE 4 is screw threaded and the opening is correspondingly screw threaded to receive such cap or plug **13'**. Both types of cap or plug **13**, **13'** are arranged to provide continuity of inner surface **14**, **14'** of the hollow body **1**, **1'** in that polar region. The trap means **5** at the polar region from which the handle **2** extends interrupts a communicating passage between the interior of the hollow body **1** and the interior of the handle **2** and the arrangement is such that a ball or balls **3** can be passed from the interior of the handle **2** to the interior of the hollow body **1** and/or conversely passed from the interior of the hollow body to the interior of the handle. In the latter case, it is preferred that the communicating passage be funnelled as shown in the drawings so that when the hollow body **1** is held in an upright position with the handle **2** disposed downwardly then a ball **3** contained within the hollow body **1** will have a tendency to be funnelled on to and through the trap

means 5 and into the hollow handle 2. Similarly, where a trap means 5 and trap unit 11 is provided at the polar region of the hollow body 1 remote from the handle 2, as shown in FIGURE 1, then the portion of the hollow body 1 adjacent such trap means 5 and trap unit 11 is preferably funnelled so that when the hollow body 1 is held in an inverted position with the handle 2 directed upwardly then a ball 3 contained within the hollow body 1 will have a tendency to be funnelled onto and through the trap means 5 and into the trap unit 11.

It will be appreciated that such funnelling, where used, should not impede the smooth motion of a ball 3 spiralling into or on to a trap means 5 and should not therefore protrude into the otherwise natural contour of the inner surface 14 of the hollow body 1. Also the design of the funneling, and in particularly the mouth thereof, is preferably such that trapping of a ball 3 is positive and without "bouncing" while at the same time the ball or balls 3 is or are allowed to orbit over a wide range of paths without distortion or deflection from such paths.

In using the present device, the device is held by the handle 2 in the hand of a user and a ball or balls 3 either passed directly from the handle 2 into the hollow body 1 (where a trap means 5 is only provided at the handle 2 of the hollow body 1) or removed from the handle 2 and passed into the hollow body 1 by way of the trap means 5 or opening (as the case may be) at the pole remote from the handle 2. The device is held with its polar axis inclined at an angle to the vertical as illustrated in FIGURE 2 and by wrist, hand or arm movement, the device is then moved rotatively as indicated by the dotted outline of the device and arrows A until the ball or balls 3 within the hollow body 1 commence movement in orbital paths such as those indicated by the letter B within the hollow body 1 and on the inner surface thereof, with such orbital paths tending to be confined at or near the equatorial area of the oblate spheroidal hollow body 1. The object is to continue rotational movement of the device and thus keep the ball or balls 3 moving in their orbital paths and it will be seen that when the device is thus used the ball or balls 3 may be likened to satellites in orbit.

The arrangement and construction of each trap means 5 is such that the trap means 5 can be opened by the weight of a ball 3 so that a trapping hazard will exist if the device is incorrectly manipulated. Also, when the device is no longer required to be manipulated and used, and if so desired, it can be held in an upright position (either with the handle 2 disposed downwardly or the handle 2 disposed upwardly depending on the position of the trap means 5 which is arranged to receive the ball or balls 3 from the interior of the hollow body 1) so as to allow the ball or balls 3 to pass outwardly from the oblate spheroidal hollow body 1 through the corresponding trap means 5 (which is preferably the trap means 5 disposed at, and communicating with, the handle 2). The ball or balls 3 can, if so desired be stored in the handle 2 when the device is no longer in use.

As previously stated, the wall of the hollow body 1 is preferably transparent or semi-transparent so that the ball or balls therein can be easily seen and such ball or balls are also preferably colored or have luminance to add to the effect when the device is in use and so as to be distinctly discernable through the wall of the said hollow body 1.

Furthermore, where the device is to be put to use for educational or recreational purposes, the hollow body 1 is preferably decorated or has some ornamentation and such ornamentation preferably includes a simulation of the planet earth's land masses and continental shapes, as shown in FIGURE 1 of the drawings, so that when the device is manpulated as aforesaid the movement of the ball or balls 3 within the hollow body 1 simulate the movement of a satellite or satellites in orbital paths around the planet earth. The hollow body 1 is assumed to represent a satellite zone or orbital envelope around the planet earth, imagined at the center of symmetry, and the ornamentation is a projection of the surface features of this planet on to the zone or envelope. If so desired, longitudinal and latitudinal markings can be provided in addition to the above ornamentation and/or other markings may be used to facilitate the explanation of scientific phenomena and laws to students.

Thus, by this invention, a user can use and manipulate one or two of the devices of this invention as desired and it will be seen that the user can execute various motions of the body and limbs for recreational and for physical culture purposes, it being envisaged that such motions can be to the accompaniment of music particularly when the device is used for recreational purposes. Alternatively, by various modifications to the basic form of this device, the device can be used as an educational aid or as a scientific demonstration device instead of, or as well as, being usable for recreational and/or physical culture purposes.

What I do claim and desire to obtain by Letters Patent of the United States of America is:

1. A device comprising a hollow body of transparent plastics material and of substantially oblate spheroidal formation, said hollow body having a hollow handle protruding outwardly from one polar region thereof, at least one ball within said hollow body, a passage between the interior of the hollow handle and the interior of the hollow body, and means in said passage for passing a ball only in a direction from said hollow body into said hollow handle.

2. The device as claimed in claim 1 wherein a removable trap unit is provided at the polar region of the hollow body remote from the handle.

3. The device as claimed in claim 1 wherein an opening having a removable closure is provided at the polar region of the hollow body remote from the handle, said closure being adapted to provide for continuity of the inner surface of the hollow body at said polar region.

4. The device as claimed in claim 1 in which said last named means includes a one-way flap valve hingedly connected at a peripheral edge portion thereof to the wall of the passage in proximity to the junction between the hollow handle and the hollow body.

5. The device as claimed in claim 1 in which said last named means includes a base attached to the wall of the passage in proximity to the junction of the hollow handle and the hollow body, said base having a plurality of flexible fingers extending therefrom normally providing a conical formation with the apex thereof being directed away from said hollow body.

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RICHARD C. PINKHAM, *Primary Examiner.*

RICHARD W. DIAZ, JR., *Assistant Examiner.*

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273—111, 113; 35—47