March 17, 1970 R. F. BRYER 3,500,579

RANDOMLY SELF-PROPELLED SPHERICAL TOY

Filed May 10, 1967

FIG. 1

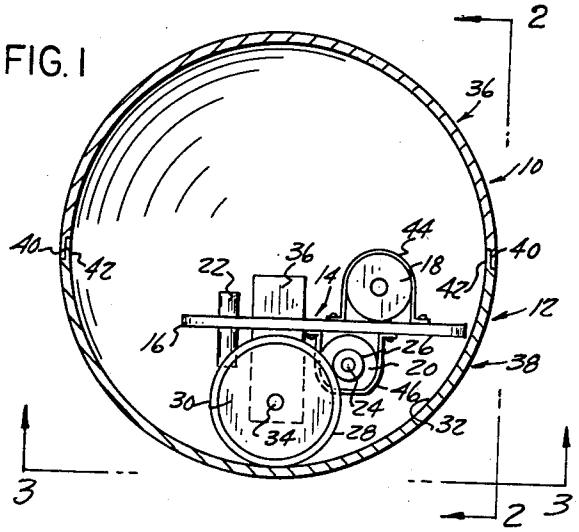


FIG. 3

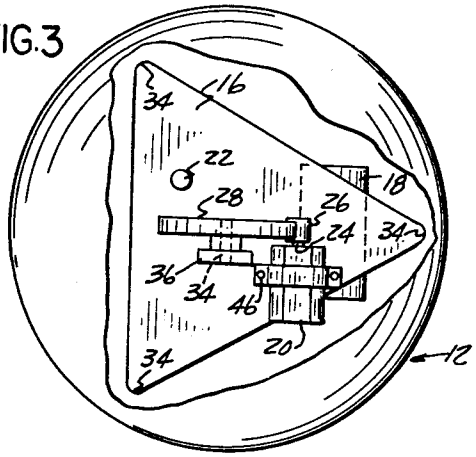


FIG. 2

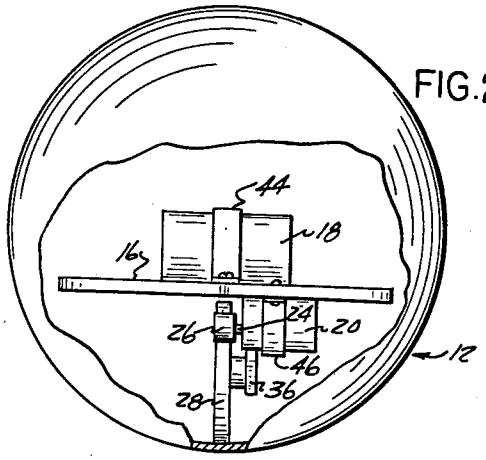


FIG. 4

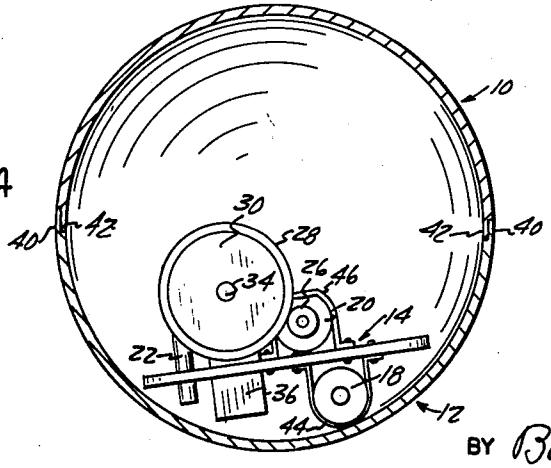
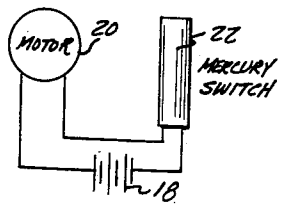


FIG. 5



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RANDOMLY SELF-PROPELLED SPHERICAL TOY

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ABSTRACT OF THE DISCLOSURE

A hollow sphere is randomly self-propelled upon a haphazard path by a self-contained internal driving unit including a friction drive wheel rotated by an electric motor mounted on a supporting platform carrying a battery for energizing the motor. An optional mercury switch on the platform automatically breaks the circuit when the driving unit is turned upside down. The platform and the driving wheel engage the inner wall of the sphere at haphazard and constantly varying locations by being completely independent of connection therewith, resulting in an irregular path of travel which automatically veers away from an object with which it collides.

BACKGROUND OF THE INVENTION

Self-propelled hollow spheres or hollow bodies with internal driving units have been previously known but in each of these known to the present inventor a definite and fixedly-located connection has been established between the body and the driving unit by means of a shaft either journaled in the hollow body wall or drivingly connected thereto, the driving unit being mounted on this shaft, so that the driving engagement continually occurs in the same location or path within the sphere and consequently the path of travel of the sphere along the floor is not random or haphazard. Exemplary of such prior self-propelled hollow bodies are the self-propelled spheres of the patents to McFaul No. 1,263,262 of Apr. 16, 1918, Glos No. 2,939,246 of June 7, 1960, and Easterling No. 2,949,696 and Licitis No. 2,949,697, both of Aug. 23, 1960. A hollow self-propelled barrel similarly driven is shown in Lettieri Patent No. 2,846,814 of Aug. 12, 1958.

SUMMARY OF THE INVENTION

The weight of the driving mechanism acting upon the friction driving wheel creates a driving engagement with the inner wall of the hollow sphere while corners of the platform laterally engage that wall at random locations which rarely repeat themselves so that a highly irregular path of travel is imparted to the sphere. If the sphere collides with an object, it bounces off and veers away because of the automatic change of the point of driving engagement of the driving wheel with the sphere, as well as by the change of orientation of the plane of the driving wheel brought about by the jolt resulting from the collision. Turning the driving unit upside down in the sphere automatically shuts off the motor by shifting a mercury switch to its off position.

In the drawing:

FIGURE 1 is a central vertical section through a randomly self-propelled spherical toy, according to one form of the invention, with the driving unit shown in side elevation;

FIGURE 2 is an end elevation partly broken away, of the hollow sphere and driving unit of FIGURE 1, looking in the direction of the arrows 2—2 therein;

FIGURE 3 is a bottom plan view with the sphere broken away, looking in the direction of the arrows 3—3 in FIGURE 1;

FIGURE 4 is a side elevation with the sphere in vertical section similar to FIGURE 1 but with the driving unit turned upside down to shut off the power; and

FIGURE 5 is a wiring diagram of the driving unit shown in FIGURES 1 to 4 inclusive.

Referring to the drawing in detail, FIGURES 1 to 4 inclusive show a randomly self-propelled spherical toy, generally designated **10**, including a hollow sphere **12** preferably of transparent plastic material within which is a self-contained driving unit **14** having no fixed connection to the hollow sphere **12** but only a random contact and driving engagement therewith. The driving unit **14** consists of a platform or supporting structure **16** upon which is mounted a battery **18**, for purposes of simplification shown as a single dry cell but ordinarily including several such cells in order to obtain adequate voltage for energizing the minature driving motor **20** bolted or otherwise secured to the under side of the platform **16**. Where the motor **20** is of such a voltage that a single dry cell is adequate, such single cell may be used.

The battery **18** is connected to the motor **20** (FIGURE 5) by way of a gravity-responsive switch **22**, such as a mercury switch. This mercury switch, in the right-side-up position of FIGURES 1, 2 and 3 of the driving unit **14**, closes the circuit between the battery **18** and the motor **20** but, when turned upside down by flipping the toy **10** over (FIGURE 4), opens that circuit and automatically shuts off the motor **20**.

The motor **20** has a rotary drive shaft **24** carrying a relatively small diameter friction drive pulley **26** which frictionally engages the resilient rim **28** of a relatively large diameter driving wheel **30** of the driving unit **14**, so as to provide a speed reduction therebetween. The rim **28** is preferably of elastic deformable material, such as natural or synthetic rubber or synthetic plastic, and is pressed into frictional engagement with the inner surface or wall **32** of the hollow sphere **12** by the force of gravity resulting from the weight of the driving unit **14**. The driving wheel **30** is mounted on an axle **34** which in turn is journaled in a bearing block **36** secured to the platform **16**. The hollow sphere **12** is preferably made up of two separable hemispheres **36** and **38** with overlapping flanges **40** and **42** to enable replacement of the battery **18** or for maintenance or repairs.

The platform **16** is preferably of approximately equilateral triangular outline, with corners **34** shown for simplification as merely rounded to prevent binding and facilitate their sliding engagement with the inner surface **32** of the hollow sphere **12**. As commercially manufactured, corners **34** would preferably be provided with anti-friction ball contacts or the like to further facilitate the sliding engagement and reduce friction. It will of course be understood that if the rim **28** of the driving wheel **30** is to make effective driving engagement with the internal spherical surface **32**, the platform **16** must be so shaped and proportioned that only two of the corners **34** engage the surface **32** at any one time in order to give threepoint contact and driving engagement therewith. Engagement of all three corners **34** with the internal spherical surface **32** would lift the driving wheel rim **28** completely out of frictional engagement with the internal surface **32** and would therefore prevent such driving engagement. The battery **18** and motor **20** are secured to the platform **14** by clamps **44** and **46** respectively. Where a second battery **18** (not shown) is added for increased voltage, it is secured to the underside of the platform **14** in the same manner, as was the case with a toy **10** actually constructed and operated according to the present invention.

In the operation of the invention, when the driving unit **14** is right-side-up (FIGURES 1, 2 and 3), the mercury switch **22** is in its closed position, closing the circuit

etween the battery **18** and the motor **20**. The consequent rotation of the motor shaft **24** and drive pulley **26** otates the driving wheel **30** at a reduced speed and this n turn rotates the hollow sphere **32** by the frictional riving engagement of the resilient rim **28** therewith. As the sphere **12** rolls along the floor or other surface, tends to travel in a straight line. When, however, it ollides with an object, the jolt causes wobbling of the riving unit **14** inside the sphere **12** and this in turn shifts he point of engagement and plane of the driving wheel **0** relatively to the previously-engaged path on the inrnal surface **32**. As a result, the sphere **12** pursues an regular path because of the random engagement of the latform **16** and the driving wheel **30** therewith and beause of the lack of any fixedly-located connection there-ith.

If, in the course of its travel, the toy **10** collides with n object, the resilience of the hollow sphere **12** ordiarily causes it to bounce or veer off and the jolt resultng from the collision again shifts the relative positions f the plane of the driving wheel **30** and its previously ngaged path on the internal spherical surface **32**, autoatically causing the toy **10** to go off in a new path of avel. When the operator desires to inactivate the toy **10**, e merely flips it in such a manner as to cause the drivg unit **14** to turn upside down as in FIGURE 4. This ction inverts the mercury switch **22** and consequently ifts it into open circuit, thereby shutting off the flow f current from the battery **18** to the motor **20**. As a sult, the shaft **24** of the motor **20** stops rotating and e toy **10** remains inoperative until the driving unit **14** is rned right-side-up, as in FIGURES 1, 2 and 3. The eight of the parts normally beneath the platform **16**, ch as the motor **20** and wheel **30**, is preferably made reater than that of the battery **18** above the platform **16** as to normally maintain the driving mechanism **14** ght-side-up by placing the center of gravity thereof elow the platform **16**.

It will be evident that the driving wheel **30** may be siliently mounted, as on a spring or springs, so as to ermit all three corners **34** to engage the inner spherical rface **32** of the hollow sphere **12** while maintaining a silient driving engagement between the driving wheel **0** and the spherical surface **32**.

I claim:

1. A randomly self-propelled spherical toy, comrising

a pair of interconnected partially spherical shells forming in assembly a hollow sphere;

and a self-contained battery-powered driving unit

mounted within said hollow sphere free from fixed connection therewith whereby to effect random free-sliding engagement therewith,

said driving unit having a plurality of components including

a supporting structure slidingly engaging said sphere, a driving wheel rotatably mounted on said supporting structure in frictional driving engagement with said sphere,

an electric motor mounted on said supporting structure and drivingly connected to said driving wheel,

and a battery mounted on said supporting structure in circuit with said motor.

2. A randomly self-propelled spherical toy, according to claim **1**, wherein said driving wheel is mounted beneath said supporting structure in frictional driving engagement with a portion of said sphere disposed beneath said supporting structure.

3. A randomly self-propelled spherical toy, according to claim **2**, wherein said driving wheel is disposed in driving engagement with the momentarily-lowermost portion of said sphere.

4. A randomly self-propelled spherical toy, according to claim **1**, wherein said supporting structure has a pair of spaced contact portions which rest against and free-slidingly engage said sphere at a pair of correspondingly-spaced locations on the inner surface thereof.

5. A randomly self-propelled spherical toy, according to claim **1**, wherein said supporting structure includes a generally-horizontal platform and wherein said components are so mounted on said supporting structure that the preponderant weight thereof disposes the center of gravity of said driving unit beneath said platform.

6. A randomly self-prepelled spherical toy, according to claim **5**, wherein said platform is of approximately triangular configuration with sphere-contacting portions disposed momentarily at two of the corners thereof.

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U.S. Cl. X.R.

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