

J. G. AYERS, JR.
MOTOR PROPELLED BALL.
APPLICATION FILED MAR. 3, 1910.

1,033,077.

Patented July 23, 1912.

4 SHEETS-SHEET 1.

Fig. 1.

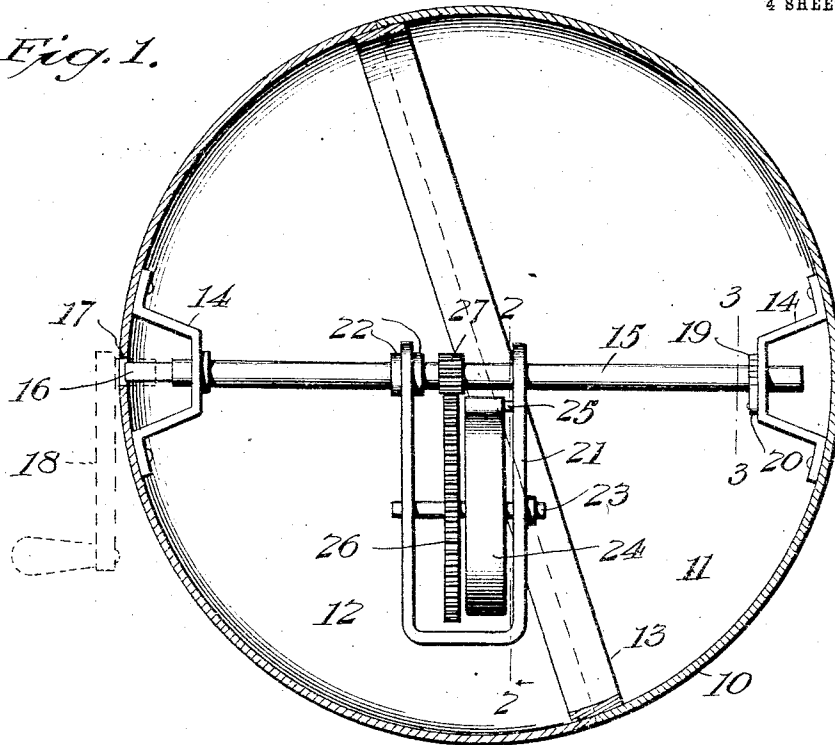


Fig. 2.

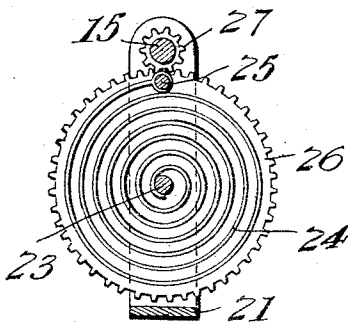
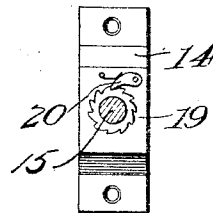


Fig. 3.



Witnesses

T. H. Ketchum
Emory D. Buff

Inventor

Joseph G. Ayers, Jr.

By

S. W. Thompson
his Attorney

J. G. AYERS, JR.
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4 SHEETS—SHEET 2.

Fig. 4.

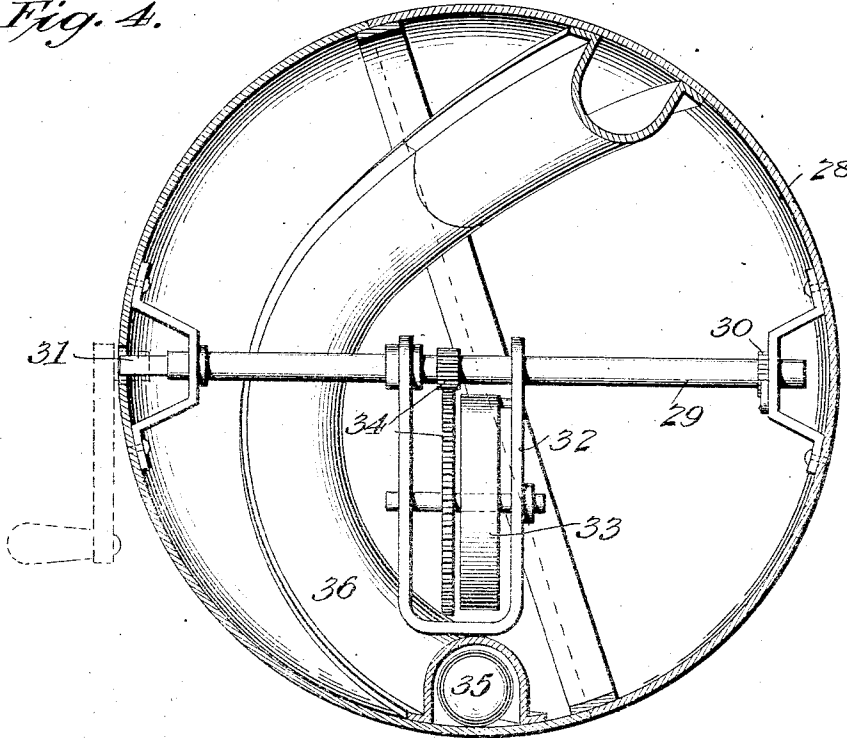
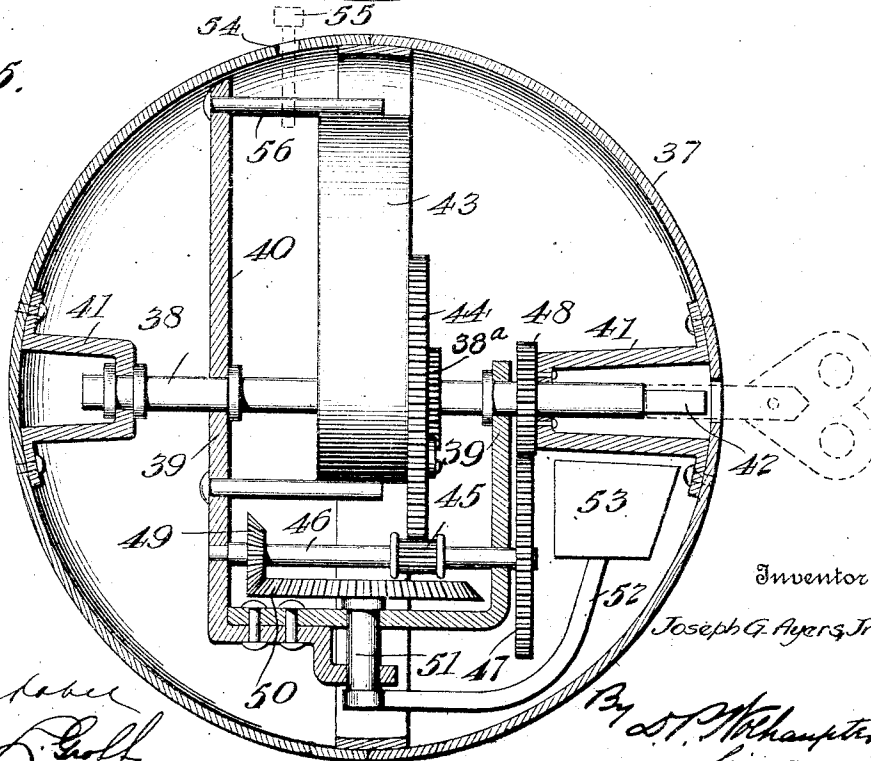


Fig. 5.



Witnesses
T. H. Mochaber
Emory D. Hoff

Inventor
Joseph G. Ayers, Jr.

By S. T. McLaughlin
his Attorney

J. G. AYERS, JR.
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4 SHEETS—SHEET 3.

Fig. 6.

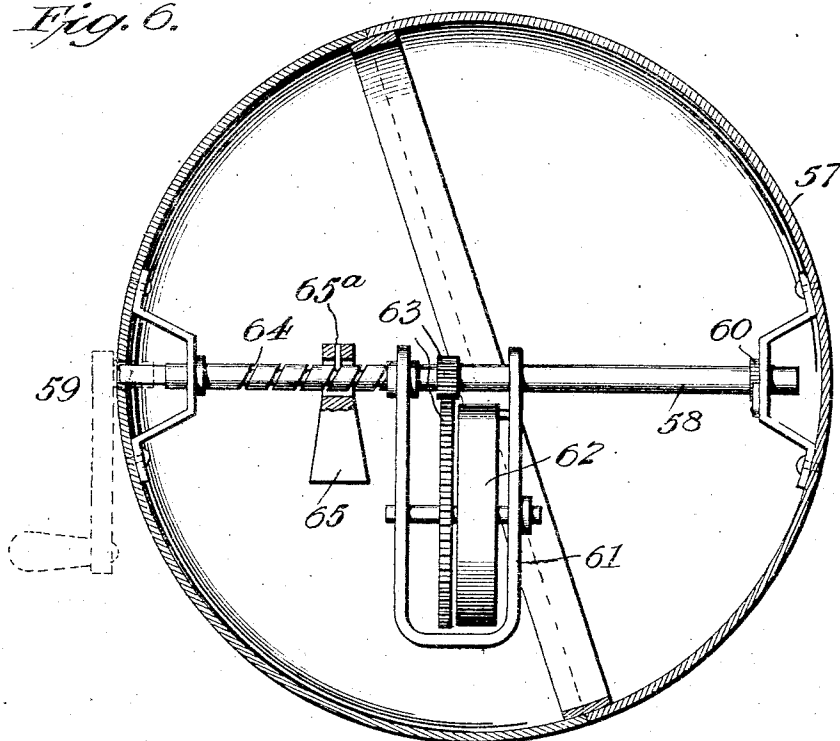
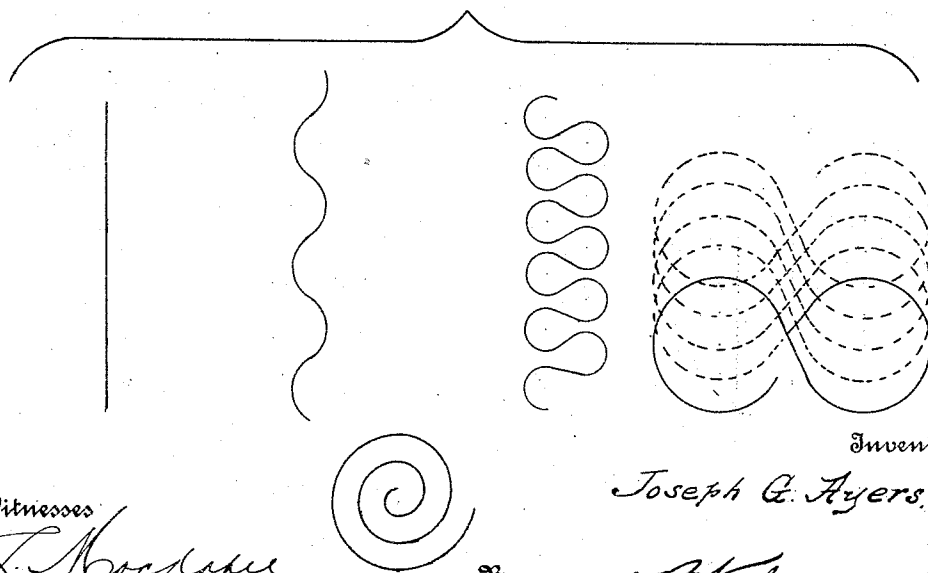


Fig. 9.



Witnesses
T. L. Mochamer
Emory L. Groff

By

Inventor
Joseph G. Ayers, Jr.
J. P. Whipple
his Attorney

J. G. AYERS, JR.
MOTOR PROPELLED BALL.
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4 SHEETS-SHEET 4.

Fig. 7.

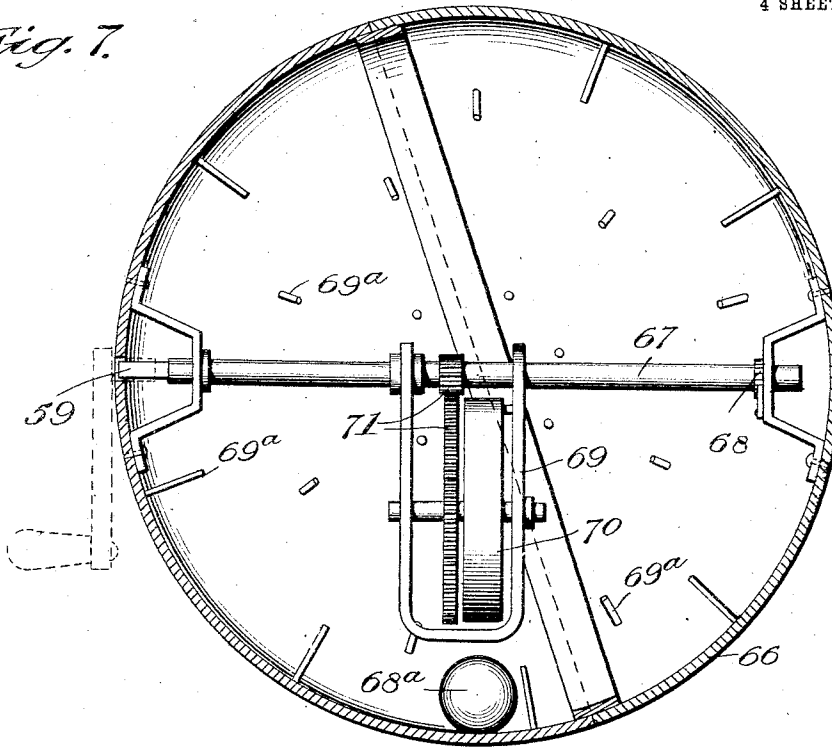
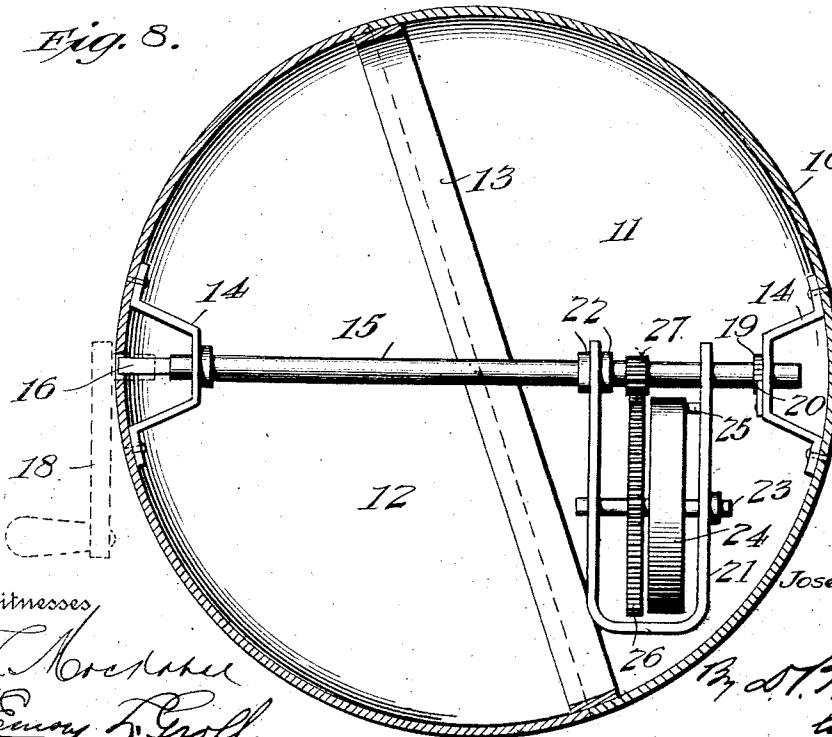


Fig. 8.



Witnesses

T. L. Knepper
Emory J. Groff

Inventor

Joseph G. Ayers, Jr.

By A. T. McLaughlin
his Attorney

UNITED STATES PATENT OFFICE.

JOSEPH GERRISH AYERS, JR., OF STEELTON, PENNSYLVANIA.

MOTOR-PROPELLED BALL.

1,033,077.

Specification of Letters Patent.

Patented July 23, 1912.

Application filed March 3, 1910. Serial No. 547,148.

To all whom it may concern:

Be it known that I, JOSEPH G. AYERS, JR., a citizen of the United States, residing at Steelton, in the county of Dauphin and State of Pennsylvania, have invented certain new and useful Improvements in Motor-Propelled Balls, of which the following is a specification.

The present invention relates to movable toys, and the primary object is to provide a self-propelled body or object, in which the propelling mechanism is concealed, so that when in operation, said toy will excite the interest and wonderment of a beholder, not conversant with the internal structure thereof.

A further and important object is to provide means for predetermining the path of movement of the object or body, in order that it may be caused to travel in a prescribed path, thus not only adding to the interest of seeing it in operation, but even making it appear extraordinary in its gyrations.

A general object is to provide a toy of the above character that can be cheaply manufactured, and can also be employed for use in games if desired.

While the invention may be embodied in various ways, in order to exemplify the same, several forms of construction, are illustrated in the accompanying drawings, wherein—

Figure 1 is a vertical sectional view through a simple embodiment of the invention, which gives the toy a predetermined straight path of movement. Fig. 2 is a sectional view on the line 2—2 of Fig. 1. Fig. 3 is a detail sectional view on the line 3—3 of Fig. 1. Fig. 4 is a sectional view of another form of construction, wherein the toy is caused to have a curved or serpentine path of movement. Fig. 5 is a sectional view through still another modification, involving a structure which provides for causing the sphere to describe the figure 8. Fig. 6 is a sectional view through a toy embodying the invention, and designed to travel in a spiral path. Fig. 7 discloses a structure wherein is employed means for determining a path of movement for the toy, but said path is made variable. Fig. 8 is a sectional view of a structure that will move in a circle. Fig. 9 is a diagrammatic view illustrating various paths of movement that the toy may have.

Similar reference numerals designate corresponding parts in all the figures of the drawings.

Referring first to the embodiment disclosed in Figs. 1—3 inclusive, it will be noted that a rolling body or casing or shell 10 is employed that is spherical in form, viz., a hollow ball, though it will be evident that it is not necessary to have a true sphere. This casing may be made of metal, or other suitable material, that is light in weight, and preferably comprises sections 11 and 12, secured together by an internal flange or band 13 that bridges the joint between said sections. A pair of brackets 14, or other suitable supports are arranged diametrically opposite to each other within the shell, and journaled in these brackets, is a shaft 15, one end of which preferably terminates short of the casing wall, the other end being angular in form, as shown at 16, and disposed at an opening 17 formed in the casing wall. This opening is for the purpose of permitting a winding crank 18 or key to be fitted on to the angular end of the shaft. The opposite end portion of said shaft is provided with a ratchet wheel 19, the teeth of which are engaged by a dog 20 pivoted on the adjacent bracket. Loosely hung on the shaft 15 is a substantially U-shaped motor frame 21, that is held against longitudinal movement on the shaft by any suitable means, as for instance, collars or enlargements 22 embracing one arm of the frame. A spring motor is mounted in and carried with this frame, and in the form shown, comprises a shaft 23, to which is attached the inner end of a helical spring 24, the outer end being connected by a pin 25 to the frame. Secured to the shaft 23 is a gear wheel 26 that meshes with a pinion 27 fast upon the shaft 15. The operation of this structure is substantially as follows:— If a winding device, as the crank 18, is applied to the angular end 16 of the shaft 15 and the shaft revolved thereby, it will be evident that the pinion 27 will be rotated, thus rotating the gear wheel 26 and winding the spring 24. It will of course be obvious that the tendency of this operation will be to turn the entire motor with its frame around the shaft, but the motor and frame are made heavy enough so that they will not thus turn. The proper weight can of course be determined by experiment, and if the mechanism is not sufficiently heavy,

or the spring has too much resistance, the frame can be suitably weighted. Having thus wound the spring, it will be evident that if it is released, said spring will retract, and thereby tend to rotate the gear wheel 26, consequently revolving the pinion 27 and the shaft 15. This shaft, however, is now held against rotation with respect to the casing by the dog and ratchet device 19 and 20. Therefore, the casing is caused to revolve, and if placed upon a floor, or other surface, will roll thereover. In the form of structure shown in Fig. 1, the sphere will roll in a straight line, inasmuch as the frame with the suspended motor is arranged centrally on the shaft 15. To cause this sphere to move in a circle, it is only necessary to place the frame and motor near one end of the shaft, as shown in Fig. 8. The diameter of the circular path of movement can of course be determined by the position of the frame at one side of the center of the shaft. Inasmuch as this is the only distinction between Figs. 1 and 8, the same reference numerals have been applied to corresponding parts of both, but it will be understood that in the arrangement shown in Fig. 8 the motor and its frame constitute the deflecting weight for giving the casing or sphere its lateral movement. A simple weight in the same location would effect the same results, as will be obvious.

In the above described embodiments, it will therefore be clear that the means for rolling the sphere or body also constitutes means for determining its path when rolling, but in order to enhance interest in the device, said body or toy may be given a defined curved path of a serpentine character. Thus in Fig. 4, is disclosed a spherical casing 28 having the supporting, winding, and driving shaft 29 journaled diametrically therein, which shaft is provided at one end with a pawl and ratchet connection 30 with the casing, and has its other end angular, as illustrated at 31 to receive a winding device. A frame 32, hung from the shaft 29, supports the spring motor 33 which is geared, as shown at 34 to the shaft, so that the mechanism, as thus far described, operates as a propelling mechanism in exactly the same manner as that embodiment shown in Figs. 1, 2, 3 and 8. In this form of the device, however, the means for determining the path of the body or toy, is a shifting weight 35, preferably a ball of lead or other heavy material, and this ball operates in a tunnel or guideway 36 formed within the casing. It will of course be understood that the guideway or tunnel can be arranged in various ways, but in any event, when the sphere is rolling under the action of the motor, the ball will remain at all times in the lowermost portion thereof. At the same time, it will be guided back and forth, thus

causing a pendulum-like lateral swing for the casing, and hence determining a serpentine path for the same, as indicated in one of the diagrams of Fig. 9. The curvature of such path is determined not only by the arrangement of the guideway 36, but also by the relative weight of the ball 35 and the motor. In fact, a plurality of said balls may be employed, so as to give a long serpentine movement, or a movement in which the path is composed of closed or overlapping loops, as disclosed in Fig. 9. A slightly different means for securing this serpentine path of movement is shown in Fig. 5. In this form of structure, the spherical casing is illustrated at 37, and contains a shaft 38, on which is loosely mounted a frame 39 having an arm 40 extending therefrom. The shaft 38 is journaled in brackets 41, and one end of said shaft is squared, as shown at 42, to receive a key or other turning device. Connected to this shaft, is a motor spring 43, and a gear wheel 44 is also attached to said shaft. The gear wheel 44 meshes with a pinion 45 on an arbor 46 journaled in the frame 39, and this arbor carries a gear wheel 47 meshing with a pinion 48 fixed to one of the brackets 41 and having a clearance over the shaft 38. The said arbor also has a beveled gear 49 meshing with a beveled gear 50 that is fixed to an angularly disposed shaft 51 journaled in the frame 39, and carrying a curved sweep or arm 52, that has secured to its free end a weight 53. With this mechanism, it will be evident that when the shaft 38 is turned by the key, the spring 43 will be wound, and preferably to avoid the turning of the frame and gearing, the casing has an opening 54, through which can be temporarily passed a holding pin 55 that engages a pin 56 on the arm 40. When the spring has thus been wound, and the device is placed upon a floor or other surface, it will be evident that the shaft 38 will be rotated, thereby rotating the arbor 46, and as said arbor will rotate the gear 48, the casing will be turned and rolled over the surface on which it is placed. At the same time, the shaft 51 will be rotated, thus sweeping the weight 56 around in a circle and causing the sphere to have a double serpentine path of movement, and in fact causing the same to describe the figure 8, as shown in one of the diagrams of Fig. 9. As will be understood, this form of the invention necessarily includes the usual pawl and ratchet device 38^a, having the functions of the corresponding pawl and ratchet in all other forms of the invention.

In Fig. 6, mechanism is disclosed for causing the toy to have a spiral path of movement. In this form of structure, the spherical casing is designated 57, and journaled diametrically therein is the usual shaft 58, having an exposed angular end 130

59, whereby it may be rotated. A dog and ratchet connection 60 is provided between the shaft and the casing. Loosely hung from this shaft is a frame 61, carrying a spring motor 62, geared as shown at 63 to the shaft. The said shaft is furthermore provided with a spiral groove 64, and a weight 65 having a projection 65^a engaging in the groove, is suspended from the shaft 59, and is of course moved along the shaft, when the latter is rotated. The parts are so arranged that when the spring is unwound, the weight 65 will be at one end of the groove 64. Consequently when the shaft is turned to wind the motor, the weight will be caused to traverse the shaft to the other end of the groove. Upon placing the sphere or toy upon a surface and releasing the shaft 58, therefore it will be obvious that said shaft will be held in a tilted position by the weight 65, and the sphere will travel in a curved path having a gradually varying diameter, inasmuch as the weight will travel along the shaft.

Finally, attention is invited to Fig. 7, wherein a structure is illustrated having means for determining a path of movement for the toy, yet making such path variable. A spherical casing 66 is employed, in which is journaled the usual shaft 67, having a dog and ratchet connection 68 with the casing, and hung from this shaft, is the frame 69 containing a motor 70 geared, as illustrated at 71, to the shaft 67.

The path determining weight or ball 68^a is arranged loosely within the casing, and said casing has a series of inwardly extending fingers or projections 69^a, which engage the ball upon the rolling movement of the casing, thus causing said ball to roll to different indeterminate positions within the casing, and causing constant variations in the path of the toy.

From the foregoing, it is thought that the construction, operation and many advantages of the herein described invention will be apparent to those skilled in the art, with-

out further description, and it will be understood that various changes in the size, shape, proportion, and minor details of construction, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is:—

1. In a toy of the character set forth, the combination with a spherical casing, of a shaft journaled diametrically therein, a dog and ratchet connection between the shaft and casing, said shaft having one end formed to receive, and being accessible to, a key, a frame loosely hung solely from the shaft, a spring motor journaled in the frame, said frame and motor being held against rotation by their own weight and gearing connecting the motor and shaft.

2. In a toy of the character set forth, the combination with a rolling spherical body, of a rotary shaft journaled in the body, a motor geared to the shaft for rolling the body, means other than the motor for determining the path of movement of the body when rolled and means for preventing rotation of the shaft in one direction.

3. In a toy of the character set forth, the combination with a spherical body, of a shaft journaled therein and having an exposed end for rotating it with respect to the body, a dog and ratchet connection between the shaft and body, a motor loosely hung from the shaft and geared thereto, means movably mounted within the body for determining its path of movement when rolled, and means engaging said path determining means for governing the direction of movement thereof.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

JOSEPH GERRISH AYERS, JR.

Witnesses:

WALTON BOUTELLE FULLER,
ANDREW ALFRED BAKER.