United States Patent

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[54] **AMUSEMENT DEVICE INCLUDING ANNULAR MAGNETS SLIDABLY DISPOSED ON NONMAGNETIC TUBE**
8 Claims, 1 Drawing Fig.

[52] **U.S. Cl.** **272/8,** 46/236
[51] **Int. Cl.** **A63h 33/26**
[50] **Field of Search** ..... 272/8, 8(N); 273/141(A), 138(A), 1(M); 46/45, 47, 236—242; 35/18.5, 19.1, (Library)

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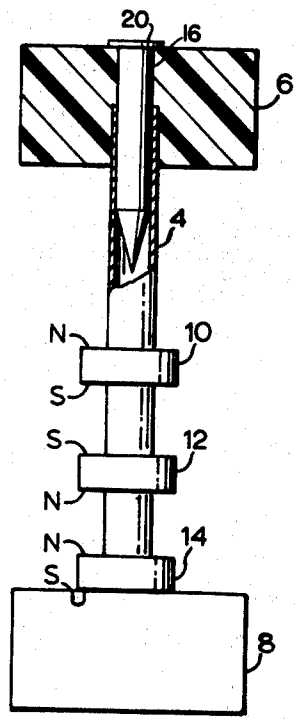
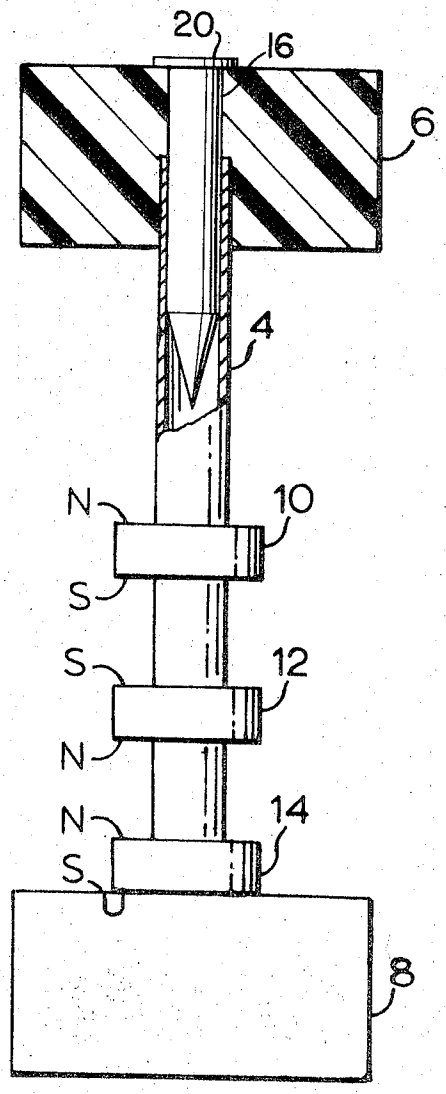
ABSTRACT: A toy, giving the impression of variable invisible springs, having strong annular magnets free to slide without tilting on a nonmagnetic tube, the magnets having their poles on the flat annular faces and being disposed on the tube with like poles next to one another, and a core of ferromagnetic material adapted to be inserted in the tube so as to give a preferential position to at least one of the magnets.

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AMUSEMENT DEVICE INCLUDING ANNULAR MAGNETS SLIDABLY DISPOSED ON NONMAGNETIC TUBE

This invention relates to an amusement device, more commonly called a toy.

I have observed that what may be termed "perennial" toys—those of lasting interest—depend upon some unusual effect, or else upon some unexpected (by children) result.

For instance, so-called "friction" cars travel much further than would be normal for their weight, due to the relatively large amount of energy stored in the unseen, highly geared flywheel; a gyroscope behaves oddly when an attempt is made to twist its axis of rotation; a strip-on-edge close coiled spring travels down a flight of stairs momentarily stopping at each step, due to an unusual form of energy storage. Many other examples will be familiar to parents.

There is something incongruous—a touch of magic—about such toys, as there is effect without enough apparent cause.

My invention is a toy which appears to be made with variable invisible springs; or perhaps it seems to a child that there must be elastic bands in it, but so well hidden that they cannot possibly be found. The invention comprises a nonmagnetic tube and magnetic devices on the tube, at least one of the magnetic devices having a mounting hole through which the rod passes, a retaining means being provided at the ends of the rod to retain the magnets and a core of ferromagnetic material insertable in the tube. The hole in the magnetic device is of such a size as to prevent it from tilting substantially, but allows it to slide freely and easily along the tube. The magnetic axis of the magnetic devices is parallel to the tube, and they are arranged with like poles facing one another, their strength being such that the mutual repulsion is sufficient to support the weight of the magnetic devices a substantial distance apart.

Of course, magnetic toys are well known, but they generally rely on a much greater degree of freedom between the elements that are mutually attracted or repelled. Such toys include magnetic fish in a tank of water, cars which do not crash, the the like; children grasp the principle and become sophisticated about new toys which use the same idea in a different guise.

The invention will be more easily understood by reference to the sole drawing, which shows the side elevation and part section of an amusement device which is a preferred embodiment.

The amusement device includes a hollow brass rod, or tube, **4**. Three annular magnets, **10, 12, 14**, each having a height approximately equal to radial thickness, are axially magnetized; that is, the magnetic poles are at the end faces of the annulus. These magnets are an easy sliding fit on the tube for it will be evident that a close fit with inadequate clearance will make sliding difficult or impossible; and excessive clearance would allow the magnets to tilt. Like poles of adjacent magnets face one another, as is clearly indicated on the drawing by the legend (reading from magnet **10** downwardly) NS–SN–NS.

Plastic end blocks **6, 8**, have a hole for receiving tube **4** in a press fit, and this hole only extends part way into the block, which has a counterbored coaxial hole, **16**, to correspond with the tube internal diameter.

The operation of the toy will now be apparent. The drawing shows that, with the rod or tube vertical, the magnets exhibit "levitation." That is, commercially available magnets are quite strong enough to support their own weight in this fashion, and at a considerably distance apart. Now, if magnet **10** is depressed, it forces magnet **12** down ahead of it before touching it; then, if magnet **10** is released when all three are touching, magnets **10** and **12** fly upwards and then fall back down under the action of gravity, and then oscillate for a moment about their rest position as if there were a spring between adjacent pairs of magnets.

If the axis of the tube is placed horizontally, magnet **10** takes up its position against end block **6**. Then, when magnet **12** is pushed to either end and released, it oscillates to and fro reversing its direction two or three times before coming to rest at approximately the midpoint of the tube.

The hollow rod and hole **16** enable a differential effect to be achieved by the partial insertion of a ferromagnetic core. For instance, if a short iron bar, such as a nail, **20**, is inserted in hole **16** to reach, say, half way down the inside of tube **4** when it is in the vertical position, the magnet **10** on being released flies upwardly and does not fall down to oscillate, but is retained in its uppermost position.

Various other games will be readily apparent, once this toy has been constructed. It will be obvious that the magnetic material itself does not have to be a close fit around the tube; the magnets may, for instance, be encased in plastic to give the required easy sliding fit which will inhibit tilting; however such a construction will reduce the effect of inserting an iron bar in the tube.

I prefer to use for the nonmagnetic tube, material such as brass, because thin-wall tubing is readily available from stock, it is rigid and friction remains low when the material wears.

While there has been shown and described what is at present considered the preferred embodiment of the invention, it will be obvious to those skilled in the art that various changes and modifications may be made therein without departing from the invention as defined by the appended claims.

I claim:

1. In combination:

a nonmagnetic tube;

a plurality of permanent magnet means mounted on said tube, at least one of said permanent magnet means having a hole through which the tube passes, the mounting hole being of such a size as to permit easy sliding along said tube of said one permanent magnet means, the magnetic axis of said plurality of permanent magnet means being substantially parallel to the tube axis, adjacent permanent magnet means having like poles facing one another and having sufficient magnetic strength to support the weight of the slideable permanent magnet means in spaced relationship by mutual repulsion;

two retaining means secured to said tube and spaced apart so as to retain said plurality of permanent magnet means on said tube; and

a ferromagnetic core means adapted to be inserted within said tube so as to influence the position along the tube of at least one slideable permanent magnet means.

2. A combination as claimed in claim **1**, in which two of said plurality of permanent magnet means are easily slideable along said tube.

3. In combination:

a nonmagnetic tube;

a plurality of permanent magnet means mounted on said tube, at least one of said permanent magnet means having a mounting hole through which the tube passes, the mounting hole being of such a size as to permit easy sliding along said tube of said one permanent magnet means, the magnetic axis of said plurality of permanent magnet means being substantially parallel to the tube axis, adjacent magnet means having like poles facing one another and having sufficient magnetic strength to support the weight of the slideable magnet means in spaced relationship by mutual repulsion;

two retaining means secured to said tube and spaced apart so as to retain said plurality of permanent magnet means on said tube, the retaining means having support surfaces formed so as to support the tube axis in a substantially horizontal position and to permit sliding of said one permanent magnet means when the tube is thus supported; and

a ferromagnetic core means adapted to be inserted within said tube so as to influence the position along the tube of at least one slideable permanent magnet means.

4. A combination as claimed in claim **3**, in which said plurality of permanent magnet means comprises at least three magnet means, each having a mounting hole through which the tube passes, each mounting hole being of such a size as to permit easy sliding along said tube of said three permanent magnet means.

5. An amusement device comprising:
a hollow nonmagnetic rod;
three permanent magnet means mounted on said hollow nonmagnetic rod, each permanent magnet means having a mounting hole through which the rod passes, each mounting hole being of such a size as to permit easy sliding of the three magnet means therealong, the magnetic axis of said three magnet means being substantially parallel to the rod axis, adjacent magnet means having like poles facing one another and having sufficient magnetic strength to support the weight of the said three magnet means in spaced relationship by mutual repulsion;
two blocks secured to said nonmagnetic hollow rod, one at each end so as to retain said three magnet means therebetween, one block having an end face for supporting the device with the axis of said rod substantially vertical, each block having a side face formed so as to support the rod axis in a substantially horizontal position and to permit sliding of said three permanent magnet means when the rod is thus supported; and
a ferromagnetic core means adapted to be inserted within said rod so as to influence the position along the hollow rod of at least one slideable permanent magnet means.

6. An amusement device comprising:
a hollow nonmagnetic rod;
three annular permanent magnet means mounted on said nonmagnetic rod, said rod passing through the hole of the annuli, each hole being of such a size as to permit easy sliding along said nonmagnetic rod of each permanent magnet means, the magnetic axis of said three annular permanent magnet means being substantially parallel to the rod axis, adjacent permanent magnet means having like poles facing one another and having sufficient magnetic strength to support the weight of said three annular permanent magnet means in spaced relationship by mutual repulsion;

two retaining means secured to said rod and spaced apart so as to retain said three annular permanent magnet means on said rod therebetween; and
a ferromagnetic core means adapted to be inserted within the hollow of said rod so as to influence the position along said rod of at least one of the three annular permanent magnet means.

7. An amusement device as claimed in claim 6, wherein said retaining means each comprise a rectangular block, one at each end of said rod and each having similar dimensions and having similar plane faces for accepting the rod, so that the rod axis can be supported in either a vertical plane or a horizontal plane.

8. An amusement device comprising:
a hollow nonmagnetic rod;
three annular magnets mounted on said rod so that the rod passes through the hole of the annuli, each hole being of such a size as to permit easy sliding along said rod of each annular magnet, the magnetic axis of each annular magnet being substantially parallel to the rod axis, adjacent annular magnets having like poles facing one another and having sufficient magnetic strength to support the weight of said three annular magnets in spaced relationship by mutual repulsion;
two blocks secured to said hollow nonmagnetic rod, one at each end so as to retain said three annular magnets on the rod therebetween, at least one block having an end face for supporting the device with the axis of the rod substantially vertical, both blocks having means to support the device with the axis of the rod substantially horizontal, so that the three annular magnets are free to slide when the rod is thus supported; and
a ferromagnetic core means adapted to be inserted within the hollow of said rod so as to influence the position along said rod of at least one of the three annular magnets.