Jan. 19, 1954 J. H. HUFF 2,666,276

GYROSCOPIC AERIAL TOP

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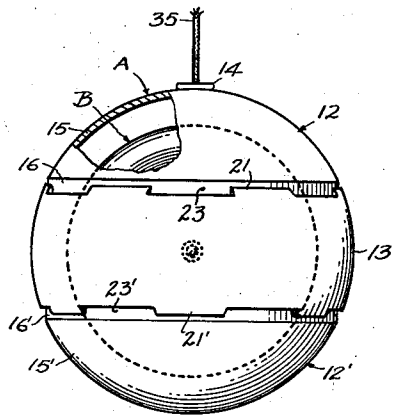


Fig. 1

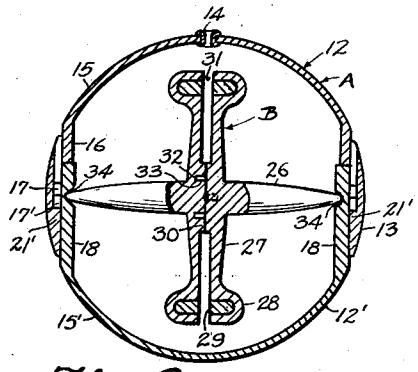


Fig. 2

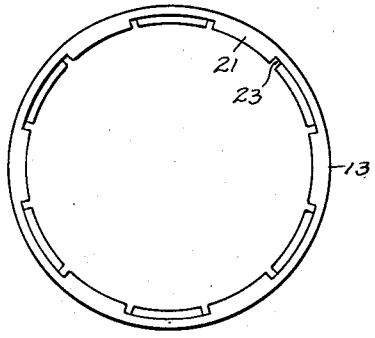


Fig. 3

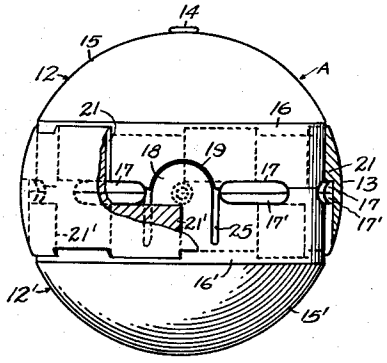


Fig. 4

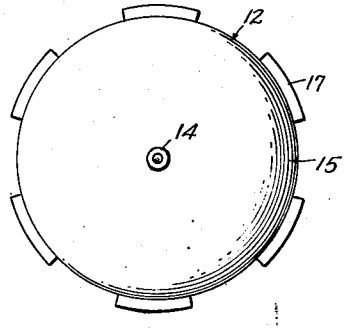


Fig. 5

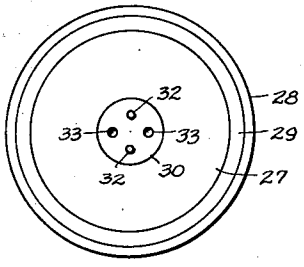


Fig. 6

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Fig. 7

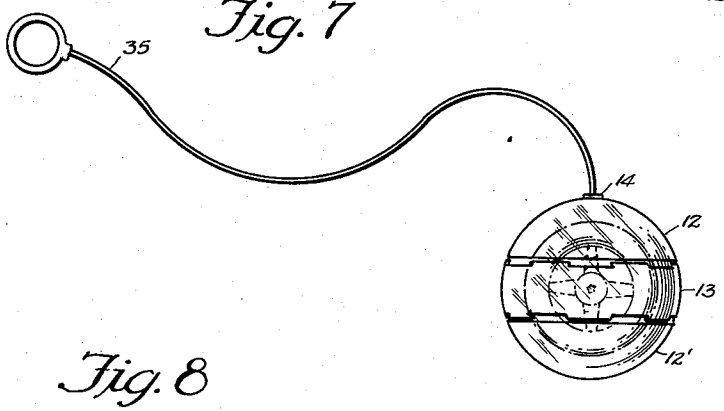


Fig. 8

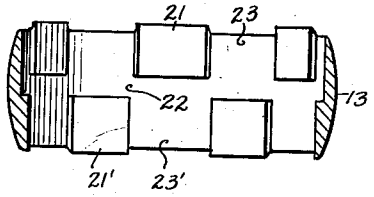


Fig. 11

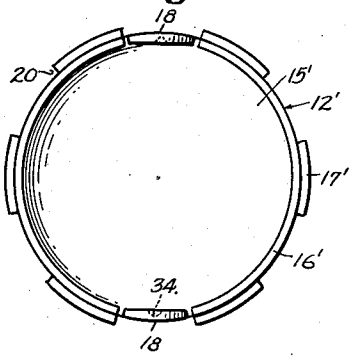


Fig. 9

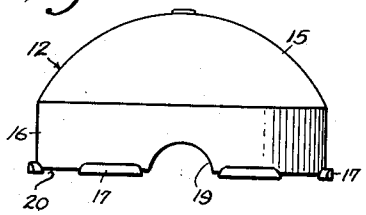


Fig. 12

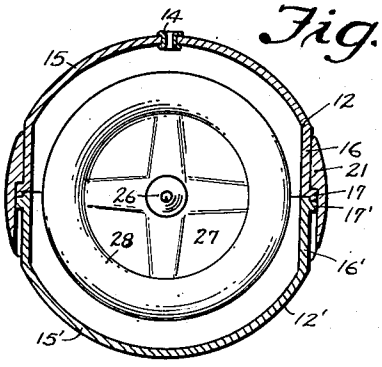
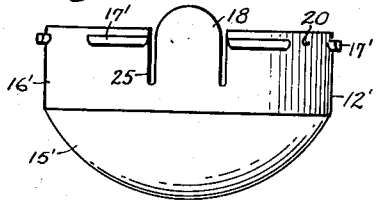


Fig. 10



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GYROSCOPIC AERIAL TOP

James H. Huff, West Los Angeles, Calif.

Application July 16, 1952, Serial No. 299,137

3 Claims. (Cl. 46—50)

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This application is in part a continuation of my application Serial No. 152,096, filed March 27, 1950, for Gyroscopic Toy (now abandoned).

My invention relates to gyroscopic toys of the type popularly known as the "yo-yo," wherein a rotating member in the form of a pair of symmetrical gyroscopic flywheels are mounted in closely spaced relation on a common shaft around which an operating cable (such as wrapping string) is wound, and wherein the rotating member is alternately wound upon and unwound from the cable, the opposite end of which is held in the hand of the operator who manipulates the toy by periodically exerting a pull against the cable.

The general object of the present invention is to provide such a toy which, during manipulation, can be bounced against a wall, floor, or other obstacle without in any way interfering with the rotation of the rotatable member. To this end, the invention contemplates, in general, a rotatable member of the type indicated, which is mounted for rotation within a light, hollow shell in which it is completely enclosed, the cable emerging from the shell through a slot which is in alignment with the space between the flywheel elements. The shell, which is preferably spherical, functions as a shield for the rotating member and may be bounced against a wall or the like without in any way interrupting or slowing down the rotation of the rotatable member.

Among the difficulties experienced in operating the conventional "yo-yo" are the knotting of the cable and the rubbing of the cable against the edges of the rotating flywheels at the periphery of the annular space defined between them. Another object is to provide a toy which may be operated without experiencing these difficulties.

A further object is to provide a toy of the general character indicated above, which is of relatively simple and yet sturdy construction. A more particular object is to provide such a toy having a shell fabricated from several sections and supporting a novel and simple bearing structure.

In a device of this type it may frequently become necessary to adjust or repair the cable in the event it becomes broken, and such operation may necessitate gaining access to the interior of the shell. Accordingly, a further object is to provide such a toy having a shell which is in several sections that can be readily separated for gaining access to the rotating member. A still further object is to provide such a toy in which the shell sections may be separated without disturbing the mounting of the rotating

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member in its bearings which are accordingly both attached to a single one of the shell sections.

Other objects will become apparent in the ensuing specification and appended drawings in which:

Fig. 1 is a side view of a toy embodying the invention;

Fig. 2 is a central sectional view through the same;

Fig. 3 is a plan view of the union ring;

Fig. 4 is a side view with portions broken away and shown in section to illustrate the means for joining the shell sections of the toy;

Fig. 5 is a plan view of one of the shell sections;

Fig. 6 is a side view of one of the rotor sections;

Fig. 7 is a side view of the toy;

Fig. 8 is a central sectional view of the union ring;

Fig. 9 is a side view of one of the shell sections;

Fig. 10 is a side view of the other shell section;

Fig. 11 is a plan view of the same; and

Fig. 12 is a cross-sectional view of the toy.

Referring now to the drawings in detail, my improved toy comprises generally a two part shell A and a rotor B. Shell A is preferably of spherical shape, although it may have other shapes generally approaching the spherical, but with flattened, recessed or embossed facets or designs on the external surface thereof, as may be desired.

Shell construction

Shell A is composed of two semi-spherical sections 12 and 12', which are attached together by a union ring 13. Considering the median great circle of the union ring 13 as being the equator of the shell, section 12 has therein an opening defined by an inserted grommet 14, through which an operating cable 35 extends to rotor B.

The shell sections 12, 12' are generally of semi-spherical form, including spherical wall portions 15, 15' and cylindrical wall portions 16, 16' modifying the spherical shape. When the shell sections are brought together the cylindrical wall portions 16, 16' cooperatively define an equatorial zone lying below the spherical surface of the toy, the intervening space being filled out by the union ring 13, the outer face of which is formed as a zone of a sphere. The axial extremities of cylindrical wall portions 16, 16' constitute the rims of the respective sections.

At the respective rims are formed integral, circumferentially elongated lugs 17, 17', the opposed faces of which are adapted to make abutting contact at the central, equatorial plane

of the shell. Cylindrical wall portion 16' projects somewhat beyond the lugs 17' and cylindrical wall portion 16 is terminated somewhat short of lugs 17. Accordingly, the projecting portion of wall section 16' is receivable in the space encircled by lugs 17 and is adapted to be snugly embraced by lugs 17, to establish a piloting of the two shell sections with their respective poles in alignment on a common axis.

Shell section 12' has diametrically opposed, axially projecting ears 18 which are adapted to mate in correspondingly shaped notches 19 in shell section 12 when the two shell sections are brought together. This interengagement of ears 18 and notches 19 establishes and maintains a registering relation of lugs 17 and 17' and prevents any rotation of the shell sections, one relative to the other, about their common pole axis, such as would displace the lugs 17, 17' from registration.

Lugs 17, 17' project radially outwardly from the outer surface of wall sections 16, 16'. Successive lugs 17, 17' are spaced apart circumferentially to define spaces 20 approximately the same in circumferential length as the lugs 17, 17'. Union ring 13 (Figs. 3 and 8) is provided with two axially spaced series of retainer lugs 21, 21', the axial spacing of these lugs providing, at the equatorial plane of the ring 13, a space 22 the axial width of which is slightly greater than the combined axial thickness of lugs 17, 17'.

Ports 23, 23' are defined circumferentially between lugs 21, 21' respectively. Ports 23 are axially opposite lugs 21' and ports 23' are axially opposite lugs 21.

It may be noted that, in securing the shell sections together, the two sections may first be brought into an abutting engagement in which mating lugs 17, 17' abut each other, as shown in Fig. 4, and the union ring 13 may then be slipped over one of the sections, adjusted to a position of concentricity to the pole axis thereof, rotated until a set of ports 23 or 23' is brought into registry with lugs 17' or 17, as the case may be, and then moved further in the axial direction to cause lugs 17 or 17' to enter the ports 23 or 23' until the lugs 17 or 17' come into engagement with lugs 21 or 21', as the case may be. For example, assuming that ring 13 is first slipped over shell section 12, until lugs 21', at their outer axial extremities, make engagement with lugs 17, rotation of ring 13 will eventually bring lugs 17 into registry with ports 23' of ring 13. Ring 13 may then be moved further in the axial direction until lugs 21 engage lugs 17. This relative position of the parts is shown in Fig. 4. Ring 13 may be rotated, with lugs 17, 17' moving in equatorial space 22, causing lugs 17, 17' to establish simultaneous engagement with the inner axial faces of both lugs 21 and 21'. This is the locked position of the parts as indicated in dotted lines in Fig. 4.

By constructing the parts of molded plastic material having some slight degree of compressibility, it becomes possible to provide a fairly snug fit between the interlocking lug members, thus to maintain the parts in assembly by frictional engagement of the parts.

Ears 18 are of considerable length and extend to a substantial depth below the equatorial plane of section 12', being separated from the adjacent wall portions 16' by slots 25. The length of the ears 18 is sufficient so that they may flex diametrically away from each other for the purpose hereinafter specified.

The rotor B

Rotor B comprises a pair of identical sections each having a staff or trunnion portion 26 and a disc portion 27 provided with a rim 28 in the form of an axially opening channel. Rim 28 may be filled or partially filled with a ring 29 of relatively heavy material such as lead, to weight the rotor to any desired extent. Each section has a hub portion 30 projecting axially a slight distance beyond the inner face of disc portion 27, which is flat. Hub portions 30 come together, leaving disc portions 27 separated to define an annular space 31 of flat ring form. Thus the hub sections 30 and disc members 27 cooperate to define a reel in which the cable 35 is wound. Grommet 14 lies in the plane of the reel space 31, to guide the cable 35 into and out of the same.

The two rotor sections are locked together by means of integral pins 32, each projecting from the face of the hub portion of one rotor section and seated in an opening 33 in the hub portion of the other section. The ends of staff sections 26 are of rounded conical form and are seated in conical bearing recesses 34 in the respective ears 18. It may now be noted that, in assembling the toy prior to securing the shell sections together, the ears 18 may be sprung apart sufficiently to allow the ends of the staff sections 26 to be slipped into recesses 34. After the shell sections are assembled and locked together by ring 13, the constricting tension of the latter securely restrains ears 18 against yielding outwardly, thus preventing any possibility of the rotor becoming dislodged from the bearing recesses 34.

Operation

In using the toy, it is manipulated in the manner of a conventional "yo-yo," cable 35 being pulled periodically so as to deliver a winding impulse to the rotor B such as to continue the alternate winding and unwinding of the cable in reel space 31. Coincidentally with this characteristic "yo-yo" movement, the toy may be moved in various orbits, as in the operation of the conventional "yo-yo."

Additionally, it may when desired be bounced against a floor or wall surface. In this connection, the plastic material for the shell is selected to provide the characteristics of toughness and resiliency such as to avoid fracture and provide considerable "bounce" in the shell. Consequently, the entertainment that may be derived from the toy is considerably improved over that afforded by a conventional "yo-yo."

The shell is preferably of transparent plastic (e. g., a vinyl resin such as polyvinyl chloride or acetate monomer or a copolymer of the two) and the disc sections 27 of the rotor B may be ornamented with appropriate designs to provide an attractive appearance.

I claim:

1. In a gyroscopic toy, a generally spherical shell comprising mating shell sections each including a polar zone of spherical conformation and a lateral wall of cylindrical shape, cooperating with that of the other shell section to define an equatorial zone lying below the extended spherical contour of the shell; lugs extending circumferentially along the rims of said cylindrical portions in circumferentially spaced relation and projecting radially outwardly; said shell having diametrically opposed bearing recesses; a rotor having a staff the ends of which are journalled in said recesses, and comprising axially spaced disc members and a hub joining said disc mem-

bers; a cable adapted to be wound around said hub for rotating the rotor; and a union ring having a cylindrical internal wall rotatably fitted to the lateral walls of the shell sections for rotation thereon, and including retainer lugs axially opposed and spaced to define an annular equatorial space to receive the lugs of said shell sections, said retainer lugs being circumferentially spaced to provide ports through which the lugs of said shell sections may be inserted in order to reach said equatorial space, with the subsequent rotation of said union ring serving to lock said shell section lugs between said axially opposed retainer lugs.

2. A toy as defined in claim 1, wherein one of said shell sections has diametrically opposed ears in which said bearing recesses are formed, said ears being circumferentially separated from adjoining portions of the cylindrical wall of said one shell section, so as to be flexible sufficiently to spread said bearing recesses for the insertion and removal of said rotor staff, said union ring, in the assembled toy, restraining said ears against outward flexing movement, and thereby locking said ears upon the ends of said staff.

3. In a gyroscopic toy, a generally spherical shell comprising mating shell sections each including a polar zone of spherical conformation and a lateral wall of cylindrical shape, cooperating with that of the other shell section to define an equatorial zone lying below the extended spherical contour of the shell; a union ring surrounding said equatorial zone, having a cylindrical inner wall fitted upon the cylindrical

walls of said shell sections for rotation thereon, and having an outer surface forming substantially a continuation of the spherical surfaces of said shell sections, releasable interlocking means on the respective shell sections and on said union ring, for locking the shell sections together through said union ring; one of said shell sections having a pair of diametrically opposed ears provided with bearing recesses; a rotor having a staff the ends of which are journalled in said recesses, and comprising axially spaced disc members and a hub joining said disc members; a cable adapted to be wound around said hub for rotating the rotor; said ears being circumferentially separated from adjoining portions of the cylindrical part of said one shell section sufficiently to provide for outward flexing such as to allow the insertion and removal of said staff, and being secured against such outward flexing movement by the engagement of said union ring thereagainst in the assembled toy.

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