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English

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[54] **FLYING TOY**

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[21] Appl. No.: **85,100**

[52] **U.S. Cl.** ..... **46/74 D,** 273/126 R

[51] **Int. Cl.** **A63h 27/00**

[58] **Field of Search** ..... 46/74 D; 273/126 R, 273/106 B

[56] **References Cited**

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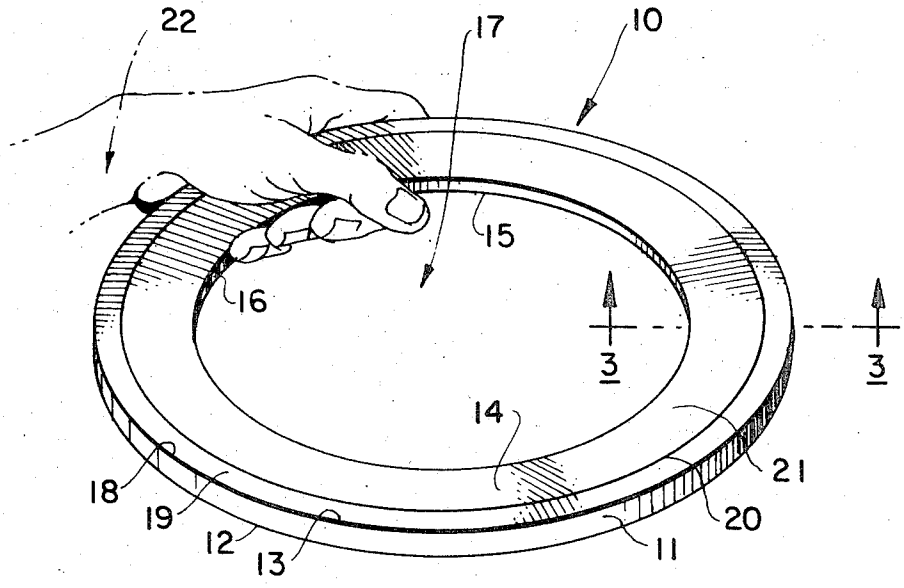
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Primary Examiner—Robert W. Michell
Assistant Examiner—A. Heinz
Attorney—Pastoriza & Kelly

[57] **ABSTRACT**

A flying toy has an annular skirt section and a ring section whose outer edge is coupled to the skirt section and whose inner edge defines a circular central opening. An inner segment of the ring constitutes a circular shaped deflector surface inclined downwardly and inwardly towards the central opening. While the toy travels with a spinning motion through the air a stream of air slips over the toy's leading edge and is guided downwardly by the deflector surface into the central opening and thereafter is directed rearwardly beneath the toy's trailing edge for cushioning or supporting the trailing edge.

5 Claims, 9 Drawing Figures



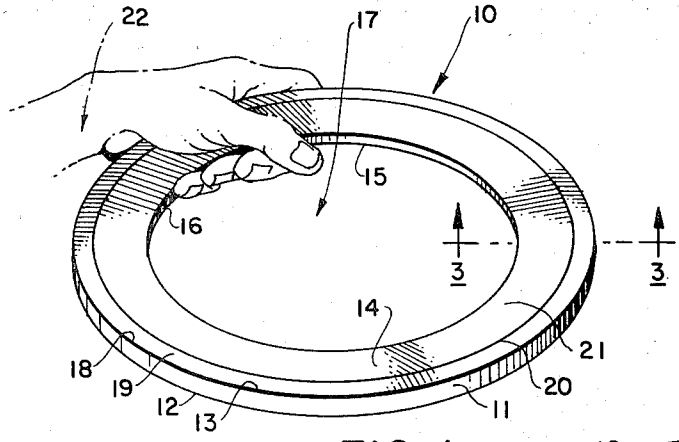


FIG. 1

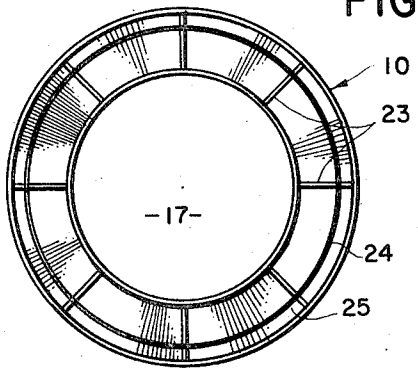


FIG. 2

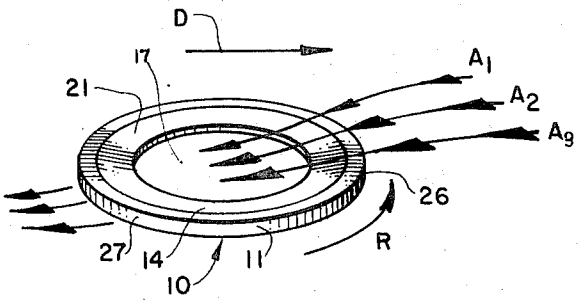


FIG. 4

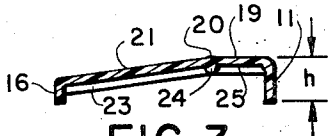


FIG. 3

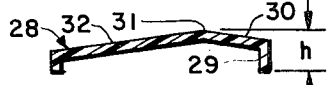


FIG. 5

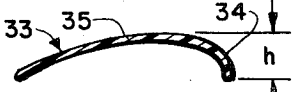


FIG. 6



FIG. 7

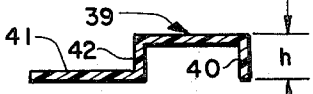


FIG. 8

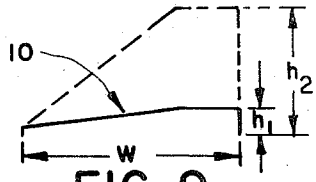


FIG. 9

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FLYING TOY

BACKGROUND OF THE INVENTION

A sport or game that has become increasingly popular with people of all ages involves the tossing and catching of flying toys which travel through the air with a spinning motion. A number of these flying toys characterized generally by disc configurations are disclosed in: U.S. Pat. No. 3,359,678 to Headrick; No. 3,220,142 to Butterfield; and, 2,659,178 to Van Hartesveldt.

Many novices and people with minimal manual dexterity are confronted with difficulties in actually tossing these toys and require much practice before they can enjoy the sport.

SUMMARY OF THE INVENTION

Briefly stated this invention comprehends a relatively lightweight, inexpensive, amusing toy structured for spinning about its axis while traveling through the air.

The flying toy includes an annular skirt having a free lower edge and an upper edge. A ring has an outer portion coupled to the annular skirt upper edge and an inner portion that defines a central opening of circular shape. The ring is integrally formed with a circular shaped deflector surface that is inclined downwardly and inwardly towards the central opening. When the toy is tossed by a person and caused to spin about its axis while traveling through the air, an air stream flowing over the toy's leading edge will be guided by the deflector surface downwardly into the central opening and thereafter directed beneath the toy's trailing edge to support the trailing edge in flight.

Preferably the underside of the ring and the skirt are integrally formed with a series of radially extending strengthening ribs and at least one circular strengthening rib so that the ring thickness can be made relatively thin and the toy is therefore made relatively lightweight. For ideal flight performance the ratio of the overall toy width to overall toy height is within the range of from 1: 1/16 to 1: 1/2. In addition the width of the ring is not greater than one half the overall radius of the toy.

Various cross sectional shapes of the flying toy made be employed so long as a segment of the ring constitutes a circular shaped deflector that is sloped downwardly and inwardly towards the central opening.

BRIEF DESCRIPTION OF THE DRAWINGS

The numerous benefits and unique aspects of the present invention will be fully understood when the following detailed description is studied in conjunction with the drawings in which:

FIG. 1 is a perspective view showing a flying toy constructed in accordance with this invention;

FIG. 2 is a bottom plan view of the flying toy showing circular and radially aligned strengthening ribs;

FIG. 3 is a cross sectional view taken along line 3—3 of FIG. 1, showing how an intermediate portion of the toy slopes downwardly and inwardly towards the central opening of the toy;

FIG. 4 is a schematic view of the toy spinning in flight, illustrating how streams of air travel over the leading edge and are deflected into the central opening and beneath the toy trailing edge for supporting purposes;

FIG. 5 is a cross sectional view of a second embodiment of the flying toy;

FIG. 6 is a cross sectional view of a second embodiment of the flying toy;

FIG. 7 is a cross sectional view of a fourth embodiment of the flying toy;

FIG. 8 is a cross sectional view of a fifth embodiment of the flying toy; and

FIG. 9 is a schematic view showing the range of possible width-to-height relationships for determining the dimensions of the flying toy.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to FIG. 1, a flying toy 10 is shown being grasped by a person's hand prior to the time when the person would snap his wrist and release the toy with a spinning motion to follow a predetermined trajectory through the air. The toy 10 has an annular skirt 11 with a free bottom edge 12 and a top edge 13. A ring 14 has an inner edge 15 associated with an inner wall portion 16 that defines a central circular opening 17. Ring 14 has an outer edge 18 joined to and integrally formed with annular skirt top edge 13. An outer ring portion 19 of planar orientation terminates inwardly to form a circular peak or ridge 20. Between ridge 20 and wall portion 16 the ring 14 is configured to form a circular shaped deflector surface 21 that slopes downwardly and inwardly towards central opening 17.

A person may conveniently and securely grasp toy 10 with his hand 22 by looping his thumb over the ring 14 so it contacts one or more fingers lying beneath ring 14. An incidental benefit provided by central opening 17 is to facilitate not only throwing the toy and setting it in motion but also catching the toy.

Referring now to FIG. 2, a plurality of radial extending strengthening ribs 23 and at least one circular strengthening rib 24 which intersects the ribs 23 are integrally formed on the undersurface 25 of toy 10 that is preferably fabricating from plastic material. Relative lightweightness of the toy 10 is accomplished by eliminating material from the center to form central opening 17 and further lightweightness is contributed by incorporating the network of strengthening ribs 23 and 24 which allow the general thickness of the toy 10 to be of a much thinner gage than would otherwise be possible.

FIG. 3 demonstrates that for this particular embodiment of the invention the outer ring portion 19 is flat and horizontal and the circular shaped deflector surface 21 is also flat in cross section. The maximum height differential or drop between the highest peak or ridge 20 and the innermost and lowermost edge of the ring is represented by letter h.

FIG. 4 shows toy 10 in flight traveling in direction D and rotating in direction R. While toy 10 is in flight streams of air represented by streams A_1, A_2 and A_3 that together actually constitute a sheet of air; (1) flow over leading edge 26, (2) become guided by circular shape deflector surface 21 into the central opening, and, (3) then travel rearwardly to eventually serve as an air cushion to support trailing edge 27. If the surface 21 of ring 14 was merely flat and coplanar with portion 19 then the vast majority of the mass of air of the air sheet would slip over the top of toy 10 and not be able to boost up the toy trailing edge. As a result the toy leading edge would soon tilt upwardly and its flight would become stalled.

FIG. 5 is another embodiment of a flying toy 28 where the skirt 29 is vertical and the ring has an inclined slope 30 to a ridge 31 and then a declined deflecting surface 32.

Referring to FIG. 6, another embodiment of the flying toy 33 has a convexly cambered skirt 34 which merges with ring 35.

Referring to FIG. 7, another embodiment of the flying toy 36 has a convexly cambered skirt 37 that merges with ring 38 characterized by a convex radially outer portion and a slightly concave radially inner portion.

FIG. 8 shows another embodiment of the flying toy 39 wherein the skirt 40 is vertical and the ring has a flat horizontal outer portion, an intermediate stepped configuration 42 and a flat horizontal interior portion 41.

All of the above described embodiments incorporate the common feature of a downwardly and inwardly inclined deflector surface of the ring for deflecting air traveling over the leading edge into the central opening where it may thereafter be directed to support the toy trailing edge.

FIG. 9 is a schematic or diagramatic view showing a profile of the flying toy 10 with an overall width W between its innermost and outermost extremes. A minimum height differential h_1 is indicated between the ridge of the deflector surface and the lowest edge of the ring, and, a maximum height differential h_2 is indicated in a similar manner. The width-to-height ratio may vary within an optimum performance range from 1: 1/16 (W: h_1) and 1: 1/2 (W: h_2). If the ratio is beyond this range to one side (e.g.; 1: 1/17) then the toy will tend to stall in flight and topple. Similarly if the ratio is beyond this range to the other side (e.g.; 1: 9/16) then the toy will tend to dip and topple.

Another parameter for superior flight behavior is that the width W is not greater than one half the length of the overall radius of toy 10. Rather than being a toy, the object embodying this invention may be a different type of projectile such as a missile having teeth formed on its outer periphery for engagement with the firing mechanism of a launching device.

OPERATION

Keeping the above constructions in mind it can be understood how this invention provides distinct structural and entertainment advantages over the more conventional flying disc-type toys.

In order to set the flying toy 10 (shown in FIG. 1) in motion while spinning about its axis in direction R (as shown in FIG. 4) the person first grasps the toy 10 with his thumb crossing over ring 14 and into central opening 17 while one or more of his fingers stretches beneath ring 14 into contact with his thumb. Certainly some people may prefer to grasp the toy 10 differently by pinching an outer peripheral section of the ring 14 so that neither the thumb nor any finger occupies space within central opening 17.

The toy 10 is released by swinging the arm away from the body and simultaneously snapping the wrist in such a manner that a predetermined initial velocity is imparted which in turn may dictate the length of travel. Under ordinary calm or slight breeze conditions the toy 10 will experience a smooth flight. If gusty winds prevail then, it has been discovered, the toy will hop in a somewhat unexpected manner which is very amusing. Flight behavior may be modified and the pattern modified by tilting the plane of the toy 10 in one direction or another.

Flight is sustained over an unexpectedly extensive path becuase the sheet of air represented by air streams A_1, A_2 and A_3 travels over the toy leading edge 26, is deflected downwardly over the circular shaped deflector surface 21 into the circular central openings 17 and thereafter travels beneath the ring to the toy trailing edge 27 which is supported by and rides on the air stream that serves as an air cushion. This combination of forces permitting the sheet of air to sink through the central opening like a "downdraft" allows the toy 10 to sustain lengthy flight primarily based on drag and planning aerodynamic principles and based on air foil principles to a lesser extent.

The toy 10 is able to progress through the air with greater ease than disc-type flying toys because resistance that otherwise would be imposed by updrafts and downdrafts is significantly diminished by the presence of central opening 17 which constitutes an air passage. For this same reason, unlike in the case of disc-type flying toys, when toy 10 loses its momentum it will settle sustantially vertically rather than along a slopted path.

Unlike disc-shaped flying toys, flying toy 10 has a general ring shape that may be taken advantage of in games where an object is to loop the toy 10 around a stake or a person's arm. As a safety feature, its external periphery is relatively blunt or rounded rather than sharp which is of benefit in avoiding cuts and injuries should the toy strike a person or fragile item. The advantages mentioned above provide a flying toy 10 that may be of interest and enjoyment to groups of all ages and is not limited, as has been the case with conventional disc-type flying toys, to people with at least average skills, coordination and strength.

From the foregoing it should be evident that the present invention has provided a flying toy in which the advantages are fully accomplished.

What is claimed is:

1. An annular flying toy having an inner perimeter defining a central circular opening, an outer perimeter, a substantially constant toy width defined by the radial distance between the inner perimeter and outer perimeter and, an imaginary planar frame of reference passing through and substantially parallel to the toy, the toy comprising:

a. an annular skirt constituting the toy outer perimeter, the skirt having a lower edge passing through said planar frame of reference and an upper edge located above said planar frame of reference;

b. a ring aligned concentrically with the annular skirt and having an inner edge that constitutes the toy inner perimeter and an outer edge that merges with the annular skirt upper edge at an annular ridge above said planar frame of reference said annular ridge being the highest portion of the toy above said reference plane and located nearer to the toy outer perimeter than to the toy inner perimeter; and,

c. a deflector surface formed by a portion of the ring, the deflector surface being inclined downwardly from said annular ridge and inwardly towards the central circular opening of the toy and said planar frame of reference,

wherein when the toy is caused to spin about its axis and travel through the air, an air stream flowing over the toy's leading edge will be deflected by the

deflector surface downwardly into the central circular opening and thereafter directed beneath the toy's trailing edge to assist in supporting the trailing edge in flight.

2. The structure according to claim 1, wherein;
the ring and skirt are integrally formed with a series of radially extending strengthening ribs and at least one circular strengthening rib so that the ring thickness can be made relatively thin and the object therefore made relatively lightweight.

3. The structure according to claim 1, wherein;
the skirt is substantially vertically oriented;
the ring is integrally formed with a horizontal planar section between the deflector surface and the skirt; and
the central opening is circular.

4. An annular flying toy having an inner perimeter defining a central circular opening, an outer perimeter, a substantially constant toy width defined by the radial distance between the inner perimeter and outer perimeter, and, an imaginary planar frame of reference passing through and substantially parrallel to the toy, the toy comprising:

a. an annular skirt constituting the toy outer perimeter, the skirt having a lower edge passing through said planar frame of reference and an upper edge located above said planar frame of reference;

b. a ring aligned concentrically with the annular skirt and having an inner edge that constitutes the toy inner perimeter and an outer edge that merges with the annular skirt upper edge at an annular ridge above said planar frame of reference, said annular ridge being the highest portion of the toy above said reference plane and located nearer to the toy outer perimeter than to the toy inner perimeter; and,

c. a deflector surface formed by a portion of the ring, the deflector surface being inclined downwardly from said annular ridge and inwardly towards the central circular opening of the toy and said planar frame of reference;

d. wherein the width of the toy is not greater than one-half the radius of the toy, and, the ratio of the toy width to the toy height at the annular ridge is within the range of from 1: 1/16 to 1: 1/2,

wherein, when the toy is caused to spin about its axis and travel through the air, an air stream flowing over the toy's leading edge will be deflected by the deflector surface downwardly into the central circular opening and thereafter directed beneath the toy's trailing edge to assist in supporting the trailing edge in flight.

5. The structure according to claim 4, wherein:
the skirt is substantially vertically oriented;
the ring is integrally formed with a horizontal planar section between the deflector surface and skirt; and,
the central opening is circular.

* * * * *