March 30, 1965 M. S. ISAACSON 3,175,326

BALL BEARING TOY

Filed Jan. 3, 1963

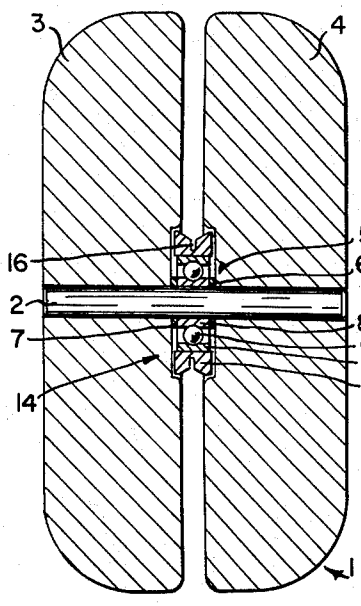

FIG-1

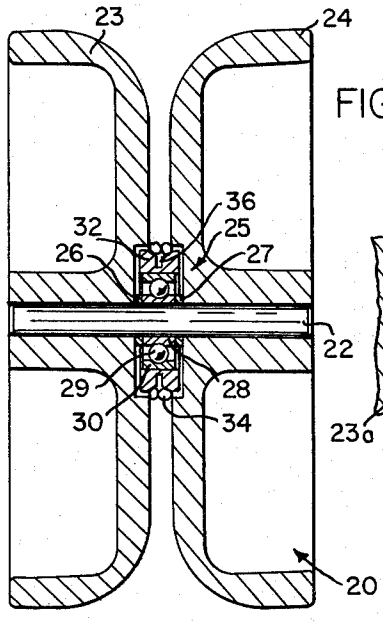

FIG-2

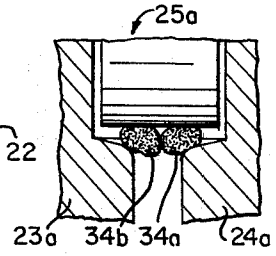

FIG-3

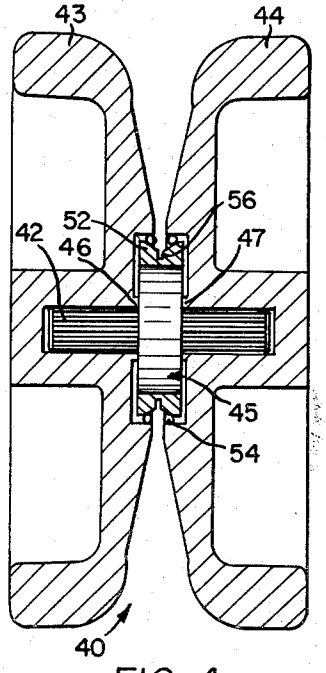

FIG-4

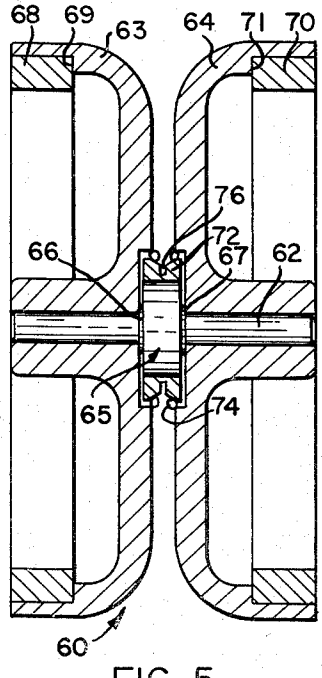

FIG-5

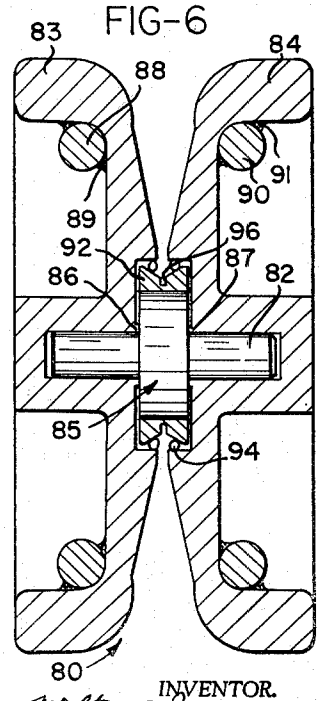

FIG-6

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BALL BEARING TOY

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This invention relates to toys, and is more particularly concerned with a Yo-Yo.

As is well known, a Yo-Yo is composed of a rotatable inertia member of disk-like configuration provided with a peripheral groove about which is wound a suspension string. In manipulating such a device the inertia member is permitted to be rotated by the string, and the inertia member travels downwardly and upwardly along the string.

It is one object of the present invention to provide a toy employing a ball bearing in a novel arrangement. It is a further object of the invention to employ a ball bearing in a Yo-Yo toy which permits rotation of the inertia member in extended position for long periods of time. It is a further object of the invention to provide a ball bearing Yo-Yo exhibiting gyroscopic effects to a degree not hitherto accomplished. A still further object of the invention is to provide a beall bearing Yo-Yo which is so constructed as to better resist any tendency to rotate about the axis of the suspension string.

These and other objects of the invention will become more readily apparent upon a reading of the description following hereinafter, reference being made to the accompanying drawings forming a part hereof, in which:

FIGURE 1 is a cross-sectional view through a Yo-Yo constructed in accordance with the invention;

FIGURE 2 is a cross-sectional view similar to FIGURE 1 but of another modification of the invention;

FIGURE 3 is a partial cross-sectional view indicating the arrangement of the supension string in greater detail;

FIGURE 4 is a cross-sectional view similar to FIGURE 1 but indicating a further modification of the invention;

FIGURE 5 is a cross-sectional view similar to FIGURE 2 but illustrating the use of inertia rings; and

FIGURE 6 is a view similar to FIGURE 4 but illustrating the use of inertia rings.

In the toy of the invention illustrated herein as in the form of a Yo-Yo, a bearing means is employed (preferably a ball bearing) in such manner that it is mounted for rotation independently of the inertia means. Thus, the suspension string is wound around the outer component of the bearing, in order to attain rotation of the inertia members for prolonged periods of time when the toy is in extended position. Additionally, the ball bearing is so mounted with respect to the inertia members as to obtain a marked gyroscopic effect resulting in a lessened tendency towards vibration. The ball bearing Yo-Yo of the invention is further so constructed that the body of the Yo-Yo has no tendency towards rotation about the axis of the suspending string to cause winding or unwinding of the string.

Referring in greater detail to the drawings, it is seen that the invention takes the form of a Yo-Yo 1 (see FIGURE 1) in which the inertia members are formed as two solid externally concaved blocks 3 and 4. These blocks or weights 3 and 4 are fixedly mounted onto the shaft 2 in spaced relationship. Also fixedly mounted onto the shaft 2 but located centrally thereof is the anti-friction bearing 5. As is well known, such anti-friction bearing 5 comprises the inner race 8, outer race 10, and a series of balls 9 entrapped therebetween. The inner race is spacedly positioned from the inertia members 3 and 4 by the spacers 6 and 7. Upon assembly the members 3 and 4, together with shaft 2, spacers 6 and 7, and the inner race

8, will rotate as a unit with respect to the outer race 10. In other words, the outer race 10 can rotate independently of the elements which are fixedly mounted with respect to the weights 3 and 4.

As indicated in FIGURE 3 wherein the bearing 25*a* is mounted between the inertia members 23*a* and 24*a*, the suspending string may simply be wound around the outer periphery of the bearing 25*a* with several strands 34*a* and 34*b* wedged between the members 23*a* and 24*a* and the bearing 25*a* as shown, to permit retrieving the toy. Alternatively, the arrangement shown in FIGURE 1 may be employed wherein a wedge ring 12 is pressed onto the outer race of the ball bearing 5. This wedge ring 12 has a wedge shaped groove 16 formed in its outer periphery. Preferably, the suspension string is formed with a single loop at its lower end which encompasses the outer periphery of the bearing 25*d* (see FIGURE 3) or the outer periphery of the wedge ring 12. In winding the string it is desirable to hold the first loop formed around the outer periphery of these members with the finger of one hand and wind the remaining portion of the suspending string around the periphery of such member. This will retain the suspension string in position without releasing the windings. Upon releasing the Yo-Yo, it is desirable to throw the inertia body formed by the members 3 and 4 back-hand, so that somewhat greater momentum is imparted to the inertia members 3 and 4 as they roll down the suspension string. Thus, when the Yo-Yo is in extended position a prolonged rotation is imparted to the inertia members 3 and 4; and due to the anti-friction bearing arrangement, a gyroscopic effect is obtained which tends to reduce or eliminate any vibrations of the rotating mass. Because of the nature of the bearing mounts, any tendency for rotation of the mass about the axis of the string is substantially eliminated.

In order to cause return of the mass of the Yo-Yo to the palm of the operator, it is necessary to apply a slight upward jerking motion on the suspending string, so that one or more convolutions of the string will wedge between the outer race of the bearing and the inertia mass to quickly return the mass to the hand of the user. The prolonged period of rotation available permits performing many intricate and time requiring tricks without having to continually retrieve the Yo-Yo from the extended position.

In the modification of FIGURE 2 a pair of inertia members 23, 24 are mounted upon the shaft 22; and the bearing 25 comprising the inner race 28, outer race 30 and series of balls 29, is mounted between the spacers 26 and 27 on the shaft 22. The wedge ring 32 is pressed onto the outer race 30 of the bearing 25. In the modification of FIGURE 2 the inertia members 23 and 24 of the Yo-Yo 20 are formed of dished-like configuration, and are preferably formed of metal. A central hub portion is provided to receive the shaft 22. Such a configuration exhibits a marked gyroscopic effect upon rotation, with the results indicated above.

In the modification of FIGURE 4 the outer flange portions of the members 43 and 44 are relatively thickened with respect to the configuration shown in FIGURE 2. Such configuration provides added mass to attain a higher rotational effect during operation. In the modification of FIGURE 4 the bearing 45 is mounted upon a splined shaft 42 which is pressed into the members 43 and 44. Instead of the spacers such as 26 and 27 of the modification of FIGURE 2, the Yo-Yo 40 is so constructed that the members 43 and 44 are formed with inner hubs 46 and 47 to spacedly hold the inner race of the bearing 45. A wedge ring 52 is employed which is pressed onto the outer race of the bearing 45 and the convolutions 54 of the suspending string may be entrapped between the

groove 56 formed in the wedge ring 52 and the opposed portions of the members 43 and 44.

In the modification shown in FIGURE 5, which is generally similar to FIGURE 2, a pair of dished shaped inertia members 63 and 64 are mounted upon the shaft 62. A pair of spacer members 66 and 67 are also mounted upon the shaft 62 between the inertia members and the bearing 65. A wedge ring 72 having a groove 76 is pressed onto the outer race of the ball bearing 65 with the convolutions of the string 74 entrapped between the wedge ring 72 and the inertia members 63 and 64. In the Yo-Yo 60 of FIGURE 5, the inertia member 63 is formed with a bore 69 into which is press fitted, molded or bonded, a relatively heavy mass 68 to aid in attaining a higher degree of inertia. The inertia member 64 is similarily constructed with the bore 71 to receive the inertia ring 70. The use of this additional inertia member increases the moment of inertia of the members 63 and 64 to attain longer periods of rotation of the Yo-Yo.

In the modification of FIGURE 6 the Yo-Yo is constructed similar to that shown in FIGURE 4 with the inertia members 83 and 84 being mounted upon the shaft 82. The hubs 86 and 87 of the inertia members 83 and 84, respectively, serve to space the bearing 85 between the inertia members. A wedge ring 92 is mounted upon the outer race of the ball bearing 85 with convolutions 94 of the suspension string being entrapped between the wedge ring and the opposed portions of the inertia members 83 and 84. Similar to the modification of FIGURE 5, the Yo-Yo 80 is provided with inertia rings 88 and 90 which are affixed, as by soldering, at 89 and 91, respectively to the inner dished out portion of the inertia members 83 and 84, respectively.

The ball bearing toy described above is illustrated with respect to a Yo-Yo configuration. It is considered to be obvious that the principle involved may readily be applied to various types of spinning toys such as gyroscopic tops, dolls, etc. Additionally, the inertia members may be so enclosed and made of bell-metal so that the device will emit sound if desired. Also, various colorful designs may be applied to the inertia members. Numerous modifications and changes will readily occur to those skilled in the art and it is desired not to limit the invention to the exact construction and operation shown and described. Accordingly, all suitable modifications and equivalents which may thus be resorted to are considered to fall within the scope of the invention as set forth in the appended claims.

What I claim is:

1. A toy comprising, in combination:
a shaft,
a rotatable inertia means fixedly mounted to said shaft,
bearing means mounted for rotation upon said shaft independently of said inertia means,
and, a flexible member adapted to be wound upon a portion of said bearing means, said rotatable inertia means and a portion of said bearing means having cooperating means to engage said flexible member for enabling winding such flexible member upon said bearing means, whereupon the unwinding of said flexible member rotates said bearing means upon said shaft, thereby causing rotation of the rotatable inertia means.

2. The toy of claim 1 wherein said inertia means comprises a pair of members spacedly mounted upon said shaft,
and, said bearing means is located between said members.

3. The toy of claim 2 wherein said inertia means includes a pair of inertia rings affixed one to each of said members.

4. A toy comprising, in combination:
a shaft,
a rotatable inertia means fixedly mounted to said shaft,
bearing means mounted for rotation upon said shaft independently of said inertia means,
said bearing means comprising an anti-friction bearing having an inner race mounted to rotate with said shaft and an outer race,
and a flexible member adapted to be wound upon a portion of said outer race, said rotatable inertia means and a portion of said outer race having cooperating means to engage said flexible member enabling winding such flexible member upon said outer race, whereupon the unwinding of said flexible member causes relative rotation of said inner and outer race and rotation of the rotatable inertia means.

5. The toy of claim 4 wherein said inertia means comprises a pair of members spacedly mounted upon said shaft,
and said bearing means is located between said members.

6. The toy of claim 5 wherein said inertia means includes a pair of inertia rings affixed one to each of said members.

7. A toy comprising, in combination:
a shaft,
a rotatable inertia means fixedly mounted to said shaft,
bearing means mounted for rotation upon said shaft independently of said inertia means,
a wedge ring affixed to the outer portion of said bearing means,
and a flexible member adapted to be wound upon said wedge ring, said rotatable inertia means and wedge ring having cooperating means to engage said flexible member enabling winding such flexible member upon said wedge ring, whereupon the unwinding of said flexible member rotates said bearing means upon said shaft, thereby causing rotation of the rotatable inertia means.

8. The toy of claim 7 wherein said inertia means comprises a pair of members spacedly mounted upon said shaft,
and, said bearing means is located between said members.

9. The toy of claim 8 wherein said bearing means comprises an anti-friction bearing having an inner race and an outer race,
said wedge ring being mounted upon said outer race to rotate therewith, and wherein said cooperating means comprises surfaces on said pair of members and a wedge shaped groove formed on the outer periphery of said outer race between which said flexible member is engaged for winding such flexible member upon said wedge ring.

10. The toy of claim 8 wherein said inertia means includes a pair of inertia rings affixed one to each of said members.

References Cited by the Examiner

UNITED STATES PATENTS

1,806,485	5/31	Mirafuentes	46—61
1,866,697	7/32	Blackburn	46—61
2,888,776	6/59	Sauer	46—61
3,081,578	3/63	Mosher	46—61

FOREIGN PATENTS

23,149	1907	Great Britain.

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