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2,762,162

GYROSCOPIC TOP

Filed March 11, 1955

Fig. 1.

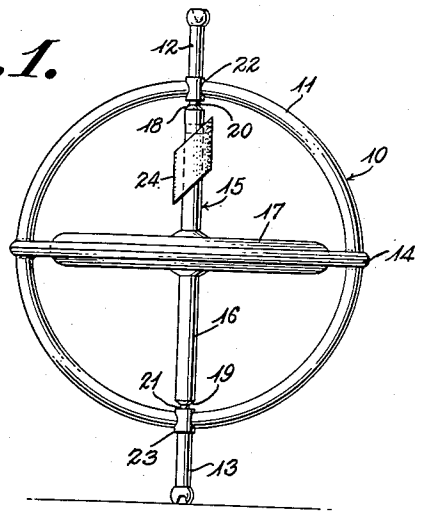


Fig. 2.

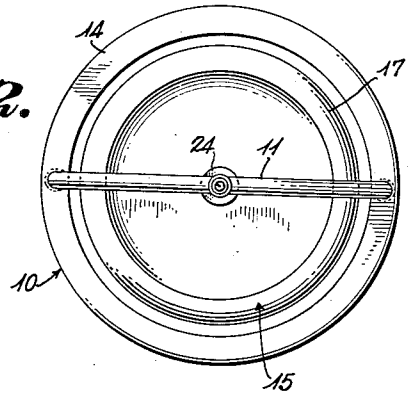


Fig. 4.

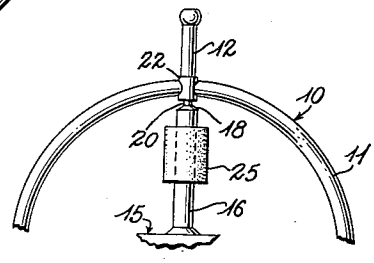
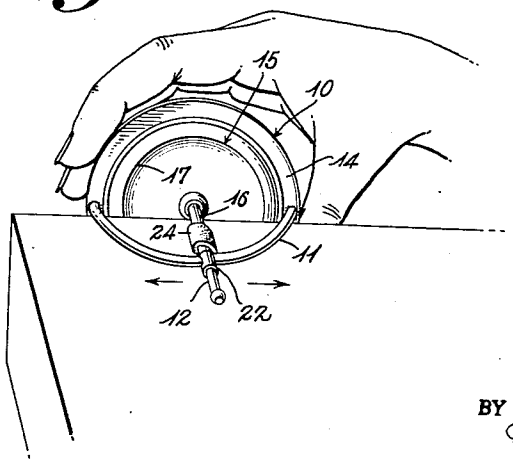


Fig. 3.



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GYROSCOPIC TOP

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2 Claims. (Cl. 46—50)

This invention relates generally to the field of toys and more particularly to an improved means for accelerating the rotor of a gyroscopic top.

Although gyroscopic type toys are well known to the art, the means by which they are rotated, namely by the action of a spinning cord, has limited the obtaining of high rotor speed. In gyroscopic type toys of the character described, the faster the heavy fly-wheel of the rotor spins, the more pronounced is gyroscope action. In order to obtain rotation of the rotor of gyroscopic toys heretofore known to the art, a winding cord is first anchored through a hole, provided in the rotor spindle, while holding the frame of the gyroscope firmly between the thumb and forefinger of, say, the right hand. By turning the rotor between the thumb and forefinger of the left hand while guiding the winding string with the right hand, the cord is tightly wound around the rotor shaft. After the winding string is firmly wound on the shaft, it is drawn from the rotor shaft with an even, strong, steady pull. This pulling of the winding cord from around the shaft accelerates the rotor until the maximum speed obtainable by the method of motivation is effected. This method of imparting speed to the rotor of a gyroscopic type toy, however, has several inherent disadvantages. First, the only motion that can be imparted to the rotor occurs during the unwinding of the cord or string, which is of course limited by the length of the operator's arm when he pulls the cord from the shaft to set the rotor to spinning. Another disadvantage in this method of accelerating a rotor is that once the rotor is set in motion, its maximum speed has been obtained and rebuilding of the speed as the rotor tends to come to rest cannot be had until the rotor has stopped and the procedure of winding the cord on the rotor shaft and pulling it therefrom has been effected. Thus, considerable time and very careful manipulation of the winding of the cord on the shaft must be accomplished before any further enjoyment can be had from the toy.

This invention contemplates the use of a built-in starter adapted to the rotor shaft so that the spinning of the rotor can be built up to a very high speed by successive, unidirectional rolling of the starter over a surface in a stroke-like manner. This new method of accelerating the rotor eliminates the use of complicated and unmanageable winding cords and provides a method of producing rotor speeds heretofore unknown to the art by further acceleration of the rotor after it has once been put in motion. Further, the rotor may be accelerated as soon as the speed of the rotor has reached a point where the gyratory action is ineffective.

It is an object of this invention to produce a gyroscopic type toy with a frictional element adapted to the rotor shaft which can be used to set the rotor in motion by rolling the frictional element over a surface.

It is a further object of this invention to provide a method of accelerating a rotor of a gyroscope by successive, unidirectional rolling of a frictional element,

adapted to the rotor shaft, against a surface in a stroke-like manner to provide a build-up in the speed of the rotor.

Additional objects of this invention will become apparent from an examination of the description, drawings, and claims.

The invention will be described further in connection with the accompanying drawings which are to be considered as an exemplification of the invention and do not constitute limitations thereof.

In the drawings:

Figure 1 is a side elevational view of the gyroscope showing the frictional roller of cylindrical configuration having opposite parallel ungulated ends mounted on the rotor shaft;

Figure 2 is a top plan view of Figure 1;

Figure 3 is a side view of the gyroscope showing the frictional roller mounted on the rotor shaft positioned against a surface preparatory to rolling to set the rotor in motion; and

Figure 4 is a fragmentary side elevational view of the gyroscope showing a frictional roller of cylindrical configuration having parallel ends perpendicular to the axis of the cylinder.

In accordance with the invention, reference numeral **10** indicates a gyroscopic type toy which is formed by a gimbal ring **11** having extended therefrom an upper tip **12** and a lower tip **13** which lie along a common axis that passes through the diameter of the gimbal ring, see Figure 1. Perpendicular to the gimbal ring is a horizontal circular structure **14** which intersects the gimbal ring at its diameter and provides the protective housing for rotor **15**. The rotor **15** comprises a shaft **16** having mounted thereon a heavy fly-wheel **17** which lies within the confines of the center opening defined by the horizontal circular structure **14**. The upper and lower terminals **18** and **19** of shaft **16** are provided with axially extending pintles or pivots **20** and **21** which extend into jeweled bearing sockets housed in bosses **22** and **23** located in the gimbal ring **11**. The fly-wheel **17**, mounted on shaft **16**, is precisely balanced and journaled in jeweled bearings so that the fly-wheel can be accelerated to obtain very high speeds of rotation when a series of successive frictional torques are applied to the rotor shaft, see Figure 1. Mounted on the shaft **17** is a frictional, resilient roller **24**, the ends of which are parallel and obliquely tapered with respect to the fly-wheel **17**, see Figure 1. The frictional roller may be of any desirable length which will provide the necessary frictional surface when the roller is rolled against a surface, see Figure 3. Another form of frictional roller **25** that may be employed is shown in Figure 4, in which the ends are at right angles to the axis of the shaft so as to provide a frictional element of cylindrical configuration.

It is to be understood, however, that a roller of any desired shape or surface configuration may be used for frictionally engaging a surface to accelerate the rotor. It is also to be understood that the frictional roller can be made of any resilient material capable of frictionally engaging a surface, such as the edge of a table, desk or book.

In operation, the gyroscope is held between the thumb and forefinger, see Figure 3, so that the gimbal ring **11** is parallel to the rolling surface. The resilient roller **24** is pressed firmly against the surface and the gyroscopic toy **10** is moved so as to produce a rolling of the roller along the surface. This rolling of the roller causes the rotor to which it is attached to turn as the speed of the roller is rapidly accelerated as it frictionally engages the surface. By successive stroking of the roller in one direction over the surface, the speed of the rotor can

be built up until the rotor attains speeds as high as 4000 revolutions per minute. Rotor speeds of this magnitude store sufficient kinetic energy to allow the rotor of the gyroscopic toy to remain spinning for as long as seven minutes, which greatly facilitates the usability of the toy as well as providing better performance because of the longer and stronger gyratory action. Thus, the gyroscopic toy can be utilized in several well-known manners and is capable of performance heretofore not obtainable in this type of toy.

It will also be appreciated that using the means for acceleration of the rotor presented in this invention, it is not necessary to wait until the gyroscope has stopped spinning before its speed can be built up again to provide the desired gyratory action because, by simply restroking the roller on a suitable surface at any time during the rotation, an accelerated speed of rotation can be obtained.

Although many shapes of resilient rollers have been found to operate successfully, it has been found that, when the resilient roller has parallel ends at an oblique angle with respect to the plane of the fly-wheel, a greater degree of acceleration can be obtained by rolling the roller over a surface. It is believed that this shape of the resilient roller acts to produce greater friction between the roller and the surface and accomplishes this by preventing slippage between the roller and the surface against which it is stroked which results in a greater acceleration of the rotor for a given number of strokes.

It is to be further understood that any resilient type of material which is capable of imparting a frictional relationship between the roller and the surface may be used to accelerate the spinning of the rotor.

Although the invention has been illustrated by the use of a conventional type of gyroscopic toy, it will be understood that the improved means for accelerating the rotation of a rotor as set forth in this specification may be used with any other equivalent mechanism regardless of outward appearance or shape which is capable

of operating in a similar manner. It is also to be understood that the invention herein illustrated and described is to be limited only by the scope of the appended claims and that various changes may be made in the details of construction without departing from the invention or sacrificing any of the advantages thereof.

What is claimed is:

1. A gyroscopic top capable of being operated without the use of a cord comprising a frame element, a rotor having a shaft portion and a flywheel portion, means for rotatably mounting said rotor in the frame element, and a stroking roller operatively associated with said rotor and held thereon within the confines of said frame element, said roller protruding above the plane of that portion of said frame element beyond the plane of said flywheel to permit frictional contact with a stroking surface.

2. A gyroscopic top capable of being operated without the use of a cord comprising a frame of circular configuration having two circular elements disposed perpendicularly with respect to each other and joined at their common diameters, two bearings opposite to each other mounted in one of said circular frame elements, a rotor having a shaft with a flywheel mounted thereon, said shaft having bearing points at opposite ends thereof rotatably mounted in said bearings, a resilient driving roller operatively associated with said shaft and held thereon between said flywheel and one of said bearings, said roller having a diameter greater than the thickness of that portion of said frame element beyond the plane of the flywheel in which said shaft is mounted, said roller being adapted to have frictional contact with a stroking surface.

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