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E. S. SAVAGE

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SPINNING TOP

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Fig. 1.

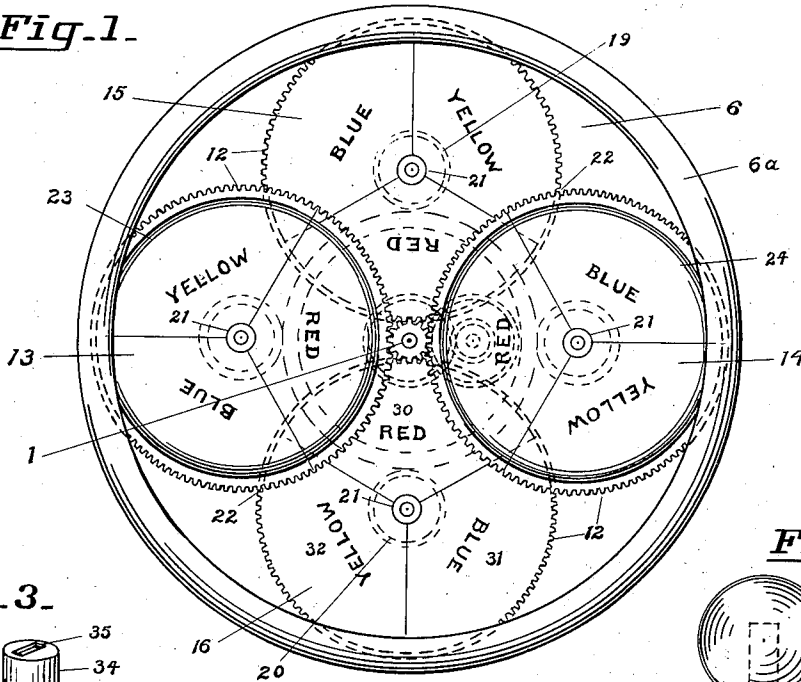


Fig. 3.

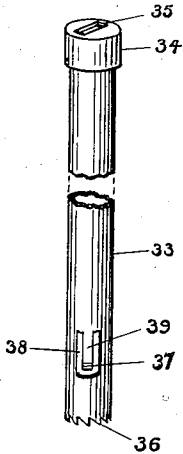


Fig. 2.

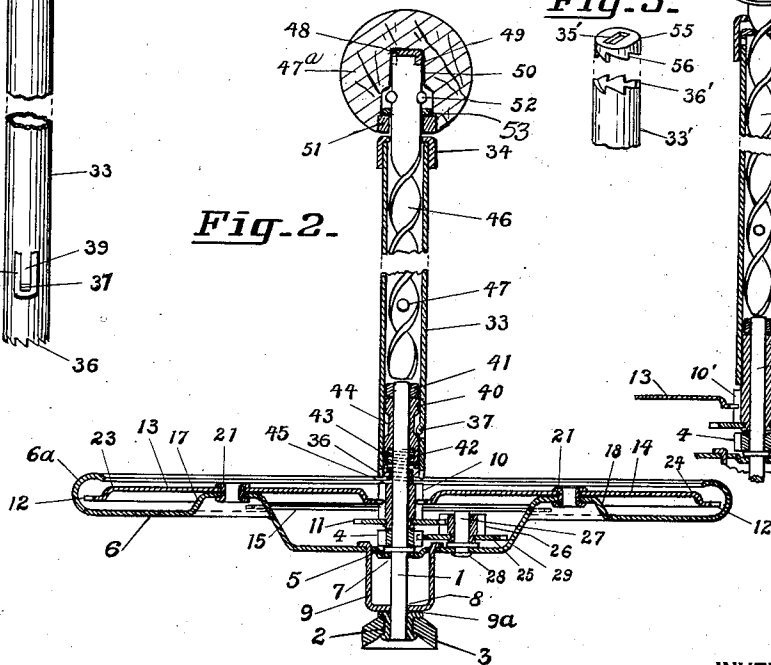


Fig. 4.

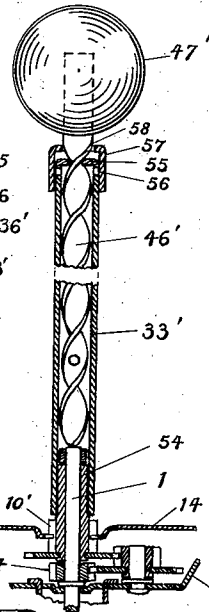
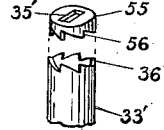


Fig. 5.



INVENTOR
Edward S. Savage
BY *Paul H. Smith*
ATTORNEY

UNITED STATES PATENT OFFICE

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SPINNING TOP

Edward S. Savage, Rochester, N. Y.

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4 Claims. (Cl. 46—32)

My present invention relates to spinning tops and more particularly to that class of spinning tops, interest and enjoyment of which is largely due to the production of changing color effects.

5 An object of my invention is to provide a top of the above mentioned class in which novel, interesting and continuously changing color effects are produced. Another object is to provide a top of this character which will produce continuous and periodic color changes from the pure primary colors to various color blends, the periodic changes occurring at a slow rate of speed, thus enhancing the beauty of the color effects and giving opportunity for the interesting study of color blends. Another object is to provide a simple sheet metal frame for the top which will be suitable for rapid and low cost production. A further object is to provide a simple, convenient and easily operated means for spinning the top, which spinning means may be easily attached and detached from the top and may remain attached to the top while the top is spinning.

25 With these and other objects in view, the invention consists of certain novel features of construction, combination and arrangement of parts, as will be described and particularly pointed out in the appended claims.

In the accompanying drawing:

30 Fig. 1 is a plan of the top with the spinning means removed;

Fig. 2 is a vertical central section of the top and the spinning means with the spinning means in operable position;

35 Fig. 3 is a perspective view of the tubular member of the spinning means;

Fig. 4 is a vertical central section of a modification of the spinning means shown in operative position and showing also adjacent members of the top in central section; and

40 Fig. 5 is a perspective view of the clutch employed in the modification of the spinning means shown in Fig. 4.

Similar reference numerals throughout the several views indicate the same parts.

Referring first to the construction shown in Figs. 1 to 3 inclusive, I provide a shaft 1 which is adapted to stand in a substantially vertical position and is fitted at its lower end with a flanged sleeve 2 which is rigidly attached thereto. A cupped rubber foot or shoe 3 fits tightly on the flanged sleeve 2 and serves to prevent rotation of the shaft 1. A pinion 4 is fixedly carried by the shaft 1, and is positioned above and in contact with a collar 5 which is formed on

the shaft 1 and serves to prevent any possible slippage of the pinion 4 downwardly. A frame 6, preferably formed of stamped sheet metal, is journaled to turn about the shaft 1, having bearings on shaft 1 at the points 7 and 8, the latter being located in the lower end of the cup 9, which forms a part of the frame 6. The lower end of the cup 9 also provides a thrust bearing, at 9a, bearing against the flanged sleeve 2 and preventing downward movement of the frame 6 on the shaft 1. It is preferable that the frame 6 be substantially circular in contour and that its outer periphery be curled upwardly and inwardly, as herein shown at 6a. The curled periphery is advantageous in that it contributes to the attractive appearance of the top, it increases the weight of the periphery which assists in sustaining rotation through momentum and it eliminates any exposed cut metal edge at the periphery. A pinion 10 is journaled on the shaft 20 1 above the fixed pinion 4 and a gear 11 is carried by and turns with the pinion 10. The said pinion 10 is in engagement with the toothed edges 12 of the discs 13, 14, 15, and 16. The upper surfaces of these discs are colored according to 25 a systematic design employing a plurality of colors and therefore I will hereinafter designate these discs 13, 14, 15, and 16 as color discs. The said color discs are preferably all of equal diameter and are journaled on the frame 6, being 30 disposed equi-distant about the shaft 1. The said color discs 13, 14, 15, and 16 are supported at proper elevation upon bosses 17, 18, 19, and 20, which bosses are struck up on the sheet metal frame 6. Loosely fitting eyelets 21 serve as journals for the said color discs. The diametrically opposite bosses 17 and 18 are of equal height in relation to the frame 6 and the height of the bosses 19 and 20 is such as to support the color discs 15 and 16 at a slightly lower level, to permit free revolution of all the color discs without interference or excessive friction at the points 22 where the color discs 13 and 14 overlap adjacent peripheries of the color discs 15 and 16. For purposes of strength durability and low cost 45 of production it is preferable that the color discs 13, 14, 15, and 16 be made of sheet metal, cut and formed in dies.

The desired color effects could be produced in a top of this character by utilizing sheet metal color 50 discs all of which are flat on the upper surfaces. There is however an element of danger in such construction which lies in the possibility that a person may be cut or injured by the sharp die-cut edges of the color discs should he touch the 55

said color discs when the top is spinning rapidly. To eliminate such element of danger I provide on the superimposed color discs 13 and 14, raised surfaces 23 and 24, adjacent to the toothed edges 12, which raised surfaces 23 and 24 are at a higher elevation than the said toothed edges 12. For the purposes of my invention it is only essential that the portion of the surfaces, 23 and 24, be raised which are immediately adjacent to the toothed edges 12. In the drawing the whole surfaces of the color discs 13 and 14 are shown raised above the toothed edges thereof. In operation, when the top is spinning rapidly, should a person touch the color discs he will contact only the raised portions 23 and 24 of the color discs 13 and 14 and he is thereby prevented from making contact with the toothed edges 12 until the speed of the top is reduced to a rate at which it cannot cause injury.

Changing color effects, however produced, are most attractive when the color changes occur at a rate slow enough to avoid eye fatigue and at such a rate that the color changing and blending of colors may be clearly and closely observed. It will be readily seen that, to produce slow color changing effects, when the frame 6 is spinning rapidly, necessitates a low gear ratio between the pinion 4 and the color discs 13, 14, 15, and 16. It is apparent that this result would be accomplished if the said color discs were directly driven, without intermediate gearing, by the pinion 4 which is stationary on the shaft 1, provided said pinion 4 were sufficiently small in diameter. It is however impractical to make the above mentioned gear ratio between the pinion 4 and the said color discs sufficiently small in such a direct drive, without employing intermediate gearing, on account of practical limitations involved. In this invention the required low gear ratio between the pinion 4 and the color discs 13, 14, 15, and 16 is secured by means of speed reduction gearing consisting of a gear train which comprises, a gear 25 meshing with the pinion 4, a pinion 26 driven by the gear 25, the gear 11 driven by the pinion 26 and the pinion 10 driven by the gear 11. The pinion 26 and attached gear 25 are journaled on the stud 27, the said stud being riveted to the frame 6 at 28. The members comprising the above described gear train are all conveniently inclosed within a circular depressed portion 29 of the frame 6 forming a gear housing.

It is apparent that many designs of different colors may be applied to the color discs 13, 14, 15, and 16 which designs would give interesting results when the top was spinning. I prefer to employ a color scheme, illustrated herein, utilizing only the three primary colors, red, blue, and yellow. The color design of the four color discs 13, 14, 15, and 16 are identical so that a description of one applies to all. The surface of the color disc is divided into three equal segmental divisions 30, 31, and 32 which are colored respectively red, blue and yellow. The color discs 13, 14, 15, and 16 are positioned on the frame 6 and in mesh with the pinion 10 in such positions that the color designs of all the said color discs are positioned alike in relation to the shaft 1. This positioning of the color discs is illustrated in Fig. 1 where the centers of the red segments 30 are all directly in line with the shaft 1 and the positions of the blue segments 31 are identical each to the other in relation to the shaft 1 and similarly the yellow segments 32 have identical positions in relation to the shaft 1. Since all the color discs bear like toothed peripheries 12 and all of said

toothed peripheries mesh with the same pinion 10 the color discs 13, 14, 15, and 16 will at all times bear synchronized relation to each other while the top is spinning, resulting in the production of definite and periodic cycles of like color changes, passing from pure primary colors of red, blue and yellow and thru various blends of these colors.

It is evident that it would be possible to spin this top in the ordinary manner by means of a string wound on the hub 9. To obviate the use of a string and to facilitate spinning the top I have provided an improved form of spinning means which spinning means may be easily attached to the top and easily detached therefrom. It is preferable that the spinning means remain in position attached to the top while the top is spinning but for convenience in packing the parts in a small container for shipping purposes it is desirable to detach the spinning means from the top. The preferred form of the spinning means is shown in Figs. 2 and 3 and consists of a tube 33 carrying a tightly fitting cap 34 at the upper end thereof. The said cap 34 is provided with an oblong hole 35 located centrally of the upper face thereof and is adapted to form a free fitting threaded connection with the screw 46. The lower end of the tube 33 is cut to form a series of downwardly beveled teeth 36 which function as a clutch drive member. A resilient detent 37 is formed on the side of the tube 33 near the lower end thereof and projects slightly inward of the inner surface of the tube 33. This detent 37 may be a simple indentation of the tube at the point 37 and depending on elasticity of the tube 33 for resiliency. For the purpose of increasing the resiliency of the detent 37 it is preferable to cut away a portion of the tube 33 as shown at 38 leaving a prong 39 with the detent 37 located at the lower end of the said prong 39. A sleeve 40 is journaled on the shaft 1 and has limited vertical movement thereon. A collar 41, rigidly attached to the upper end of the shaft 1, serves to limit upward movement of the sleeve 40 and the upper end of the pinion 10 limits downward movement of the sleeve 40. A compression spring 42 loosely surrounds the shaft 1 between the pinion 10 and the sleeve 40 and acts to normally sustain the sleeve 40 at its uppermost position. The said spring 42 extends upwardly into a counterbore in the lower end of the sleeve 40, the said spring 42 being entirely enclosed within the counter-bore 43 when the sleeve 40 is forced down to its lower limit of motion. The outer surface of the sleeve 40 is provided with a recess or groove 44 which coacts with the detent 37 of the tube 33. The lower end of the tube 33 fits loosely over the sleeve 40 and is normally held in position thereon by the detent 37 which enters the groove 44 and contacts the lower edge of the said groove 44, whereby the tube 33 is normally supported with the teeth 36 slightly clearing the upper end of the teeth of the pinion 10. The teeth 36 are spaced to interlock with and drivingly engage the upper ends of the teeth of the pinion 10 at 45 when the tube 33 is forced downward, in which event the pinion 10 will function as the driven member of a one-way clutch. The screw 46 is preferably formed of twisted flat wire and fits freely within the tube 33 and is guided thereby.

A nub 47 projecting from the surface of the screw 46, adjacent the lower end thereof, is adapted to contact the cap 34 and thereby limit upward movement of the screw 46. A handle 47a, which is preferably made of wood, is drivingly connected to the upper end of the screw 46 75

thru a clutch means which engages when the handle 47 is pressed downward and disengages when the said handle is lifted. This clutch means consists of a disc 48 carrying downwardly projecting prongs or teeth 49, the said disc 48 being fixed in the top of a hole 50 drilled in the wood handle 47. A bushing 51 fits tightly in a counter-bore in the lower end of the hole 50, the hole in the bushing 51 being sized to permit free rotation of the handle 47 on the screw 46. Burrs 52, projecting from opposite edges of the screw 46, prevent withdrawal of the said screw 46 from the hole 50. A washer 53 serves as a thrust bearing between the burrs 52 and the bushing 51, serving to reduce friction when the handle 47 is being lifted.

In the construction shown in Figs. 2 and 3 I have provided two clutch connections between the handle 47 and the pinion 10, one at 49 in the handle 47 and one at 36 at the lower end of the tube 33. It will be readily seen that the construction shown in Figs. 2 and 3 is operable should the clutch connection 49 be eliminated and the handle 47 be fastened rigidly to the top of the screw 46. If so constructed the device would operate as follows: Reciprocation of the screw 46 vertically, while the handle 47 is grasped, thus preventing rotation of the screw 46, will cause alternately reversing rotations of the tube 33 about the vertical axis thereof. During upward movement of the screw 46 the tube 33 remains at its upper position with the clutch teeth 36 out of engagement with the pinion 10. Downward movement of the screw 46 will first cause the tube 33 and the sleeve 40 to be forced downward, causing the teeth 36 to engage with the upper end of the teeth of the pinion 10 at 45. Continuance of downward movement of the screw 46 will cause rotation of the pinion 10 and thereby rotation of the frame 6. When downward movement of the screw 46 ceases the teeth 36 disengage from the pinion 10, the spring 42 then acting to raise the sleeve 40 and the tube 33, thus permitting the frame 6 to continue to rotate freely through momentum. Repeated oscillations of the screw 46 at increasing downward speed will increase the speed of the spinning top. While this construction, with the handle 47 rigidly attached to the screw 46, is operable in the manner above described, it has been found to possess one inherent fault which frequently causes excessive resistance to upward movement of the screw 46 while it is being operated to spin the top. This resistance or upward drag is often sufficient to cause the top to be lifted bodily upward before the screw 46 has been raised to its upper limit of motion in the tube 33. This resistance or drag is due to gyroscopic action of the top tending to resist any tilting caused by the handle 47 while it is being reciprocated and thereby causing binding at the bearing surfaces of the sleeve 40. It is apparent that binding at the bearing surfaces of the sleeve 40 will prevent free rotation of the tube 33 about the shaft 1 resulting in resistance to free upward movement of the screw 46. To eliminate this objectionable binding action I have provided the previously described clutch connection at 49 between the handle 47 and the screw 46. This clutch connection 49 disengages when the handle 47 is lifted thereby permitting the screw 46 to revolve freely, in the event that binding occurs at the bearing surfaces of the sleeve 40 and thereby preventing free revolution of the tube 33. It may be noted that in this construction all parts

of the spinning means remain stationary with the shaft 1 when the top is spinning freely.

It is preferable that the connecting means between the shaft 1, the frame 6 and the pinion 10 be so related, as shown herein, that the frame 6 will be caused to rotate at a greater rotational speed than the pinion 10 when the pinion 10 is being rotated. This construction enables the operator to easily attain high rotational speed of the frame 6 while reciprocating the screw 46 at a moderate rate of speed. This feature is particularly advantageous in that the top so constructed is very easy to operate and is therefore a suitable toy for those too young or too inexperienced to operate the ordinary type of top.

Figs. 4 and 5 illustrate a modification of the spinning means in which the pinion 10' is provided with an upwardly extending hub 54. The tube 33' is frictionally held in position on the said hub 54 and rotates therewith. The upper end of the tube 33' is provided with a series of beveled teeth 36' which function as a driven clutch member. A toothed disc 55 carries downwardly extending teeth 56 adjacent the periphery thereof, the said teeth 56 being adapted to engage with the teeth 36' on the tube 33' and forming therewith a one-way clutch. The disc 55 is provided with a centrally located oblong hole 35' adapted to threadedly engage the screw 46'. The said disc 55 fits freely within a cap 57 and is adapted to rotate about its vertical axis therein. The cap 57 fits tightly the upper end of the tube 33' and is vertically positioned thereon to provide clearance above the tube teeth 36' for the disc 55 to revolve freely when the teeth 36' and 56 are out of engagement. A round hole 58 thru the center of the cap 57 is sized to act as a free fitting guide for the screw 46'. The wood handle 47' is fixedly attached to the upper end of the screw 46'. When the screw 46' is lifted the disc 55 revolves freely within the cap 57 causing the teeth 56 to over-run the teeth 36'. Downward movement of the screw 46' will first cause the disc 55 to move down and so cause the teeth 36' to drivingly engage the teeth 56. Continuance of downward movement of the screw 46' will cause rotation of the tube 3' and thereby the pinion 10' and the frame 6 will be rotated. This spinning means may be detached from the top by removing the tube 33' from the hub 54. In this modified construction all parts of the spinning means revolve with the pinion 10' when the top is spinning freely.

What I claim as my invention and desire to secure by Letters Patent is:

1. In a spinning top, an upright supporting shaft adapted for endwise ground contact, a frame rotatably mounted upon the shaft, a drive member journaled upon the shaft and connected to the frame through speed reduction driving means and vertically disposed spinning means supported by the shaft and axially in line therewith, said spinning means being adapted to engage the drive member and apply rotational force thereto, said spinning means comprising a vertically reciprocable screw, a handle attached to the upper end of the said screw, a revolvable tube in which the screw reciprocates and with which the said screw has threaded connection, and clutch connection between the screw and the drive member.

2. In a spinning top, an upright supporting shaft adapted for endwise ground contact, a frame rotatably mounted upon the shaft, vertically disposed spinning means supported by the

shaft and axially in line therewith and being adapted to engage the frame and apply rotary force thereto, said spinning means comprising a vertically reciprocable screw, a handle connected to the upper end of the said screw through a one-way clutch drive, a revoluble tube in which the screw reciprocates, and a one-way clutch connection between the tube and the frame, whereby downward force applied to the handle, while it is grasped to prevent it from turning, will cause engagement of both of said clutch connections and will cause rotational force to be applied to the frame, and upward movement of the handle will release both of said clutch connections.

3. In a spinning top, an upright supporting shaft adapted for endwise ground contact, a frame rotatably mounted upon the shaft, drive clutch means associated with the frame and concentric with the shaft, a sleeve free upon the shaft positioned above the frame and having limited vertical movement on the shaft, a spring

acting to normally sustain the sleeve at its upper limit of movement, and manually operable spinning means positioned above the frame and axially in line with the shaft, carrying driving clutch means at its lower end, said spinning means being supported by the sleeve and having vertical movement therewith.

4. In a spinning top, a shaft, a frame rotatably mounted thereon, two sets of exteriorly exposed color discs arranged upon and mounted for rotation on said frame and journaled eccentric to the shaft, the first set of discs being provided with toothed peripheries and superimposed and partially overlapping the second set of discs, the overlapping first set of discs having portions adjacent to and raised above the toothed peripheries thereof and constituting guards thereagainst, and means on the shaft for engagement with said discs for imparting rotary motion to the discs relative to the frame when the frame is rotated.

EDWARD S. SAVAGE.