

# US Patent & Trademark Office

## Patent Public Search | Text View

United States Patent Application Publication

20250256211

Kind Code

A1

Publication Date

August 14, 2025

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### SPINNING TOP TOY

#### Abstract

A spinning top toy includes a spinning top accelerator and a spinning top body movably connected with the spinning top accelerator. The spinning top accelerator includes a housing and a driving device, a clamping assembly and an injection pushing assembly disposed in the housing. The driving device includes a case and an acceleration gear set which is rotatably provided in the case. A gravity block is slidably provided on the case, and the gravity block is drivingly connected to the acceleration gear set. The clamping assembly is drivingly connected to the acceleration gear set, and is used to movable clamp the spinning top body. The injection pushing assembly is used to push the spinning top body. When the gravity block slides back and forth on the case by swinging, the gravity block drives the acceleration gear set to rotate, thereby driving the clamping assembly to rotate.

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<b>Family ID:</b>	89383915
<b>Appl. No.:</b>	18/702397
<b>Filed (or PCT Filed):</b>	March 03, 2023
<b>PCT No.:</b>	PCT/CN2023/079564

#### Foreign Application Priority Data

CN	202210758455.4	Jun. 30, 2022
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#### Publication Classification

**Int. Cl.:** A63H1/02 (20060101)

**U.S. Cl.:**

**CPC** A63H1/02 (20130101);

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## **Background/Summary**

CROSS-REFERENCE TO RELATED APPLICATIONS [0001] This application claims priority to PCT/CN2023/079564 filed on Mar. 3, 2023, which claims priority to Chinese Patent Application No. 202210758455.4 filed on Jun. 30, 2022. The entire contents of both are hereby incorporated by reference.

### **FIELD OF TECHNOLOGY**

[0002] The following relates to the technical field of toys, and in particular to a spinning top toy.

### **BACKGROUND**

[0003] Toys are tools for intellectual development and entertainment. With the continuous improvement of people's living standards, users' pursuit of the quality and functionality of toys is also getting higher and higher. Among them, projectile toys based on spinning tops have attracted a large number of fans and users due to animation movies and their unique gameplay.

[0004] However, existing projectile toys usually use rack acceleration to accelerate and rotate the spinning top. Specifically, a rack first passes through a driving gear, and then the rack is pulled to drive the driving gear to rotate, and then the driving gear drives the spinning top to rotate and accelerate. This kind of spinning top toy can usually only be accelerated once. After the rack is pulled out, it cannot be accelerated twice, causing the spinning top to be unable to obtain more rotational potential energy. In addition, a user must use both hands to operate through a driving method of the rack acceleration. This makes driving and acceleration of the spinning top cumbersome, time-consuming and labor-intensive, and reduces the fun of the spinning top toy.

### **SUMMARY**

[0005] According to an aspect of this disclosure, a spinning top toy is disclosed. The spinning top toy includes a spinning top accelerator and a spinning top body movably connected with the spinning top accelerator; wherein, the spinning top accelerator includes a housing and a driving device, a clamping assembly and an injection pushing assembly disposed in the housing, the driving device includes a case and an acceleration gear set which is rotatably provided in the case, a gravity block is slidably provided on the case, and the gravity block is drivingly connected to the acceleration gear set; the clamping assembly is drivingly connected to the acceleration gear set, and is used to movable clamp the spinning top body; the injection pushing assembly is used to push the spinning top body; when the gravity block slides back and forth on the case by swinging, the gravity block drives the acceleration gear set to rotate, thereby driving the clamping assembly to rotate.

[0006] In some embodiments, the acceleration gear set is rotatably disposed inside the case, a first opening is provided on one side of the case, and at least a portion of the acceleration gear set extends out of the first opening of the case; a first driving rack is provided on one side of the gravity block, and the first driving rack is cooperatively and drivingly connected with the portion of the acceleration gear set extending out of the first opening of the case.

[0007] In some embodiments, the acceleration gear set includes a first active gear, a first clutch gear and a driving gear, the case is provided with a first arc-shaped groove, the first active gear and the driving gear are respectively rotatably provided in the case, and the first active gear meshes with the first clutch gear; the first clutch gear is slidably disposed in the first arc-shaped groove,

when the first clutch gear slides to one end of the first arc-shaped groove, the first clutch gear meshes with the driving gear, and when the first clutch gear slides to other positions of the first arc-shaped groove, the first clutch gear and the driving gear do not contact each other; at least a portion of the first active gear extends out of the first opening of the case, and the portion of the first active gear extending out of the first opening is cooperatively and drivingly connected with the first driving rack of the gravity block.

[0008] In some embodiments, a second opening is provided on the other side of the case, and a second driving rack is provided on the other side of the gravity block; the acceleration gear set also includes a second active gear and a second clutch gear; the case is provided with a second arc-shaped groove; the second clutch gear is slidably disposed in the second arc-shaped groove, and the second clutch gear meshes with the second active gear; when the second clutch gear slides to one end of the second arc-shaped groove, the second clutch gear meshes with the driving gear; when the second clutch gear slides to other positions of the second arc-shaped groove, the second clutch gear and the driving gear do not contact each other.

[0009] In some embodiments, at least a portion of the second active gear extends out of the second opening of the case, and the portion of the second active gear extending out of the second opening is cooperatively and drivingly connected with the second driving rack of the gravity block; the second active gear, the second clutch gear and the second arc-shaped groove are respectively arranged symmetrically with the first active gear, the first clutch gear and the first arc-shaped groove with respect to the driving gear.

[0010] In some embodiments, guide slide rods are provided in parallel on both sides of the case, and both sides of the gravity block are respectively slidably sleeved on the guide slide rods on both sides of the case.

[0011] In some embodiments, the clamping assembly includes a magnetic sleeve, which is drivingly connected to the acceleration gear set; the magnetic sleeve has a cylindrical structure with an open lower end, a magnetic unit is provided on the top of an inner wall of the magnetic sleeve, and a magnet unit is provided on the top of the spinning top body; the spinning top body is attracted and connected to the magnetic unit of the magnetic sleeve through the magnet unit on the top of the spinning top body.

[0012] In some embodiments, the clamping assembly also includes a transmission gearbox and a passive gear rotatably arranged in the transmission gearbox; the transmission gearbox is fixed below the acceleration gear set of the driving device, the passive gear and the acceleration gear set is drivingly connected, and the passive gear is coaxially fixedly connected with the magnetic sleeve.

[0013] In some embodiments, one or more transmission gears are arranged between the passive gear and the acceleration gear set, and the passive gear, the one or more transmission gears and the acceleration gear set are drivingly connected in sequence.

[0014] In some embodiments, the housing is a cavity structure with upper and lower openings, the injection pushing assembly includes an injection pushing rod and a return spring, an upper end of the injection pushing rod is located at the upper opening of the housing, a middle part of the injection pushing rod is connected to an inner wall of the housing through the return spring, and a lower end of the injection pushing rod is located on an outer peripheral side of the magnetic sleeve.

[0015] In the spinning top toy of this application, the driving device swings the gravity block back and forth, so that the gravity block continuously accelerates and rotates the acceleration gear set. Particularly, the acceleration gear set is driven and accelerated through the driving rack(s) on one side or both sides of the gravity block, and the one or two clutch gears in the acceleration gear set ensure the one-way rotation of the driving gear, thus avoiding a bidirectional rotation of the driving gear due to the back and forth swing of the gravity block. As a result, the driving gear always maintains the one-way rotation, and then the driving device drives the clamping assembly to rotate,

the clamping assembly drives and stores energy in the spinning top body. Finally, the spinning top after rotation and energy storing is ejected out through the injection pushing assembly.

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## Description

### BRIEF DESCRIPTION

[0016] Some of the embodiments will be described in detail, with references to the following Figures, wherein like designations denote like members, wherein:

[0017] FIG. 1 is a schematic diagram of an internal structure of a spinning top toy of the present application;

[0018] FIG. 2 is another schematic diagram of the internal structure of the spinning top toy of the present application;

[0019] FIG. 3 is a schematic diagram of an external structure of the spinning top toy of the present application;

[0020] FIG. 4 is a schematic structural diagram of the spinning top accelerator of the spinning top toy of the present application;

[0021] FIG. 5 is a schematic structural diagram of an injection pushing assembly of the spinning top toy of the present application;

[0022] FIG. 6 is a schematic diagram of a connection between a driving device and a spinning top body of the spinning top toy of the present application;

[0023] FIG. 7 is a schematic structural diagram of the driving device of the spinning top toy of the present application;

[0024] FIG. 8 is another structural schematic diagram of the driving device of the spinning top toy of the present application;

[0025] FIG. 9 is an exploded schematic diagram of the driving device of the spinning top toy of the present application;

[0026] FIG. 10 is a schematic structural diagram of a case of the driving device of the spinning top toy of the present application;

[0027] FIG. 11 is a schematic structural diagram of an acceleration gear set of the driving device of the spinning top toy of the present application;

[0028] FIG. 12 is a schematic diagram of a bottom structure of a clamping assembly of the spinning top toy of the present application;

[0029] FIG. 13 is a schematic diagram of an internal structure of the clamping assembly of the spinning top toy of the present application;

[0030] FIG. 14 is a schematic structural diagram of the spinning top body of the spinning top toy of the present application;

[0031] FIG. 15 is an exploded schematic diagram of the spinning top body of the spinning top toy of the present application; and

[0032] FIG. 16 is a schematic diagram of a connection between the driving device and the spinning top body according to embodiment 3 of the present application.

### DETAILED DESCRIPTION

[0033] To further explain various embodiments, the present application provides drawings. These drawings are part of the disclosure of the present application, and are mainly used to illustrate the embodiments, and may be used to explain the operating principles of the embodiments in conjunction with the relevant descriptions in the specification. With reference to these contents, those of ordinary skill in the conventional art will be able to understand other possible implementations and advantages of the present application.

[0034] In the description of the present application, it should be understood that an orientation or position relationship indicated by terms “center”, “longitudinal”, “transverse”, “length”, “width”,

“thickness”, “upper”, “lower”, “left”, “right”, “top”, “bottom”, “inner”, “outer”, “axis”, “radial”, “circumferential”, etc. are based on the orientation or position relationship shown in the drawings. This is only to facilitate the description of the present application and to simplify the description, and does not indicate or imply that the device or element referred to must have a specific orientation, be constructed and operated in a specific orientation, and therefore no limitations to the present application can be understood.

#### Embodiment 1

[0035] Please refer to FIGS. 1 to 15. FIG. 1 is a schematic diagram of an internal structure of a spinning top toy of the present application; FIG. 2 is another schematic diagram of the internal structure of the spinning top toy of the present application; FIG. 3 is a schematic diagram of an external structure of the spinning top toy of the present application; FIG. 4 is a schematic structural diagram of the spinning top accelerator of the spinning top toy of the present application; FIG. 5 is a schematic structural diagram of an injection pushing assembly of the spinning top toy of the present application; FIG. 6 is a schematic diagram of a connection between a driving device and a spinning top body of the spinning top toy of the present application; FIG. 7 is a schematic structural diagram of the driving device of the spinning top toy of the present application; FIG. 8 is another structural schematic diagram of the driving device of the spinning top toy of the present application; FIG. 9 is an exploded schematic diagram of the driving device of the spinning top toy of the present application; FIG. 10 is a schematic structural diagram of a case of the driving device of the spinning top toy of the present application; FIG. 11 is a schematic structural diagram of an acceleration gear set of the driving device of the spinning top toy of the present application; FIG. 12 is a schematic diagram of a bottom structure of a clamping assembly of the spinning top toy of the present application; FIG. 13 is a schematic diagram of an internal structure of the clamping assembly of the spinning top toy of the present application; FIG. 14 is a schematic structural diagram of the spinning top body of the spinning top toy of the present application; FIG. 15 is an exploded schematic diagram of the spinning top body of the spinning top toy of the present application.

[0036] This embodiment provides a spinning top toy, which includes a spinning top accelerator **100** and a spinning top body **200** movably connected to the spinning top accelerator **100**; the spinning top accelerator **100** includes a housing **10** and a driving device **20**, a clamping assembly **30** and an injection pushing assembly **40** disposed in the housing **10**. The driving device **20** includes a case **21** and an acceleration gear set **22**. The acceleration gear set **22** is rotatably provided in the case **21**, and a gravity block **23** is slidably provided on the case **21**. The gravity block **23** is drivingly connected to the acceleration gear set **22**; the clamping assembly **30** is drivingly connected to the acceleration gear set **22**, and the clamping assembly **30** is used to movable clamp the spinning top body **200**; the injection pushing assembly **40** is used to push the spinning top body **200**; when the gravity block **23** slides back and forth on the case **21** by swinging, the gravity block **23** drives the acceleration gear set **22** to rotate, thereby driving the clamping assembly **30** to rotate.

[0037] Specifically, the acceleration gear set **22** is rotatably disposed inside the case **21**, a first opening is provided on one side of the case **21**, and at least a portion of the acceleration gear set **22** extends out of the first opening of the case **21**; a first driving rack **231** is provided on one side of the gravity block **23**, and the first driving rack **231** is cooperatively and drivingly connected with the portion of the acceleration gear set **22** extending out of the first opening of the case **21**.

[0038] In order to ensure that an output end of the acceleration gear set **22** is able to rotate in one direction when the gravity block **23** slides back and forth on the case **21**, the acceleration gear set **22** in this embodiment includes a first active gear **24**, a first clutch gear **25** and a driving gear **26**. The case **21** is provided with a first arc-shaped groove **211**. The first active gear **24** and the driving gear **26** are respectively rotatably provided in the case **21**, and the first active gear **24** meshes with the first clutch gear **25**. The first clutch gear **25** is slidably disposed in the first arc-shaped groove **211**. When the first clutch gear **25** slides to one end of the first arc-shaped groove **211**, the first

clutch gear **25** meshes with the driving gear **26**. When the first clutch gear **25** slides to other positions of the first arc-shaped groove **211**, the first clutch gear **25** and the driving gear **26** do not contact each other.

[0039] Further, at least a portion of the first active gear **24** extends out of the first opening of the case **21**, and the portion of the first active gear **24** extending out of the first opening is cooperatively and drivingly connected with the first driving rack **231** of the gravity block **23**. Wherein, in order to enable the gravity block **23** to better drive the first active gear **24** when sliding back and forth, the first opening of this embodiment is provided in the middle of one side of the case **21**, and a length of the first driving rack **231** is slightly longer than half a length of one side of the case **21**. In this way, when the gravity block **23** slides back and forth, since the first opening is located in the middle of one side of the case **21** and the length of the first driving rack **231** is just longer than half the length of one side of the case **21**, the first driving rack **231** always meshes with and is connected to the first active gear **24**. Moreover, a travel distance of the first driving rack **231** in back and forth sliding that may drive the first active gear **24** to rotate is half the length of one side of the case **21**, thereby allowing that the gravity block **23** may better drive the first active gear **24**.

[0040] It should be noted that in this embodiment the first opening is not limited to being located in the middle of one side of the case **21**. It may also be located in other positions on one side of the case **21**. Correspondingly, the length of the first driving rack **231** is not limited to the above length, and other lengths of the driving rack may also be used.

[0041] Therefore, the acceleration gear set **22** of this embodiment is provided with a slidable first clutch gear **25**, and a first arc-shaped groove **211** matching the first clutch gear **25** is provided on the case **21**, allowing that a rotating shaft of the first clutch gear **25** may slide in the first arc-shaped groove **211**. In addition, the first active gear **24** of this embodiment always meshes with the first clutch gear **25**, when the gravity block **23** slides along a left direction, the first driving rack **231** drives the first active gear **24** to rotate clockwise. At the same time, the first active gear **24** drives the first clutch gear **25** to rotate counterclockwise. At this time, the first clutch gear **25** slides to one end of the first arc-shaped groove **211** close to the driving gear **26** under a pushing action of the first active gear **24**, and meshes with and is connected with the driving gear **26**. At the same time, due to the pushing action of the first active gear **24**, the first clutch gear **25** always meshes with the driving gear **26**. That is to say, when the gravity block **23** slides to the left, the first driving rack **231** drives the first active gear **24**, the first clutch gear **25** and the driving gear **26** to rotate in sequence.

[0042] When the gravity block **23** slides along a right direction, the first driving rack **231** drives the first active gear **24** to rotate counterclockwise, and at the same time the first active gear **24** drives the first clutch gear **25** to rotate clockwise. At this time, the first clutch gear **25** slides to one end of the first arc-shaped groove **211** away from the driving gear **26** under the pushing action of the first active gear **24**, and is not in contact with the driving gear **26**. Due to the pushing action of the first active gear **24**, the first clutch gear **25** remains disengaged from the driving gear **26** at all times. That is to say, when the gravity block **23** slides to the right, the first driving rack **231** drives the first active gear **24** and the first clutch gear **25**, and the driving gear **26** continues to rotate in its original direction since it is disengaged from the first clutch gear **25**.

[0043] Therefore, in this embodiment, a position of the first arc-shaped groove **211** is cleverly set, and when the first clutch gear **25** moves to one end of the first arc-shaped groove **211**, the first clutch gear **25** meshes with the driving gear **26**. When the first clutch gear **25** slides to other positions of the first arc-shaped groove **211**, the first clutch gear **25** and the driving gear **26** do not contact each other, so that a rotation direction of the driving gear **26** is kept unchanged through a back and forth sliding motion of the gravity block **23**.

[0044] In addition, in the acceleration gear set **22** of this embodiment, one or more first driven gears **241** are drivingly connected between the first active gear **24** and the first clutch gear **25**.

[0045] In some embodiments, first protrusions **214** are respectively provided at both ends of the

side of the case **21** provided with the first opening, and a guide slide rod **213** is provided between the two first protrusions **214**. The gravity block **23** is slidably sleeved on the guide slide rod **213** of the case **21**. In this embodiment, a first guide seat **234** is provided between the first driving rack **231** of the gravity block **23** and the gravity block **23**. The first guide seat **234** is provided with a first guide hole which is slidably sleeved on the guide slide rod **213**.

[0046] Therefore, in the case **21** of this embodiment, by providing the two first protrusions **214**, which may serve as an installation structure for the guide slide rod **213**, and may also serve as a limiting structure for the first driving rack **231**, it may effectively prevent the first driving rack **231** from sliding out of the guide slide rod **213**, making a reciprocating sliding of the gravity block **23** safe and effective.

[0047] In order to make the gravity block **23** slide more smoothly, in this embodiment, one or more sliding wheels **233** are provided at the bottom of the gravity block **23**, and the gravity block **23** is slidably disposed on an upper surface of the case **21** through the one or more sliding wheels **233**. In this way, a surface-to-surface contact friction between the gravity block **23** and the case **21** is avoided, making a sliding movement of the gravity block **23** relative to the case **21** smoother.

[0048] In order to further ensure smooth and stable sliding of the gravity block **23**, the other side of the case **21** in this embodiment is also provided with the guide slide rod **213**, and the guide slide rods **213** on both sides of the case **21** are parallel to each other. Correspondingly, second protrusions **215** are respectively provided at both ends of the other side of the case **21**. The guide slide rod **213** is provided between the two second protrusions **215**, and a second guide seat **235** is provided at the bottom of the other side of the gravity block **23**. The second guide seat **235** is provided with a second guide hole. In this way, both sides of the gravity block **23** are slidably sleeved on the guide slide rods **213** on both sides of the case **21** through the first guide hole and the second guide hole respectively. Combined with one or more sliding wheels **233** at the bottom of the gravity block **23**, a sliding of the gravity block **23** relative to the case **21** is more stable and smooth, which is also beneficial to a meshing drive between the first driving rack **231** of the gravity block **23** and the acceleration gear set **22**.

[0049] In this embodiment, the spinning top accelerator **100** includes a housing **10** with upper and lower openings. The case **21** of the driving device **20** is fixed inside the housing **10**. The clamping assembly **30** includes a transmission gearbox **31** and a magnetic sleeve **32**. The transmission gearbox **31** is fixed below the case **21** of the driving device **20**, and the bottom of the case **21** is provided with a through hole. The transmission gearbox **31** is rotatably provided with a passive gear **33**. The passive gear **33** meshes and is connected to the driving gear **26** of the driving device **20**. The magnetic sleeve **32** is arranged below the transmission gearbox **31**, and the magnetic sleeve **32** is coaxially fixedly connected with the passive gear **33**. Therefore, the magnetic sleeve **32** of this embodiment is used to attract and clamp the spinning top body **200**.

[0050] Further, in this embodiment, the magnetic sleeve **32** has a cylindrical structure with an open lower end, and a magnetic unit **34** is provided on the top of an inner wall of the magnetic sleeve **32**. In addition, a top center of the spinning top body **200** of this embodiment is provided with a magnetic protrusion **50** protruding upward, and a magnet unit **51** is provided inside the magnetic protrusion **50**. In this way, the magnetic unit **34** in the magnetic sleeve **32** may be used to attract the spinning top body **200** with the magnet unit **51** on the top and fix the spinning top body **200** by attraction. Therefore, the spinning top accelerator **100** of this embodiment may drive the passive gear **33** to rotate through the driving gear **26** of the driving device **20**, and at the same time drive the magnetic sleeve **32** to rotate, and then drive the spinning top body **200** that is attracted and clamped by the magnetic sleeve **32** to rotate and store energy.

[0051] In order to ensure the stability of the connection between the spinning top body **200** and the magnetic sleeve **32**, in this embodiment, the magnetic protrusion **50** of the spinning top body **200** have a polygonal cylinder structure. Correspondingly, interior of the magnetic sleeve **32** is a polygonal cavity structure. In this way, when the magnetic sleeve **32** is attracted and connected to

the spinning top body **200**, the polygonal cylinder structure design may effectively prevent the two from being displaced from each other during rotation.

[0052] In addition, the injection pushing assembly **40** of this embodiment includes an injection pushing rod **41** and a return spring **42**. An upper end of the injection pushing rod **41** is located at an upper opening of the housing **10**, a middle part of the injection pushing rod **41** is connected to an inner wall of the housing **10** through the return spring **42**, and a lower end of the injection pushing rod **41** is located on an outer peripheral side of the magnetic sleeve **32**. Therefore, by pressing the upper end of the injection pushing rod **41** downward, the injection pushing rod **41** moves downward and compresses the return spring **42**. At the same time, the lower end of the injection pushing rod **41** moves downward quickly and may quickly push the spinning top in the magnetic sleeve **32** out from the lower opening of the housing **10**; after loosening the upper end of the injection pushing rod **41**, the injection pushing rod **41** quickly moves up and resets under an action of the return spring **42**.

[0053] Further, in order to reduce a friction force generated when the injection pushing rod **41** pushes the spinning top body **200**, in this embodiment, an arc-shaped pushing ring **43** is provided at a bottom of the injection pushing rod **41**, and the arc-shaped pushing ring **43** is located on an outer peripheral side of the magnetic sleeve **32**. A number of pulleys **44** are provided at intervals at a bottom of the arc-shaped pushing ring **43**. In this way, when the arc-shaped pushing ring **43** of the injection pushing rod **41** is about to touch the spinning top body **200** that rotates at a high speed, the pulleys **44** at the bottom of the arc-shaped pushing ring **43** may first contact the spinning top body **200**, and the pulleys **44** are driven to rotate under the high-speed rotation of the spinning top body **200**. This may greatly reduce the friction force generated when the injection pushing rod **41** pushes the spinning top body **200**, and preserve more of a rotational potential energy of the spinning top body **200**.

[0054] In this embodiment, the driving device **20** is operated by a user holding the housing **10** of the spinning top accelerator **100** and rocking it left and right. Under the action of inertia, the gravity block **23** keeps sliding left and right along with the housing **10** to perform a reciprocating motion, and at the same time drives the acceleration gear set **22** to rotate, so that the driving gear **26** of the acceleration gear set **22** drives the passive gear **33** to rotate, and finally drives the spinning top body **200** in the magnetic sleeve **32** to rotate and store energy. After storing energy, the spinning top body **200** may be ejected out through the injection pushing rod **41**.

[0055] Furthermore, in this embodiment, a magnetic connection between the magnetic sleeve **32** and the spinning top body **200** is provided, so that the spinning top body **200** after being ejected may be quickly recovered to continue to accelerate and store energy. During a specific operation, it only need to roughly align an opening of the magnetic sleeve **32** with the magnetic protrusion **50** of the rotating spinning top body **200**, and the spinning top body **200** may be quickly re-attracted and clamped in the magnetic sleeve **32** under the magnetic attraction of the two, and through rocking the housing **10** left and right again to re-accelerate and to rotate the spinning top body **200**, thereby making the spinning top toy of the present application more entertaining and playable.

[0056] In some embodiments, one or more third driven gears **35** may be disposed between the passive gear **33** and the driving gear **26**. In order to clearly distinguish a rocking direction of the gravity block **23**, recessed portions **11** are provided on both sides of the housing **10** in this embodiment, and a connection line of the two recessed portions **11** is parallel to a sliding direction of the gravity block **23**. In this way, the user may distinguish the rocking direction of the gravity block **23** by holding the two recessed portions **11**.

[0057] Therefore, in the spinning top toy of this embodiment, the driving device **20** swings the gravity block **23** back and forth, so that the gravity block **23** continuously accelerates and rotates the acceleration gear set **22**. Particularly, the acceleration gear set **22** is driven and accelerated through the first driving rack **231** on one side of the gravity block **23**, and the first clutch gear **25** in the acceleration gear set **22** ensures the one-way rotation of the driving gear **26**, thus avoiding a



bidirectional rotation of the driving gear **26** due to the back and forth swing of the gravity block **23**. As a result, the driving gear **26** always maintains the one-way rotation, and drives the passive gear **33** and the magnetic sleeve **32** to rotate synchronously, thereby accelerates and stores energy in the spinning top body **200** attracted in the magnetic sleeve **32**. Finally, a stored energy spinning top body **200** is ejected out from the lower opening of the housing **10** through the injection pushing rod **41**. Therefore, the spinning top toy of the present application is easy to operate, has a novel and interesting driving method, expands the functionality and fun of the driving device **20**, and has high marketing value.

## Embodiment 2

[0058] With reference to FIGS. **1** to **15**, this embodiment is substantially the same as Embodiment 1. The difference is that in this embodiment, a second opening is provided on the other side of the case **21**, and a second driving rack **232** is provided on the other side of the gravity block **23**; the acceleration gear set **22** also includes a second active gear **27** and a second clutch gear **28**; the case **21** is provided with a second arc-shaped groove **212**; the second clutch gear **28** is slidably disposed in the second arc-shaped groove **212**, and the second clutch gear **28** meshes with the second active gear **27**; when the second clutch gear **28** slides to one end of the second arc-shaped groove **212**, the second clutch gear **28** meshes with the driving gear **26**; when the second clutch gear **28** slides to other positions of the second arc-shaped groove **212**, the second clutch gear **28** and the driving gear **26** do not contact each other.

[0059] In this embodiment, at least a portion of the second active gear **27** extends out of the second opening of the case **21**, and the portion of the second active gear **27** extending out of the second opening is cooperatively and drivingly connected with the second driving rack **232** of the gravity block **23**. The second active gear **27**, the second clutch gear **28** and the second arc-shaped groove **212** are respectively arranged symmetrically with the first active gear **24**, the first clutch gear **25** and the first arc-shaped groove **211** with respect to the driving gear **26**.

[0060] That is to say, compared with Embodiment 1, the case **21** of this embodiment is further provided with the second opening and the second arc-shaped groove **212**, and the second opening is provided in the middle of the other side of the case **21**. The second arc-shaped groove **212** and the first arc-shaped groove **211** are arranged symmetrically with respect to the driving gear **26**; and the acceleration gear set **22** of this embodiment is further provided with the second active gear **27** and the second clutch gear **28**, and the second active gear **27** and the second clutch gear **28** are arranged symmetrically with the first active gear **24** and the first clutch gear **25** in Embodiment 1 with respect to the driving gear **26**; correspondingly, the other side of the gravity block **23** is provided with the second driving rack **232**, the second guide seat **235** is provided between the second driving rack **232** and the gravity block **23**, and the second driving rack **232** and the first driving rack **231** are arranged symmetrically with respect to the case **21**.

[0061] Therefore, when the gravity block **23** of this embodiment slides along the left direction, the first driving rack **231** drives the first active gear **24** to rotate clockwise, and at the same time, the first active gear **24** drives the first clutch gear **25** to rotate counterclockwise. At this time, the first clutch gear **25** slides to one end of the first arc-shaped groove **211** close to the driving gear **26** under a pushing action of the first active gear **24** and meshes with the driving gear **26**. At the same time, due to the pushing action of the first active gear **24**, the first clutch gear **25** always meshes with the driving gear **26**. The second driving rack **232** drives the second active gear **27** to rotate counterclockwise, and at the same time the second active gear **27** drives the second clutch gear **28** to rotate clockwise. At this time, the second clutch gear **28** slides to one end of the second arc-shaped groove **212** away from the driving gear **26** and is not in contact with the driving gear **26** under pushing action of the second active gear **27**, and due to the pushing action of the second active gear **27**, the second clutch gear **28** remains disengaged from the driving gear **26** at all times.

[0062] That is to say, when the gravity block **23** drives the first driving rack **231** and the second driving rack **232** to slide to the left, the first driving rack **231** drives the driving gear **26** to rotate,

and due to the second clutch gear **28** and the driving gear **26** are not in contact with each other, and the second clutch gear **28** is idling so that the second driving rack **232** does not drive the driving gear **26** to rotate.

[0063] When the gravity block **23** slides along the right direction, the first driving rack **231** drives the first active gear **24** to rotate counterclockwise, and at the same time the first active gear **24** drives the first clutch gear **25** to rotate clockwise. At this time, the first clutch gear **25** slides to one end of the first arc-shaped groove **211** away from the driving gear **26** and is not in contact with the driving gear **26** under pushing action of the first active gear **24**. Due to the pushing action of the first active gear **24**, the first clutch gear **25** remains disengaged from the driving gear **26** at all times. The second driving rack **232** drives the second active gear **27** to rotate clockwise, and at the same time the second active gear **27** drives the second clutch gear **28** to rotate counterclockwise. At this time, the second clutch gear **28** slides to one end of the second arc-shaped groove **212** close to the driving gear **26** and meshes with the driving gear **26** under pushing action of the second active gear **27**. Due to the pushing action of the second active gear **27**, the second clutch gear **28** always meshes with the driving gear **26**, thereby allowing the second driving rack **232** to drive the second active gear **27**, the second clutch gear **28** and the driving gear **26** to rotate in sequence.

[0064] That is to say, when the gravity block **23** drives the first driving rack **231** and the second driving rack **232** to slide to the right, since the first clutch gear **25** and the driving gear **26** are in a separated state, the first driving rack **231** drives the first active gear **24** and the first clutch gear **25** to idle. The second driving rack **232** drives the second active gear **27**, the second clutch gear **28** and the driving gear **26** to rotate in sequence, and causes the driving gear **26** to continue to rotate in the original direction. Moreover, driven by the second driving rack **232**, the second active gear **27** continues to drive the driving gear **26** to rotate through the second clutch gear **28**, so that the gravity block **23** always drives the driving gear **26** in a single direction and stores energy during the reciprocating sliding process.

[0065] Therefore, in this embodiment, the first active gear **24**, the first clutch gear **25**, the first arc-shaped groove **211** are arranged symmetrically respectively with the second active gear **27**, the second clutch gear **28**, and the second arc-shaped groove **212** with respect to the driving gear **26**. The first driving rack **231** and the second driving rack **232** of the gravity block **23** are arranged symmetrically with respect to the case **21**, so that when the gravity block **23** slides back and forth, the driving gear **26** always keeps the rotation direction unchanged.

[0066] Furthermore, one or more second driven gears **271** are drivingly connected between the second active gear **27** and the second clutch gear **28** in this embodiment. In order to better connect the passive gear **33** of the transmission gearbox **31**, the driving gear **26** of this embodiment may also be drivingly connected with one or more output gears **29**.

[0067] Therefore, in the spinning top toy of this embodiment, the driving device **20** swings the gravity block **23** back and forth, so that the gravity block **23** continuously accelerates and rotates the acceleration gear set **22**. Particularly, the acceleration gear set **22** is driven and accelerated through the driving racks on both sides of the gravity block **23**, and the two clutch gears in the acceleration gear set **22** ensures the one-way rotation of the driving gear **26**, thus avoiding a bidirectional rotation of the driving gear **26** due to the back and forth swing of the gravity block **23**. As a result, the driving gear **26** always maintains the one-way rotation, and drives the passive gear **33** and the magnetic sleeve **32** to rotate synchronously, thereby accelerates and stores energy in the spinning top body **200** attracted in the magnetic sleeve **32**. Finally, a stored energy spinning top body **200** is ejected out from the lower opening of the housing **10** through the injection pushing rod **41**. Therefore, the spinning top toy of the present application is easy to operate, has a novel and interesting driving method, expands the functionality and fun of the driving device **20**, and has high marketing value.

### Embodiment 3

[0068] Please refer to FIG. **16**. FIG. **16** is a schematic diagram of a connection between the driving

device and the spinning top body according to embodiment 3 of the present application. This embodiment is substantially the same as Embodiment 1 or 2. The difference lies in that: a bottom of the magnetic sleeve **32** in this embodiment is provided with an annular zigzag magnetic unit **34**, and a top surface of the spinning top body **300** in this embodiment is provided with an annular zigzag magnet unit **60**. In this way, the spinning top body **300** of this embodiment may be magnetically attracted on the magnetic unit **34** of the magnetic sleeve **32** through the magnet unit **60** on the top surface of the spinning top body **300**. Moreover, through the mutual engagement of the magnet unit **60** and the magnetic unit **34**, the magnetic sleeve **32** and the spinning top body **300** in this embodiment are relatively more stable during synchronous rotation and are less likely to be displaced.

[0069] Although the present invention has been disclosed in the form of preferred embodiments and variations thereon, it will be understood that numerous additional modifications and variations could be made thereto without departing from the scope of the invention.

[0070] For the sake of clarity, it is to be understood that the use of “a” or “an” throughout this application does not exclude a plurality, and “comprising” does not exclude other steps or elements.

## Claims

1. A spinning top toy, comprising: spinning top accelerator and a spinning top body movably connected with the spinning top accelerator; wherein, the spinning top accelerator includes a housing and a driving device, a clamping assembly and an injection pushing assembly disposed in the housing, the driving device includes a case and an acceleration gear set which is rotatably provided in the case, a gravity block is slidably provided on the case, and the gravity block is drivingly connected to the acceleration gear set; the clamping assembly is drivingly connected to the acceleration gear set, and is used to movably clamp the spinning top body; the injection pushing assembly is used to push the spinning top body; wherein, when the gravity block slides back and forth on the case by swinging, the gravity block drives the acceleration gear set to rotate, thereby driving the clamping assembly to rotate.
2. The spinning top toy of claim 1, wherein; the acceleration gear set is rotatably disposed inside the case, a first opening is provided on one side of the case, and at least a portion of the acceleration gear set extends out of the first opening of the case; a first driving rack is provided on one side of the gravity block, and the first driving rack is cooperatively and drivingly connected with the portion of the acceleration gear set extending out of the first opening of the case.
3. The spinning top toy of claim 2, wherein; the acceleration gear set includes a first active gear, a first clutch gear and a driving gear, the case is provided with a first arc-shaped groove, the first active gear and the driving gear are respectively rotatably provided in the case, and the first active gear meshes with the first clutch gear; the first clutch gear is slidably disposed in the first arc-shaped groove, when the first clutch gear slides to one end of the first arc-shaped groove, the first clutch gear meshes with the driving gear, and when the first clutch gear slides to other positions of the first arc-shaped groove, the first clutch gear and the driving gear do not contact each other; at least a portion of the first active gear extends out of the first opening of the case, and the portion of the first active gear extending out of the first opening is cooperatively and drivingly connected with the first driving rack of the gravity block.
4. The spinning top toy of claim 3, wherein; a second opening is provided on the other side of the case, and a second driving rack is provided on the other side of the gravity block; the acceleration gear set also includes a second active gear and a second clutch gear; the case is provided with a second arc-shaped groove; the second clutch gear is slidably disposed in the second arc-shaped groove, and the second clutch gear meshes with the second active gear; when the second clutch gear slides to one end of the second arc-shaped groove, the second clutch gear meshes with the driving gear; when the second clutch gear slides to other positions of the second arc-shaped groove,

the second clutch gear and the driving gear do not contact each other.

**5.** The spinning top toy of claim 4, wherein; at least a portion of the second active gear extends out of the second opening of the case, and the portion of the second active gear extending out of the second opening is cooperatively and drivingly connected with the second driving rack of the gravity block; the second active gear, the second clutch gear and the second arc-shaped groove are respectively arranged symmetrically with the first active gear, the first clutch gear and the first arc-shaped groove with respect to the driving gear.

**6.** The spinning top toy of claim 1, wherein; guide slide rods are provided in parallel on both sides of the case, and both sides of the gravity block are respectively slidably sleeved on the guide slide rods on both sides of the case.

**7.** The spinning top toy of claim 1, wherein; the clamping assembly includes a magnetic sleeve, which is drivingly connected to the acceleration gear set; the magnetic sleeve has a cylindrical structure with an open lower end, a magnetic unit is provided on the top of an inner wall of the magnetic sleeve, and a magnet unit is provided on the top of the spinning top body; the spinning top body is attracted and connected to the magnetic unit of the magnetic sleeve through the magnet unit on the top of the spinning top body.

**8.** The spinning top toy of claim 7, wherein; the clamping assembly also includes a transmission gearbox and a passive gear rotatably arranged in the transmission gearbox; the transmission gearbox is fixed below the acceleration gear set of the driving device, the passive gear and the acceleration gear set is drivingly connected, and the passive gear is coaxially fixedly connected with the magnetic sleeve.

**9.** The spinning top toy of claim 8, wherein; one or more transmission gears are arranged between the passive gear and the acceleration gear set, and the passive gear, the one or more transmission gears and the acceleration gear set are drivingly connected in sequence.

**10.** The spinning top toy of claim 7, wherein; the housing is a cavity structure with upper and lower openings, the injection pushing assembly includes an injection pushing rod and a return spring, an upper end of the injection pushing rod is located at the upper opening of the housing, a middle part of the injection pushing rod is connected to an inner wall of the housing through the return spring, and a lower end of the injection pushing rod is located on an outer peripheral side of the magnetic sleeve.

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