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(54) **SUCKER MODULE OF LAUNCHER, LAUNCHER AND TOY SUITE**

(57) Disclosed is a suction cup module of a launcher, the suction cup module comprising a suction cup housing (710) and a magnetic assembly (720), wherein the magnetic assembly (720) is arranged on the suction cup housing (710); and a fastener (730) movably arranged on the suction cup housing (710). A fastener foot (731) capable of moving between a locking position and an unlocking position is arranged on the fastener (730). The fastener foot (731) is suitable to be fastened on an object (800) to be launched when in the locking position and is suitable to be disengaged from the object (800) to be launched when in the unlocking position. By arranging the movable

fastener (730) on the suction cup housing (710) and further defining that the fastener foot (731) is movable between the locking position and the unlocking position, the fastener (730) can fasten and release the object (800) to be launched. That is, when the suction cup module magnetically attracts the (800) object to be launched, the object (800) to be launched is locked by the fastener foot (731), and after the fastener (730) is triggered, the fastener (730) releases the object (800) to be launched and makes it fall freely, which brings an amazing playing experience to a player.

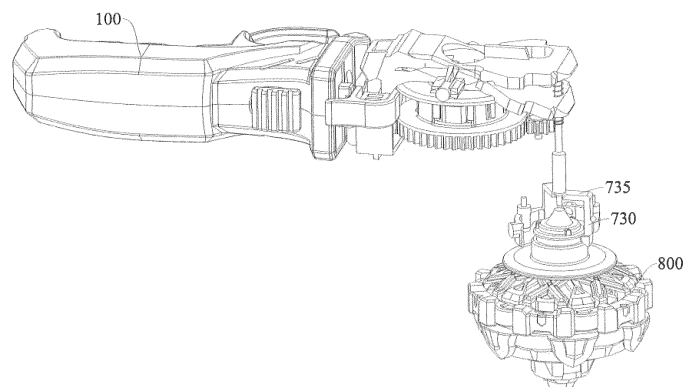


FIG. 4

Description

FIELD

[0001] The present disclosure relates to the technical field of tops, and more particularly to a suction cup module of a launcher, a launcher, and a toy suite.

BACKGROUND

[0002] At present, launchers of popular tops accelerate the tops mainly by manually pulling racks or using ropes, and then launch the tops. However, since high-speed launchers require a relatively large pulling force to start, it is difficult for children to pull; moreover, one launcher cannot be compatible with multiple launching speeds, and cannot launch the tops in a reverse direction.

[0003] In the related art, launchers of tops include launchers for tops with racks, launchers having one-time energy storage, and launchers having racks. Tops are accelerated directly by the racks, but it is laborious to pull the high-speed launchers; or tops are accelerated by the force of torsion springs alone or using launchers with repeated energy storage, but the tops are not fast and competitive enough; or tops are accelerated by continuously pulling the ropes, but the tops cannot freely fall vertically, and landing points are uncontrollable. After tops are installed, no external force can be used to turn the tops, making the toys less interesting.

SUMMARY

[0004] The present disclosure aims to solve at least one of the problems existing in the related art.

[0005] To this end, the present disclosure provides a suction cup module of a launcher, and the collision launcher is more interesting to play.

[0006] The present disclosure further provides a launcher having the above suction cup module.

[0007] The present disclosure further provides a toy suite having the above launcher.

[0008] A suction cup module of a launcher according to embodiment of a first aspect of the present disclosure includes: a suction cup housing; a magnetic assembly arranged on the suction cup housing; and a fastener movably arranged on the suction cup housing, and provided with a fastener foot that is movable between a locking position and an unlocking position, wherein when in the locking position, the fastener foot is configured to be fastened on an object to be launched; when in the unlocking position, the fastener foot is configured to be separated from the object to be launched.

[0009] With the suction cup module according to the embodiments of the present disclosure, by providing the suction cup housing with the movable fastener, and further defining that the fastener foot is movable between the locking position and the unlocking position, the fastener can fasten and release the object to be launched.

That is, when the suction cup module magnetically attracts the object to be launched, the object to be launched is fastened by the fastener foot. When the fastener is triggered, the fastener will release the object to be launched and make it fall freely, which brings a surprising experience to players.

[0010] According to an embodiment of the present disclosure, the suction cup housing includes a suction cup outer cover and an inner liner, and the inner liner is arranged inside the suction cup outer cover.

[0011] According to an optional example of the present disclosure, the fastener is rotatably arranged between the suction cup outer cover and the inner liner and has a fastener shaft, the fastener foot is located at an end of the fastener shaft, and the fastener foot is retractable when the fastener rotates around the fastener shaft; and the suction cup module further includes a snap-lock elastic member connected between the fastener and the suction cup housing and configured to drive the fastener foot to rotate toward the locking position.

[0012] According to another optional example of the present disclosure, the snap-lock elastic member is fitted on the fastener; the snap-lock elastic member and the fastener foot are located at both ends of the fastener shaft; the fastener is provided with a fastener groove configured to cooperate with the snap-lock elastic member.

[0013] According to still another optional example of the present disclosure, the fastener is provided with a snap-lock protrusion; the suction cup outer cover or the inner liner is provided with a snap-lock groove corresponding to the snap-lock protrusion; when the fastener is in the locking position, the snap-lock protrusion is fitted in the snap-lock groove.

[0014] According to still another optional example of the present disclosure, an inner liner opening is provided in a peripheral wall of the inner liner; the fastener foot extends into or exits from the inner liner through the inner liner opening when rotating; an end of the inner liner is provided with an inner liner flange, and an end of the fastener shaft cooperates with the inner liner flange.

[0015] According to another embodiment of the present disclosure, the fastener is provided with an extension foot provided with an extension surface; when a force is exerted on the extension surface, the fastener foot moves toward the unlocking position.

[0016] According to yet another optional example of the present disclosure, the suction cup outer cover includes two detachable half covers that enclose an outside of the inner liner.

[0017] According to still another embodiment of the present disclosure, the suction cup housing has a mating opening for the object to be launched to extend in; the magnetic assembly is arranged inside the suction cup housing, and includes a suction cup magnetically attracting member and a magnetically insulated sleeve; the magnetically insulated sleeve is open on a side facing the mating opening.

[0018] According to yet another embodiment of the

present disclosure, the suction cup housing is formed into a cylindrical shape with two open ends; the magnetic assembly and the fastener are both arranged inside the suction cup housing; a plurality of fasteners are provided and spaced apart along a circumferential wall of the suction cup housing.

[0019] A launcher according to embodiment of a second aspect of the present disclosure includes: a launcher body and the suction cup module in the above embodiments, in which the suction cup module is arranged on the launcher body.

[0020] For the launcher according to the embodiment of the present disclosure, by providing the suction cup housing with the movable fastener, and further defining that the fastener foot is movable between the locking position and the unlocking position, the fastener can fasten and release the object to be launched. That is, when the suction cup module magnetically attracts the object to be launched, the object to be launched is fastened by the fastener foot. When the fastener is triggered, the fastener will release the object to be launched and make it fall freely, which brings a surprising experience to players.

[0021] In some embodiments, the launcher further includes a drive assembly that is arranged on the launcher body and is configured to cooperate with the suction cup module and drive the suction cup module to rotate when triggered and be separated from the suction cup module when released.

[0022] Further, the drive assembly includes a rope winding portion and a rope body; the rope winding portion is connected to the suction cup module; the rope body is wound on the rope winding portion and has an inner end connected to the rope winding portion.

[0023] A toy suite according to embodiment of a third aspect of the present disclosure includes: the launcher in the above embodiments; and a top having a magnetic top tip that is attractable onto the suction cup module.

[0024] For the toy suite according to the embodiment of the present disclosure, by providing the launcher having the suction cup module, the top can be attracted onto the launcher and launched by the launcher, which brings a surprising experience to players.

[0025] Additional aspects and advantages of embodiments of the present disclosure will be given in part in the following descriptions, become apparent in part from the following descriptions, or be learned from the practice of the embodiments of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0026] The above and/or additional aspects and advantages of the present disclosure will become apparent and more readily appreciated from the following description of embodiments with reference to the drawings, in which:

FIG. 1 is a state diagram of a launcher and an object

to be launched according to an embodiment of the present disclosure;

FIG. 2 is an exploded view of a launcher and an object to be launched according to an embodiment of the present disclosure;

FIG. 3 is a sectional view of a launcher and an object to be launched according to an embodiment of the present disclosure;

FIG. 4 is a partial structural diagram of a launcher and an object to be launched according to another embodiment of the present disclosure;

FIG. 5 is a perspective view of a suction cup module of a launcher according to an embodiment of the present disclosure;

FIG. 6 is an exploded view of a suction cup module of a launcher according to an embodiment of the present disclosure;

FIG. 7 is a partial structural diagram of a launcher according to an embodiment of the present disclosure;

FIG. 8 is a schematic diagram of a unidirectional driver of a launcher according to an embodiment of the present disclosure;

FIG. 9 is a partial structural diagram of a launching driver of a launcher according to an embodiment of the present disclosure;

[0027] Reference numerals:

launcher 1000;
hand-held portion 100, thumb gripping side 110, four-finger gripping side 120;
launcher body 200;
unidirectional transmission 510, drive end gear 511, passive end gear 512, cycloidal gear 513, rotating shaft 5131, rope winding portion 520, rope body 530, energy accumulator 540;
suction cup module 700, suction cup housing 710, snap-lock groove 710a, mating opening 710b, suction cup outer cover 711, half cover 7111, inner liner 712, inner liner opening 712a, inner liner flange 7121, magnetic assembly 720, suction cup magnetically attracting member 721, magnetically insulated sleeve 722, fastener 730, fastener groove 730a, fastener foot 731, fastener shaft 732, snap-lock elastic member 733, snap-lock protrusion 734, extension foot 735, extension surface 7351;
object 800 to be launched.

DETAILED DESCRIPTION OF EMBODIMENTS

[0028] Embodiments of the present disclosure will be described in detail below, and the examples of the embodiments will be illustrated in the drawings. The same or similar elements and the elements having same or similar functions are denoted by like reference numerals throughout the description. The embodiments described herein with reference to the drawings are illustrative and

used to generally understand the present disclosure. The embodiments shall not be construed to limit the present disclosure.

[0029] A suction cup module 700 of a launcher 1000 according to embodiment of a first aspect of the present disclosure will be described with reference to FIGS. 1 to 6.

[0030] As shown in FIG. 6, the suction cup module 700 of the launcher 1000 according to the embodiments of the present disclosure includes a suction cup housing 710, a magnetic assembly 720, and a fastener 730.

[0031] Specifically, the magnetic assembly 720 is arranged on the suction cup housing 710 and used to magnetically attract an object 800 to be launched. The fastener 730 is movably arranged on the suction cup housing 710, and for example, the fastener 730 can rotate on the suction cup housing 710. The fastener 730 is provided with a fastener foot 731, and the fastener foot 731 is movable between a locking position and an unlocking position. When the fastener foot 731 is in the locking position, the fastener foot 731 is suitable to be fastened on the object 800 to be launched. When the fastener foot 731 is in the unlocking position, the fastener foot 731 is suitable to separate from the object 800 to be launched.

[0032] In a normal state, the fastener foot 731 is in the locking position, and the fastener foot 731 locks the object 800 to be launched. When the fastener 730 is triggered, the fastener foot 731 switches from the locking position to the unlocking position and releases the object 800 to be launched. At this time, the object 800 to be launched is disengaged from the fastener foot 731 and falls freely. Therefore, through the movement of the fastener foot 731 between the locking position and the unlocking position, the object 800 to be launched can be locked or released.

[0033] The magnetic assembly 720 can retain the object 800 to be launched on the suction cup housing 710, that is, the magnetic assembly 720 can keep connected to the object 800 to be launched by magnetic attraction. During rotation, the suction cup housing 710 will drive the object 800 to be launched to rotate, so as to accelerate the object 800 to be launched. For example, the object 800 to be launched is elaborated by taking a top as an example. After being separated from the launcher 1000, the top rotates freely, and a rotation speed of the top will gradually decrease or even the top will stop. At this time, the suction cup module 700 is aligned with the top, and the magnetic assembly 720 magnetically attracts the top onto the suction cup module 700. Meanwhile, since the suction cup housing 710 rotates at a high speed under the drive of a launching driver of the launcher 1000, the top can be driven to rotate at a high speed.

[0034] When the top is retained on the suction cup module 700, and the fastener 730 is connected to the top by clamping, the soundness of connection between the top and the suction cup module 700 can be further enhanced, ensuring that the top will not easily separate from the suction cup module 700 when rotating at a high speed under the drive of the launching driver. At the same

time, if the launcher 1000 has a flip function, the top can flip along with the flip of a launcher body 200 of the launcher 1000, and for example, can flip downwards from a state of the launcher body 200 of the launcher facing upwards. That is, the top flips from being located above the launcher body 200 to being located below the launcher body 200. During the flip of the launcher body 200, the top has a large inertia force and is easily thrown out, but by providing the fastener 730, the connection with the top becomes more reliable, which can avoid that the launcher body 200 results in throwing out the object to be launched due to the inertia during the flip, and ensure the safety and reliability when the child is playing.

[0035] For the suction cup module 700 of the launcher 1000 according to the embodiments of the present disclosure, by providing the suction cup housing 710 with the movable fastener 730, and further defining that the fastener foot 731 is movable between the locking position and the unlocking position, the fastener 730 can fasten and release the top. That is, when the suction cup module 700 magnetically attracts the top, the top is fastened by the fastener foot 731. When the fastener 730 is triggered, the fastener 730 will release the top and make it fall freely, which brings a surprising experience to players. The soundness of connection between the top and the suction cup module 700 can be further enhanced, and the top can be prevented from being separated from the suction cup module 700 when rotating at a high speed under the drive of the launching driver.

[0036] Referring to FIG. 6, according to an embodiment of the present disclosure, the suction cup housing 710 includes a suction cup outer cover 711 and an inner liner 712. The magnetic assembly 720 and the fastener 730 are arranged outside the suction cup housing 710, while the inner liner 712 is arranged inside the suction cup outer cover 711. The suction cup outer cover 711 has a protective effect on inner liner 712. The suction cup outer cover 711 is located on the outermost side of the suction cup module 700, which can have a protective function for the internal components on the one hand, and can make the suction cup module 700 form a whole on the other hand.

[0037] As shown in FIG. 6, according to an optional example of the present disclosure, the suction cup outer cover 711 and the inner liner 712 are spaced apart, and the fastener 730 is rotatably arranged between the suction cup outer cover 711 and the inner liner 712. The fastener 730 has a fastener shaft 732 connected to the inner liner 712. The fastener foot 731 is located at an end of the fastener shaft 732. The fastener foot 731 is retractable when the fastener 730 rotates around the fastener shaft 732. For example, three fasteners 730 are provided between the inner liner 712 and the suction cup outer cover 711 and arranged at intervals around the inner liner 712. The fastener feet 731 are located at an upstream end of the fasteners 730 in a clockwise direction around the inner liner 712. When the fasteners 730 rotate around respective fastener shafts 732 (for example, when the

fasteners 730 rotate clockwise around the fastener shafts 732), the fastener feet 731 retract into the inner liner 712. When the fastener feet 731 rotate counterclockwise around the fastener shafts 732, the fastener feet 731 extend out of the inner liner 712.

[0038] Specifically, in a normal state, the fastener foot 731 retracts into the inner liner 712 to lock the top. When the fastener 730 is triggered, the fastener foot 731 rotates counterclockwise around the fastener shaft 732, that is, the fastener foot 731 rotates outward of the inner liner 712, thereby releasing the top.

[0039] Further, the suction cup module 700 further includes a snap-lock elastic member 733 connected between the fastener 730 and the suction cup housing 710. The snap-lock elastic member 733 is in a normally compressed state. The snap-lock elastic member 733 and the fastener foot 731 are located on both sides of the fastener shaft 732, respectively. The snap-lock elastic member 733 is used to drive the fastener foot 731 to rotate toward the locking position. In a normal state, due to an elastic restoring force of the snap-lock elastic member 733, the fastener 730 tends to rotate clockwise around the fastener shaft 732. An end of the fastener shaft 732 provided with the snap-lock elastic member 733 rotates outwards, and in turn the fastener foot 731 rotates to the locking position. In this way, the fastener foot 731 can be kept in the locking position by the snap-lock elastic member 733, thereby further enhancing the soundness of connection between the top and the suction cup module 700.

[0040] As shown in FIG. 6, according to another optional example of the present disclosure, the snap-lock elastic member 733 is fitted on the fastener 730. The snap-lock elastic member 733 and the fastener foot 731 are located at both ends of the fastener shaft 732. The fastener 730 is provided with a fastener groove 730a configured to cooperate with the snap-lock elastic member 733. That is, a first end of the snap-lock elastic member 733 is connected to an outer wall of the inner liner 712, and a second end of the snap-lock elastic member 733 is connected in the fastener groove 730a. Thus, the snap-lock elastic member 733 can be fixed in the fastener groove 730a, the connection between the inner liner 712 and the fastener 730 can be reliable, and the fastener foot 731 can be normally kept in the locking position to prevent the top from being separated from the suction cup module 700 when rotating at a high speed under the drive of the launching driver.

[0041] According to another optional example of the present disclosure, the fastener 730 is provided with a snap-lock protrusion 734. The suction cup outer cover 711 or the inner liner 712 is provided with a snap-lock groove 710a corresponding to the snap-lock protrusion 734. Specifically, when the fastener 730 is in the locking position, the snap-lock protrusion 734 is fitted in the snap-lock groove 710a. A snap-lock bump and the fastener foot 731 are located at both ends of the fastener shaft 732, so that the snap-lock protrusion 734 is fitted in the

snap-lock groove 710a, that is, the snap-lock protrusion 734 at a first end of the fastener shaft 732 is snapped in the snap-lock groove 710a, and hence the fastener foot 731 at a second end of the fastener shaft 732 can fasten the top to prevent the top from falling off. Thus, the soundness of connection between the top and the suction cup module 700 can be further enhanced, to ensure that the top will not be easily separated from the suction cup module 700 even when rotating at a high speed under the drive of the launching driver.

[0042] Specifically, when the suction cup module 700 rotates at a high speed, due to a centrifugal force, the snap-lock bump on the fastener 730 is snapped in the snap-lock groove 710a, so as to prevent the first end of the locking shaft 732 from continuing to rotate outward, and then the fastener foot 731 at the second end of the fastener shaft 732 can fasten the top firmly.

[0043] As shown in FIG. 6, according to yet another optional example of the present disclosure, an inner liner opening 712a is provided in a peripheral wall of the inner liner 712. The fastener foot 731 can extend into or exit from the inner liner 712 through the inner liner opening 712a when rotating. An end of the inner liner 712 (an upper end of the inner liner 712 as shown in FIG. 6) is provided with an inner liner flange 7121. An end of the fastener shaft 732 (e.g., an upper end of the fastener shaft 732) cooperates with the inner liner flange 7121 to increase a surface area of the upper end of the inner liner 712, and can be used to connect with an inner wall of the suction cup outer cover 711 at the same time.

[0044] Normally, the fastener foot 731 extends into the inner liner 712 through the inner liner opening 712a. At this time, the fastener foot 731 is in the locking position and is used to fasten the top. When the fastener 730 is triggered, the fastener foot 731 exits from the inner liner 712 through the inner liner opening 712a. The fastener foot 731 rotates outward relative to the inner liner 712 to release the top, and the top separates from the suction cup module 700 and falls freely.

[0045] As shown in FIG. 6, according to another embodiment of the present disclosure, the fastener 730 is provided with an extension foot 735. The extension foot 735 and the fastener foot 731 are located at the same end of the fastener shaft 732. An end of the extension foot 735 is provided with an inclined extension surface 7351. When a force is exerted on the extension surface 7351, the fastener foot 731 moves toward the unlocking position. In a normal state, the fastener 730 on the inner liner 712 extends into the inner liner 712 through the inner liner opening 712a, and the end of the extension foot 735 of the fastener 730 is located at the center of the inner liner 712. When a downward force is exerted on the extension surface 7351, the extension foot 735 is pushed to rotate from the inner liner opening 712a to the outside of the inner liner 712, and meanwhile the fastener foot 731 also exits from the inner liner 712 through the inner liner opening 712a and moves toward the unlocking position, thereby releasing the top. In this way, by exerting

action on the extension surface 7351 of the extension foot 735, the release of the top by the fastener foot 731 can be realized.

[0046] Advantageously, the center of gravity of the fastener 730 deviates from the fastener shaft 732 and is located on a side where the snap-lock protrusion 734 is located. It can be understood that since the center of gravity of the fastener 730 is not on the fastener shaft 732, when the fastener 730 rotates along with the inner liner 712, the snap-lock protrusion 734 rotates in a direction away from the inner liner 712 under the centrifugal action, thereby allowing the fastener foot 731 to be better fastened on the top. Moreover, the faster the inner liner 712 rotates, the tighter the fastener foot 731 is fastened on the top, which can improve the firmness of connection between the top and the suction cup module 700 and ensure that the top will not be easily separated from the suction cup module 700 when rotating at a high speed.

[0047] As shown in FIG. 6, according to another optional example of the present disclosure, the suction cup outer cover 711 includes two detachable half covers 7111. The two half covers 7111 enclose the outside of the inner liner 712. By configuring the suction cup outer cover 711 as a structure consisting of two half covers 7111, the disassembly is easy, which brings convenience to maintenance and replacement of the suction cup module 700 in future. That is, when maintenance and replacement are needed, the two half covers 7111 can be directly disassembled. After completion, the two half covers 7111 can be directly assembled and closed.

[0048] As shown in FIG. 5, according to another embodiment of the present disclosure, the suction cup housing 710 has a mating opening 710b suitable for the top to extend in. The magnetic assembly 720 is arranged inside the suction cup housing 710. The magnetic assembly 720 in FIG. 6 is located inside the inner liner 712. The magnetic assembly 720 includes a suction cup magnetically attracting member 721 and a magnetically insulated sleeve 722. The magnetically insulated sleeve 722 is wrapped around the suction cup magnetically attracting member 721. The magnetically insulated sleeve 722 is open on a side facing the mating opening 710b.

[0049] Further, the suction cup magnetically attracting member 721 includes a first magnetically attracting member and a second magnetically attracting member. The first magnetically attracting member is located above the second magnetically attracting member. The first magnetically attracting member and the magnetically insulated sleeve 722 can cooperate to generate an effect of magnetic insulation, to avoid magnetizing a bearing disposed above the suction cup module 700. The second magnetically attracting member can magnetically attract the top.

[0050] Specifically, when the rotation speed of the top decreases or the top stops, the suction cup module 700 of the launcher 1000 approaches the top, and the top can be magnetically attracted and connected to the suction cup module 700 through the second magnetically

attracting member. Hence, in the process of playing, when the top needs to be installed on the suction cup module 700, no manual operation is required, and it is only necessary to make the suction cup module 700 of the launcher 1000 approach and align with the top, which greatly boosts the fun of playing.

[0051] As shown in FIG. 6, according to still another embodiment of the present disclosure, the suction cup housing 710 is formed into a cylindrical shape with two open ends. The magnetic assembly 720 and the fastener 730 are both arranged inside the suction cup housing 710. A plurality of fasteners 730 are provided and spaced apart along a circumferential wall of the suction cup housing 710. For example, three fasteners 730 are provided in a circumferential direction of the suction cup housing 710, and extension feet 735 of the three fasteners 730 are arranged facing each other (e.g., all concentrated at the center of the inner liner 712). At this time, the three fastener feet 731 fasten the top, which can further enhance the firmness of connection between the top and the suction cup module 700 and ensure that the top will not be easily separated from the suction cup module 700 when rotating at a high speed under the drive of the launching driver. When the downward force is applied to three extension surfaces 7351 simultaneously, the three extension feet 735 rotate toward the outside of the inner liner 712 simultaneously, and the three fastener feet 731 also rotate outward of the inner liner 712, thereby releasing and launching the top.

[0052] In the description of the present disclosure, the term "a plurality of" means two or more.

[0053] When the suction cup module 700 rotates at a high speed, the fastener 730 rotates under the action of a centrifugal force and a pressure spring, to make the snap-lock bump extend out of the mating opening 710b of the suction cup outer cover 711, so that the fastener foot 731 at the other end of the fastener 730 fastens the top. The magnetic assembly 720 can be used to magnetically attract the top. The top is retained on the suction cup housing 710 under the action of magnetic attraction. It is possible to ensure the firm connection between the top and the suction cup module 700 under the magnetic attraction force and the fastening action of the fastener 730, to avoid danger that the top is thrown out when the launcher head is flipped.

[0054] As shown in FIGS. 1-4 and 7-9, a launcher 1000 according to embodiments of a second aspect of the present disclosure includes the launcher body 200 and the suction cup module 700 described in the above embodiments, in which the suction cup module 700 is arranged on the launcher body 200.

[0055] For the launcher 1000 according to the embodiments of the present disclosure, by providing the suction cup housing 710 with the movable fastener 730, and further defining that the fastener foot 731 is movable between the locking position and the unlocking position, the fastener 730 can fasten and release the top. That is, when the suction cup module 700 magnetically attracts the top,

the top is fastened by the fastener foot 731. When the fastener 730 is triggered, the fastener 730 will release the top and make it fall freely. In addition, since the suction cup module 700 can magnetically attract the top, the players can enjoy a surprising experience. The soundness of connection between the top and the suction cup module 700 can be further enhanced, and the top can be prevented from being separated from the suction cup module 700 when rotating at a high speed under the drive of the launching driver.

[0056] It should be noted that an end of the launcher 1000 is connected with a hand-held portion 100. When playing, a child holds the hand-held portion 100. Moreover, the hand-held portion 100 is provided with a thumb gripping side 110 and a four-finger gripping side 120, which makes the player's operation more comfortable.

[0057] Specifically, the launcher body 200 is provided with a drive assembly. The drive assembly is configured to cooperate with the suction cup module 700 and drive the suction cup module 700 to rotate when triggered and is configured to be separated from the suction cup module 700 when released. After the user adopts the drive assembly to drive the suction cup module 700 to make the suction cup module 700 and the top rotate, the top can be released (i.e., the top is separated from the launcher 1000) under certain conditions. Based on the above description, the user can choose a landing position of the top according to needs, thus improving the player's satisfaction with the use of the launcher 1000.

[0058] Since the drive assembly is configured to cooperate with the suction cup module 700 and drive the suction cup module 700 to rotate when triggered and is configured to be separated from the suction cup module 700 when released, the suction cup module 700 will rotate only when the user triggers the drive assembly. If the drive assembly is not triggered and the player rotates the suction cup module 700 manually, the suction cup module 700 can only be rotated and will not drive the drive assembly to move. Thus, it is possible to avoid wear or damage to the drive assembly and getting the top stuck when an external force acts on the suction cup module 700 and drives it to rotate, reduce the damage rate of the drive assembly, and improve the reliability of the entire launcher 1000.

[0059] It should be noted that the top is installed on the suction cup module 700, and the drive assembly directly drives the suction cup module 700. That is to say, if the suction cup module 700 is compatible with different tops, the launcher 1000 can launch a variety of different tops. Compared with the top launcher in the related art, the launcher 1000 according to the embodiments of the present disclosure can be compatible with various tops, which broaden the application range of the launcher 1000 according to the embodiments of the present disclosure.

[0060] In some optional embodiments, the drive assembly includes a unidirectional transmission 510. The unidirectional transmission 510 includes a drive end gear 511, a passive end gear 512, and a cycloidal gear 513.

The drive end gear 511 is spaced apart from the passive end gear 512 and arranged on the launcher body 200. The passive end gear 512 is connected to the suction cup module 700. The drive end gear 511 always meshes with the cycloidal gear 513. A rotating shaft 5131 of the cycloidal gear 513 can swing along a set track. The cycloidal gear 513 meshes with and drives the passive end gear 512 when in one end of the set track; and the cycloidal gear 513 disengages from the passive end gear 512 when in the other end of the set track.

[0061] It should be noted that for the convenience of description, a rotation direction in which the drive end gear 511 rotates to allow the rotating shaft 5131 of the cycloidal gear 513 to move toward the passive end gear 512 is regarded as a forward direction, and a rotation direction in which the drive end gear 511 rotates to allow the rotating shaft 5131 of the cycloidal gear 513 to move away from the passive end gear 512 is regarded as a reverse direction.

[0062] It can be understood that the function of the unidirectional transmission 510 is that when the drive end gear 511 rotates forward, the cycloidal gear 513 is driven by the drive end gear 511 to rotate in a direction approaching the passive end gear 512 and hence meshes with the passive end gear 512, so that the drive end gear 511 can drive the passive end gear 512 to rotate. In other words, when the drive end gear 511 rotates forward, the suction cup module 700 can rotate relative to the launcher body 200. When the drive end gear 511 rotates reversely, the cycloidal gear 513 is driven by the drive end gear 511 to rotate in a direction away from the passive end gear 512, so that the cycloidal gear 513 and the passive end gear 512 are separated, and the drive end gear 511 cannot bring the passive end gear 512 into rotation. That is, when the drive end gear 511 rotates reversely, the suction cup module 700 will not rotate reversely. Due to the function of the unidirectional transmission 510, the player can realize repeated acceleration of the suction cup module 700. For example, in some embodiments, the drive end gear 511 is driven by a rack; based on the above analysis, the player can pull the rack repeatedly to make the launcher head accelerate continuously, and the rotation of the suction cup module 700 will not be affected when the rack is pulled back. As a result, the player can use a normal pulling force to make the top on the suction cup module 700 obtain a higher initial rotation speed, and improve the winning rate of the top.

[0063] It should be supplemented that proper adjustment for the numbers of teeth of the drive end gear 511, the passive end gear 512 and the cycloidal gear 513 can improve the acceleration function of the launcher 1000 to a certain extent, increase the rotation speed of the suction cup module 700, and hence raise the initial rotation speed of the top launched from the suction cup module 700.

[0064] In some optional embodiments, the drive assembly includes a rope winding portion 520 and a rope body 530. The rope winding portion 520 is connected to

the suction cup module 700. The rope body 530 is wound on the rope winding portion 520 and has an inner end connected to the rope winding portion 520. In this way, pulling the rope body 530 can make the rope winding portion 520 rotate, thereby driving the suction cup module 700 to rotate.

[0065] Specifically, the rope winding portion 520 is connected to the drive end gear 511, so when the player pulls the rope body 530, the drive end gear 511 can be driven to rotate, and in turn the passive end gear 512 is rotated to drive the suction cup module 700 to rotate. The method of pulling the rope body 530 to drive the suction cup module 700 to rotate can reduce a driving force of the player, so that the player can more easily drive the suction cup module 700 to rotate and in turn drive the top arranged in the suction cup module 700 to rotate. Certainly, in other embodiments of the present disclosure, the launcher 1000 may also use other devices to drive the drive end gear 511 to rotate, and for example, a player may use a rack to drive the drive end gear 511 to rotate.

[0066] In some optional embodiments, the launcher 1000 further includes an energy accumulator 540 that is connected to the drive end gear 511 and the launcher body 200. The energy accumulator 540 is configured to accumulate energy during meshing transmission of the passive end gear 512 and the cycloidal gear 513. When the energy accumulator 540 releases the energy, the passive end gear 512 is disengaged from the cycloidal gear 513.

[0067] It can be understood that, based on the foregoing description, since the launcher 1000 according to the embodiments of the present disclosure has the unidirectional transmission 510, the unidirectional transmission 510 can allow the player to repeatedly accelerate the top mounted on the suction cup module 700. When the launcher 1000 is provided with the rope winding portion 520 and the rope body 530, and the energy accumulator 540 is connected to the rope winding portion 520, if the player pulls the rope body 530 to make the drive end gear 511 rotate forward, the cycloidal gear 513 is driven by the drive end gear 511 to rotate in the direction approaching the passive end gear 512 and hence meshes with the passive end gear 512, so that the drive end gear 511 can bring the passive end gear 512 into rotation and the energy accumulator 540 can accumulate energy. If the rope body 530 is pulled to a certain distance or to the end, the energy accumulator 540 releases the energy, and the rope body 530 is rolled back to the rope winding portion 520 and drives the drive end gear 511 to rotate reversely; the cycloidal gear 513 is driven by the drive end gear 511 to rotate in the direction away from the passive end gear 512, so that the cycloidal gear 513 and the passive end gear 512 are separated, and the drive end gear 511 cannot bring the passive end gear 512 into rotation. That is, when the rope body 530 is rolled back automatically, the suction cup module 700 will not slow down. As a result, the user can pull the rope body 530

repeatedly to accelerate the suction cup module 700 repeatedly, and hence the initial rotation speed of the top flying out of the suction cup module 700 can be increased, thereby improving the winning rate of the top.

[0068] A toy suite according to embodiments of a third aspect of the present disclosure includes a launcher 1000 and a top. The launcher 1000 is the launcher 1000 described in the above embodiments. The top has a magnetic top tip that can be attracted onto the suction cup module 700. Thus, through the suction cup module 700, the top can be attracted by suction, which brings more top launching methods.

[0069] In the specification, it is to be understood that terms such as "central," "longitudinal," "transverse," "length," "width," "thickness," "upper," "lower," "front," "rear," "left," "right," "vertical," "horizontal," "top," "bottom," "inner," "outer," "clockwise," "counterclockwise," "axial," "radial" and "circumferential" should be construed to refer to the orientation as then described or as shown in the drawings under discussion. These relative terms are for convenience of description and do not indicate or imply that the device or element referred to must have a particular orientation or be configured and operated in a particular orientation. Thus, these terms shall not be construed to limitation on the present disclosure.

[0070] In the specification, a structure in which a first feature is "on" or "below" a second feature may include an embodiment in which the first feature is in direct contact with the second feature, and may also include an embodiment in which the first feature and the second feature are not in direct contact with each other, but are contacted via an additional feature formed therebetween.

[0071] In the specification, a first feature "on," "above," or "on top of" a second feature may include an embodiment in which the first feature is right or obliquely "on," "above," or "on top of" the second feature, or just means that the first feature is at a height higher than that of the second feature.

[0072] Reference throughout this specification to "an embodiment," "some embodiments," "an exemplary embodiment," "an example," "a specific example," or "some examples," means that a particular feature, structure, material, or characteristic described in connection with the embodiment or example is included in at least one embodiment or example of the present disclosure. Thus, the appearances of the above phrases in various places throughout this specification are not necessarily referring to the same embodiment or example of the present disclosure. Furthermore, the particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples.

[0073] Although embodiments of the present disclosure have been shown and described, it would be appreciated by those skilled in the art that changes, modifications, alternatives and variations can be made in the embodiments without departing from principles and purposes of the present disclosure. The scope of the present disclosure is defined by claims or equivalents thereof.

Claims**1.** A suction cup module of a launcher, comprising:

a suction cup housing;
 a magnetic assembly arranged on the suction cup housing; and
 a fastener movably arranged on the suction cup housing, and provided with a fastener foot that is movable between a locking position and an unlocking position, wherein when in the locking position, the fastener foot is configured to be fastened on an object to be launched; when in the unlocking position, the fastener foot is configured to be separated from the object to be launched.

2. The suction cup module according to claim 1, wherein the suction cup housing comprises a suction cup outer cover and an inner liner, and the inner liner is arranged inside the suction cup outer cover.**3.** The suction cup module according to claim 2, wherein the fastener is rotatably arranged between the suction cup outer cover and the inner liner and has a fastener shaft, the fastener foot is located at an end of the fastener shaft, and the fastener foot is retractable when the fastener rotates around the fastener shaft; and
 the suction cup module further comprises a snap-lock elastic member connected between the fastener and the suction cup housing and configured to drive the fastener foot to rotate toward the locking position.**4.** The suction cup module according to claim 3, wherein the snap-lock elastic member is fitted on the fastener; the snap-lock elastic member and the fastener foot are located at both ends of the fastener shaft; the fastener is provided with a fastener groove configured to cooperate with the snap-lock elastic member.**5.** The suction cup module according to claim 3, wherein the fastener is provided with a snap-lock protrusion; the suction cup outer cover or the inner liner is provided with a snap-lock groove corresponding to the snap-lock protrusion; when the fastener is in the locking position, the snap-lock protrusion is fitted in the snap-lock groove.**6.** The suction cup module according to claim 3, wherein an inner liner opening is provided in a peripheral wall of the inner liner; the fastener foot extends into or exits from the inner liner through the inner liner opening when rotating; an end of the inner liner is provided with an inner liner flange, and an end of the fastener shaft cooperates with the inner liner flange.**7.** The suction cup module according to claim 1, wherein the fastener is provided with an extension foot provided with an extension surface; when a force is exerted on the extension surface, the fastener foot moves toward the unlocking position.**8.** The suction cup module according to claim 2, wherein the suction cup outer cover comprises two detachable half covers that enclose an outside of the inner liner.**9.** The suction cup module according to claim 1, wherein the suction cup housing has a mating opening for the object to be launched to extend in; the magnetic assembly is arranged inside the suction cup housing, and comprises a suction cup magnetically attracting member and a magnetically insulated sleeve; the magnetically insulated sleeve is open on a side facing the mating opening.**10.** The suction cup module according to claim 1, wherein the suction cup housing is formed into a cylindrical shape with two open ends; the magnetic assembly and the fastener are both arranged inside the suction cup housing; a plurality of fasteners are provided and spaced apart along a circumferential wall of the suction cup housing.**11.** A launcher, comprising:

a launcher body; and
 the suction cup module according to any one of claims 1 to 10, the suction cup module being arranged on the launcher body.

12. The launcher according to claim 11, further comprising: a drive assembly that is arranged on the launcher body and is configured to cooperate with the suction cup module and drive the suction cup module to rotate when triggered and be separated from the suction cup module when released.**13.** The launcher according to claim 12, wherein the drive assembly includes a rope winding portion and a rope body; the rope winding portion is connected to the suction cup module; the rope body is wound on the rope winding portion and has an inner end connected to the rope winding portion.**14.** A toy suite, comprising:

a launcher configured as the launcher according to any one of claims 11 to 13; and
 a top having a magnetic top tip that is attractable onto the suction cup module.

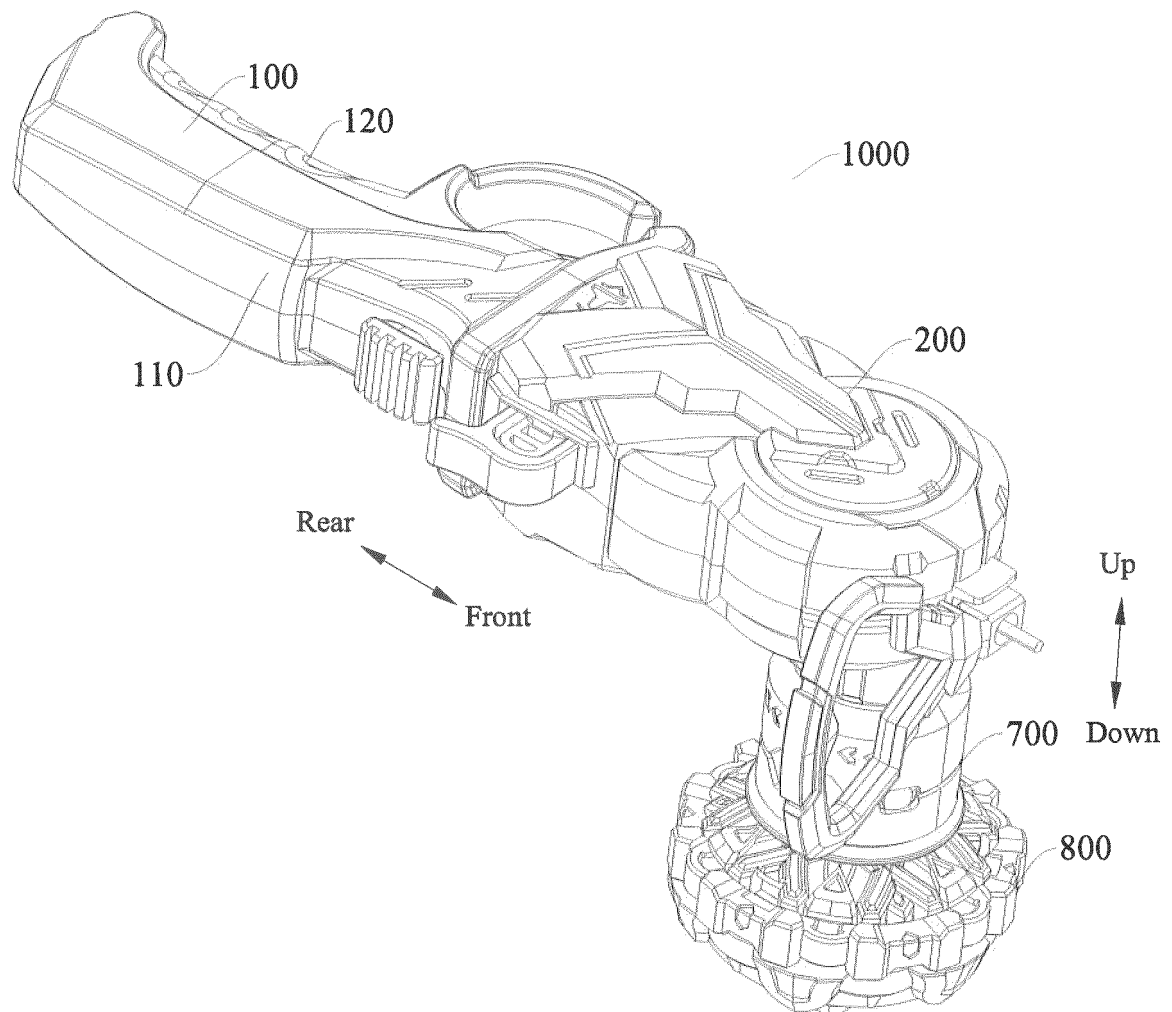


FIG. 1

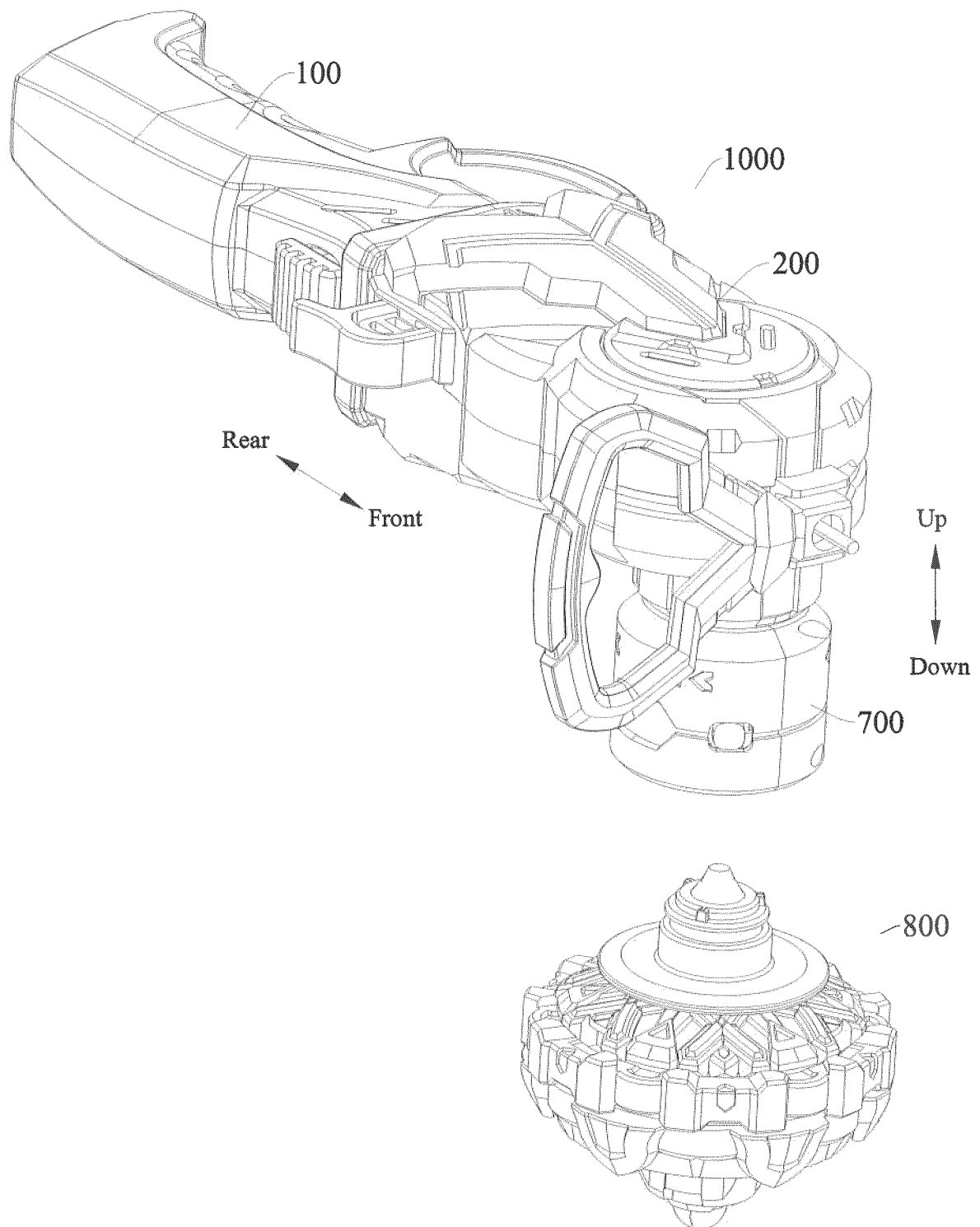


FIG. 2

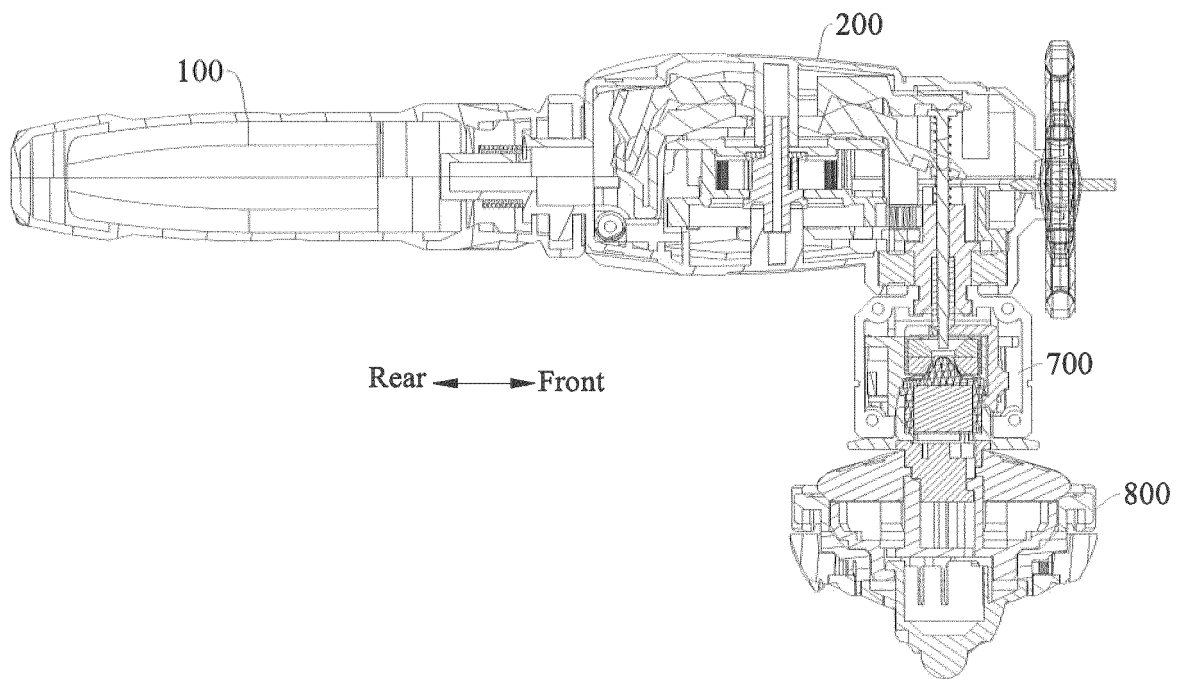


FIG. 3

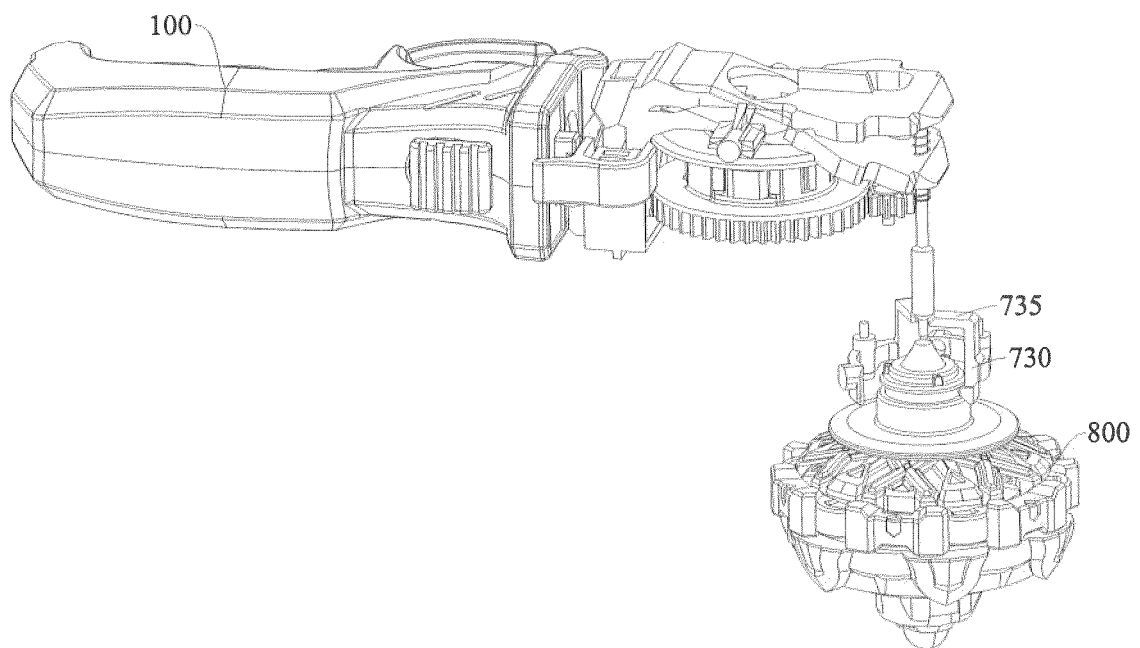


FIG. 4

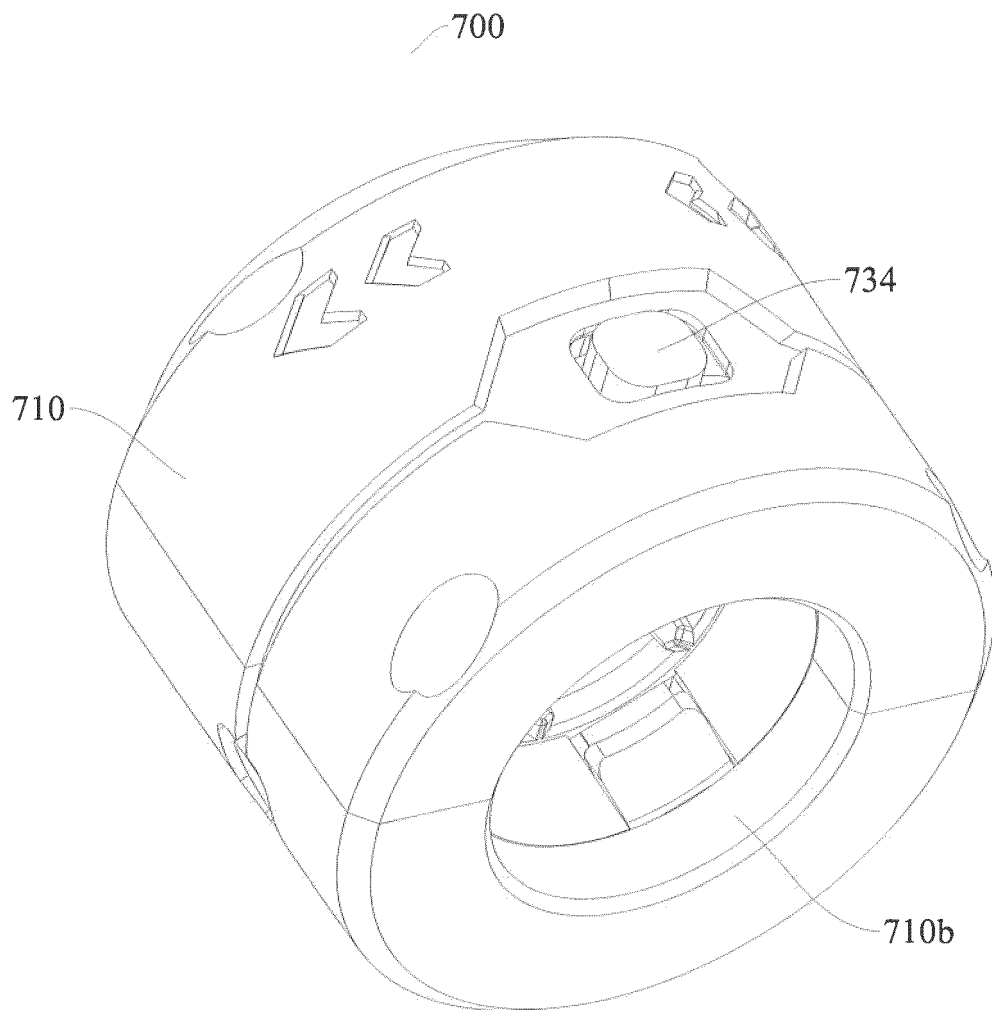


FIG. 5

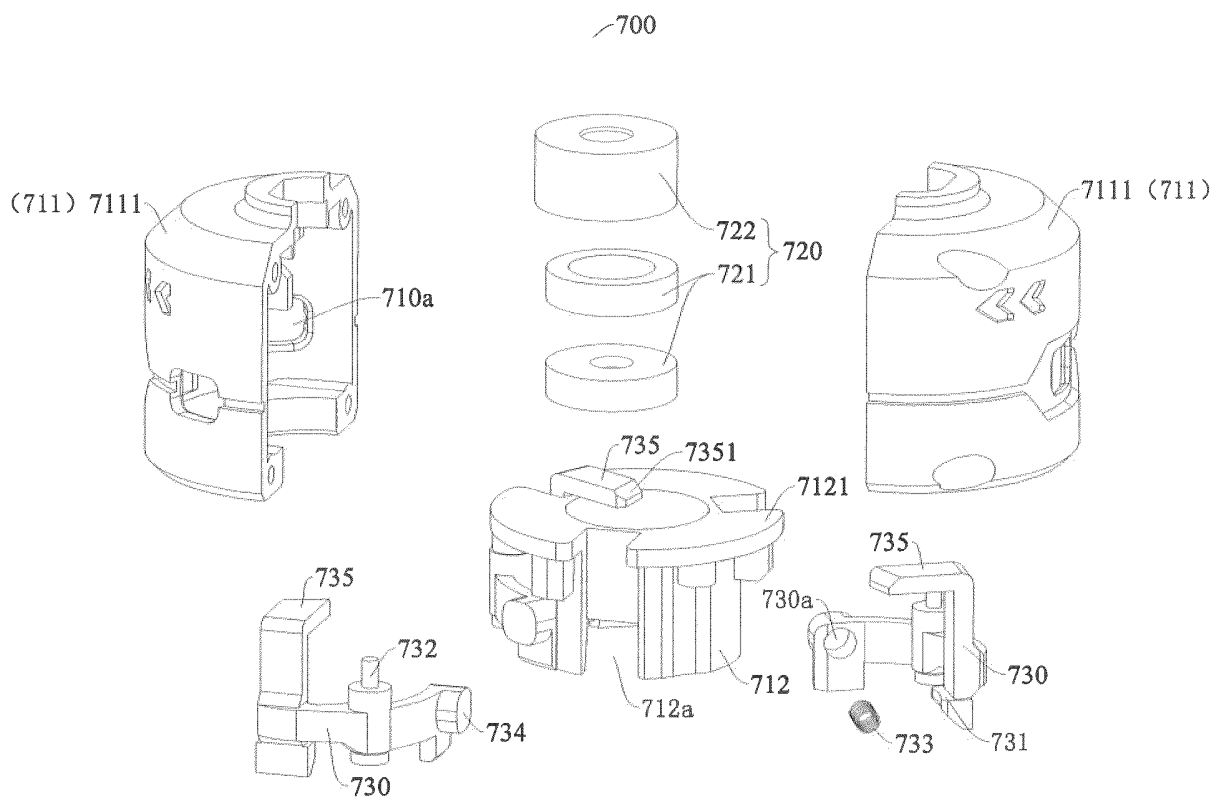


FIG. 6

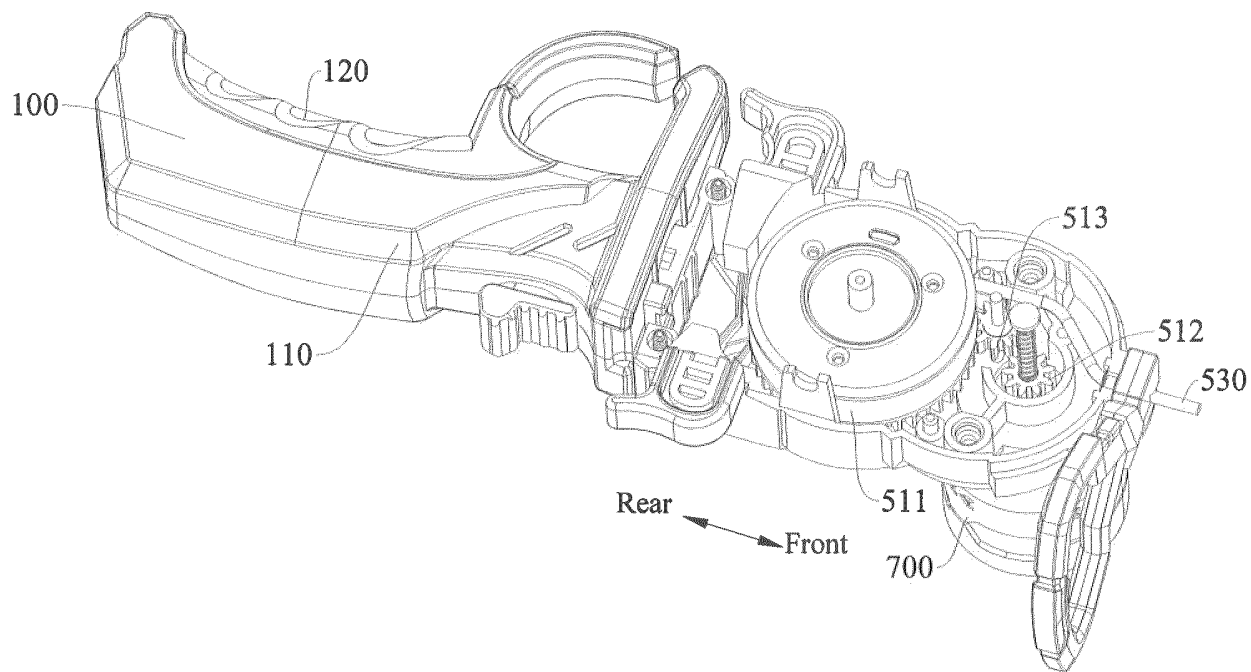


FIG. 7

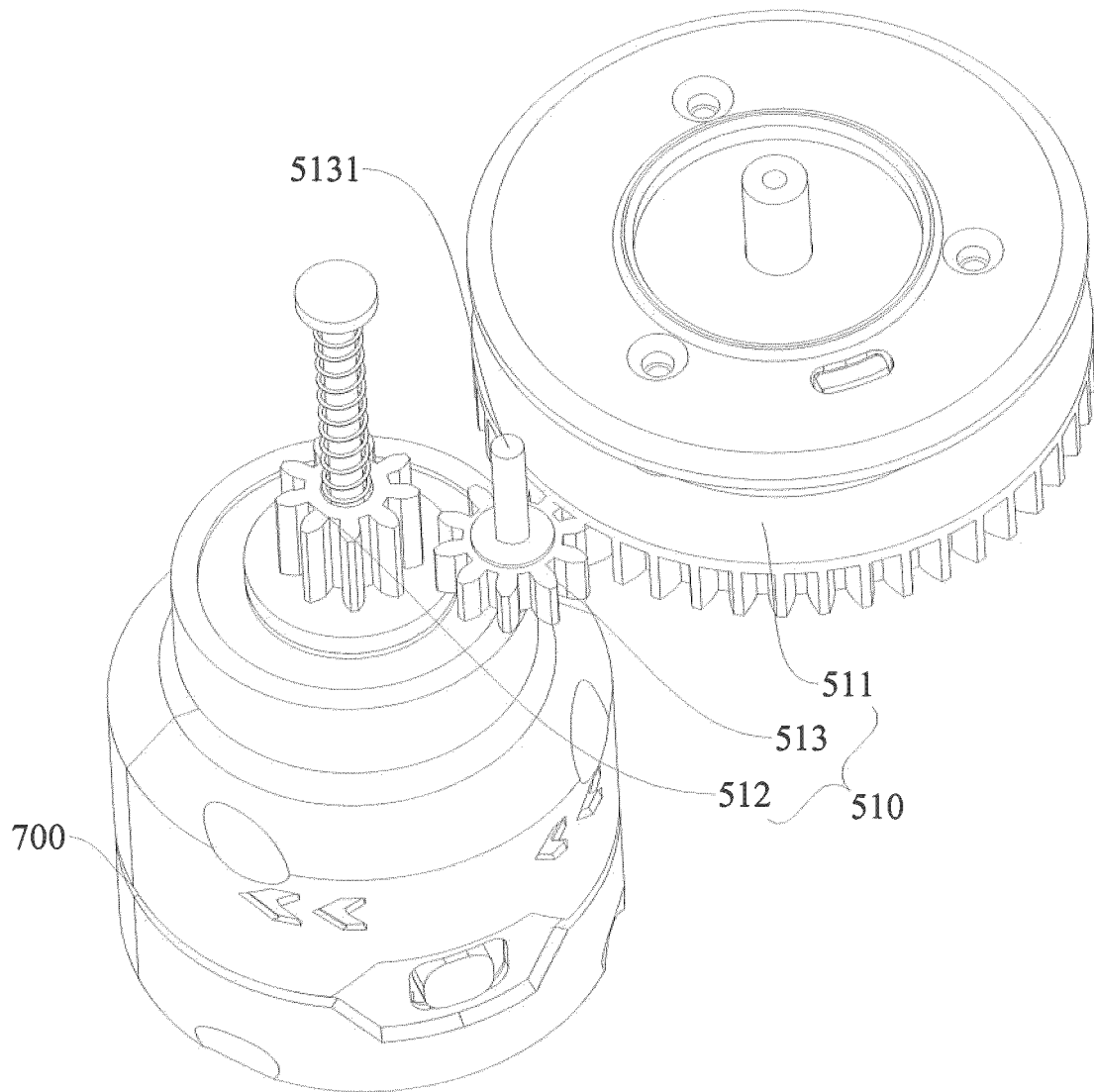


FIG. 8

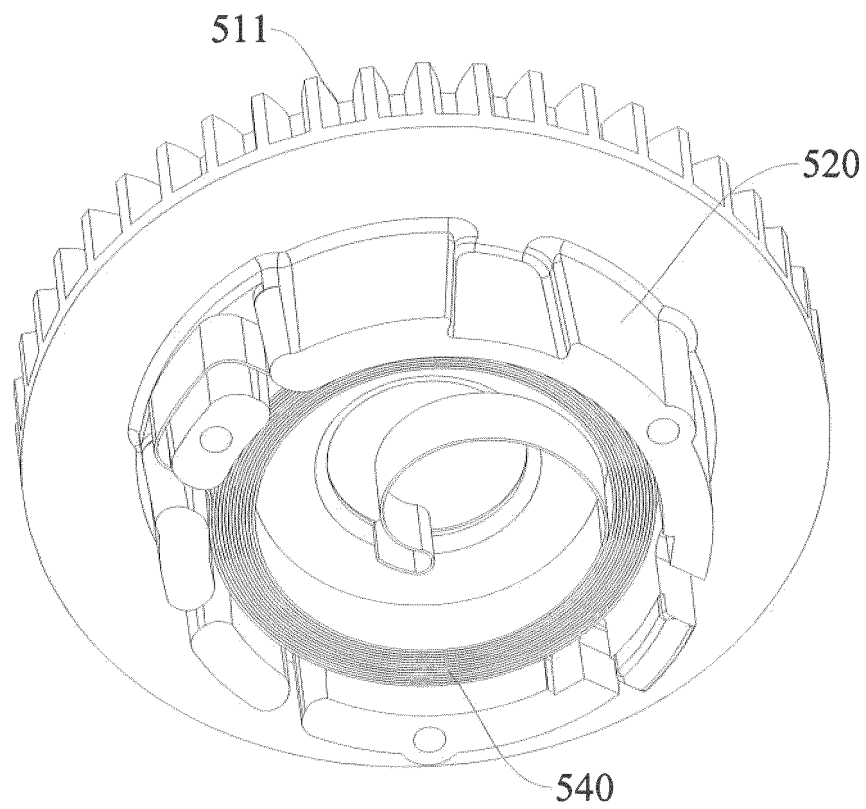


FIG. 9

INTERNATIONAL SEARCH REPORT

International application No.

PCT/CN2019/092932

5	A. CLASSIFICATION OF SUBJECT MATTER	
	A63H 1/32(2006.01)i	
	According to International Patent Classification (IPC) or to both national classification and IPC	
10	B. FIELDS SEARCHED	
	Minimum documentation searched (classification system followed by classification symbols)	
	A63H1, A63H31, A63H33	
	Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched	
15	Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)	
	CNABS, CNTXT, CNKI, SIPOABS, DWPI, VEN; 陀螺, 发射, 释放, 磁, 卡, 扣, 锁, gyroscope, spin, emmit, launch, fire, release, unlock, magnetic, magnet, clamp, lock	
20	C. DOCUMENTS CONSIDERED TO BE RELEVANT	
	Category*	Citation of document, with indication, where appropriate, of the relevant passages
		Relevant to claim No.
	Y	CN 205796498 U (GUANGZHOU SUNBOY TOYS CO., LTD.) 14 December 2016 (2016-12-14) description, paragraphs [0025]-[0031], and figures 1-3
25	Y	CN 201516284 U (YANG, PEIRONG) 30 June 2010 (2010-06-30) description, paragraphs [0018]-[0026], and figures 1-3
	A	CN 2582697 Y (CAI, DONGQING) 29 October 2003 (2003-10-29) entire document
	A	CN 205796500 U (GUANGZHOU SUNBOY TOYS CO., LTD.) 14 December 2016 (2016-12-14) entire document
30	A	CN 201046340 Y (CAI, DONGQING) 16 April 2008 (2008-04-16) entire document
	A	CN 204973039 U (GUANGDONG ALPHA ANIMATION AND CULTURE CO., LTD. ET AL.) 20 January 2016 (2016-01-20) entire document
35	A	CN 102886143 A (GUANGZHOU TEENBO CO., LTD.) 23 January 2013 (2013-01-23) entire document
	☒ Further documents are listed in the continuation of Box C. ☒ See patent family annex.	
40	* Special categories of cited documents: "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier application or patent but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art "&" document member of the same patent family	
45	Date of the actual completion of the international search 14 August 2019	
	Date of mailing of the international search report 16 September 2019	
50	Name and mailing address of the ISA/CN China National Intellectual Property Administration (ISA/CN) No. 6, Xitucheng Road, Jimenqiao, Haidian District, Beijing 100088 China	
55	Authorized officer Facsimile No. (86-10)62019451 Telephone No.	

Form PCT/ISA/210 (second sheet) (January 2015)

INTERNATIONAL SEARCH REPORT

International application No. PCT/CN2019/092932

5	C. DOCUMENTS CONSIDERED TO BE RELEVANT		
	Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
	A	US 6685531 B1 (TIEFEL SIMEON ET AL.) 03 February 2004 (2004-02-03) entire document	1-14
10	A	CN 103768796 A (GUANGZHOU SEASHELLS ANIMATION TECHNOLOGY CO., LTD.) 07 May 2014 (2014-05-07) entire document	1-14
	A	CN 204745635 U (YANG, LEI) 11 November 2015 (2015-11-11) entire document	1-14
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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.

PCT/CN2019/092932

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
CN 205796498 U	14 December 2016	None	
CN 201516284 U	30 June 2010	None	
CN 2582697 Y	29 October 2003	None	
CN 205796500 U	14 December 2016	None	
CN 201046340 Y	16 April 2008	None	
CN 204973039 U	20 January 2016	None	
CN 102886143 A	23 January 2013	None	
US 6685531 B1	03 February 2004	None	
CN 103768796 A	07 May 2014	CN 103768796 B	18 May 2016
CN 204745635 U	11 November 2015	None	

Form PCT/ISA/210 (patent family annex) (January 2015)