



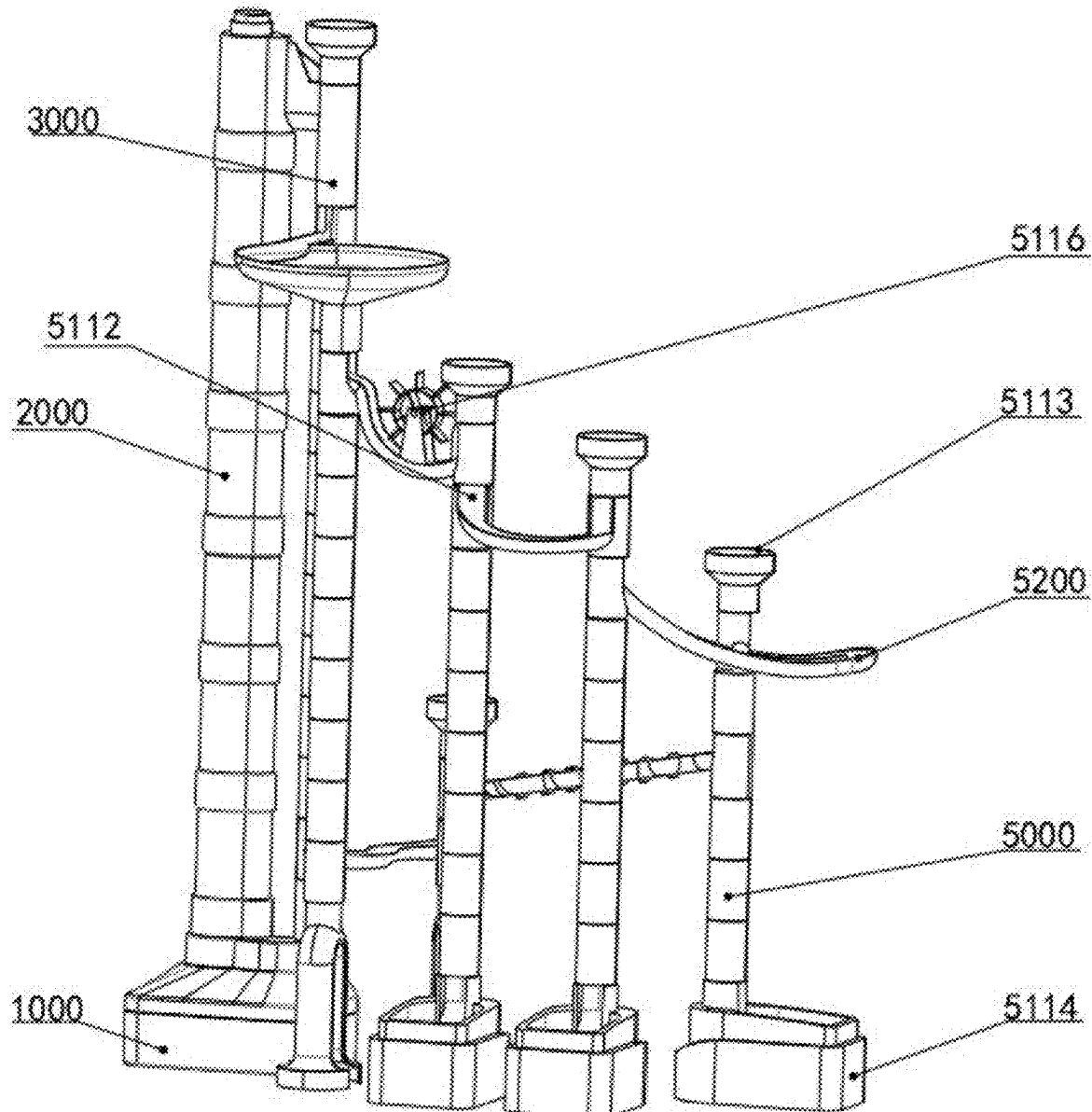
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(19) **United States**(12) **Patent Application Publication**
LIU(10) **Pub. No.: US 2025/0262560 A1**(43) **Pub. Date: Aug. 21, 2025**(54) **SPIRAL LIFTER FOR LIFTABLE TOY BALLS**(71) Applicant: **Langping LIU**, Guangdong (CN)(72) Inventor: **Langping LIU**, Guangdong (CN)(21) Appl. No.: **19/199,478**(22) Filed: **May 6, 2025****Related U.S. Application Data**

(63) Continuation-in-part of application No. 18/236,418, filed on Aug. 22, 2023.

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A63H 18/06 (2006.01)(52) **U.S. Cl.**
CPC **A63H 18/06** (2013.01)(57) **ABSTRACT**

The present disclosure provides a spiral lifter for liftable toy balls, comprising a base, a lifting assembly, a recovery assembly, and an external rail. The external rail comprises a rail assembly, which is provided with a rail channel communicating with the recovery conduit. The rail assembly comprises at least one rail unit, wherein at least one rail unit is provided with a rail outlet, and at least one rail unit is provided with a rail inlet. The rail inlet is used to receive and guide toy balls into the rail channel, and the rail outlet is used to guide toy balls out of the rail channel.



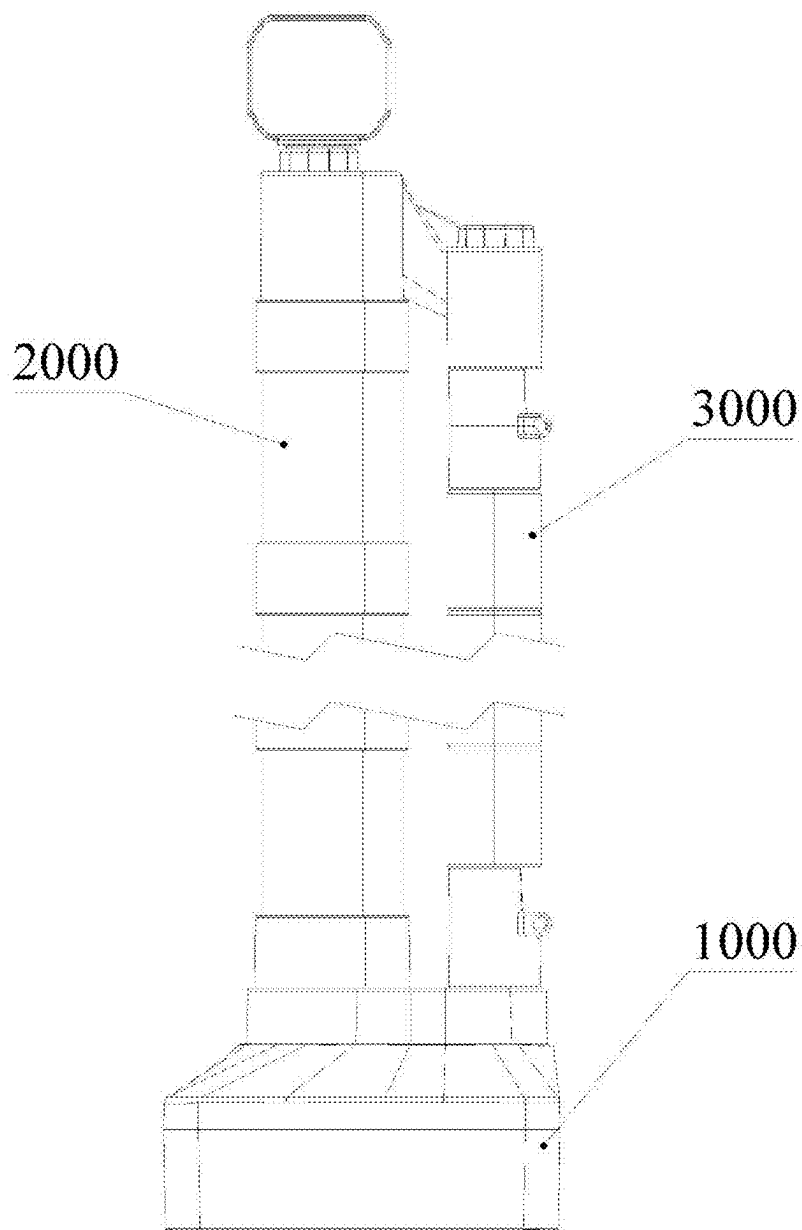


FIG. 1

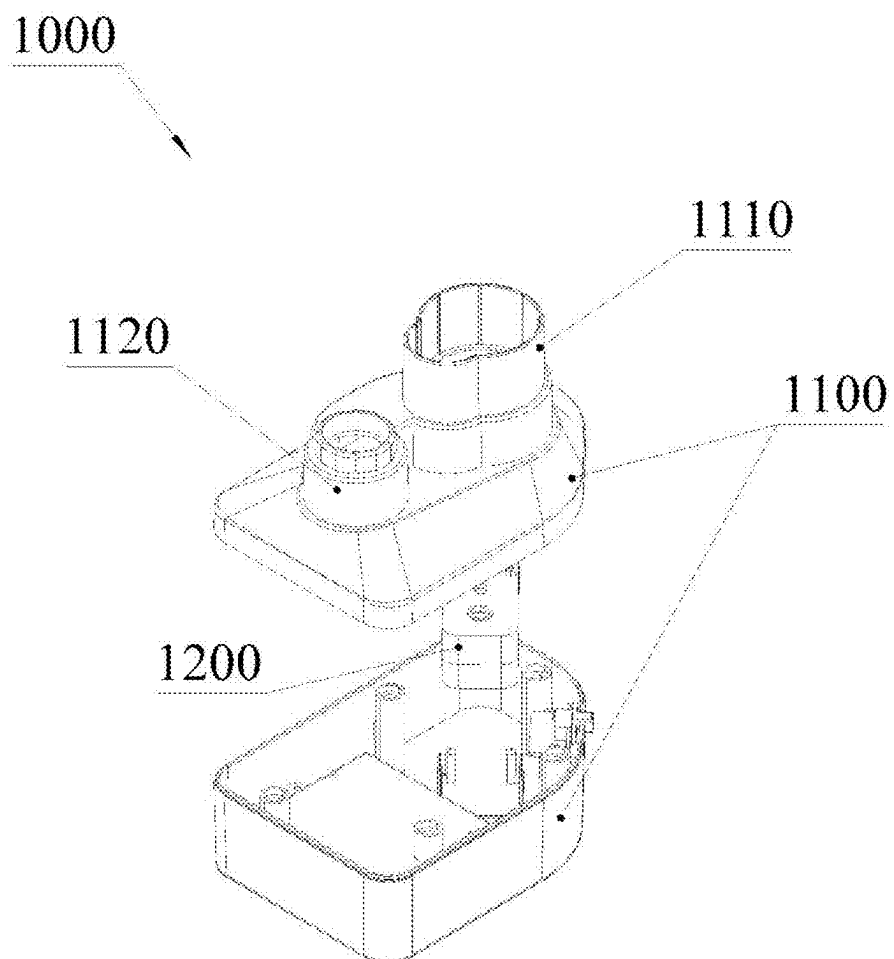


FIG. 2

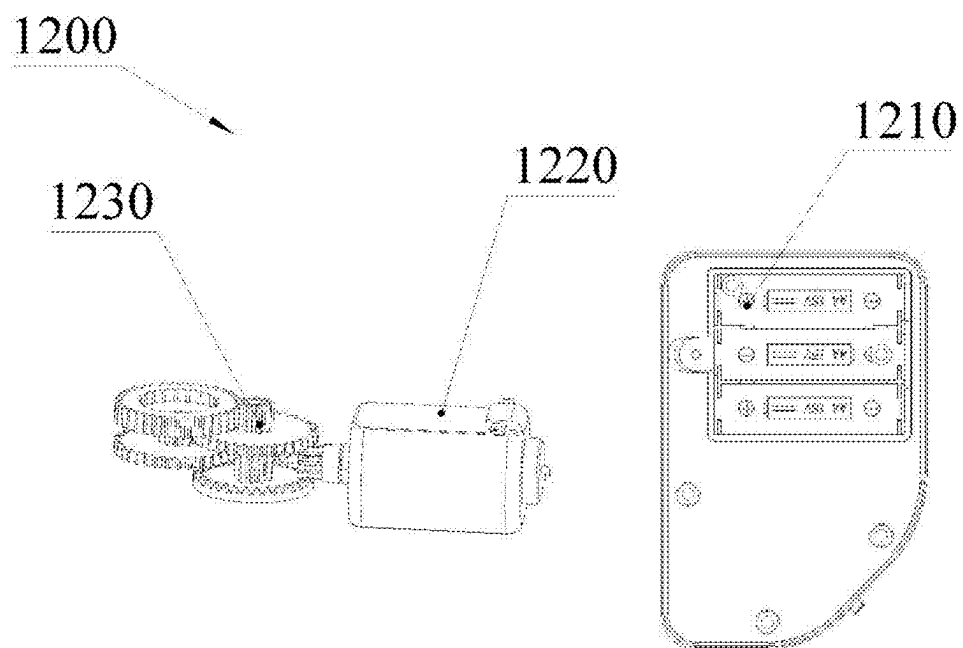


FIG. 3

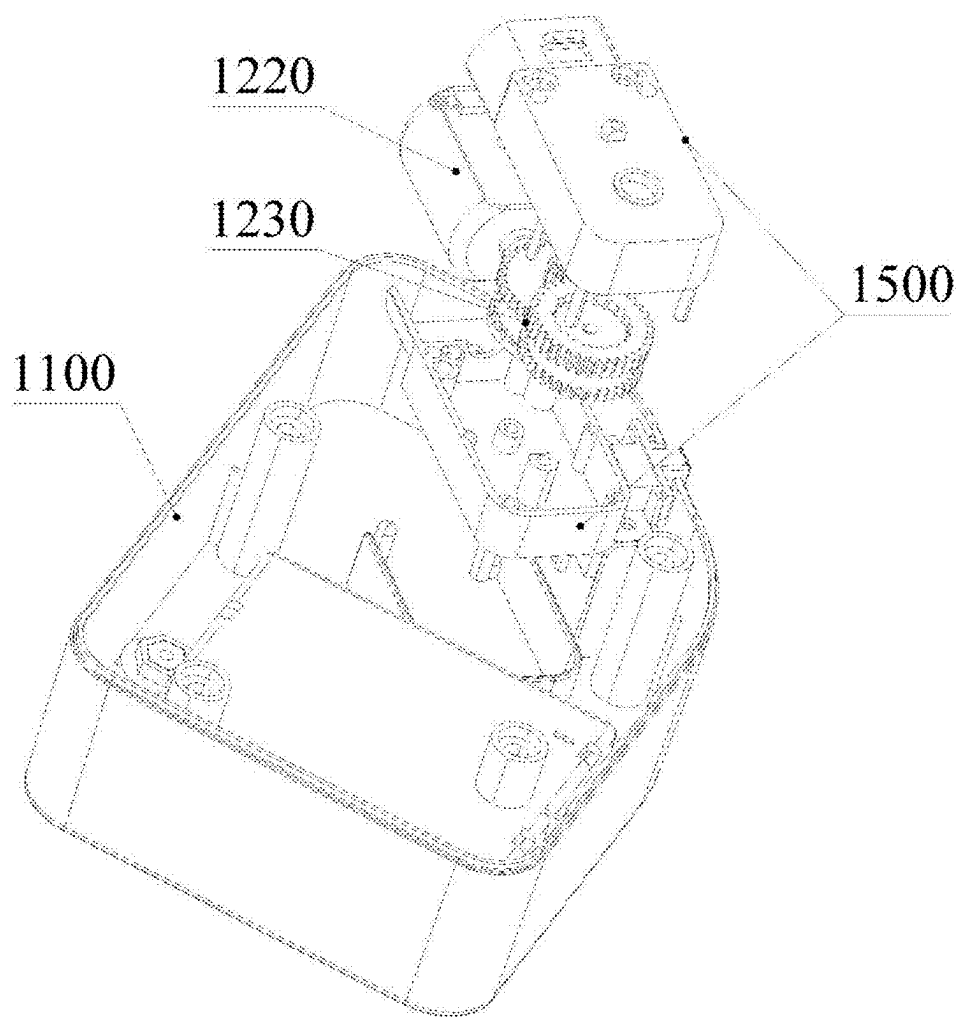


FIG. 4

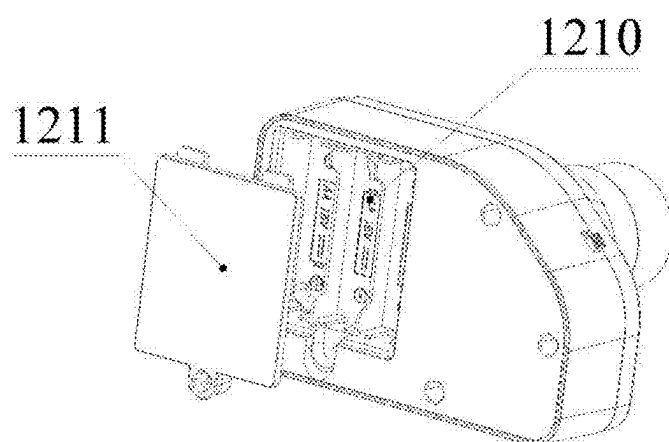


FIG. 5

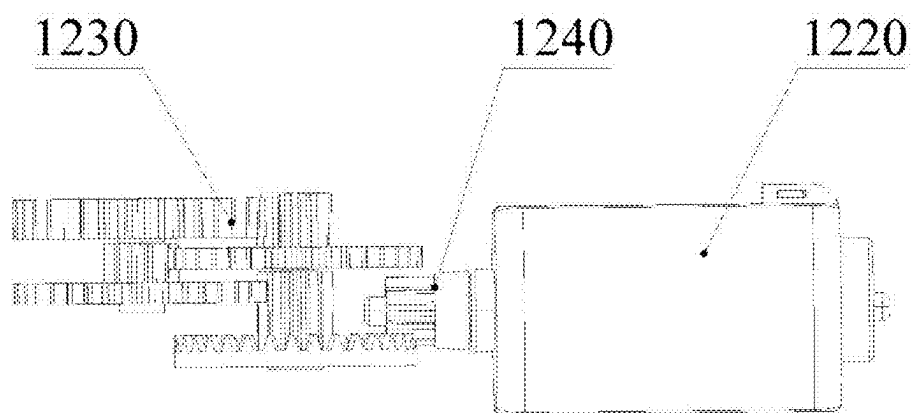


FIG. 6

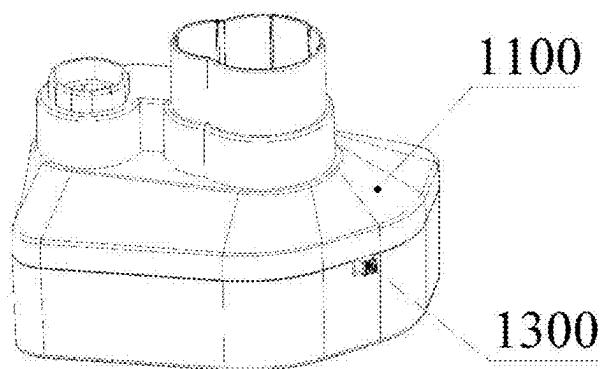


FIG. 7

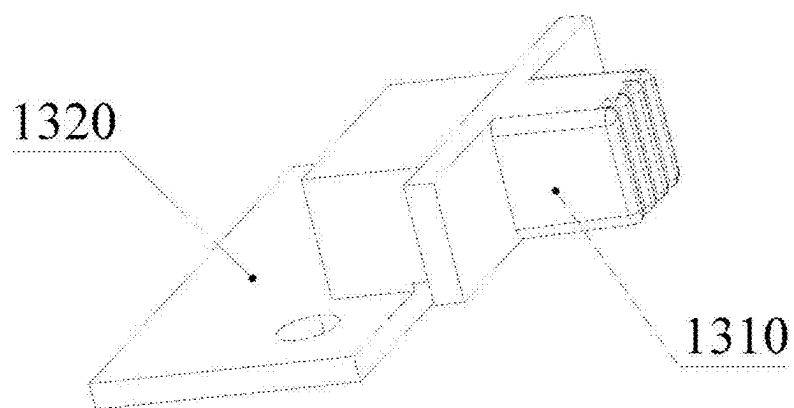


FIG. 8

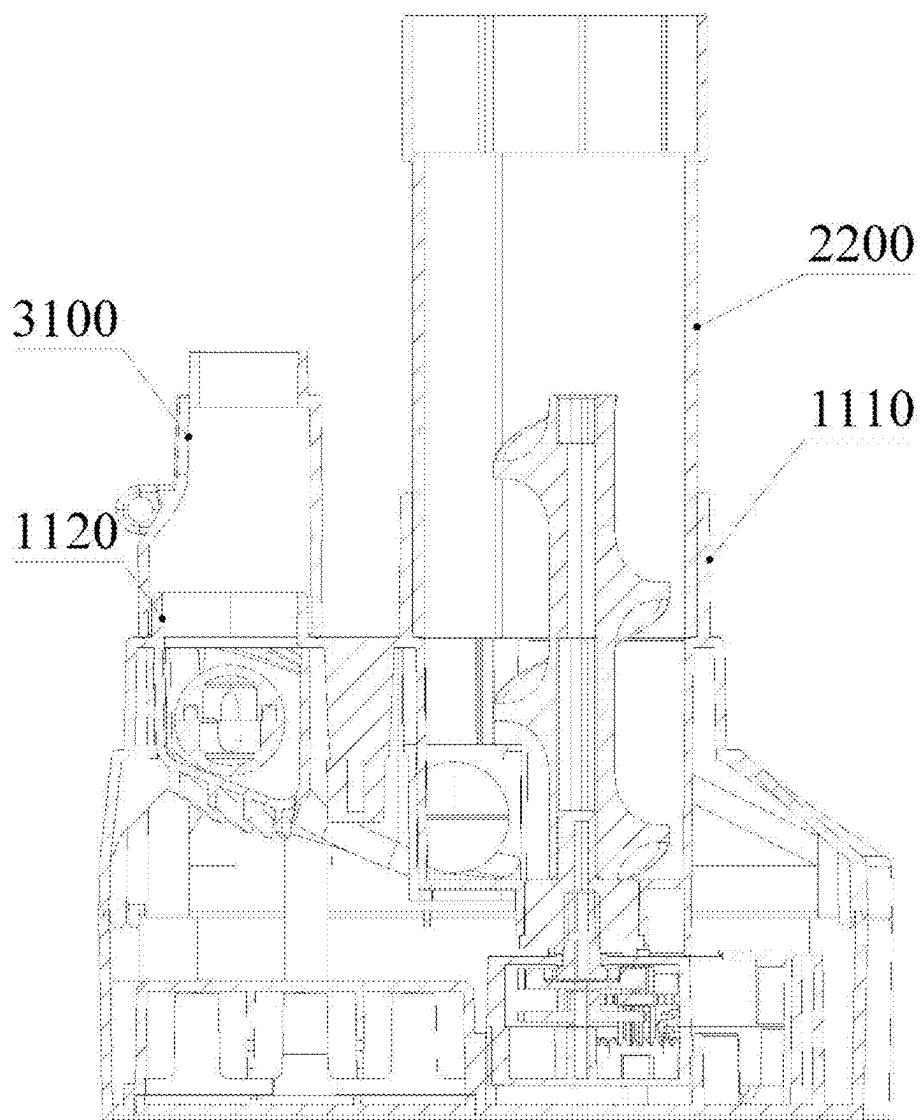


FIG. 9

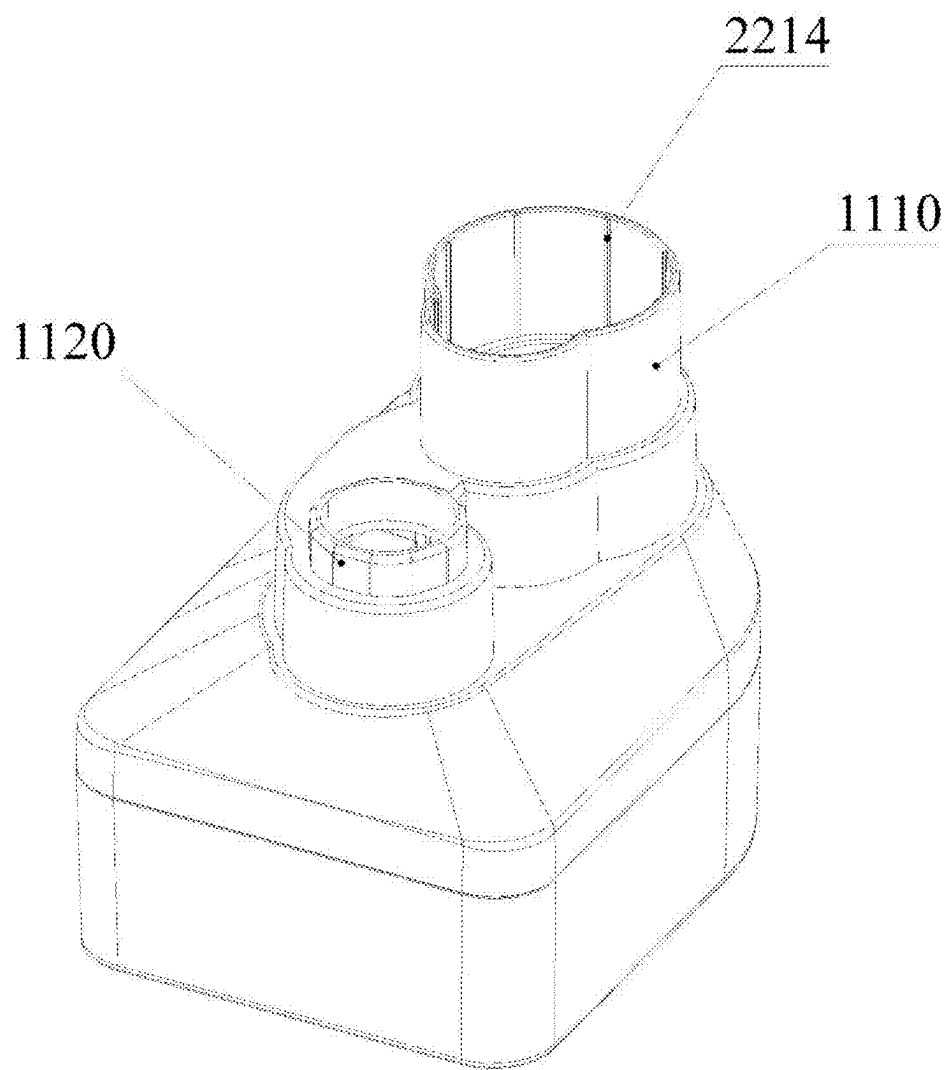


FIG. 10

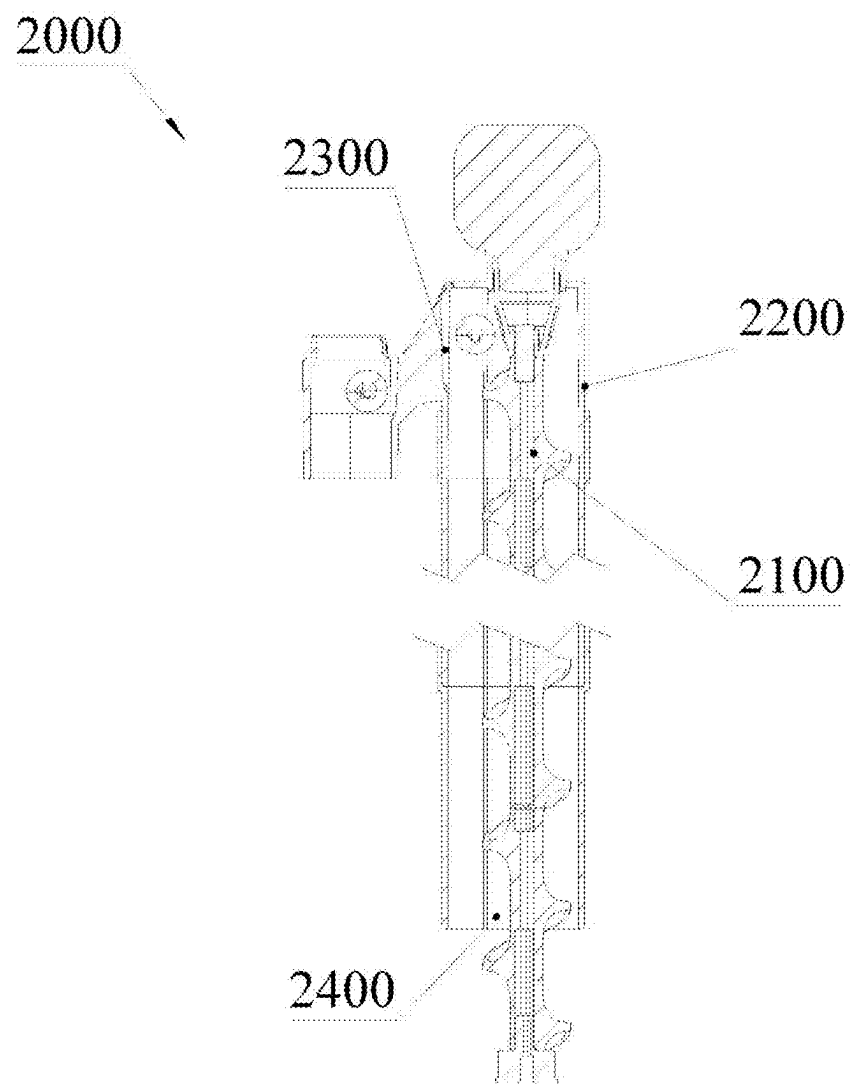


FIG. 11

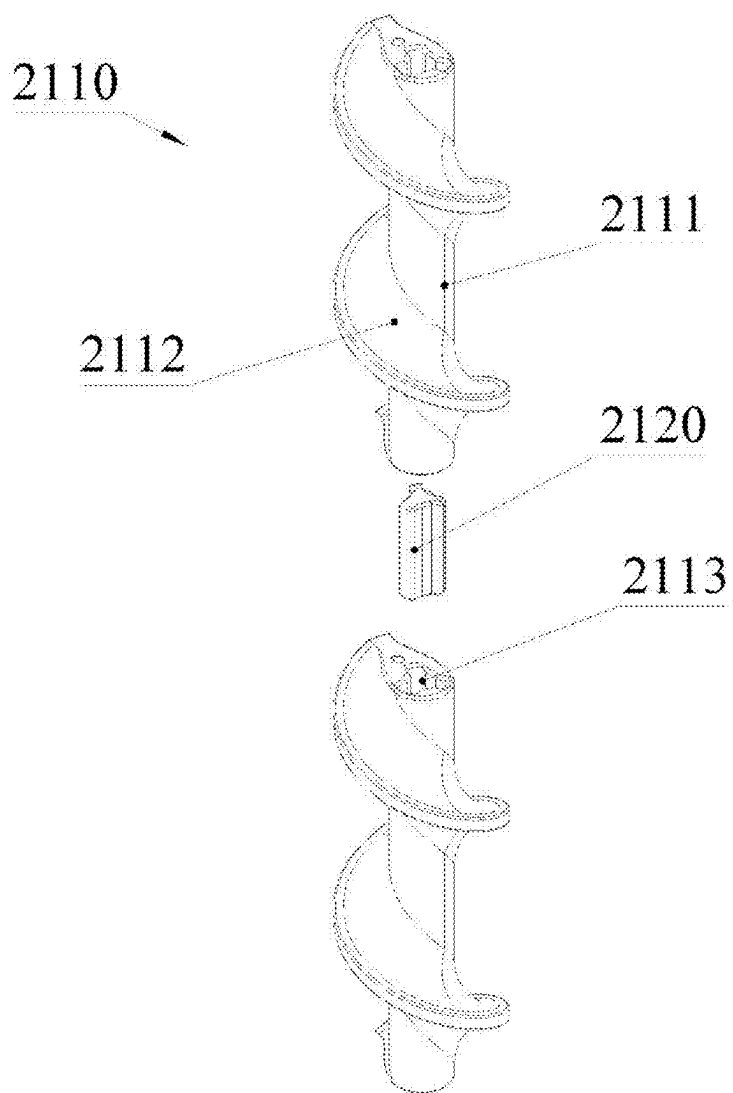


FIG. 12

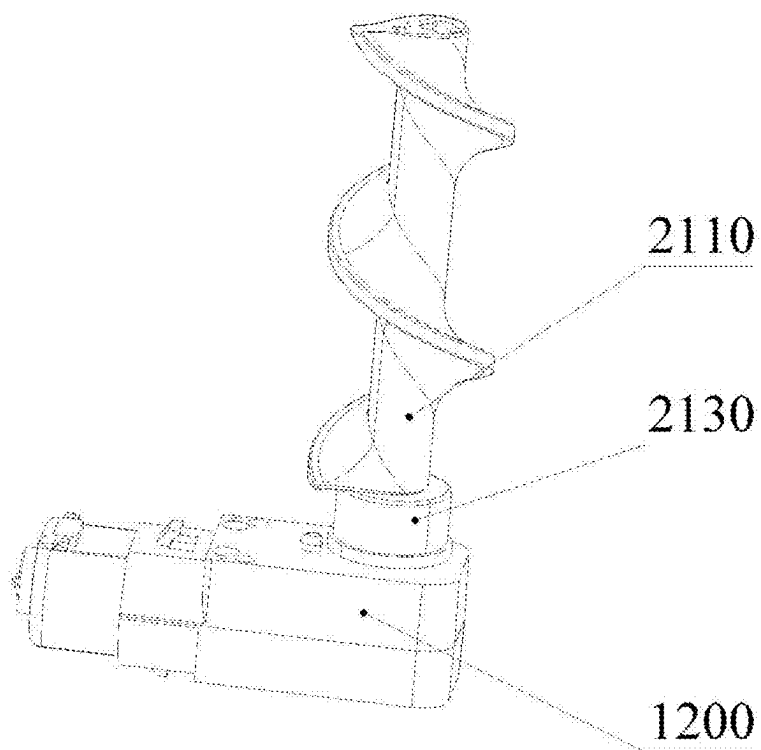


FIG. 13

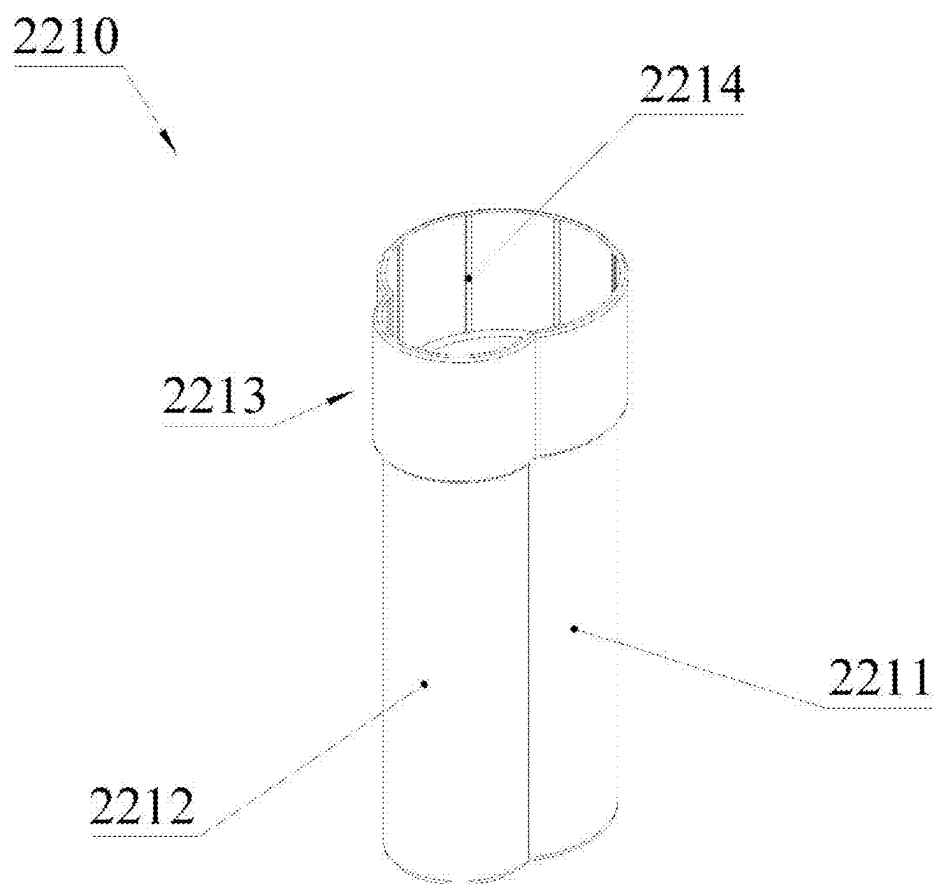


FIG. 14

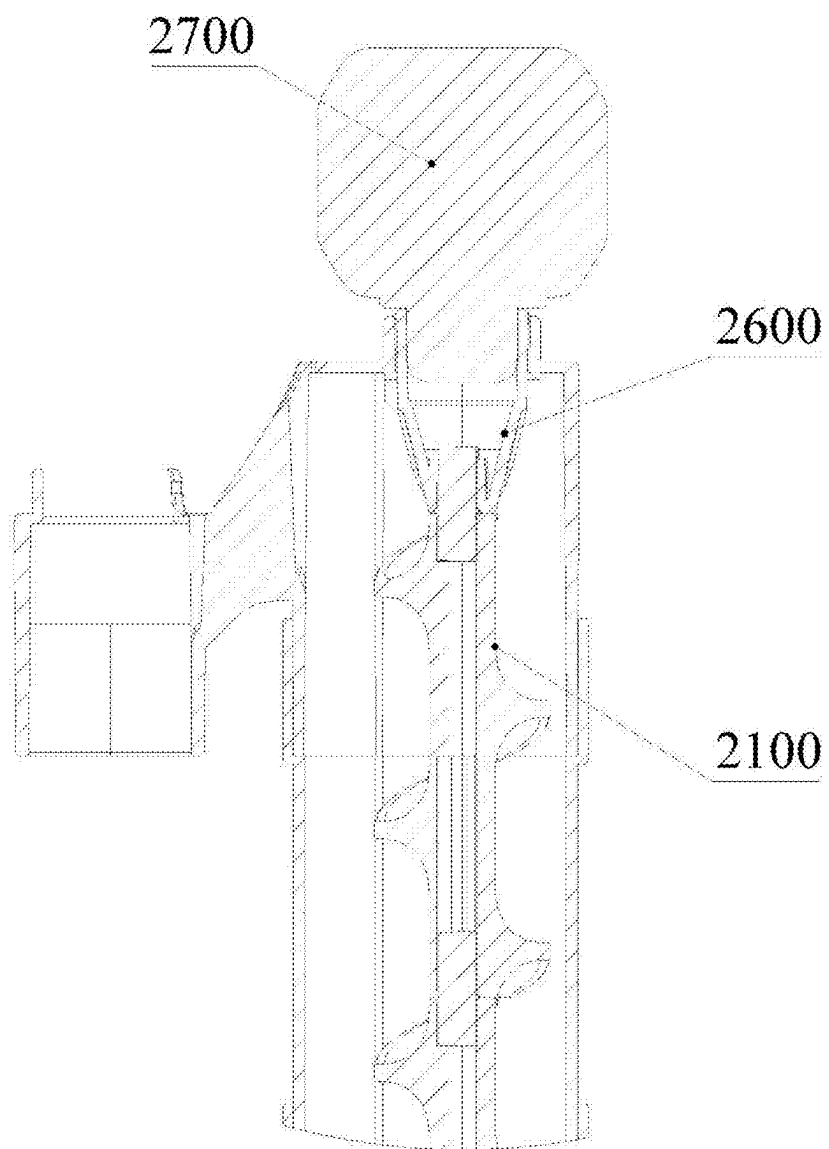


FIG. 15

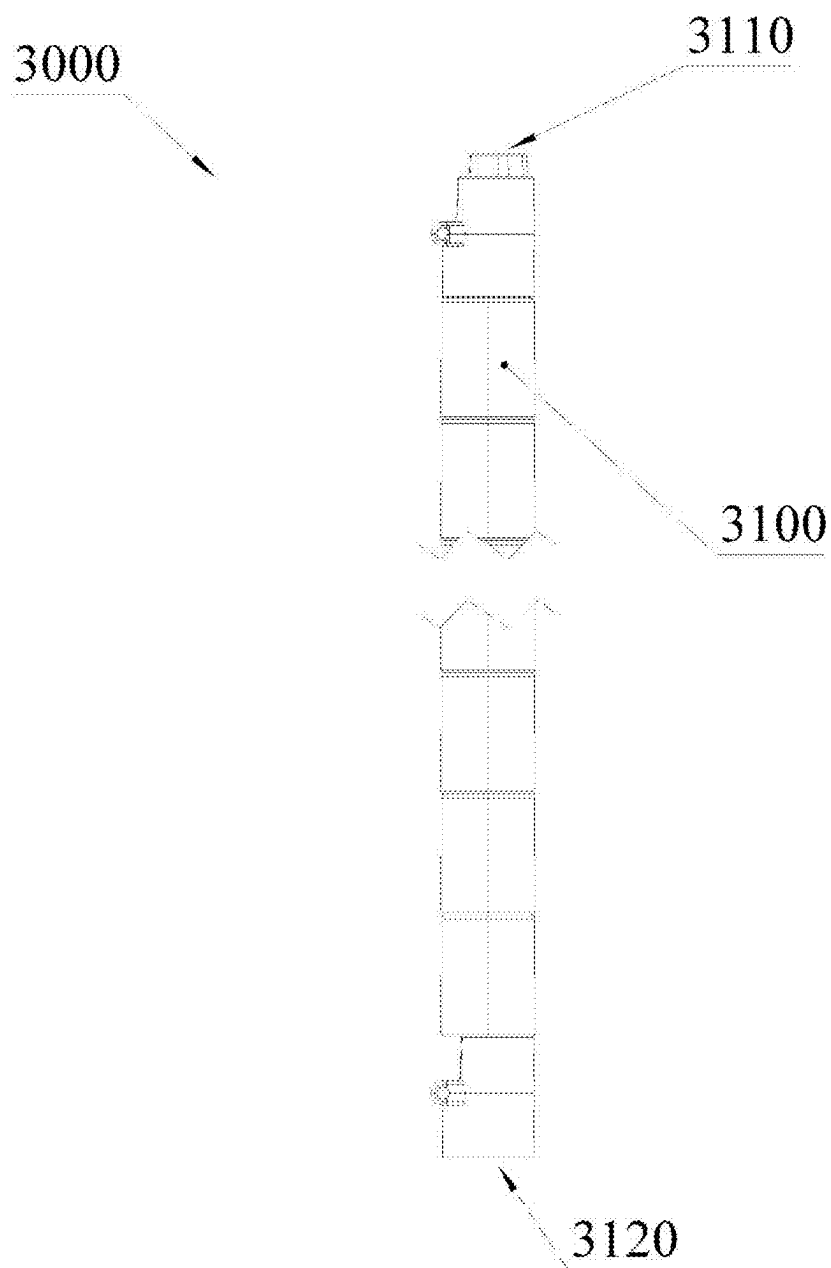


FIG. 16

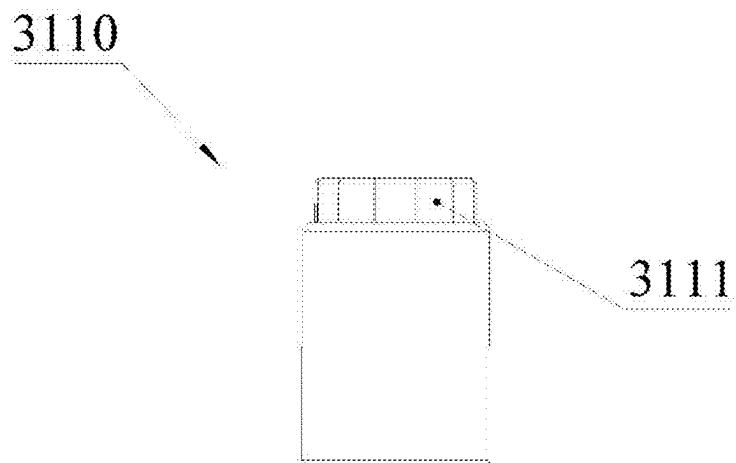


FIG. 17

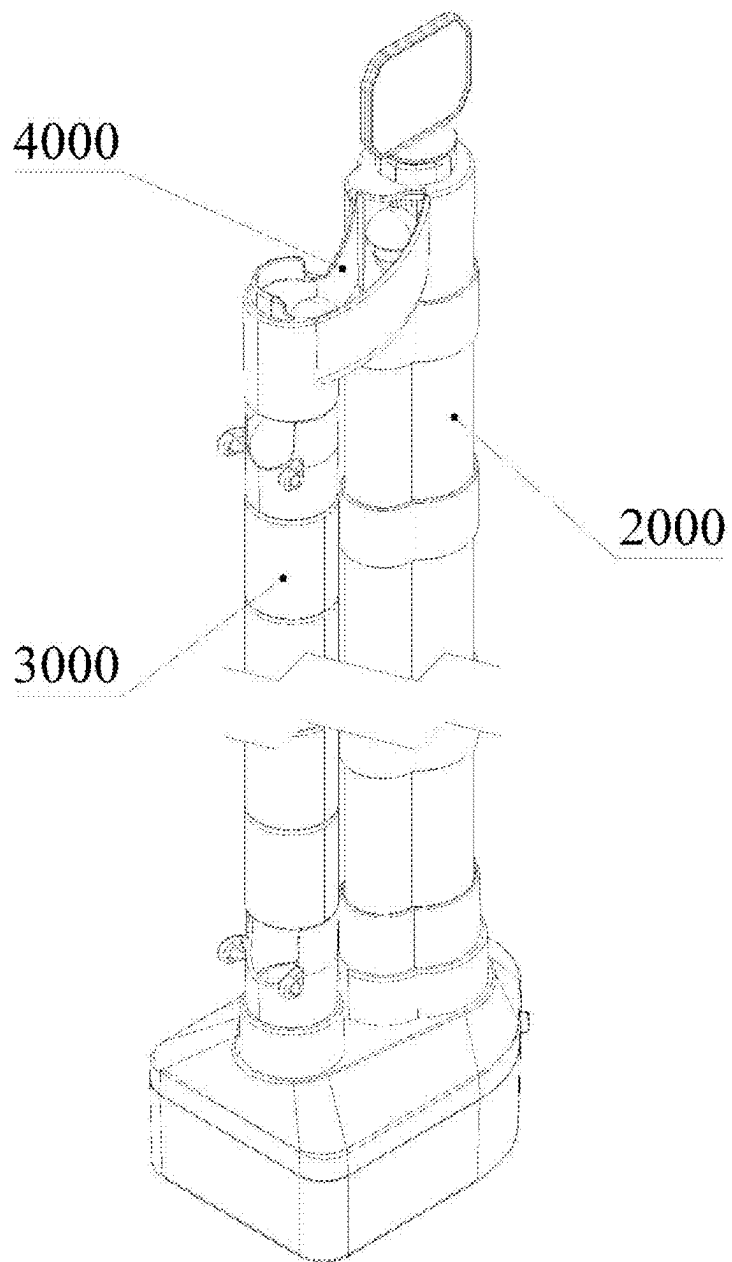


FIG. 18

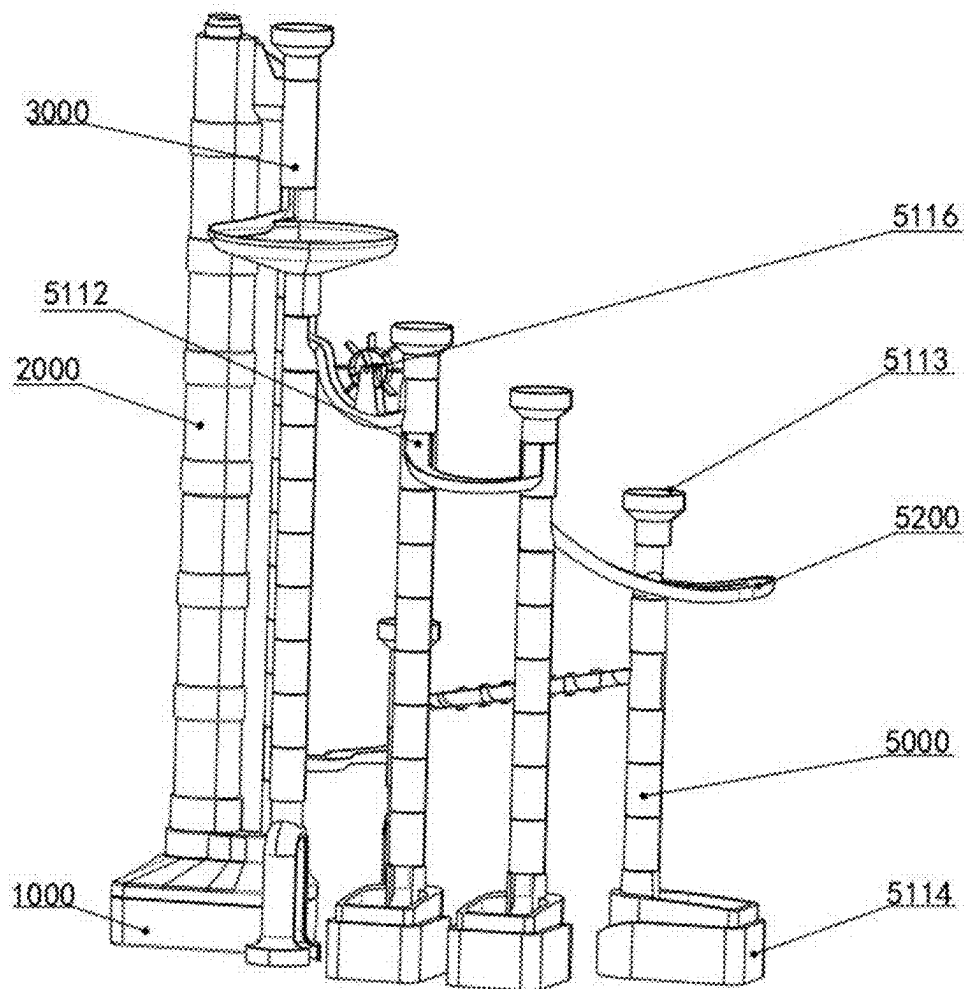


FIG. 19

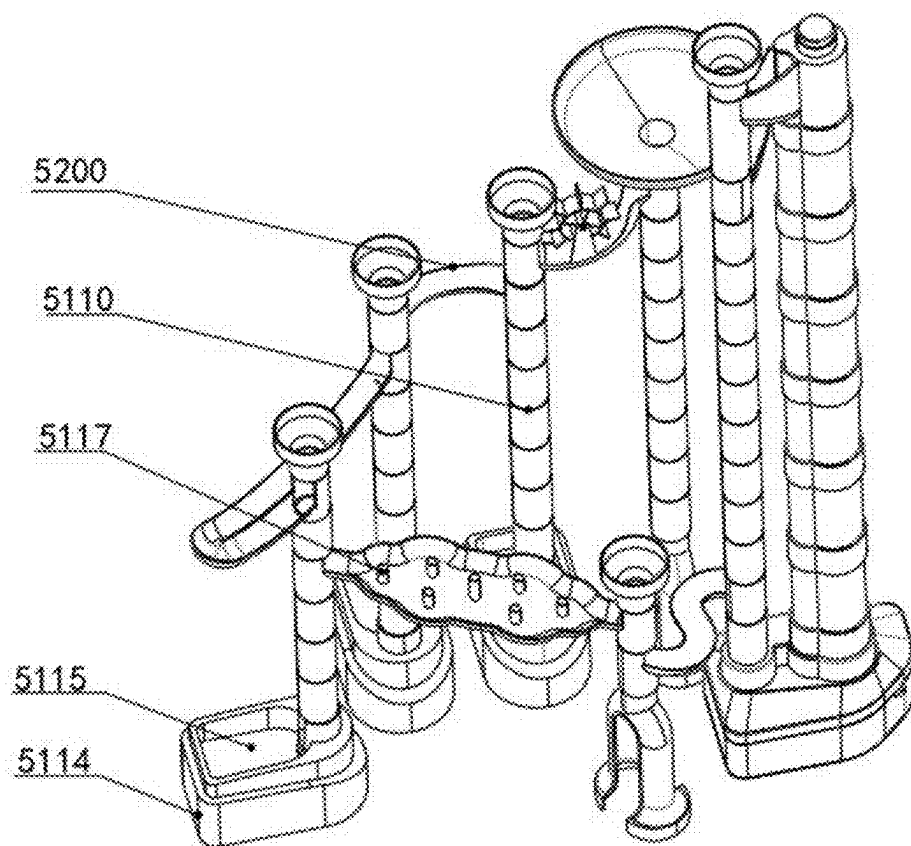


FIG. 20

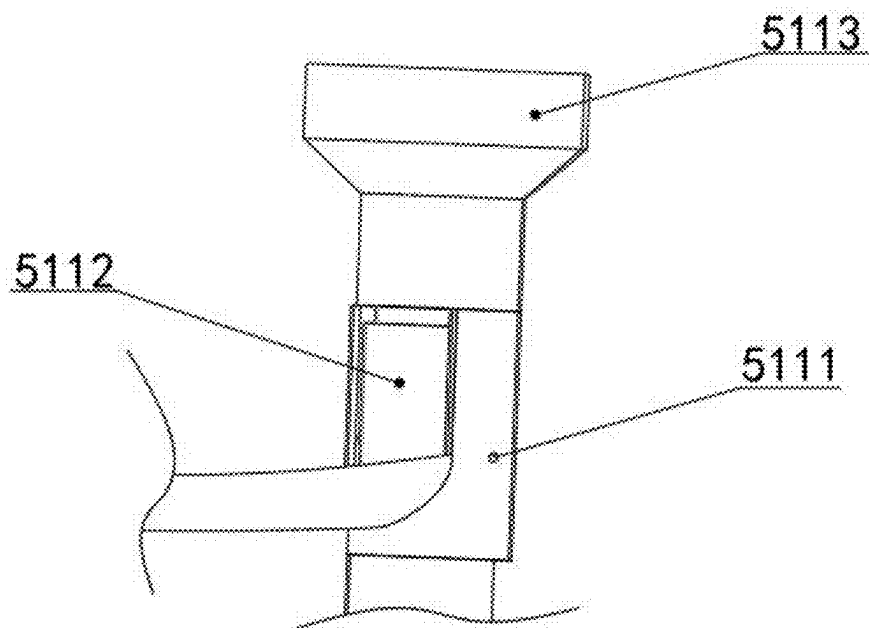


FIG. 21

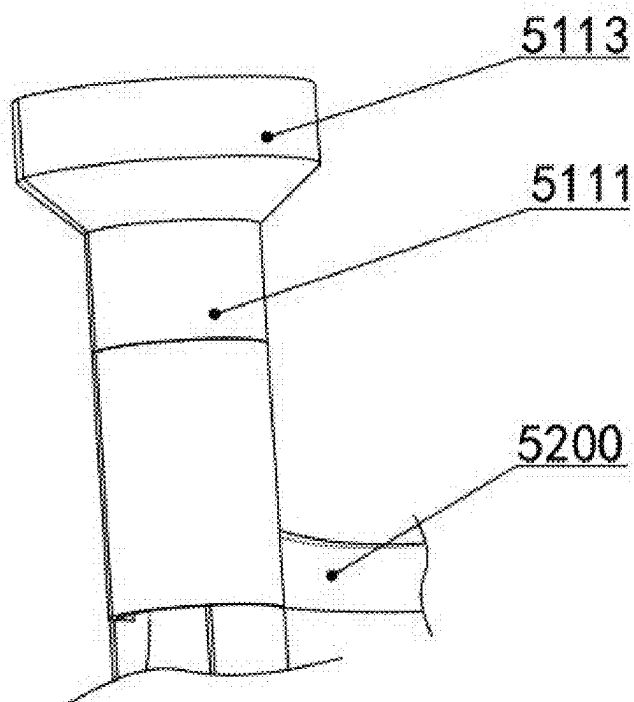


FIG. 22

SPIRAL LIFTER FOR LIFTABLE TOY BALLS

[0001] This application is a continuation-in-part of the application titled “Spiral Lifter for Liftable Toy Balls” filed on Aug. 22, 2023, with an application number of U.S. Ser. No. 18/236418, the content of which is incorporated herein by reference in its entirety.

TECHNICAL FIELD

[0002] The present disclosure relates to the technical field of children’s toys, and particularly to a spiral lifter for liftable toy balls.

BACKGROUND

[0003] Infant and children’s toys are well-known and continuously improved and reconfigured to provide greater interest and entertainment. Among them, the spiral lifter is widely loved for its ability to enhance hands-on skills and expand thinking abilities.

[0004] Existing examples include U.S. Pat. Nos. 9,925,471 and 9,457,284, both of which propose toys utilizing object lifting mechanisms. However, the toys disclosed in these patents, as well as some spiral lifters on the market, only allow toy balls to perform linear reciprocating motion within pre-installed enclosed recovery conduits. This results in repetitive use of the toy balls, and the unidirectional cycle mechanism leads to high repetitiveness and unchangeable paths. After a plurality of operations, children may lose interest due to a lack of novelty, thereby affecting the long-term playability of the product.

SUMMARY

[0005] The present disclosure provides a spiral lifter for liftable toy balls to address the issues raised in the background.

[0006] To achieve the above inventive object, the present disclosure adopts the following technical solutions:

[0007] A spiral lifter for liftable toy balls comprises a base, a lifting assembly, a recovery assembly, and an external rail.

[0008] The base comprises a base housing, and the base housing is provided with a first opening and a second opening; and the lifting assembly comprises a lifting conduit and a lifting inlet and a lifting outlet provided on the lifting conduit, wherein the lifting assembly is arranged in the first opening; and the recovery assembly comprises a recovery conduit and a recovery inlet and a recovery outlet provided on the recovery conduit, wherein the recovery assembly is arranged in the second opening; and the external rail comprises a rail assembly, which is provided with a rail channel communicating with the recovery conduit, and the rail assembly comprises at least one rail unit, wherein at least one rail unit is provided with a rail outlet, and at least one rail unit is provided with a rail inlet; and the rail inlet is configured to receive and guide toy balls into the rail channel, and the rail outlet is configured to guide toy balls out of the rail channel.

[0009] A spiral lifter for liftable toy balls comprises a base, a lifting assembly, a recovery assembly, and an external rail. The base comprises a base housing, and the base housing is provided with a first opening and a second opening; and the lifting assembly comprises a lifting conduit and a lifting inlet and a lifting outlet arranged on the lifting conduit,

wherein the lifting assembly is arranged in the first opening; and the recovery assembly comprises a recovery conduit and a recovery inlet and a recovery outlet arranged on the recovery conduit, wherein the recovery assembly is arranged in the second opening; and the external rail comprises a rail assembly, which is provided with a rail channel communicating with the recovery conduit, and the rail assembly comprises at least one rail unit, wherein at least one rail unit is provided with a rail outlet, and at least one rail unit is provided with a rail inlet; and the rail inlet is configured to receive and guide toy balls into the rail channel, and the rail outlet is configured to guide toy balls out of the rail channel; and the rail unit is composed of a plurality of rail columns stacked in combination.

[0010] Beneficial effects: when toy balls enter the rail channel through the rail inlet, they can move out of the recovery conduit and return to the recovery conduit after a certain distance for re-lifting, enhancing the product’s fun factor; meanwhile, the external rail can be freely assembled by users into rail channels of different strokes, providing DIY gameplay.

BRIEF DESCRIPTION OF DRAWINGS

[0011] The drawings, which form part of this application, are provided to further illustrate the present disclosure. The illustrative embodiments and descriptions thereof are intended to explain the present disclosure and do not constitute undue limitations. In the drawings:

[0012] FIG. 1 is a schematic diagram of the lifting assembly and recovery assembly in the present disclosure;

[0013] FIG. 2 is an exploded structural diagram of the base;

[0014] FIG. 3 is a schematic diagram of the components in the drive assembly;

[0015] FIG. 4 is a schematic diagram of the position of the motor housing in the base;

[0016] FIG. 5 is a schematic diagram of the positions of the battery slot and battery cover;

[0017] FIG. 6 is a schematic diagram of the position of the gear torsion member;

[0018] FIG. 7 is a schematic diagram of the position of the switch;

[0019] FIG. 8 is a structural diagram of the switch;

[0020] FIG. 9 is a cross-sectional structural diagram of the base and the upper conduit section;

[0021] FIG. 10 is a schematic diagram of the position of the protrusion block;

[0022] FIG. 11 is a cross-sectional structural diagram of the lifting assembly;

[0023] FIG. 12 is a schematic diagram of the structure of the spiral rod;

[0024] FIG. 13 shows the positional schematic of the flange plate;

[0025] FIG. 14 shows the structural schematic of the lifting conduit unit;

[0026] FIG. 15 shows the cross-sectional schematic of the limit block and external connection part;

[0027] FIG. 16 shows the structural schematic of the recovery assembly;

[0028] FIG. 17 shows the structural schematic of the recovery conduit unit;

[0029] FIG. 18 shows the schematic of the chute;

[0030] FIG. 19 shows the structural schematic of the present disclosure;

[0031] FIG. 20 shows the structural schematic of the protrusion column in FIG. 19;

[0032] FIG. 21 shows Schematic 1 of the external inlet in FIG. 19;

[0033] FIG. 22 shows Schematic 2 of the external inlet in FIG. 19.

[0034] Reference signs: Base (1000); Base housing (1100); Drive assembly (1200); Switch (1300); Motor housing (1500); First opening (1110); Second opening (1120); Battery slot (1210); Battery cover (1211); Motor (1220); Gear set (1230); Gear torsion member (1240); Slider (1310); Fixed base (1320); Lifting assembly (2000); Spiral mechanism (2100); Lifting conduit (2200); Lifting inlet (2300); Lifting outlet (2400); Limit block (2600); External connection part (2700); Spiral rod (2110); Central axis (2111); Spiral guide rail (2112); Connection slot (2113); Triangular pin (2120); Flange plate (2130); Lifting conduit unit (2210); [0035] Main body section (2211); Accommodation section (2212); Connector (2213); Protrusion block (2214); Recovery assembly (3000); Recovery conduit (3100); Recovery inlet (3110); Recovery outlet (3120); Connector (3111); Recovery conduit unit (3200); Chute (4000); External rail (5000); Rail assembly (5100); Rail channel (5200); Rail unit (5110); Rail inlet (5120); Rail outlet (5130); Rail column (5111); External inlet (5112); Cover body (5113); Base seat (5114); Groove (5115); Rotating wind wheel (5116); Protrusion column (5117).

DESCRIPTION OF EMBODIMENTS

[0036] The technical solution in the embodiment of the present disclosure will be clearly and completely described below with reference to the drawings. Obviously, the described embodiment is part of, rather than all of the embodiments of the present disclosure. The following description of at least one exemplary embodiment is illustrative in nature and is in no way intended to limit the present disclosure, its application or uses. Based on the embodiments in the present disclosure, all other embodiments obtained by those skilled in the art without creative work belong to the scope of protection of the present disclosure.

[0037] It should be noted that the terminology used here is only for describing specific embodiments, and is not intended to limit exemplary embodiments according to the present application. As used herein, the singular form is also intended to include the plural form unless the context clearly indicates otherwise. Furthermore, it should be appreciated that when the terms “comprising” and/or “including” are used in this specification, they specify the presence of features, steps, operations, devices, components and/or combinations thereof.

[0038] Unless otherwise specified, the relative arrangement of components and steps, numerical expressions and numerical values set forth in these embodiments do not limit the scope of the present disclosure. At the same time, it should be appreciated that for the convenience of description, the dimensions of various parts shown in the drawings are not drawn according to the actual scale relationship. Techniques, methods and equipment known to those skilled in the art may not be discussed in detail, but in appropriate cases, they should be regarded as part of the authorization specification. In all the examples shown and discussed herein, any specific values should be interpreted as illustrative, and not as limiting. Therefore, other examples of exemplary embodiments may have different values. It

should be noted that similar numbers and letters indicate similar items in the following drawings, therefore once an item is defined in one drawing, it does not need to be further discussed in subsequent drawings.

[0039] The present disclosure provides a spiral lifter for liftable toy balls. As shown in FIGS. 1 and 19, the spiral lifter for liftable toy balls includes a base 1000, a lifting assembly 2000, a recovery assembly 3000, and an external rail 5000.

[0040] As shown in FIGS. 2 and 3, the base 1000 includes a base housing 1100 and a drive assembly 1200. The base housing 1100 is provided with a first opening 1110 and a second opening 1120. In this embodiment, the drive assembly 1200 includes a battery slot 1210, a motor 1220, and a gear set 1230. In this embodiment (as shown in FIG. 4), a motor housing 1500 is arranged inside the base housing 1100. The motor housing 1500 encloses the motor 1220 and the gear set 1230. The motor housing 1500 is fixed to the base housing 1100 by plugging, and the upper and lower parts of the motor housing 1500 are fixedly connected by screws. Further (as shown in FIG. 5), the battery slot 1210 is also provided with a battery cover 1211. The battery cover 1211 is detachably connected to the battery slot 1210 by screws. The battery slot can accommodate three 1.5V batteries, which provide power for the entire spiral lifter. (As shown in FIG. 6), torque is transmitted between the motor 1220 and the gear set 1230 through a gear torsion member 1240. The gear end of the gear torsion member 1240 is connected to the gear set via meshing of gear teeth, while the other end of the gear torsion member 1240 is plugged into the motor.

[0041] As shown in FIG. 7, in this embodiment, the outer surface of the base housing 1100 is also provided with a switch 1300. (As shown in FIG. 8), the switch 1300 includes a slider 1310 and a fixed base 1320. The fixed base 1320 is fixedly connected to the bottom of the base housing 1100 by plugging. The base housing 1100 is also provided with screw fixing posts 1400, which secure the upper and lower parts of the base housing 1100 to prevent separation.

[0042] As shown in FIG. 9, in this embodiment, both the first opening 1110 and the second opening 1120 are configured as vertically extending conduits. The first opening 1110 encloses the lower end of the lifting conduit, while the second opening 1120 is inserted into the lower end of the recovery conduit 3100, forming a sealed conduit structure. Additionally (as shown in FIG. 10), the inner wall of the first opening 1110 is also equipped with a protrusion block 2214, enhancing safety by preventing consumers from inserting fingers during incomplete assembly and avoiding pinching injuries.

[0043] In other embodiments (not shown), the drive assembly 1200 may also take the form of built-in batteries, external power supply, or purely mechanical rack-driven mechanisms.

[0044] As shown in FIG. 11, the lifting assembly 2000 includes a spiral mechanism 2100, a lifting conduit 2200, and a lifting inlet 2300 and lifting outlet 2400 arranged on the lifting conduit 2200. The lifting assembly 2000 is installed in the first opening 1110. The spiral mechanism 2100 consists of a plurality of sections of spiral rods 2110 (as shown in FIG. 12). Each spiral rod 2110 includes a central axis 2111, a spiral guide rail 2112 arranged around the central axis 2111, and a connection slot 2113 at the end of the spiral rod 2110. The spiral mechanism 2100 also

includes triangular pins 2120. Every two adjacent spiral rods 2110 are connected via a triangular pin 2120 to form a transmission linkage. The two ends of each triangular pin 2120 extend into the connection slots 2113 of the adjacent spiral rods 2110, allowing the ends of the two adjacent spiral rods 2110 to contact each other. This design achieves a solid structure for the spiral mechanism 2100, improving the equipment's service life. Additionally (as shown in FIG. 13), the bottom of the spiral mechanism 2100 is connected to the drive assembly 1200 via a flange plate 2130.

[0045] Furthermore, in this embodiment, the lifting inlet 2300 is arranged at the bottom of the lifting conduit 2200, while the lifting outlet 2400 is arranged at the top of the lifting conduit 2200. The lifting conduit 2200 encloses the entire spiral mechanism 2100. As shown in FIG.

[0046] 14, the lifting conduit 2200 is formed by connecting a plurality of lifting conduit units 2210.

[0047] Each lifting conduit unit 2210 consists of a main body section 2211 and an accommodation section 2212. One end of each lifting conduit unit 2210 is equipped with a connector 2213, and the inner wall of the connector 2213 has a protrusion block 2214 that can secure another lifting conduit unit 2210, enabling the lifting conduit units 2210 to engage with each other. The pipeline connection method is simple, allowing consumers to assemble or reassemble it themselves during use.

[0048] As shown in FIG. 15, in this embodiment, a limit block 2600 is arranged at the top of the spiral mechanism 2100. The limit block 2600 is designed with an upper cylindrical shape and a lower inverted conical shape. The maximum height to which toy balls rise within the lifting conduit 2200 is the position of the limit block 2600. Furthermore, an external connection part 2700 is installed above the limit block 2600, with its lower portion extending into the limit block 2600, enabling the external connection part 2700 to rotate synchronously with the spiral mechanism 2100. The external connection part 2700 is a decorative object with light-emitting or sound-producing functions, such as a rotating figurine. In other embodiments (not shown), it could also be a decorative panel with illustrations or a music-playing device that plays different tunes under varying environmental conditions to achieve diverse experiential effects.

[0049] As shown in FIG. 16, the recovery assembly 3000 includes a recovery conduit 3100, along with a recovery inlet 3110 and a recovery outlet 3120 arranged on the recovery conduit 3100. The lower part of the recovery conduit 3100 is sleeved onto the second opening 1120.

[0050] The recovery conduit 3100 consists of a plurality of recovery conduit units 3200, with both the bottommost and topmost recovery conduit units 3200 being provided with openings through which toy balls can be placed into the recovery conduit 3100 (as shown in FIG. 17). Each recovery conduit unit 3200 is equipped with a connector 3111 at one end. The inner wall of the connector 3111 is a smooth arc surface, while the outer wall is enveloped by a plurality of rectangular surfaces. The diameter of the connector 3111 is smaller than that of the other end of the recovery conduit unit 3200, allowing a plurality of recovery conduit units 3200 to be engaged with each other.

[0051] In this embodiment, the recovery conduit 3100 is vertically positioned. The longitudinal height of the recovery inlet 3110 does not exceed that of the lifting outlet 2400, and the longitudinal height of the recovery outlet 3120 is not

lower than that of the lifting inlet 2300. In other possible embodiments (not shown), the recovery conduit 3100 may also be placed at a certain angle to the ground or at a vertical angle relative to the lifting conduit 2200.

[0052] As shown in FIG. 18, in this embodiment, the lifting assembly 2000 and the recovery assembly 3000 are connected by two chutes 4000. The two chutes 4000 are respectively positioned between the recovery outlet 3120 and the lifting inlet 2300, as well as between the recovery inlet 3110 and the lifting outlet 2400. The chutes 4000 are designed as semi-enclosed chutes with open upper ends. The chute 4000 between the recovery outlet 3120 and the lifting inlet 2300 is installed inside the base housing 1100, allowing toy balls to pass through the chutes 4000 between the lifting assembly 2000 and the recovery assembly 3000.

[0053] In this embodiment, the recovery conduit 3100 and the lifting conduit 2200 are arranged horizontally in the vertical direction. In other embodiments (not shown), the arrangement of the recovery conduit 3100 and the lifting conduit 2200 can vary. For example, the longitudinal height of the recovery inlet 3110 may be set lower than that of the lifting outlet 2400, while the longitudinal height of the recovery outlet 3120 may be set higher than that of the lifting inlet 2300. However, when the recovery conduit 3100 and the lifting conduit 2200 adopt a double-helix arrangement, the structure appears more aesthetically pleasing.

[0054] As shown in FIGS. 9, 19, and 20, in other embodiments, the external rail 5000 includes a rail assembly 5100, which features a rail channel 5200 communicating with the recovery conduit 3100. The rail assembly 5100 includes at least one rail unit 5110, where at least one rail unit 5110 is equipped with a rail outlet 5130, and at least one rail unit 5110 is equipped with a rail inlet 5120. The rail inlet 5120 is located inside the recovery conduit 3100 and below the recovery inlet 3110. The rail inlet 5120 is designed to receive and guide toy balls into the rail channel 5200, while the rail outlet 5130 guides toy balls out of the rail channel 5200. When a toy ball enters the rail channel via the rail inlet 5120, it can move out of the recovery conduit 3100 and, after a certain distance, return to the recovery conduit 3100 for re-lifting, enhancing the product's fun factor. Additionally, users can freely assemble the external rail into rail channels of varying strokes, offering DIY play possibilities.

[0055] As shown in FIGS. 19 and 20, in other embodiments, the rail unit 5110 is formed by stacking several rail columns 5111, allowing users to determine the overall height of the rail unit, thereby increasing the product's flexibility.

[0056] Meanwhile, traditional toy tracks require additional installation of separate conduits and support frames, resulting in complex structures and cumbersome assembly. In this device, however, the rail unit 5110 forms an enclosed channel directly through the stacking of rail columns 5111, eliminating the need for external frameworks. The rail columns 5111 serve both as structural supports and as boundaries for the ball's movement path.

[0057] As shown in FIGS. 19 to 22, in other embodiments, at least one rail unit 5110 is equipped with an external inlet 5112, located on the topmost rail column 5111. The external inlet 5112 communicates with the rail channel 5200, enabling users to provide an additional entry point for adding toy balls to the device.

[0058] As shown in FIGS. 19 and 20, in other embodiments, at least one rail unit 5110 is fitted with a cover body 5113 that connects to the top. The cover body 5113 is

provided with an opening communicating with the external inlet **5112**, facilitating the placement of toy balls by users.

[0059] As shown in FIGS. **19** and **20**, in other embodiments, at least one set of rail units **5110** is provided with a base seat **5114** at its bottom. The rail column **5111** is mounted on the base seat **5114**, and the base seat **5114** has a groove **5115** communicating with the rail outlet **5130**. The groove **5115** is used to accommodate toy balls exiting from the connected rail outlet **5130**.

[0060] As shown in FIGS. **19** and **20**, in other embodiments, at least one rail channel **5200**

[0061] is equipped with a rotating wind wheel **5116**, and at least one rail channel **5200** is provided with a plurality of protrusion columns **5117**. When a toy ball rolls over and collides with the protrusion columns **5117** or the rotating wind wheel, dynamic feedback is provided, thereby enhancing the game's sense of surprise and engagement.

[0062] As shown in FIGS. **19** and **20**, in other embodiments, when a plurality of rail units

[0063] **5110** are arranged, their heights decrease sequentially. This allows the toy balls to roll along the rail channel **5200** relying on its own gravity.

[0064] In the description of the present disclosure, it should be appreciated that directional terms such as “front, rear, up, down, left, right”, “horizontal, vertical, perpendicular, horizontal” and “top, bottom” etc. indicate the orientation or positional relationship based on the orientation or positional relationship shown in the drawings, and are only for the convenience of describing the present disclosure and simplifying the description. In the absence of a contrary explanation, these directional terms do not indicate or imply that the device or element referred to must have a specific orientation or be constructed and operated in a specific orientation, and therefore should not be understood as limiting the scope of protection of the present disclosure; the directional terms “inside, outside” refer to the inside and outside relative to the contour of each component itself.

[0065] For the convenience of description, spatial relative terms such as “on . . .”, “above . . .”, “on the upper surface of . . .”, “upper” etc. may be used here to describe the spatial positional relationship of a device or feature with other devices or features as shown in the drawings. It should be appreciated that spatial relative terms are intended to encompass different orientations of the device in use or operation other than the orientation described in the drawings. For example, if the device in the drawing is inverted, the device described as “above other devices or structures” or “on other devices or structures” will subsequently be positioned as “below other devices or structures” or “under other devices or structures”. Thus, the exemplary term “above” can include both “above” and “below” orientations. The device can also be positioned in other different ways (rotated 90 degrees or in other orientations), and the spatial relative descriptions used here should be interpreted accordingly.

[0066] In addition, it should be noted that the use of terms such as “first”, “second” etc. to define components is for the convenience of distinguishing the corresponding components.

[0067] Unless otherwise stated, the above terms have no special meaning, and therefore should not be understood as limiting the scope of protection of the present disclosure.

[0068] The above description is only a preferred embodiment of the present disclosure and is not intended to limit the present disclosure. For those skilled in the art, the present

disclosure can have various modifications and changes. Any modifications, equivalent replacements, improvements etc. made within the spirit and principles of the present disclosure should be included within the scope of protection of the present disclosure.

What is claimed is:

1. A spiral lifter for liftable toy balls, comprising a base, a lifting assembly, a recovery assembly, and an external rail, wherein

the base comprises a base housing, and the base housing is provided with a first opening and a second opening; and

the lifting assembly comprises a lifting conduit and a lifting inlet and a lifting outlet provided on the lifting conduit, wherein the lifting assembly is arranged in the first opening; and

the recovery assembly comprises a recovery conduit and a recovery inlet and a recovery outlet provided on the recovery conduit, wherein the recovery assembly is arranged in the second opening; and

the external rail comprises a rail assembly, which is provided with a rail channel communicating with the recovery conduit, and the rail assembly comprises at least one rail unit, wherein at least one rail unit is provided with a rail outlet, and at least one rail unit is provided with a rail inlet; and the rail inlet is configured to receive and guide toy balls into the rail channel, and the rail outlet is configured to guide toy balls out of the rail channel.

2. The spiral lifter for liftable toy balls according to claim 1, wherein the rail unit is composed of a plurality of rail columns stacked in combination.

3. The spiral lifter for liftable toy balls according to claim 2, wherein at least one of the rail units is provided with an external inlet, the external inlet is located on a topmost rail column, and the external communicates with the rail channel.

4. The spiral lifter for liftable toy balls according to claim 1, wherein at least one of the rail units is provided with a cover body connected to a top portion, and the cover body is provided with an opening communicating with the external inlet.

5. The spiral lifter for liftable toy balls according to claim 2, wherein a bottom of at least one set of the rail units is provided with a base seat, the rail columns are arranged on the base seat, and the base seat is provided with a groove communicating with the rail outlet, wherein the groove is configured to accommodate toy balls exiting from the connected rail outlet.

6. The spiral lifter for liftable toy balls according to claim 1, wherein the rail channels on at least two of the rail units communicate with an interior of the recovery conduit.

7. The spiral lifter for liftable toy balls according to claim 1, wherein at least one of the rail channels is provided with a rotating wind wheel.

8. The spiral lifter for liftable toy balls according to claim 1, wherein at least one of the rail channels is provided with a plurality of protrusion columns.

9. The spiral lifter for liftable toy balls according to claim 2, wherein when a plurality of rail units are arranged, heights of the rail units decrease sequentially.

10. The spiral lifter for liftable toy balls according to claim 1, wherein the rail channel is located between the recovery inlet and recovery outlet.

11. The spiral lifter for liftable toy balls according to claim **1**, wherein the base further comprises a drive assembly; and the drive assembly comprises a battery slot, a motor, and a gear set.

12. The spiral lifter for liftable toy balls according to claim **11**, wherein the battery slot is further provided with a battery cover, which is detachably connected to the battery slot via screws.

13. The spiral lifter for liftable toy balls according to claim **11**, wherein the lifting assembly further comprises a spiral mechanism coupled to the drive assembly, with the lifting conduit enclosing the entire spiral mechanism; and when the spiral mechanism is driven by the drive assembly, the spiral mechanism is capable of lifting toy balls entering through the lifting inlet and transporting the balls to the lifting outlet.

14. The spiral lifter for liftable toy balls according to claim **13**, wherein the spiral mechanism consists of a plurality of spiral rods, each comprising a central axis, a spiral guide rail arranged around the central axis, and a connection slot at an end of the spiral rod.

15. The spiral lifter for liftable toy balls according to claim **14**, wherein the spiral mechanism further comprises triangular pins, with every two adjacent spiral rods forming a transmission connection via the triangular pins, wherein both ends of each triangular pin extend into the connection slots of adjacent spiral rods, allowing the ends of adjacent spiral rods to contact each other, thereby achieving a solid structural design.

16. The spiral lifter for liftable toy balls according to claim **1**, wherein a longitudinal height of the recovery inlet is not higher than a longitudinal height of the lifting outlet, and a longitudinal height of the recovery outlet is not lower than a longitudinal height of the lifting inlet.

17. The spiral lifter for liftable toy balls according to claim **1**, wherein the recovery inlet is arranged at a top of the

recovery conduit, and the recovery outlet is arranged at a bottom of the recovery conduit.

18. A spiral lifter for liftable toy balls, comprising a base, a lifting assembly, a recovery assembly, and an external rail, wherein the base comprises a base housing, and the base housing is provided with a first opening and a second opening; and

the lifting assembly comprises a lifting conduit and a lifting inlet and a lifting outlet arranged on the lifting conduit, wherein the lifting assembly is arranged in the first opening; and

the recovery assembly comprises a recovery conduit and a recovery inlet and a recovery outlet arranged on the recovery conduit, wherein the recovery assembly is arranged in the second opening; and

the external rail comprises a rail assembly, which is provided with a rail channel communicating with the recovery conduit, and the rail assembly comprises at least one rail unit, wherein at least one rail unit is provided with a rail outlet, and at least one rail unit is provided with a rail inlet; and the rail inlet is configured to receive and guide toy balls into the rail channel, and the rail outlet is configured to guide toy balls out of the rail channel; and

the rail unit is composed of a plurality of rail columns stacked in combination.

19. The spiral lifter for liftable toy balls according to claim **18**, wherein at least one of the rail units is provided with an external inlet, the external inlet is located on the topmost rail column, and the external communicates with the rail channel.

20. The spiral lifter for liftable toy balls according to claim **18**, wherein at least one of the rail channels is provided with a rotating wind wheel, and at least one of the rail channels is provided with a plurality of protrusion columns.

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