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(71) Applicant: **Guangzhou New Design Biotechnology Co., Ltd**
Guangzhou, Guangdong 510220 (CN)

(72) Inventors:
- **ZHANG, Shaowei**
  Guangzhou, Guangdong 510220 (CN)
- **ZOU, Sile**
  Guangzhou, Guangdong 510220 (CN)
- **SHEN, Weijie**
  Guangzhou, Guangdong 510220 (CN)
- **LIN, Jiehong**
  Guangzhou, Guangdong 510220 (CN)

(74) Representative: **Zaboliene, Reda**
Metida
Business center Vertas
Gyneju str. 16
01109 Vilnius (LT)

(54) KNOB TYPE REGULATOR FOR REGULATING LOOSENESS AND TIGHTNESS OF ROPE AND ARTICLE HAVING SAME

(57) The present disclosure provides a knob type rope adjuster and an article with an adjustment rope. The knob type rope adjuster includes a base, a rope winding disc, a knob, and an unlocking button; the rope winding disc used for winding an adjustment rope is rotatably installed in the base; the knob is installed on the base in an unidirectional rotation mode; the knob is combined with the rope winding disc to drive the rope winding disc to rotate via the knob, thereby winding and locking the adjustment rope; the unlocking button is connected to the rope winding disc and passes through the knob, thereby switching combination or separation of the knob and the rope winding disc; and the knob is separated from the rope winding disc, so that the rope winding disc is arranged to rotate in a direction opposite to the winding direction, thereby loosening the adjustment rope. The arrangement of the unidirectional rotation mode of the knob ensures that the adjustment rope remains locked on the rope winding disc to avoid loosening. Using the unlocking button, which is installed on the knob and in contact with the rope winding disc, the knob and the rope winding disc can be switched from the combined state to the disengaged state. After the knob is separated from the rope winding disc, the rope winding disc can rotate in the direction opposite to the winding direction, thereby loosening the adjustment rope.

EP 4 549 354 A1

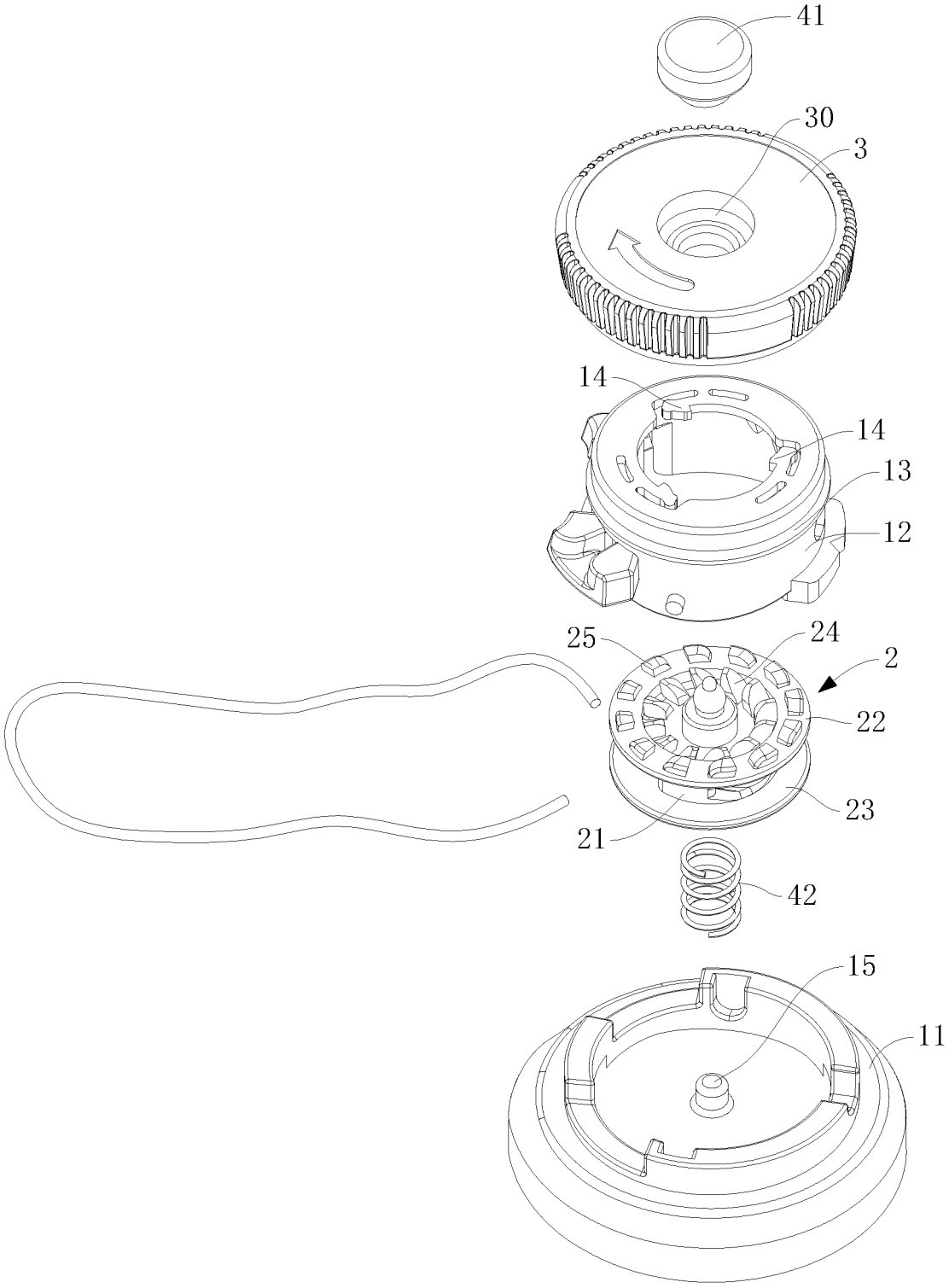

FIG. 2

Description

TECHNICAL FIELD

[0001] The present disclosure herein relates to the technical field of tension adjustment for ropes, and in particular to a knob type rope adjuster and an article with an adjustment rope.

BACKGROUND

[0002] Shoes, clothes, backpacks, medical protective gear and other products are usually equipped with adjustment ropes and rope adjusters. Users can tighten or loosen the adjustment ropes through the rope adjusters to adjust the tightness of the adjustment ropes. For example, a loop of adjustment rope is threaded around the perimeter of the backpack's opening. Both ends of the adjustment rope are connected to a rope adjuster. By pressing and holding the rope adjuster while applying force along the adjustment rope, the adjuster can be moved along the rope. When the adjuster is released, it secures onto the adjustment rope, enabling the user to tighten or loosen the backpack's opening as desired.

[0003] However, current rope adjusters are either simplistic in structure, with limited functionality, making them unsuitable for diverse product applications; or they are fully functional, but boast complex structures and cumbersome assembly processes.

SUMMARY

[0004] In view of the above, the present disclosure provides a knob type rope adjuster, which has the advantages of simple structure, easy assembly, complete functions, and good versatility.

[0005] Technical solution of the present disclosure:
the present disclosure provides a knob type rope adjuster, comprising a base, a rope winding disc, a knob, and an unlocking button; the rope winding disc used for winding an adjustment rope is rotatably installed in the base; the knob is installed on the base in an unidirectional rotation mode; the knob is combined with the rope winding disc to drive the rope winding disc to rotate via the knob, thereby winding and locking the adjustment rope; the unlocking button is connected to the rope winding disc and passes through the knob, thereby switching combination or separation of the knob and the rope winding disc; and the knob is separated from the rope winding disc, so that the rope winding disc is arranged to rotate in a direction opposite to the winding direction, thereby loosening the adjustment rope.

[0006] Furthermore, the base includes a removably installed bottom cover and a fixed barrel, and the rope winding disk is rotatably installed in the fixed barrel.

[0007] Furthermore, the rope winding disc includes a barrel body, and a first disc body and a second disc body connected to both ends of the barrel body, respectively; and the first disc body, the second disc body and the barrel body form an annular rope winding space for the adjustment rope to wrap around.

[0008] Furthermore, the first disc body is installed close to the knob, and a driven gear is formed on the first disc body, and a driving gear engaged with the driven gear is formed on the knob.

[0009] Furthermore, an open end of the knob is provided with a plurality of hooks, and an outer peripheral surface of the base is provided with a snap ring, the knob snaps into the snap ring of the base via the plurality of hooks, so that the knob is arranged to be rotatably installed on the base.

[0010] Furthermore, a ratchet is provided on an axis center inside the knob, a plurality of elastic pawls are formed on an end of the base that is inserted into the knob, the plurality of elastic pawls are engaged with the ratchet, and the plurality of elastic pawls cooperate with the ratchet to rotate the knob in one direction.

[0011] Furthermore, the unlocking button includes a button body and an elastic member; and the knob is provided with a button hole, the button body is arranged to be movably inserted into the button hole, the button body is connected to an axis center of the rope winding disc, and the elastic member is installed in the base and elastically presses against both the rope winding disc and a bottom wall of the base, thereby combining the knob with the rope winding disc.

[0012] Furthermore, a guide post is protruded inward from the bottom wall of the base, the guide post is arranged coaxially with the rope winding disc, one end of the elastic member is inserted into the rope winding disc, and another end is sleeved on an outer periphery of the guide post.

[0013] Furthermore, the rope winding disc is provided with a primary clamping gear, the base is provided with a secondary clamping gear, and the primary clamping gear engages with the secondary clamping gear under an elastic force of the elastic member, thereby limiting the rope winding disc from rotating in the direction opposite to the winding direction; and the rope winding disc is driven to rotate along the winding direction by twisting the knob, and the primary clamping gear is arranged to compress the elastic member and is disengaged from the secondary clamping gear.

[0014] The present disclosure further provides an article with an adjustment rope, comprising an adjustment rope and the knob type rope adjuster, wherein one end of the adjustment rope is connected to the article, and another end of the adjustment rope penetrates through a base and is connected to a rope winding disk.

[0015] Beneficial effects of the present disclosure:
the knob type rope adjuster of the present disclosure cooperates with the base, the rope winding disc, the knob and the unlocking button. Since the knob can be installed on the base in the unidirectional rotation mode, and the knob is combined with the rope winding disc, when the knob is turned, it can drive the rope winding disc to rotate,

thereby winding and locking the adjustment rope. The arrangement of the unidirectional rotation mode of the knob ensures that the adjustment rope remains locked on the rope winding disc to avoid loosening, so that the adjustment rope can be tightened. Using the unlocking button, which is installed on the knob and in contact with the rope winding disc, the knob and the rope winding disc can be switched from the combined state to the disengaged state. After the knob is separated from the rope winding disc, the rope winding disc can rotate in the direction opposite to the winding direction, thereby loosening the adjustment rope, and then the adjustment rope wrapped on the rope winding disc can be pulled out to achieve the relaxation of the adjustment rope. The knob type rope adjuster using the above solution has the advantages of simple structure, easy assembly, complete functions, and good versatility.

[0016] The preferred embodiments of the present disclosure and their beneficial effects will be further described in detail in conjunction with specific embodiments.

BRIEF DESCRIPTION OF THE DRAWINGS

[0017] The accompanying drawings are intended to provide a further understanding of the present disclosure, and they constitute a part of the specification. Together with the following detailed descriptions of embodiments, they are used to explain the present disclosure, but should not be construed as limiting the scope of the present disclosure. In the accompanying drawings,

FIG. 1 is a three-dimensional structural diagram of a knob type rope adjuster of the present disclosure;

FIG. 2 is an exploded view of a knob type rope adjuster of the present disclosure from a first perspective;

FIG. 3 is an exploded view of a knob type rope adjuster of the present disclosure from a second perspective; and

FIG. 4 is a sectional view diagram of a knob type rope adjuster of the present disclosure.

[0018] Explanation of reference numbers: base 1, rope winding disc 2, knob 3, unlocking button 4, adjustment rope 5, bottom cover 11, fixed barrel 12, barrel body 21, first disc body 22, second disc body 23, driven gear 24, driving gear 31, hook 32, snap ring 13, ratchet 33, elastic pawl 14, button body 41, elastic member 42, button hole 30, guide post 15, primary clamping gear 25, and secondary clamping gear 16.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0019] Specific embodiments of the present disclosure will be described in detail below with reference to the accompanying drawings. It should be understood that the specific embodiments described here are only used to illustrate and explain the present disclosure, and are not intended to limit the present disclosure.

[0020] Please refer to FIGS. 1 to 4. The present disclosure provides a knob type rope adjuster, which comprises a base 1, a rope winding disc 2, a knob 3, and an unlocking button 4; the rope winding disc 2 used for winding an adjustment rope 5 is rotatably installed in the base 1 around its own axis; the knob 3 is installed on the base 1 in an unidirectional rotation mode; the knob 3 is combined with the rope winding disc 2 to drive the rope winding disc 2 to rotate via the knob 3, thereby winding and locking the adjustment rope 5; the arrangement of the unidirectional rotation mode of the knob ensures that the adjustment rope 5 remains locked on the rope winding disc 2; and the unlocking button 4 is connected to the rope winding disc 2 and passes through the knob 3, thereby switching combination or separation of the knob 3 and the rope winding disc 2. By disengaging the knob 3 from the rope winding disc 2, the rope winding disc 2 can rotate in the direction opposite to the winding direction, thereby loosening the adjustment rope 5, and then the adjustment rope 5 wrapped on the rope winding disc 2 can be pulled out.

[0021] The knob type rope adjuster of the present disclosure cooperates with the base 1, the rope winding disc 2, the knob 3 and the unlocking button 4. Since the knob 3 can be installed on the base 1 in the unidirectional rotation mode, and the knob 3 is combined with the rope winding disc 2, when the knob 3 is twisted, it can drive the rope winding disc 2 to rotate, thereby winding and locking the adjustment rope 5. The arrangement of the unidirectional rotation mode of the knob 3 ensures that the adjustment rope 5 remains locked on the rope winding disc 2 to avoid loosening, so that the adjustment rope 5 can be tightened. Using the unlocking button 4, which is installed on the knob 3 and in contact with the rope winding disc 2, the knob 3 and the rope winding disc 2 can be switched from the combined state to the disengaged state. After the knob 3 is separated from the rope winding disc 2, the rope winding disc 2 can rotate in the direction opposite to the winding direction, thereby loosening the adjustment rope 5, and then the adjustment rope 5 wrapped on the rope winding disc 2 can be pulled out to achieve the relaxation of the adjustment rope 5. The knob type rope adjuster using the above solution has the advantages of simple structure, easy assembly, complete functions, and good versatility.

[0022] In this embodiment, the base 1 includes a removably installed bottom cover 11 and a fixed barrel 12, and the rope winding disk 2 is rotatably installed in the fixed barrel 12. In this way, during assembly, the rope winding disc 2 can be installed in the fixed barrel 12 first, and then the bottom cover 11 can be installed on the fixed barrel 12, so that the rope winding disc 2 can be accommodated in a rotating space formed by the bottom cover 11 and the fixed barrel 12, making assembly more convenient. Preferably, the bottom cover 11 is engaged with the fixed barrel 12.

[0023] In this embodiment, the rope winding disc 2 includes a barrel body 21, and a first disc body 22 and a second disc body 23 connected to both ends of the barrel body 21, respectively; and the first disc body 22, the second disc body 23 and the barrel body 21 form an annular rope winding space for the adjustment rope 5 to wrap around. The first disc body 22 is installed close to the knob 3, and a driven gear 24 is formed on the first disc body 22, and a driving gear 31 engaged with the driven gear 24 is formed on the knob 3. Both the driven gear 24 and the driving gear 31 are helical gears to facilitate the engagement or disengagement of the driven gear 24 and the driving gear 31. In this embodiment, the driven gear 24 is a ring gear, the driving gear 31 is an internal gear, and the internal gear engages within the ring gear. It can be understood that the driven gear 24 can also be an internal gear, the driving gear 31 can be a ring gear, and the internal gear engages with the ring gear.

[0024] In this embodiment, an open end of the knob 3 is provided with a plurality of hooks 32, and an outer peripheral surface of the fixed barrel 12 of the base 1 is provided with a snap ring 13, the knob 3 snaps into the snap ring 13 of the base 1 via the plurality of hooks 32, so that the knob 3 can to be rotatably installed on the base 1. In this way, as long as the hook 32 at the open end of the knob 3 is aligned with the snap ring 13 and force is applied on a top end of the knob 3, the knob 3 can be snapped into the base 1, making assembly very convenient.

[0025] In order to facilitate the unidirectional rotation of the knob 3, a ratchet 33 is provided on an axis center inside the knob 3, a plurality of elastic pawls 14 are formed on an end of the fixed barrel 12 of the base 1 that is inserted into the knob 3, and the plurality of elastic pawls 14 are engaged with the ratchet 33. The elastic pawl 14 is provided with a first stop surface and a first inclined surface, and the ratchet tooth of the ratchet 33 is provided with a second stop surface and a second inclined surface. When the second stop surface of the ratchet tooth of the ratchet 33 is abutted against the first stop surface of the elastic pawl 14, the rotation of the knob 3 can be limited. When the second inclined surface of the ratchet tooth of the ratchet 33 is abutted against the first inclined surface of the elastic pawl 14, by twisting the knob 3, the second inclined surface of the ratchet tooth of the ratchet 33 can slide out along the first inclined surface of the elastic pawl 14, so that the knob 3 to rotate in the unidirectional rotation.

[0026] In this embodiment, the unlocking button 4 includes a button body 41 and an elastic member 42. A button hole 30 is provided at the center of the knob 3. The button body 41 can be axially slidably inserted into the button hole 30 along the button hole 30. The button body 41 is rotatably connected to the axial center of the rope winding disc 2. Specifically, the axial center of the first disc body 22 is provided with a clamping ball, and the clamping ball is clamped into an end portion of the button body 41 to achieve rotational connection. It can be understood that the button body 41 can also be fixedly connected to the axial center of the rope winding disc 2, as long as the button body 41 can be rotatably installed in the button hole 30. It can be understood that it is only necessary that at least one of the connection between the button body 41 and the rope winding disc 2 and the connection between the button body 41 and the button hole 30 is a rotational connection. The elastic member 42 is installed in the base 1 and elastically presses against both the rope winding disc 2 and a bottom wall of the base 1, thereby combining the knob 3 with the rope winding disc 2. By pressing the button body 41 and compressing the elastic member 42, the knob 3 disengages from the rope winding disc 2, releasing the rope winding disc 2 from the locking mechanism between the knob 3 and the base 1, and allowing the rope winding disc 2 to rotate freely and release the adjustment rope 5. When the button body 41 is released, the elastic force of the elastic member 42 pushes the rope winding disc 2 and the knob 3 to be combined. Preferably, the elastic member 42 is a spring, but it is not limited to this, as long as it can provide a device with elastic force.

[0027] In order to improve the compactness of the structure and the stability of the elastic force, a guide post 15 is protruded inward from the bottom wall of the bottom cover 11, the guide post 15 is arranged coaxially with the rope winding disc 2, one end of the elastic member is inserted into the barrel body 21 of the rope winding disc 2, and another end is sleeved on the outer periphery of the guide post 15.

[0028] To further optimize the solution, in order to tighten the adjustment rope 5 on the rope winding disc 2 more stably, the first disc body 22 of the rope winding disc 2 is provided with a primary clamping gear 25, and the primary clamping gear 25 is provided with a plurality of primary clamping teeth arranged in a ring shape on the first disc body 22. The inner end wall of the fixed barrel 12 of the base 1 is provided with a secondary clamping gear 16. The secondary clamping gear 16 is provided with a plurality of secondary clamping teeth arranged in a ring shape in the fixed barrel 12. When the rope winding disc 2 is stationary, the primary clamping gear 25 engages with the secondary clamping gear 16 under the elastic force of the elastic member 42. When the knob 3 is turned by human hand to rotate the rope winding disc 2 in the winding direction, the inclined surface on one side of the primary clamping tooth comes into contact with the inclined surface on one side of the secondary clamping tooth. After pressing against the elastic force of the elastic member 42, the primary clamping gear 25 can compress the elastic member 42 to move along its axis to disengage from the secondary clamping gear 16, thus completing the disengagement state and enabling the rope winding disc 2 to rotate in the winding direction. Meanwhile, the flat surface on the other side of the primary clamping tooth is opposite to the flat surface on one side of the adjacent secondary clamping tooth. Since the fixed barrel 12 remains stationary, the limiting effect achieved by the abutment between these two flat surfaces prevents

the rope winding disc 2 from rotating in a direction opposite to the winding direction, thereby more stably maintaining the tension of the adjustment rope 5 on the rope winding disc 2. The functions of the primary clamping gear 25 and the secondary clamping gear 16 are the same as those of the ratchet 33 and the elastic pawl 14, both serving to enable unidirectional rotation of the knob 3 and tighten the adjustment rope 5 on the rope winding disc 2, preventing the rope winding disc 2 from rotating in the opposite direction and loosening the adjustment rope 5. Therefore, at least one of the structure formed by the primary clamping gear 25 and the secondary clamping gear 16 or the structure formed by the ratchet 33 and the elastic pawl 14 can be selected to the desired result.

[0029] In this embodiment, the present disclosure further provides an article with an adjustment rope, comprising an adjustment rope 5 and the knob type rope adjuster, wherein one end of the adjustment rope 5 is connected to the article, and another end of the adjustment rope penetrates through a base 1 and is connected to a rope winding disk 2, so that the adjustment rope 5 is tightened or loosened. The article with the adjustment rope comprises but is not limited to shoes, clothes, knapsacks, medical protective equipment and the like. In the description of the present disclosure, it should be noted that the orientation or positional relationship indicated by the terms "upper", "lower", etc. is based on the orientation or positional relationship shown in the drawings, and is only for the convenience of describing the present disclosure and simplifying the description. It is not intended to indicate or imply that the device or element referred to must have a specific orientation, be constructed and operate in a specific orientation, and therefore is not to be construed as a limitation of the present disclosure. Additionally, the terms "first" and "second" are used for descriptive purposes only and are not to be construed as indicating or implying relative importance; the words "bottom surface" and "top surface", as well as "inner" and "outer", refer to orientations towards or away from a specific component's geometric direction, respectively.

[0030] In the description of the present disclosure, it should be noted that, unless otherwise explicitly specified or defined, the terms "installed", "communicated", and "connected" should be understood in a broad sense. For example, they can refer to fixed connections, detachable connections, or integral connections; they can be mechanical connections or electrical connections; they can be direct connections or indirect connections through intermediate media; and they can represent internal connections between two elements. For those of ordinary skill in the art, the specific meanings of the above terms in the present disclosure can be understood on a case-by-case basis. Furthermore, in the description of the present disclosure, unless otherwise specified, "a plurality of" means two or more.

[0031] The above are only preferred embodiments of the present disclosure and are not intended to limit the present disclosure. Any modifications, equivalent substitutions, improvements, etc. made within the spirit and principles of the present disclosure shall be included in the protection scope of the present disclosure.

Claims

1. A knob type rope adjuster, comprising a base (1), a rope winding disc (2), a knob (3), and an unlocking button (4); the rope winding disc (2) used for winding an adjustment rope (5) is rotatably installed in the base (1); the knob (3) is installed on the base (1) in an unidirectional rotation mode; the knob (3) is combined with the rope winding disc (2) to drive the rope winding disc (2) to rotate via the knob (3), thereby winding and locking the adjustment rope (5); the unlocking button (4) is connected to the rope winding disc (2) and passes through the knob (3), thereby switching combination or separation of the knob (3) and the rope winding disc (2); and the knob (3) is separated from the rope winding disc (2), so that the rope winding disc (2) is arranged to rotate in a direction opposite to the winding direction, thereby loosening the adjustment rope (5).

2. The knob type rope adjuster according to claim 1, wherein the base (1) includes a removably installed bottom cover (11) and a fixed barrel (12), and the rope winding disk (2) is rotatably installed in the fixed barrel (12).

3. The knob type rope adjuster according to claim 1, wherein the rope winding disc (2) includes a barrel body (21), and a first disc body (22) and a second disc body (23) connected to both ends of the barrel body (21), respectively; and the first disc body (22), the second disc body (23) and the barrel body (21) form an annular rope winding space for the adjustment rope (5) to wrap around.

4. The knob type rope adjuster according to claim 3, wherein the first disc body (22) is installed close to the knob (3), and a driven gear (24) is formed on the first disc body (22), and a driving gear (31) engaged with the driven gear (24) is formed on the knob (3).

5. The knob type rope adjuster according to claim 1, wherein an open end of the knob (3) is provided with a plurality of hooks (32), and an outer peripheral surface of the base (1) is provided with a snap ring (13), the knob (3) snaps into the snap ring (13) of the base (1) via the plurality of hooks (32), so that the knob (3) is arranged to be rotatably installed on the base (1).

6. The knob type rope adjuster according to claim 1, wherein a ratchet (33) is provided on an axis center

inside the knob (3), a plurality of elastic pawls (14) are formed on an end of the base (1) that is inserted into the knob (3), the plurality of elastic pawls (14) are engaged with the ratchet (33), and the plurality of elastic pawls (14) cooperate with the ratchet (33) to rotate the knob (3) in one direction.

7. The knob type rope adjuster according to claim 1, wherein the unlocking button (4) includes a button body (41) and an elastic member (42); and the knob (3) is provided with a button hole (30), the button body (41) is arranged to be movably inserted into the button hole (30), the button body (41) is connected to an axis center of the rope winding disc (2), and the elastic member (42) is installed in the base (1) and elastically presses against both the rope winding disc (2) and a bottom wall of the base (1), thereby combining the knob (3) with the rope winding disc (2).

8. The knob type rope adjuster according to claim 7, wherein a guide post (15) is protruded inward from the bottom wall of the base (1), the guide post (15) is arranged coaxially with the rope winding disc (2), one end of the elastic member (42) is inserted into the rope winding disc (2), and another end is sleeved on an outer periphery of the guide post (15).

9. The knob type rope adjuster according to claim 7, wherein the rope winding disc (2) is provided with a primary clamping gear (25), the base (1) is provided with a secondary clamping gear (16), and the primary clamping gear (25) engages with the secondary clamping gear (16) under an elastic force of the elastic member (42), thereby limiting the rope winding disc (2) from rotating in the direction opposite to the winding direction; and the rope winding disc (2) is driven to rotate along the winding direction by twisting the knob (3), and the primary clamping gear (25) is arranged to compress the elastic member (42) and is disengaged from the secondary clamping gear (16).

10. An article with an adjustment rope, comprising an adjustment rope (5), and further comprising the knob type rope adjuster according to any one of claims 1-9, wherein one end of the adjustment rope (5) is connected to the article, and another end of the adjustment rope (5) penetrates through a base (1) and is connected to a rope winding disk (2).

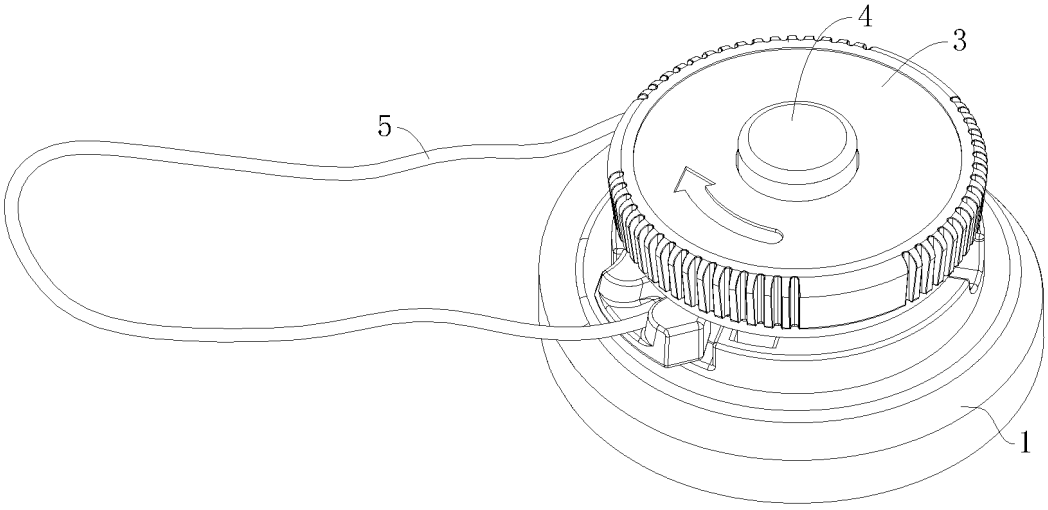

FIG. 1

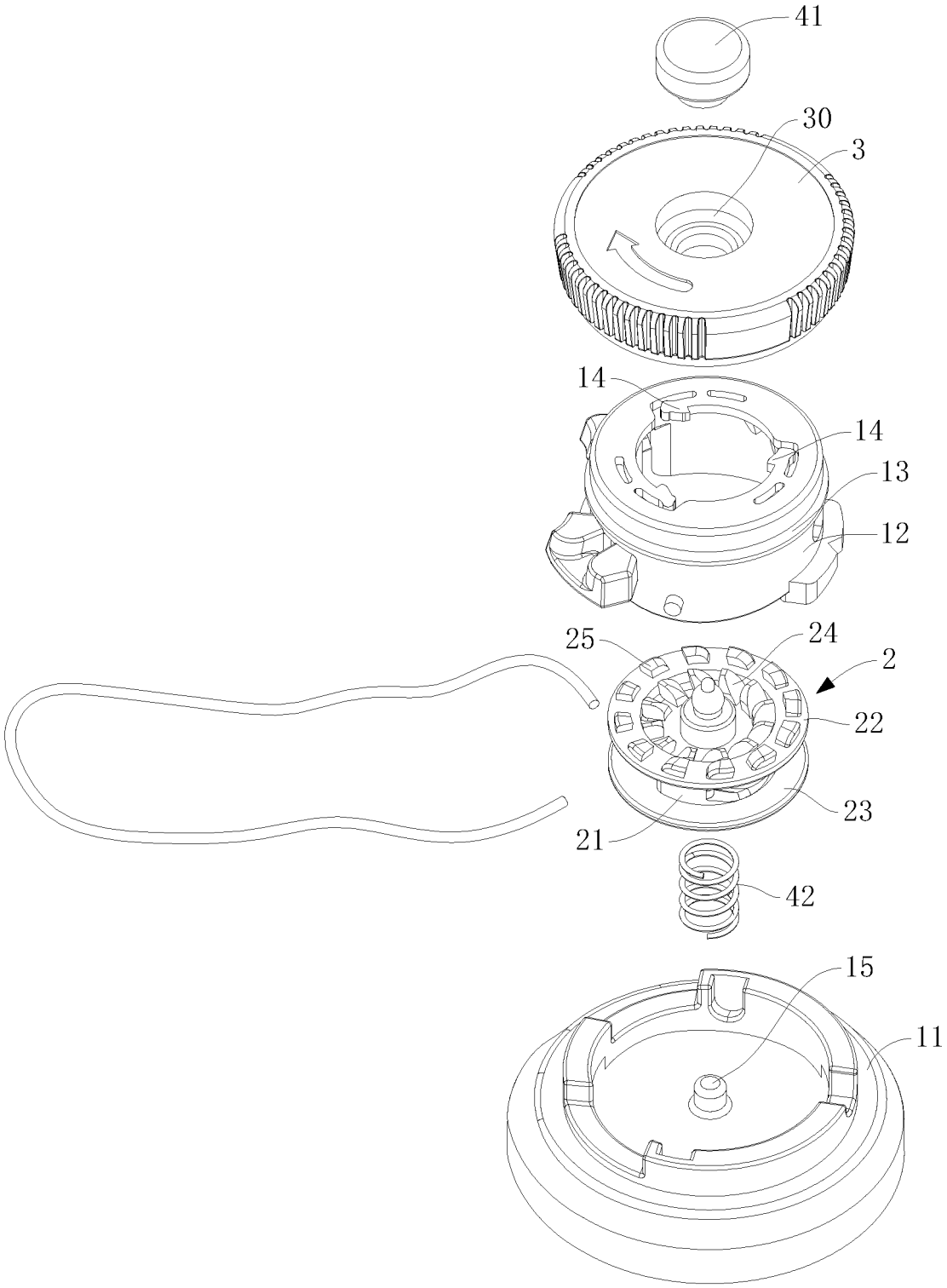

FIG. 2

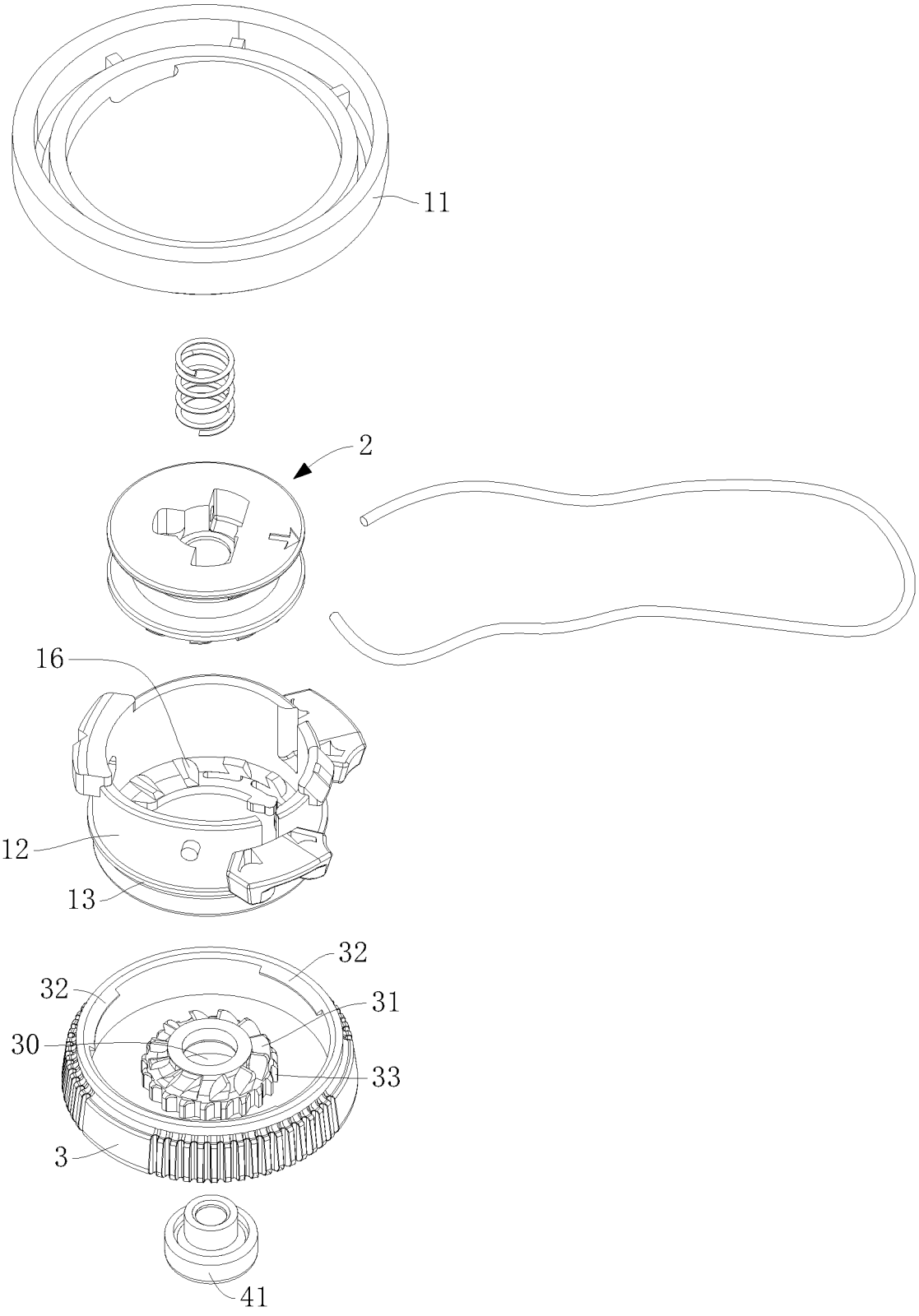

FIG. 3

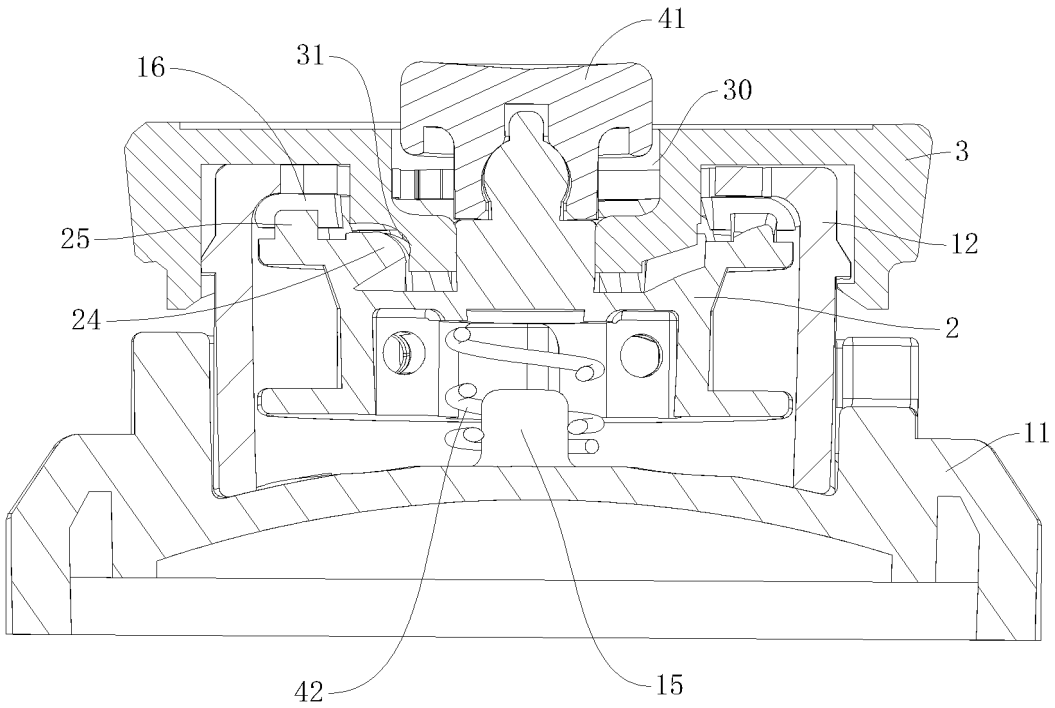

FIG. 4

INTERNATIONAL SEARCH REPORT

International application No.
PCT/CN2022/103377

A. CLASSIFICATION OF SUBJECT MATTER

B65H 75/44(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

B65H

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

WPI, EPODOC, CNPAT, CNKI: 线, 绳, 绕, 卷, 调节, 解锁, 松, 反, 顺时针, 逆时针, 旋钮, 转, 贯穿, 结合, 接合, 切换, rope, line, thread, string, wind+, wound, reel+, lock+, unlock+, loos+, revers+, clockwise, anticlockwise, knob, rotat+, through, engag+, switch+.

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP S6481773 A (NARA SPORTS CO., LTD.) 28 March 1989 (1989-03-28) description, embodiments, and figures 1-5	1-10
X	CN 110271916 A (WUHAN JIAJUXIN COMPUTER CO., LTD.) 24 September 2019 (2019-09-24) description, specific embodiments, and figures 1-3	1-10
A	CN 201230650 Y (UNIVERSAL TRIM SUPPLY CO., LTD.) 06 May 2009 (2009-05-06) description, specific embodiments, and figures 1-11	1-10
A	CN 109892721 A (WANG MENGCHUN) 18 June 2019 (2019-06-18) entire document	1-10
A	CN 107055221 A (HUNG HONG MEDICAL SUPPLIES (SHENZHEN) CO., LTD.) 18 August 2017 (2017-08-18) entire document	1-10
A	CN 208361608 U (FOSHAN HONGNENG METAL TECHNOLOGY CO., LTD.) 11 January 2019 (2019-01-11) entire document	1-10

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
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"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

Date of the actual completion of the international search	Date of mailing of the international search report
02 December 2022	**16 December 2022**
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** Facsimile No. **(86-10)62019451**	Authorized officer Telephone No.

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

INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/CN2022/103377

Patent document cited in search report			Publication date (day/month/year)	Patent family member(s)			Publication date (day/month/year)
JP	S6481773	A	28 March 1989	None			
CN	110271916	A	24 September 2019	JP	6623443	B1	25 December 2019
				US	2020140226	A1	07 May 2020
CN	201230650	Y	06 May 2009	None			
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