



(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
26.03.2008 Bulletin 2008/13

(51) Int Cl.:
E06B 9/322 (2006.01) **E06B 9/325** (2006.01)

(21) Application number: **06120526.6**

(22) Date of filing: **12.09.2006**

(84) Designated Contracting States:
AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HU IE IS IT LI LT LU LV MC NL PL PT RO SE SI SK TR
Designated Extension States:
AL BA HR MK YU

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(54) **Device for winding a suspension cord of a blind**

(57) A device for winding a suspension cord (110) of a blind is provided to wind a suspension cord (110) disposed on a blind. The suspension cord (110) is spirally wound about a cord spool (300) through a spiral groove (333) of a guide component (330), and then arranged along the cord spool (300) in sequence. Additionally, when the cord spool (300) is connected to a power resilient element (700) as a power source of rotation, friction force is applied to the cord spool (300) through an adjusting component (500) to adjust the output torque of the cord spool (300), such that the torque applied to the cord spool (300) by the power resilient element (700) can be balanced out with the torque applied to the cord spool (300) by the gravity of the blind.

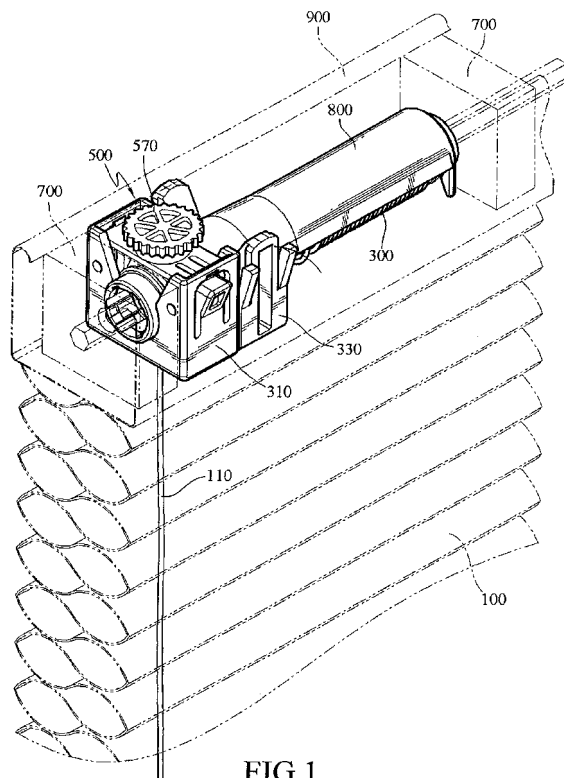


FIG.1

Description

BACKGROUND OF THE INVENTION

Field of Invention

[0001] The present invention relates to a device for winding a suspension cord of a blind, and more particularly to a device for winding a suspension cord of a blind, which arranges the suspension cord on a cord spool in sequence through a guide means and adjusts the output torque of the cord spool by using the friction force applied to the cord spool by an adjusting means.

Related Art

[0002] A cordless blind utilizes a spring housing as a power source, and the torque applied to a cord spool by the spring housing is balanced out with the torque applied to the cord spool by the gravity of the blind. Therefore, the blind can be kept at any position.

[0003] The relevant technology has been disclosed in some U.S. patents. U.S. Patent Publication No. 5,706,876 has disclosed that a suspension cord is wound when a roller shade bar is rotated, and a power spring is disposed in the roller shade bar to generate the power of rotation for winding the suspension cord.

[0004] U.S. Patent Publication No. 5,813,447 has also disclosed that the roller shade bar is rotated and moved in an axial direction to arrange the suspension cords along the surface of the roller shade bar, thereby preventing the suspension cords from intertangling together. However, the structure for winding the suspension cords is complicated and the space for the roller shade bar to move in an axial direction is limited. Therefore, such structure is unsuitable for a blind with a large size or long suspension cords.

[0005] U.S. Patent Publication No. 5,133,399 and U.S. Patent Publication No. 5,328,113 have disclosed that the cord spool has a taper and the spring housing is also used as a power source. The suspension cords can be arranged on the surface of the cord spool automatically when being wound. Therefore, the structure for winding the suspension cords is simple. In U.S. Patent Publication No. 5,133,399, spiral grooves are formed in the surface of the cord spool for accommodating suspension cords, however, a long suspension cord needs an accordant spiral groove of the cord spool, thus, the cord spool should be of a larger size for completely accommodating a long suspension cords. Therefore, the cord spool should have different sizes for the length of the suspension cord varies with different occasions for fitting a blind. Spiral grooves formed in the surface of the cord spool must increase the manufacturing cost. In U.S. Patent Publication No. 5,328,113, the cord spool shapes like a taper, such that the suspension cord may be arranged on the cord spool with a taper automatically when winding a suspension cord. However, there is no guide mecha-

nism between the suspension cord and the cord spool, and the portion with a taper is far away from the position where the suspension cord corresponds to the cord spool. As such, the suspension cord will be easily seized during the later stage of winding the suspension cord due to the absence of the guide of the taper, resulting in the non-smoothness in winding the suspension cord. Additionally, the torque of the spring housing will be attenuated as the time passes and the frequency of use increases. The attenuated torque of the spring housing cannot be balanced out with the torque applied to the cord spool by the gravity of the blind. Therefore, the blind cannot be fixed due to the gravity thereof, and such problem cannot be solved until the spring housing is replaced. Additionally, the size of the blind should be slightly adjusted depending on different installation occasions. Thus, the gravity of the blind is various, while the torque of the spring housing is constant, resulting in that the spring housing cannot be completely suitable for the blinds with different sizes.

[0006] However, the device for winding a suspension cord without using the spring housing often suffers from the problem of the non-smoothness in winding the suspension cord. Therefore, the smoothness in winding the suspension cord becomes a topic to be studied.

SUMMARY OF THE INVENTION

[0007] In view of the aforementioned problems needed to be solved, the device for winding a suspension cord of a blind provided by the present invention may arrange the suspension cord on a cord spool in sequence and can compensate the torque of a power resilient element for the blinds of different sizes.

[0008] Accordingly, the present invention provides a device for winding a suspension cord of a blind which is used to wind a suspension cord passing through at least one covering material of a blind. The device for winding a suspension cord of a blind comprises a power resilient element, a pedestal, a cord spool, a guide means and an adjusting means. The cord spool is pivoted to the pedestal and driven by the power resilient element to rotate, such that the suspension cord is guided by the guide means to be wound about the cord spool smoothly and sequentially. Additionally, the adjusting means is mounted on the pedestal to apply a friction force to the cord spool to damp the rotation of the cord spool, thereby balancing out the torque applied to the cord spool by the power resilient element and the torque applied to the cord spool by the covering material of the blind.

[0009] Furthermore, the present invention provides a module for winding a suspension cord of a blind, which is used to wind a suspension cord passing through at least one covering material of a blind. The module for winding a suspension cord of a blind comprises a pedestal, a cord spool, and a guide means. The cord spool is pivoted to the pedestal and is rotated to wind the suspension cord. The guide means has a guide portion,

which is used to guide the suspension cord to be wound about the cord spool and arrange the suspension cord along the cord spool in sequence.

[0010] In the present invention, the guide means guides the suspension cord such that the suspension cord is wound about the cord spool by a specific angle, and with the taper of the cord spool, the suspension cord is arranged on the cord spool in sequence. When the cord spool is connected to the power resilient element as a power source for rotation, the present invention further provides the adjusting means. The adjusting means applies friction force to the cord spool to adjust the torque of the cord spool. When the present invention is applied to the blinds with different sizes, or the power resilient element has an insufficient torque due to the attenuation of the elastic force, the torque applied to the suspension cord by the cord spool can be constant by reducing the friction force. Therefore, the device for winding a suspension cord of a blind provided by the present invention can wind the suspension cord about the cord spool smoothly and can be used for the blinds of different sizes by adjusting the torque applied to the suspension cord by the cord spool. Furthermore, when the elastic force of the power resilient element attenuates, the torque of the cord spool can also be adjusted to achieve the efficacies of being commonly used, conventional assembling, and subsequent adjustment.

[0011] The features and practice of the preferred embodiments of the present invention will be illustrated below in detail with reference to the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] The present invention will become more fully understood from the detailed description given herein below for illustration only, and thus are not limitative of the present invention, and wherein:

FIG. 1 is a combined diagram of the present invention;

FIG. 2 is an exploded view of the present invention;

FIG. 3 is a schematic view of the connecting relation between the guide means, the suspension cord, and the cord spool of the present invention;

FIG. 4A is a schematic view of the connection of the adjusting means and the pedestal in the first embodiment of the present invention;

FIG. 4B is a schematic view of the operation of the adjusting means and the pedestal in the first embodiment of the present invention;

FIG. 5 is a schematic view of the connection of the adjusting means and the pedestal in the second embodiment of the present invention; and

FIG. 6 is a schematic view of the connection of the adjusting means and the pedestal in the third embodiment of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

[0013] Please refer to FIGs. 1 and 2 of a combined diagram and an exploded view of the present invention. As shown in FIGs. 1 and 2, a device for winding a suspension cord of a blind is used to make the suspension cord 110 passing through at least one blind covering material 100 to wind about a cord spool 300 by rotation. The blind covering material 100 may be a honeycomb pleat or a common blind slat.

[0014] One end of the cord spool 300 is connected to a power resilient element 700 through a rotating shaft 910, and a pedestal 310 and a guide means 330 are mounted to a top rail 900. The pedestal 310 is adjacent to the guide means 330 and used for bearing the cord spool 300 to be rotated. The suspension cord 110 passes through the pedestal 310 from bottom to top, then passes through the guide means 330 laterally, and is finally wound about the cord spool 300.

[0015] An adjusting means 500 is further disposed on the pedestal 310 and is used to adjust the resistance force occurring when the cord spool 300 is rotated, so as to solve the problems that the elastic force of the power resilient element 700 is attenuated after long-term usage and the blinds of different sizes require different elastic forces.

[0016] Furthermore, a cover 800 has one end buckled in the pedestal 310, and the other end pivoted to one end of the cord spool 300 far away from the pedestal 310, such that the two ends of the cord spool 300 are respectively pivoted to the pedestal 300 and the cover 800. Therefore, the cord spool 300 may be rotated smoothly.

[0017] The power resilient element 700 is a spring housing, which uses a power spring as a power source. The power spring may be used to generate torque, and it is a constant force spring.

[0018] The rotating shaft 910 passes through the axle center of the cord spool 300, and is connected to one or more power resilient elements 700 with one end or both two ends thereof, and passes through multiple devices for winding a suspension cord disposed on in the top rail 900.

[0019] Please refer to FIG. 3 of a schematic view of the connecting relation of the guide means 330, the suspension cord 110, and the cord spool 300 of the present invention. As shown in FIG. 3, a first hole 311 is formed in the bottom of the pedestal 310, a second hole 313 is formed in one side of the pedestal 310 facing the guide means 330, and a third hole 331 is formed in the guide means 330 opposite to the second hole 313. A guide portion is formed on two sides of the guide means 330 adjacent to the periphery of the third hole 331 in the circumferential direction of the surface of the cord spool 300. In this embodiment, the guide portion is a spiral

groove 333. After passing through the first hole 311, the second hole 313 and the third hole 331, the suspension cord 110 is spirally wound along the spiral groove 333, so as to be wound on the surface of the cord spool 300 smoothly. Additionally, in order to arrange the suspension cord 110 automatically and smoothly, a taper 301 is formed on the position wherein the cord spool 300 winds the suspension cord 110. The diameter of the taper 301 is increased along the length direction from the cord spool 300 to the end pivoted to the pedestal 310. As such, when the suspension cord 110 is wound about the cord spool 300 along the spiral groove 333, and due to influence of the gravity of the blind, the suspension cord 110 wound about the cord spool 300 slides to the taper 301 with a small diameter, such that the suspension cord 110 may be arranged on the cord spool 300 automatically and sequentially.

[0020] Besides, an annular accommodation space formed between the cover 800 and the cord spool 300 is used to accommodate the suspension cord 110 wound around the cord spool 300, and the space between the cover 800 and the cord spool 300 is slightly greater than the diameter of the suspension cord 110 and smaller than the double diameters of the suspension cord 110, such that the suspension cord 110 is wound about the cord spool 300 sequentially and smoothly and prevented from being wound about the cord spool 300 overlappedly.

[0021] Please refer to FIGs. 4A and 4B of a schematic view of the connection and a schematic view of the operation of the adjusting means and the pedestal in the first embodiment of the present invention. As shown in FIGs. 2, 4A, and 4B, the adjusting means 500 includes a fixed plate 510, a tablet 530, a resilient element 550, and a knob. The fixed plate 510 has a bump 511 extending from both ends thereof. A hole 317 is respectively opened in the two side walls 315 of the pedestal 310, such that the bumps 511 of the fixed plate 510 is buckled in the holes 317 and then the fixed plate 510 is buckled in the pedestal 310. A through hole 513 is opened in the fixed plate 510 along the side wall 315. The tablet 530 is an arc plate 531, and a sliding bar 533 extends from one side of the arc plate 531. The sliding bar 533 penetrates through the through hole 513, such that the tablet 530 may slide up and down with respect to the fixed plate 510. When the fixed plate 510 is fixed on the pedestal 310, the tablet 530 presses against the surface of the cord spool 300.

[0022] A bolt hole 515 is formed beside the through hole 513, and the knob has a screw axis 571. A screw thread is formed on a part of the surface of the screw axis 571 to be screw-connected to the bolt hole 515. Furthermore, the free end of the screw axis 571 has a retaining ring 573 extending along the outer circumference of the screw axis 571. A second hole 535 is opened beside the sliding bar 533 of the tablet 530, such that the retaining ring 573 of the screw axis 571 passes through the second hole 535 and presses against the circumference of the second hole 535, therefore, one end of the

knob may slide in the second hole 535.

[0023] A resilient element 550 is fitted in the knob and placed between the tablet 530 and the fixed plate 510, so as to be compressed by the tablet 530 and the fixed plate 510 to generate an elastic force, which drives the tablet 530 to face the cord spool 300. As such, the tablet 530 can constantly press against the retaining ring 573 and press the surface of the cord spool 300, so as to form damping effect through the friction force correspondingly generated by the positive pressure on the surface of the cord spool 300, and reduce the torque when the cord spool 300 is driven to rotate by each of the power resilient elements 700 and the rotating shaft 910.

[0024] Of course, the arc plate 531 at the lower end of the tablet 530 can be directly pressed on the surface of the cord spool 300. However, in this embodiment, a blade spring 537 respectively extends from the left side and right side of the arc plate 531. The blade springs 537 press against the cord spool 300, and adjust the height of the tablet 530 by rotating the knob, so as to adjust the application force applied by the blade springs 537 pressing against the cord spool 300.

[0025] Therefore, the relational expression of the torque T_s applied to the cord spool 300 by the power resilient element 700, the torque T_f applied to the cord spool 300 by the friction force generated by the tablet 530 pressing against the cord spool 300, and the torque T_c generated when the suspension cord 110 holds the cord spool 300 is $T_s + T_f = T_c$.

[0026] The rotation of the cord spool 300 is hindered by the torque T_f , thus it can be balanced out with the torque T_s . Therefore, the torque T_c can be changed by the application force generated when the tablet 530 presses against the cord spool 300, thereby adjusting the torque of the cord spool 300. When the power resilient element 700 has attenuated elastic force after long-term usage, the torque T_s is reduced. The pressure applied to the cord spool 300 by the tablet 530 is reduced by adjusting knob, so as to reduce the resistance force of the torque T_f on the cord spool 300. As such, the torque T_s and the torque T_c can be balanced out with each other. In another aspect, when assembling, due to the different sizes of windows, blinds should be suitably cut accordingly, thus the torque T_c changes as well. However, the torque T_s is generally constant. Therefore, when the torque T_c changes, the pressure applied to the cord spool 300 by the tablet 530 may be used to change the torque T_f . Similarly, the torque T_s and the torque T_c can be balanced out with each other.

[0027] Please refer to FIG 5 of a schematic view of the connection of the adjusting means and the pedestal in the second embodiment of the present invention. As shown in FIG. 5, the fixed plate 510 and the pedestal 310 are integrally formed. Therefore, a through hole 318 and a bolt hole 319 are opened in one side wall of the pedestal 310 opposite to the adjusting means 500, and the relationship between the pedestal 310 and the adjusting means 500 is the same as that in the above-mentioned

embodiment and will not be described any more.

[0028] Please refer to FIG 6 of a schematic view of the connection of the adjusting means and the pedestal in the third embodiment of the present invention. As shown in FIG 6, a through hole 318 and a bolt hole 319 are formed in one side of the pedestal 310. The adjusting means 500 includes a tablet 530 and a knob 570. The tablet 530 has a sliding bar 533 extending from one end thereof, wherein the sliding bar 533 passes through the through hole 318, such that the tablet 530 is fitted on the pedestal 310 and may slide vertically, and the lower end of the tablet 530 presses against the surface of the cord surface 300. The knob 570 has a screw axis 571 extending from one end thereof, and the screw axis 571 is screw-connected to the bolt hole 319 and pivoted to the tablet 530 with the back end thereof. A collar 575 is further disposed above the tablet 530 to prevent the tablet 530 from dropping outside the rotating shaft 571. As such, the tablet 530 may adjust the pressure generated when the tablet 530 presses against the cord spool 300 through rotating the knob 570.

[0029] The pedestal, the cord spool, and the guide means may be combined to form a module for winding a suspension cord of a blind. Such module is driven by the suspension cord or the power resilient element to rotate the cord spool, and can be commonly used in a blind winding structure with or without the suspension cord.

[0030] Therefore, the device for winding a suspension cord of a blind provided by the present invention can adjust the torque of the power resilient element to be suitable for blinds with different sizes, and also can be used to reduce the limitation on the torque of the power resilient element when the torque of the power resilient element is decreased, such that the torque applied to the blind by the power resilient element is increased, so as to compensate the attenuated elastic force. Furthermore, the device for winding a suspension cord of a blind according to the present invention is equally applicable to other types of blinds, including but not limited to, curtain, cellular shade and the like.

Claims

1. A device for winding a suspension cord (110) of a blind, used for winding a suspension cord (110) passing through at least one blind covering material (100), comprising:

a power resilient element (700);
a pedestal (310);
a cord spool (300), pivoted to the pedestal (310), wherein one end of the cord spool (300) is connected to the power resilient element (700), such that the cord spool (300) rotates and winds the suspension cord (110), and a taper (301) is formed on the surface of the cord spool (300);

a guide means (330), having a guide portion for guiding the suspension cord (110) to be wound about the taper (301) and arranging the suspension cord (110) along the cord spool (300) in sequence;

a rotating shaft (910), connecting the power resilient elements (700) and the cord spool (300); and

an adjusting means (500), disposed on the pedestal (310), wherein the adjusting means (500) moves along a predetermined direction to press against the cord spool (300), so as to damp the rotation of the cord spool (300), and balance out the torque applied to the cord spool (300) by each of the power resilient elements (700) and the gravity applied to the cord spool (300) by the blind covering material (100).

2. The device for winding a suspension cord (110) of a blind as claimed in claim 1, wherein the suspension cord (110) passes through the pedestal (310) and the guide means (330) to enter the guide portion.
3. The device for winding a suspension cord (110) of a blind as claimed in claim 1, wherein the guide portion is a spiral groove (333) corresponding to the circumferential surface of the cord spool (300) to be spiral, and the spiral groove (333) guides the suspension cord (110) to be spirally wound about the cord spool (300).
4. The device for winding a suspension cord (110) of a blind as claimed in claim 1, wherein the rotating shaft (910) passes through a predetermined part of the cord spools (300) and the power resilient element (700).
5. The device for winding a suspension cord (110) of a blind as claimed in claim 1, wherein the adjusting means (500) comprises:

a fixed plate (510), fixed on the pedestal (310);
a tablet (530), pressing against the surface of the cord spool (300);

a knob (570), having a screw axis (571) extending from one end thereof, wherein the screw axis (571) is screw-connected to the fixed plate (510) and connected to the tablet (530), and the distance between the tablet (530) and the fixed plate (510) is adjusted through rotating the knob (570); and

a resilient element (550), disposed between the tablet (530) and the fixed plate (510), for constantly applying a force toward the cord spool (300) to the tablet (530).

6. The device for winding a suspension cord (110) of a blind as claimed in claim 1, wherein the adjusting

means (500) comprises:

a knob (570), having a screw axis (571) extending from one end thereof, wherein the screw axis (571) is screw-connected to the pedestal (310);
 a tablet (530), disposed at one end of the screw axis (571) opposite to the pedestal (310), wherein the distance between the tablet (530) and the pedestal (310) is changed with the rotation of the knob (570); and
 a resilient element (550), disposed between the pedestal (310) and the tablet (530), for constantly applying a force toward the cord spool (300) to the tablet (530).

7. The device for winding a suspension cord (110) of a blind as claimed in claim 1, wherein the adjusting means (500) comprises:

a knob (570), having a screw axis (571) extending from one end thereof, wherein the screw axis (571) is screw-connected to the pedestal (310); and
 a tablet (530), pivoted on one end of the rotating shaft (910) opposite to the pedestal (310), wherein the distance between the tablet (530) and the pedestal (310) is changed with the rotation of the knob (570).

8. The device for winding a suspension cord (110) of a blind as claimed in claim 7, wherein the adjusting means (500) further comprises:

a fixed plate (510), fixed in the pedestal (310), for enabling the predetermined part of the tablet (530) to be slidably fitted on the pedestal (310), and for the knob (570) being connected to the pedestal (310).

9. The device for winding a suspension cord (110) of a blind as claimed in claim 1, further comprising a cover (800), wherein one end of the cover (800) is buckled in the pedestal (310), the other end of the cover (800) is pivoted to one end of the cord spool (300) far away from the pedestal (310), such that the cord spool (300) is rotated smoothly, and an accommodation space is formed between the cover (800) and the cord spool (300) to accommodate the suspension cord (110) wound about the outer edge of the cord spool (300).

10. A module for winding a suspension cord (110) of a blind, used to wind a suspension cord (110) passing through at least one blind covering material (100), comprising:

a pedestal (310);
 a cord spool (300), pivoted to the pedestal (310)

for wounding the suspension cord (110), wherein a taper (301) is formed on the surface of the cord spool (300);

a guide means (330), having a guide portion for guiding the suspension cord (110) to be wound about the taper (301) by an angle and arranging the suspension cord (110) along the cord spool (300) in sequence; and

a rotating shaft (910), passing through the cord spool (300) and used to drive the cord spool (300) to be rotated.

11. The module for winding a suspension cord (110) of a blind as claimed in claim 10, wherein the suspension cord (110) passes through the pedestal (310) and the guide means (330) to enter the guide portion.

12. The module for winding a suspension cord (110) of a blind as claimed in claim 10, further comprising a cover (800), wherein one end of the cover (800) is gripped in the pedestal (310), the other end of the cover (800) is pivoted to one end of the cord spool (300) far away from the pedestal (310), such that the cord spool (300) is rotated smoothly, and an accommodation space is formed between the cover (800) and the cord spool (300) to accommodate the suspension cord (110) wound about the outer edge of the cord spool (300).

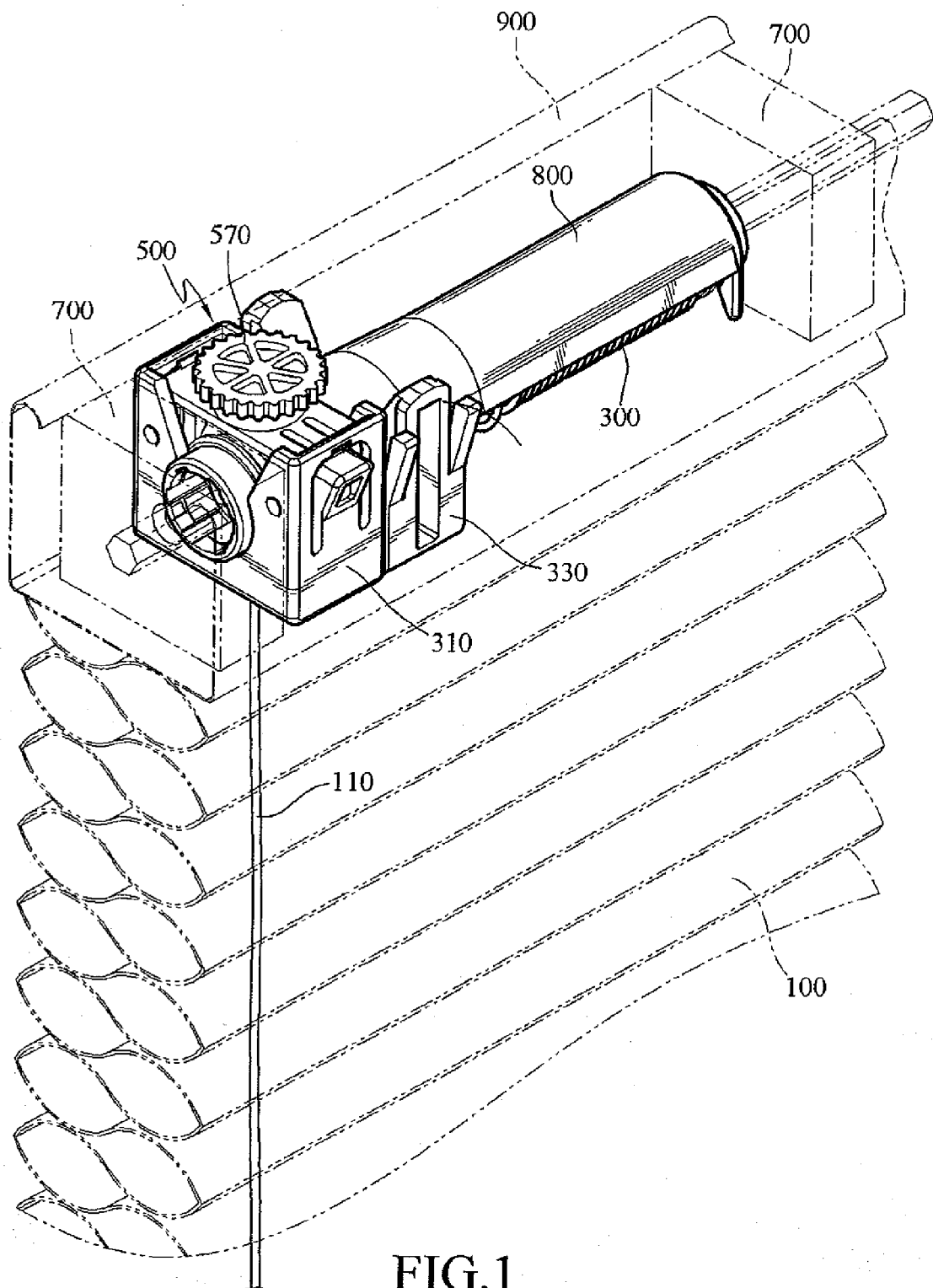
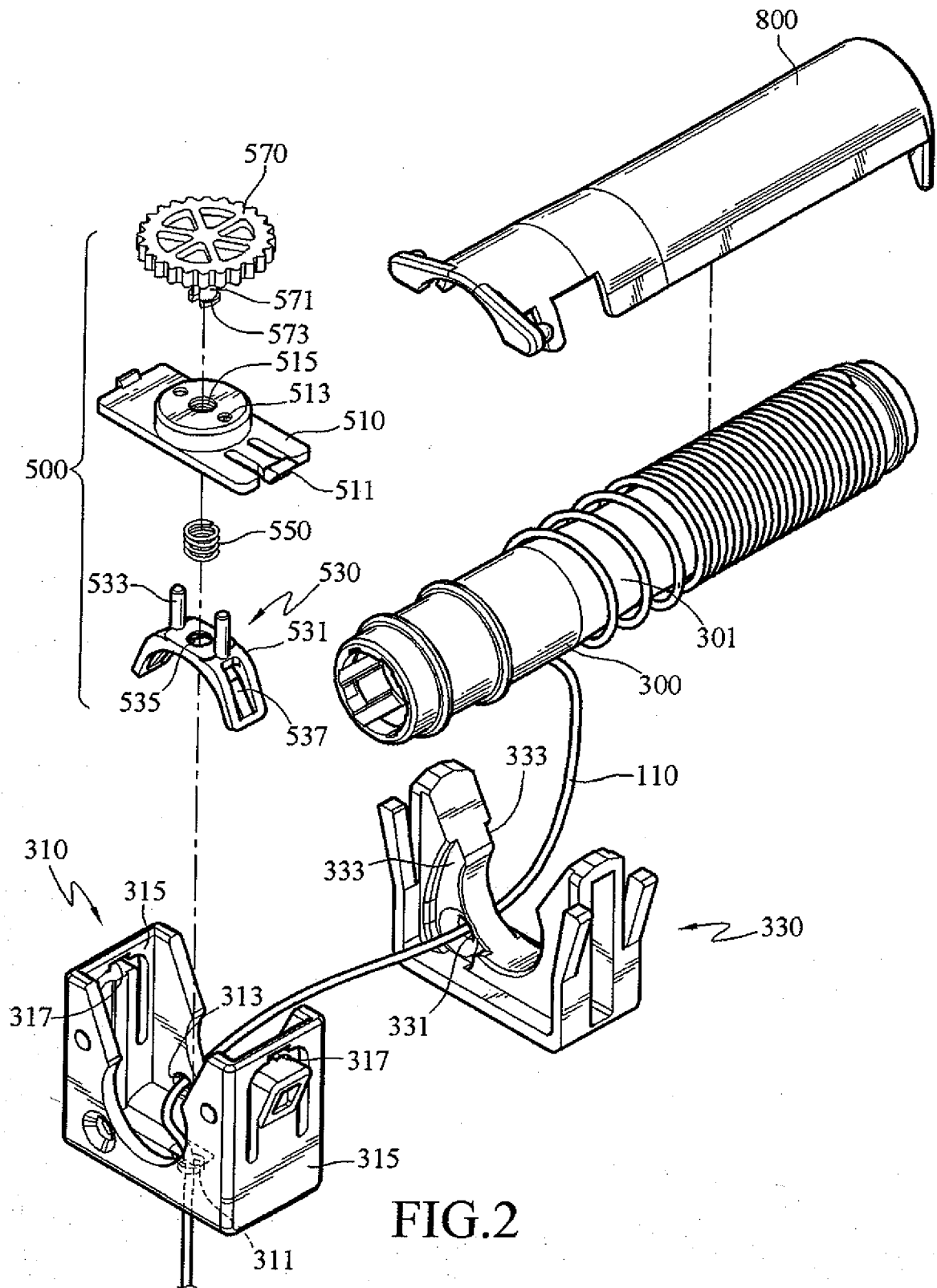


FIG.1



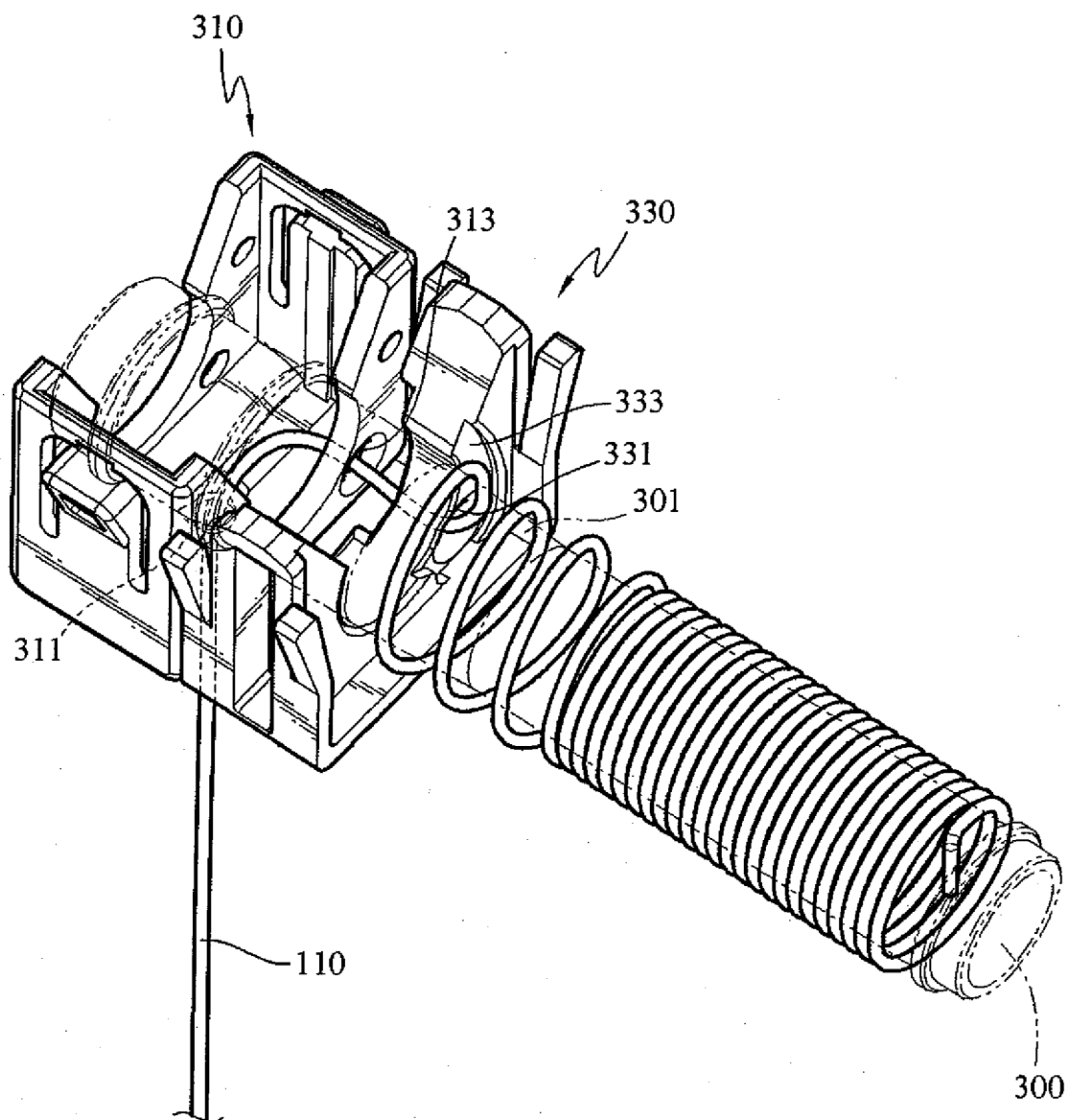


FIG.3

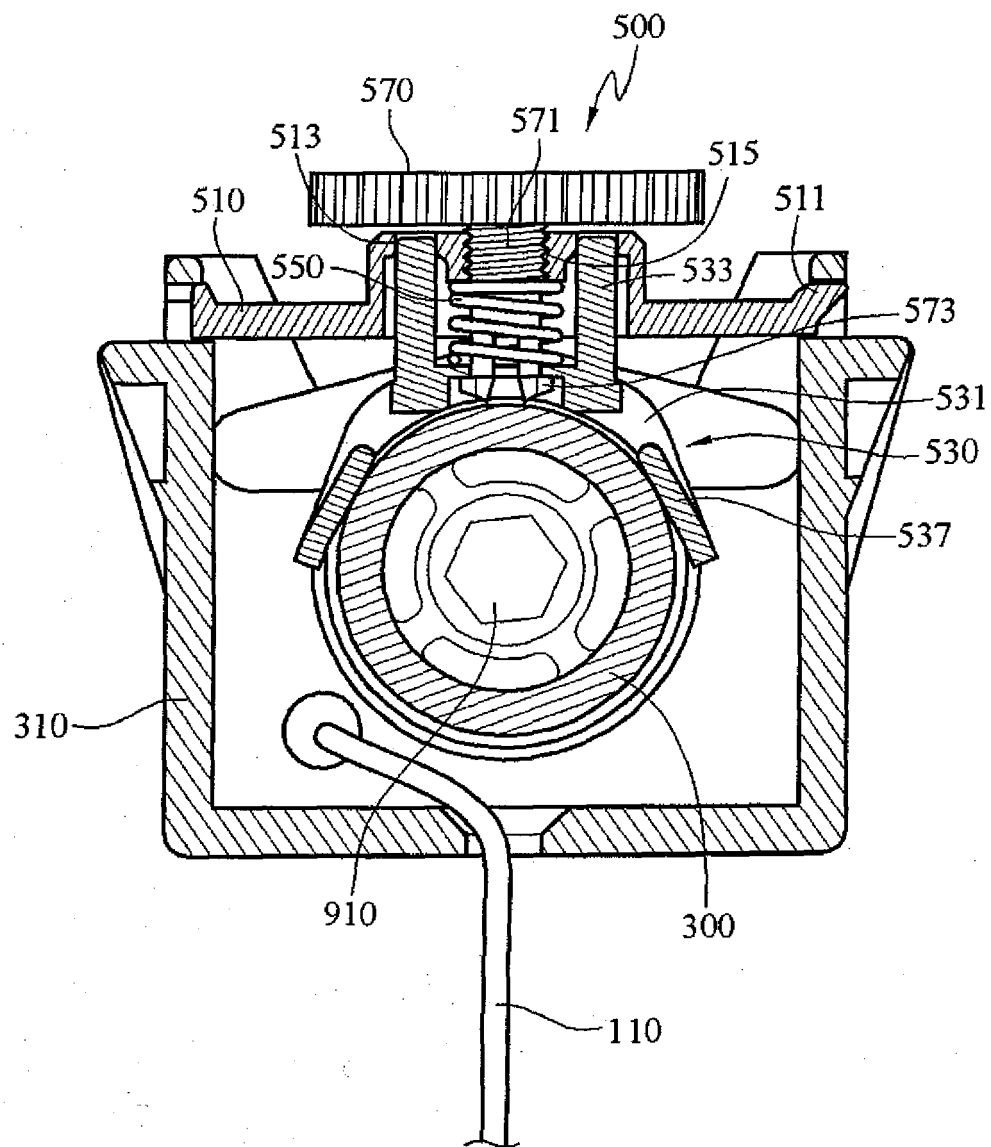


FIG.4A

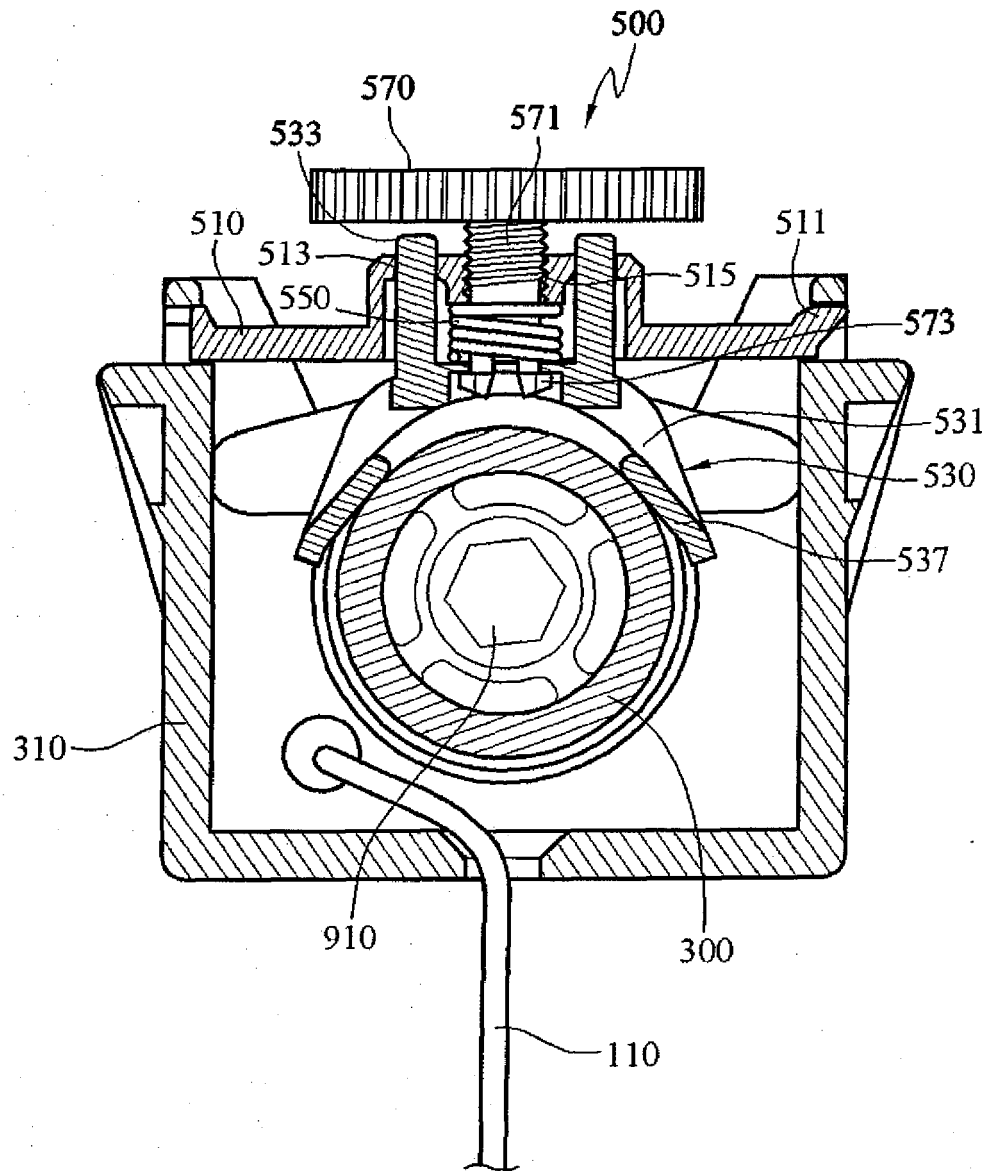


FIG.4B

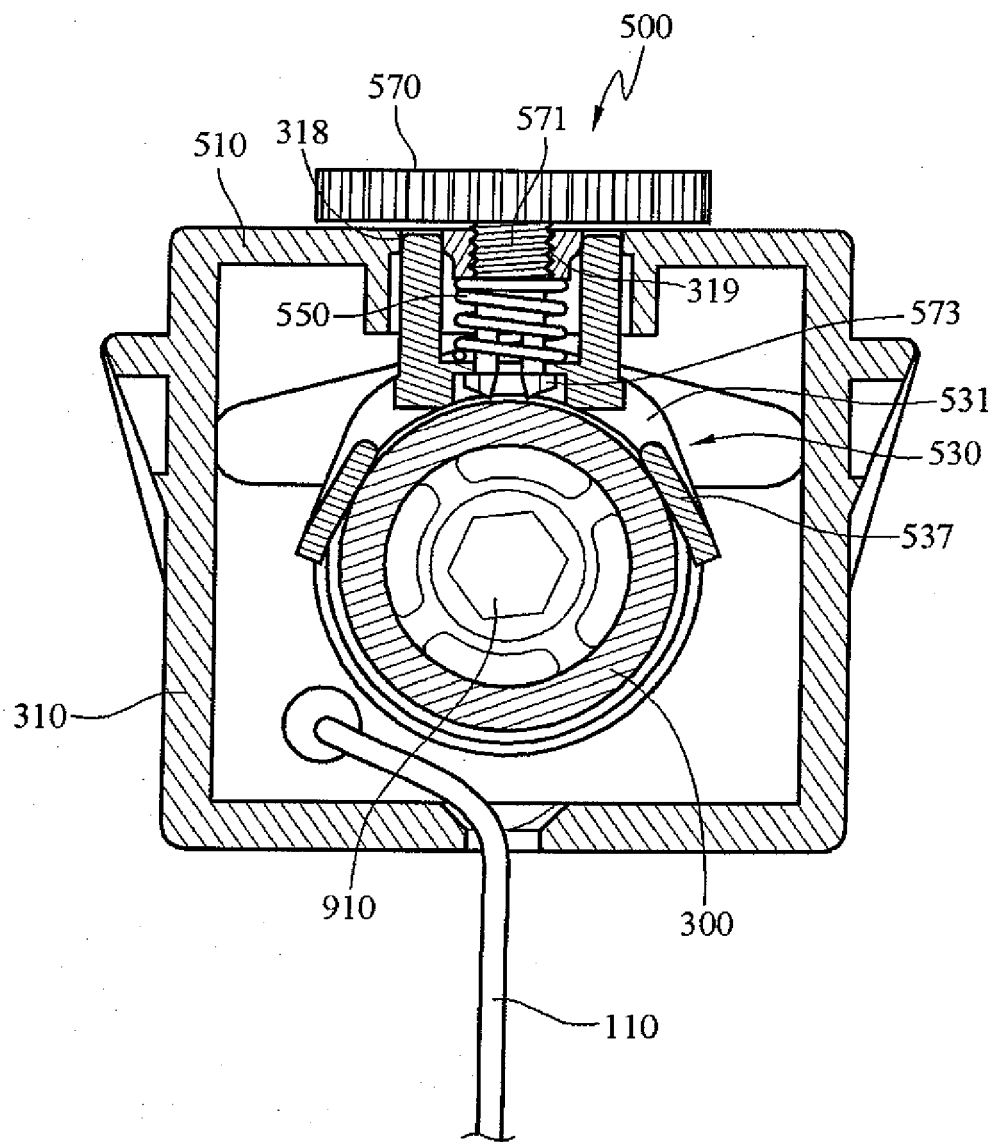


FIG.5

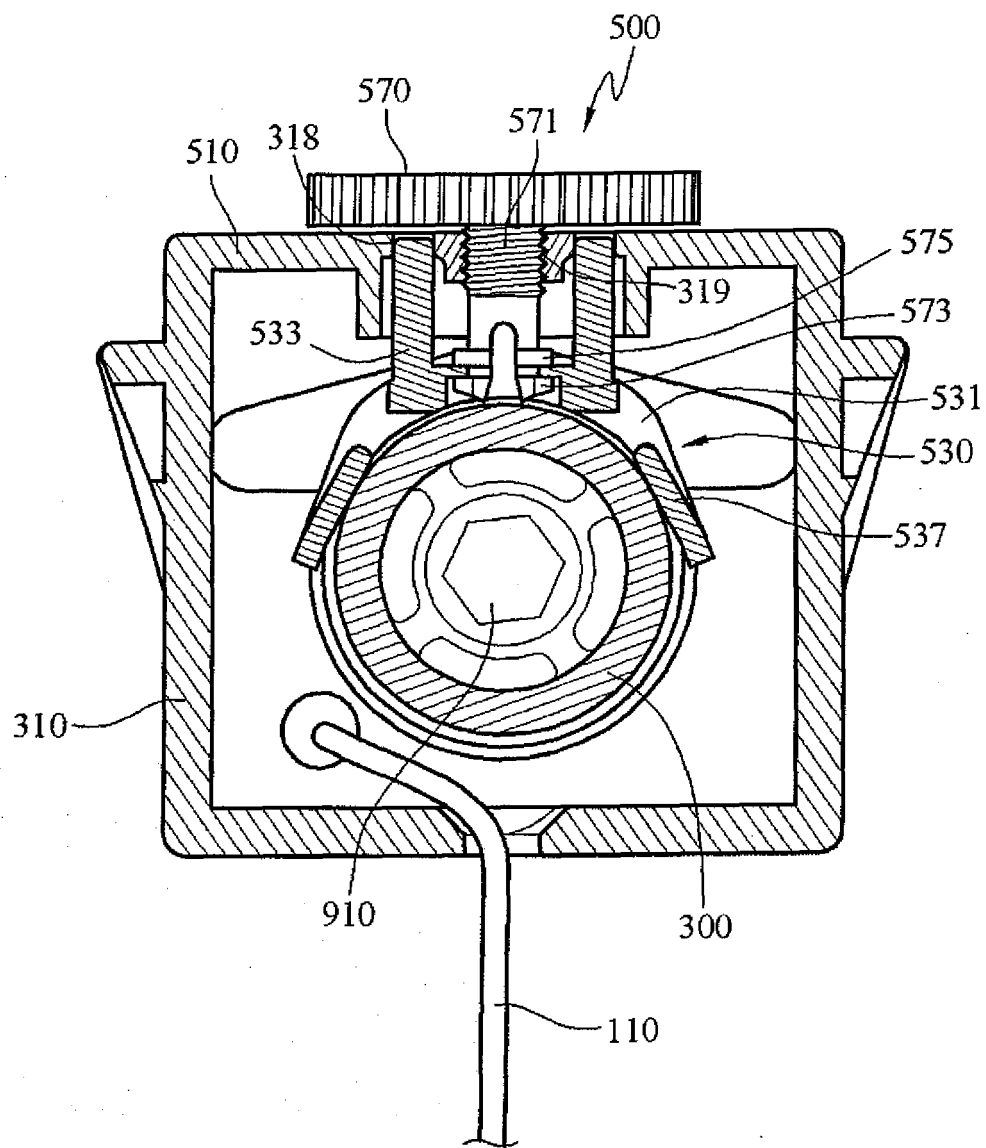


FIG.6



European Patent
Office

EUROPEAN SEARCH REPORT

Application Number
EP 06 12 0526

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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A	* paragraph [0047] - paragraph [0056]; figures 1,2 *	1	ADD. E06B9/325
Y	----- US 2003/178155 A1 (FRACZEK RICHARD [US]) 25 September 2003 (2003-09-25)	12	
A	* paragraph [0026]; figures 1-4,6,7 *	1	

			TECHNICAL FIELDS SEARCHED (IPC)
			E06B
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
Munich		4 April 2007	Peschel, Gerhard
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

3
EPO FORM 1503 03.82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
ON EUROPEAN PATENT APPLICATION NO.**

EP 06 12 0526

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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04-04-2007

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