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(54) **Electric curtain with accurate control of a stop position of its covering sheet**

(57) An electric curtain mainly utilizes a covering sheet (311) furled at an upper limit position (a), which simultaneously impels an actuating member (333) of a zero device (33) to relatively cooperate with a sensor (334) of the zero device (33), so that the covering sheet (311) would not continue operating and a counter (335) in the zero device (33) would recount once a processing unit (342) of a controlling device (34) receives a signal from the sensor (334). Thus, the processing unit (342) would drive the counter (335) to recount in every following drop of the covering sheet (311) to accurately control the suspending position without incurring an accumulative counting error and increase an operative convenience.

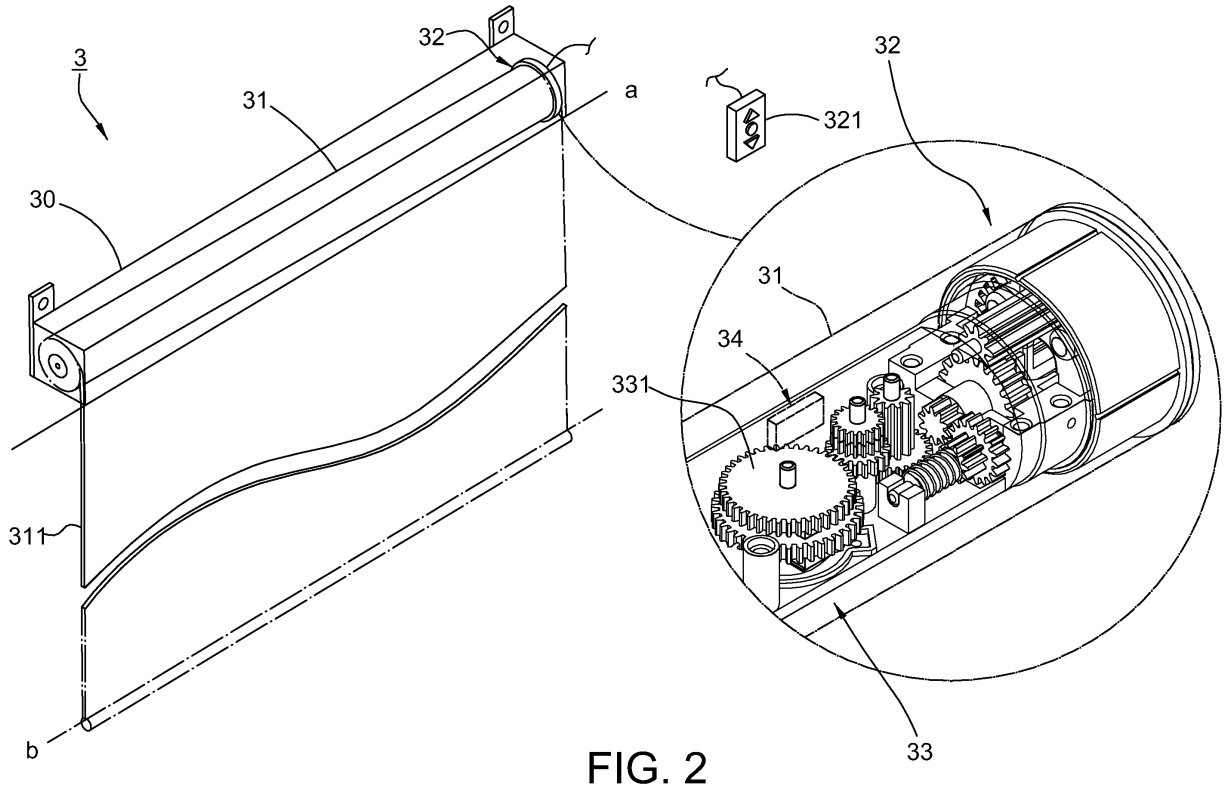

FIG. 2

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Description

BACKGROUND OF THE INVENTION

1. Field of the Invention

[0001] The present invention relates to an electric curtain, particular to an electric curtain via accurately controlling a stop position of its covering sheet.

2. Description of the Related Art

[0002] Referring to Fig. **1,** a conventional electric curtain **1** comprises a rail **10,** a rolling shaft **11** pivoted on the rail **10,** a power **12** applied to motivate the rolling shaft **11,** and a controlling device **13** applied to control the power **12.** Wherein, the rolling shaft **11** includes a covering sheet **111** rolled thereon. Moreover, the controlling device **13** includes a turning member **131** synchronizing with the rolling shaft **11,** a sensor **132** applied to correspondingly sense the rotation of the turning member **131,** a processing unit **133** connected to the sensor **132** to control the power **12,** a counter **134** connected to the sensor **132,** and a memory unit **135** connected to the processing unit **133.**

[0003] While in manipulation of the electric curtain **1,** users need to set a lower limit position of the covering sheet **111.** Namely, when the covering sheet **111** initially descends to the lowest position, the turning member **131** is concurrently triggered to rotate and generate a revolution, whose revolution number is counted and converted into a data by the counter **134.** Further, the memory unit **135** saves the data as a standard value, and the raising and descending of the covering sheet **111** would depend on comparing an actual amount counted by the counter **134** with respect to the standard value. Once the number of revolution counted by the counter **134** equals the standard value saved in the memory unit **135,** the processing unit **133** would keep the power **12** from running.

[0004] After setting up, users draw down the covering sheet **111** again by the power **12** driving the rolling shaft **11,** and then the turning member **131** is synchronically rotated for permitting the sensor **132** capable of detecting the rotation thereof and rendering the counter **134** to count the rotation number. Hence, when the number counted by the counter **134** equals to the standard value saved in the memory unit **135,** the processing unit **133** prevents the power **12** from running to impede the dropping of the covering sheet **111.** Whereas, when the covering sheet **111** is retracted upward, the processing unit **133** would trigger the power **12** to rotate the rolling shaft **11** until the revolution number counted by the counter **134** equals to the standard value saved in the memory unit **135.** Therefore, the covering sheet **111** would be retracted to the upper limit position base on above preset standard data.

[0005] Obviously, the conventional operating rationale mainly depends on the counting value executed by the counter **134** relative to the standard data saved in the memory unit **135** for lifting and dropping the covering sheet **111,** so that the processing unit **133** accordingly determines the timing for stopping the power **12.** However, an accumulative imprecision of the counter **134** may be probably generated since a mal-sensing may affect the function of the sensor **132,** or a facile transmission inertia between the power **12** and the rolling shaft **11** may incur an inaccurate motion and result errors produced therebetween. Thus, the actual rotating quantity of the turning member **131** would inevitably deviate from the number counted by the counter **134** in a long term of using to cause the electric curtain **1** unable to precisely furl and drop the covering sheet **111** to the desired upper and lower limit positions.

[0006] If an electricity outage happens unpredictably, the counter **134** forcedly interrupts the counting and has to restart its counting while resuming the power supply. In such situation, the counter **134** usually confuses the revolution number of furling the covering sheet **111** with the revolution number of lowering the covering sheet **111** and makes an inaccurately counting and even a shutdown of the controlling device **13.** Thus, the conventional electric curtain **1** needs to reset the setting, which causes an inconvenient using and requires improvements.

SUMMARY OF THE INVENTION

[0007] Therefore, the object of the present invention is to provide an electric curtain that assists in accurately suspending the covering sheet at a preferable position in each operation and increasing a convenience of using.

[0008] The electric curtain in accordance with the present invention mainly provides with a rail, a rolling shaft pivoted on the rail, a power located relative to the rail for driving the rotation of the rolling shaft, a zero device disposed at one side of the power, and a controlling device connected to the zero device and the power. Wherein, the zero device has a turning member concurrently rotated with the rolling shaft, an actuating member disposed correspondingly to the turning member, a sensor correspondingly positioned to the actuating member, and a counter connected to the sensor. Additionally, the controlling device includes a receiver connected to the sensor, a processing unit respectively connected to the receiver and the power, and a memory member connected to the processing unit. When a covering sheet is rolled by the rolling shaft to stop at its upper limit position to trigger the actuating member every time, the sensor would generate a signal and send it to the processing unit, for which to control the counter to resume its counting to zero so as to recount the succeeding descending operation base on a standard value stored in the memory member. Whereby, an accumulative inaccuracy of the counting in a long term of using can be avoided for efficiently stopping the covering sheet at a desired position without further adjustments while using in a long period

and increasing a using convenience.

[0009] The advantages of the present invention would be apparent in following embodiments with drawings, and like elements are denoted by same numerals throughout the disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010]

Fig. **1** is a perspective view showing a conventional invention;
Fig. **2** is a perspective view showing a first preferred embodiment
of the present invention;
Fig. **3** is an enlarged view showing partial components of the first
embodiment;
Fig. **4** is a schematic view showing the first preferred embodiment
while setting and descending;
Fig. **5** is a flow diagram showing the dropping of the first embodiment;
Fig. **6** is another schematic view showing the first preferred
embodiment while furling;
Fig. **7** is a flow diagram showing the furling of the first embodiment;
Fig. **8** is a perspective view showing a second preferred embodiment
of the present invention; and
Fig. **9** is an enlarged view showing partial components of a third
preferred embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0011] Before in greater detail, it is noted that the like elements are denoted by the similar reference numerals throughout the disclosure.

[0012] Referring to Figs. **2** and **3** showing a first preferred embodiment of an electric curtain **3** comprises a rail **30,** a rolling shaft **31** pivoted on the rail **30,** a power **32** located on the rail **30** for driving the rotation of the rolling shaft **31,** a zero device **33** disposed at one side of the power **32,** and a controlling device **34** connected to the zero device **33** and the power **32.** Wherein, the rolling shaft **31** includes a covering sheet **311** swiveled thereby, and the covering sheet **311** is restricted to stop extremely at an upper limit position **a** and a lower limit position **b.** Further, the zero device **33** includes a turning member **331** concurrently rotated with the rolling shaft **31,** an actuating member **333** preferably installed on the turning member **331,** a sensor **334** positioned correspondingly to the actuating member **333,** and a counter **335** connected to the sensor **334.** Additionally, the controlling device **34** includes a receiver **341** connected to the sensor **334,** a processing unit **342** respectively connected to the receiver **341** and the power **32,** and a memory unit **343** connected to the processing unit **342.**

[0013] Wherein, the power **32** could be triggered by a starter **321** which is directed to a wireless remote control or directed to a wired switch used by pressing. Herein, the starter **321** in the illustration adopts a wireless remote control. Moreover, to promote a preferable matching position of the actuating member **333** with respect to the sensor **334,** the actuating member **333** and the sensor **334** are coaxially disposed on an axle as illustrated.

[0014] Successively, when the covering sheet **311** is rolled to stop at its upper limit position **a**, the actuating member **333** on the turning member **331** would concurrently rotate relatively to the sensor **334,** from which a signal is emitted for the receiver **341** of the controlling device **34** to receive . Accordingly, when the processing unit **342** receives the signal transmitted by the sensor **334,** the processing unit **342** would properly stop the operation of the power **32** and control the counting of the counter **335** turning to zero. Thus, for initially dropping or descending the covering sheet **311,** the counter **335** would preset its counting.

[0015] Still referring to Figs. **2** and **3,** before a substantial operation, users need to set a proper lower limit position **b** of the covering sheet **311.** Wherein, the lower limit position **b** is directed where the covering sheet **311** is dropped to its extreme lowest position. Thereby, when the covering sheet **311** is dropped from the upper limit position **a** toward its lower limit position **b,** the turning member **331** would be concurrently rotated with the rolling shaft **31** to motivate the actuating member **333** to deviate from the sensor **334** as shown in Fig. **4.** Accordingly, the counter **335** would not only synchronically count the rotating quantity of the actuating member **333** on the turning member **331** detected via the sensor **334** but also concurrently convert the quantity into a data. Whereby, the data would be saved in the memory unit **343** as a standard data basis for the next dropping of the covering sheet **311.**

[0016] Referring to Figs. **3, 4,** and **5,** when users desire to drop the electric curtain **3** again after setting up, they can directly press the starter **321** to trigger the power **32** so as to motivate the rolling shaft **31** for rotably synchronizing the covering sheet **311** with the turning member **331.** Thence, the actuating member **333** on the turning member **331** would rotate correspondingly to the sensor **334** as arrowed in Fig. **4.** When an actual rotating quantity of the actuating member **333** counted by the counter **335** equals the standard data basis saved in the memory unit **343,** the processing unit **342** accordingly controls the power **32** to stop dropping the covering sheet **311.**

[0017] Reciprocally, referring to Figs.**2, 3,** and **6,** in furling the covering sheet **311,** the power **32** drives the rolling shaft **31** to gradually move the actuating member **333** on the turning member **331** close to the sensor **334** until the actuating member **333** and the sensor **334** are aligned as shown in Fig. **6.** Further referring to Fig. **7,** the sensor

334 would detect the rotation of the actuating member **333** on the turning member **331** to transmit a signal to the receiver **341** to promote the processing unit **342** for stopping the power **32** from running and simultaneously zeroing the counting of the counter **335.** Therefore, the counter **335** would resume its counting every time when the covering sheet **311** is drawn downward, thereby avoiding the mechanical inertia and cumulative errors that causes inexact downward and upward motions of the covering sheet **311** after using for a long period. Whereby, the present invention preferably obtains a precise controlling of the stop position of the covering sheet without frequent adjustments or settings of the covering sheet **311** in a long term of using, thus increasing a using convenience.

[0018] Even an electricity outage occurs during the operation of the electric curtain **3,** a furling of the covering sheet **311** would be firstly proceeded after the power supply is resumed so as to allow the actuating member **333** moving relative to the sensor **334.** Namely, the rolling shaft **31** would furl the covering sheet **311** back to the upper limit position **a**, and the processing unit **342** would retrieve the counter **335** by zeroing while aligning the actuating member **333** with the sensor **334,** so that the electric curtain **3** appropriately restarts operating and efficiently conduces to a using convenience.

[0019] Referring to Fig. **8,** a second preferred embodiment of the present invention comprises elements, operations and functions similar to the first preferred embodiment, in which the electric curtain **3** still comprises a rail **30,** a rolling shaft **31,** a power **32,** a zero device **33,** and a controlling device **34.** Differentially, an adjusting member **336** is disposed at one side of the zero device **33** for preferably adjusting the position of the sensor **334.** Further, a governor **337** can be alternatively installed between the adjusting member **336** and the zero device **33** for controlling the output power of the adjusting member **336.** Accordingly, by means of the additive adjustment member **336** cooperating with the governor **337,** the position of the sensor **334** can be more delicately amended to collaborate with the actuating member **333** for achieving the merits of precisely controlling the covering sheet at the desired position, obtaining an efficient speedy adjustment, and attaining a convenient operation.

[0020] Referring to Fig. **9,** a third preferred embodiment of the present invention comprises elements, operations and functions similar to the first preferred embodiment, in which the electric curtain **3** still comprises a rail **30,** a rolling shaft **31,** a power **32,** a zero device **33,** and a controlling device **34.** Specifically, the arrangement of the interrelated elements in the zero device **33** can be either performed in the configuration like the first and second preferred embodiments or performed in the configuration like this embodiment. Namely, the actuating member **333** of the zero device **33** in this embodiment is set as a discrete part to separate from the turning member **331** on which a plurality of apertures **332** are equidistantly defined, and the sensor **334** is still correspondingly situated with respect to the turning member **331.** Accordingly, when the turning member **331** and the rolling shaft **31** are concurrently rotated, the sensor **334** would be able to sense the rotation of the turning member **331,** and the actuating member **333** would be triggered by the furling of the covering sheet **311** stopping at the upper limit position **a.**

[0021] Further in setting, the covering sheet **311** is firstly dropped to the lower limit position **b** for the sensor **334** to simultaneously sense the relative rotation of the turning member **331,** enhancing the counter **335** to convert the rotation into a data for the memory unit **343** to save as a standard data basis serving for the succeeding dropping basis of the covering sheet **311.** In the succeeding operation for dropping the covering sheet **311,** the processing unit **342** would thence impede the power **32** from operating and stop the covering sheet **311** at a proper position when the rotating number of the turning member **331** counted by the counter **335** equals to the standard data basis saved in the memory unit **343.** In contrast, when the covering sheet **311** is retracted or furled to the upper limit position **a,** the covering sheet **311** propels the actuating member **333** for the sensor **334** to directly emit a signal; whereby, the receiver **341** receives the signal from the sensor **334,** and the processing unit **342** accordingly impedes the driving of the power **32** and concomitantly resumes the counting of the counter **335** to zero. Therefore, the counter **335** recounts when every time the covering sheet **311** is dropped.

[0022] To sum up, the present invention takes advantages of the actuating member of the zero device cooperating with the correlated sensor. Thereby, the covering sheet furled to the upper limit position would force the sensor to emit a signal to the controlling device for stopping the power and returning the counting of the counter to zero, which benefits a newly counting in pursuance of a next descent of the covering sheet. Thus, the present invention decreases an accumulative error resulting from inaccurate movements of the covering sheet after using for a long time for ensuring a precise suspension of the covering sheet and promoting an operative convenience.

[0023] Various modifications may be made in further embodiments described without departing from the spirit and scope of the invention.

Claims

1. An electric curtain (3) via accurately controlling a stop position of its covering sheet (311) comprising:

a rail (30);
a rolling shaft (31) pivoted on said rail (30), including a covering sheet (311) rolled by said rolling shaft (31); wherein, said stop position of said covering sheet (311) being divided into an upper limit position (a) and a lower limit position (b);
a power (32) disposed on said rail (30) for driving

said rolling shaft (31);
a zero device (33) situated by one side of said power (32), including a turning member (331) concurrently turned with said rolling shaft (31), an actuating member (333) disposed correspondingly to said turning member (331), a sensor (334) relatively positioned with said actuating member (333), and a counter (335) connected to said sensor (334); and
a controlling device (34) respectively connected to said zero device (33) and said power (32), including a receiver (341) connected to said sensor (334), a processing unit (342) respectively connected to said receiver (341) and said power (32), and a memory unit (343) connected to said processing unit (342); wherein, said covering sheet (311) stopped at said upper limit position (a) triggering said actuating member (333) for said sensor (334) to generate a signal and to transmit said signal to said processing unit (342) so as to stop said power (32) and control returning said counter (335) to zero.

2. The electric curtain as claimed in claim 1, wherein, said actuating member (333) is installed on said turning member (331), and said actuating member (333) preferably aligns with said sensor (334) in time of stopping said covering sheet (311) at said upper limit position (a).

3. The electric curtain as claimed in claim 1, wherein, said actuating member (333) is disposed separately from said turning member (331) and triggered via stopping said covering sheet (311) at said upper limit position (a).

4. The electric curtain as claimed in claim 3, wherein, a plurality of apertures (332) are equidistantly defined on said turning member (331) for said sensor (334) to sense rotable displacements of said apertures (332).

5. The electric curtain as claimed in claim 1, wherein, an adjusting member (336) is disposed at one side of said sensor (334) for adjusting a proper position of said sensor (334).

6. The electric curtain as claimed in claim 5, wherein, a governor (337) is mounted between said adjusting member (336) and said zero device (33) for regulating an output force of said adjusting member (336) .

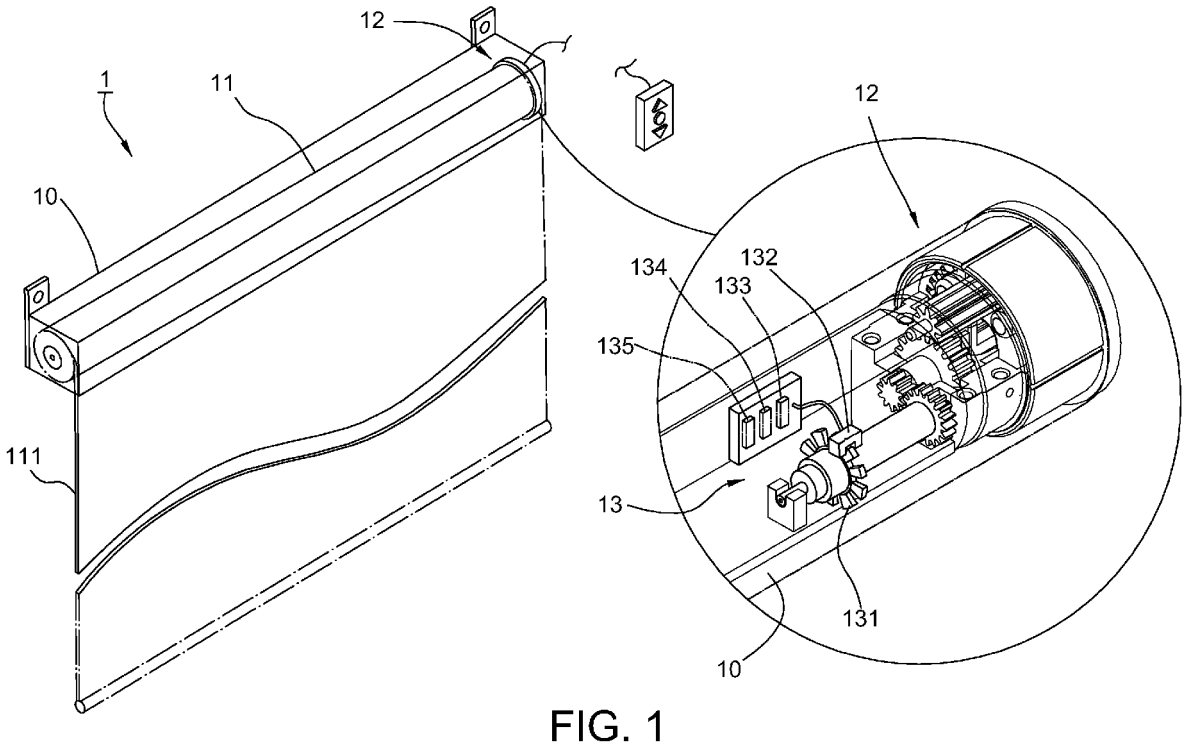

FIG. 1
(PRIOR ART)

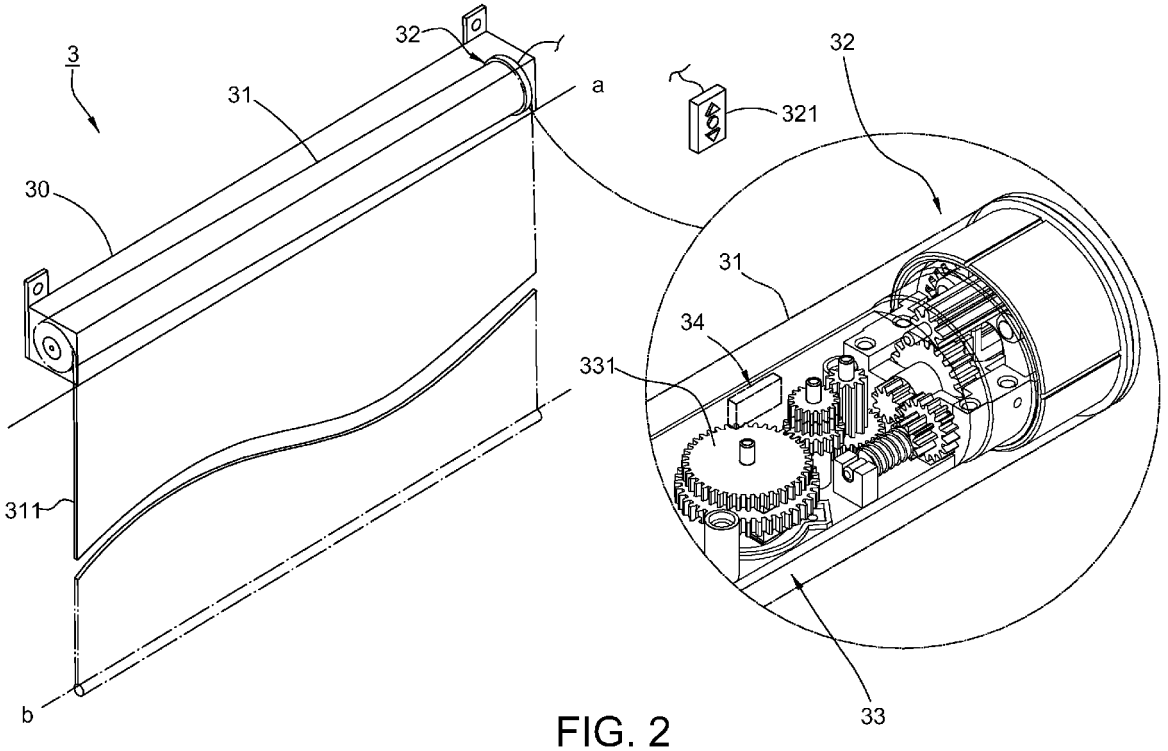

FIG. 2

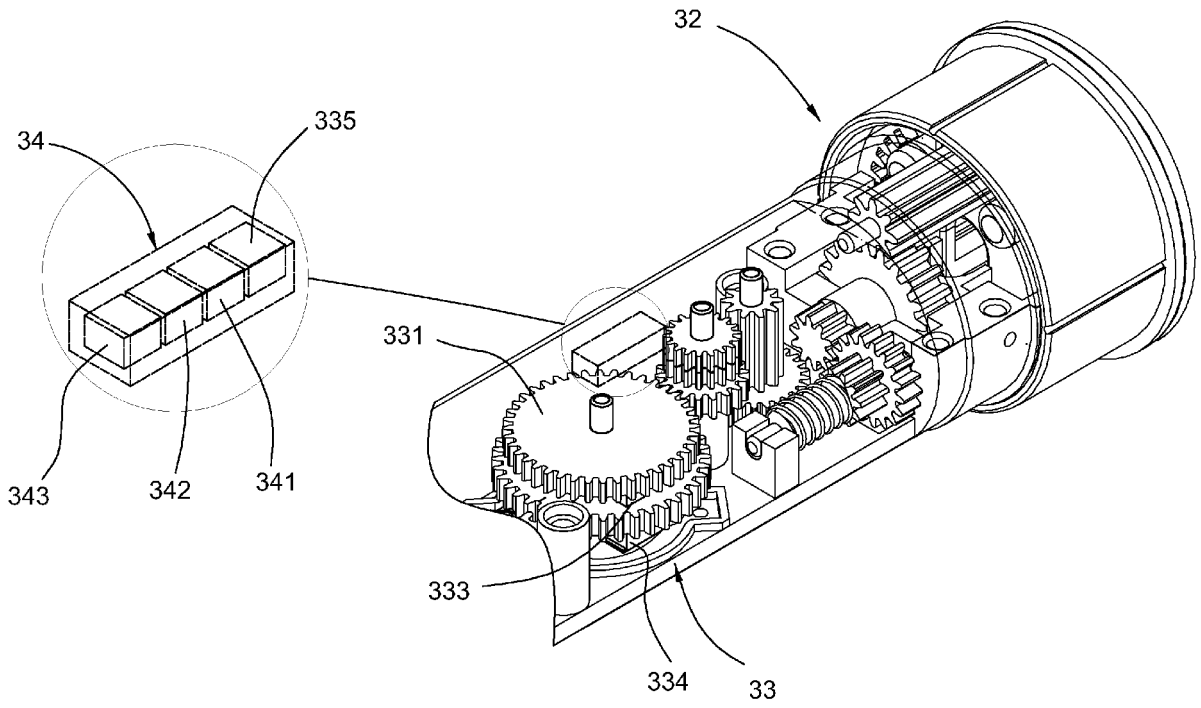

FIG. 3

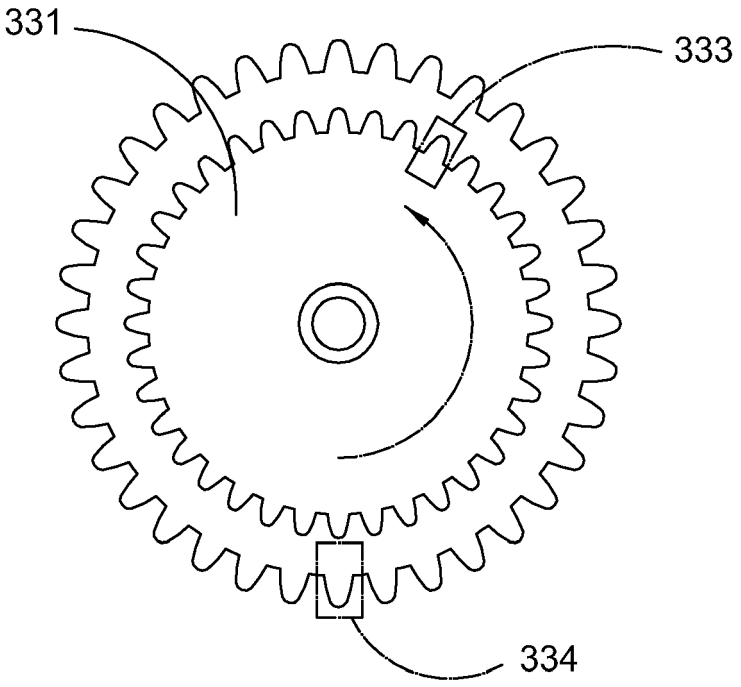

FIG. 4

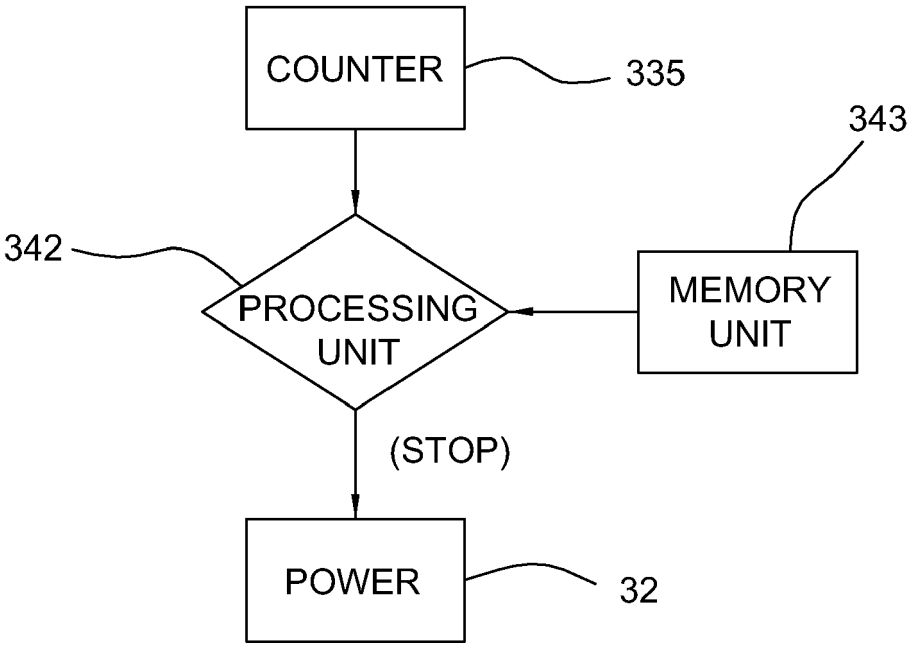
COUNTER
335
343
342
PROCESSING UNIT
MEMORY UNIT
(STOP)
POWER
32

FIG. 5

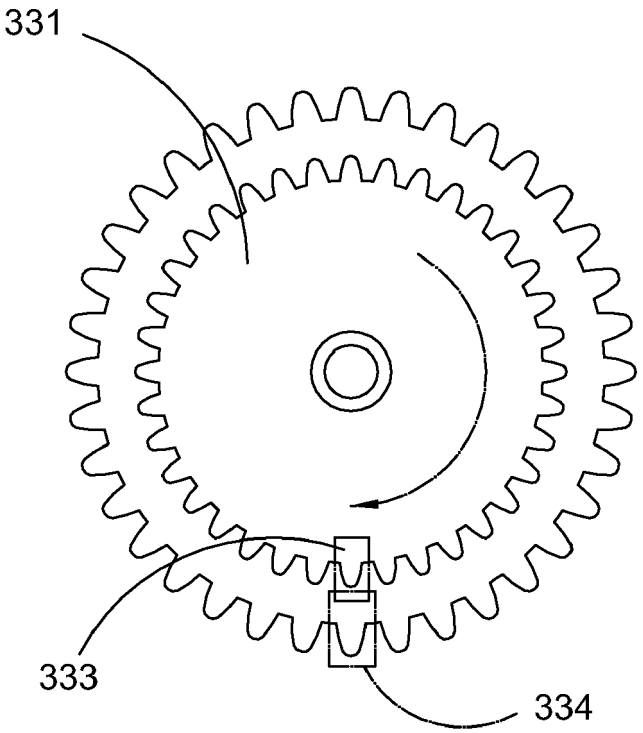

FIG. 6

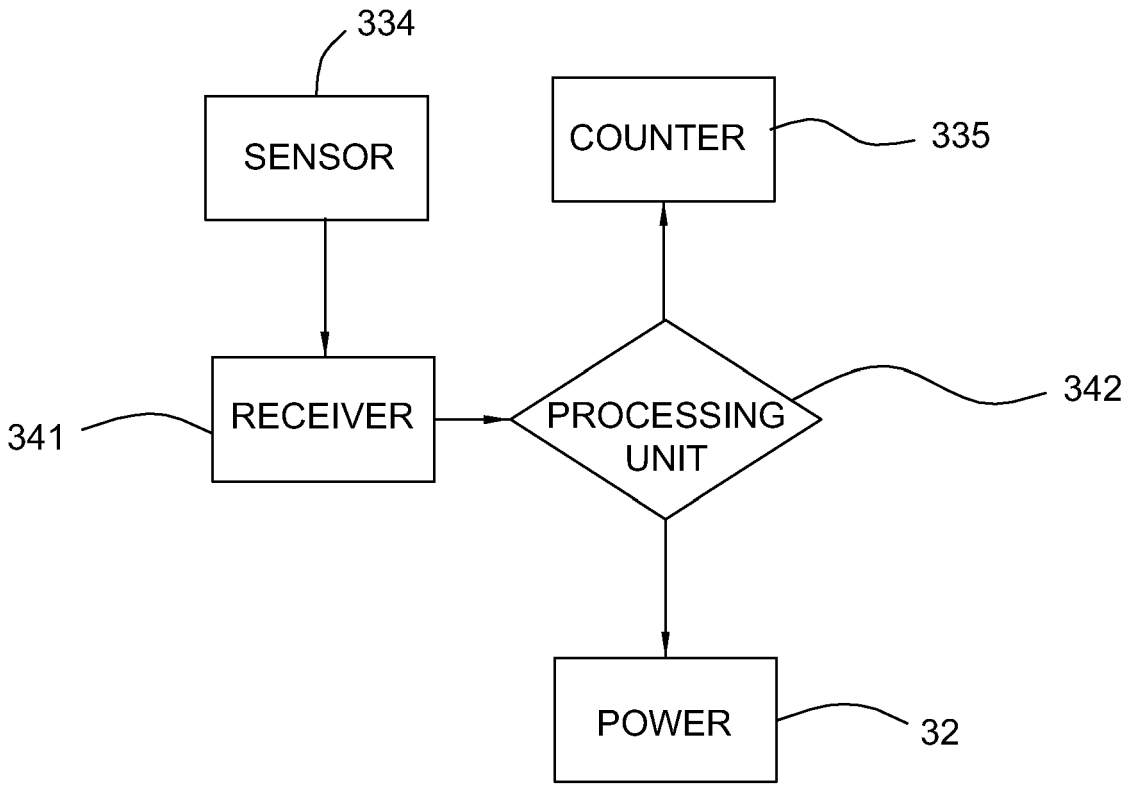
334
SENSOR
COUNTER
335
RECEIVER
341
PROCESSING UNIT
342
POWER
32

FIG. 7

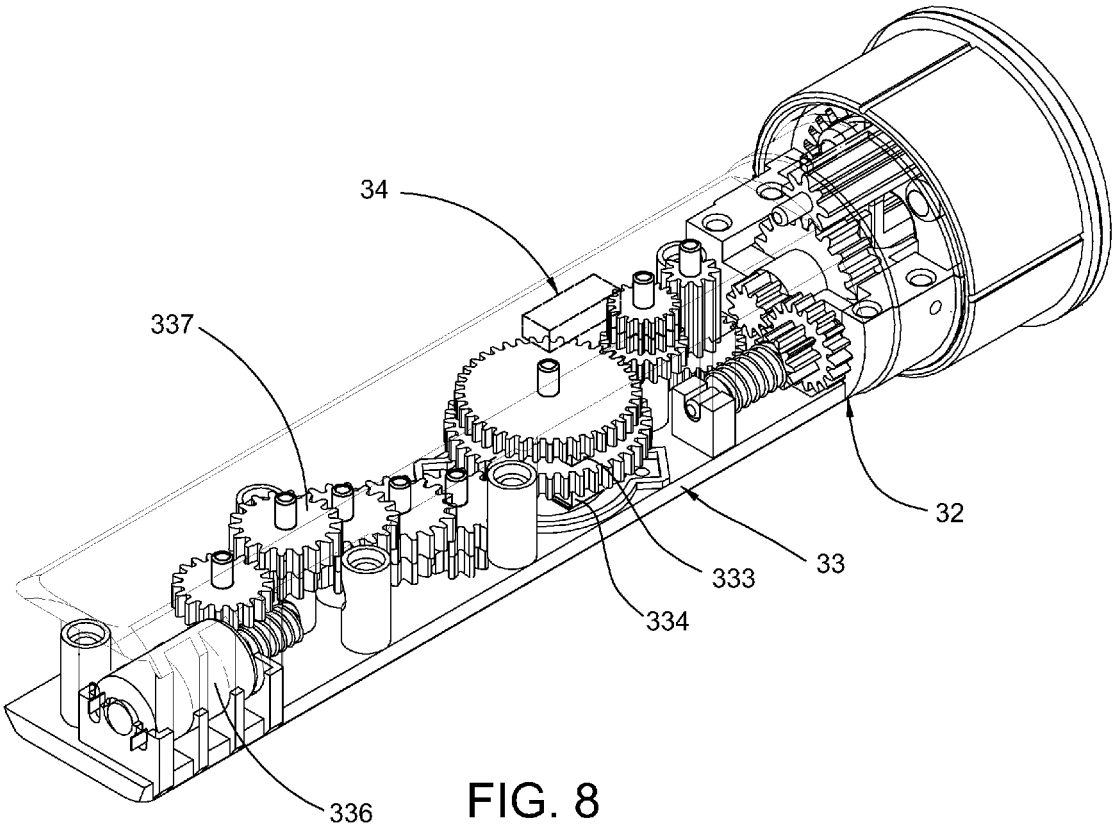

FIG. 8

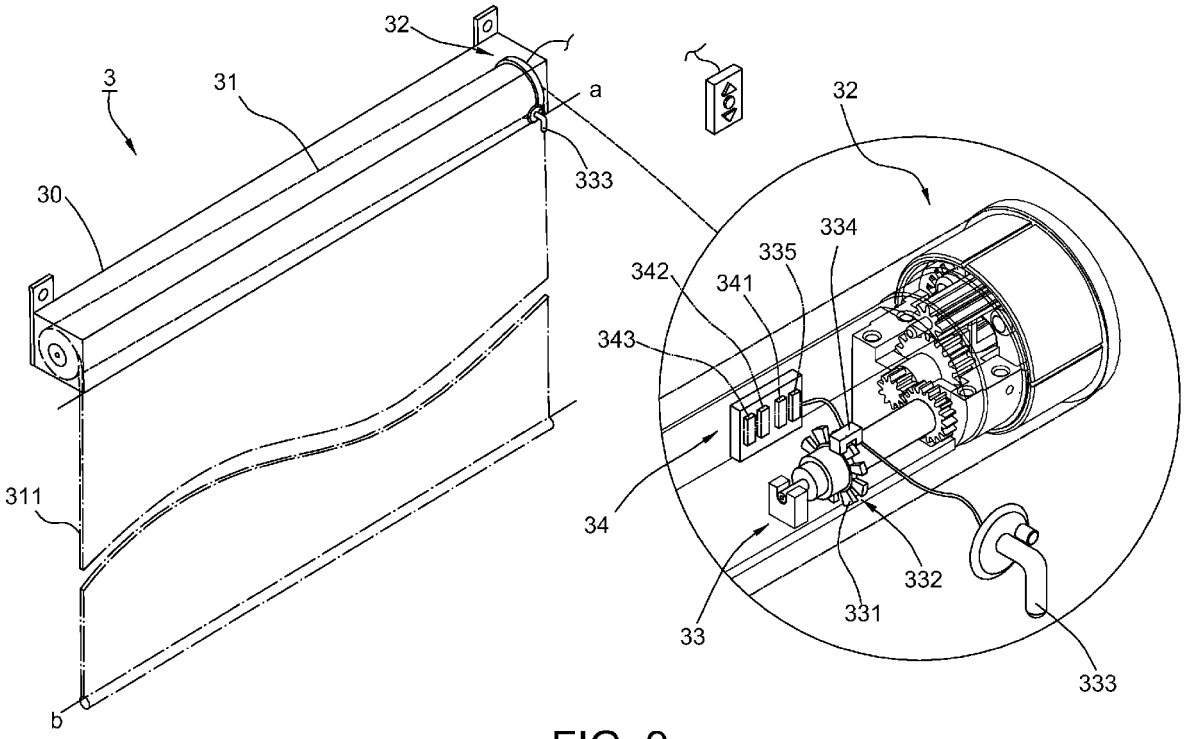

FIG. 9

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EUROPEAN SEARCH REPORT

Application Number
EP 09 16 6350

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
Y	EP 1 577 486 A (DEPRAT JEAN SA [FR]) 21 September 2005 (2005-09-21) * the whole document * -----	1-6	INV. E06B9/88
Y	EP 0 770 757 A (ELERO ANTRIEB SONNENSCHUTZ [DE] ELERO GMBH [DE]) 2 May 1997 (1997-05-02) * column 2, line 16 - column 3, line 5 * * column 4, line 29 - line 41 * -----	1-6	
A	US 2003/205978 A1 (LEE PAO-CHEN [TW]) 6 November 2003 (2003-11-06) * paragraph [0024] * -----	4	
			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	29 January 2010	Knerr, Gerhard

CATEGORY OF CITED DOCUMENTS

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29-01-2010

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