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(54) **Programmable Watch Winding Apparatus**

(57) A programmable watch winding apparatus includes a user interface for users to input a winding number and rotational direction of turns the programmable watch winding apparatus performs to wind a mechanical watch, and a control unit controlling a transmission device to rotate a rotatory base according to the users' input. Thereby, the programmable watch winding apparatus is fully controlled to automatically wind the mechanical watch carried thereon.

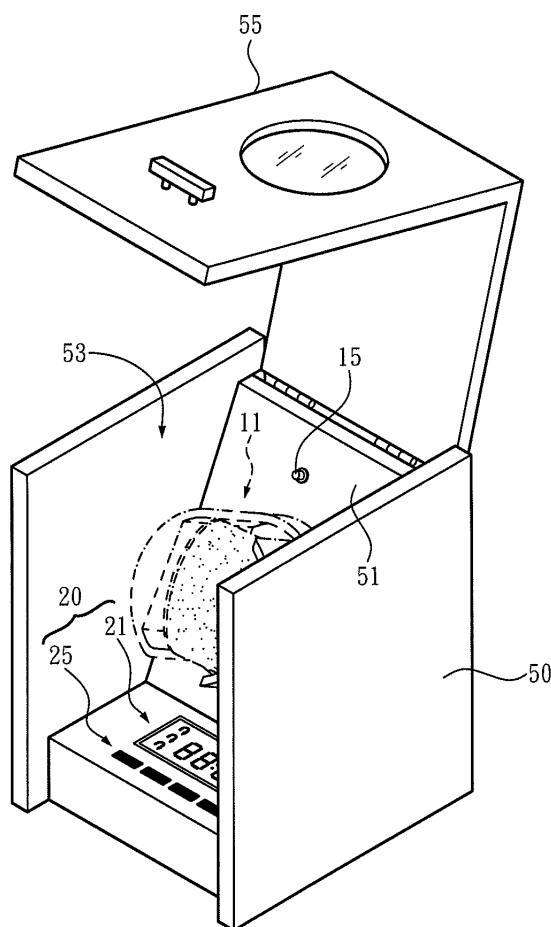


FIG. 1

Description

BACKGROUND OF THE INVENTION

1. Technical Field

[0001] The present invention relates to a watch winding apparatus according to the preamble of Claim 1. Accordingly, the present invention severally relates to watch winding apparatuses and more particularly, to a watch winding apparatus that automatically winds mechanical watches in a fully controlled manner.

2. Description of Related Art

[0002] A watch winding apparatus is designed for automatically winding mechanical watches. Mechanical watches are wound by kinetic energy created from human hands' movement. Watch winding apparatuses have thus been developed for performing particular operation to substitute for human hands and keep mechanical watched wound during periods of non-use.

[0003] A known orbital watch-winding apparatus is disclosed in US Patent No. 6,254,270. The orbital watch-winding apparatus includes a base unit and a mandrel rotatably mounted to the base unit. A watch is supported on the outer surface of the mandrel. When activated, the watch moves in a circular path. The orbital motion of the watch causes the self-winding mechanism to swing back and forth to simulate the effect produced by normal arm movements when the watch is worn by a user.

[0004] The known orbital watch-winding apparatus operates in a time-based manner. For example, it may be set to operate for a time period, such as 20 or 30 minutes, so as to continuously wind a watch carried thereon during the time period. However, the rotational rate of a motor in the orbital watch-winding apparatus may be subject to the changeable supply voltage and unlikely to remain constant. Consequently, the number of turns performed by the orbital watch-winding apparatus during a preset time period cannot be accurately controlled and thus the watch may be over-wound or under-wound.

[0005] Besides, operational vibration of the orbital watch-winding apparatus may damage the apparatus itself or the watch thereon. In addition, the mechanism may be damaged when the mandrel receives an outward force counter to its rotational direction or an additional co-rotating force excessively accelerating rotation of the mandrel. However, the prior art provides no approach to addressing the problems.

SUMMARY OF THE INVENTION

[0006] One objective of the present invention is to provide a programmable watch winding apparatus that winds a mechanical watch by rotating the mechanical watch in a predetermined direction by a predetermined number of turns, and prevents the mechanical watch from

over-winding or under-winding.

[0007] Another objective of the present invention is to provide a programmable watch winding apparatus that buffs mechanical resonance so as to operate with less operational noise and protect a mechanical watch carried thereon from vibration-induced damage.

[0008] Another objective of the present invention is to provide a programmable watch winding apparatus that is equipped with cushion components for protecting reduction gears in a transmission device thereof from being damaged when imposed with an outward reverse force or an additional co-rotating force excessively accelerating rotation thereof.

[0009] Another objective of the present invention is to provide a programmable watch winding apparatus that implements a control unit to control a number of winding turns and stop operating when a predetermined number is reached so as to ensure the mechanical watch wound sufficiently and eliminate over-winding and under-winding.

[0010] To achieve these and other objects of the present invention, the invention provides a watch winding apparatus according to claim 1. Further embodiments of the invention are described in the dependent claims. The programmable watch winding apparatus of the present invention includes a user interface that allows a user to operate and input a rotational direction and a number of winding turns. The programmable watch winding apparatus also includes a control unit that drives the transmission device of the programmable watch winding apparatus to rotate a rotatory base for the preset number of winding turns.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] The invention as well as a preferred mode of use, further objectives and advantages thereof will be best understood by reference to the following detailed description of an illustrative embodiment when read in conjunction with the accompanying drawing, wherein:

Figure 1 is a perspective view of a programmable watch winding apparatus of the present invention;

Figure 2 is a schematic view of the programmable watch winding apparatus of the present invention;

Figure 3 is an exploded view of a transmission device of the programmable watch winding apparatus of the present invention;

Figure 4 is an assembled view of the transmission device of the programmable watch winding apparatus of the present invention;

Figure 5 is a block diagram showing a control module of the programmable watch winding apparatus of the present invention;

Figure 6 is a schematic drawing of a user interface according to the present invention; and

Figures 7 and 8 are applied views of the user interface according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

[0012] While a preferred embodiment provided hereinafter for illustrating the concept of the present invention as described above, it is to be understood that the components of the embodiment shown in the accompanying drawings are depicted for the sake of easy explanation and need not to be made in scale.

[0013] Please refer to **Figures 1 and 2** for a programmable watch winding apparatus of the present invention. The programmable watch winding apparatus includes a box **50**, a gear motor **10**, a rotatory base **11**, a sensor **12**, a user interface **20**, and a control unit **30**.

[0014] The box **50** has an inclined partition **51** that separates the box **50** into an inward part **52** and an outward part **53**. The box **50** is provided with a liftable cover **55** that serves to close the outward part **53** when affixed to the box **50**.

[0015] The transmission device **10** is fixed to an inner surface **511** of the partition **51** and positioned in the inward part **52**. A driving shaft **101** of the transmission device **10** pierces through the partition **51** and becomes exposed in the outward part **53**.

[0016] The rotatory base **11** is connected with the driving shaft **101** of the transmission device **10** and positioned in the inward part **52** so that a mechanical watch (not shown) can be mounted therearound.

[0017] The sensor **12** is provided about the transmission device **10** for sensing the turns of the driving shaft **105** of the transmission device **10**. The sensor **12** may be realized by any known optical encoder.

[0018] The user interface **20** includes a display unit **21** and an input unit **25** that are provided at a surface of the box **50** for users to easily view and operate the same.

[0019] Referring to **Figures 3 and 4**, the transmission device **10** is fixed to the partition **51** by a seat **13**. A cushion pad **14** is provided at a border between the seat **13** and the partition **51** for buffering impact and reducing the vibration the transmission device **10** imparts to the partition **51** when the transmission device **10** is actuated. As a result, the entire box **50** performs less resonance while the operational noise of the programmable watch winding apparatus is also reduced. Meantime, since the vibration the transmission device **10** imparts to the partition **51** is reduced, the programmable watch winding apparatus is unlikely to damage watches.

[0020] In the transmission device **10**, the driving shaft **101** is rotated in a predetermined rotation rate by a motor **102** through a reduction gear box **103** so as to drive the rotatory base **11** connected thereto. A flexible sleeve **104** is mounted around the reduction gear box **103**. The flexible sleeve **104** is positioned inside the seat **13** and abutting against an inner wall of the seat **13**. An output shaft **105** of the reduction gear box **103** is shielded by a flexible axis guide **106**. The flexible axis guide **106** has a polygonal shape for mating a polygonal hole **107** formed in a coupler **108** of the driving shaft **101** and abutting against

an inner wall of the coupler **108**. The sleeve **104** services for buffer and shock absorption, so as to protect the precise gears in the reduction gear box **103** from being affected by operational vibration of the motor **102** or the rotatory base **11**. The axis guide **106** ensures close combination between the output shaft **105** and the driving shaft **101** so as to eliminate the problem related to idle running of the output shaft **105** and ensure that the rotatory base **11** connected with the driving shaft **101** performs predetermined turns. However, when the rotatory base **11** is rotated by an outward force reverse to or along with the rotational direction of the output shaft **105**, the driving shaft **101** has the coupler **108** rotating about the axis guide **106** under a resistance. Thus, the undesired outward force is blocked from reaching the output shaft **105**, so as to protect the precise gears in the reduction gear box **103**.

[0021] **Figures 5 and 6** illustrate the user interface **20**. The display unit **21** of the user interface **20** displays information related to the performed turns of the rotatory base **11** or remained turns to be performed by the rotatory base **11**, and the rotational direction. The turns are displayed in numerical forms while the rotational direction is shown by figurative symbols. The input unit **25** includes a plurality of buttons for users to operate and thus input instructions related to the turns and directions.

[0022] The control unit **30** is coupled with the user interface **20** and the transmission device **10** for receiving and processing the instructions input from the input unit **25**, controlling the driving shaft **101** of the transmission device **10** to rotate in a predetermined direction, receiving and processing signals related to turns output by the sensor **12**, and stopping the transmission device **10** when the rotatory base **11** has performed a particular number of turns. The control unit **30** also exhibits the turns input by users, performed turns, and turns to be performed at the display unit **21**.

[0023] The display unit **21** is an LCD screen that includes a main display area **211**, a direction display area **212**, an instruction area **213** and a time area **214**.

[0024] The main display area **211** acts as an electronic clock telling the current time in an "hour: minute" format or shows the performed turns (or turns to be performed). For example, **23:10** indicates that the current time is ten minutes after eleven o'clock. In another example, **25:00** means the turns for the rotatory base **11** to perform is **25** turns.

[0025] The direction display area **212** uses figurative symbols to describe the present rotational direction.

[0026] The instruction area **213** displays phrases of relevant instructions, such as REMAIN (turns to be performed), CLOCK (clock), and SETUP (setting). For example, when it is the current time shown in the main area **211**, the instruction area **213** presents the phrase "CLOCK". When it is the turns to be performed shown in the main area **211**, the instruction area **213** presents the phrase "REMAIN". When a setup button **254** is pressed, the instruction area **213** presents "SETUP".

[0027] The time area **214** shows time in the format of AM, PM or 24H.

[0028] The input unit **25** comprises a turn button **251**, a switch button **252**, a light button **253**, and the previously mentioned setup button **254**.

[0029] The turn button **251** is associated with actuation of the transmission device **10**.

[0030] The switch button **252** is used to control the main display area **211** to present the remained turns or the current time.

[0031] The light button **253** can be operated to turn on or off a light **15** for illuminating the outward part **53** of the box **50**.

[0032] After the setup button **254** is pressed, the turn button **251** turns to serve for mode selection and the switch button **252** turns to serve for adding numbers "UP" while the light button **253** turns to serve for reducing numbers "DOWN". At this time, upon pressing the turn button **251** the hour, minute, time format (AM/PM/24 hours), right turns, and left turns can be successively set by adding or reducing numbers with the "UP" or "DOWN" buttons **252**, **253**.

[0033] As shown in **Figure 7**, when the turn button **251** is pressed for the first time, the right turn symbol in the direction area **212** is lighted up and the main display area **211** presents the phrase of "REMAIN". Afterward, the transmission device **10** starts to rotate right, while the sensor **12** detecting the turns the rotatory base **11** performs. The number of "REMAIN" counted down with the additional turns the rotatory base **11** performs, until the number becomes zero and the programmable watch winding apparatus stops. In this manner, the programmable watch winding apparatus operates every **30** minutes, namely **48** times a day.

[0034] Referring to **Figure 8**, when the turn button **251** is pressed for the second time, the left turn symbol in the direction area **212** is lighted up and the transmission device **10** starts to rotate left while the operation of the sensor **12** and display are similar to those described in the above paragraph.

[0035] When the turn button **251** is pressed for the third time, the dual-direction turn symbol in the direction area **212** is lighted up and the transmission device **10** starts to rotate right for the preset turns and at the next **30**-minute points starts to rotate left for the preset turns.

[0036] The known winding device operates on a time-counting base. For example, the motor operates continuously for **20** or **30** minutes. However, during the continuous operation period, the number of turns is uncontrollable and tends to vary with the changing rotation speed caused by the voltage difference. As the present invention differently operates upon winding turns, the number of turns can be perfectly controlled and thus the problem related to insufficient or over winding can be eliminated.

[0037] The present invention has been described with reference to the preferred embodiment and it is understood that the embodiment is not intended to limit the scope of the present invention. Moreover, as the contents

disclosed herein should be readily understood and can be implemented by a person skilled in the art, all equivalent changes or modifications which do not depart from the concept of the present invention should be encompassed by the appended claims.

Claims

1. A programmable watch winding apparatus comprising a box (50), a transmission device (10) fixed in the box (50), and a rotatory base (11) fixed in the box (50) and driven to rotate by the transmission device (10), the programmable watch winding apparatus being **characterized in**:
 - a user interface (20) including a display unit (21) and an input unit (25) that are provided at an external surface of the box (50); and
 - a control unit (30) coupled with the user interface (20) and a sensor (12) settled in the box (50), and serving to control actuation, stop, rotational directions, and a number of turns of the transmission device.
2. The programmable watch winding apparatus of Claim 1, **characterized in that** the box (50) has a partition (51) that separates the box (50) into an inward part (52) and an outward part (53), the transmission device (10) being fixed to the partition (51) and received in the inward part (52) and the rotatory base (11) being received in the outward part (53).
3. The programmable watch winding apparatus of Claim 2, **characterized in that** the input unit (25) includes a plurality of buttons (252, 253) at the surface of the box (50).
4. The programmable watch winding apparatus of Claim 2, **characterized in that** the box (50) comprises a light (15) for illuminating the outward part (53).
5. The programmable watch winding apparatus of Claim 1, **characterized in that** the display unit (21) is an LCD screen that includes a main display area (211) for presenting a current time or number of turns the rotatory base (11) performs, and a direction display area (212) for showing a rotational direction of the rotatory base (11).
6. The programmable watch winding apparatus of Claim 2, **characterized in that** the transmission device (10) is fixed to the partition (51) by a seat (13) and a cushion pad (14) is provided at a border between the seat (13) and the partition (51).

7. The programmable watch winding apparatus of Claim 6, **characterized in that** the transmission device (10) includes a motor (102) and a reduction gear box (103), the reduction gear box (103) having an output shaft (105) shielded by a flexible axis guide (106), the flexible axis guide (106) having a polygonal shape for mating a polygonal hole (107) formed on a coupler (108) of the driving shaft (101) and abutting against an inner wall of the coupler (108). 5 10
8. The programmable watch winding apparatus of Claim 6, **characterized in that** a flexible sleeve (104) is mounted around the reduction gear box (103), the flexible sleeve (104) being positioned inside the seat (13) and abutting against an inner wall of the seat (13). 15

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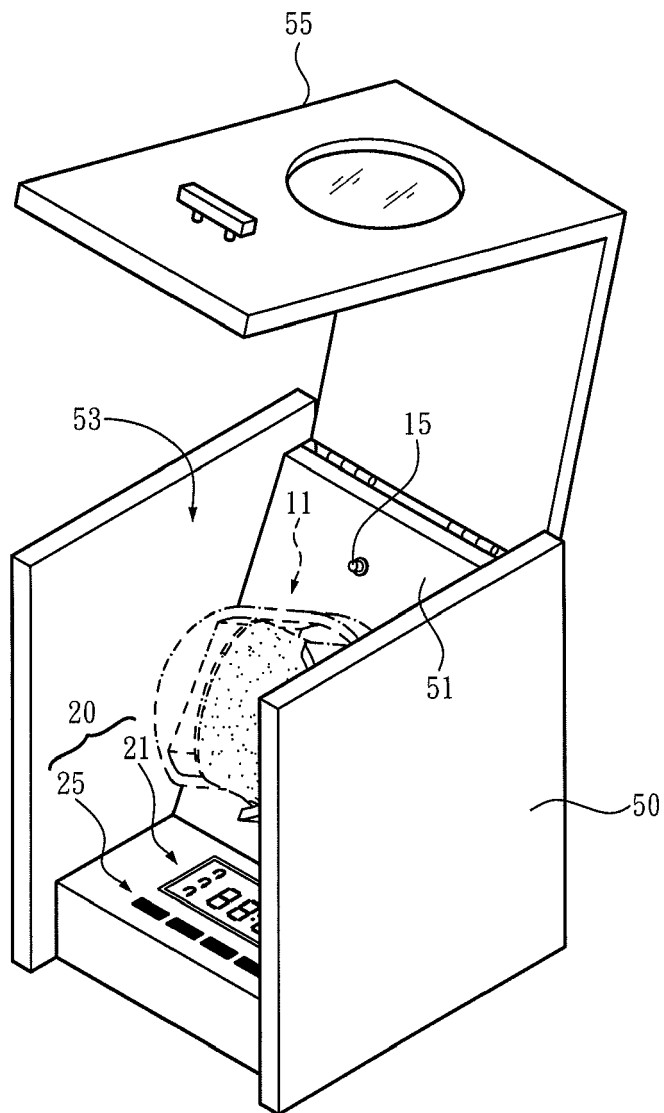


FIG. 1

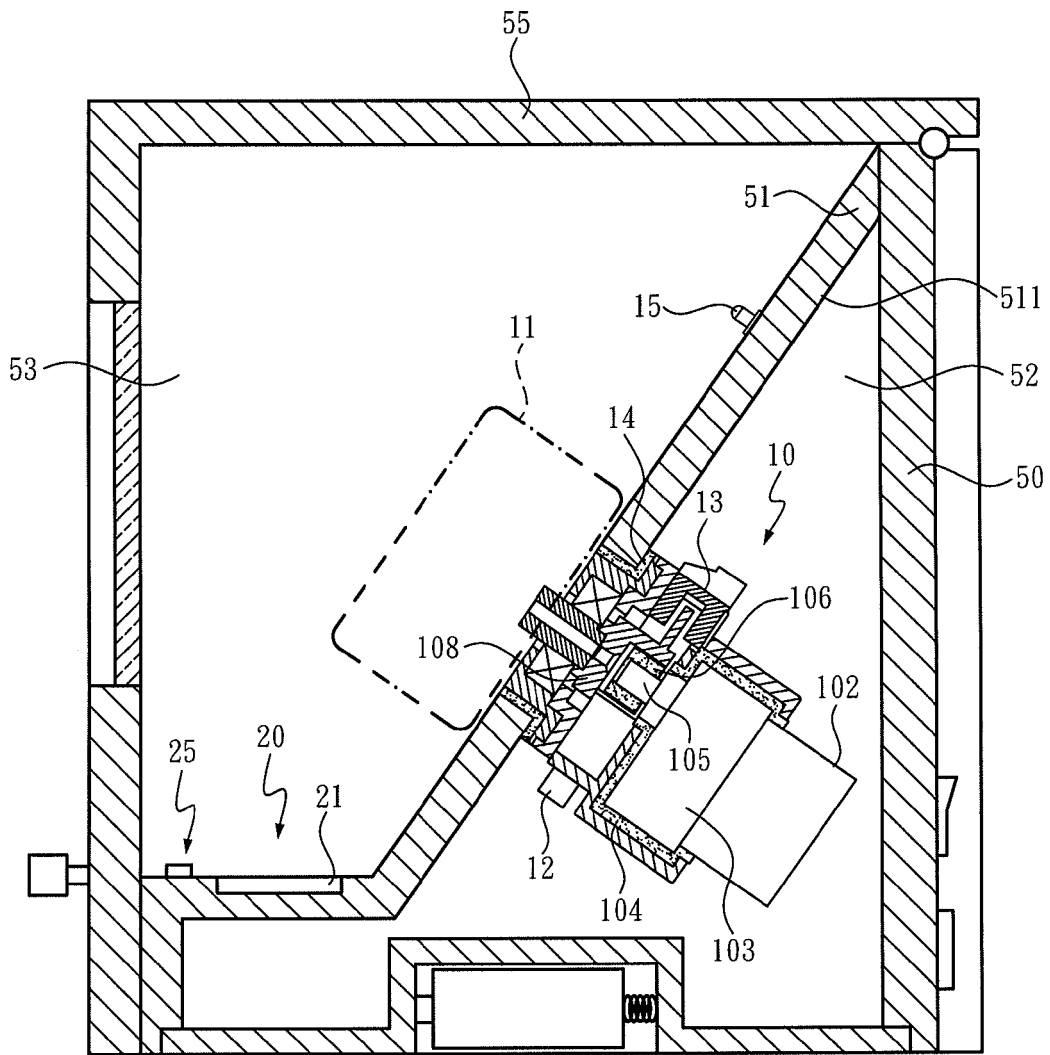


FIG. 2

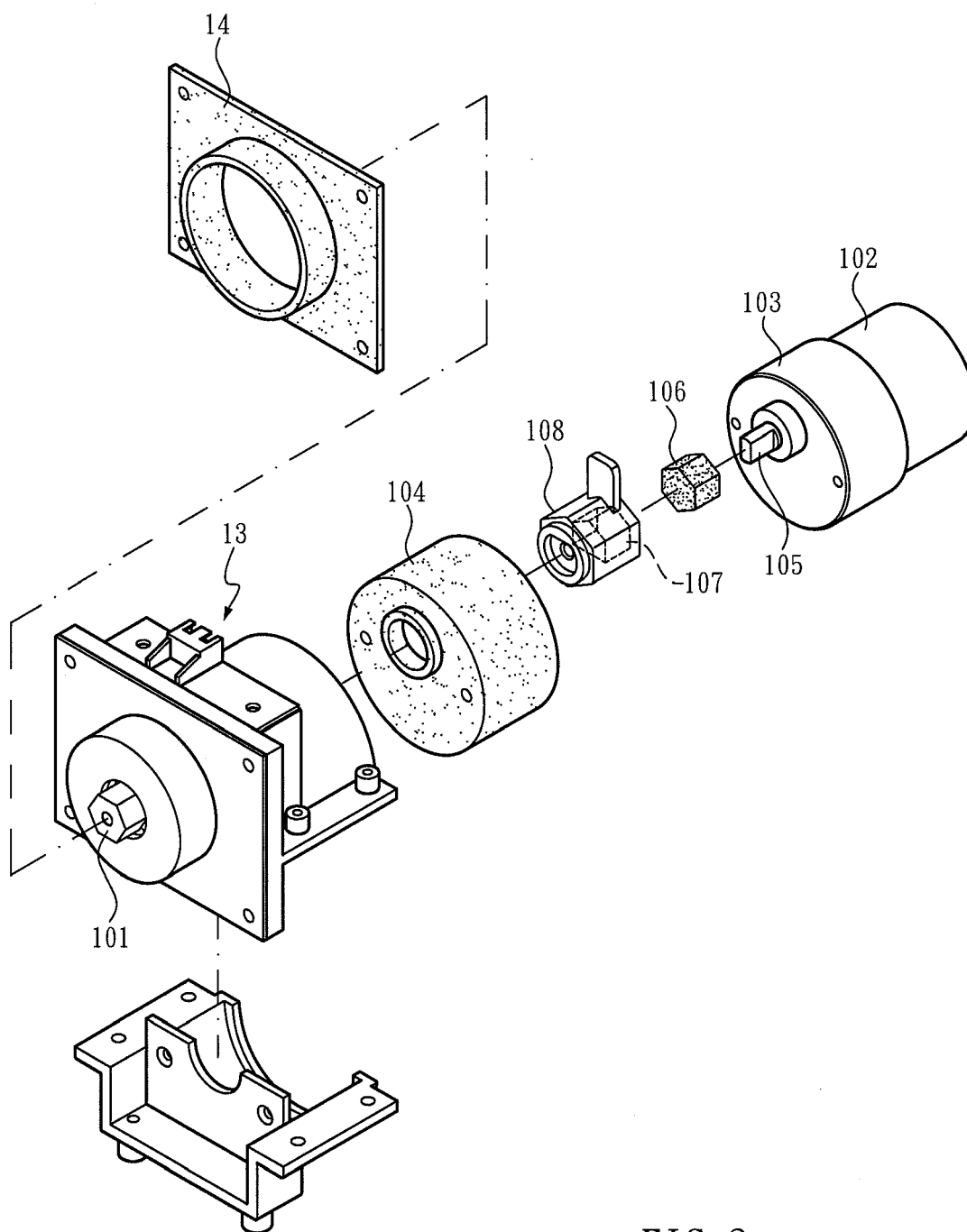


FIG. 3

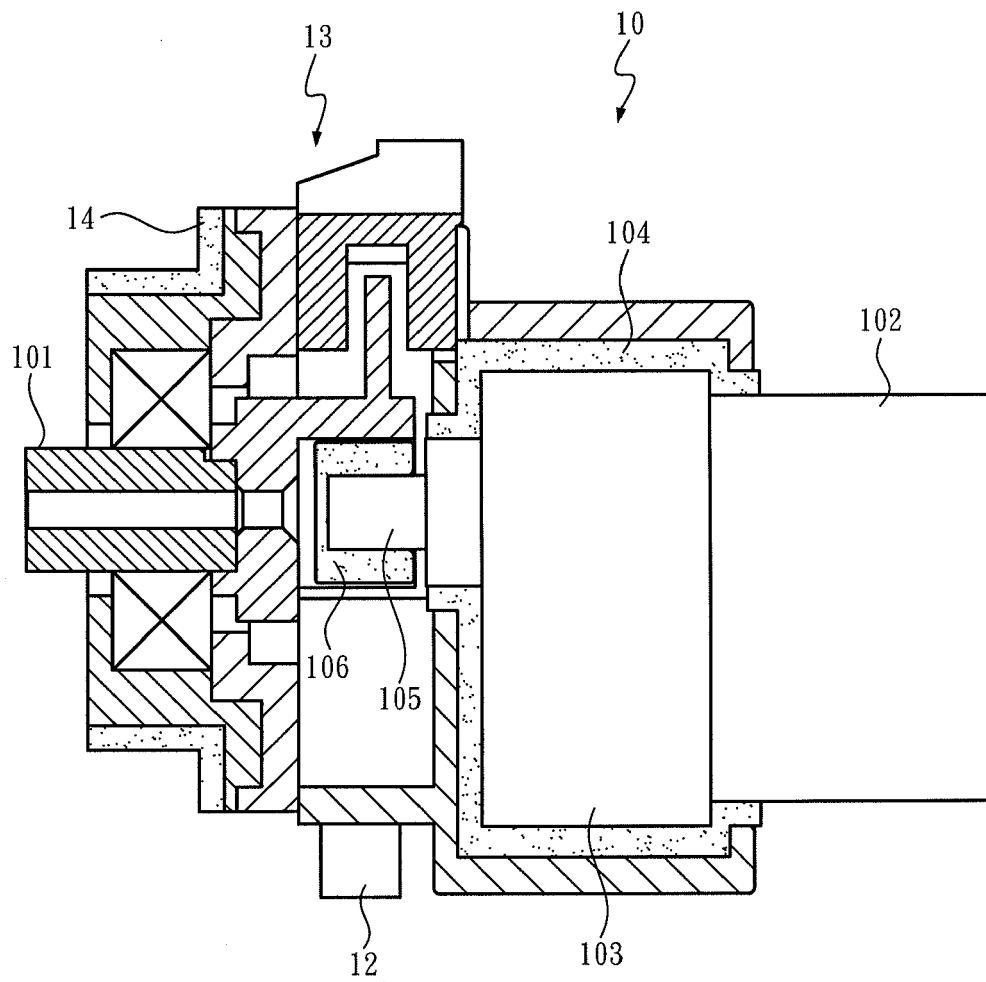


FIG. 4

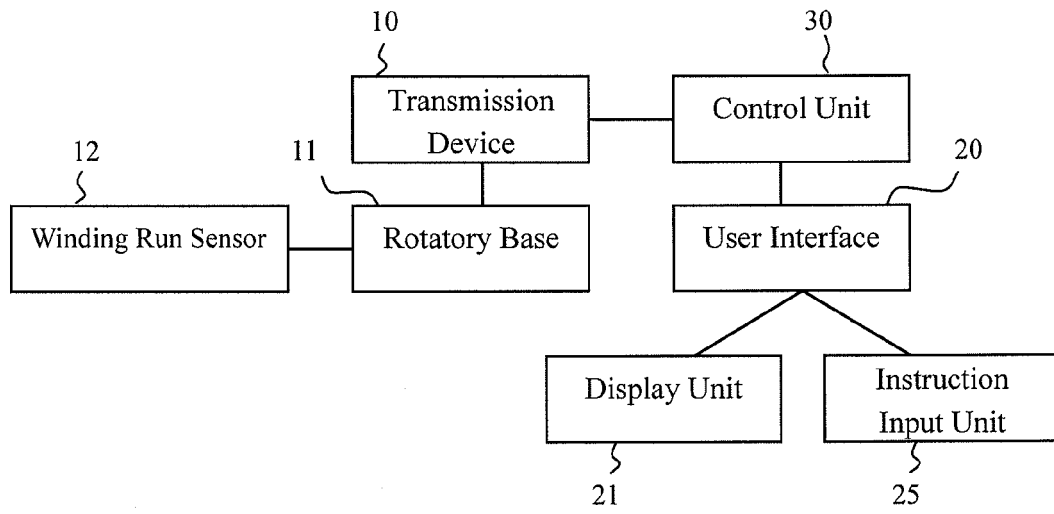


FIG. 5

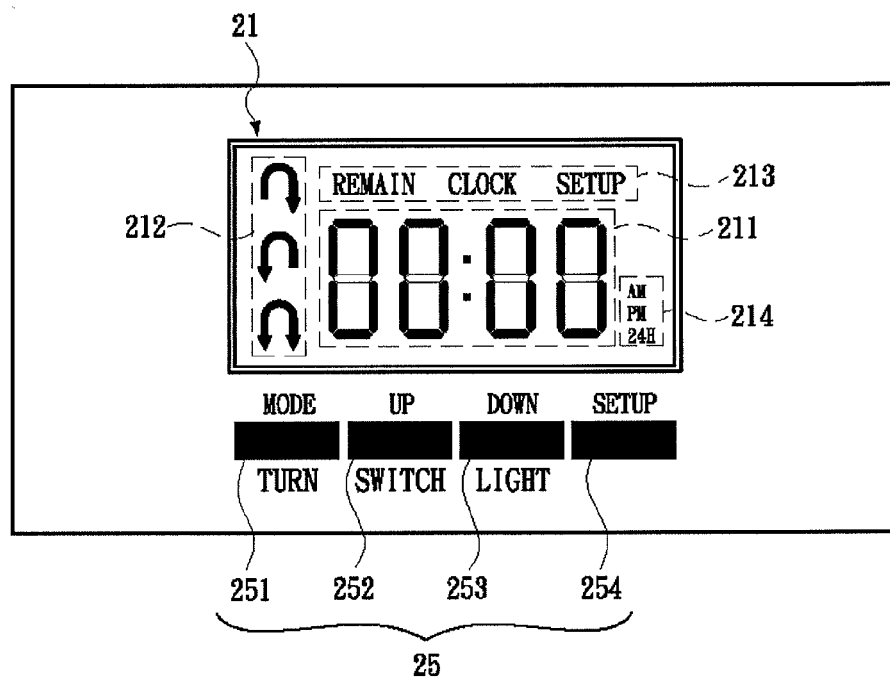


FIG. 6

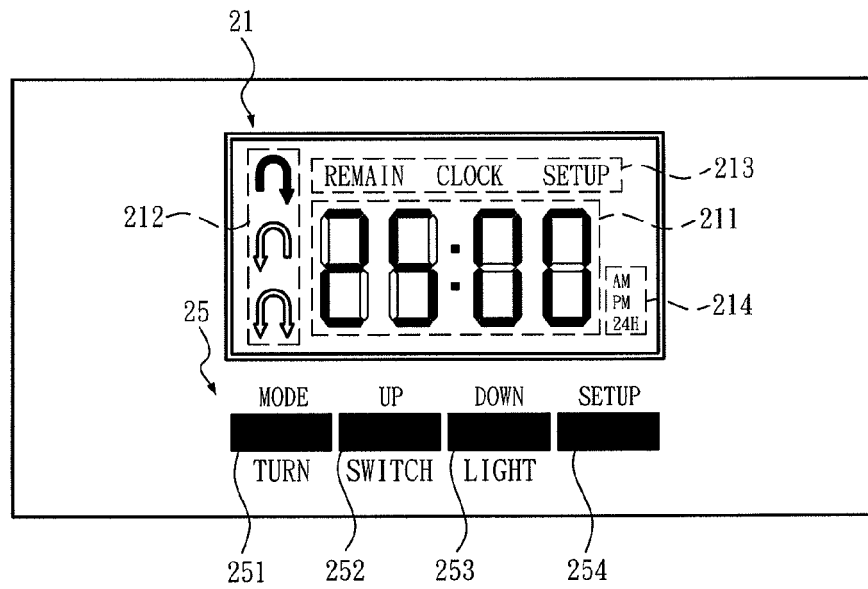


FIG. 7

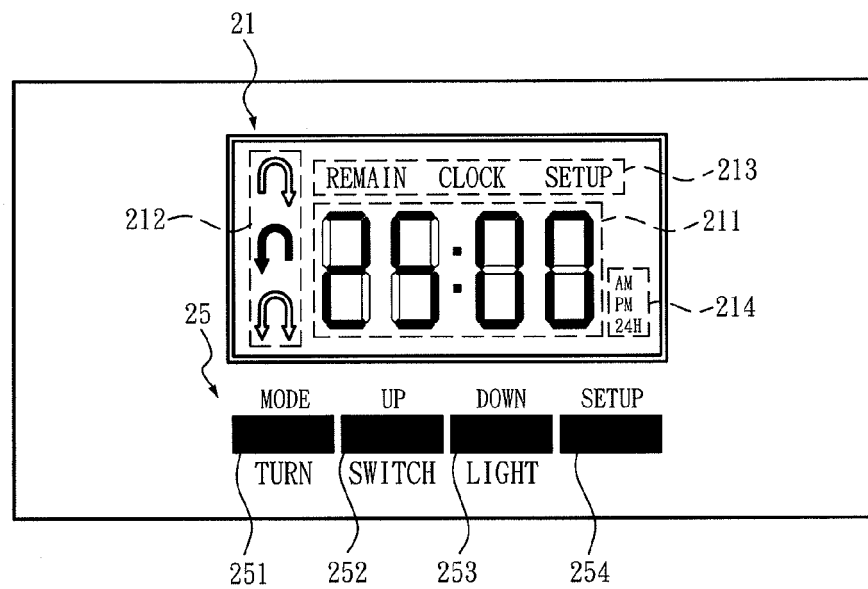


FIG. 8



EUROPEAN SEARCH REPORT

Application Number
EP 09 16 6563

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	US 2005/254352 A1 (WOLF V SIMON P [US] ET AL WOLF V SIMON P [US] ET AL) 17 November 2005 (2005-11-17) * figures 1-6 * * paragraphs [0006], [0007] * * paragraphs [0040] - [0047] * * paragraphs [0050] - [0053] *	1-8	INV. G04D7/00
A	US 2008/247278 A1 (WALKER JASON [US] ET AL) 9 October 2008 (2008-10-09) * paragraph [0007] *	1-4	
A	EP 1 288 744 A1 (AGNOFF CHARLES [US]) 5 March 2003 (2003-03-05) * figure 2 *	5-8	
The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (IPC)
			G04D
Place of search		Date of completion of the search	Examiner
The Hague		8 October 2009	Pirozzi, Giuseppe
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			

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EPO FORM 1503 03.82 (P04C01)

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

EP 09 16 6563

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 2005254352 A1	17-11-2005	CH 697836 B1 DE 102004032688 A1	27-02-2009 01-12-2005
US 2008247278 A1	09-10-2008	NONE	
EP 1288744 A1	05-03-2003	DE 60205436 D1 DE 60205436 T2 US 6543929 B1	15-09-2005 24-05-2006 08-04-2003

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

- US 6254270 B [0003]