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(54) **Programmable watch winding apparatus**

Programmierbare Uhrenbewegervorrichtung

Appareil programmable pour remonter une montre

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**US-A1- 2008 247 278**

**EP 2 280 321 B1**

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## 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 watch 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] Both EP1288744 and US 2005/0259352 describe watch winders according to the preamble of claim 1.

[0006] Operational vibration of orbital watch-winding apparatuses 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

[0007] 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.

5 [0008] 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.

10 [0009] 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.

15 [0010] 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.

20 [0011] 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

40 [0012] 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:

45 **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;

50 **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

**[0013]** 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.

**[0014]** 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**.

**[0015]** 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**.

**[0016]** 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**.

**[0017]** 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.

**[0018]** 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.

**[0019]** 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.

**[0020]** 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.

**[0021]** 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**.

**[0022]** **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.

**[0023]** 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**.

**[0024]** 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**.

**[0025]** 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.

**[0026]** The direction display area **212** uses figurative symbols to describe the present rotational direction.

**[0027]** 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".

[0028] The time area 214 shows time in the format of AM, PM or 24H.

[0029] The input unit 25 comprises a turn button 251, a switch button 252, a light button 253, and the previously mentioned setup button 254.

[0030] The turn button 251 is associated with actuation of the transmission device 10.

[0031] The switch button 252 is used to control the main display area 211 to present the remained turns or the current time.

[0032] 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.

[0033] 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.

[0034] 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.

[0035] 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.

[0036] 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.

[0037] 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.

[0038] 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.

[0039] The scope of the present invention is limited solely by the claims.

## Claims

1. A programmable watch winding apparatus for automatically winding mechanical watches comprising: a box (50); a transmission device (10) fixed in the box (50); a rotatory base (11) fixed in the box (50) and driven to rotate by the transmission device (10); 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); 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, the sensor (12) being adapted to sense the turns of the transmission device (10); the box (50) having 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); the transmission device (10) being fixed to the partition (51) by a seat (13), the watch winding apparatus being **characterized in that** it further comprises a cushion pad (14) provided at a border between the seat (13) and the partition (51).
2. The programmable watch winding apparatus of Claim 1, **characterized in that** the input unit (25) includes a plurality of buttons (252, 253) at the surface of the box (50).
3. The programmable watch winding apparatus of Claim 1, **characterized in that** the box (50) comprises a light (15) for illuminating the outward part (53).
4. 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).
5. The programmable watch winding apparatus of Claim 1, **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 polygo-

nal 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).

6. The programmable watch winding apparatus of Claim 1, **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).

### Patentansprüche

1. Eine programmierbare Uhraufziehvorrichtung zum automatischen Aufziehen von mechanischen Uhren, umfassend: eine Box (50); ein Getriebe (10), welches in der Box (50) befestigt ist; einen Drehsokkel (11), welcher in der Box (50) befestigt ist und zum Drehen von dem Getriebe (10) angetrieben wird; eine Benutzerschnittstelle (20), welche eine Displayeinheit (21) und eine Eingabeeinheit (25) aufweist, welche an einer Außenfläche der Box (50) angeordnet sind; eine Kontrolleinheit (30), welche mit der Benutzerschnittstelle (20) und einem Sensor (12), welcher in der Box (50) angeordnet ist, verbunden ist und dazu dient, Betätigungen, Unterbrechungen, Drehrichtungen und eine Anzahl der Umdrehungen des Getriebes zu steuern, wobei der Sensor (12) dazu dient, die Umdrehungen des Getriebes (10) zu erfassen; wobei die Box (50) eine Trennwand (51) aufweist, welche die Box (50) in einen inneren Bereich (52) und in einen äußeren Bereich (53) trennt, wobei das Getriebe (10) an der Trennwand (51) befestigt ist und in dem inneren Bereich (52) aufgenommen ist und wobei der Drehsockel (11) in dem äußeren Bereich (53) aufgenommen ist; wobei das Getriebe (10) an der Trennwand (51) mittels eines Sitzes (13) befestigt ist, **dadurch gekennzeichnet, dass** die Uhraufziehvorrichtung weiter ein Polsterkissen (14) aufweist, welches an einem Rand zwischen dem Sitz (13) und der Trennwand (51) vorgesehen ist.
2. Die programmierbare Uhraufziehvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Eingabeeinheit (25) eine Vielzahl von Tasten (252, 253) an der Oberfläche der Box (50) aufweist.
3. Die programmierbare Uhraufziehvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Box (50) eine Beleuchtung (15) zum Beleuchten des äußeren Bereiches (53) aufweist.
4. Die programmierbare Uhraufziehvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** die Displayeinheit (21) ein LCD-Bildschirm ist, welcher

einen Hauptanzeigebereich (211) zum Anzeigen der aktuellen Zeit oder der Anzahl der von dem Drehsokkel (11) ausgeführten Umdrehungen und einen Richtungsanzeigebereich (212) zum Anzeigen einer Drehrichtung des Drehsockels (11) aufweist.

5. Die programmierbare Uhraufziehvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** das Getriebe (10) einen Motor (102) und eine Untersetzungsgetriebebox (103) aufweist, wobei die Untersetzungsgetriebebox (103) eine Ausgangswelle (105), welche durch eine flexible Achsenführung (106) abgeschirmt ist, aufweist, wobei die flexible Achsenführung (106) eine polygonale Form aufweist, damit diese in ein polygonal geformtes Loch (107), welches in einem Verbindungsstück (108) der Antriebswelle (101) ausgebildet ist, passt und an einer Innenwand des Verbindungsstückes (108) anliegt.
6. Die programmierbare Uhraufziehvorrichtung nach Anspruch 1, **dadurch gekennzeichnet, dass** eine flexible Hülle (104) um die Untersetzungsgetriebebox (103) herum angeordnet ist, wobei die flexible Hülle (104) innerhalb des Sitzes (13) angeordnet ist und an einer Innenwand des Sitzes (13) anliegt.

### Revendications

1. Appareil programmable pour remonter une montre, pour le remontage automatique de montres mécaniques, comprenant : un boîtier (50) ; un dispositif de transmission (10) fixé dans le boîtier (50) ; une base rotative (11) fixée dans le boîtier (50) et entraînée en rotation par le dispositif de transmission (10) ; une interface utilisateur (20) comprenant une unité d'affichage (21) et une unité d'entrée (25) qui sont disposées à une surface externe du boîtier (50) ; une unité de commande (30) couplée à l'interface utilisateur (20) et à un capteur (12) installé dans le boîtier (50), et servant à commander l'actionnement, l'arrêt, les sens de rotation et un nombre de tours du dispositif de transmission, le capteur (12) étant conçu pour détecter les tours du dispositif de transmission (10) ; le boîtier (50) ayant une cloison (51) qui sépare le boîtier (50) en une partie (52) tournée vers l'intérieur et une partie (53) tournée vers l'extérieur, le dispositif de transmission (10) étant fixé à la cloison (51) et reçu dans la partie (52) tournée vers l'intérieur et la base rotative (11) étant reçue dans la partie (53) tournée vers l'extérieur ; le dispositif de transmission (10) étant fixé à la cloison (51) par un siège (13), l'appareil pour remonter une montre étant **caractérisé en ce qu'il** comprend en outre un coussin amortisseur (14) disposé à une limite entre le siège (13) et la cloison (51).

2. Appareil programmable pour remonter une montre selon la revendication 1, **caractérisé par le fait que** l'unité d'entrée (25) comprend une pluralité de boutons (252, 253) à la surface du boîtier (50). 5
3. Appareil programmable pour remonter une montre selon la revendication 1, **caractérisé par le fait que** le boîtier (50) comprend une lumière (15) destinée à éclairer la partie (53) tournée vers l'extérieur. 10
4. Appareil programmable pour remonter une montre selon la revendication 1, **caractérisé par le fait que** l'unité d'affichage (21) est un écran à affichage à cristaux liquides qui comprend une zone d'affichage principale (211) pour présenter une heure actuelle ou un nombre de tours que la base rotative (11) réalise, et une zone d'affichage de sens (212) pour représenter un sens de rotation de la base rotative (11). 15
5. Appareil programmable pour remonter une montre selon la revendication 1, **caractérisé par le fait que** le dispositif de transmission (10) comprend un moteur (102) et un réducteur (103), le réducteur (103) ayant un arbre de sortie (105) protégé par un guide d'axe souple (106), le guide d'axe souple (106) ayant 20  
une forme polygonale pour un accouplement à un trou polygonal (107) formé sur un coupleur (108) de l'arbre d'entraînement (101) et une mise en butée contre une paroi interne du coupleur (108). 25  
30
6. Appareil programmable pour remonter une montre selon la revendication 1, **caractérisé par le fait qu'un** manchon souple (104) est monté autour du réducteur (103), le manchon souple (104) étant disposé à l'intérieur du siège (13) et étant en butée contre une paroi interne du siège (13). 35

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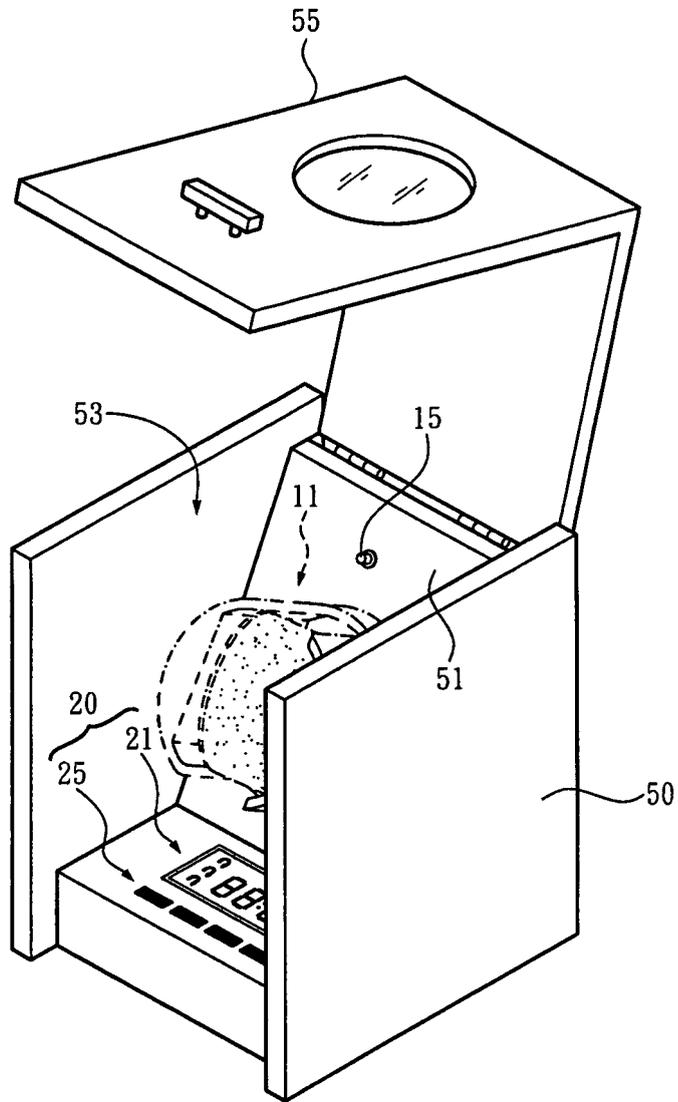


FIG. 1

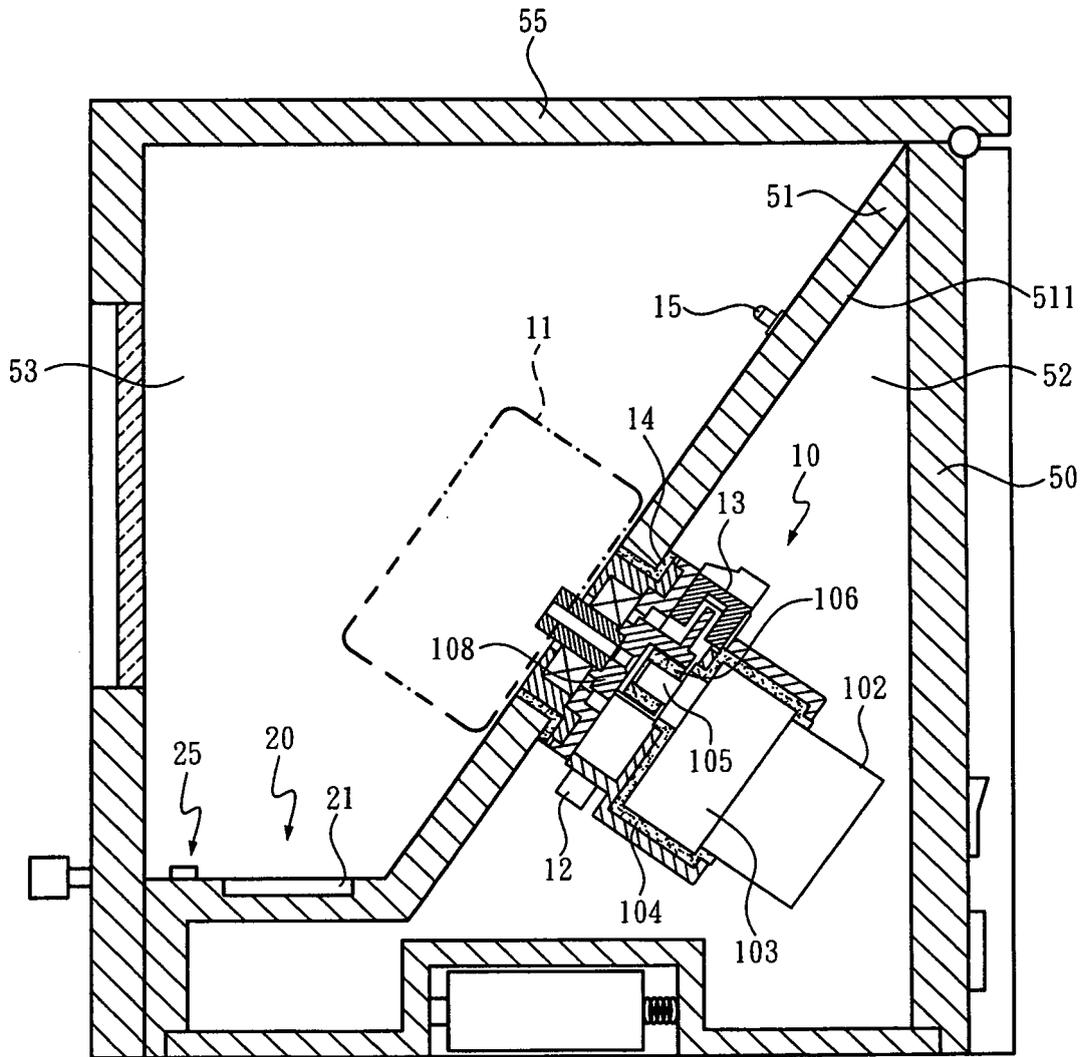


FIG. 2

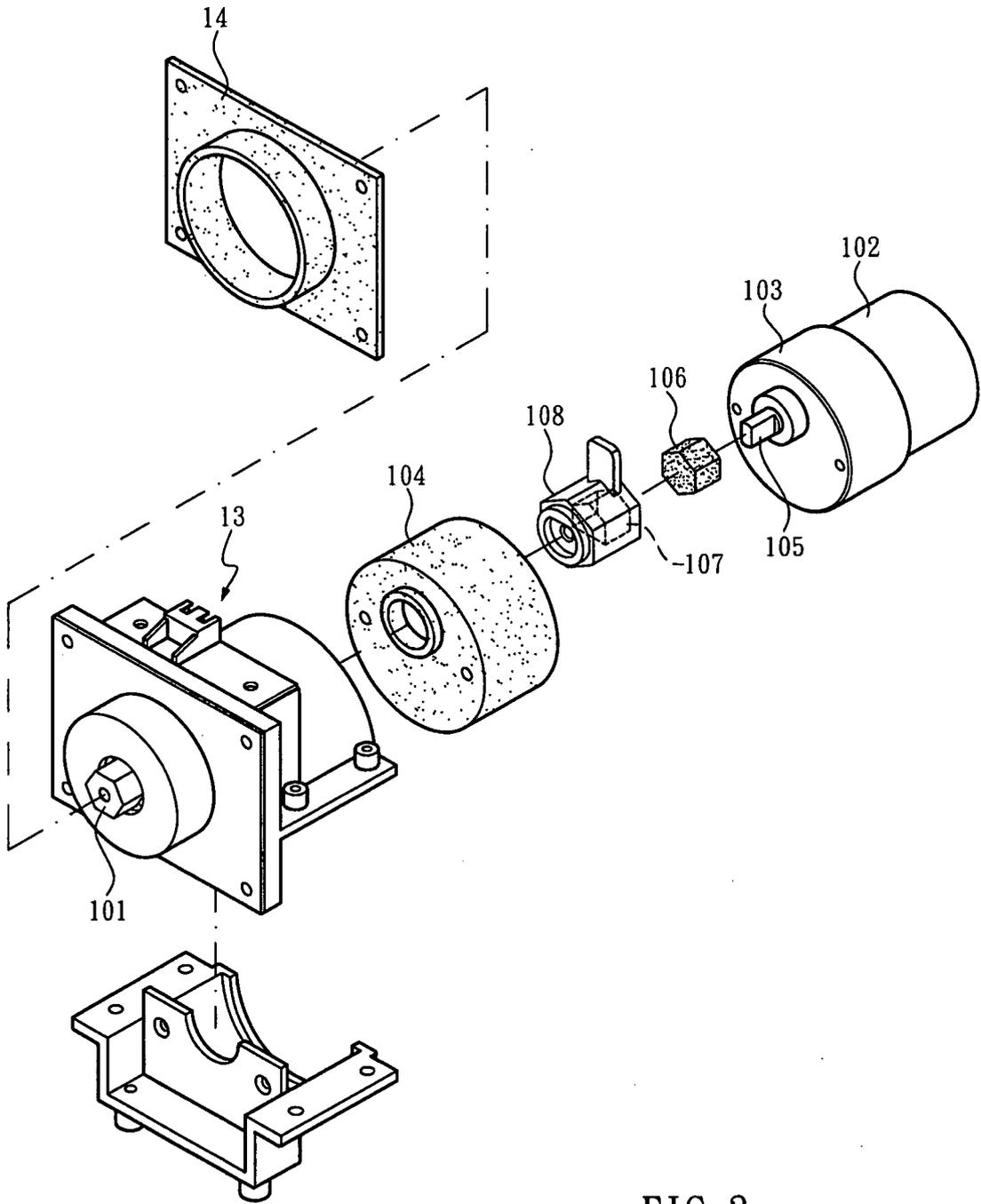


FIG. 3

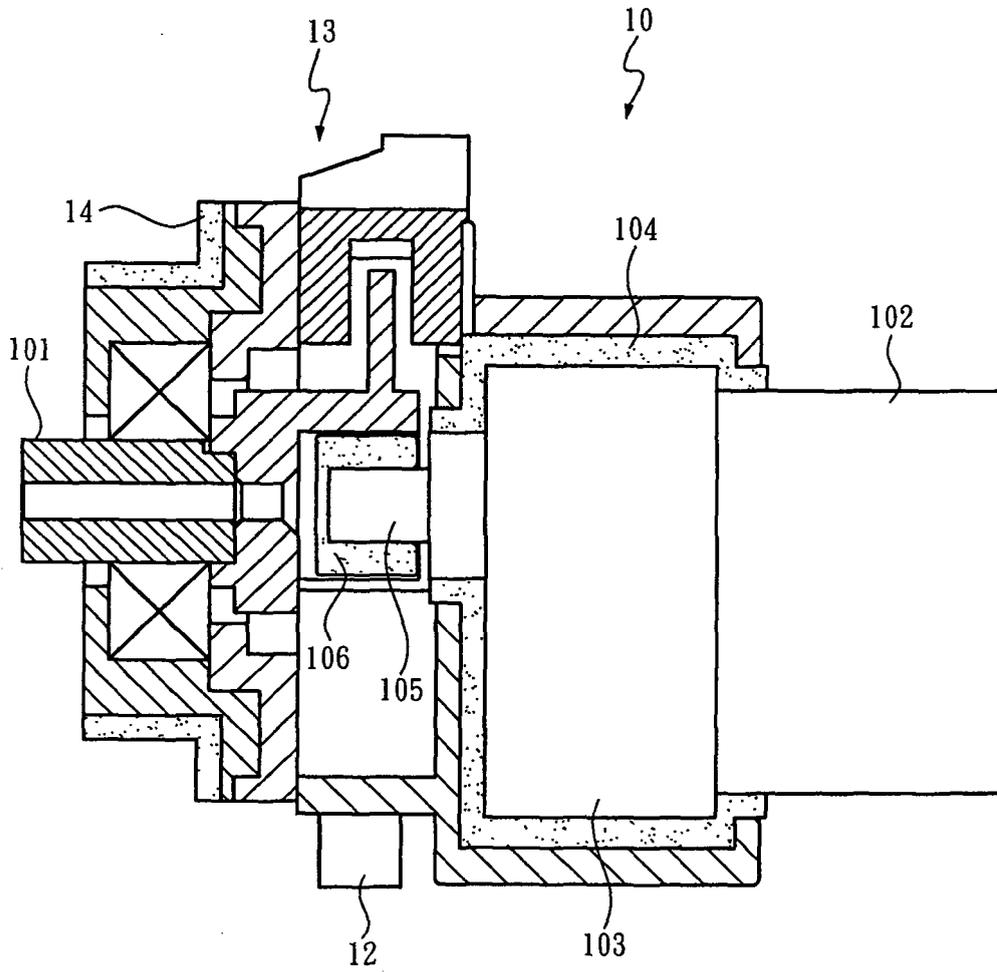


FIG. 4

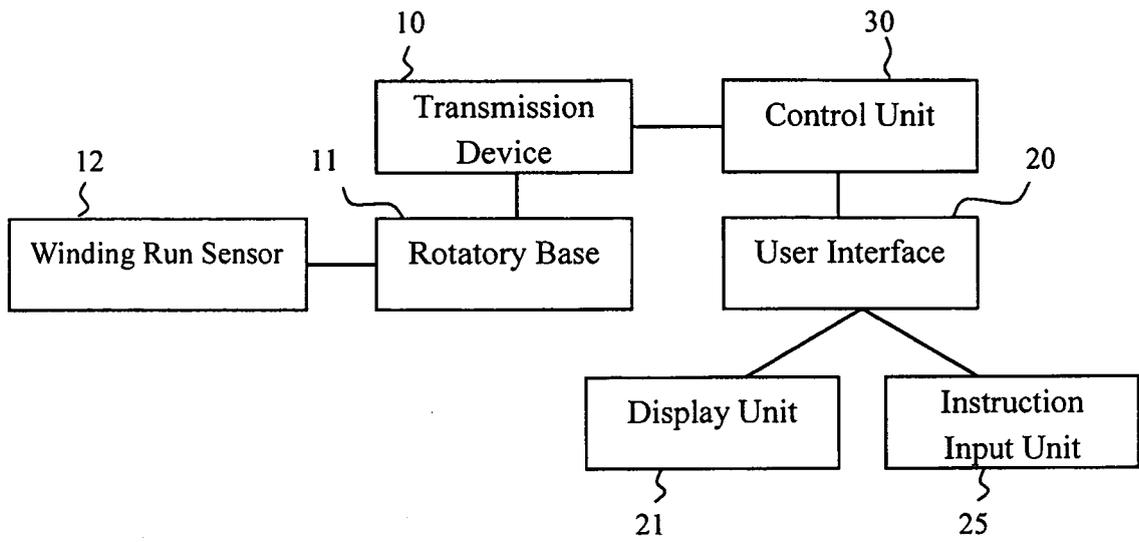


FIG. 5

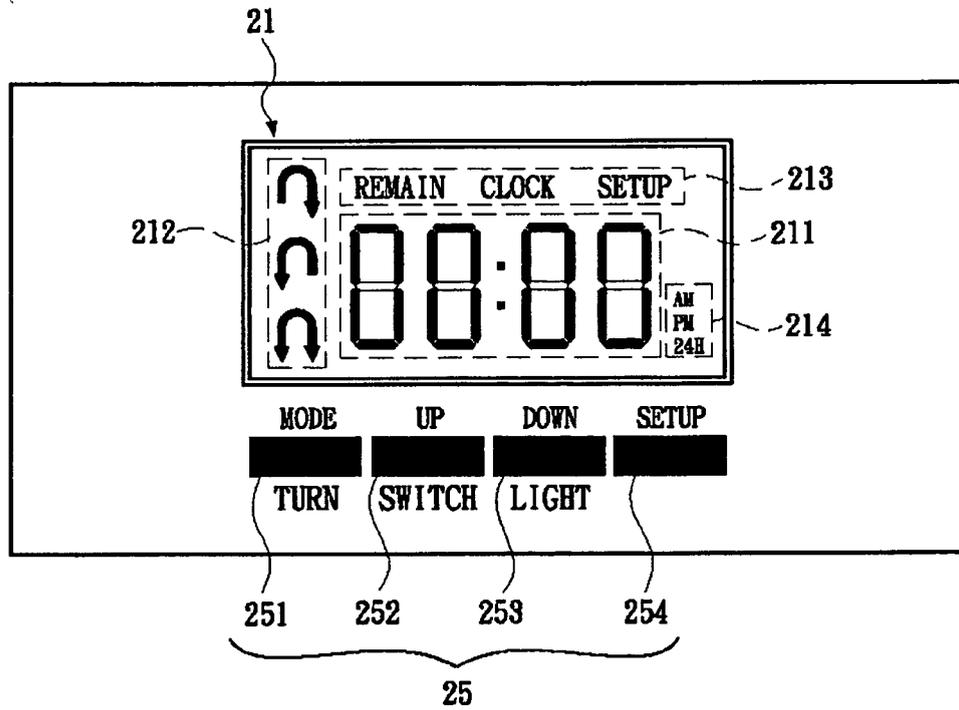


FIG. 6

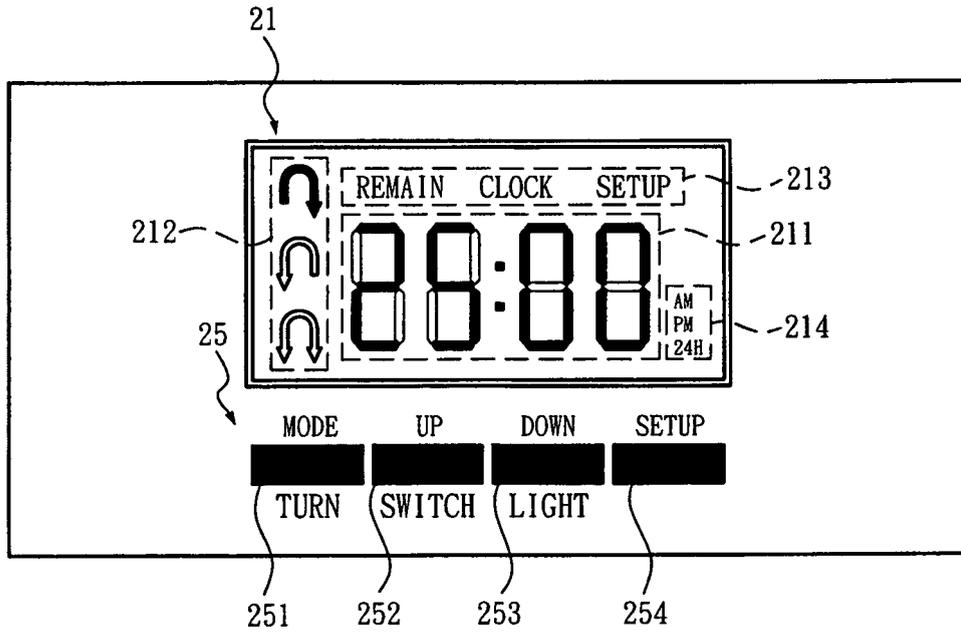


FIG. 7

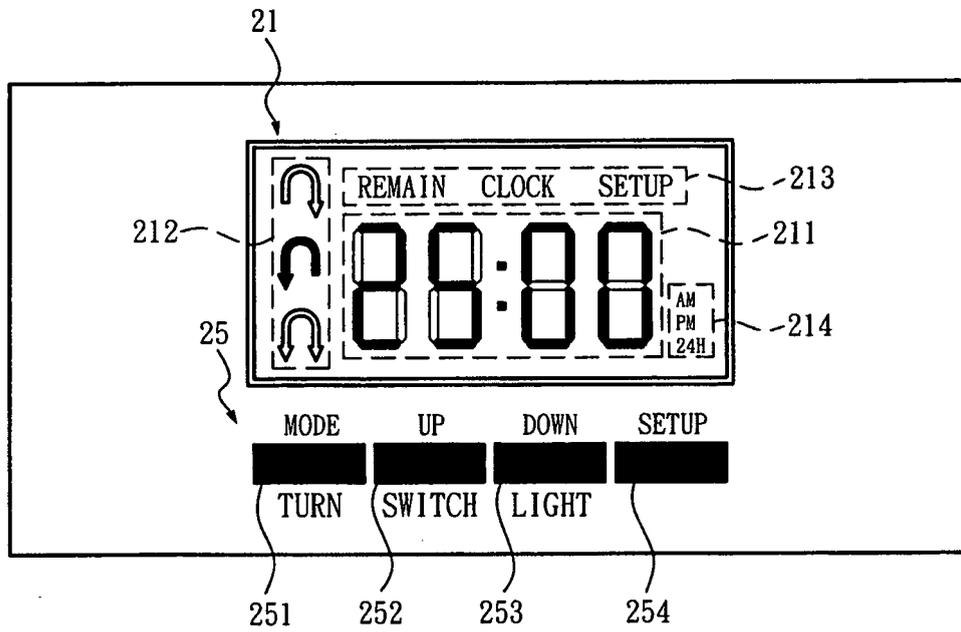


FIG. 8

**REFERENCES CITED IN THE DESCRIPTION**

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