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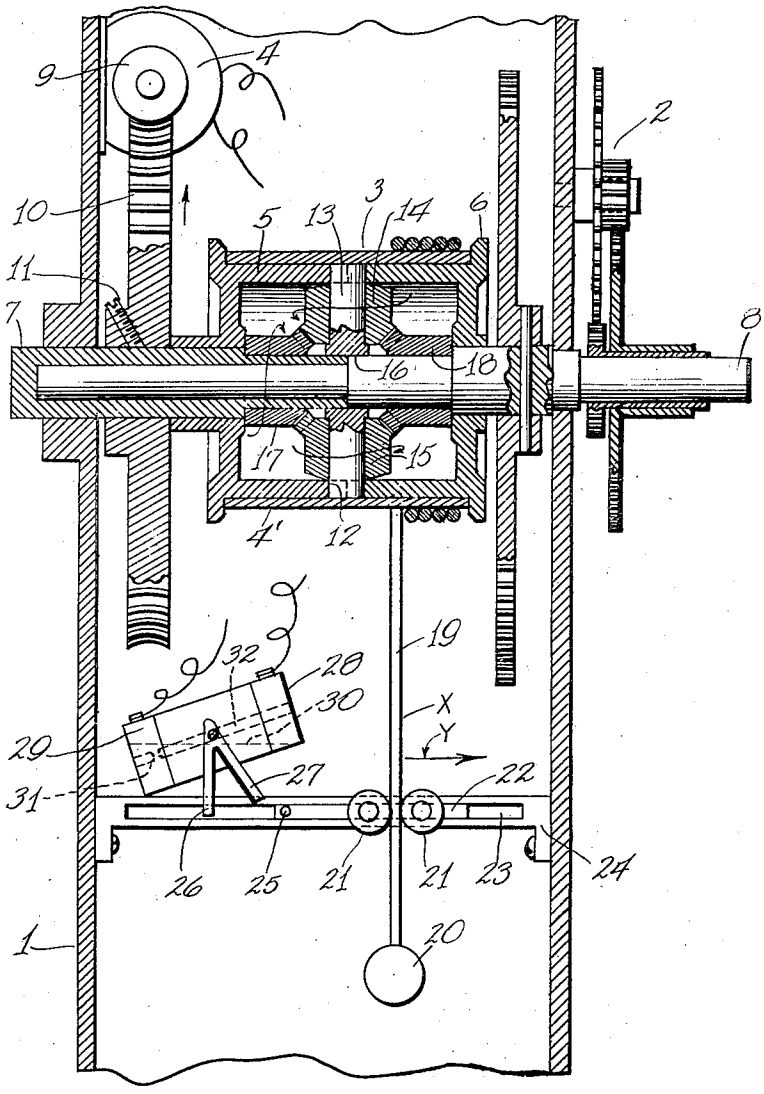


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# UNITED STATES PATENT OFFICE.

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## AUTOMATIC CONTROL WINDING MECHANISM FOR CLOCKS.

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*To all whom it may concern:*

Be it known that I, JOHN M. BONER, a citizen of the United States, and a resident of Evansville, in the county of Vanderburg and State of Indiana, have invented a new and useful Improvement in Automatic Control Winding Mechanism for Clocks, of which the following is a full, clear, and exact description.

My invention relates to improvements in automatic control winding mechanism for clocks, and it consists in the combinations, constructions, and arrangements herein described and claimed.

An object of my invention is to provide an automatic control winding mechanism for clocks which is adapted to wind the clock without interference with the normal operation of the clock.

A further object of my invention is to provide an automatic control winding mechanism for clocks in which the winding mechanism is electrically operated and in which the weight for operating the clock mechanism is adapted to close the circuit to the winding mechanism before the clock has entirely run down, whereby the clock is adapted to run for a considerable length of time after the circuit has been closed, in case the source of current has been temporarily cut off, the clock being instantly wound as soon as the current flows through the winding mechanism.

A further object of my invention is to provide an automatic control winding mechanism for clocks which does away with the spring winding mechanism and makes use of a drum, a cable, and a weight, whereby the weight applies a constant force upon said drum so as to turn the clock mechanism at a constant speed.

Other objects and advantages will appear in the following specification, and the novel features of the invention will be particularly pointed out in the appended claims.

My invention is illustrated in the accompanying drawings forming a part of this application in which:

The figure is a vertical section through the device.

In carrying out my invention I provide a casing 1 which carries a clock mechanism, indicated generally at 2, and a weight, actuated drum 3 for turning the mechanism 2. The drum is of novel construction and is adapted to be rotated by means of a motor 4, and in turn to rotate the clock mechanism 2 controlled by the usual escapement mechanism (not shown).

The drum 3 is composed of a cylinder 4′ that is mounted upon journals 5 and 6. The journal 5 is rotatably mounted upon a hollow shaft 7, while the journal 6 is rotatably mounted upon a shaft 8. As clearly shown in the drawings, the shaft 8 is received in the shaft 7 but is adapted to rotate independently of the shaft 7. The shaft 7 is operatively connected to the motor 4 by means of a worm 9 and a worm gear 10. A set screw 11 connects the worm gear 10 to the shaft 7, whereby the shaft 7 is rotated each time the motor 5 is actuated. The shaft 7 is mounted in the casing 1 as is also the shaft 8.

The cylinder 4′ and the journals 5 and 6 frictionally engage with each other so as to have all three of these parts operate as a single unit. The adjacent edges of the journals 5 and 6 are adapted to abut each other and are provided with recesses 12 which form openings in which a stub shaft 13 is mounted. The shaft 13 carries mitre gears 14 and 15, and is provided with an opening 16 therein through which the shaft 8 extends. The mitre gear 17 is rigidly secured to the shaft 7 and is in mesh with the gears 14 and 15. In like manner the mitre gear 18 is rigidly secured to the shaft 8 and is in mesh with the gears 14 and 15. It will be seen from this construction that when the motor 4 is actuated it will rotate the gear 17 so as to cause the gears 14 and 15 to rotate the drum 3 in an anti-clockwise direction, when looking at the figure from the right hand side thereof. This operation will at once be clear when it is learned that the shaft 8 is held against anti-clockwise rotation by means of the clock mechanism 2 and therefore prevents the gear 18 from rotating in the same direction. If the gear 18 is held stationary with respect to the gear 17, a rotation of the gear 17 in the direction of the arrow will cause this gear to rotate the gears 14 and 15. The gears 14 and 15, being in mesh with the gear 18, will rotate around the gear 18 so as to swing the stub shaft 13 about the shaft 8 as an axis, the shaft 13 carrying the drum 3 therewith and rotating the drum in an anti-clockwise direction. The rotation of the drum 3 in an

anti-clockwise direction will wind the cable 19 around the drum 3 and raise the weight 20.

The gears 14 and 15, 17, and 18 are so arranged with respect to each other that the drum 3 may move so as to rotate the shaft 8 in a clockwise direction and keep the clock mechanism working, even when the drum 3 is being wound up by means of the motor 4. The drum 3 of course will be rotated in an anti-clockwise direction when the motor 4 is being actuated, but, due to the fact that the shaft 8 must continue to turn so as to operate the clock mechanism 2 during the winding operation, the drum 3 will not be rotated in an anti-clockwise direction at the same speed as if the shaft 8 were regarded as stationary and not being able to rotate in a clockwise direction, but at a mean ratio of the two movements. The gears 14, 15, 17, and 18 in reality resemble a differential, and thus permit the movement in the opposite direction.

As the drum 3 rotates in the clockwise direction it will unwind the cable 19 therefrom and cause the length of cable indicated by $x$ to move in the direction of the arrow $y$. The cable 19 is placed between two rollers 21 which are mounted upon a carrier 22, the carrier, in turn, being slidably received in a groove 23 of a frame 24. A pin 25 is secured to the carrier 22 and is adapted to engage with an arm 27 when the carrier is moved. The arms 26 and 27 are secured to a switch 28, which, in the present instance, is of the mercury type. The switch 28 comprises a cylinder 29 in which the mercury 30 is disposed. Two terminals 31 and 32 are disposed in the cylinder 29 and are positioned so as to have the mercury cover their ends when the cylinder is swung into the position shown in the drawing. If, however, the cylinder 29 is tilted to the opposite position, the mercury will flow to the opposite end of the cylinder and therefore will break the contact between the terminals 31 and 32. As illustrated in the drawing, the switch 28 is in closed position and the motor 4 is being actuated so as to wind the drum 3. As the cable 19 is wound upon the drum 3 the length of the cable will be moved so as to cause the pin 25 to engage with the arm 26 and to swing the cylinder 29 so as to open the switch. This movement instantly breaks the circuit to the motor 4 and therefore stops further winding of the drum 3. The gear 17 is locked against rotation in either direction by means of the worm 9, which prevents rotation of the worm gear 10 in either direction. It will therefore appear that since the gear 17 is locked against rotation, all of the movement of the cable 3 will be imparted to the shaft 8 to operate the clock mechanism 2.

From the foregoing description of the various parts of the device the operation thereof may be readily understood. I have described that the motor 4 is adapted to wind the drum 3 in an anticlockwise direction when the switch 28 is closed. I have also shown how the weight 20 is adapted to rotate the drum 3 in a clockwise direction so as to operate the clock mechanism 2 in the ordinary manner. The drum 3 is of sufficient length to carry a number of turns of the cable 19. As clearly shown in the drawing, when the switch 28 is closed there are still a sufficient number of turns left upon the drum 3 to continue to rotate the drum so as to cause the clock mechanism to run for approximately six days longer. This safety precaution is provided in case the source of current to the motor 4 should accidentally be cut off when it is desired to wind the drum 3. It is apparent that the switch 28 will remain in the position shown as long as the cable 19 continues to unwind from the drum 3, and that as soon as the source of current is again established through the terminals 31 and 32 the drum will be wound up so as to cause the pin 25 to again open the switch 28. This six day period, or unwinding of the cable 19 after the switch has been closed, provides a novel safety precaution against the clock being accidentally stopped. As heretofore stated the drum will be wound up any time during the six day interval if the source of current again flows through the motor 4 during this period. It is obvious that this period may be increased by merely lengthening the drum 3. The device is extremely simple in operation and does away with the spring mechanism for winding clocks. It is obvious that the weight 20 would exert substantially the same force upon the drum 3, no matter whether the weight is disposed close to the drum or at a considerable distance therefrom. In this way the same force will be exerted upon the clock mechanism 2 from the time the drum 3 is wound up to its fullest amount, to the time when the drum again has to be wound up. The worm 9 provides a novel means for locking the gear 17 against rotation in either direction and takes the place of the ordinary pawls which are usuallly provided with spring actuated clocks.

I claim:

1. A clock mechanism comprising a drive shaft, a driven shaft, a drum, differential means connecting said drive shaft to said drum, and said drum to said driven shaft, said drum housing said means, means for rotating said drum to actuate said driven shaft, said last named means comprising a cable attached to and wound about said drum, a weight secured to the free end of said cable, electrically controlled means for actuating said driving shaft, a switch for

connecting said means with a source of current, said switch being actuated by the lateral movement of said cable as said cable is wound or unwound from said drum.

2. A device of the type described comprising a drive shaft, a driven shaft axially aligned with said drive shaft, a drum mounted on said shafts, differential means connecting said drum with both of said shafts, said drum enclosing said means, electrically controlled means for actuating said drive shaft, a switch for connecting said means with a source of current, a slide member for controlling the movement of said switch, a cable mounted upon said drum and adapted to be wound thereupon and unwound therefrom, said cable being operatively connected to said slide member so as to actuate said slide member as said cable is moved laterally with respect to said drum when wound upon said drum or unwound therefrom.

JOHN MONROE BONER.