Mar. 20, 1923. 1,448,815

F. J. REILLY

SELF WINDING CLOCK

Filed Feb. 27, 1920

Fig. 1.

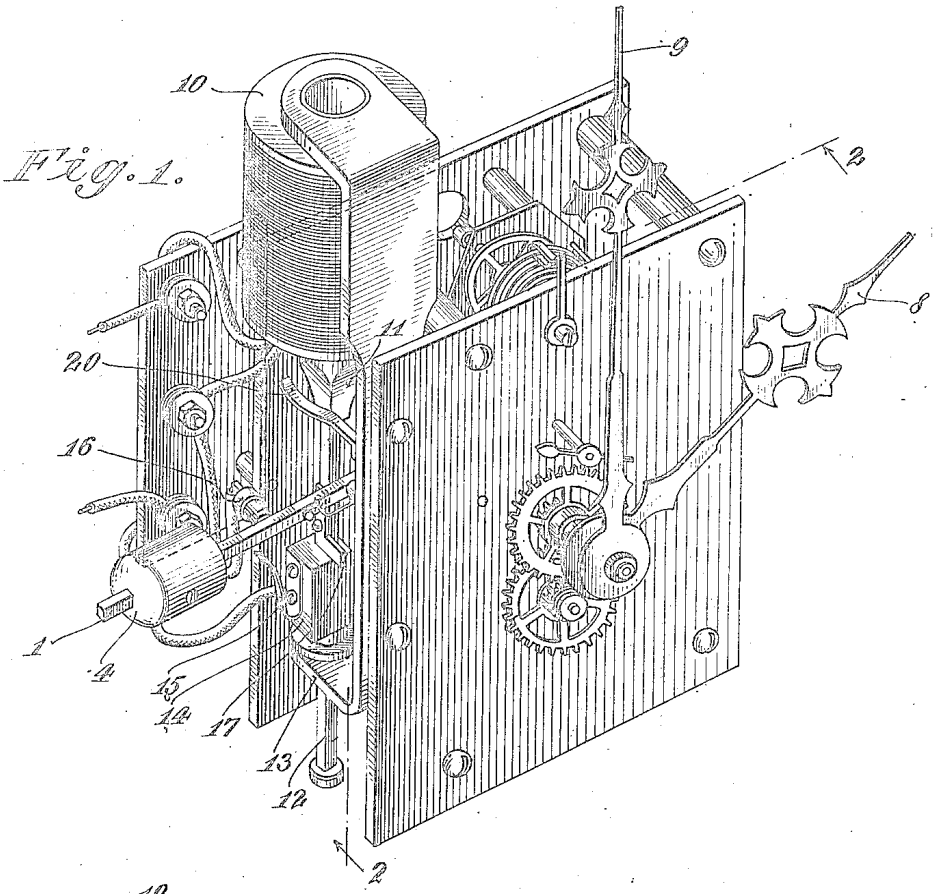
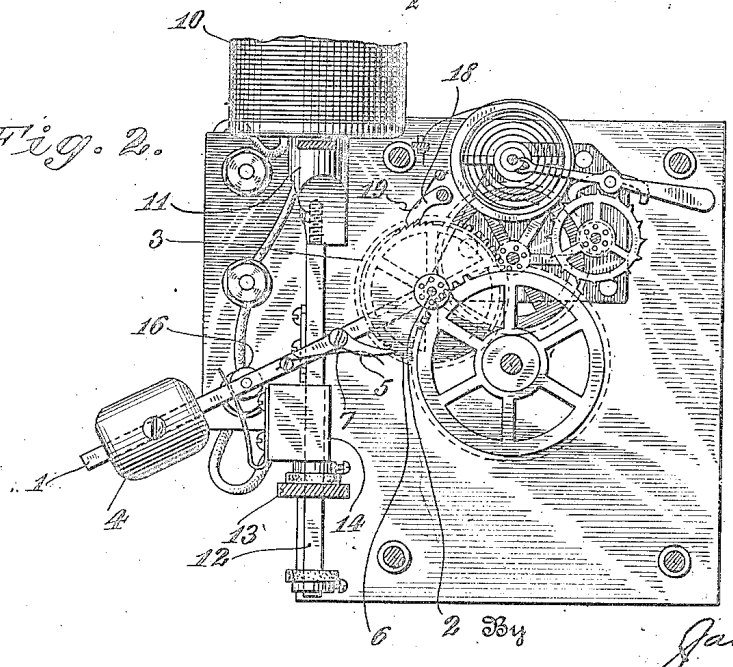


Fig. 2.



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UNITED STATES PATENT OFFICE.

FRANCIS J. REILLY, OF NEW YORK, N. Y.

SELF-WINDING CLOCK.

Application filed February 27, 1920. Serial No. 361,878.

To all whom it may concern:

Be it known that I, FRANCIS J. REILLY, a subject of the King of Great Britain, residing at New York city, borough of Manhattan, county and State of New York, have invented a certain new and useful Self-Winding Clock, of which the following is a specification.

This invention relates to clock movements and is, more particularly, directed to a self controlling, electrically operated, primary movement.

In embodying the present invention in clock construction, the main spring which is generally utilized as the prime mover for the time train, is dispensed with and, in lieu thereof, a weighted lever is employed. The lever is pivoted on one of the spindles or arbors of the movement and preferably has a pawl and ratchet connection with said spindle or arbor. Through this connection the weight of the lever is imposed upon the time train and serves to drive the same. During this driving operation, the weighted lever gravitates downwardly about the spindle or arbor on which it is pivoted, but is adapted to be periodically elevated by electrical means preferably in the form of a solenoid.

It is essential to the proper operation of the movement that the weight of the operating lever be constantly imposed on the time train so as to steadily drive the same without appreciable periods of rest or dwell thereof. The present invention provides for the accomplishment of this by electrically elevating the operating lever in such a quick and rapid manner that, practically speaking, its weight is constantly imposed upon the time train.

In accordance with this invention, the control of the electrical circuit which is utilized to elevate the operating lever, is controlled by the lever itself in such manner as to be unfailing in its operation. The invention is particularly directed to the efficient making and breaking of this circuit through the employment of novel and simple switch mechanism which obviates arcing and renders the control positive.

Features of the invention, other than those specified, will be apparent from the hereinafter detailed description and claims taken in conjunction with the accompanying drawings.

In the accompanying drawings, I have illustrated one practical embodiment of the invention, but the construction therein shown is to be understood as illustrative only, and not as defining the limits of the invention.

Figure 1 is a perspective view of a clock movement embodying the present invention; and

Figure 2 is a section in the plane of the line 2—2 of Figure 1.

The clock movement shown in the drawing embodies a time train of any suitable, conventional type, controlled by proper escapement mechanism. As this mechanism may vary without departing from the invention, and is well known by those skilled in the art, it is not considered necessary to describe it in detail. This invention has to do with the driving of the time train rather than to the time train itself and this driving is accomplished by a weighted operating lever in lieu of the usual main spring.

Referring to the drawings, the operating lever is designated by the reference character 1, and is shown as pivotally mounted at one of its ends, on the spindle or arbor 2 of one of the intermediate gears 3. In practice however, the arbor 2 can be any arbor or spindle of the movement which it may be considered desirable to drive. Mounted on the lever 1, near the free end thereof, is a weight 4, and between the weight and fulcrum of the lever, said lever carries a pawl or dog 5, normally held in engagement with a ratchet wheel 6, fixed on the arbor 2, by a spring 7 and mounted on the lever, as best shown in Figure 2. The weight 4 is thus imposed on lever 1 and tends to force it through the action of gravity, to rotate it about its fulcrum 2 in a counterclockwise direction. In order to partake of this movement, however, it must carry with it the ratchet wheel 6 to which it is locked by the pawl 5. The time train is thus driven, and is properly timed by the escapement mechanism aforesaid. This mechanism properly controls the operation of the time train and renders it capable of correct actuation of hands 8 and 9, associated therewith.

It will appear from the drawings that, after the lever 1 has descended and thus driven the time train through a certain period, it is necessary to again elevate the lever so that it may be utilized to drive the time train through a next subsequent period. To this end, a solenoid 10 is mounted in fixed position above the lever 1, and this

solenoid is provided with a movable core 11. Depending from the core 11 is a rod 12, rigid with the core, and extending downwardly through a bracket 13 by means of which the rod and core are guided for vertical movement.

Supported on the rod 12 and rigid therewith is a block of insulation 14 on one lateral face of which is secured a relatively long, tongue-like, leaf spring 15, the free end portion of which is preferably slit as shown, to increase its resiliency. This leaf spring constitutes a relatively fixed contact, with which a movable contact 16 is adapted to co-operate. The movable contact 16 is in the form of a cam like roller carried on and fixedly supported by the lever 1 and electrically insulated therefrom. The two contacts are so relatively disposed that, as the lever 1 nears the end of its downward movement, the roller 16 engages with the leaf spring 15. The leaf spring is, in practice, made quite light and sensitive so that the roller engages it gently and starts to slowly slide down thereover. The contacts are, however, included in series in an electric circuit with the solenoid 10 and a suitable source of current supply, with the result that, as soon as the contacts engage as aforesaid, the solenoid is energized and its core 11 and the rod 12 are drawn quickly upward. The rod 12 is provided with a laterally extending finger 17, which at all times underlies the lever 1, so that when the solenoid 10 is energized, and its core elevated, the finger 17 elevates the lever 1. In practice, the lifting of the core is accomplished with considerable rapidity, but this upward movement is limited by a stop 21 secured to the lower end of the rod 12. As the core elevates, carrying with it the lever 1, the core is suddenly brought to rest through engagement of the stop 21 with the bracket 13. The inertia of the lever 1, however, causes such lever to continue its upward movement, whereby it is disengaged from electrical engagement with the contact spring 15 and thereby effects a breaking of the core circuit. As the lever nears the upper terminus of its travel, and after leaving contact with the spring 15, it engages with the cushioning spring 20, which arrests the movement thereof without shock or vibration. As soon as the circuit through the solenoid is broken, the rod 12 drops by gravity while the lever 1 is left in a position to impose its weight through the pawl 5 upon the ratchet wheel 6 for the purpose of driving the time train as already set forth.

During the elevation of the lever as described, retrograde shifting of the ratchet wheel 6, due to the drag of the pawl 5, is precluded by a locking pawl or dog 18 preferably mounted on the back of the front plate as shown in Figure 2. A spring 19 holds the dog 18 to its work and the end of the dog may be provided with two or more teeth, as shown, somewhat smaller than the teeth of the ratchet wheel 6 so that at least one of these teeth will be at all times in position to lock the ratchet and preclude the slightest retrograde movement thereof.

A very durable, highly efficient, and trustworthy clock movement results through the employment of this invention, and while a great many features of novel construction and utility will appear therein to those skilled in the art, particular emphasis may be laid here on the mode of operation of making and breaking the controlling circuit.

It will be noted that, as the movable contact 16 descends, it gradually engages the fixed contact 15 and starts to slide thereover. The circuit is immediately closed, but, at this instant, the lifting finger has not yet been engaged by the lever 1. However, as soon as the circuit is completed, the core of the solenoid is drawn up smartly causing the two contacts to be quickly slid over one another to establish a perfect contact and, through the resulting friction, free said contacts of corrosion, dirt, or other insulating matter which would serve to destroy proper electrical connection. On the other hand, even though the contacts were dirty and did not immediately complete the circuit as soon as they engaged with one another, they will proceed to wedge tightly together until contact is established. Thus, during both the making and breaking of the circuit the contacts act upon one another to maintain themselves smooth and bright. It will further appear that the circuit is made through engagement between the contacts at one point and broken at another point due to the shifting of the solenoid core, and the turning movement of the cam shaped contact describing an arc in its upward movement.

It will be understood that the specific invention described may be modified in formal respects, such as by the substitution of equivalents, and that parts of the complete mechanism described may be used alone, or in other environments, without departing from the spirit or substance of the broad invention, the scope of which is commensurate with the appended claims.

Having thus fully described the invention, what I claim as new and desire to secure by Letters Patent is:

1. In a device of the class described, a clock movement embodying, as a prime mover, a gravity operated member adapted through the gravitating descent thereof to drive the movement, an upstanding solenoid having a core provided with a depending stem, a lifting projection mounted in said stem and underlying the gravity member though normally free from engagement therewith, a resilient electrical contact

mounted on and supported by the stem of the solenoid core, a movable contact carried on and supported by the gravity member and adapted to engage with the resilient contact and complete a circuit through the solenoid before the gravity member engages with the lifting projection of the stem, whereupon the solenoid is energized, brings the lifting projection into engagement with the gravity member, forces the contacts into tight engagement with one another and elevates the gravity member to the point of starting of its downward movement.

2. In a device of the class described, a clock movement embodying, as a prime mover, a gravity operated member adapted through the gravitating descent thereof to drive the movement, an upstanding solenoid having a movable core for periodically elevating the gravity member, a movable contact carried by the gravity member, a relatively fixed flexible contact carried by the solenoid core in the path of the movable contact and in a position to be engaged and flexed by said movable contact as the gravity member nears the terminus of its downward gravitating travel for the purpose of completing an electric circuit through the solenoid and elevating the gravity member to the point of starting of its downward travel.

3. A clock movement embodying hands, a time train for operating said hands, and means for driving the time train, which means embodies a ratchet wheel operatively associated with the time train and rotatable on a horizontal axis, a lever mounted for oscillation coaxially of the ratchet wheel, a weight cooperating with the lever to cause it to gravitate in a downward direction, a pawl associated with the lever and engaging with the ratchet wheel to drive the ratchet wheel when the lever is oscillated by the weight, a stationary solenoid provided with a movable core, a stem on the core, a shoulder on the stem adapted to underlie the pivoted lever, whereby the energizing of the solenoid will cause the core to be drawn in to lift the lever into a position to subsequently gravitate and drive the time train, a movable contact carried by the lever, a relatively fixed flexible contact carried by the stem, and an electric circuit including both contacts and the solenoid, said fixed contact being so positioned that it will be engaged and flexed by the movable contact when the lever has substantially completed its downward movement.

4. In a device of the class described, a clock movement embodying, as a prime mover, a gravity operated lever adapted, through its gravitating descent, to drive the movement, a solenoid mounted in fixed position and provided with a movable core having a rigid dependng stem provided with a shoulder adapted to at all times underlie the gravity member, a relatively fixed contact carried by the stem, and an electric circuit including both contacts and the solenoid, whereby, when the gravity member has descended, the contacts will come into engagement with one another for the purpose of energizing the solenoid to elevate the core and lift the gravity member into a position to again gravitate and drive the clock movement.

In testimony whereof, I have signed my name to this specification.

FRANCIS J. REILLY.