No. 861,980. PATENTED JULY 30, 1907.

R. L. HIGHT.

SECONDARY ELECTRIC CLOCK.

APPLICATION FILED MAR. 29, 1906.

Fig. 1.

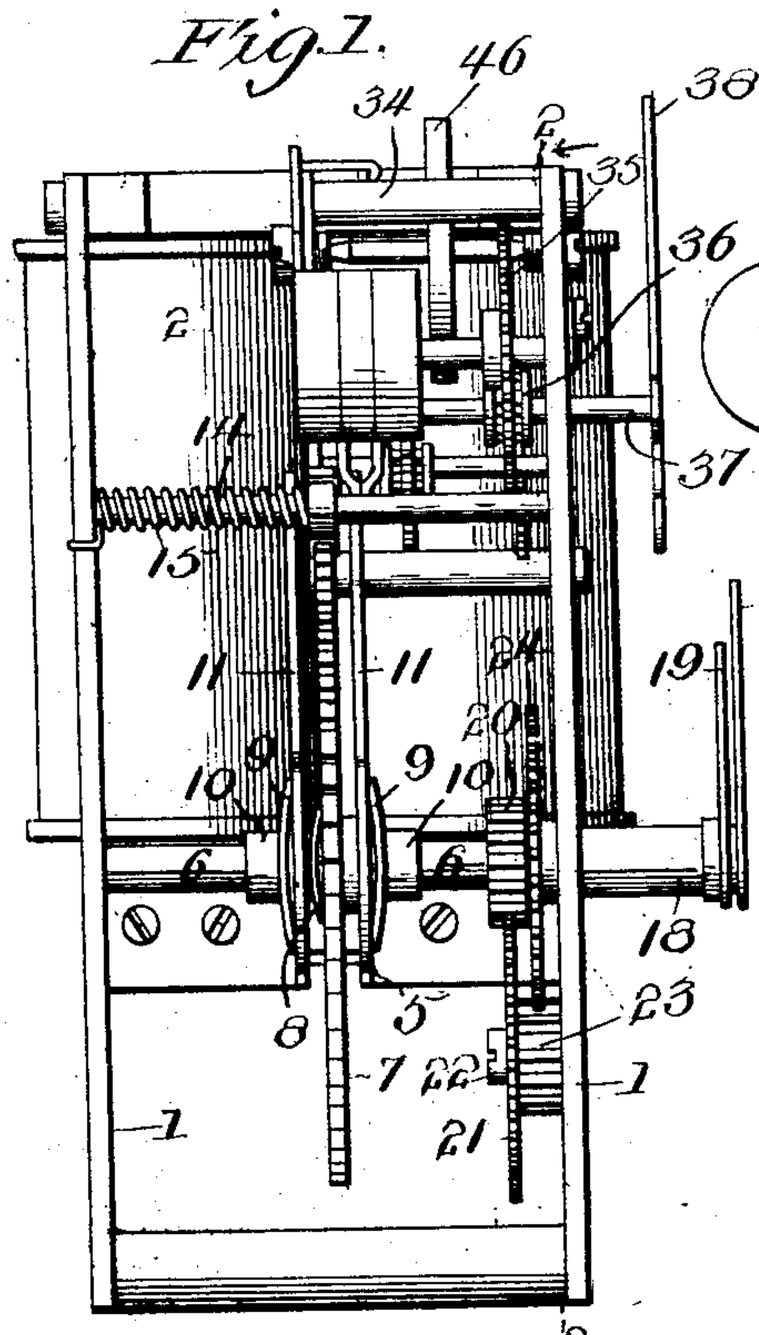


Fig. 2.

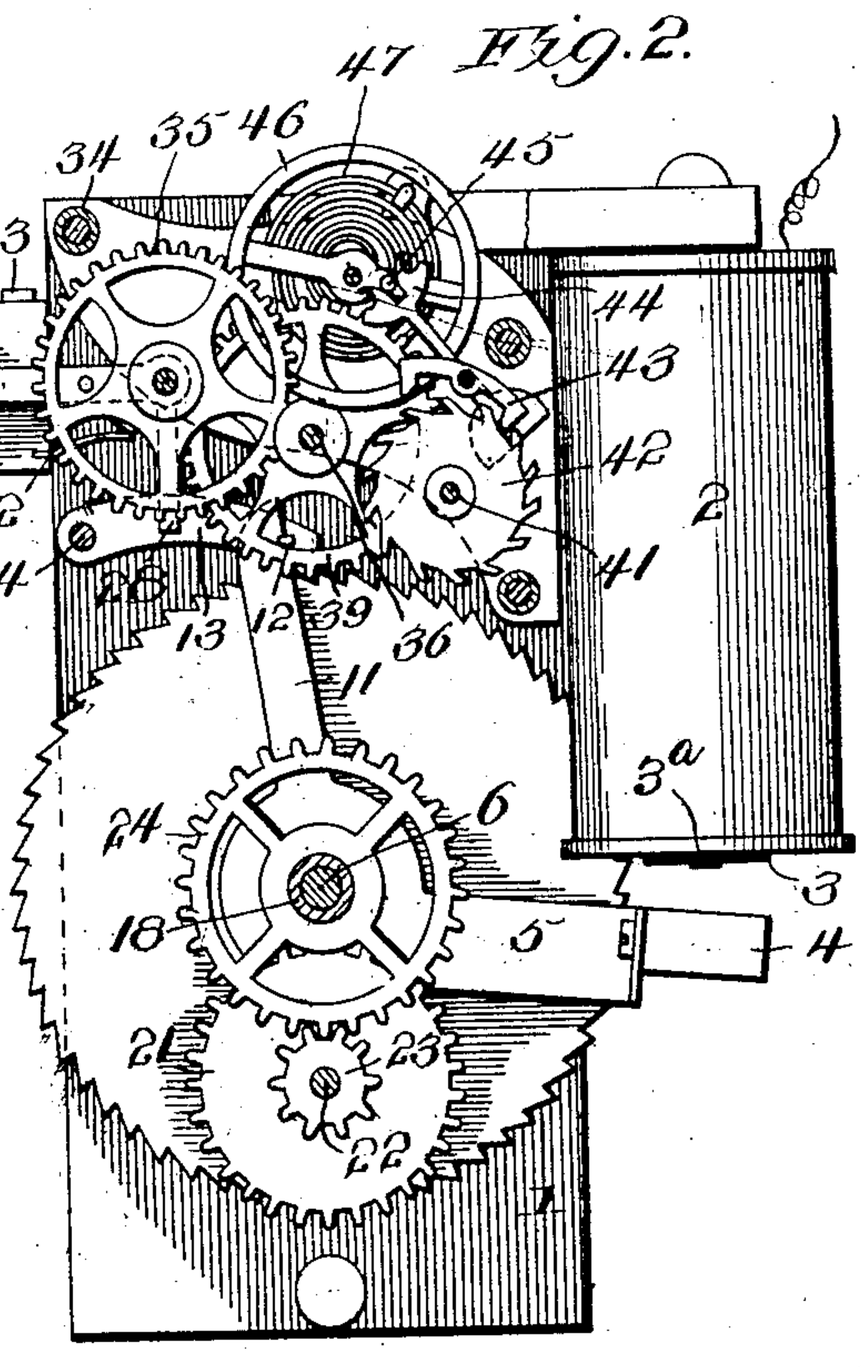


Fig. 4.

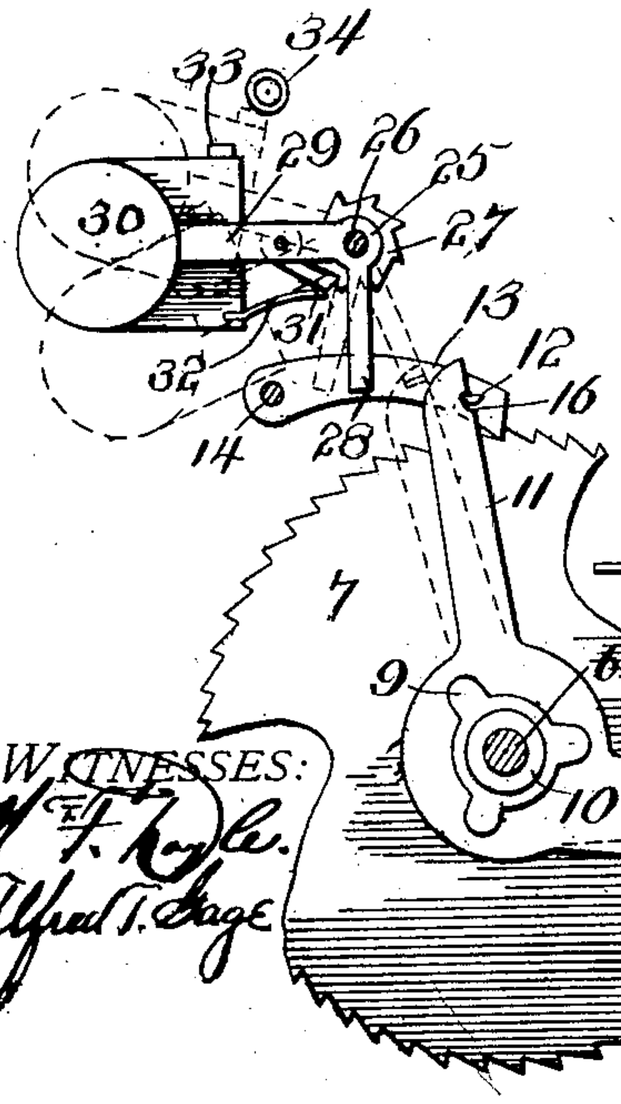
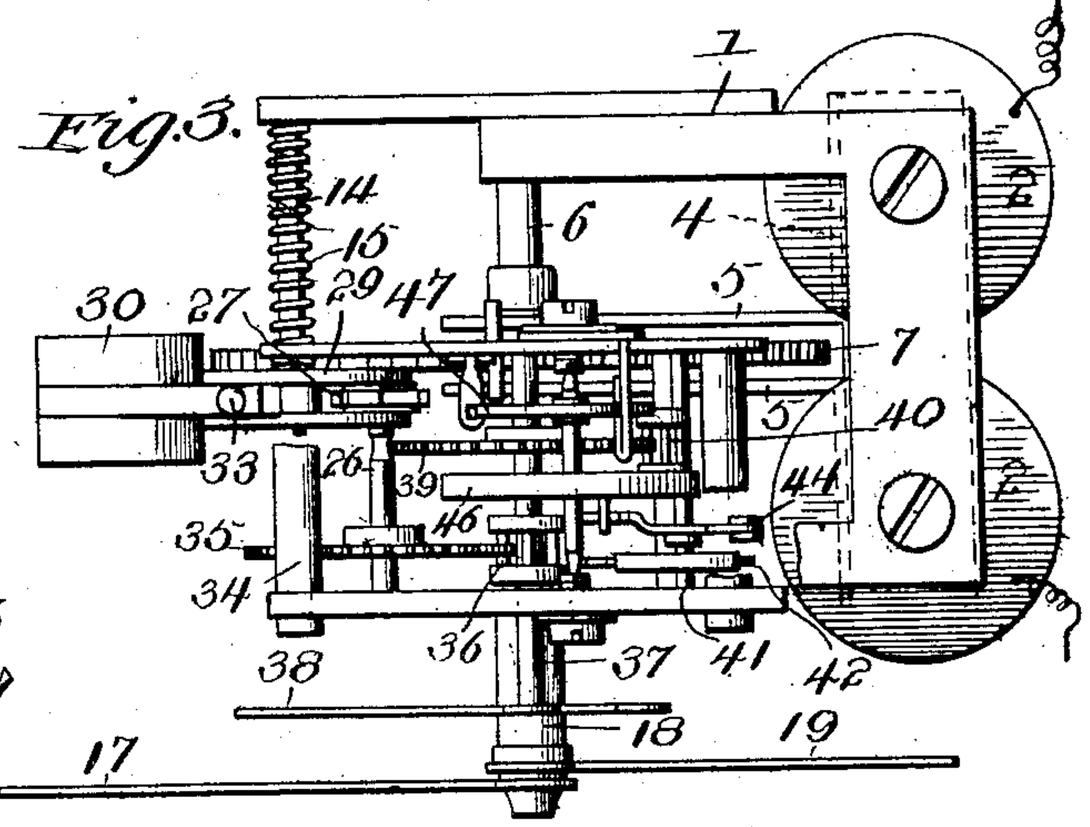


Fig. 3.



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UNITED STATES PATENT OFFICE.

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SECONDARY ELECTRIC CLOCK.

No. 861,980. Specification of Letters Patent. Patented July 30, 1907.

Application filed March 29, 1906. Serial No. 308,708.

To all whom it may concern:

Be it known that I, ROBERT L. HIGHT, a citizen of the United States, residing at Decatur, in the county of Macon, State of Illinois, have invented certain new and useful Improvements in Secondary Electric Clocks, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to a secondary clock, and particularly to an electrically operated device of that character adapted for use in circuit with a master clock.

The invention has for an object to provide an improved construction and arrangement of ratchet wheel for the minute or dial train in connection with an armature lever for operating the same, with means carried by the same for locking the holding pawl of said wheel in position when no current is passing through the actuating mechanism.

A further object of the invention is to provide a novel and improved construction of second operating mechanism adapted to be actuated by the armature lever to provide power for operating the second or time train between the movements of the minute train.

Other and further objects and advantages of the invention will be hereinafter fully set forth and the novel features thereof defined by the appended claims.

In the drawing:—Figure 1 is an end view of the invention; Fig. 2 is a vertical section on line 2—2, Fig. 1; Fig. 3 is a plan view, and Fig. 4 is a detail section on an enlarged scale of the armature lever and its connections.

Like numerals of reference designate like parts in the several views of the drawing.

The numeral 1 indicates a frame of any suitable character or configuration upon which the actuating magnets 2 are mounted, these magnets being in circuit with any desired form of master clock in the usual manner by which the poles 3 of the magnets are adapted to attract the armature 4 carried at the outer end of the armature lever 5 and provided with projections 3^a to prevent sticking. This lever is pivotally mounted upon the shaft or staff 6 of the minute or dial train and is free to move thereon independent of the ratchet wheel 7, also mounted upon said shaft and secured thereto by friction disk 8. The armature lever is duplicated at each side of the ratchet wheel, and secured upon the shaft 6 by means of the friction disk 9 disposed between the collar 10 secured to the shaft and the armature lever.

Extending upward from the armature levers are arms 11 adapted in their travel to engage projections 12 extending laterally from the holding pawl 13 which is pivotally mounted upon the cross shaft 14 mounted in the frame of the movement, said lever being held normally in contact with the ratchet wheel by means of a spring 15 upon the cross shaft 14, as shown in Fig. 1. The arms 11 are each provided with recesses 16 to embrace the projections 12 on the holding pawl to lock the latter in its contacting position when the armature is at rest, as shown in Fig. 4. These armature levers and arms may be used either singly or at opposite sides of the ratchet wheel as shown.

With the parts as shown in full lines in Fig. 4, when circuit is established through the magnets 2, the armature levers are drawn upward to the dotted line position swinging the arms back owing to the free movement of the armature levers, the ratchet wheel being held at such time against movement by the pawl, while the weight of the armature lever and its armature in returning to the full line position when circuit is broken through the magnets moves the ratchet wheel forward one tooth or to a predetermined extent.

The usual train of gearing extends from the minute or dial shaft 6 carrying the hand 17, to operate the sleeve gearing 18 carrying the hour hand 19 and comprises a pinion 20 secured to the shaft 6 meshing with the gear 21 mounted upon a stud 22 carried by the frame 1. This gear also carries a pinion 23 meshing with the gear 24 upon the inner end of the sleeve 18, as shown in Fig. 1.

The mechanism hereinbefore described is adapted to control and operate the minute or dial train of gearing for the secondary clock, and for the purpose of operating the second or time train of gearing in connection with the minute train I have provided a very desirable construction in which the propelling power for the second or time train is actuated at each operation of the arm carried by the armature lever. This is accomplished by means of a crank arm 25 pivotally mounted to swing upon a journal 26 to which a ratchet toothed wheel 27 is secured. The depending finger 28 of the crank arm is disposed in the path of the upper end of the arm 11 from the armature lever 5 so as to be engaged thereby and thrown into the left dotted position shown in Fig. 4. The opposite arm 29 of the crank is provided with a weight 30 and with a pivotally mounted pawl 31 held in contact with the ratchet toothed wheel by a spring 32. The weighted end of the arm 29 is provided with a buffer block 33 adapted to limit the upward movement of the weight by contact with the cross bar 34 of the frame. With this construction it will be seen that with each upward movement of the armature lever the crank arm is thrown from the right dotted position shown in Fig. 4 to the left dotted position, thus raising the weight to its highest point and

providing means for driving the shaft or journal 26 in the downward movement of the weight by means of the engagement of the pawl therewith. Motion may be transmitted from this driving device to the second or time train of gearing in any desired manner, for instance, the shaft 26 may be provided with gear 35 secured thereto, and adapted to mesh with a barrel pinion 36 carried upon the shaft 37 which is provided with the second hand 38 on the face of the clock. Any suitable escapement mechanism may be applied to this second hand shaft, for instance, the gear 39 mounted thereon and meshing with a barrel pinion 40 carried on a countershaft 41 which also carried the escapement wheel 42 coöperating with the pivoted anchor 43 which is connected by means of a lever 44 with the roller pin 45 carried by the balance wheel 46, the shaft of which is controlled by the usual spring 47 provided for that purpose.

In the operation of the mechanism it will be seen that at each electrical impulse from the master clock, the armature lever of the secondary clock is raised into contact with the magnet, and the arm carried by said lever swung backward, while the ratchet wheel is held in its former position. The frictional contact of this armature lever with the shaft carrying the ratchet wheel is such that in its return movement to the full line position shown in Fig. 4, the ratchet wheel is moved forward one notch by the weight of the released armature and its supporting lever, and the arm engages the pin on the holding pawl to positively lock this pawl in position. The pawl can only be raised from the ratchet wheel when the armature lever is attracted to its magnet. This arm of the lever also provides means for raising the driving weight for the second or time train as hereinbefore described to provide power for driving the said train during the interval between the impulses of the magnet. A secondary clock is thus provided which gives the second indications as well as the hour and minute, the same as the master clock, and is only here shown as provided with means for driving for one minute at each lifting of the armature lever. This second or time train may be omitted, if desired, and the clock used with the ordinary minute movement, and the mounting of the minute or dial movement is such that the armature lever can slip upon the shaft in one direction and carry the escapement wheel forward in its return movement at which time the finger of the crank arm may assist the weighted armature in driving the ratchet wheel.

Having now described my invention and set forth its merits, what I claim and desire to secure by Letters Patent is:—

1. In an electric clock, a ratchet wheel, a magnet, means for transmitting power from the magnet to said wheel, a train of minute or dial gears to be driven by said wheel, a train of second or time gears, and means carried by the shaft of said ratchet wheel for placing the driving means for the time train in position for operation during the intervals between the movements of the ratchet wheel.

2. In an electric clock, a ratchet wheel, a magnet, means for transmitting power from the magnet to said wheel, a train of minute or dial gears to be driven by said wheel, a train of second or time gears, driving means carried by the time train, and means carried by the magnet connection for placing said driving means in actuating position.

3. In an electric clock, an actuating magnet, a ratchet wheel, an armature lever coöperating with said magnet and mounted upon the shaft of said wheel, a holding pawl to retain said wheel against motion in one direction, an arm carried by said armature lever, a time train, and driving means for said time train disposed in the path of said arm to be placed in position for operation in one movement thereof.

4. In an electric clock, an actuating magnet, ratchet wheel, an armature lever coöperating with said magnet and mounted upon the shaft of said wheel, a holding pawl to retain said wheel against movement in one direction, a lateral projection carried by said pawl, and an angularly disposed arm carried by said lever and provided with means to engage and lock said pawl by said projection.

5. In an electric clock, an actuating magnet, ratchet wheel, an armature lever coöperating with said magnet and mounted upon the shaft of said wheel, a holding pawl to retain said wheel against movement in one direction, a lateral projection carried by said pawl, an angularly disposed arm carried by said lever and provided with means to engage and lock said pawl by said projection, a second or time train of gearing, driving means therefor, and an actuating arm depending from said driving means into the path of the arm carried by said armature lever.

6. In an electric clock, an actuating magnet, ratchet wheel, an armature lever coöperating with said magnet and mounted upon the shaft of said wheel, a holding pawl to retain said wheel against movement in one direction, a lateral projection carried by said pawl, an angularly disposed arm carried by said lever and provided with means to engage and lock said pawl by said projection, a second or time train of gearing, driving shaft therefor, a ratchet toothed wheel secured to said shaft, a weighted arm mounted upon said shaft and disposed in the path of an arm of the armature lever, and a pawl carried by said weighted arm to engage the ratchet toothed wheel upon the second or time driving shaft.

7. In an electric clock, an actuating magnet, ratchet wheel, an armature lever coöperating with said magnet and mounted upon the shaft of said wheel, a holding pawl to retain said wheel against movement in one direction, a lateral projection carried by said pawl, an angularly disposed arm carried by said lever and provided with means to engage and lock said pawl by said projection, a second or time train of gearing, a driving shaft therefor, a ratchet toothed wheel secured to said shaft, a weighted arm mounted upon said shaft and disposed in the path of an arm of the armature lever, a pawl carried by said weighted arm to engage the ratchet toothed wheel upon the second or time driving shaft, a buffer block carried by the weighted arm of said crank, and an abutment carried by the frame in the path of said block.

8. In an electric clock, an actuating magnet, a driving shaft having a ratchet wheel mounted thereon, an armature lever frictionally connected to said wheel and provided with angularly disposed arms one of which carries an armature and the other provided with a locking recess, and a pivoted holding pawl adapted to engage said wheel and having a lateral locking extension disposed to enter said recess when the armature of the lever is released from the magnet.

9. In an electric clock, an actuating magnet, a ratchet wheel, an armature lever coöperating with said magnet and mounted to drive said wheel in one direction, an arm carried by said armature lever, a time train provided with a ratchet toothed wheel upon the shaft of one of its gears, and a two armed lever mounted to oscillate on said shaft and provided with a pawl to engage said ratchet toothed wheel, one arm of said lever being disposed in the path of travel of the arm of the armature lever to be placed in position for operation in one movement thereof.

10. In an electric clock, a train of driving gears provided with a ratchet toothed wheel upon the shaft of one of said gears, a two armed lever mounted to rotate upon said shaft and provided with a pawl to engage said

ratchet toothed wheel, an actuating magnet, an armature lever provided with means for transmitting motion to one arm of said two armed lever, and a driving weight carried by one arm of said two armed lever to rotate the shaft of said ratchet toothed wheel between the actuating movements of the armature lever.

11. In an electric clock, a dial train, a wheel for driving the same, a time train, a weighted lever for driving the same intermittent of the movements of said wheel, an actuating magnet, and means coöperating therewith for placing the driving means for the time train in actuating position during its movement in one direction and for feeding the wheel in its opposite movement.

In testimony whereof, I affix my signature in presence of two witnesses.

ROBERT L. HIGHT.

Witnesses:
HERBERT J. HALL,
JOHN H. CULVER.