R. J. SHEEHY.

ELECTRIC-CLOCK.

No. 173,072. Patented Feb. 1, 1876.

Fig. 1.

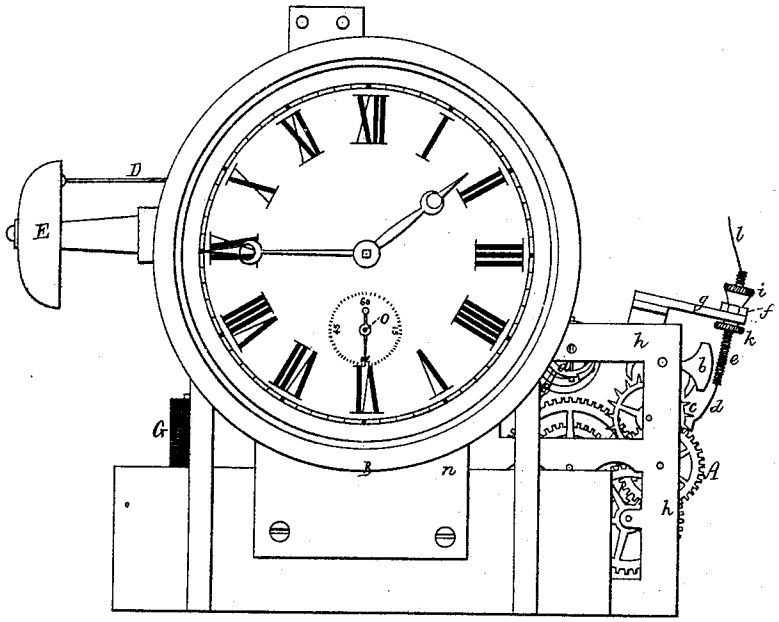


Fig. 2.

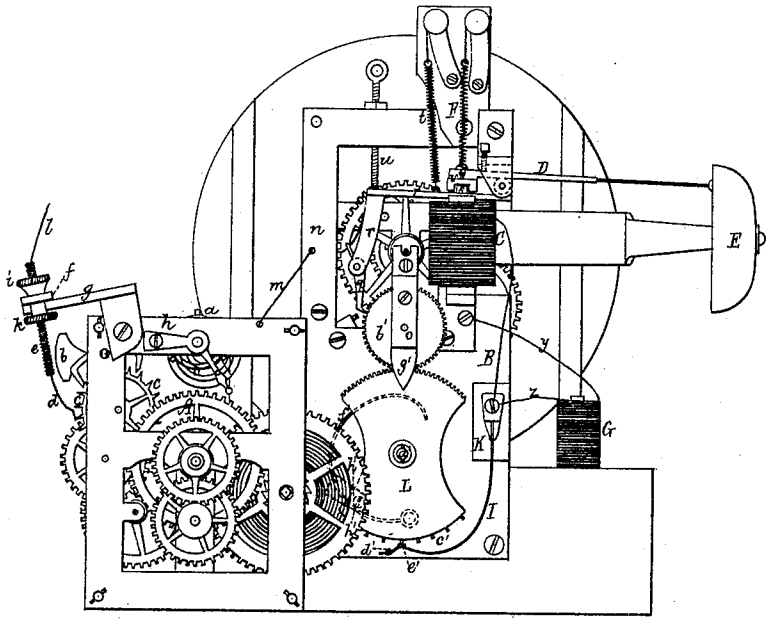
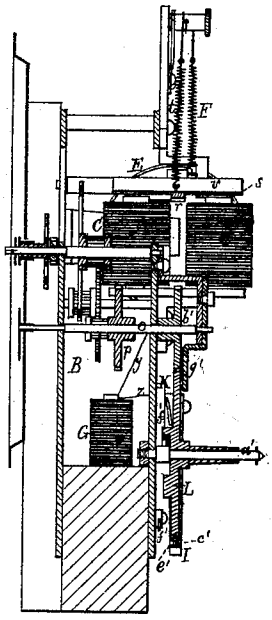


Fig. 3.



Witnesses
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UNITED STATES PATENT OFFICE.

ROBERT J. SHEEHY, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN ELECTRIC CLOCKS.

Specification forming part of Letters Patent No. **173,072**, dated February 1, 1876; application filed November 16, 1875.

To all whom it may concern:

Be it known that I, ROBERT J. SHEEHY, of Boston, in the county of Suffolk and State of Massachusetts, have made a new and useful Invention having reference to Electric Clocks; and do hereby the same to be fully described in the following specification, and represented in the accompanying drawings, of which—

Figure 1 is a front elevation, and Fig. 2 a rear elevation, of a primary and a secondary electric clock, with means by which the secondary clock is operated by the primary one.

By means hereinafter explained, any number of electric clocks like the secondary one may be put in operation from one primary clock.

My invention relates to apparatus for time-sounding or signalizing. Also, to the combination of an electro-magnet and its armature with an auxiliary armature to operate therewith, substantially as hereinafter explained.

Heretofore, so far as I have been able to learn, it has been customary to move the minute-hand of a secondary electric clock but once every minute or half-minute, such clock, generally speaking, being without any second-hand or dial to indicate seconds. In my secondary clock, as shown in the drawings, and hereinafter described, there is a second hand and dial to indicate seconds of time, and the minute-hand has a movement every second. Furthermore, instead of applying to the second-hand arbor of the primary clock the apparatus for closing the electric circuit once during each revolution of the said arbor, I make use of the escapement-wheel and a spring, duly insulated, to effect the opening and closing of the electric circuit, such enabling me, by imparting to the escapement-wheel the necessary velocity, to move the second-hand of the secondary clock one or more times a second, as occasion may require, the arbors of the second and minute hands being provided with a train, by which the minute-hand arbor is operated from the second-hand arbor.

In the drawings, A denotes the wheel-work of a common clock, in which *a* is the balance-wheel, *b* the escapement-lever, and *c* the escapement-wheel. Against the periphery of the wheel *c* there is arranged, as shown, a metallic spring, *d*, projecting from the lower end of a screw, *e*, that extends up through a metallic ear, *f*, projecting from an insulator or piece of glass or hard rubber, *g*, fixed to the frame *h* of the clock. Two nuts, *i k*, screwed on the screw *e*, one above and the other below the ear *f*, serve, with such screw, to adjust the spring *d* relatively to the escapement-wheel. From the upper end of the screw *e* a wire, *l*, from one pole of a battery, is attached, and from the frame *h* another wire, *m*, is led to the frame *n* of the secondary clock B, whose second-hand arbor is shown, at *o*, as provided with a ratchet-wheel, *p*, having sixty teeth. With this ratchet-wheel a pawl, *q*, engages, such pawl being pivoted to a lever, *r*, which has fixed to it a small armature, *s*, arranged immediately over the poles of an electro-magnet, C, more particularly shown in Fig. 3, which is a vertical and transverse section of the secondary clock. To the lever *r* there is an elevating-spring, *t*, and there is to the frame *n* an adjustable stop, *u*, to determine the extent of upward movement of such lever. The second-hand arbor is connected with the minute-hand arbor by a train, as usual, whereby, by every movement of the second-hand arbor, the minute-hand is caused to move—that is, if the second-hand arbor moves sixty times each minute, the minute-hand arbor will also have a like number of movements in such time. The magnet C is in the circuit of which the wire *l* constitutes a part.

From the above it will be seen that during each movement of the escape-wheel the circuit will be closed and broken, for while each tooth of the wheel comes into contact with the spring the circuit will be closed, and it will be opened immediately on the tooth passing the end of the spring, in which case the wheel will be wholly out of contact with the spring. This breaking and closing the circuit aids in producing the movement of the hands of the secondary clock.

Instead of the escapement-wheel to act against the spring, another or circuit breaking and closing wheel may be used on the arbor of such escapement-wheel.

Directly over and embracing the armature *s*, in the manner as shown, is a second or larger armature, *v*, which is applied to the shorter arm of a lever-hammer, D, of a bell, E, ar-

ranged as represented. A spring, F, fixed to the said arm and to the frame of the secondary clock, serves to raise the arm on the circuit being broken. On the circuit being closed the larger armature will be depressed, and, as a consequence, the bell will be sounded by the hammer.

In order to cause the bell to be rung only at the necessary periods, it will be observed that the larger armature should not be moved by the magnet every time the smaller armature is so moved. For the smaller armature to move independently of the larger or upper one, the attractive force of the magnet should be insufficient to move the upper, though sufficient to move the lower, of such armatures.

In order to increase the efficiency of the magnet, to cause it to operate the larger armature, I use a "resistance-coil," G, which is put in the same circuit with the electro-magnet. The outer wire *y* of this coil is attached to the frame of the secondary clock, the inner wire Z being connected to a spring, I, which, at one end, is fixed to the frame, but insulated from it by an insulator, K. This spring, supported at its free end against a stud, *d'*, operates with a movable duplex sector, L, that turns and slides on a stationary arbor, *a'*. The upper arc of the sector has gear-teeth, to engage with a gear, *b'*, fixed on the second hand arbor of the secondary clock. The lower arc of the sector is provided with a series of signalizing-teeth, *c'*, to work in succession against a projection, *e'*, on the spring.

There is applied to the frame a spring, *f'*, to slide the sector L forward on the arbor *a'*, in order to throw the sector out of gear with the wheel *b'*, it being kept in gear by a projection or rider, *g'*, extended down in front of it, and from the frame, as shown.

To the duplex sector there is fixed an overbalance weight, *h*, which, after disengagement of the sector with the gear, which takes place as soon as the upper arc of the sector may have passed by the rider, and the sector is thrown forward on the arbor by the spring, brings the sector in a position for again being coupled with the gear.

From the above it will be seen that the sector, when in engagement with the gear *b'*, will be revolved by it, so as to carry the signalizing-teeth *c'* successively on and off the projection *e'* of the spring. When a tooth, *c'*, may be in contact with the projection *e'*, the electric current will not pass through the resistance-coil, but will go through the spring and the duplex sector, and thus it becomes relieved of the resistance of the coil, so as to increase the attractive force of the magnet sufficiently for it to operate the larger armature, and thereby cause the bell to be sounded.

Instead of the resistance-coil an auxiliary-battery may be employed, its wires being applied, as those of the resistance-coil are, to the frame and the spring.

Furthermore, instead of the spring *d*, insulated and applied to the escapement-wheel, as described, I sometimes make use of an equivalent—that is, I insulate one of the escapement-pallets from the rest of the escapements by a piece of glass or hard rubber duly interposed, and connect with the insulated pallet the circuit-wire of the battery.

I claim—

1. The combination of the resistance-coil G, the spring I, the duplex sector L, and its operating gear *b'* with the primary and secondary clocks A B, their electro-magnet C, and its armature S, and the auxiliary armature V, attached to the bell-hammer, all being applied substantially as and to operate as specified.

2. I claim, in combination with the electro-magnet C, and its primary armature S, a secondary armature, *v*, to operate with such magnet and primary armature, substantially as specified.

ROBERT JAMES SHEEHY.

Witnesses:

R. H. EDDY,

J. R. SNOW.