(No Model.) 2 Sheets—Sheet 1.

# E. LEFEBVRE.

## INDEPENDENT ELECTRIC CLOCK.

No. 445,023. Patented Jan. 20, 1891.

Fig. 1

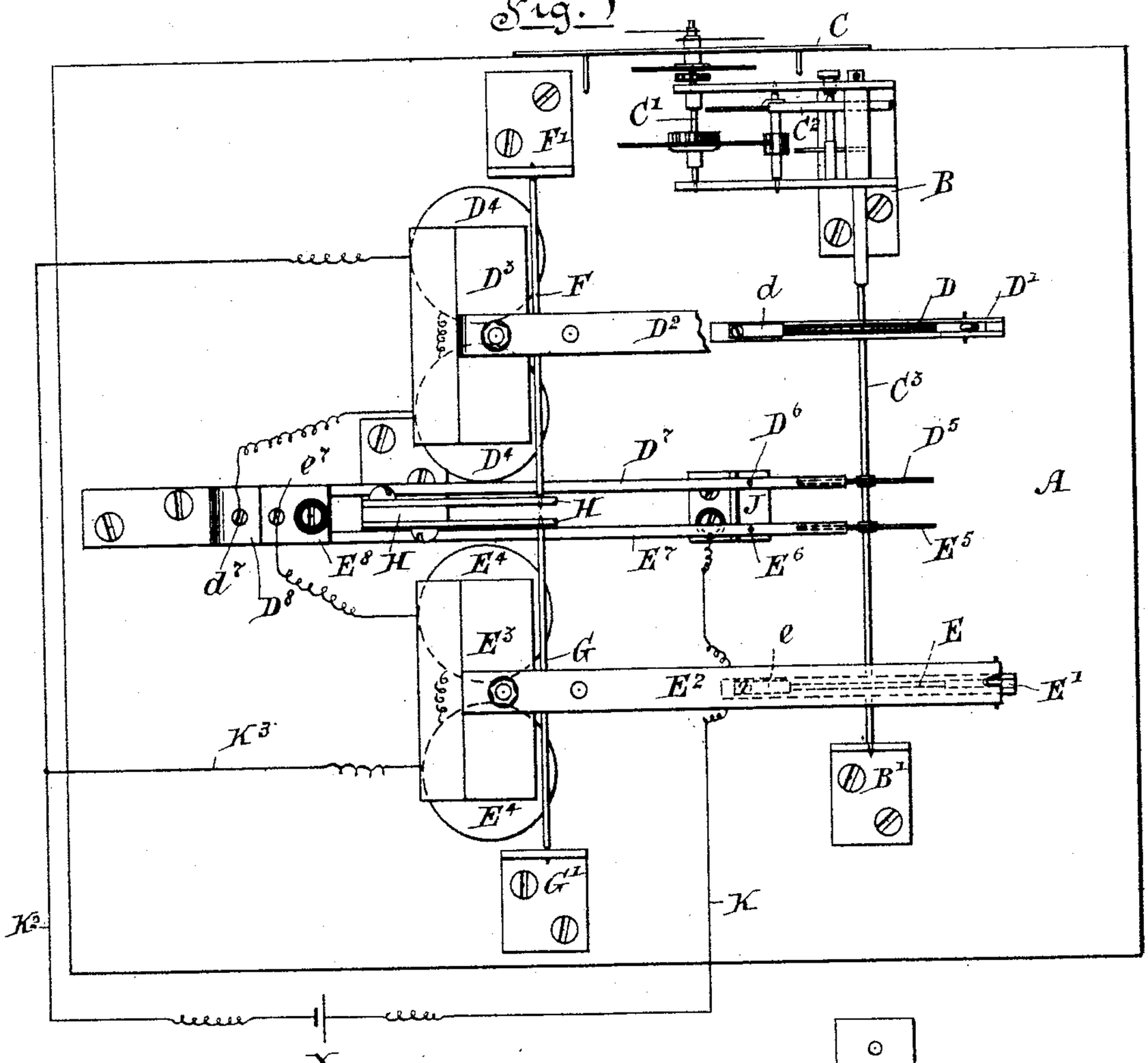
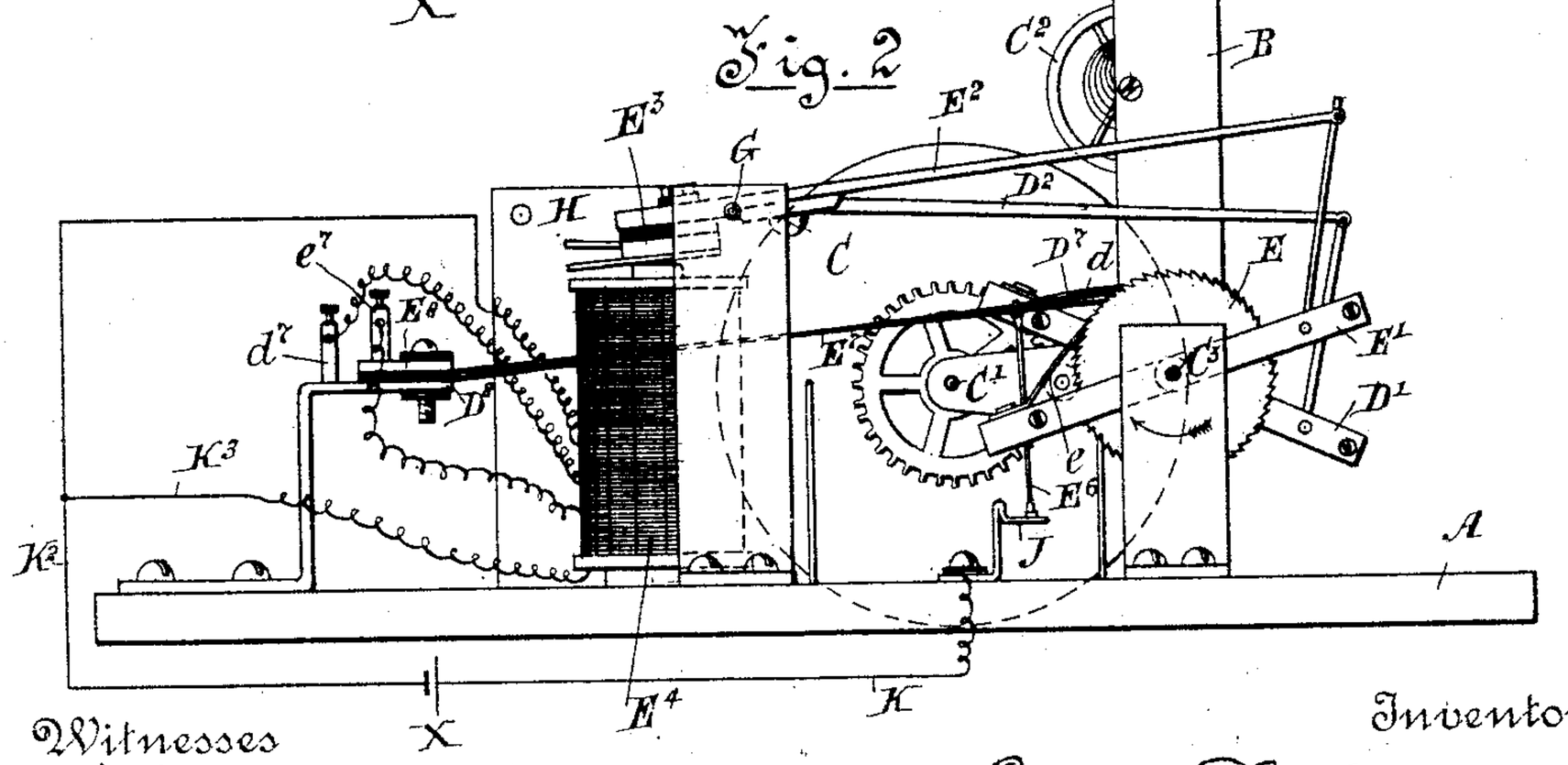



Fig. 2

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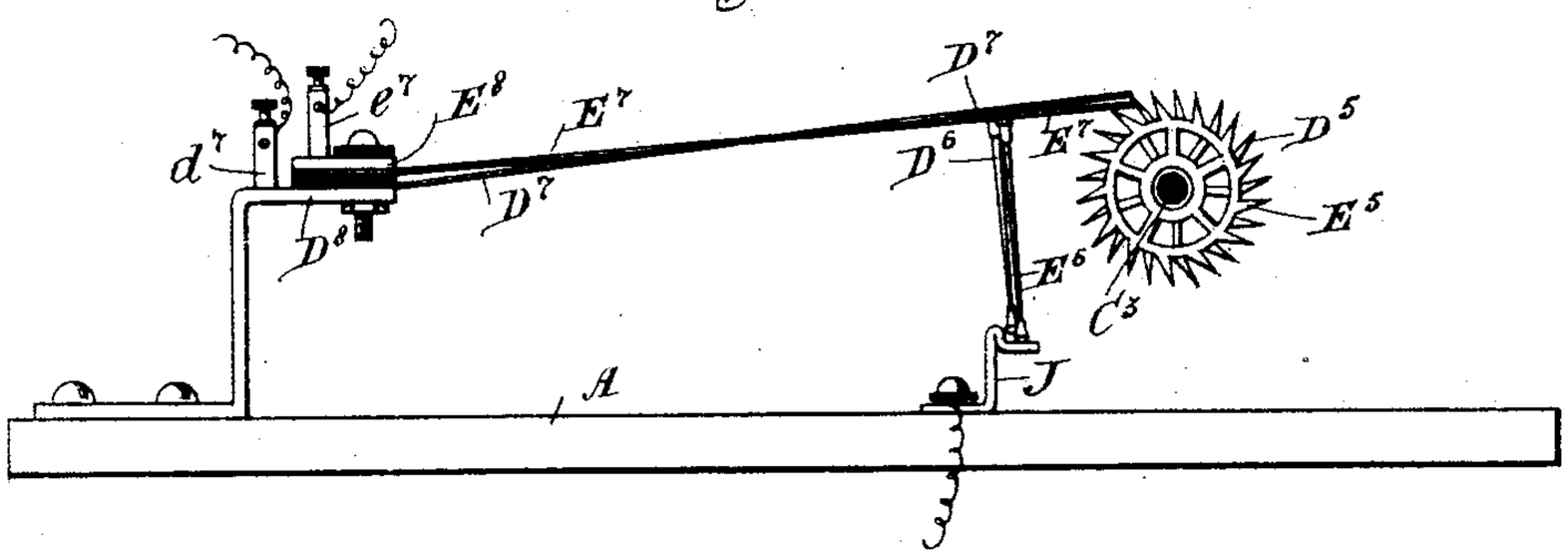
(No Model.) 2 Sheets—Sheet 2.

# E. LEFEBVRE.

## INDEPENDENT ELECTRIC CLOCK.

No. 445,023. Patented Jan. 20, 1891.

Fig. 3

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# UNITED STATES PATENT OFFICE.

EDOUARD LEFEBVRE, OF MONTREAL, CANADA.

## INDEPENDENT ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 445,023, dated January 20, 1891.

Application filed October 6, 1890. Serial No. 367,222. (No model.)

*To all whom it may concern:*

Be it known that I, EDOUARD LEFEBVRE, of the city of Montreal, in the district of Montreal and Province of Quebec, Canada, have invented certain new and useful Improvements in Electric Clocks; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention relates to that class of clocks in which electrical energy replaces the usual weight or mainspring, and has for its object, in addition to avoiding the necessity of winding up such weight or spring, to secure a source of energy combining electricity and the force of gravity, whereby a more regular and improved action will be attained than with electricity alone.

The invention consists in the combination, with the arbor, which is usually rotated by a falling weight or a mainspring, of ratchet-wheels rigidly secured to such arbor, frames mounted loosely on the shaft and carrying pawls to engage with such ratchets, electro-magnets having their armatures provided with arms extended on one side of the pivoting-point to secure a preponderance of weight and connected with said frames, and make-and-break mechanism worked from such arbor for passing the electric current from a suitable battery alternately through different magnets to operate the different armatures and frames.

For full comprehension, however, of the invention, reference must be had to the annexed drawings, in which like symbols indicate corresponding parts, and wherein—

Figure 1 is a plan view of the operating parts of my clock; Fig. 2, a rear elevation of same, and Fig. 3 a detail elevation of the make-and-break mechanism.

A is any suitable wooden base, on which is mounted a metal frame B of the required construction to carry the usual clock-work, all of which is used, with the exception of the weights or springs and the parts for winding up same, C being the dial, C′ the index-arbor, and $C^2$ the balance-wheel, which, however, form no part of my invention. The main arbor, or that upon which the usual spring or weight would act, is shown at $C^3$, being extended from the frame B to another support or standard B′, mounted on the base A near the rear. This arbor $C^3$ carries two ratchet-wheels D and E, which are rigidly secured to it, and two frames D′ and E′, mounted loosely. These frames are preferably made in the form shown—*i. e.*, each having two side strips connected together at their ends, so as to leave a central intervening space, which is occupied by the ratchet-wheel. Pawls *d* and *e* are carried on the upper sides of corresponding ends of each of the frames D′ and E′, respectively, and the opposite ends thereof are respectively connected by means of links or rods to the ends of the extended arms $D^2$ $E^2$ of the armatures proper $D^3$ $E^3$, which are fulcrumed on the respective spindles F G, having bearings in the standards F′, G′, and H, which, together with pairs of electro-magnets $D^4$ $E^4$, located beneath the armatures $D^3$ $E^3$, are mounted on the base A. Also on the arbor $C^3$, and midway between the two ratchet-wheels D and E, are mounted rigidly two spur-wheels $D^5$ $E^5$, the spurs or teeth of each of which are equally spaced, but alternate with each other in passing any given point, this arrangement being for the purpose of passing the electric current alternately through the magnets $D^4$ $E^4$, as will now be described.

J is a contact-plate projecting from the base A and forming one terminal of the battery, (indicated at X,) and $D^6$ $E^6$ are contact-fingers (forming the opposite terminals) projecting down, respectively, from spring-strips $D^7$ $E^7$, which extend, respectively, from bearing-plates $D^8$ $E^8$ to the spur-wheels $D^5$ $E^5$, these plates being connected together with insulation intervening and suitably mounted on the base A.

The circuit between the opposite poles of the battery X and the terminals J and $D^6$ $E^6$ is secured by means of a wire K between the negative pole and the plate J, another wire $K^2$ from the positive pole through the pair $D^4$ of electro-magnets to a binding-post $d^7$ on the bearing-plate $D^8$, with which the spring-strip $D^7$ is in electrical contact, and by a branch wire $K^3$ taken from the wire $K^2$ through the pair $E^4$ of electro-magnets to another binding-post $e^7$ on the bearing-plate $E^8$, with which the spring-strip $E^7$ is in electrical contact.

The operation of the parts is as follows:

Fig. 3 shows the finger $D^6$ out of contact with the terminal plate J and the finger $E^6$ in contact therewith, the result of which is that a current is passing through the magnets $E^4$ and the armature $E^3$ is attracted by the cores of such magnets, so that the arm $E^2$ is raised, and with it the end of the frame E′, with which such arm is connected, and the opposite end of such frame carrying the pawl *e* lowered. The arm $D^2$, we will suppose, is by the force of gravity falling from a position corresponding to that in which the arm $E^2$ now is, and in so doing is rotating the arbor $C^3$ in the direction indicated by the arrow by means of the frame D′, pawl *d*, and ratchet D, and just as it reaches its lowest point the spring-strip $D^7$ slips off the tooth of the spur-wheel that is holding it out of contact with the plate J, and simultaneously with its finger $D^6$ reaching such plate the finger $E^6$ is raised out of contact with same, the result being that the arm $D^2$ is instantaneously drawn up, and as the current has been diverted from the magnets $E^4$ to those $D^4$ the armature $E^3$ is freed and the arm $E^2$ begins to fall by its own weight and so rotate the arbor $C^3$ in the same direction and for the same distance as by the falling of the arm $D^2$.

What I claim is as follows:

1. In an electric clock, the combination, with the driving-arbor in gear with the usual clock-work mechanism intervening between it and the index-arbor, of electro-magnets and armatures, the latter extended in length and pivoted at a point which will place a preponderance of weight on one side thereof and furnish sufficient surface for attraction by such magnets on the other, a battery, and make-and-break mechanism operated from said arbor for passing the current from such battery alternately through different magnets to elevate the heavier ends of said armatures, and connections between these latter and said arbor, whereby upon their being released they will drop and rotate such arbor, as set forth.

2. In an electric clock, the combination, with an extended main arbor in gear with the usual clock-work mechanism intervening between it and the index-arbor, of ratchet-wheels rigidly secured to such main arbor, frames mounted loosely on same and carrying pawls to engage said ratchets, electro-magnets and armatures, each of the latter having an arm extended on one side of the pivoting-point of the armature and connected with said frames, a battery, and make-and-break mechanism operated from said arbor for passing the current from such battery alternately through different magnets controlling different armatures, as and for the purposes set forth.

EDOUARD LEFEBVRE.

In presence of—
WILLIAM EVANS,
FRED J. SCARS.