(No Model.)

2 Sheets—Sheet 1.

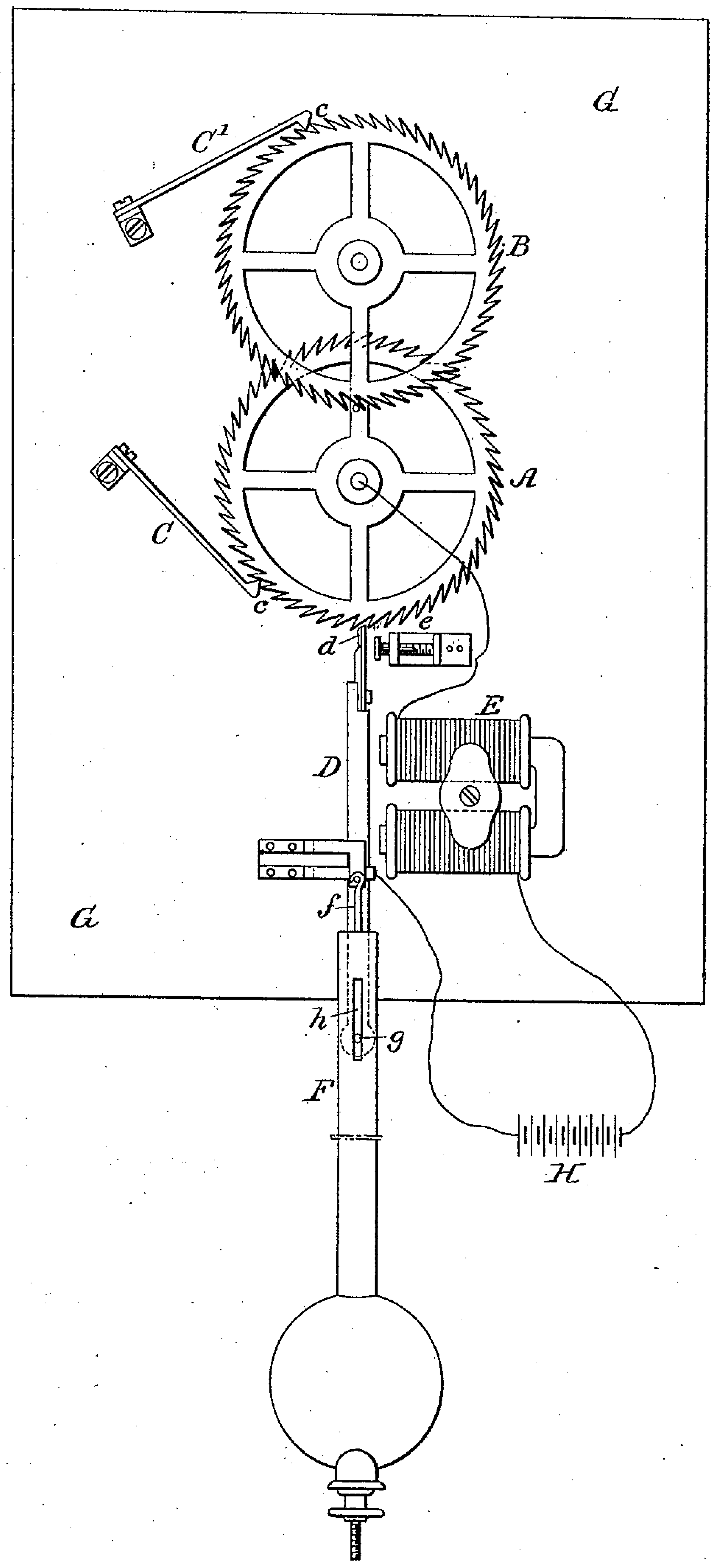
S. SCHISGALL.

ELECTRIC CLOCK.

No. 300,139.

Patented June 10, 1884.

FIG.1.



WITNESSES:
John E Parker
James F Tobin

INVENTOR:
Solomon Schisgall
by his Attorneys
Howson & Sons

N. PETERS. Photo-Lithographer, Washington, D. C.

(No Model.) 2 Sheets—Sheet 2.

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FIG. 3.

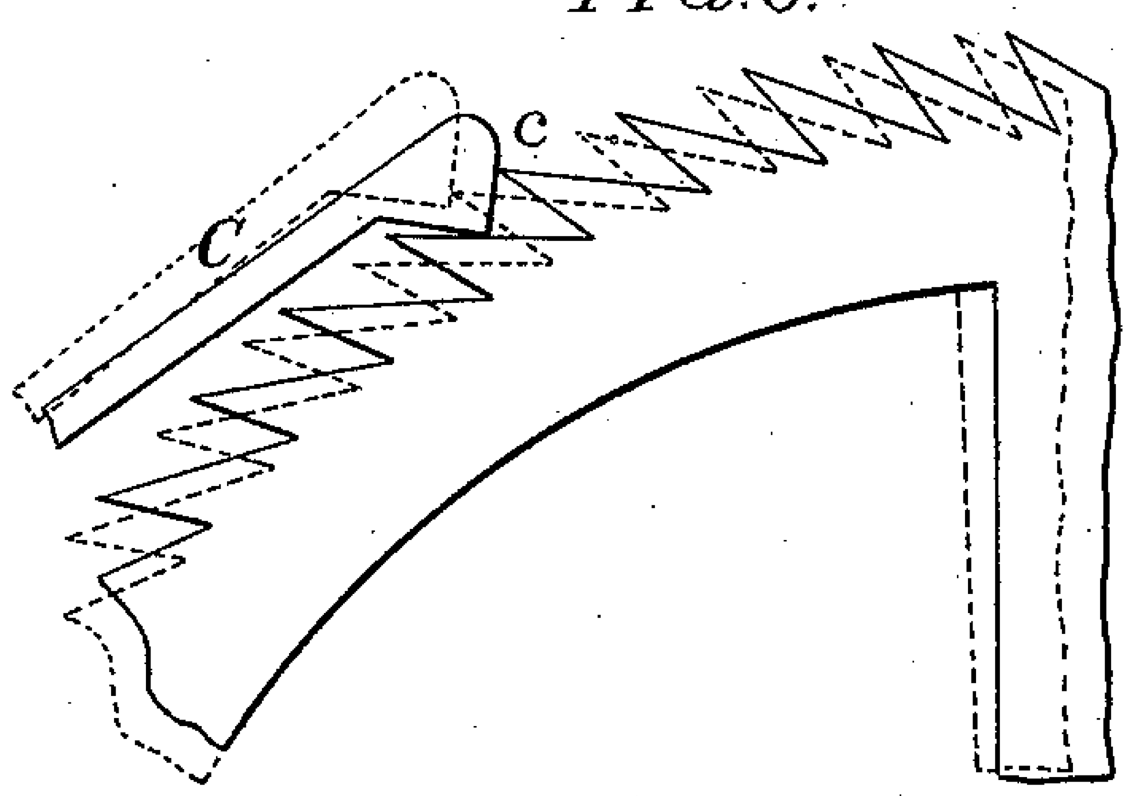


FIG. 2.

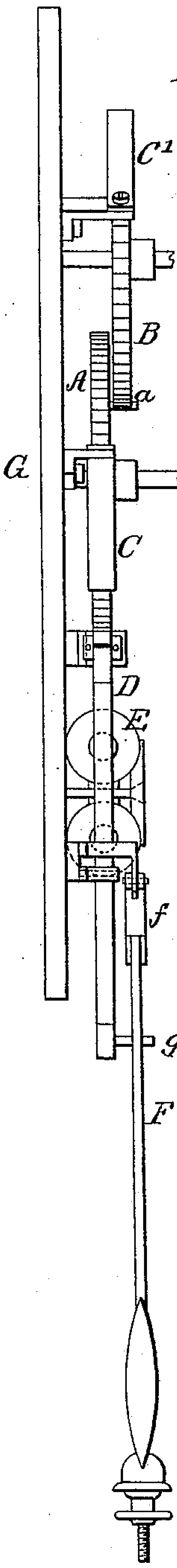
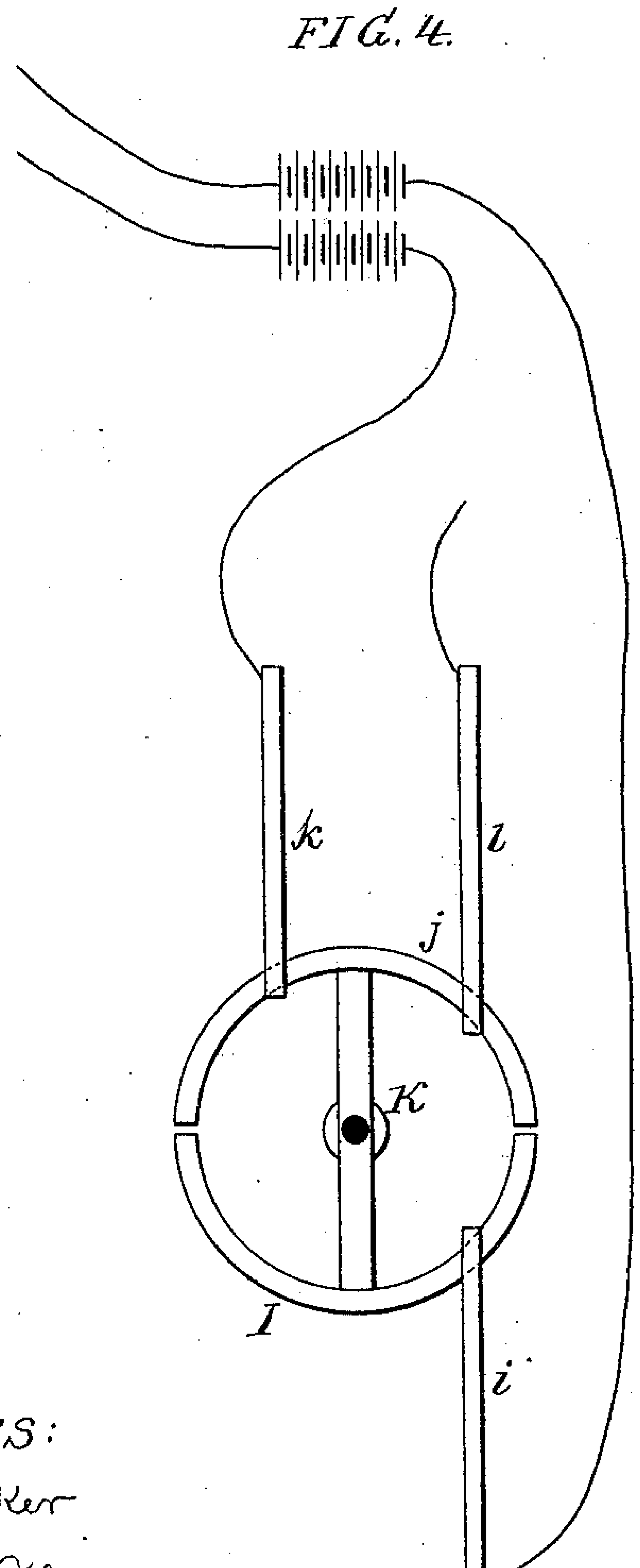


FIG. 4.



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UNITED STATES PATENT OFFICE.

SOLOMON SCHISGALL, OF ST. PETERSBURG, RUSSIA.

ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 300,139, dated June 10, 1884.

Application filed November 8, 1883. (No model.) Patented in Belgium October 19, 1883, No. 62,932; in France October 22, 1883, No. 158,175; in Germany October 24, 1883, No. 27,382; in England October 30, 1883, No. 5,153; in Portugal November 21, 1883, No. 875; in Italy December 31, 1883, XXXII, 26; in India January 7, 1884, No. 213, and in Spain January 19, 1884, No. 5,135.

To all whom it may concern:

Be it known that I, SOLOMON SCHISGALL, a subject of the Czar of Russia, and residing in St. Petersburg, Russia, have invented certain Improvements in Electric Clocks not requiring winding up, of which the following is a specification.

My invention consists of certain improvements in the construction of electric clocks, as more fully described hereinafter.

In the accompanying drawings, Figure 1 is a view of the working parts of my improvement. Fig. 2 is a side view of the same. Fig. 3 is an enlarged view of a portion of one of the wheels and its springs, and Fig. 4 is a diagram of a modification.

In the drawings I have not illustrated the dial, hands, or intermediate gear for transmitting motion to the hands, as these may be of any usual construction.

G represents the board upon which the whole clock mechanism is to be mounted and shut up in a case with the usual glass front.

The mechanism for putting the hands in motion consists of two wheels, A and B, mounted in suitable bearings, the wheel A being for the second-hand, while the wheel B operates the minute-hand. Each of these wheels is provided with sixty inclined teeth, disposed in opposite directions, as shown in Fig. 1. To the face of the wheel A is fixed a projecting pin, *a*, which at every revolution of the second-wheel A moves the minute-wheel B the extent of one tooth. C C′ are two springs ending in triangular heads *c*, which press against the teeth of the corresponding wheels, A and B. The shape of these heads is calculated in such a manner that when the wheel A (or B) turns the ends of the corresponding spring, C, (or C′,) is first lifted up by a tooth of the wheel, and thereupon leaps over the tooth and compels the whole wheel to move on in the same direction to half the distance between the teeth, as clearly shown in Fig. 3. The second-wheel A is put in motion by the lever D, pivoted to the frame, and having at its upper end the spring *d*, the left side of which is insulated by a piece of glass, or in any other suitable way. The lever D is attracted by the electro-magnet E, when the circuit is closed; but before reaching the electro-magnet the spring *d* of the lever comes into contact with the regulating-screw *e*, which is placed in such position that when the lever D is oscillating the spring *d* touches one of the teeth of the wheel A, and the moment when the spring C leaps over the next tooth of this wheel, Fig. 3, the spring *d* is instantly stopped by the end of the screw *e*.

On the prolongation of the bearing-piece for the lever D the half-second pendulum F is suspended by the flexible spring *f*. This pendulum is connected with the lower arm of the lever D by the pin *g*, fixed to this lever, and freely passing through the slot *h* of the pendulum F.

On the axle of the minute-wheel B is placed an ordinary set of pinions, serving to put the hour-hand in motion.

In the casing of the clock, or at some other convenient place, is a galvanic battery, H, (in most cases two elements of Leclanché's system are sufficient.) One conducting-wire is connected with the lever D, while the other connects with a terminal of the electro-magnet E. The other terminal of this electro-magnet is connected with the metallic support of the axle of the wheel A.

When the pendulum F is in a vertical position, Fig. 1, the clock is at rest and the end of the spring *d* out of contact with the teeth of the wheel A, the current is interrupted, and the electro-magnet E does not attract the lever D; but when the pendulum is moved a little to the left the spring *d* touches a tooth of the wheel A and closes the circuit, in consequence whereof the electro-magnet E attracts the lever D, which turns the wheel A sufficiently to permit the end of the spring C to leap over the corresponding tooth, whereupon the lever D is instantly stopped by the screw *e*. In the meantime the spring C compels the wheel A to move on, as described above, in consequence whereof the contact between the wheel and the spring *d* is suspended and the circuit again interrupted, the electro-magnet E is demagnetized, and the pendulum F makes two motions (right and left) freely by the momentum acquired. By the pendulum's motion to the right the conditions undergo no alteration, because the left side of the spring *d*, being isolated, does not close the circuit even in case the spring was to touch the teeth of the wheel A; but when the pendulum F moves on to the left—*i. e.*, when the spring *d* is inclining to the right—the metallic surface of the spring *d* once more meets a tooth of the wheel A and again closes the circuit, so that the electro-magnet E is magnetized anew and attracts again the lever D, which, turning the wheel A, compels the head *c* of the spring C to leap over the next tooth and to move the wheel A farther on, in order to suspend the contact between this wheel and the spring *d*. In consequence, the electro-magnet E is again magnetized, and so on. Thus the lever D receives impulses whose force is partly spent in helping the end of the spring C over the teeth of the wheel A, and partly transmitted by means of the pin *g* to the pendulum F and maintains its oscillating motion. When the end of the screw is placed so as to touch the spring *d* at a vertical position of the pendulum, then a motion of the latter to the right will interrupt the circuit, which will close again as soon as the spring *d* catches the next tooth, (on the left.) It needs no explaining that thereby the action of the clock is not altered.

The power of the galvanic battery must be superior to the power required for complete saturation of the electro-magnet E, in order that even when the battery's power is diminished the magnetic force of the electro-magnet E is not reduced, and sufficient to keep the clock correctly going.

For increasing the duration of the clock's motion a commutator (represented separately in Fig. 4) may be set on the axle of the seconds-wheel, and destined for connecting the above-described clock-work alternately with two batteries, H H'.

The commutator consists of two metallic semicircles, I J, connected with each other by a wooden or other isolating cross-piece, K, so that the two semicircles form together a complete circle cut through in two places. In combination with this commutator are three springs, *i*, *k*, and *l*, whereof the springs *i* and *k* are always in contact with the opposite semicircles I and J, while the spring *l* presses on either semicircle, no matter on which. The anode of the one galvanic battery, H, is connected with the spring *i*, and the anode of the other battery, H', is connected with the spring *k*, while the two cathodes of both batteries H and H' are connected with the lever D, Fig. 1. The third spring *l* is connected with one terminal of the electro-magnet E, whose other terminal is connected, as aforesaid, with the wheel A. It is easily understood that when this wheel turns, together with the described commutator, the batteries H and H' will act alternately, each for fifteen seconds. Small interruptions in the action of these batteries during the passage of the springs over the spaces between the ends of the semicircles I and J have no influence upon the regular movement of the clock mechanism, for the pendulum continues to oscillate even when not acted upon by the electro-magnet E for some seconds.

I claim as my invention—

1. In an electric clock, the combination of a toothed actuating-wheel, A, pendulum, electro-magnet, and armature-lever having a spring, *d*, closing the circuit through the said wheel and the clock-work, with a spring, C, acting on said wheel A to push it forward and break its contact with the spring *d*, substantially as set forth.

2. The combination of the actuating-wheel A of an electric clock, a pendulum, an electro-magnet, armature-lever D, having a spring, *d*, making contact with said wheel, with two electric batteries adapted to be put in circuit through the coils of said electro-magnet to operate the clock, and a commutator operated by said wheel to throw one or other of the batteries into circuit alternately, all substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

SOLOMON SCHISGALL.

Witnesses:

FREDERICK KAUPE,
NICHOLAS TSCHEKALOFF.