No. 753,757. PATENTED MAR. 1, 1904.

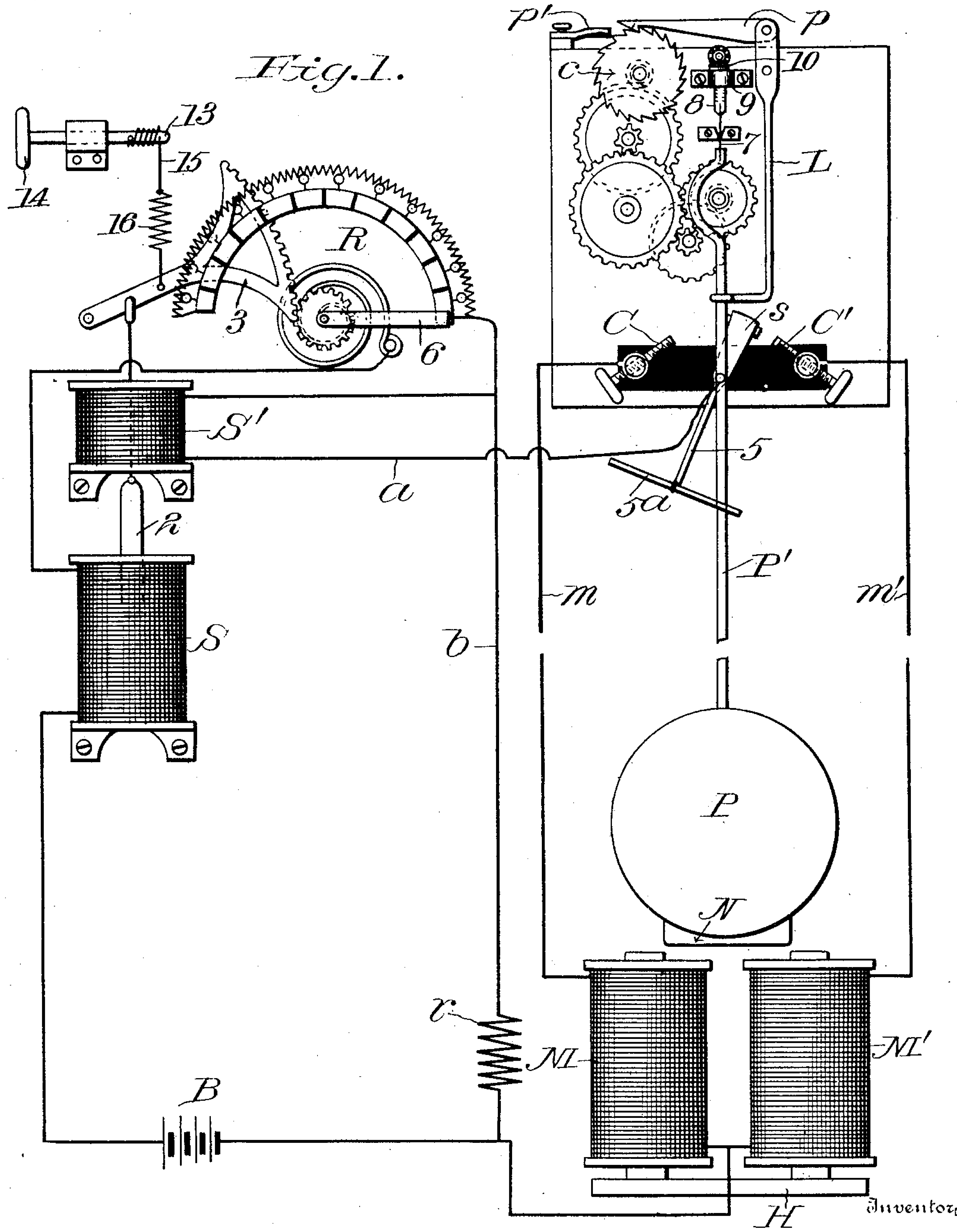
F. T. TALCOTT & B. F. KERR.

SELF WINDING ELECTRIC CLOCK.

APPLICATION FILED MAR. 11, 1903.

NO MODEL. 2 SHEETS—SHEET 1.

Fig. 1.



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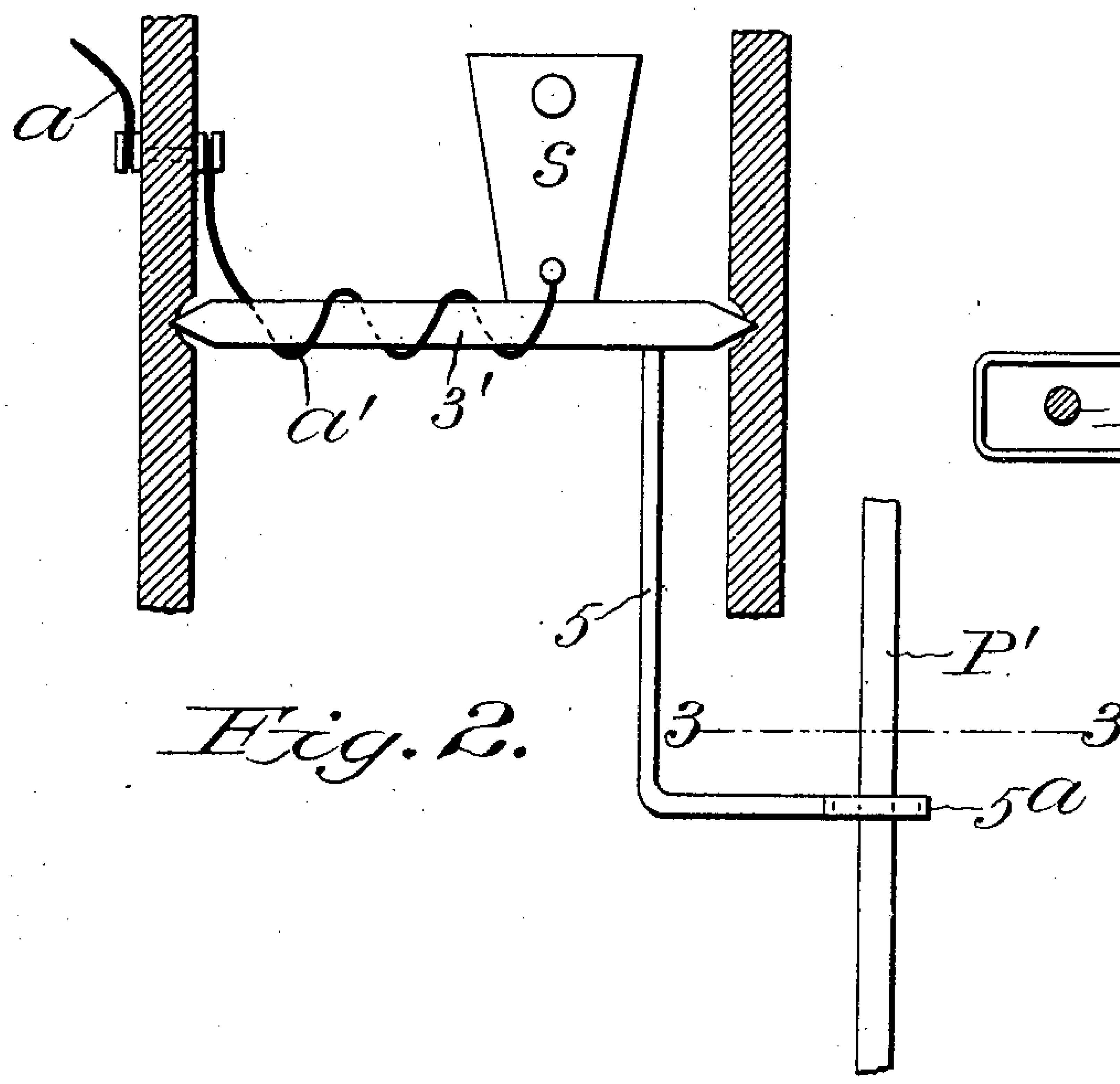

Fig. 2.

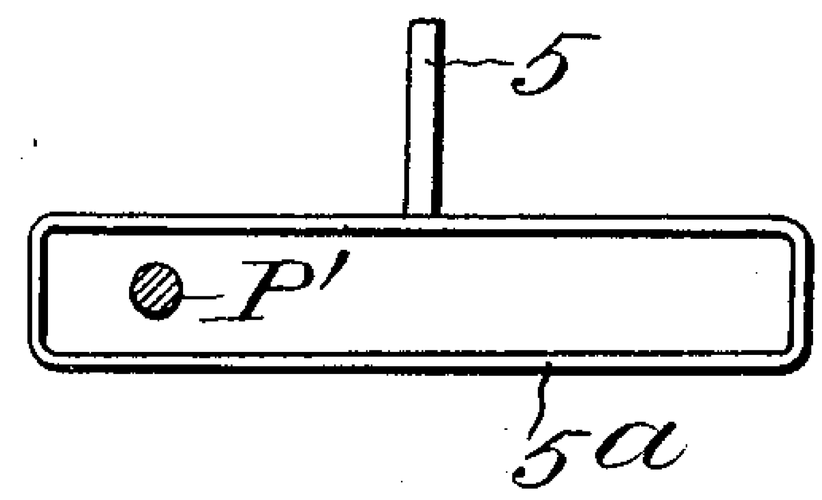

Fig. 3

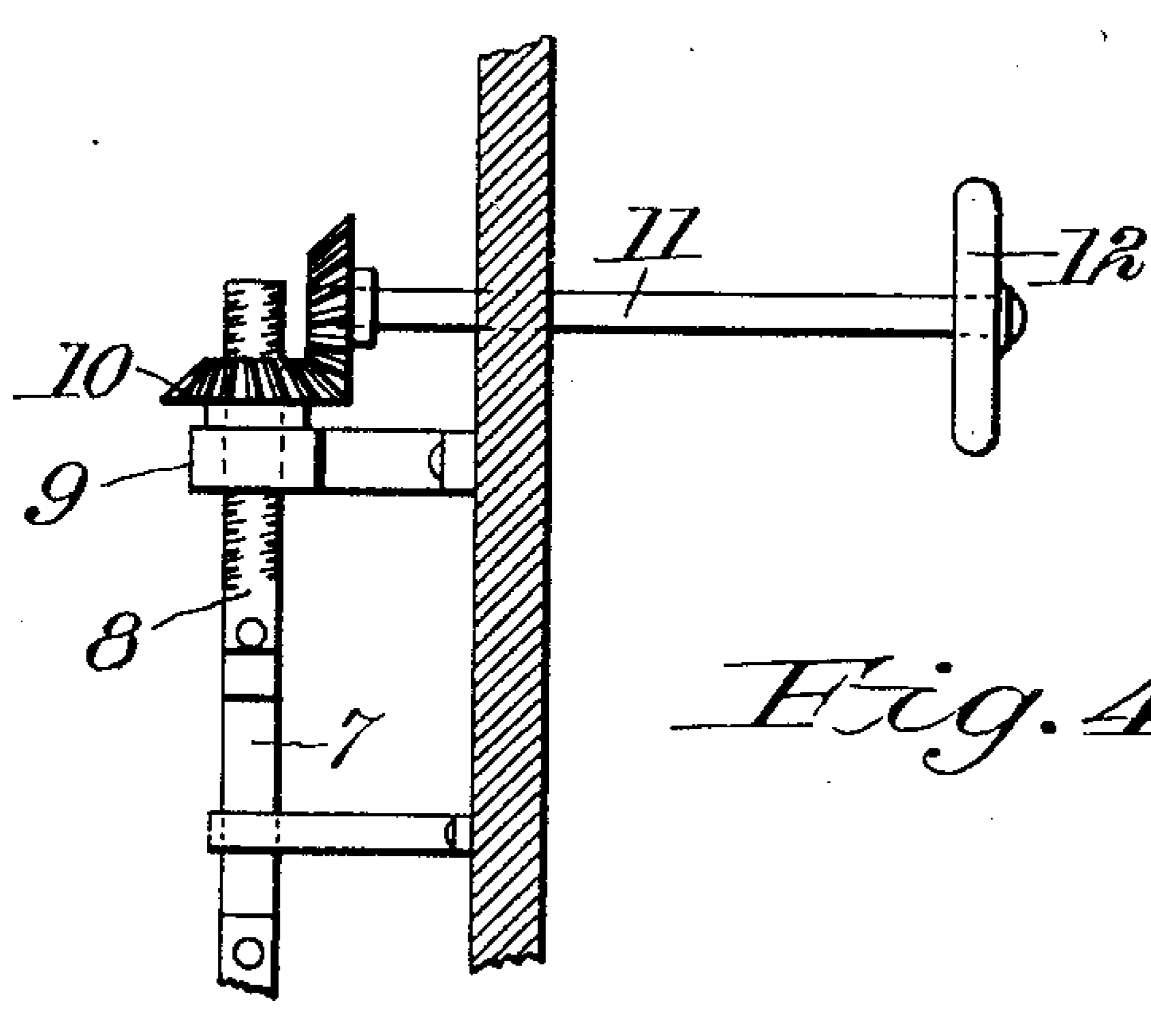

Fig. 4.

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UNITED STATES PATENT OFFICE.

FRANK T. TALCOTT AND BENJAMIN F. KERR, OF ASHTABULA, OHIO.

SELF-WINDING ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 753,757, dated March 1, 1904.

Application filed March 11, 1903. Serial No. 147,208. (No model.)

To all whom it may concern:

Be it known that we, FRANK T. TALCOTT and BENJAMIN F. KERR, citizens of the United States, residing at Ashtabula, in the county of Ashtabula and State of Ohio, have invented certain new and useful Improvements in Electric Clocks; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form a part of this specification.

This invention relates particularly to electric clocks in which the pendulum is actuated by the attraction and repulsion of electromagnets.

The object of the invention is to produce improved means for controlling the current by which the magnets are energized.

A further object is to form an improved switch for alternating the magnets according to the swing of the pendulum.

A further object is to form an improved device for transmitting the swing of the pendulum to the clock-train.

A further object is to generally improve the circuit and current arrangements of such a clock to deliver an adjustable constant current irrespective of battery strength.

With these and other objects in view the invention is illustrated in the accompanying drawings, in which—

Figure 1 is a diagrammatic elevation of the clock. Fig. 2 is a detail in side elevation of the switch. Fig. 3 is a section of the line 3 3 of Fig. 2. Fig. 4 is a detail in side elevation of the means for adjusting the length of the pendulum.

Referring specifically to the drawings, a pair of actuating-electromagnets are indicated at M and M′, which are arranged adjacent to and in line with the swing of the pendulum P, which carries the permanent bar-magnet N. The magnets are connected by an iron yoke H. The circuit also contains the battery B, a large solenoid S, a rheostat R, a smaller solenoid S′, which is arranged above the large solenoid S and acts in opposition thereto, whence the conducting-wire *a* extends to connection with the switch *s*. The electromagnets are respectively connected by wires *m* and *m′* to contact-screws C and C′, adapted to alternately contact with the switch. In a bridge *b* in the circuit, connected between the rheostat and the smaller solenoid and between the magnets and the battery, is a resistance-coil *r*, the resistance of which is substantially equal to the resistance of the circuit through the magnets. The core 2 of the solenoids is connected to and actuates the segment 3 of the rheostat, whereby the arm 6 thereof is caused to move over the contact-segments of the rheostat according to the amount of current.

In general operation when the pendulum is drawn to one side over the electromagnet—say M′—the switch is thrown by the pendulum to contact with screw C, which causes the current to flow through the magnet M, giving a south polarity to its top pole and a north polarity to the top pole of the magnet M′ by means of the yoke H, whereby the electromagnet M is caused to attract the magnetized armature N and the eleetromagnet M′ to repel the same, thereby producing the swing of the pendulum. This action is reversed when the pendulum swings over the mrgnet M.

The main or operating circuit is from the battery through the large solenoid S, the rheostat R, the small solenoid S′, the circuit-wire *a*, the switch *s*, and one contact, C or C′, and magnets M or M′, and thence back to the battery. The branch closed circuit *b* is connected to one arm of the main circuit between the rheostat and the small solenoid and extends across to the other arm between the magnets and the battery.

When the switch is out of contact with both contact-pieces C C′, the current flows through the bridge *b* and the resistance *r* therein. This prevents breaking the circuit and jumping or great fluctuation of the solenoid-core. When the switch is in contact with either contact-screw, there is necessarily double the amount of current through the solenoid S, and the fluctuation of the core and rheostat, which would otherwise be caused thereby, is corrected by the solenoid S′, which, as will be seen, is only active when the switch is in contact. An effective means of circuit control is thus produced whereby a practically constant circuit is assured irrespective of the strength of battery. Consequently uniformity in the vibration of the pendulum is assured.

The details of the switch are illustrated in Figs. 1, 2, and 3. When thrown beyond the perpendicular by the movement of the pendulum, it acts by gravity, being mounted upon a rock-shaft 3′, which is connected by a rod or bar 5 to an elongated cage or loop 5^a, within which the pendulum-rod P′ swings. The loop or cage is of such size that the pendulum-rod strikes the end thereof and throws the switch in the opposite direction beyond the perpendicular at the moment that the pendulum is directly above one of the magnet-cores. After passing the perpendicular the switch falls by its weight to the contact-screw. The friction is thus reduced to a minimum. *a′* is a fine wire wound around the shaft to insure conduction from the switch-plate *s* to the circuit-wire *a*.

The movement of the pendulum is communicated to the clock-train by means of the lever L, one arm of which is looped around the pendulum-rod in a well-known manner and the other arm of which carries the pallet *p*, which engages and actuates the ratchet-wheel *c*. Back slip is prevented by a spring-pawl *p′*, which is so located as to insure that the pallet will take only one tooth of the ratchet-wheel at a time. Should the swing of the pendulum carry the pallet beyond one tooth, it will ride over the pawl and not take the second tooth. The arrangement illustrated actuates the train at alternate beats of the pendulum. Obviously a double-pallet arrangement might be substituted to give movement at each beat.

To adjust the length of the pendulum, we employ means illustrated in Fig. 4, wherein the end of the pendulum-rod above the thin flexible portion 7 thereof is squared, as at 8, and passes through a bracket 9 and is threaded at the corners to receive a nut 10, resting upon the bracket. This nut carries a miter-pinion in mesh with a similar pinion on a spindle 11, which extends through the clock-plate and is turned by a hand-wheel 12 on the outside. This permits the pendulum to be adjusted without stopping the clock.

Adjustment of the pendulum raises or lowers the permanent magnet in the magnetic field, and consequently varies the magnetic force. To compensate for this, the resistance of the rheostat R may be varied by adjustment of its segment 3. This adjustment may be effected in any suitable way. We have illustrated a spindle 13 to be turned by hand-wheel 14 and carrying at its end a cord or wire 15, connected to a spring 16, which is connected to the segment 3. By winding or unwinding the cord 15 the tension of the springs 16, and consequently the location of the segment and the rheostat-arm is varied, and with it the current and the strength of the magnets.

What we claim as new, and desire to secure by Letters Patent, is—

1. In an electric clock, the combination with a pendulum, an electric circuit, and means in the circuit to drive the pendulum, of a rheostat in the circuit, and oppositely-acting solenoids in the circuit on opposite sides of the rheostat, controlling the resistance thereof.

2. In an electric clock, the combination with electric driving means including a switch and magnets, of a constantly-closed circuit, a rheostat therein, an operating branch circuit containing the switch and magnets, and a solenoid in each circuit acting oppositely upon the rheostat.

3. In an electric clock, the combination with electromagnets, and a pendulum actuated thereby, of a switch controlled by the pendulum and comprising a pivoted switch-plate acting by gravity, contacts on opposite sides thereof, connected to the magnets, and an arm connected to the plate and engaging the pendulum, and acting to rock the plate beyond the perpendicular, in opposite directions alternately, substantially as described.

4. In an electric clock, the combination, with a pendulum, an operating-circuit, means actuated thereby to drive the pendulum, a rheostat in the circuit, oppositely-acting solenoids in the circuit on opposite sides of the rheostat, for varying the resistance thereof, of a branch constantly-closed circuit extending across between the arms of the main circuit and connected thereto between the rheostat and one of the solenoids, and a uniform resistance in said closed circuit.

In testimony whereof we affix our signatures in presence of two witnesses.

FRANK T. TALCOTT.
BENJAMIN F. KERR.

Witnesses:
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HARRY K. BRAINARD.