

3 Sheets—Sheet 1.

No. 272,100.

Patented Feb. 13, 1883.



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(No Model.)

3 Sheets—Sheet 2.

D. F. SWEET.
ELECTRIC CLOCK.

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Fig. 2.

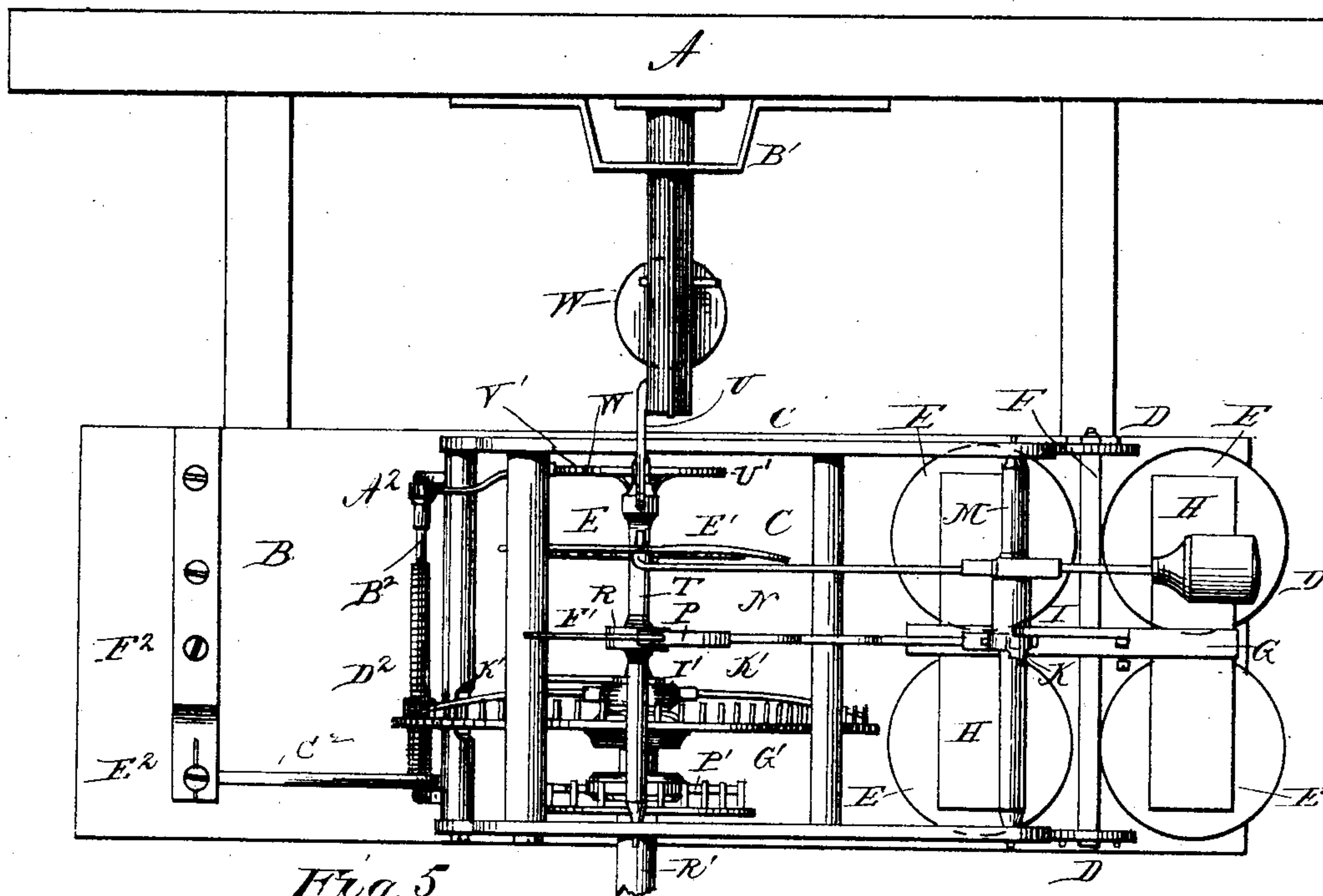


Fig. 5

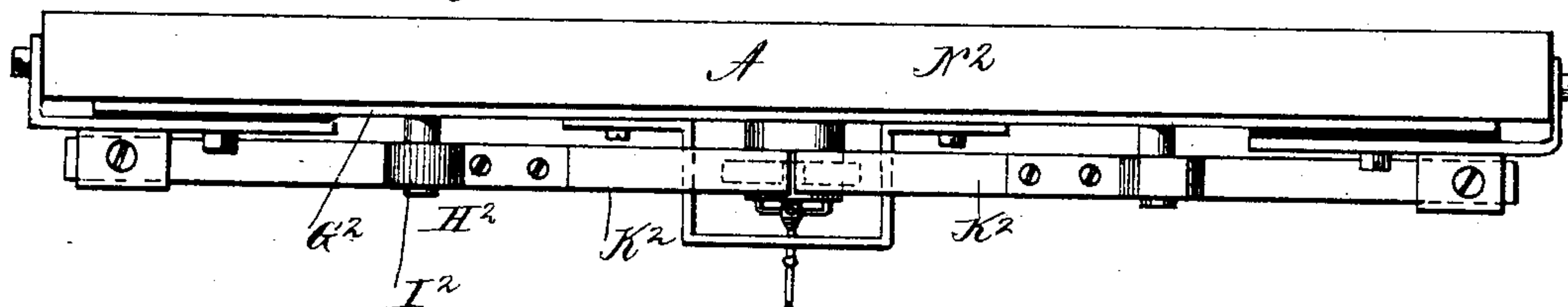


Fig. 9.

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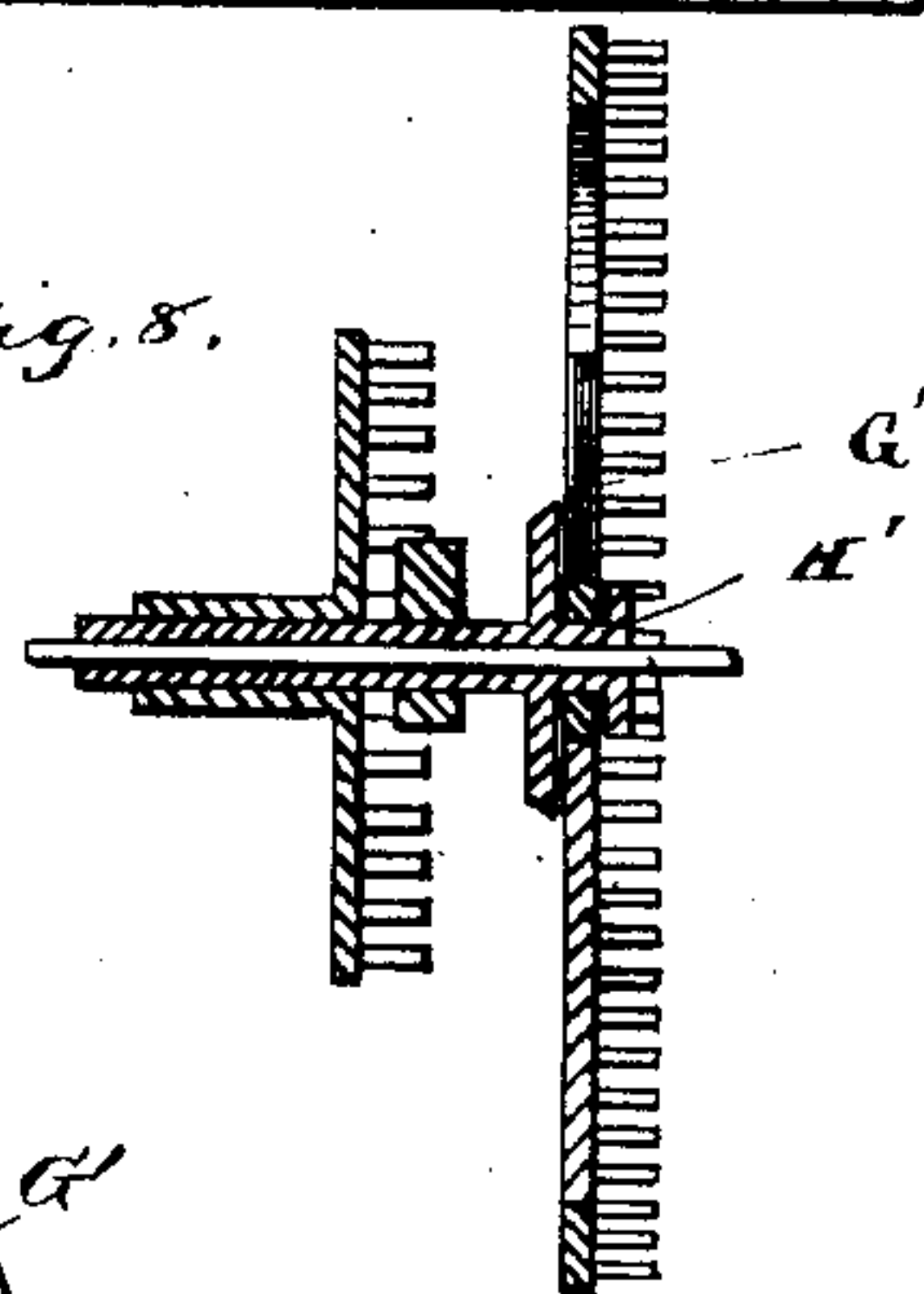
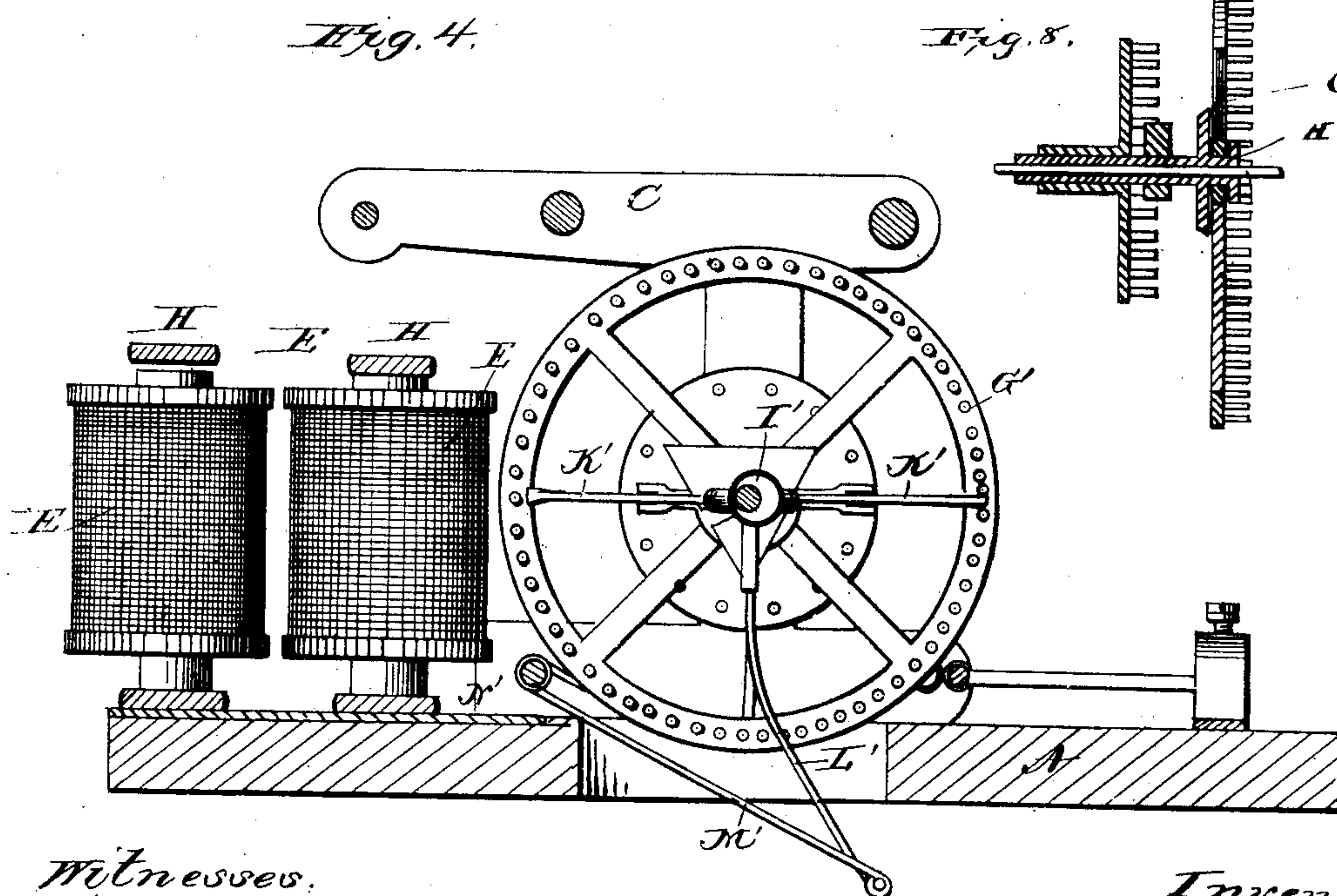
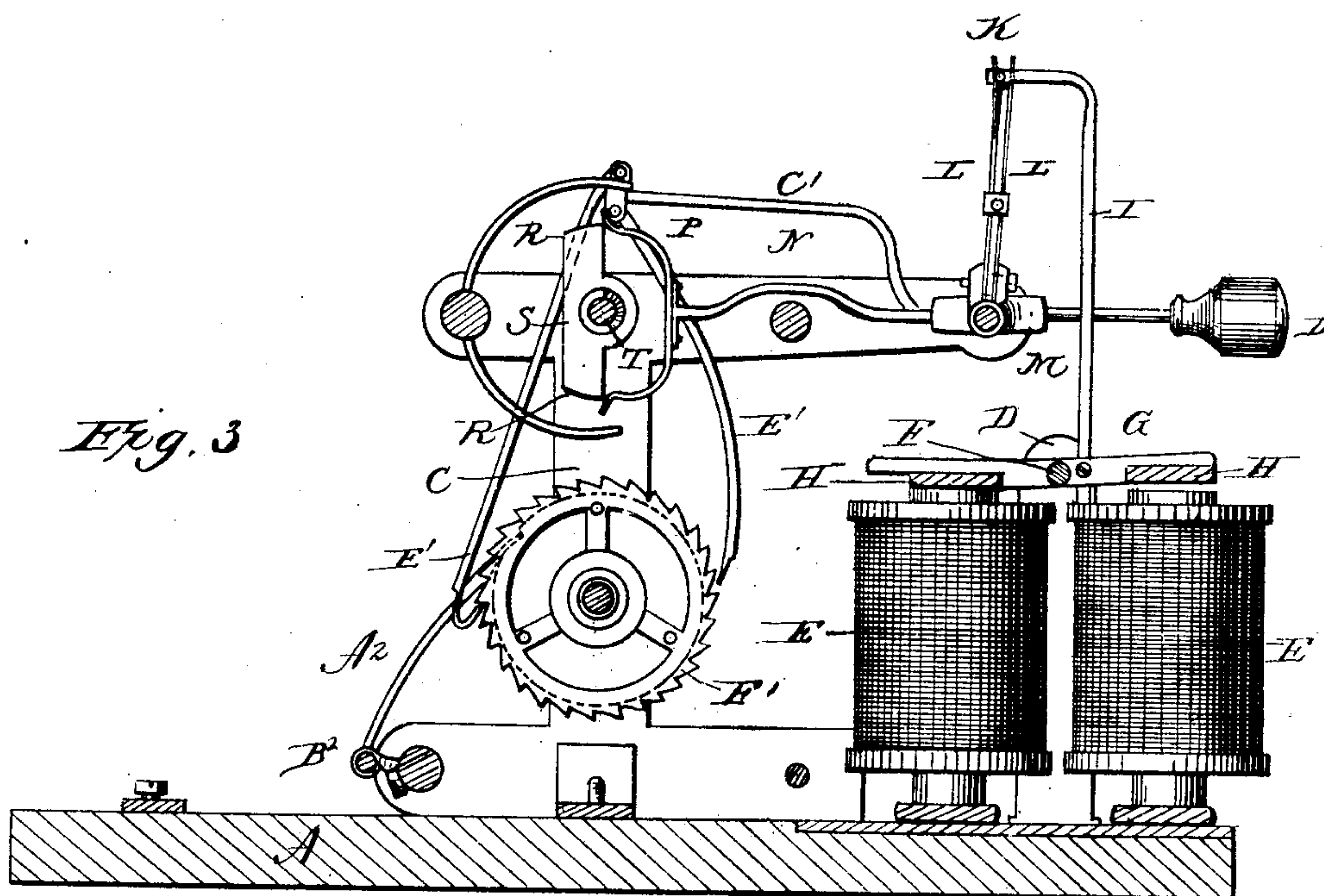
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UNITED STATES PATENT OFFICE.

D. FRED SWEET, OF HASTINGS, MICHIGAN.

ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 272,100, dated February 13, 1883.

Application filed August 1, 1882. (No model.)

To all whom it may concern:

Be it known that I, DANIEL FRED SWEET, of Hastings, in the county of Barry, and in the State of Michigan, 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 thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, making a part of this specification.

This invention relates to certain improvements in clocks or chronometers of that class in which an electro magnet or magnets, in connection with a suitable battery and circuit-breaker, are employed in the place of the usual springs to furnish the motive power to the mechanism; and it has for its objects, first, to provide an improved means for transmitting the power induced by an intermittent electrical current through the helices of the magnet or magnets to the clock mechanism; second, to provide an improved primary circuit-breaker to be operated by the pendulum, in connection with a suitable battery or electric generator, to establish an intermittent electric current through the helices of an electro magnet or magnets to operate the clock mechanism; third, to provide, in connection with the clock or chronometer mechanism, an improved secondary circuit-breaker, whereby an intermittent electric current may be established to operate a secondary electric clock or a series of the same synchronously, as more fully hereinafter set forth; and, fourth, to provide certain improvements in the clock mechanism proper, as more fully hereinafter set forth. These objects I attain by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 represents a front elevation of my apparatus, showing the battery and primary connections. Fig. 2 represents a top view of the apparatus. Fig. 3 represents a longitudinal vertical section of the apparatus; Fig. 4, a similar view taken in the opposite direction; Fig. 5, a horizontal section taken on the line *xx* of Fig. 1. Figs. 6 and 7 represent detached views of a portion of the circuit-breaker. Fig. 8 represents a detached view, in section, of the wheels and shafts for driving the hands of the clock. Fig. 9 represents a detached view of a portion of the mechanism, showing the lever and pallets by which motion is transmitted from the electro-magnets to the clock-work.

The letter A indicates the supporting-board of the apparatus, which is provided with a bracket, B, which supports the clock mechanism.

The letter C indicates the frame supporting clock mechanism, the said frame being secured to the bracket B in any convenient manner.

The letter D indicates a frame secured to the bracket B, which supports the electro-magnets E. The said frame D, at its upper portion, has journaled in it a transverse rock-shaft, F, which is provided with an arm, G, to the ends of which are secured the armatures H, which are so arranged as to vibrate above the poles of the magnets, as more fully hereinafter described. The said arm G is provided with an upright standard, I, which is bent at its upper end, and is provided with a lateral pin, K, which is adapted to work between the two flat springs L, secured to a rock-shaft, M, journaled in bearings in the frame C. The said rock-shaft is provided with a lever, N, which at its free end is formed or provided with a bifurcated extension, P, which, during the oscillation of said lever, alternately engages the pallets R of the lever S on the rock-shaft T, and in connection therewith imparts the proper momentum to the pendulum to overcome the friction and maintain its movement. The rock-shaft T is journaled in suitable bearings in the frame C, and is provided with an oscillating arm, U, which has a pin at its extremity engaging the pendulum W, which is hung upon a spring vibrating support, A', attached to a bracket, B', secured to the supporting-board of the apparatus.

The letter C' indicates a vibrating lever secured to the rock-shaft M. The said lever, at its rear end, is provided with a counterpoise, D', and at its forward end with two pivoted pawls, E', which are adapted to engage alternately as the lever vibrates the ratchet-wheel F' on the second-hand shaft of the clock, so as to move the said ratchet-wheel the extent of two teeth at each vibration of the lever.

The letter G' indicates the minute-hand wheel, which is provided with a boss, H', mounted loosely on the second-hand shaft. The said wheel is provided with a series of equidistant pins, sixty in number, and the second-hand shaft is provided with a cam which operates an eccentric-strap, I', to give a reciprocating motion to the rods K', secured to the cam-strap, so as to cause the said bars to al-

ternately engage a pin on opposite sides of the wheel and rotate it to the extent of one pin to give the proper movement to the minute-hand. The bars are maintained in a horizontal position by means of a bar, L', secured loosely at its lower end to a bar, M', attached to the clock-frame at N', as indicated in Fig. 4 of the drawings. The boss of the minute-hand wheel is provided with a cam carrying a reciprocating dog, P', slotted at opposite ends. The said dog is adapted to work across the face of the hour-hand wheel, which is provided with a suitable sleeve or boss, R'. The said wheel is provided with a series of twelve pins, with which the ends of the dog are adapted to alternately engage to move the said hour-hand wheel. The dog is held in a horizontal position by means of an arm, S', connected loosely with an arm, T', secured to the frame.

The letter U' indicates a wheel mounted on the second-hand shaft. This wheel is notched on its periphery, as indicated by the letter V'.

The letter A² indicates a pawl secured to a rock-shaft, B², which carries an arm, C², the rock-shaft being provided with a spring, D², by which the pawl is thrown into the notch on the wheel U' once at each rotation of the wheel.

E² indicates an adjusting-screw mounted in a standard, F², in such position it may be adjusted with respect to the arm C² that the said arm will touch the end of the screw each time the pawl drops into the notch in the wheel U' for the purpose of closing an electric circuit, embracing a secondary or series of secondary clocks for the purpose of operating them synchronously with the primary clock.

The letter G² indicates a plate secured to the lower part of the supporting-board. The said plate has fulcrumed to it at H², by means of the coiled springs I², two levers, K², which are so arranged as to nearly meet at their contiguous ends. These levers are provided with steel plates L², which are alternately lifted by the friction-wheel M² on the oscillating collar or ring N², which is mounted loosely on a boss, P², secured to the plate G².

The letter S² indicates a rock-shaft, having a bearing at one end at the center of the boss P², and at the other in the end of an adjusting-screw, T², passing through the standard U².

The collar N² is provided with a pin, V², which is alternately engaged by the wires W² on the rock-shaft S², so as to operate the collar to alternately lift the levers K², as before mentioned.

The letter A³ indicates a rod secured to the rock-shaft S² at one end, the other end being bent, and setting in a slot, B³, in the pendulum, so that it will be oscillated thereby.

The letter C³ indicates two adjustable screws passing through insulated standards D⁴, secured to the plate G². The said screws are so adjusted that as the levers K oscillate they will come alternately into contact with the said screws, and establish alternately an electric current through the magnets of the clock, so as to oscillate the bar carrying the magnets,

and thus maintain the oscillation of the pendulum. The standards are connected with the helices of the magnets by means of the wires D³, and the said helices are connected with one pole of a suitable battery by means of the wires E³, the other pole connecting with the plate G² by means of a wire, F³.

The operation of my invention is as follows: The oscillations of the pendulum through the primary circuit-breaker alternately magnetize and demagnetize the magnets of the clock. This causes the arm carrying the armatures to vibrate, causing the arm carrying the lateral pin to oscillate. The pin alternately presses upon the springs on the arm of the vibrating lever, which in their reverse action operate the lever to keep up the motion of the pendulum. The clock-gearing is operated through the pawls working in the ratchets of the second-hand to actuate the respective hands, as before mentioned. At each revolution of the notched wheel on the second-hand shaft the second circuit maker and breaker will close the circuit of the secondary clocks, operating the same isochronously with the primary clock.

Having thus fully described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In combination with the electro-magnets and the primary circuit-breaker actuated by the pendulum, the vibrating arm carrying the armatures and a standard, and the vibrating arm provided with springs, the actuating-lever C, and pawls adapted to operate in connection with the first-mentioned standard to give motion to the clock mechanism, substantially as specified.

2. In combination with the rock-shaft M, provided with a standard carrying springs, L, adapted to be operated by the standard I, secured to the armatures of the magnets, the lever C', the bifurcated arm N, attached to the shaft M, and the rock-shaft T, carrying a lever, S, and pallets R, and the pawls E' adapted to operate the ratchet-wheel on the second-hand shaft, substantially as specified.

3. In combination with the electro-magnets, the primary circuit-breaker, consisting of the spring-fulcrumed levers, the oscillating ring mounted on a boss and provided with friction-wheels, the rock-shaft and rod connected with the pendulum, and the pins mounted on the oscillating ring and struck by the arms on the rock-shaft to vibrate the levers and alternately move them out of and allow them to come into contact with the adjusting-screws in electric circuit with the magnet, to break and establish a current alternately through the magnets, and a suitable battery and connections, substantially as specified.

In testimony whereof I affix my signature, in presence of two witnesses, this 1st day of August, 1881.

D. FRED SWEET.

Witnesses:

J. J. MCCARTHY,
H. AUBREY TOULMIN.