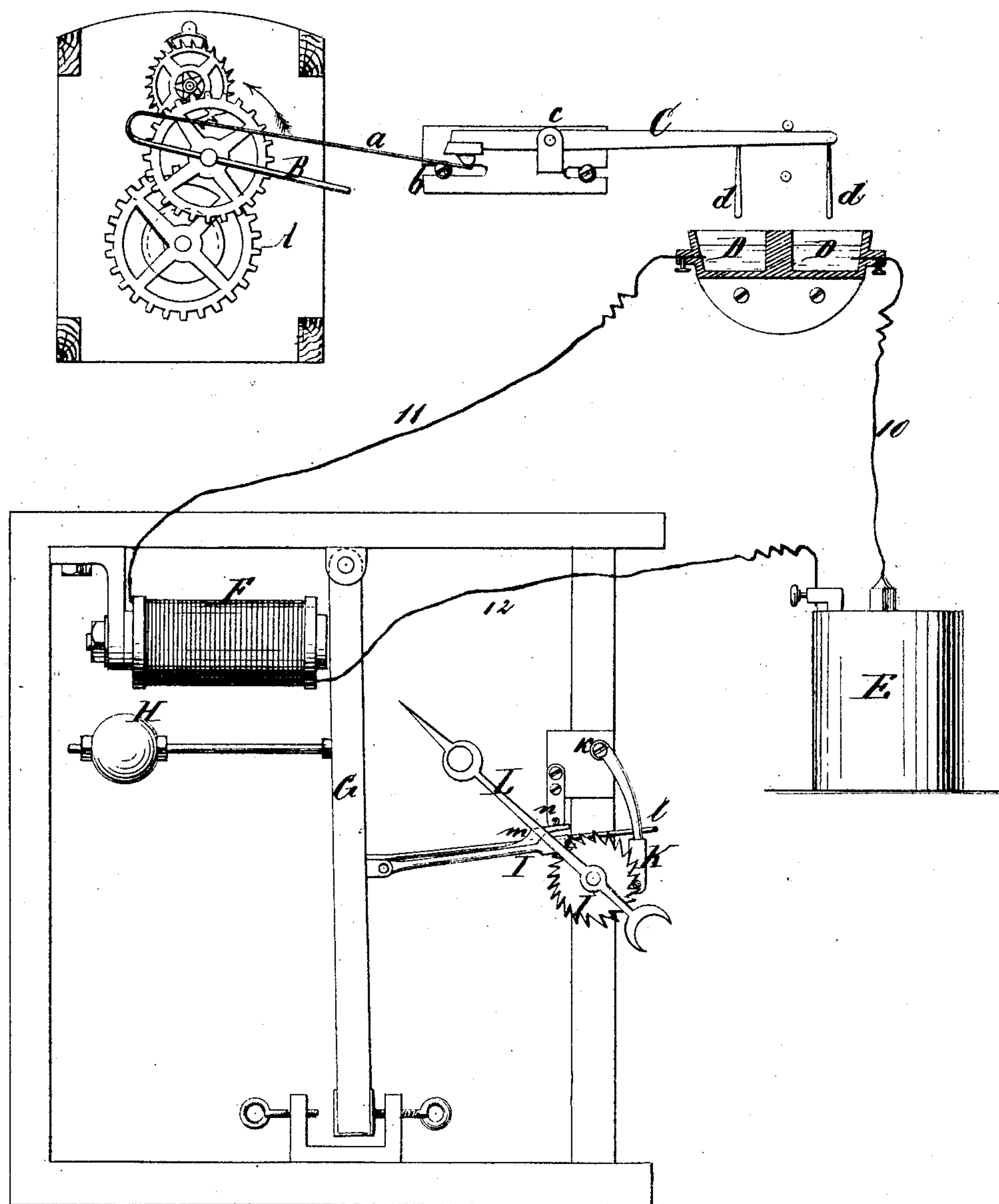


J. B. KERZ.
Electric-Clocks.

No. 148,469.

Patented March 10, 1874.



Witnesses :
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UNITED STATES PATENT OFFICE

JOHANN B. KERZ, OF MAINZ, GERMANY.

IMPROVEMENT IN ELECTRIC CLOCKS.

Specification forming part of Letters Patent No. **148,469**, dated March 10, 1874; application filed January 9, 1874.

To all whom it may concern:

Be it known that I, JOHANN B. KERZ, of Mainz, in the Empire of Germany, have invented a new and Improved Electric Clock; and I do hereby declare the following to be a full, clear, and exact description thereof, which will enable those skilled in the art to make and use the same, reference being had to the accompanying drawing forming part of this specification, which drawing represents a sectional front view of my clock.

This invention consists in the arrangement of an elastic arm which revolves once in a given period of time—say, in one minute—and which during its revolutions comes in contact with a fixed pin, so that it is first strained and then suddenly released. On being released it strikes a key, and causes the same to close instantaneously a circuit that passes through an electro-magnet, the armature of which carries a pawl that engages with a ratchet-wheel, in such a manner that whenever the circuit through the electro-magnet is closed the pawl is drawn back so as to take hold on a fresh tooth of the ratchet-wheel, and when the circuit is broken the armature returns to its original position, carrying the ratchet-wheel forward one tooth, and locking it in this position until the circuit is again closed. The key which controls the circuit is by preference constructed with two pins, and whenever the elastic arm strikes this key said pins are depressed into mercury-cups, one of which connects with one pole of a battery and the other with the helix of the electro-magnet, and through this with the other pole of the battery. By this key the closing of the circuit is rendered absolutely sure and instantaneous, so that for each revolution of the elastic arm the ratchet-wheel is propelled one tooth, and by fixing a hand on the arbor of this ratchet-wheel the desired intervals of time are indicated at any distance from the clock-movement which controls the motion of the elastic arm.

In the drawing, the letter A designates a clock-movement, on one of the arbors of which is fastened an arm, B. This clock-movement is, by preference, a simple second-pendulum, and the speed of the arbor which carries the arm B is so regulated that the same completes ex-

actly one revolution per minute. The arm B carries a spring, *a*, and as the arm turns in the direction of the arrow marked near it said spring comes in contact with a stop, *b*, so that it is first strained and then suddenly released. On being released, the spring strikes the heavy end of a gravitating key, C, which oscillates on a pivot, *c*, and from the light end of which project two pins, *d*. As the spring *a* strikes the heavy end of said key the pins *d* are suddenly depressed, so that the same dip into mercury contained in two cups, D D, which are insulated from each other, and one of which connects by a wire, 10, directly with one pole of a battery, E, while the other cup connects by a wire, 11, with one end of the helix of an electro-magnet, F. The other end of this helix connects by a wire, 12, with the second pole of the battery, or it may connect with the ground, and in this case the second pole of the battery also connects with the ground. As the pins *d* of the key are suddenly depressed into the mercury-cups, the circuit through the electro-magnet F is closed once for every revolution of the spring-arm B, and, as the electro-magnet becomes vitalized, the armature-lever G is attracted. As soon as the spring *a* has passed the key C, the heavy end of this key sinks down and the pins *d* are withdrawn from the mercury-cups, the circuit is broken, and the armature-lever G is carried back to its original position by a weight, H, or by a spring. To said armature is hinged a pawl, I, which engages with a ratchet-wheel, J, and when the armature is attracted this pawl recedes the distance of one tooth, so that when the armature-lever falls back to its original position the ratchet-wheel is propelled one tooth. With the ratchet-wheel J is combined a stop-pawl, K, which is suspended from a pivot, *k*, and serves to prevent the ratchet-wheel from turning backward. A hook, *l*, which is hinged to the armature-lever, holds the stop-pawl in gear, while the moving pawl takes a fresh tooth. The moving pawl is prevented from jumping out of gear by a guard, *m*, and stop *n*. By this arrangement the ratchet-wheel is locked in position every time it has been propelled one tooth, and the index-hand L, which is fastened to the arbor of said ratchet-wheel, and which may be unequally

balanced, can have no effect in throwing the same round in either direction. If the ratchet-wheel has sixty teeth, and receives an impulse once every minute, the index-hand L will complete a revolution once in an hour; or, in other words, it will represent the minute-hand of a clock.

It will be seen from the foregoing description that, by means of this arrangement, any desired number of clocks can be kept in motion by the action of the central pendulum, and all the clocks will show precisely the same time. By means of the elastic arm B and the key C dipping in mercury, the act of closing the circuit becomes absolutely sure and instantaneous, and, as soon as the current is closed, the armature of all the clocks in the circuit are attracted by their electro-magnets, the moving pawls take fresh teeth, and when the circuit is broken the several ratchet-wheels are propelled each one tooth, and the index-hands are turned one step and then locked,

so that their position can not be disturbed. The application of an hour-hand to each clock can easily be effected, and requires no further explanation.

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

1. The combination of the revolving elastic arm B, operated by a clock movement, with a circuit-closing key, C, constructed and operating substantially as described.

2. The combination of mercury-cups D D with the gravitating-key C, elastic arm B, clock movement A, electro-magnet F, armature-lever G, and ratchet-wheel J, all constructed and operating substantially in the manner herein set forth.

This specification signed by me this 11th day of September, 1873.

JOHANN B. KERZ.

Witnesses:

AARON SEELEY,
CARL ED. HAHN.