

J. W. SWAIN & H. M. SMITH.

ELECTRIC CLOCK.

APPLICATION FILED MAY 3, 1911.

1,037,079.

Patented Aug. 27, 1912.

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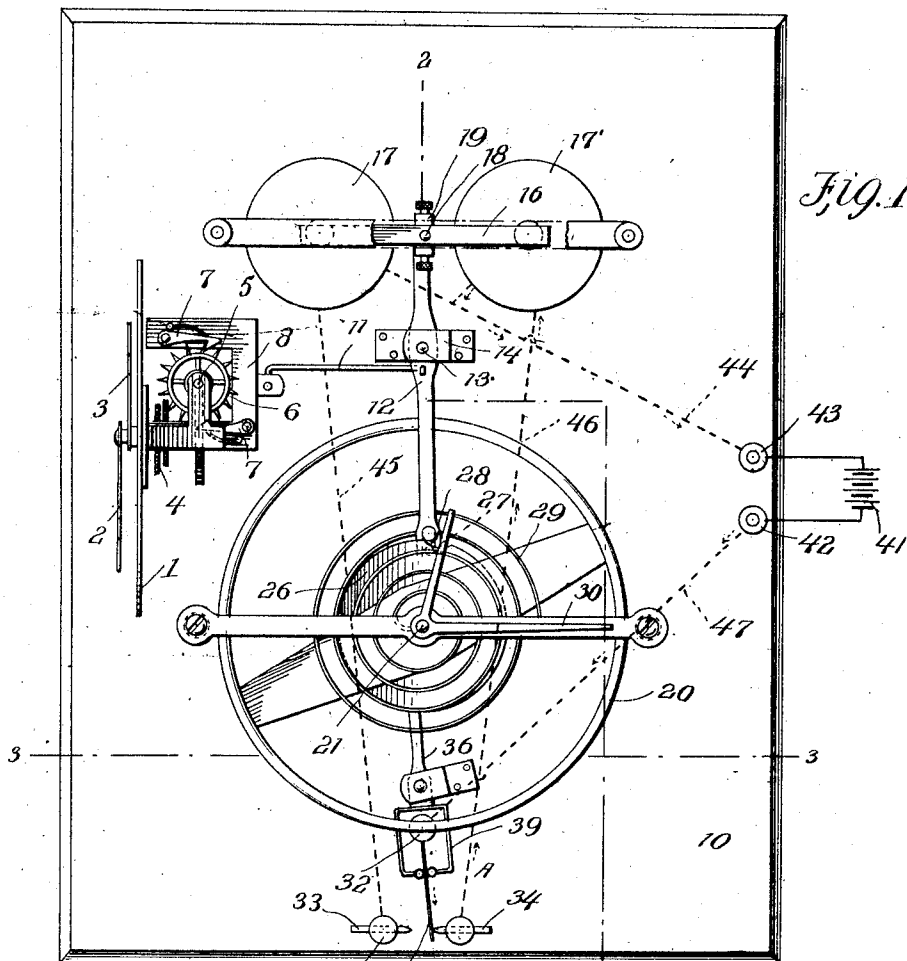
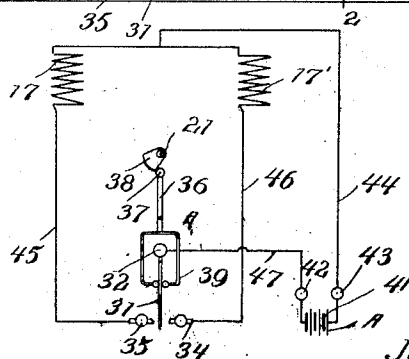


Fig. 1.

Fig. 5.



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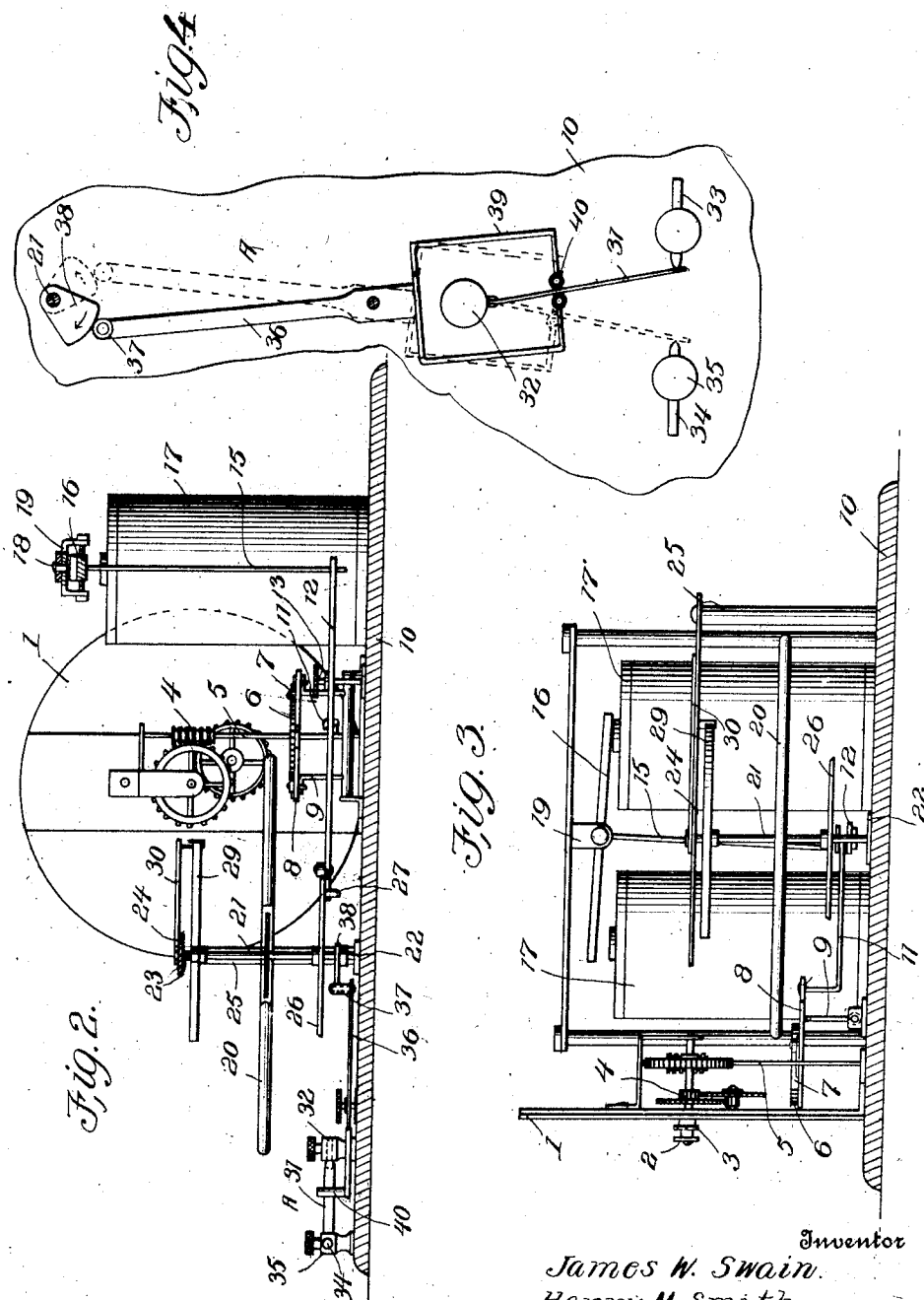
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# UNITED STATES PATENT OFFICE.

JAMES W. SWAIN AND HENRY M. SMITH, OF CLARINGTON, OHIO.

## ELECTRIC CLOCK.

1,037,079.

Specification of Letters Patent.

Patented Aug. 27, 1912.

Application filed May 3, 1911. Serial No. 624,755.

*To all whom it may concern:*

Be it known that we, JAMES W. SWAIN and HENRY M. SMITH, citizens of the United States, residing at Clarington, in the county of Monroe and State of Ohio, have invented new and useful Improvements in Electric Clocks, of which the following is a specification.

This invention relates to an electric clock of that type in which the balance wheel and the escapement are operated by means of an electro-magnet periodically energized and deenergized by the making and breaking of the electric circuit by the movement of the balance wheel or a part moving in synchronism therewith.

The invention has for one of its objects to improve and simplify the construction and operation of electric clocks of this character so as to be reliable and efficient in use, composed of comparatively few parts, and inexpensive to manufacture.

Another object of the invention is the provision of a pair of electro-magnets adapted to be alternately energized to operate an impulse lever that actuates the balance wheel and the escapement, there being used in combination with the electro-magnets a circuit make and break device controlled by the movement of the balance wheel to alternately connect and disconnect the electro-magnets in and out of circuit with a source of current.

With these and other objects in view, the nature of which will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claim appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention, Figure 1 is a plan view of the clock mechanism. Fig. 2 is a vertical section on line 2—2, Fig. 1. Fig. 3 is a vertical section on line 3—3, Fig. 1. Fig. 4 is an enlarged detail view of the make and break device. Fig. 5 is a diagrammatic view of the circuit connections.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawings, 1 designates the dial of the clock over which move the hour and minute hands 2 and 3, which are

operated by a suitable train of gears 4 from an escapement shaft 5 suitably supported in bearings, the said shaft having an escapement wheel 6 which is operated by coacting pawls 7 mounted on a movable carrier 8. This carrier, which is supported on swinging arms 9 pivoted to the base plate 10, is connected by a rod 11 with an impulse lever 12. This lever is fulcrumed intermediate its ends, at 13, in bearings 14 on the base plate, and one end of the lever is connected with the lower end of a swinging arm 15 on the armature 16 of the electro-magnets 17 and 17'. The armature is centrally pivoted at 18 on a frame 19, rigidly secured to the base plate, and these electro-magnets are alternately energized so as to oscillate the armature and swing the arm 15 that actuates the impulse lever 12. Thus, by the oscillation of the armature, the escapement is moved back and forth with the result that the coacting pawls of the escapement cause the escapement wheel to turn step by step.

The impulse lever 12 operates a balance wheel 20 which is fastened to a staff 21 having its lower end journaled in a bearing 22 on the base plate and its upper end journaled in a bearing 23 on a cross bar 24 supported by standards 25. On the staff 21 is a disk 26 that carries a pin or other projection 27 including a roller to reduce friction, and the end of the impulse lever opposite from that connected with the armature is formed with bifurcations 28 between which the roller pin 27 is adapted to engage at a certain point in the rotation of the balance wheel staff, so that while thus engaged, the appropriate electro-magnet can give an impulse to the balance wheel, said balance wheel having the usual hair spring 29 and a regulator 30 therefor.

The electro-magnets are alternately energized and deenergized by a make and break device, designated generally by A, which is controlled by the balance element of the clock. This make and break device comprises a movable or spring contact 31 fastened to a post 32 on the base plate and movable between spaced fixed contacts 33 and 34, which are adjustably held in posts 35 on the base plate. The posts of the contacts are connected with the electro-magnets by circuit connections which will be described hereinafter with relation to Fig. 5. Fulcrumed on the base plate adjacent the

post 32 is a lever 36 which has one extremity provided with a roller contact 37 with which engages a cam 38 on the balance element, the cam being shown on the staff 21 below the disk 26. On the lever are oppositely-disposed arms 39 that continue past the post 32 and are provided with insulated fingers 40 which engage opposite sides of the spring contact, so that as the lever is moved in one direction and then in the other, the spring contact will alternately engage the fixed contacts 33 and 34.

In Fig. 5, the circuit connections are shown. A source of current, such as a battery 41, has its opposite terminals connected with binding posts 42 and 43, and from the binding post 43 extends a wire 44 which connects with corresponding terminals of the electro-magnets 17 and 17', the latter having their other terminals connected, respectively, by wires 45 and 46 with the posts 33 for the contacts 33 and 34. The post 42 is connected by a wire 47 with the post 32 of the spring contact 31. When the spring contact is tilted to the left, Fig. 5, the current flows through the circuit consisting of the battery 41, binding post 43, wire 44, electro-magnet winding 17, wire 45, fixed contact 33, spring contact 31, wire 47, binding post 42, and battery 41. The armature of the electro-magnets is thus oscillated to give an impulse to a balance wheel. The flow of current is only momentary because the spring contact 31 separates from the contact 33 as the cam 38 on the balance staff passes beyond the roller 37 of the lever 36. Upon the return movement of the cam 38 the lever 36 is tilted in a direction to move the spring contact 31 to the right into engagement with the fixed contact 34 and current now flows through a circuit consisting of the battery 41, binding post 43, wire 44, electro-magnet 17', wire 46, fixed contact 34, spring contact 31, wire 47, binding post 42, and battery 41. The electro-magnet 17' thus becomes energized and oscillates the armature to impart an impulse to the balance wheel in the opposite direction. In this manner, the clock will operate continuously

as long as the proper voltage is maintained at the source of current.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while we have described the principle of operation of the invention, together with the apparatus which we now consider to be the best embodiment thereof, we desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claim appended hereto.

Having thus described the invention, what we claim is:—

In an electric clock, the combination of a base, separate electro-magnets thereon adapted to be alternately energized, an armature centrally pivoted with its extremities in coöperative relation with the poles of the electro-magnets, an arm fixed on the armature and extending between the electro-magnets, a balance element mounted on the base and spaced from the electro-magnets, a lever pivoted on the base and disposed between the electro-magnets and balance element and having one end connected with the extremity of the arm on the armature, means on the balance element with which the opposite extremity of the lever is adapted to engage, a time mechanism mounted on the base at one side of the lever and including an escapement, means for connecting the lever with the escapement whereby the lever forms a common actuator for the escapement and balance element, circuits for the electro-magnets, and a circuit make and break device mounted on the base and operated by the balance element.

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

JAMES W. SWAIN.  
HENRY M. SMITH.

Witnesses:

C. A. WARD,  
JOHN W. ROSE.