July 3, 1934. O. NEUMANN 1,964,857

ELECTRICALLY DRIVEN CLOCK

Filed Nov. 2, 1931

Fig. 1.

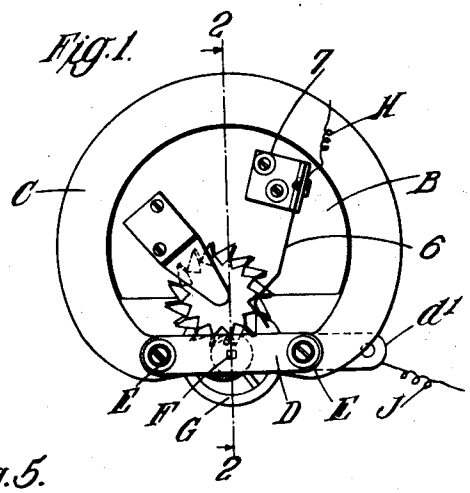


Fig. 5.

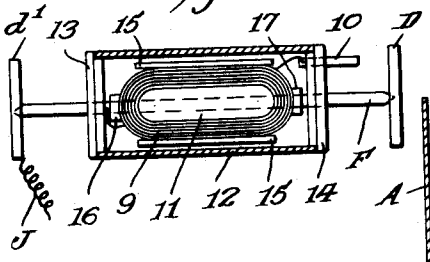


Fig. 2.

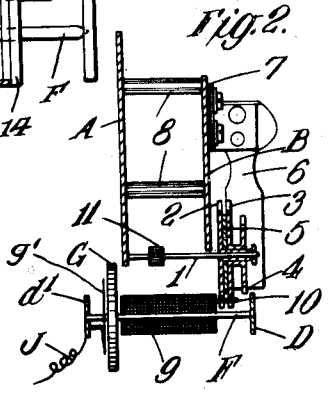


Fig. 3.

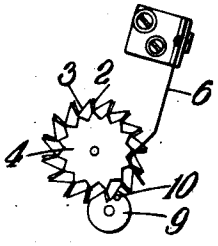
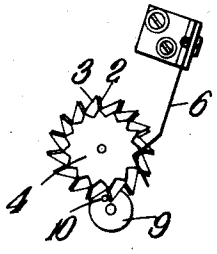


Fig. 4.



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UNITED STATES PATENT OFFICE

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ELECTRICALLY DRIVEN CLOCK

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Application November 2, 1931, Serial No. 572,667
In Great Britain November 3, 1930

2 Claims. (Cl. 58—28)

This invention relates to electrically driven clocks of the kind in which the movements of the ratchet wheel of the clock gear are effected by means of a contact pin connected with a coil on the balance wheel spindle. Its chief object is to produce a small clock which will work in any position without a pendulum.

According to the invention the contact pin of the balance wheel coil is arranged to actuate the ratchet wheel directly without the intervention of a lever, contact tongue, or spring, the teeth of the ratchet wheel being adapted to act as contacts to close and open the electric circuit. On the spindle of the said ratchet wheel is secured a second ratchet wheel of the same shape and size but slightly staggered in relation to the first ratchet wheel and insulated therefrom, so that on the return oscillation the contact pin only touches the second ratchet wheel without closing the circuit. A star wheel on the same spindle is in contact with a spring insulated from the clock frame and connected with one of the electrical conductors, which spring at each oscillation gives way sufficiently to enable the contact pin to reach the next following tooth gap in the first ratchet wheel and to effect the forward movement of rotation. The coil on the balance wheel is connected with the other electrical conductor and is located between the poles of a horseshoe magnet.

In order that the said invention may be clearly understood and readily carried into effect, the same will now be more fully described with reference to the accompanying drawing, in which:—

Figure 1 represents in rear elevation a clock embodying the invention, with the casing removed.

Figure 2 represents a section taken on the line 2—2 in Figure 1 to illustrate such parts of the clock as are necessary for the explanation of the invention.

Figure 3 is a detail view representing the ratchet wheels and contact pin in one position, and Figure 4 is a similar view representing the said parts in another position.

Fig. 5 is a view on an enlarged scale of the magnet coil and adjacent parts.

A and B represent frame members of the clock, connected together by stays 8. A spindle 1 is rotatably mounted in the said frame and provided with a pinion 11 by which the wheels actuating the clock hands are driven. A horseshoe magnet C is suitably secured to the member A, and carries a frame D, comprising insulating washers E. In the frame D is mounted the spindle F of the balance wheel G, on which is a coil 9 located between the poles of the magnet C. The hair spring of the balance wheel is indicated at g'. The coil is made without an iron core in order to avoid disturbance of the working of the clock by external magnetic influences or terrestrial magnetism. The spindle F may be made of brass with steel or tungsten pins at each end. On the coil 9 is a contact pin 10. On the spindle 1 is secured a ratchet wheel 2, and another ratchet wheel 3 having on its boss a star wheel 4 is insulated from the wheel 2 by a washer 5. The teeth of the wheel 3 are slightly staggered in relation to those of the wheel 2. A blade spring 6 insulated from the frame member B by one or more washers 7 bears on the star wheel 4. The positive electrical conductor H is connected with the spring 6, and the negative conductor J is connected with the member d^1 of the frame D.

The magnet coil 9 is wound on a paper-body 11 (see Figure 5) fitted on the spindle F between two insulating washers 16, 17, and enclosed in a brass tube 12, a tube of paper 15 being interposed between the coil and the said tube 12. The ends of the brass tube are closed by vulcanite caps 13, 14, through the centres of which the spindle F passes, the contact pin 10 being secured in the cap 14. One end of the wire constituting the coil is attached to the inner end of the pin 10 and the other end thereof to the spindle F. The said spindle may be made of non-magnetic material such as tungsten or molybdenum, or as aforesaid may be made of brass with steel points at each end. This specific construction of the magnet coil and adjacent parts forms no part of the present invention, and any equivalent form or forms may be substituted therefor.

On the forward oscillation of the coil 9 the contact pin 10 engages the wheel 3 as seen in Figure 3, whereby the electrical circuit is closed through 6, 4, 3, 10, 9 F and d^1, and the pin 10 rotates the wheel 3 to the extent of one tooth, and the spindle 1 to the same extent. The spring 6 yields slightly and engages the next tooth gap of the star wheel 4. On the return oscillation of the balance wheel G and coil 9, the pin 10 engages the ratchet wheel 2 as seen in Figure 4, and the circuit is broken; the wheels return so that the contact pin 10 passes under the tooth into the next gap, the spring 6 again yielding slightly and returning to its former position when the contact pin 10 is ready to effect the next movement of the wheel 3, and the cycle of operations is repeated.

The clock can be driven by direct current with a choke coil or the like, or by alternating mains current, in which latter case a transformer would probably be necessary to step down the voltage.

What I claim and desire to secure by Letters Patent of the United States is:—

1. In an electrically driven clock, a clock gear spindle, two ratchet wheels of identical size insulated from each other secured on said spindle, the teeth of the second of said wheels being staggered in relation to the teeth of the first of said wheels, a star wheel carried on the boss of the said second ratchet wheel, a spring contact piece engaging said star wheel, an oscillatory spindle, a coil thereon having a contact pin to engage the second of said ratchet wheels to close an electrical circuit through said second wheel, star wheel, and contact piece, and to advance all said wheels to the extent of one tooth, said pin being adapted on the return oscillation to engage said first ratchet wheel, without closing the circuit and to move said first ratchet wheel slightly in order to pass into the next tooth gap, said spring contact being adapted to return the wheels the same slight amount to restore the wheels for co-action with said pin during the next oscillation of the latter.

2. A clock as in claim 1, wherein the coil on the spindle which oscillates in the field of a magnet is made without an iron core in order to prevent the working of the clock from being disturbed by external magnetic influences of terrestrial magnetism.

OTTO NEUMANN.