Jan. 5, 1932. J. GEISSLINGER 1,839,215

ELECTRIC CLOCK

Original Filed April 15, 1929

Fig. 1

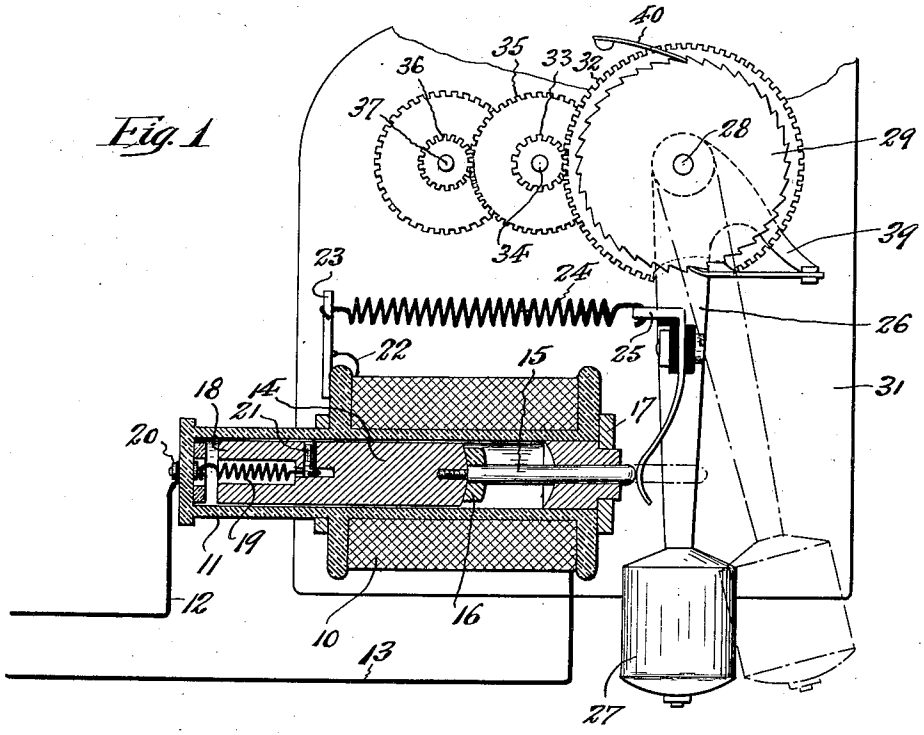
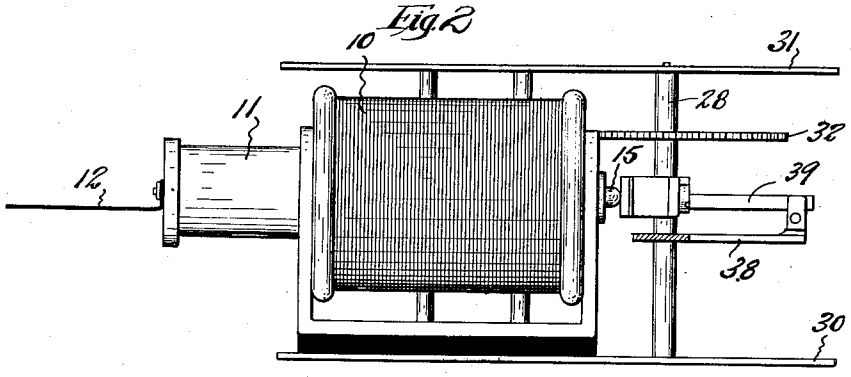


Fig. 2



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ELECTRIC CLOCK

Continuation of application Serial No. 355,003, filed April 15, 1929. This application filed March 18, 1931. Serial No. 526,500.

This invention relates to improvements in electrically operated clocks; and it is the principal object of my invention to provide an electric clock of simple and therefore inexpensive construction, yet efficient in operation, and which may be operated by either A. C. or D. C. current; and this application for patent is a continuation of application Ser. No. 355,003, filed April 15, 1929.

Another object of my invention is the provision of a horizontally arranged solenoid, the core of which, upon energization of said solenoid, slides inwardly and is equipped with a suitable thrust pin to operate a drive arm of a clock work or movement; said core being also provided both with means to yieldably retain the same in outward inactive position and means for limiting as well as absorbing the shock of its active stroke.

A further object of my invention is the provision of means cooperative with the solenoid core and drive arm for periodically interrupting the electric circuit through the solenoid, on setting of the drive arm to clock work actuating position by the active stroke of the core, whereby the core is released for return to inactive position and thereafter, on completion of an operative movement of the drive arm, to again close the circuit to energize the solenoid and again actuate the core to reset the drive arm.

These and other objects and advantages of my invention will become more fully known as the description thereof proceeds, and will then be specifically defined in the appended claims.

An illustrative embodiment of my invention is shown in the accompanying drawings, in which:—

Fig. 1 is a sectional front elevation of the electrically operated clock movement constructed according to my invention.

Fig. 2 is a top plan view thereof.

As illustrated, the solenoid 10 is horizontally disposed and possesses an extended core-casing 11, in the end of which is mounted a binding post 20 which is conductively connected, by means of a conductor or wire 12, to one pole of a source of electrical energy, such as either an A. C. or D. C. commercial supply. Within the solenoid is slidably arranged an iron core 14, having in its rearward end an inwardly extending chamber 18, near the interior end of which is fixed an anchor screw 21. A pull spring 19 is anchored by its outer end to said binding post 20 and by its inner end to said anchor screw 21. Said pull spring 19 serves to normally and yieldably retain the core 14 in outwardly projected inactive position within the core-casing 11.

Secured to the inner end of the core 14, for axial forward projection from the free end thereof, is a thrust pin 15. Said thrust pin 15 is made of electrically conductive but preferably non-magnetic material. Secured to the free end of said core 14 and around the base of said thrust pin 15 is an elastic body, preferably made of soft rubber, and adapted to provide a shock-absorbing stop or buffer 16. The free end of said thrust pin 15 projects forwardly and exteriorly from the solenoid 10, being slidably supported in a bushing 17 which closes the forward end of the core casing 11.

One terminal 22 of the coil or winding of the solenoid 10 is connected to an up-standing conductive bar or piece 23. The other end of the coil or winding of the solenoid is connected by a conductor or wire 13 to the other pole of the source of electrical energy. The electrical circuit through the coil or winding of the solenoid is controlled by a make and break means, of which the core 14 and thrust pin 15 form a part, and which will be subsequently further described.

The reference character 28 indicates the drive shaft of a clock work mechanism, which is journaled in and between frame plates 30 and 31 of the latter. Secured on this drive shaft 28 is a drive or first gear 32, which meshes with and drives the pinion 33 on a second shaft 34 on which is fixed a second gear 35. Said second gear 35 meshes with and drives the pinion 36 on a third shaft 37. The said gear train thus provided forms part of a clock gear train of a clock-work, the remainder of which is not shown, but which may be of any desired or suitable construction familiar to the art.

Pivoted on said drive shaft 28, so as to swing freely thereon as a fulcrum, is a pendulum or drive arm 26 which depends from said drive shaft adjacent to the forward or inner end of said solenoid 10. The lower end of said pendulum or drive arm is preferably provided with a weight 27. Fixed on said drive shaft 28 is a ratchet wheel 29. Connected with said pendulum or drive arm 26 is an angularly off-set lever arm 39, to which is secured a resilient pawl 38 arranged to engage with said ratchet-wheel 29. Also cooperating with said ratchet wheel 29 is a fixed pawl 40, operative to prevent back lash or retractive rotation of said ratchet wheel 29 and the clock gear train driven thereby through drive shaft 28.

Affixed to said pendulum or drive arm 26, and suitably electrically insulated therefrom, is a preferably resilient contact member or arm 25, the lower free end of which lies in the path of said thrust pin 15, so as to be subject to engagement therewith and thereby. Connected between the upper fixed end of said contact member or arm 25 and said bar or piece 23 is a pull spring 24, which is thus operatively connected with said pendulum or drive arm 26. Said contact member or arm 25 and spring 24 form the remaining parts of the solenoid circuit make and break means.

In the operation of the mechanism, when the pendulum or drive arm 26, under both the pull of said spring 24 and the gravitational pull of its weight 27, when provided with the latter, swings toward the solenoid 10, the pawl 38, being engaged with the ratchet wheel 29, will exert rotative pressure thereon, thus turning the drive shaft 28 and thereby driving the clock gear train actuated therefrom. As the pendulum or drive arm 26 approaches completion of its operative or driving swing, the contact member or arm 25 will be carried into engagement or contact with the thrust pin 15, while the latter is in rearwardly drawn positions disposed by the retracted solenoid core 14. On occurrence of such contact, the electrical circuit through the solenoid coil is completed from conductor 12 through binding post 20, spring 19, core 14, thrust-pin 15, contact arm 25, spring 24, member or piece 23, solenoid coil winding 22 to conductor 13. On such completion of the circuit, the solenoid 10 is energized, whereby the core 14 is forwardly attracted and moved to impart thrusting movement to the thrust-pin 15. Such thrusting movement swings the pendulum or driver arm upward to a position to again initiate an operative driving movement thereof. The operative thrust of the thrust pin 15 is arrested when the buffer 16 strikes the bushing 17, but the inertia of the pendulum or drive arm 26 under the thrust stroke (which inertia is enhanced when said arm is provided with the weight 27), carries the same onward, thereby disengaging the contact arm 25 from contact with the thrust pin 15, and thus again interrupting the solenoid circuit, whereupon the spring 19 immediately retracts the core 14 and thrust pin to normal inactive position, leaving the pendulum or drive arm 26 free to exert through the pawl 38, as the former is again pulled toward the solenoid, a driving torque upon the ratchet wheel 29 and drive shaft 28. This cycle of operation is successively repeated, whereby continuous actuation of the clock work is effected.

The spring 24 serves both as an extendible electrical connection between the contact arm 25 and the solenoid coil terminal 22, as well as an operating force to induce the driving stroke of the pendulum or drive arm.

Owing to the provision of the elastic stop buffer 16, the periodic movement of the core is rendered noiseless, an advantage which is very desirable in a clock device.

Having thus described my invention, I claim:—

1. An electro-motive power mechanism, comprising a horizontally disposed solenoid having a spring retracted movable core, means to arrest the active stroke of said core, a thrust-pin operated by said core, a drive arm suspended to swing toward said thrust pin, power transmission means actuated by movement of said drive arm toward said solenoid, means to so move said drive arm, a contact arm carried by said drive arm so as to be engageable by said thrust pin, and means for connecting said solenoid core and thrust pin, contact arm and solenoid in series in electrical circuit; said thrust pin being cooperative with said contact arm both to set said drive arm for operative movement as well as to make and break said circuit.

2. In an electro-motive power mechanism as defined in claim 1, an elastic buffer means connected with the free end of said core to coact with said core arresting means.

3. An electro-motive power mechanism, comprising a horizontally disposed solenoid having a spring retracted movable core, a thrust-pin axially extending from the free end of said core, a bushing through which the free end of said thrust-pin projects, said bushing being adapted to arrest the active stroke of said core, an elastic stop buffer between the free end of said core and said bushing, a weighted drive arm suspended to swing toward said thrust pin, power transmission means actuated by movement of said drive arm, toward said solenoid, means to so move said drive arm, a contact arm carried by said drive arm so as to be engageable by said thrust pin, and means for connecting said solenoid core and thrust pin, contact arm and solenoid in series in electrical circuit, said thrust pin being cooperative with said contact arm both to set said drive arm for operative gravita-

tional movement as well as to make and break said circuit.

4. In an electro-motive power mechaninsm as defined in claim 1, in which said power transmission means includes a drive shaft, a ratchet wheel fixed on said drive shaft, and a pawl carried by said drive arm to actuate said ratchet wheel drive shaft.

5. In an electro-motive power mechanism as defined in claim 3, in which said power transmission means includes a drive shaft, a ratchet wheel fixed on said drive shaft, and a pawl carried by said drive arm to actuate said ratchet wheel and drive shaft.

6. An electro-motive power mechanism, comprising a horizontally disposed solenoid core, a core slidable therein, spring means for retracting said core to inactive position, a thrust pin axially extending from the free end of said core, means to arrest the active stroke of said core, means for connecting one pole of an electrical source with said core and thrust pin, a weighted drive arm suspended to swing toward and away from said thrust pin, power transmission means actuated by gravitational movement of said drive arm toward said solenoid, a contact arm carried by said drive arm so as to be engageable by said thrust pin, and a pull spring to induce the driving stroke of said arm, said pull spring also serving as an extendible electrical connection between said contact arm and one end of said solenoid coil, the other end of said solenoid coil being connected with the other pole of said electrical source.

7. In an electro-motive power mechanism as defined in claim 6, in which said power transmission means includes a drive shaft, a ratchet wheel fixed on said drive shaft, and a pawl carried by said drive arm to actuate said ratchet wheel and drive shaft.

In testimony, that I claim the invention set forth above I have hereunto set my hand this 14 day of March, 1931.

JOHANN GEISSLINGER.