T. B. POWERS.

SELF WINDING CLOCK.

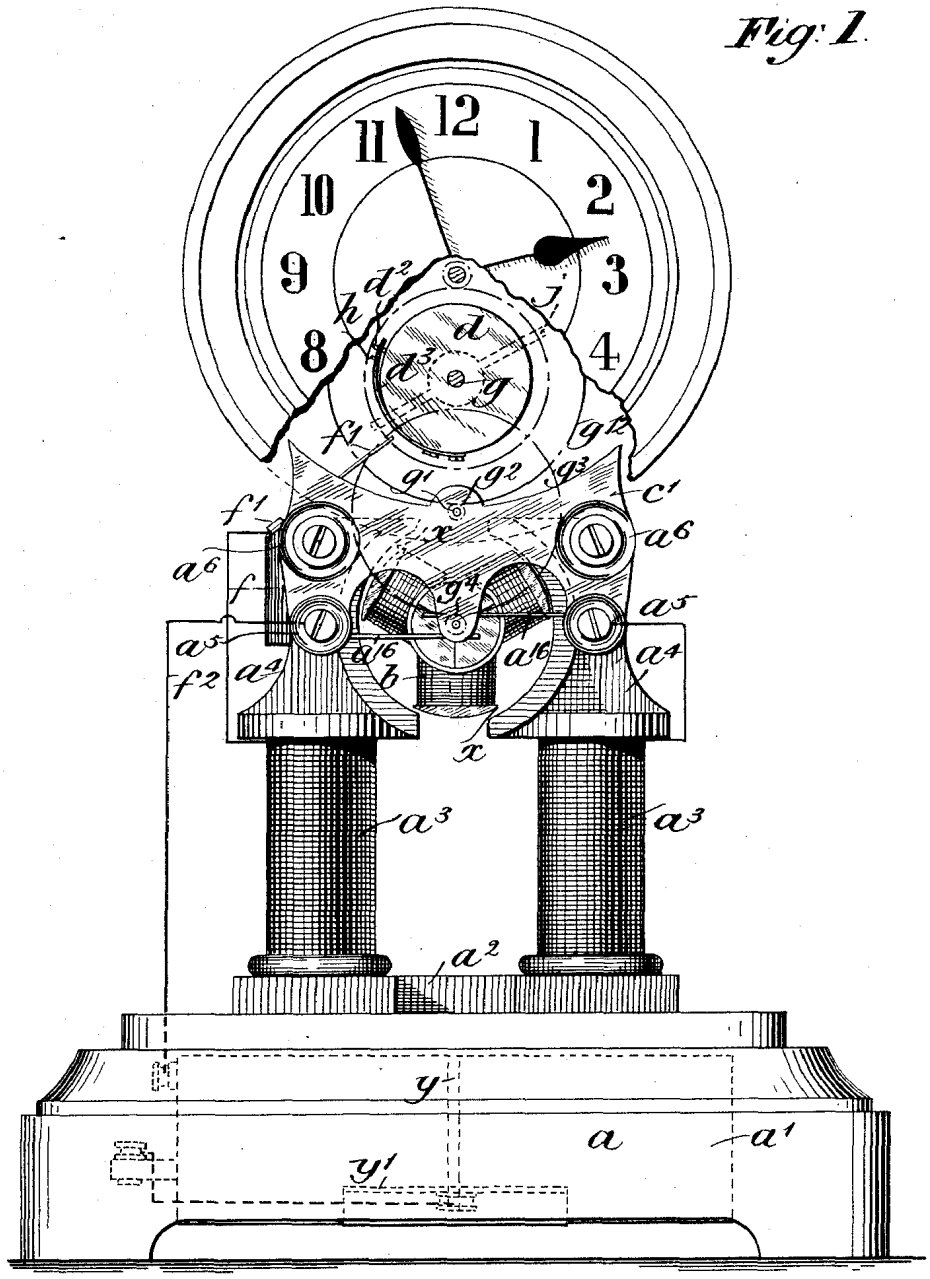
APPLICATION FILED MAR. 11, 1911.

1,012,010.

Patented Dec. 19, 1911.

2 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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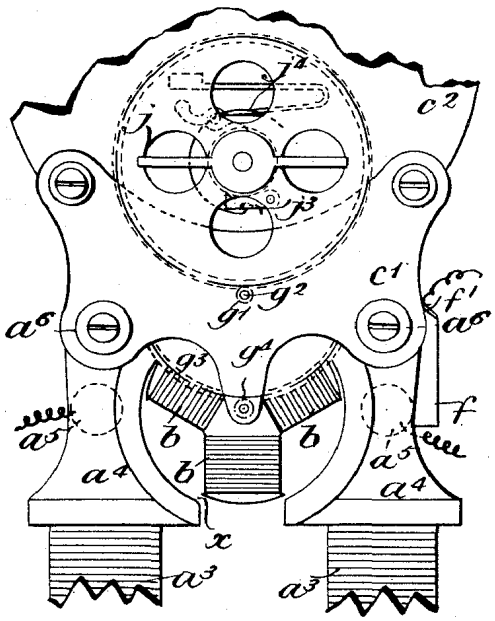
2 SHEETS—SHEET 2.

Fig. 2



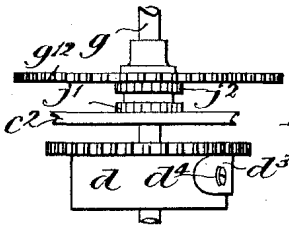


Fig. 3

Fig. 4

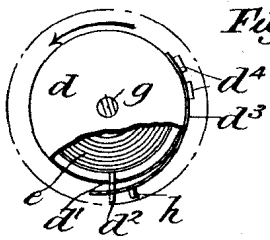
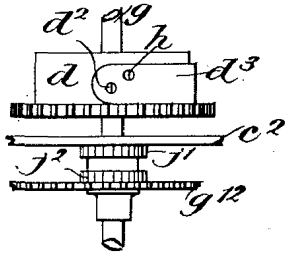


Fig. 5



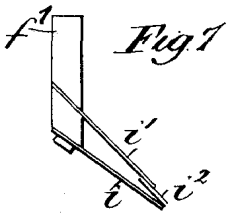


Fig. 1

Fig. 6

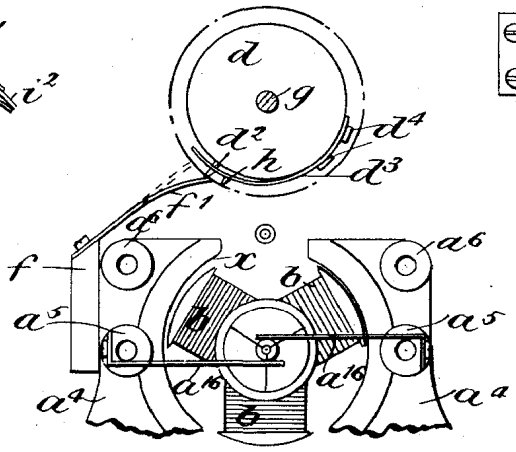
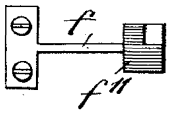


Fig. 8



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UNITED STATES PATENT OFFICE.

TIMOTHY BERNARD POWERS, OF LONDON, ENGLAND.

SELF-WINDING CLOCK.

1,012,010. Specification of Letters Patent. Patented Dec. 19, 1911.

Application filed March 11, 1911. Serial No. 613,681.

To all whom it may concern:

Be it known that I, TIMOTHY BERNARD POWERS, a citizen of the United States of America, residing in London, England, have invented certain new and useful Improvements in and Relating to Self-Winding Clocks, of which the following is a specification.

This invention relates to self winding clocks, and it refers particularly to clocks in which the rewinding is effected by means of an electromotor which is energized from time to time by means of contacts which are closed by a suitable member of the clock mechanism.

The present invention, while it provides an improved construction and arrangement generally of the operative mechanism of clocks of this type, has for its primary object to provide an improved circuit closing and opening means for insuring the proper closing and opening of the motor circuit at the desired intervals, and also to provide circuit closing and opening members whereby a proper and effective contact is secured so that not only is the action of the motor insured, but its intermittent action owing to improper contact is avoided.

The invention further provides for the rewinding of the clock by hand when so desired.

In order that the invention may be the better understood, drawings are appended illustrating a clock embodying the present invention, in which:—

Figure 1. is a sectional front elevation. Fig. 2. is a back view. Fig. 3. is a top plan of the main spring barrel. Fig. 4. is a front elevation partly in section of said barrel. Fig. 5. is a plan from the under side. Fig. 6. is a view showing more clearly the arrangement of the contacts. Fig. 7. is a side elevation of one arrangement of the fixed contact. Fig. 8. is a plan of an alternative arrangement.

Referring to the accompanying drawings, it will be seen that the invention in the present instance is applied to a clock of which the base a forms a receptacle for a battery a^1 from which the necessary current is obtained for driving the motor whereby the winding is effected. It will, however, be understood that any other arrangement may be employed, and that the battery or other source of energy need not in all cases be carried upon the clock itself. The motor in the present instance is also arranged to form a part of the clock itself, and comprises a yoke a^2, secured in any convenient manner to the base a, and provided with magnets a^3 terminating in pole pieces a^4. The upper ends of the pole pieces are provided with projections a^5, a^6 which respectively serve for the attachment of the framing carrying the clock mechanism, and for the support of blocks of non conducting material such as vulcanite to which the brushes a^{16} of the armature b are secured, see Figs. 1 and 6. The armature is a three pole armature, and in order that the torque of the poles may be uniform to insure self starting at all points, the air gap between the armature and the face of said poles is increased at the points x x, Figs. 1 and 6. The clock movement, which may be of any suitable form, is supported from the pole pieces by means of the plates c c^1, to one of which plates, the back plate or frame c^2 of the movement is secured in any convenient manner.

The clock movement forms no part of the present invention, and except for such parts as are essential to the proper understanding of the invention, is omitted from the drawings.

d, Figs. 1, 2, 3, 4, 5, 7 indicates the main spring barrel which as shown in Fig. 5 is perforated at d^1, and has passing through it a pin d^2 which is attached to a short spring piece or arm d^3 curved to agree with the outer contour of the barrel d, to which it is attached by screws d^4. The pin d^2 passes to the spring d^3 and projects upon the outside of the said spring. The tendency of the spring d^3 is to keep the inner end of pin d^2 in contact with the outer convolution of the main spring e, Fig. 4. By this means the partially wound or unwound state of the spring e will control the position of the projection d^2 with respect to the outer surface of the spring barrel, and said pin will project more and more as the spring runs down, and the diameter of its convolutions increases.

It will be understood that the substance of the spring or arm d^3 is not sufficient to cause it to offer any substantial resistance to the expansion of the convolutions of the spring. The pin d^2 forms one end of the electric circuit, the battery a^1 aforesaid having one of its poles connected to one of the studs such as 7 by which the battery is

clamped by means of plate y^1 to the base a see Fig. 1. The current thus is enabled to pass, or is "grounded" through the base, pole pieces of the motor and frame of the clock to the pin d^2. Secured to one of the pole pieces of the motor is a block of insulating material f to which is secured a resilient contact f^1, one end of which projects into the line of movement of the pin d^2. The length of the arm however is such that it does not come into contact with the pin d^2 until the main spring is sufficiently unwound to require rewinding. The contact f is connected to one end of the wire on the magnet poles while the opposite end of the winding on the poles of the said magnet is connected to one brush a^6 of the armature, the other brush being connected to the lead f^2 connected to the opposite pole of the battery a^1. The connection between the lower ends of the winding on the magnets, and which connection is not shown, may be led through the yoke or base. Under these circumstances as the barrel d rotates, the projection d^2, on the spring being sufficiently unwound, will come into contact with the contact f closing the circuit and energizing the motor which will continue to run so long as the contact is maintained, that is to say until the spring is sufficiently wound up to permit the projection d^2 to be withdrawn clear of contact f. The motion of the armature is transmitted to the main spring spindle g by means of a pinion g^1 upon a spindle g^2, which spindle carries a second larger pinion g^3 which in its turn receives motion from a pinion g^4 on the motor spindle. The pinion g^2 is in mesh with a pinion g^{12} on the spindle g of the main spring. It may be found in practice that with a simple contact f and pin d^2, the pressure of the said arm may not insure a lasting contact sufficient to keep the motor in operation for the desired period, but that there may be a tendency for the motor to start and stop a number of times until the movement of the barrel establishes a sufficiently firm contact. As this starting and stopping is injurious to the battery by reason of the fact that more current is required to start the motor than to keep it running, we may provide means whereby this objection may be overcome. This is effected by providing a second pin h upon the spring piece d^3, which pin is placed in advance of the pin d^2, and comes into contact with the end of the contact f, with which however it does not establish any electrical contact, and bends said arm downward until the movement of the barrel d carries pin h free thereof when the arm springs downward against the pin d^2 and presses thereon establishing a firm contact therewith, see Fig. 6, until the pin d^2 passes beyond the end of the said arm. In order to avoid any electrical contact between pin h and contact f, the pin h is arranged to one side of the pin d^2 and the contact f is increased in width at its outer end as shown in Fig. 8. A piece of vulcanite or other material f^{11} is applied to the end of the contact f, which is cut away at point f^2 to permit of the contact of pin d^2 with said arm in order to close the circuit. Where a single pin such as d^2 is employed, the difficulty may be met by the employment of an arrangement such as shown in Fig. 7. In this case two resilient arms or plates i i^1 are employed, one of which i^1 is arranged above the other, and is somewhat shorter being provided with an extension i^2 formed of vulcanite or other non-conducting material. The two plates are secured to a piece of non-conducting material, and the arrangement is such that during the rotation of the barrel d the pin d^2 first comes into contact with the upper surface of the non-conducting material i^2 pressing both plates down until it rides off the end of the said non-conducting material, and comes into contact with the conductor or plate i which is sufficiently depressed to insure a good contact between the parts. As the effective contact in all the arrangements described is a rubbing contact, there is little or no chance of failure owing to oxidation or the collection of dust at the points of contact as the friction between the parts serves to keep them clean.

In order that the clock may be wound by hand if so desired, I provide the spindle g of the main spring with a turn button or head j which is arranged in the usual manner at the back of the clock. The spindle g is also provided with ratchet wheels j^1, j^2 which are respectively engaged by pawls j^3, j^4 disposed one upon the inner face of the pinion g^{12} which is free on its shaft, and the other on the frame of the clock. By this means while the rotation of the turn button or head acts directly upon the spring, the rotation of the wheel g^{12} which is connected to the spindle g through the pawl j^3, also acts upon the spindle g. The second pawl j^4 is provided to permit of the hand winding without the wheel g^{12} acting on the motor.

By arranging the contact so that it is brought into an operative position by the expansion of the main spring, it is evident that in the event of the failure of the contact during one or more revolutions of the barrel, the expansion of the spring will finally reach such a point that a contact cannot fail to be established, but this contingency is so remote that it is practically negligible.

Claims.

1. In a self winding clock, a main spring for the clock movement, circuit closing means comprising a conducting resilient member secured to the barrel of the main spring, a metallic projection on the resilient member in contact with the outer convolu-

tion of the main spring, metallic projections upon the outer surface of the resilient member arranged one behind the other, a resilient contact arranged in the line of movement of the projections, an insulated surface upon the contact and a metallic surface upon said contact, said insulated surface first engaging one of the projections on the member on the spring barrel whereby the resilient contact is first deflected and then allowed to spring back establishing a firm and prolonged contact between the metallic surface and the second pin on the spring barrel.

2. In a self-winding clock, a main spring for the clock movement, circuit closing means comprising a resilient conducting member secured to the barrel of the main spring, a metallic projection on the resilient member in contact with the outer convolution of the main spring, metallic projections upon the exterior surface of the resilient member arranged one behind the other and out of alinement one with the other, a resilient contact arranged in the line of movement of the projections, an insulated surface upon the contact and a metallic surface upon said contact, said insulated surface first engaging one of the projections on the member on the spring barrel whereby the resilient contact is first deflected and then allowed to spring back establishing a firm and prolonged contact between the metallic surface and the second pin on the spring barrel.

3. In a self winding clock, a main spring for the clock movement, circuit closing means comprising a conducting resilient member secured to the barrel of the main spring, a metallic projection on the resilient member in contact with the outer convolution of the main spring, metallic projections upon the outer surface of the resilient member arranged one behind the other, a resilient contact arranged in the line of movement of the projections, said contact having the end widened and part of said end covered with a non-conducting body, said non-conducting body being engaged by the first of the projections on the resilient member on the spring barrel and deflected thereby until allowed to spring back when the metallic surface on the contact is caused to bear upon the second projection on the resilient member on the spring barrel whereby a firm and prolonged contact is obtained.

Signed in the presence of the two undersigned witnesses.

TIMOTHY BERNARD POWERS.

Witnesses:

HERMANN KUTNOW,

JOSEPH WEINSTEIN.