S. W. BRAMLEY.

MOTOR FOR CLOCK MOVEMENTS AND THE LIKE.

APPLICATION FILED JUNE 28, 1909.

951,903.

Patented Mar. 15, 1910.

2 SHEETS—SHEET 1.

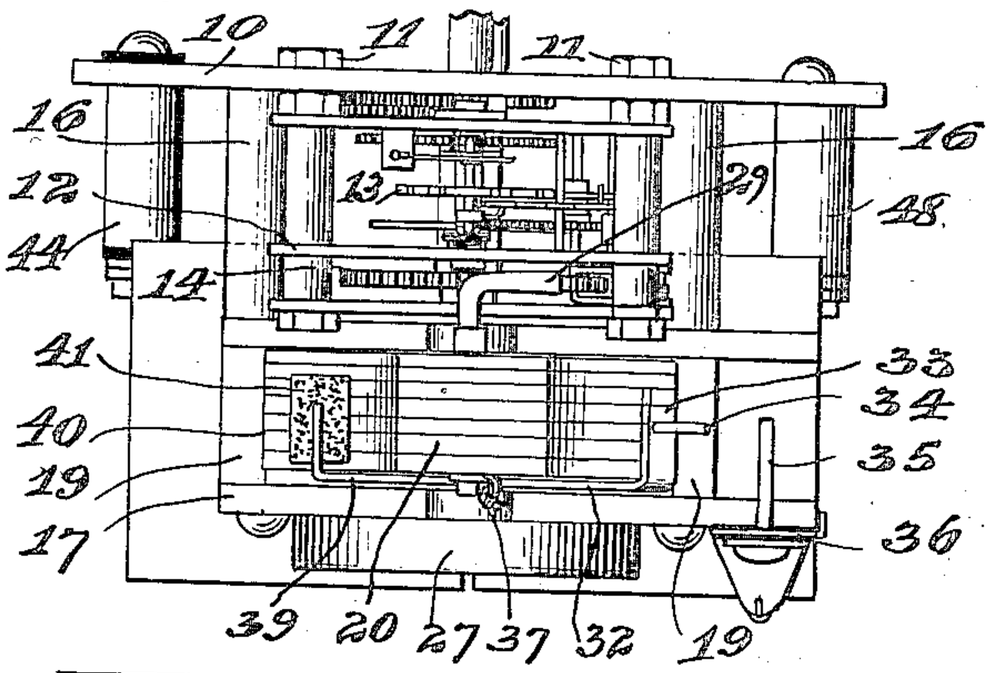

Fig. 2.

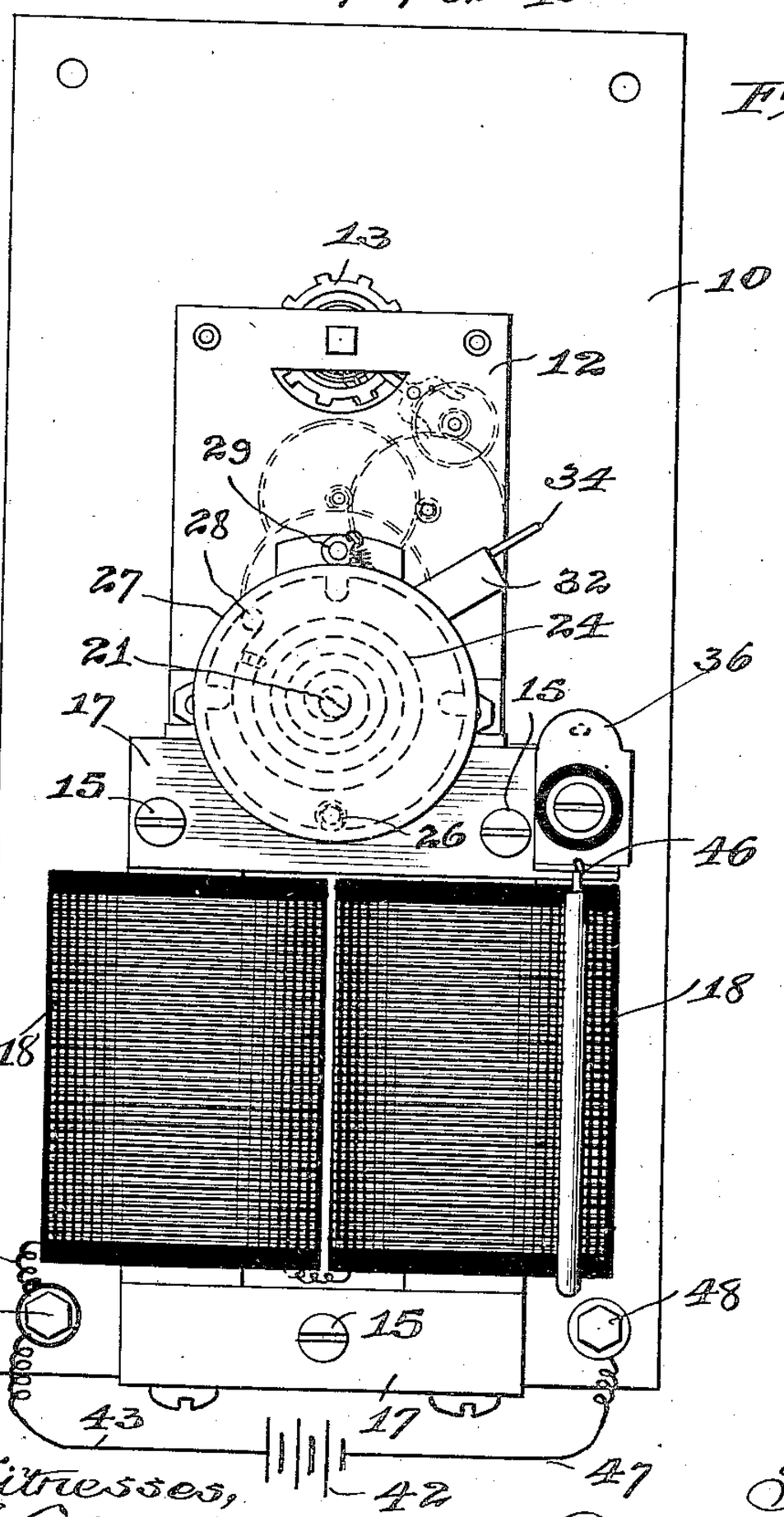

Fig. 1.

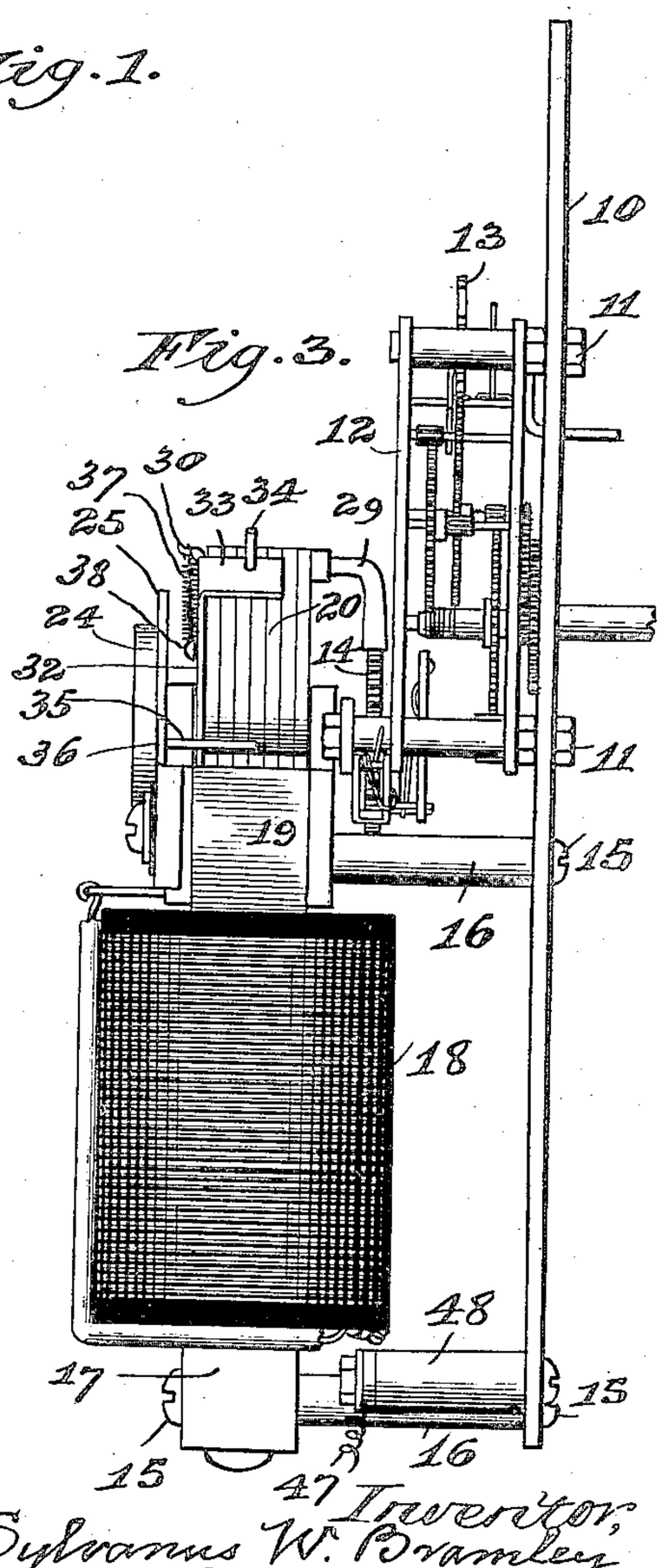

Fig. 3.

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2 SHEETS—SHEET 2.

Fig. 6.

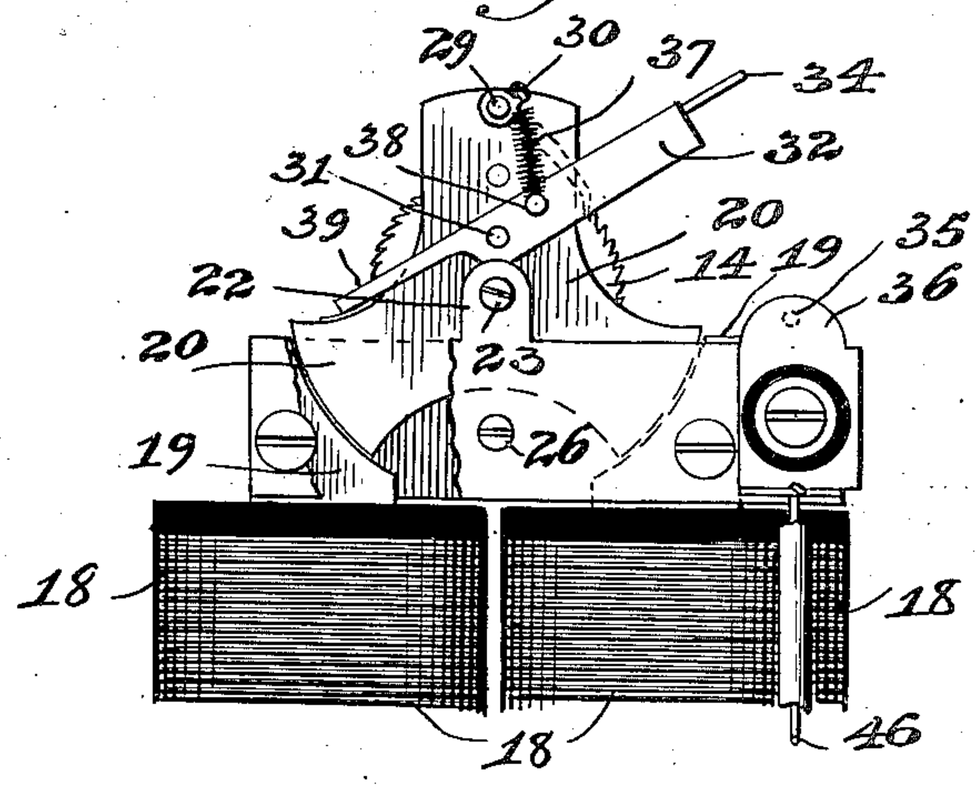


Fig. 4.

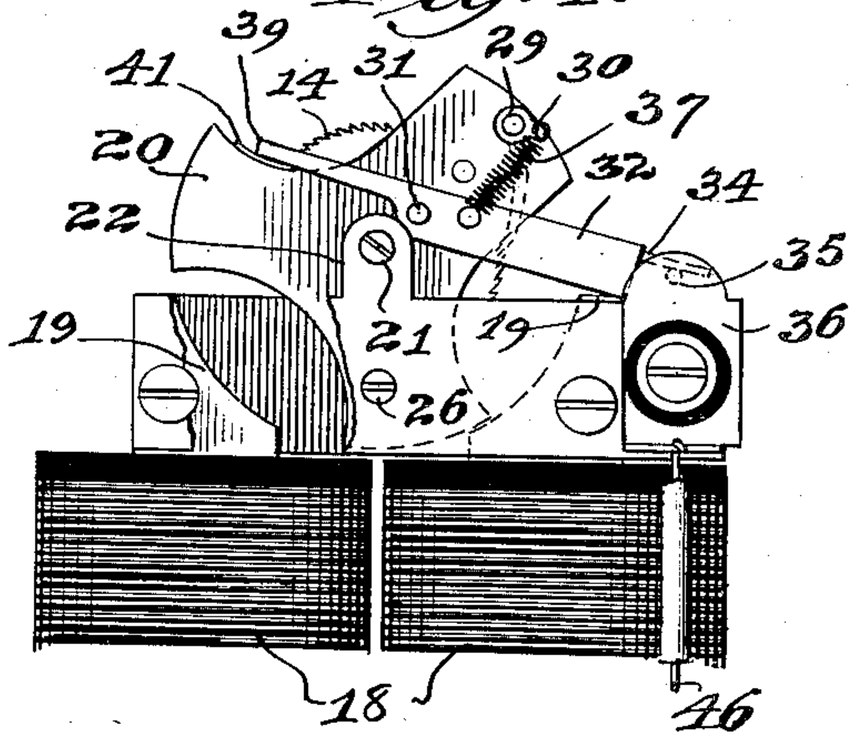
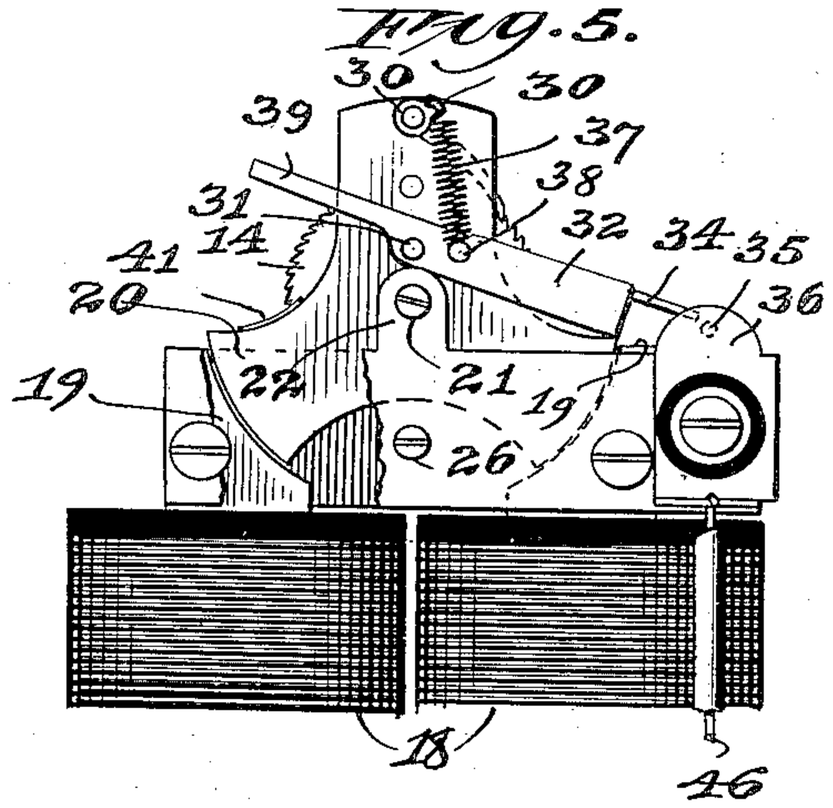


Fig. 5.



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UNITED STATES PATENT OFFICE.

SYLVANUS W. BRAMLEY, OF CHICAGO, ILLINOIS.

MOTOR FOR CLOCK-MOVEMENTS AND THE LIKE.

951,903. Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed June 28, 1909. Serial No. 504,662.

To all whom it may concern:

Be it known that I, SYLVANUS W. BRAMLEY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Motors for Clock-Movements and the Like, of which the following is a specification.

This invention relates to the art of so-called self-winding electric clocks, and pertains more especially to that type of such clocks which employ an electro-magnet to effect an intermittent rewinding or retensioning of a spring to drive the clock train, the electric current which energizes the magnet being automatically established and broken by contact devices, of which the movable contact device is carried into engagement with the fixed contact device through the agency of the spring which drives the clock movement, and is retracted to open the circuit through the magnet. Owing to the fact that in devices of this character as hitherto constructed the closing of the circuit and consequent attraction of the armature is but instantaneous, the circuit being broken by the movement of the armature practically upon the instant of its closing, the movement of the armature to rewind or retension the spring is not always uniform or of a sufficient force or extent to insure the complete rewinding or retensioning of the spring at each actuation, resulting in more or less unreliability of the clock.

The main object of my present invention is to obviate the foregoing objection; and this I accomplish through what I believe to be an entirely new principle of control of the contact devices.

To this end, my invention comprehends, as its chief distinguishing characteristic, the provision, in a mechanism of the general type above outlined, of means for prolonging the engagement of the fixed and movable contacts, and consequently the energizing of the magnet, during the entire period when the armature is rewinding or retensioning the motor spring, thus insuring a full or complete stroke of the armature for this purpose. The means herein shown and described for effecting this result comprises essentially a fixed contact and a movable contact so mounted as to be capable of a sliding or wiping movement over said fixed contact during the spring-winding movement of the armature, with means consisting of a contact arm or carrier of magnetizable material acted upon by the core of the magnet when energized to hold said movable contact in sliding or wiping engagement with said fixed contact during the rewinding stroke of the armature, against the pull of a spring which swings said movable contact, after it has been drawn out of engagement with the fixed contact, to a position favorable for returning it into reëngagement with the fixed contact under the unwinding movement of the motor spring.

My invention, and its manner and principle of operation, will be readily understood when considered in connection with the accompanying drawings, which illustrate one practical form in which the invention may be embodied, and wherein,—

Figure 1 is an elevational view of the complete mechanism including the clock train or movement that is actuated by the device of my invention. Fig. 2 is a top plan view of Fig. 1. Fig. 3 is an edge elevational view of Fig. 1, with the cap or cover of the motor spring housing removed. Figs. 4, 5 and 6 are elevational views of the contact devices and their immediate actuating and coöperating parts; Fig. 4 showing the relative positions of the contacts and armature at the instant the contacts are brought into engagement, Fig. 5 showing the relative positions of said parts at the instant the movable contact has been drawn across and out of engagement with the fixed contact, and Fig. 6 showing the relative positions of the parts immediately succeeding the position shown by Fig. 5, wherein the movable contact arm has been raised by its spring into a position to be returned, under the influence of the motor spring, to the initial contact position shown in Fig. 4.

Referring to the drawings, 10 designates a base-plate or support for the mechanism, which may constitute one wall of a clock case, and to which is secured by bolts 11 the frame 12 of an ordinary clock movement indicated as an entirety by 13. Fast on the main driving shaft or arbor of the clock train, behind the rear wall of the frame 12, is a ratchet disk 14. Strongly secured to the base-plate 10 beneath the clock movement by means of bolts 15 and suitable spacing sleeves 16 is a suitable frame designated as an entirety by 17 supporting a twin-spool electro-magnet 18, the cores 19 of which ex-

tend somewhat above the tops of the spools, and are rounded or concave on their inner or adjacent sides to accommodate the play of a three-arm laminated oscillatory armature 20, this latter being fast on a central shaft 21 that is journaled in a pair of upstanding lugs 22 carried by the upper parallel bars of the frame 17 between which the projecting upper ends of the cores 19 are confined. The rear end of the shaft 21 is slotted, as shown at 23 (Fig. 6) to receive and hold the inner end of a flat helical spring 24, which latter is contained within a suitable case or housing comprising a disk or plate 25 (Fig. 3) secured to one of the frame bars 17 by a screw 26 and a cap or cover 27 fitting over and interlocking with the periphery of said disk. The outer end of the spring is anchored at 28 to a stud on the face of the stationary disk 25.

Journaled in and through a central upwardly projecting arm of the armature 20 near its outer end is a shaft 29, one end portion of which is bent at right angles, as best shown in Fig. 3, and sharpened at its end to form a driving pawl for the ratchet disk 14. Fast on the opposite end of said shaft is a short arm 30, the purpose of which will hereinafter appear. Pivoted at 31 to the same central arm of the armature, and eccentrically of the latter, is a movable contact arm 32, the free end of which is bent inwardly, as shown at 33 (Figs. 2 and 3) and carries a movable contact pin 34 projecting therefrom. This contact pin 34 is adapted to coöperate with a stationary contact pin 35 mounted on a bracket 36 secured to but insulated from the frame 17. The pins 34 and 35 are disposed at right angles to each other; and, in the operation of said contact devices, the movable contact pin 34 is adapted to have a sliding or wiping movement across the fixed contact pin 35 during the working stroke of the armature in retensioning the motor spring 24, as will be hereinafter more fully explained. A tensile spring 37 connects the free end of the short arm 30 on pawl shaft 29 with a pin 38 in the contact arm 32; said spring thus tending normally to hold the driving pawl in engagement with the ratchet disk 14 and raise the contact arm 32 to the elevated position shown in Figs. 1, 3 and 6.

The contact arm 32 is made of a magnetizable material such as soft iron or steel; and it is so mounted that, when carried into its lowest position, wherein the contact pins are engaged with each other, its free end directly overlies one pole 19 of the magnet, and is consequently attracted and held down by the latter against the upward pull of the spring 37 so long as the contact pins are in engagement and the magnet consequently energized. The arm 32 has a tail-piece 39 formed with an inwardly bent end 40 (Fig. 2) that overlies one of the arms of the armature, thereby constituting a stop limiting the extent of upward swing of the contact arm. A simple and convenient device to deaden or dampen the stroke of the contact arm consists of a pad 41 of leather, felt, or the like, secured to the arm of the armature and adapted to be struck by the end 40 of the tail-piece 39 when the contact arm is snapped back by the spring 37.

The battery or other source of current is conventionally illustrated at 42 in Fig. 1. From one pole of the battery a wire 43 runs to an insulated binding post 44, thence by a short wire 45 to and through the winding of the magnet, thence by an insulated wire 46 to the insulated bracket 36 carrying the fixed contact pin 35. From the opposite pole of the battery a wire 47 leads to a binding post 48 in metallic connection with the frame-plate 10, the circuit being thence through the metallic parts of the structure to the movable contact arm 32, 33, and the contact pin 34.

In the operation of the device, let it be assumed that the parts are in the relative position shown in Figs. 1, 3 and 6, in which the spring 24 has just been rewound or retensioned. As the spring exerts its energy to drive the clock movement through the armature, the pawl shaft 29 and the ratchet disk 14, said armature is turned in the direction of the hands of a clock, as shown in Fig. 6, thus gradually carrying the contact arm 32 and its pin 34 down to the relative positions shown in Fig. 4. When the pin 34 engages the pin 35, said pins occupy the relative positions shown in Fig. 4, and at that instant the circuit is closed, the magnet energized, the armature attracted and swung back to the position shown in Figs. 5 and 6, thus rewinding the spring and giving the pawl a fresh hold upon the ratchet disk 14. During this spring-winding movement of the armature, the attraction of the magnet upon the contact arm 32 holds the pin 34 in contact with the stationary pin 35, so that the former is drawn across the latter under the endwise bodily movement of the contact arm created by the swinging movement of the armature; and this sliding or wiping contact lasts throughout the entire spring-winding movement of the armature, thus insuring the complete and full actuation of the armature under the influence of the magnet, owing to the prolonged closure of the contacts. The instant, however, the armature has completed its swinging movement responsive to the pull of the magnet, the point of the pin 34 is drawn out of contact with the fixed pin 35, the circuit is broken, the magnet deënergized, and the spring 37 at once swings the arm 32 back to the initial or starting position; and the above-described cycle of operation is then repeated.

From the foregoing it will be seen that the mechanism shown and described effects the chief purpose and function of the invention as hereinabove stated; namely, the insuring of a full and complete working stroke of the armature under the pull of the magnet by reason of maintaining the circuit closed during such entire working stroke of the armature. This result is preferably effected through the agency of a sliding or wiping contact maintained by means of a magnetizable contact arm having endwise bodily movement and subjected to the attraction of the magnet to overcome the contact-separating effect of a spring that normally tends to raise the movable contact arm. However, it will be plain to those skilled in the art that the broad principle of the invention is capable of embodiment in mechanism differing in detail from that herein shown and described; and hence it should be understood that the invention is not limited to the precise and exact means disclosed for effectuating the purposes thereof, except to the extent clearly indicated in specific claims.

While I have described and illustrated my invention as a winding device for clocks, and contemplate that such will be its principal use, yet it will be obvious that it might be employed in connection with time stamps or any other spring-actuated movement of the same character.

I claim:

1. In a motor for clock movements and the like, the combination of an electro-magnet and its armature, an electric circuit in which said magnet is included, a spring tensioned by said armature when the magnet is energized, means for transmitting the energy of said spring to the mechanism to be driven, fixed and movable contacts in said electric circuit, a spring normally tending to separate said movable contact from said fixed contact, and means controlled by the attractive influence of the energized magnet for prolonging the engagement of said contacts until the spring-tensioning movement of said armature has been completed, substantially as described.

2. In a motor for clock movements and the like, the combination of an electro-magnet and its armature, an electric circuit in which said magnet is included, a spring tensioned by said armature when the magnet is energized, means for transmitting the energy of said spring to the mechanism to be driven, fixed and movable contacts in said electric circuit, said movable contact having both swinging and bodily movement relatively to said fixed contact, a spring normally tending to swing said movable contact from said fixed contact, and means for effecting a wiping engagement of said movable with said fixed contact under the bodily movement of the former during the spring-tensioning movement of said armature, substantially as described.

3. In a motor for clock movements and the like, the combination of an electro-magnet and its armature, an electric circuit in which said magnet is included, a spring tensioned by said armature when the magnet is energized, means for transmitting the energy of said spring to the mechanism to be driven, fixed and movable contacts in said electric circuit, a carrier for said movable contact of magnetizable material and actuated by said armature in a manner to effect a wiping engagement of said movable contact over said fixed contact, and a spring normally tending to separate said contacts, the latter being held against separation during the wiping movement of said movable contact by the attractive influence of the energized magnet upon said contact carrier, substantially as described.

4. In a motor for clock movements and the like, the combination of an electro-magnet and its armature, an electric circuit in which said magnet is included, a spring tensioned by said armature when the magnet is energized, means for transmitting the energy of said spring to the mechanism to be driven, fixed and movable contacts in said electric circuit, a contact arm for said movable contact of magnetizable material pivoted to said armature and moved lengthwise by the latter, whereby to effect a wiping engagement of the movable contact carried thereby over said fixed contact, and a spring normally tending to swing said contact arm on its pivot, said contact arm, when said contacts are in engagement, overlying the core of the magnet and held thereby against the separating influence of said last-named spring, substantially as described.

5. In a motor for clock movements and the like, the combination of an electro-magnet, an oscillatory armature therefor, an electric circuit in which said magnet is included, a spring tensioned by said armature when the magnet is energized, means for transmitting the energy of said spring to the mechanism to be driven, fixed and movable contacts in said electric circuit, a contact arm for said movable contact of magnetizable material pivoted to said armature eccentrically of the pivot of the latter and at its free end overlying and attracted by the core of the magnet when said contacts are closed, and a spring operating to swing said contact arm on its pivot when said movable contact has been drawn by said armature out of engagement with said fixed contact at the conclusion of the spring-tensioning movement of said armature, substantially as described.

6. In a motor for clock movements and the like, the combination of an electro-magnet and its armature, an electric circuit in

which said magnet is included, a spring tensioned by said armature when the magnet is energized, means for transmitting the energy of said spring to the mechanism to be driven, fixed and movable contacts in said electric circuit, a carrier for said movable contact mounted on said armature with capacity for both bodily and swinging movement and restrained against the latter during the entire spring-tensioning movement of said armature, and a spring normally tending to swing said contact carrier in a direction to separate said contacts, substantially as described.

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