No. 897,019. PATENTED AUG. 25, 1908.

G. H. RUPLEY.

ELECTRIC CLOCK MECHANISM.

APPLICATION FILED APR. 2, 1906.

2 SHEETS—SHEET 1.

Fig. 1

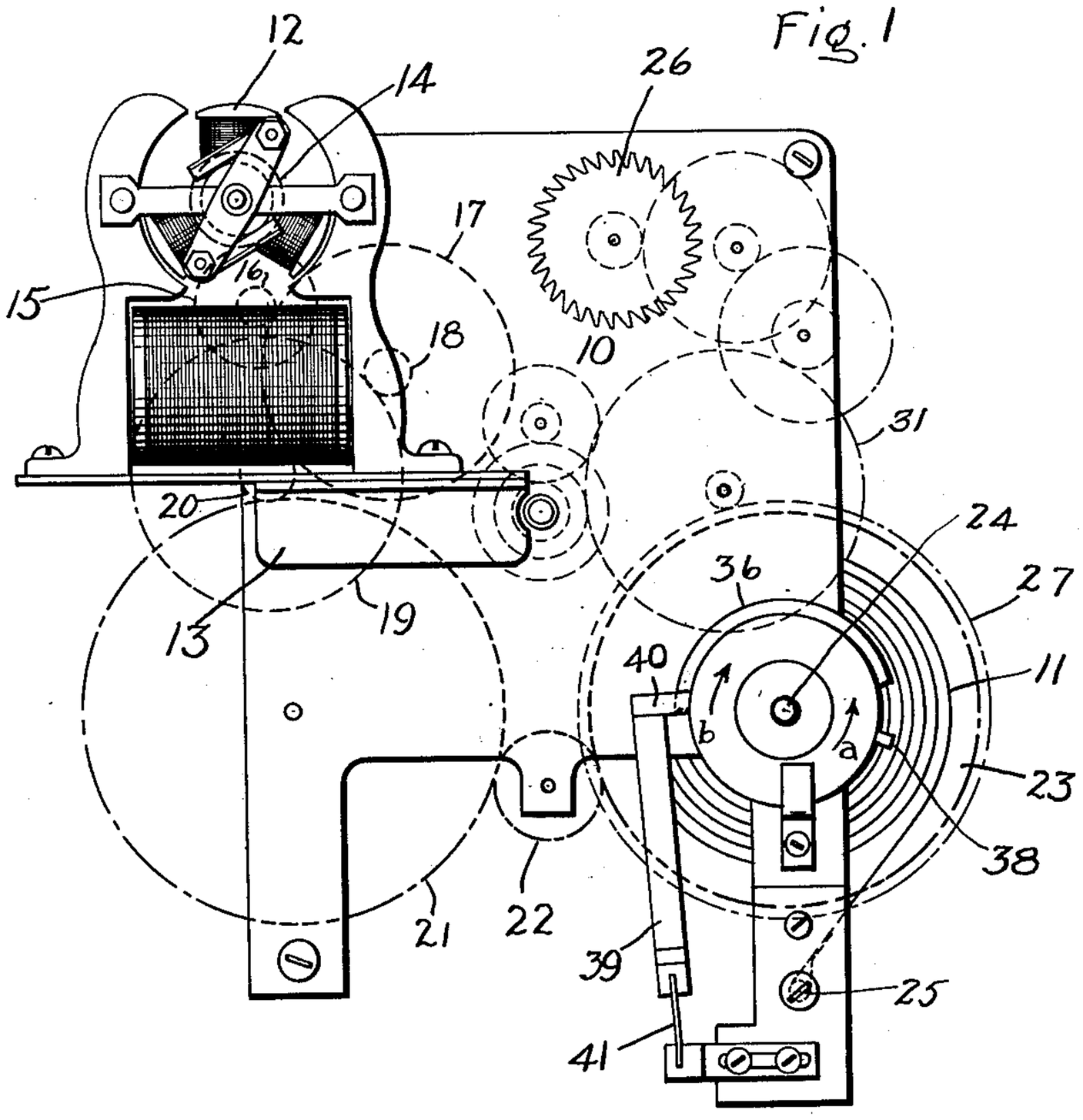


Fig. 2

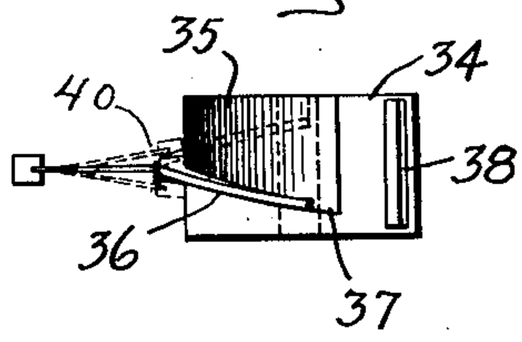
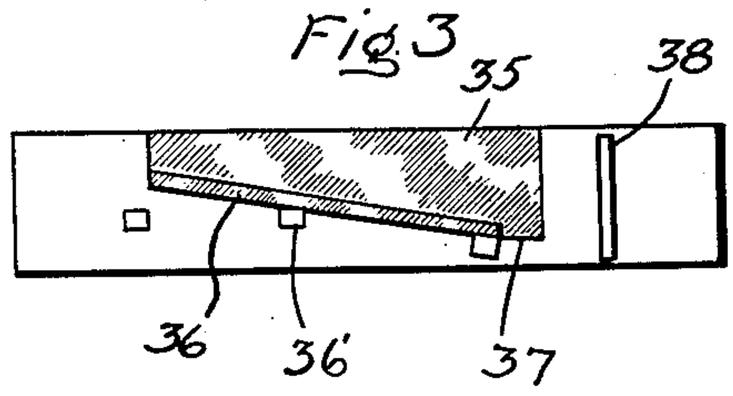


Fig. 3



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2 SHEETS—SHEET 2.

Fig. 5

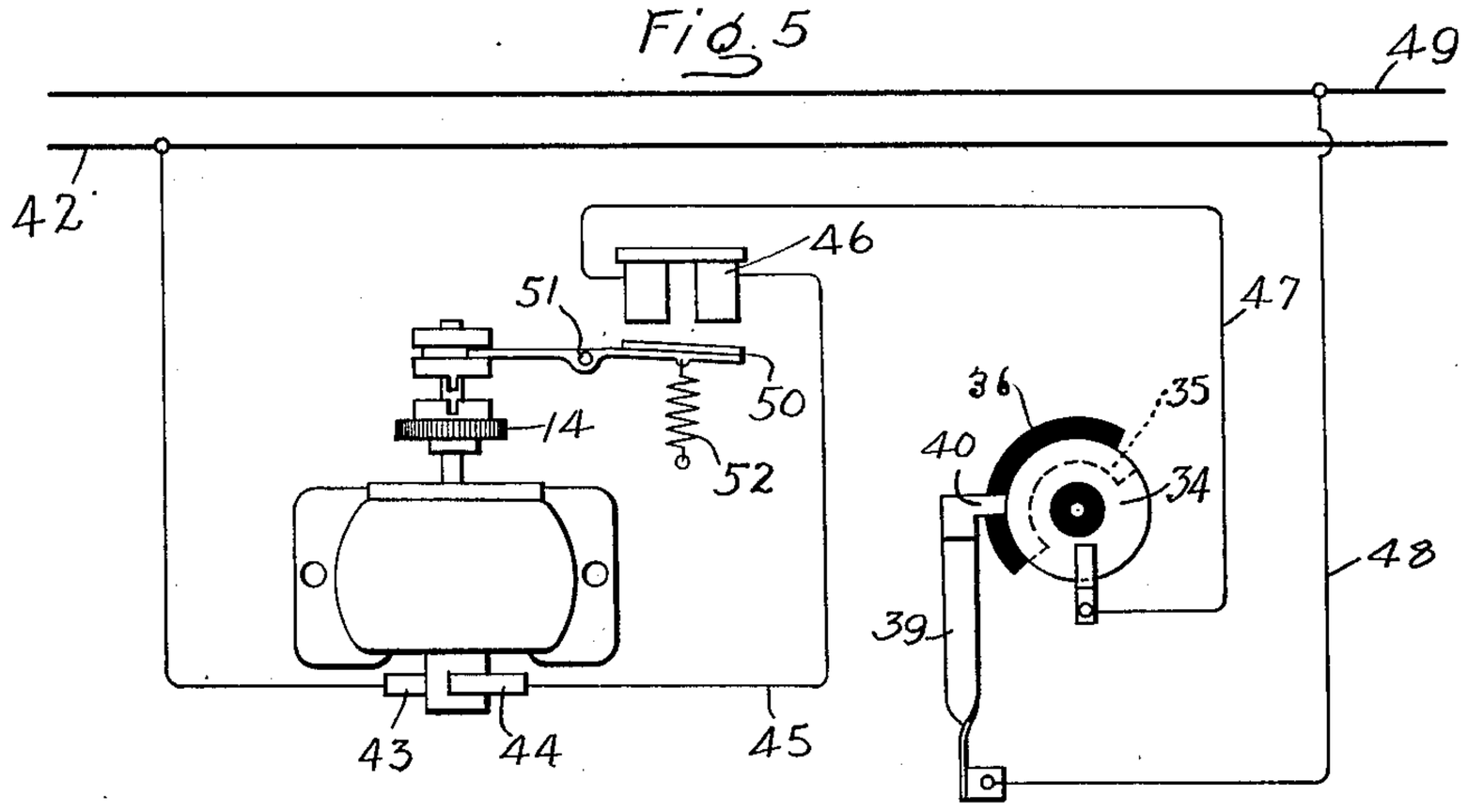
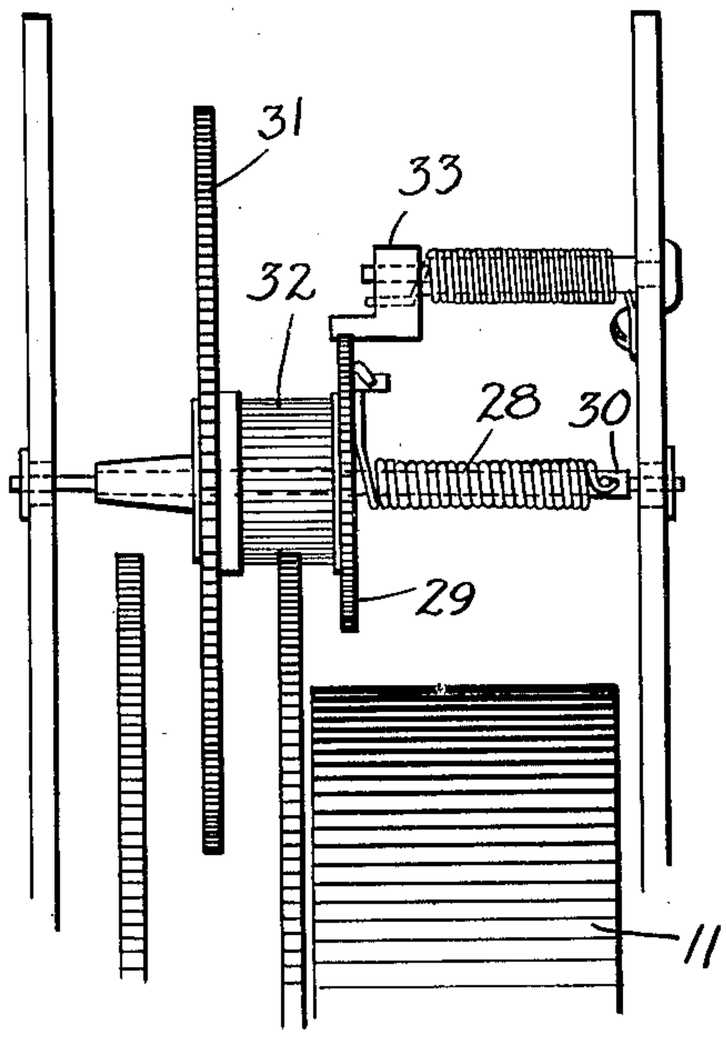


Fig. 4



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UNITED STATES PATENT OFFICE.

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ELECTRIC CLOCK MECHANISM.

No. 897,019. Specification of Letters Patent. Patented Aug. 25, 1908.

Application filed April 2, 1906. Serial No. 309,256.

To all whom it may concern:

Be it known that I, GEORGE H. RUPLEY, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Electric Clock Mechanisms, of which the following is a specification.

This invention relates to means for automatically winding clock mechanisms and has for its object the provision of a means of this character whereby an electric current will be periodically utilized to effect the winding of the clock mechanism after a predetermined amount of energy is expended.

One of the objects of my invention is to provide an electric clock winding mechanism which may be connected with the ordinary lighting or power circuit and which will wind and rewind at stated intervals and will require no attention whatever.

A further object is to provide improved means whereby the clock mechanism will continue to operate for a definite period in case the electric power should not be available, when the time comes for the mechanism to wind, arrangements being made whereby when the power does come on, the winding mechanism will immediately start and restore the energy which has been expended.

A still further and very important object of my invention is to provide against the complete running-down of the clock mechanism, since whenever this occurs the clock mechanism gets out of adjustment and the services of an expert are required to adjust it.

In my previous patent, No. 832,747, I have described and claimed broadly a mechanism whereby the above functions may be accomplished. Although in said application I have claimed the invention broadly and have not limited it to any particular type of clock mechanism, it is therein shown and described in connection with a drum winding clock. In this type of clock the main spring arbor always rotates in the same direction, the drum being used to wind the spring, or, in some cases, the drum operates the clock mechanism and the spring is wound through the arbor. The type of mechanism shown in the above noted patent is not well adapted for use with a clock in which there is no drum, *i. e.*, where the arbor rotates in one direction to wind and in the reverse direction to operate the clock train. In carrying out my invention, therefore, I provide a winding mechanism including an electric motor for winding a clock mechanism which has no drum. I also provide means whereby—when the arbor reverses its direction to operate the clock train—it will be disconnected from the motor armature, so that the latter will not be rotated and thus impede the movement of the clock. I have also provided a very simple form of contactor which will accomplish all the functions which are accomplished by the device described in my previous application.

My invention further consists in the features of construction and in the arrangement and combination of elements hereinafter set forth and particularly pointed out in the claims annexed to and forming a part of this application.

In the drawings, Figure 1 is an elevation of a clock mechanism, conventionally shown, having my improvements attached thereto; Fig. 2 is a plan view of the contacting drum; Fig. 3, is a view of the drum developed on a plane surface; Fig. 4 shows an elevation of the take-up mechanism; and Fig. 5 is a diagram of circuits.

Referring to the drawings, 10 is an ordinary clock mechanism which may be operated by a main spring 11 or in any desired manner; the type of clock itself is no part of my invention, it only being essential that it be of the broad type in which there is no drum, the spring arbor rotating in opposite directions to wind and drive the clock train, respectively.

An electric motor having an armature 12 is suitably mounted upon the frame of the clock, preferably upon the rear plate, as by means of the bracket 13. This motor may be of any desired type, either rotary or vibratory, and may be either series or shunt wound, although in this particular instance I have used a series wound motor. The main spring 11 is wound from the armature by means of the gear 14 on the armature shaft. A suitable reduction gear is provided in this case, the power being transmitted from gear 14 to gear 15, thence successively through gears 16, 17, 18, 19, 20, 21, 22, to the gear 23 on the main arbor 24 to which the inner end of the main spring is secured, the outer end being fastened to the frame at 25. From this shaft power is transmitted to the clock mechanism and escapement 26, through gear 27 in the usual way.

In order to maintain the tension upon the clock train while the spring is being wound, a compensating device is provided. In Fig. 4 I have shown a mechanism suitable for this purpose. As the main spring 11 drives the clock train, it acts through the spring 28, one end of which is secured to the ratchet wheel 29 and the other end to the shaft 30. The gear 31 is keyed to the shaft 30, while the gear 32 is secured to the ratchet wheel 29 and both sleeved to the shaft. As the spring 11 uncoils it places a tension upon the spring 28 and through it and the shaft 30 drives the gear 31. When the tension of the main spring 11 is removed or reduced through the winding operation, the clock train is kept under tension by the spring 28. A spring pawl 33 is adapted to engage the ratchet wheel to keep the spring under tension.

Rigidly secured to the main arbor 24 is a contacting drum 34 preferably made of conducting material, such as brass, and having an insulating portion 35 set into its face so as to be flush with the metallic surface of the drum. This insulation is shaped as shown in Figs. 2 and 3 and is provided along its beveled side with a spiral rib 36. This does not extend quite to the end of the insulation, leaving a gap 37 at one end. A stop 38 is provided upon the metallic portion of the drum, for purposes hereinafter set forth. A spring contactor 39 has one end secured to the clock frame and has its free end provided with a brush 40, which is held in contact with the drum by the tension of spring 41. Normally, this contactor occupies the position shown in full lines in Fig. 2, but may be moved longitudinally of the cylinder to the positions shown in dotted lines against the tension of the spring 39 by means of the rib 36.

The operation of my device will be clear from the foregoing. The parts being in the position shown in Fig. 1, the brush 40 is in engagement with the metallic surface of the drum and the motor circuit is closed, the circuits being as follows: from main 42, through brush 43, through the motor to brush 44, thence by conductor 45 through magnet 46, conductor 47, to the drum 34, thence by brush 40, spring 39 and conductor 48 back to line at 49. The motor armature then starts to rotate, but, as before stated, it is not normally in driving engagement with the winding train. This engagement is effected by means of the magnet 46, which, upon being energized, attracts its armature 50 pivoted at 51 to clutch the armature to the drive gear 14. The motor then operates to drive the drum in the direction of the arrow *a* while the brush travels along the metallic surface of the drum in the direction of the arrow *b* (Fig. 1). When the brush reaches the rib 36 at 36′ it is deflected against the tension of the spring 39, the circuit, however, being kept closed (Fig. 3). When it reaches the gap 37 the brush springs away from the rib and onto the insulation 35, and the armature circuit is thereupon opened and the magnet 46 deënergized. The motor is thereupon unclutched from the winding train by means of the spring 52. The brush now being on the insulation, the spring 11 starts to operate the clock train, rotating the drum in the direction *b*. The brush again travels along the drum until it reaches the end of the rib, whereupon it springs onto the metallic portion to again operate the motor. In case there should be no power on the line when the brush comes in contact with the conducting surface, the clock mechanism may continue to run, the brush all the time maintaining the circuit closed, so that the motor will start as soon as the power comes on. After the clock has run for a definite interval without power on the line, it will be positively stopped by the brush 40 engaging the stop 38. When the power does come on the motor will start and completely wind up the spring.

It will be seen that I have provided an extremely simple and inexpensive arrangement for making and breaking the circuit. There are no parts to get out of order and the circuit is completed on a rubbing or wiping contact which keeps the parts bright and prevents oxidation.

Various other means may be provided for clutching the motor to the driving mechanism, it being only essential that the motor shall drive the winding mechanism in one direction only. Various other modifications will also suggest themselves to one skilled in the art, all of which will come within the spirit of my invention in so far as they fall within the scope of the claims annexed hereto.

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

1. The combination with clock mechanism, of a winding mechanism therefor comprising an electric motor positively connected to said mechanism, permanently contacting members controlling the motor circuit arranged to maintain the motor circuit closed for a predetermined period, and means for disconnecting the motor from the winding mechanism when the armature circuit is opened.

2. The combination with clock mechanism, of a winding mechanism therefor comprising an electric motor and permanently contacting members controlling said motor, one of which is driven in one direction by the winding mechanism with the motor circuit closed and in the opposite direction by the clock mechanism with the motor circuit open.

3. The combination with clock mechanism, of a winding mechanism therefor comprising an electric motor, permanently con-

tacting members arranged to maintain the motor circuit closed, one of which is driven in one direction by the winding mechanism and in the opposite direction by the clock mechanism, and means for maintaining a tension in the clock mechanism during the winding operation.

4. The combination with clock mechanism, of a winding mechanism therefor comprising an electric motor, permanently contacting members, one of which is driven in one direction by the winding mechanism with the armature circuit closed and in the opposite direction by the clock mechanism with the armature circuit open, and means for disconnecting the motor from the winding mechanism when the armature circuit is opened.

5. The combination with a clock mechanism, of a winding mechanism therefor comprising an electric motor, a movable circuit controller driven in opposite directions by the clock and winding mechanisms respectively, a contactor arranged for permanent sliding engagement with said controller, and means whereby a circuit is closed between the contactor and controller as the latter rotates in one direction and opened as it rotates in the opposite direction.

6. The combination with a clock mechanism, of a winding mechanism therefor comprising an electric motor, a cylindrical circuit controller driven in opposite directions by the clock and winding mechanisms respectively, a contactor arranged for sliding engagement with said controller, and means whereby the contactor is shifted axially of the controller as the latter rotates.

7. The combination with a clock mechanism, of a winding mechanism therefor comprising an electric motor, a cylindrical circuit controller provided with a metallic portion and an insulating portion and driven in opposite directions by the clock and winding mechanisms respectively, a spring contactor arranged for sliding engagement with either portion of said controller, and means whereby the contactor is shifted axially of one portion of the controller a predetermined amount and returned in response to its spring tension to the other portion.

8. The combination with a clock mechanism, of a winding mechanism therefor comprising an electric motor, a cylindrical circuit controller provided with a metallic portion and an insulating portion separated by a spiral rib and driven in opposite directions by the clock and winding mechanisms respectively, a spring contactor arranged for sliding engagement with said controller and adapted to engage said rib to place the contactor spring under tension.

9. The combination with clock mechanism of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising a movable contact having a conducting and an insulated surface separated by a flange, a spring-pressed contactor engaging said surfaces and arranged to be put under tension by said flange whereby the said contactor will be automatically shifted from one surface to the other when it reaches the ends of the flange.

10. The combination with clock mechanism of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising a rotary contact having a conducting and an insulated surface separated by a flange, a spring-pressed contactor engaging said surfaces and arranged to be put under tension by said flange whereby the said contactor will be automatically shifted from one surface to the other when it reaches the ends of the flange.

11. The combination with clock mechanism of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising a rotary contact having a conducting and an insulated surface separated by a flange, a spring-pressed contactor engaging said surfaces and arranged to be put under tension by said flange, one of said contacting members being rotated by the clock mechanism.

12. The combination with clock mechanism of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising a movable contact having a conducting and an insulated surface separated by a flange, a spring-pressed contactor engaging said surfaces and arranged to be put under tension by said flange one of said contacting members being rotated by the winding mechanism.

13. The combination with clock mechanism of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit said means comprising movable contact members having both conducting and non-conducting engaging relations, means in connection with said members for automatically shifting from one relation to the other as the members move, one of said mechanisms being operated while the contacts are in conducting relation and the other while the contacts are in non-conducting relation.

14. The combination with clock mechanism of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising a rotary contact having a conducting and an insulated surface separated by a flange, a spring-pressed contactor engaging said surfaces and arranged to be put under tension by said flange, and means

whereby said members are given a rotary motion with reference to each other by the clock mechanism while the contact is made on the insulated surface and by the winding mechanism when the contact is made on the conducting surface.

15. The combination with clock mechanism of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising contacting members having both conducting and non-conducting engaging relations, means whereby said members are given a rotary motion with reference to each other by the clock mechanism while the members are in non-conducting relation and by the winding mechanism while the members are in conducting relation, and means for positively stopping the relative movement of said members at a predetermined point.

16. The combination with clock mechanism of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising movable contacting members having both conducting and non-conducting engaging relations, means in connection with said members for automatically shifting the contact from one relation to the other to open and close the motor circuit as the members move, said members being moved with reference to each other by the clock-mechanism while the members are in non-conducting relation and by the winding mechanism while the members are in conducting relation.

17. The combination with clock mechanism of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising contacting members having both conducting and non-conducting engaging relations, means whereby said members are rotated with reference to each other by the clock mechanism while the members are in non-conductive relation and by the winding mechanism while the members are in conducting relation, and means in connection with said members for automatically shifting the contact from one relation to the other as the members rotate.

18. The combination with clock mechanism, of winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising a rotary circuit controlling device mounted for movement independently of said motor and arranged to be operated alternately in opposite directions by said mechanisms, and means whereby the motor circuit is closed by one of said movements and opened by the other.

19. The combination with clock mechanism, of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising a contacting drum and a contactor in sliding engagement therewith, one of which is rotated alternately in opposite directions by the clock mechanism and the motor respectively and is movable independently of the motor, said drum and contactor being arranged to open and close the motor circuit during the rotation.

20. The combination of a clock mechanism, of a winding mechanism therefor comprising an electric motor, a cylindrical circuit controller driven by one of said mechanisms, a contactor arranged for sliding engagement with said controller, and means whereby the contactor is shifted axially of the controller as the latter rotates.

21. The combination with a movable member having a conducting and an insulating surface separated by a flange arranged at an angle to the direction of movement of said member, of a resilient contacting member engaging said flange and said surfaces.

22. The combination with a rotary member having a conducting and an insulating surface separated by a flange arranged at an angle to the direction of movement of said member, of a resilient contacting member engaging said flange and said surfaces.

23. The combination with a member having a conducting and an insulating surface separated by a flange arranged at an angle to the direction of movement of said member, of means for moving said member in opposite directions, and a resilient contacting member engaging said flange and said surfaces.

24. The combination with a member having a conducting and an insulating surface separated by a flange arranged at an angle to the direction of movement of said member, of means for rotating said member in opposite directions, and a resilient contacting member engaging said flange and said surfaces.

25. The combination with clock mechanism, of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising contacting members movable with reference to each other alternately by said mechanisms and having conducting surfaces of contact, means whereby the members are automatically shifted out of conducting relation during said movement, and means whereby the movement is continued by the clock mechanism with the members in conducting relation upon failure of the winding mechanism to operate.

26. The combination with clock mechanism, of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising contacting members having both conducting and non-conducting engaging re-

lations movable alternately by said mechanisms, means whereby the contact is automatically shifted from one relation to the other during the said movements, and means whereby the movement is continued by the clock mechanism with the members in conducting relation after the contact is shifted upon the failure of the winding mechanism to operate.

27. The combination with clock mechanism, of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising contacting members having both conducting and nonconducting engaging relations rotatable alternately by said mechanisms, means in connection with said members whereby the contact is automatically shifted from one relation to the other during said movements, and means whereby the movement is continued by the clock mechanism with the members in conducting relation after the contact is shifted upon the failure of the winding mechanism to operate.

28. The combination with clock mechanism, of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising a contact drum having both conducting and insulating surfaces, a contact member arranged to engage said surfaces, means whereby the drum and contact member are alternately moved by said mechanisms, means for shifting the engagement from one surface to the other during said movements, and means whereby the movement is continued by the clock mechanism with the contact in engagement with the conducting surface upon the failure of the winding mechanism to operate.

29. The combination with clock mechanism, of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising a contacting drum having both conducting and insulating surfaces of contact separated by a flange and movable by one of said mechanisms, a spring-pressed contact engaging said surfaces and said flange and arranged to be shifted automatically from one surface to the other when it is moved out of engagement with said flange, and means whereby the movement is continued by the clock mechanism with the contact in engagement with the conducting surface upon the failure of the winding mechanism to operate.

30. The combination with clock mechanism, of a winding mechanism therefor including an electric motor and means for periodically controlling the motor circuit, said means comprising a contacting drum and a contactor engaging the same, one of which is geared to the motor, and means in connection with said contacting members for automatically making and breaking the motor circuit.

In witness whereof I have hereunto set my hand this 31st day of March, 1906.

GEORGE H. RUPLEY.

Witnesses:

BENJAMIN B. HULL,

HELEN ORFORD.