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D. PERRET.

ELECTRIC TIME SYSTEM.

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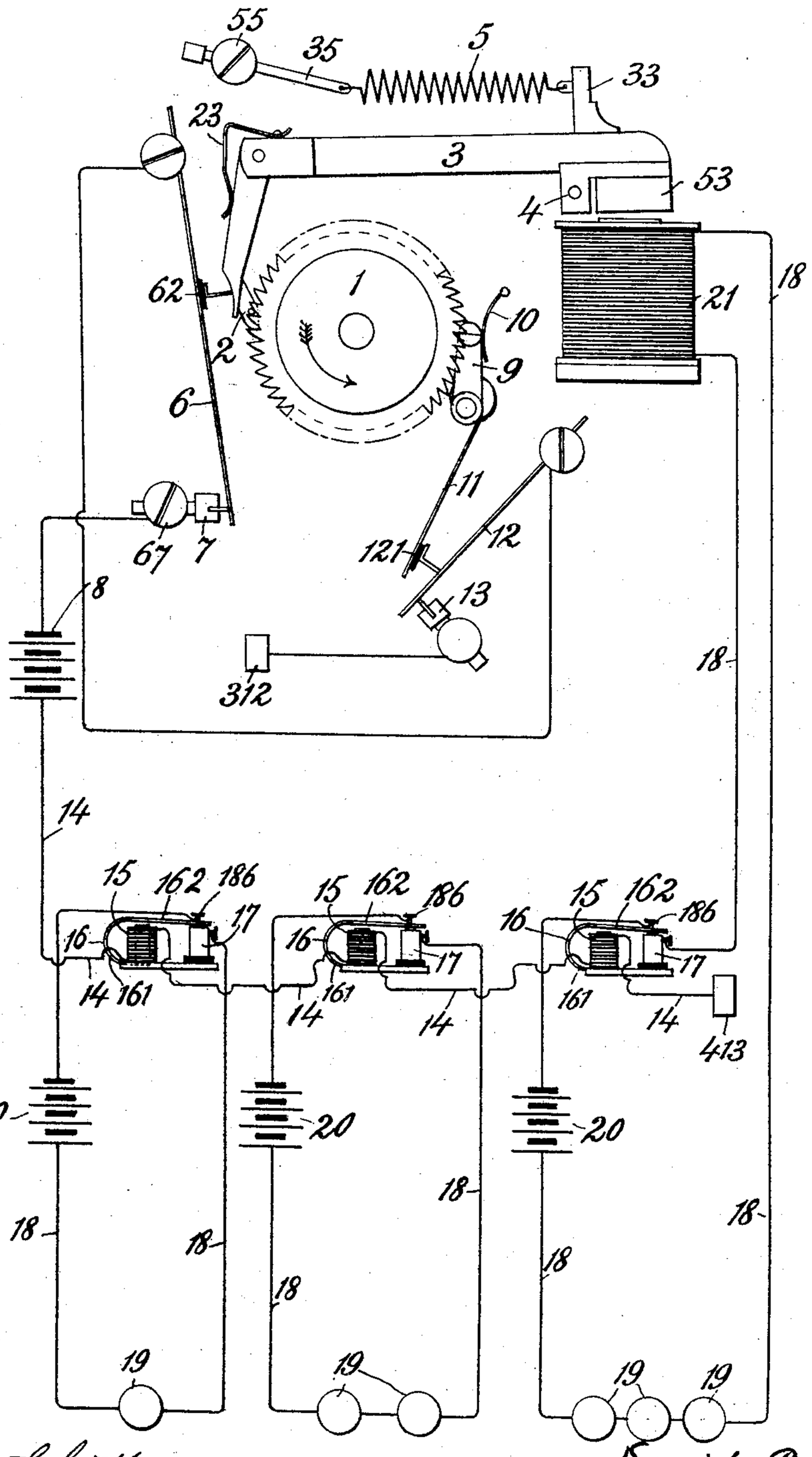
NO MODEL.



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UNITED STATES PATENT OFFICE.

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ELECTRIC TIME SYSTEM.

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To all whom it may concern:

Be it known that I, DAVID PERRET, a citizen of Switzerland, residing at Neufchâtel, in the Republic of Switzerland, have invented certain new and useful Improvements in Electric Time Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to electric time systems, its object being to provide an installation which may be applied to and connected with any electrically wound or actuated clock and which will be simple in construction and in which all the receiving-clocks will operate with certainty. The system which I have devised for this purpose involves the use for the transmission of time of an electrically wound or set clock which is provided with circuit-breakers actuated by a movable part of the clock-movement. In this system there is connected to the circuit breakers or interrupters of the controlling-clock the circuit from a source of electricity in which are installed the relays designed to close and open the local motive circuits of the receiving-clocks, the winding device of the controlling-clock being itself installed in one of these relay-governed local circuits.

In the accompanying drawing I have represented in diagram an example of the preferred manner in which I carry my invention into effect.

As seen from the drawing, the controlling-clock is provided with a ratchet 1, engaged by a pawl or dog 2, pivoted to a lever 3, which in turn is pivoted at 4, said lever being urged into the position shown in the drawing by a spring 5, one end of which is secured to a stud 33 at the forward end of the lever, while its other end is attached to a rod or pintle 35, which may be adjusted longitudinally to vary the tension of the spring 5, if desired, and secured in its position of adjustment by a set-screw 55. The lever 3 is also provided at its forward end with an armature 53, which whenever the electromagnet 21, arranged opposite the same, is energized will be drawn forward against the stress of spring 5, thereby causing the pawl 2 on lever 3 to ride over one tooth of the ratchet-wheel 1, armature 53, and the lever 3, being returned to their initial position by the spring as soon as the magnet is deënergized, thereby causing the pawl 2 to carry the wheel 1 forward to the extent of one tooth in the direction of the arrow, as will be readily understood. The pawl 2 is held into engagement with the teeth of ratchet-wheel 1 of the controlling-clock by any suitable or convenient means, such as the bent spring 23 shown, which is attached to the lever 3 and reaching around over the knee where the pawl 2 is pivoted to the said lever bears against the shank of said pawl. This spring might, however, be dispensed with, as it acts merely as an auxiliary to the contact or plate spring 6, which bears against said pawl, as shown, and which spring is caused to contact with a contact-piece 7 (shown to be adjustably arranged) each time the pawl 2 rides over one of the teeth of the ratchet 1. To the contact-piece 7 is connected one of the poles of a battery or other source of electricity 8. The contact-spring 6, it will be noted, is arranged at an angle to the pawl 2, and it and the contact-piece 7, with their operative means, constitute one circuit-breaker. A second detent-pawl, 9, is held into engagement with the ratchet 1 by a small spring 10, and the tail 11 of this pawl is so arranged as to bear against a portion of contact or plate spring 12 and to force it into contact with a contact piece or screw 13, also adjustably arranged and connected to earth at 312, as shown. Whenever the point of one of the teeth of the ratchet, under the action of pawl 2, passes below and by this pawl 9, the tail 11 of the said pawl releases the spring 12 and permits the latter to move out of contact with the contact-piece 13 by virtue of its own tension, whereby the current is broken between the points 12 and 13. The spring 12 and contact-piece 13, with their operative means, form the second circuit-breaker. Of course insulations, such as 62 and 121, are arranged at the points where the pawls 2 and 11 contact with the contact-springs 6 and 12. The other pole of the source

of electricity 8 is connected to a line 14, terminating at earth, as shown at 413, on which line are connected the relays 15, three of which are shown in the drawing for purposes of illustration, but which may be of any suitable or desired number. As shown, these relays 15 are connected in series. Each of the relays comprises an electromagnetic coil, whose two ends or binding-posts are connected to the line 14 in series, and a U-shaped frame 16, one arm, 161, of which is connected or attached to the support or base of the relay and also to the core of the electromagnet, while the other upper elastic or resilient arm, 162, acts as the armature, which is drawn downward each time the magnet of the relay is energized—that is, each time a current passes through the line or circuit 14. When the arm 162 is drawn down, its end is caused to strike against an insulated contact 17, connected to a local circuit 18, in which are installed one or more electric clocks 19, as well as a source of electricity 20. This local circuit, as shown, is connected at 186 to the resilient arm 162. Each relay 15 and each local circuit 18, with their various parts and appurtenances, are arranged and constructed as just described, except that in the last local circuit 18 of the series is placed the electromagnet 21 of the controlling-clock, which when energized serves to attract the armature 53 on the pawl-lever 3, and thereby to intermittently rotate the ratchet-wheel 1, as above described.

The operation of the electric time system thus described is as follows: Whenever the current in the coil of electromagnet 21 is broken, the armature-lever 3 is released and the spring 5 rocks the said lever, whereby the pawl 2 is caused to advance the ratchet-wheel 1 of the controlling or master clock in the sense of the arrow. Thereby the pawl 9 is raised by the ratchet-tooth, which it engages, thereby removing the tail 11 out of contact with the contact-spring 12, which being released breaks contact with the contact-piece 13, and thus breaking the circuit of line 14. Coincidently with this action of the pawl 9 the descending movement of the pawl 2 causes the latter to bear against the contact-spring 6 and to force it into contact with the contact-piece 7. The arrangement of the parts is such that the contact between spring 6 and contact-piece 7 is established a little before the pawl 9 after being ridden over a tooth of the ratchet-wheel 1 drops back into the next notch between two teeth. As soon as the pawl 9 drops into such notch the tail 11 forces the contact-spring 12 against contact-piece 13, and since now both circuit-breakers are closed the circuit from battery or current source 8 is established and the current passes into all of the relays 15, so that in each the resilient arm 162 is attracted to the magnet of the relays, thereby closing the local circuit 18 by causing each arm 16 to contact with its contact-piece 17. The current in each circuit 18 being thus closed each of the corresponding receiving-clocks 19 in each circuit is thus actuated by means well understood by those skilled in the art and which it is not necessary to describe. At the same time the electromagnet 21, which, as above set forth, is connected into the last local circuit and which serves to return the actuating-pawl 2 of the controlling-clock to its starting position, is energized, thereby drawing down the armature-lever 3, whereby the spring 5 is put under tension and further energy to actuate the controlling-clock is stored in the same. As soon as the spring 5 has been stretched by the above action of the electromagnet 21 on the armature-lever 3 the pawl 2, which has thereby been raised so as to first ride over a tooth of the ratchet-wheel 1 and then drop into engagement with the following tooth, is out of contact with the contact-spring 6, and the latter therefore breaks contact with contact-piece 7 and opens the circuit or line 14, and thereby all of the local circuits 18. Hence the electromagnet 21 becomes deënergized, thereby completing one cycle of operations of this system, and the spring 5 again acts to rock lever 3, and thereby to start the next cycle of operations, and so on, as above described.

Any electrically wound or actuated clock may without undergoing any change whatever serve as a controlling or time-distributing clock in a system embodying my invention. All that is necessary is to connect to the circuit-breaker of such controlling or distributing clock a circuit in which are placed relays operated by said circuit and local circuits each connected with an electric receiving clock or clocks, said local circuits to be opened and closed by the said relays, one of the local circuits having included in it an electromagnet-motor for winding or actuating the controlling-clock. Since the electromagnet 21 of the controlling electric clock is included in one of the local circuits which actuate the receiving-clocks, the said controlling-clock cannot be reset for the next advance of the ratchet-wheel 1 after having fed the same forward one step unless the said local circuit has been closed by its relay, or, in other words, unless the receiving-clocks in said local circuit have been coincidentally actuated. Hence in order to avoid the lagging behind of any of the receiving-clocks with respect to the controlling-clock it will be sufficient to include in the local circuit of the electromagnet for resetting said controlling-clock and in series with said electromagnet a receiving clock or clocks which are more inert or slow acting than any of those of the other local circuits, so that unless the more inert or slow-acting receivers have been effectively operated the

controlling-clock 1 cannot be reset for its next impulse to break the relay-circuit 14. There exists, therefore, an absolute certainty that this circuit will remain closed sufficiently long to permit all of the receiving-clocks to be actuated with certainty. The resetting-electromagnet 21 might also be included alone, without any receivers 19, in a separate local circuit. In such a case the corresponding relay would be made more inert than any of the others, so that it would not close the circuit of said resetting-magnet 21 preparatory to breaking the relay-circuit 14, until the more rapid relays of the remaining local circuits 18 had already operated. The receiving-clock in each of the local circuits may be either in series or in parallel or partly in series and partly in parallel. The relays also may be included in the line 14 in parallel, if desired. Though the said line 14 is in the drawing represented as being connected to earth, it is evident that it might be provided with a return-conductor other than earth instead.

It will be noted that in all cases the electromagnetic means for operating the circuit-breaker, comprising the ratchet 1, the feed-pawl 2, stop-pawl 9, the contact-pieces 7 and 13, and contact-springs 6 and 12, consist of an electromagnet 21 and armature 53 or their equivalents in combination with the resetting-spring 5, said electromagnetic means being included in a local circuit 18, operated by a relay 15 included in the main circuit arranged to be opened and closed by the circuit-breaker.

Having thus fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In an electric time system, a main circuit, an electromagnetic circuit-breaking device for the same, and relays included in said main circuit, in combination with local circuits corresponding to said relays, the electromagnet of the circuit-breaking device for the main circuit being included in one of the local circuits.

2. In an electric time system, a main circuit, an electromagnetic circuit-breaking device for the same, and relays included in said main circuit, in combination with local circuits, each connected to a receiving clock or clocks corresponding to said relays, the electromagnet of the circuit-breaking device for the main circuit being included in one of the local circuits.

3. In an electric time system, a main circuit, an electric controlling-clock and a circuit-breaking device actuated by the controlling-clock, in combination with relays included in the main circuit, and local circuits corresponding to and adapted to be closed by said relays, one of said local circuits being connected to the electric controlling-clock.

4. In an electric time system, a main circuit, a controlling-clock and a circuit-breaking device actuated by the controlling-clock, in combination with relays included in the main circuit, and local circuits corresponding to and adapted to be closed by said relays, one of said local circuits being connected to the actuating-electromagnet of the controlling-clock.

5. In an electric time system, a main circuit, a controlling-clock and a circuit-breaking device actuated by the controlling-clock, in combination with relays included in the main circuit, and local circuits, each connected to a receiving clock or clocks corresponding to and adapted to be closed by said relays, one of said local circuits being connected to the actuating-electromagnet of the controlling-clock.

6. In an electric time system, a main circuit, an electric controlling-clock and a circuit-breaking device actuated by the controlling-clock, in combination with relays included in series in the main circuit, and local circuits corresponding to and adapted to be closed by said relays, one of said local circuits being connected to the actuating-electromagnet of the controlling-clock.

7. In an electric time system, a main circuit, a controlling-clock and a circuit-breaking device actuated by the controlling-clock, in combination with relays included in series in the main circuit, and local circuits, each connected to a receiving clock or clocks corresponding to and adapted to be closed by said relays, one of said local circuits being connected to the actuating-electromagnet of the controlling-clock.

8. In an electric time system, a main circuit, an electromagnetic circuit-breaking device for the same, and relays included in said main circuit, in combination with local circuits corresponding to said relays, the electromagnet of the circuit-breaking device for the main circuit being included in the slowest-acting local circuit.

9. In an electric time system, a main circuit, an electromagnetic circuit-breaking device for the same, and relays included in said main circuit, in combination with local circuits, each connected to a receiving clock or clocks corresponding to said relays, the electromagnet of the circuit-breaking device for the main circuit being included in the slowest-acting local circuit.

10. In an electric time system, a main circuit, an electric controlling-clock and a circuit-breaking device actuated by the controlling-clock, in combination with relays included in the main circuit, and local circuits corresponding to and adapted to be closed by said relays, the slowest-acting local circuit being connected to the electric controlling-clock.

11. In an electric time system, a main circuit, a controlling-clock and a circuit-breaking device actuated by the controlling-clock,

in combination with relays included in the main circuit, and local circuits corresponding to and adapted to be closed by said relays, the slowest-acting local circuit being connected to the actuating-electromagnet of the controlling-clock.

In testimony whereof I affix my signature to this specification in the presence of two witnesses.

DAVID PERRET.

Witnesses:
ADOLF FEDERER,
FRIEDRICH NAEGELI.