

(No Model.)

E. L. BERRY & F. HARRISON.
APPARATUS FOR PERIODICALLY COMPLETING AND INTERRUPTING
ELECTRIC CIRCUITS.

No. 514,746.

Patented Feb. 13, 1894.

Fig. 1.

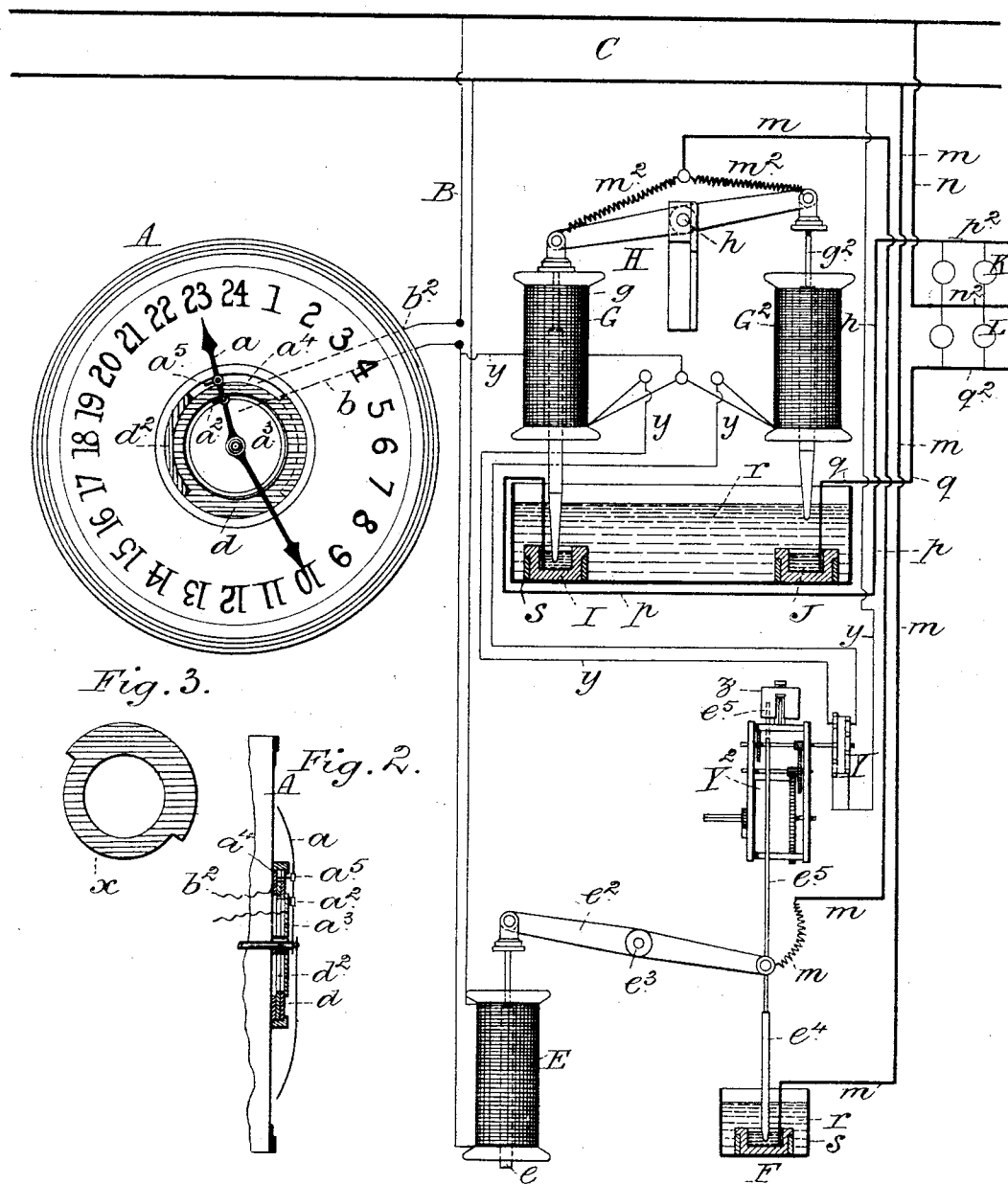


Fig. 3.

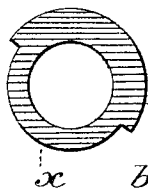
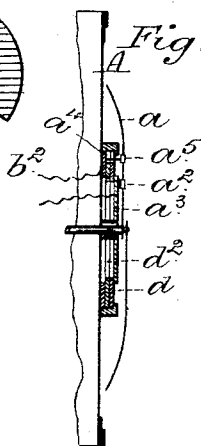


Fig. 2.



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UNITED STATES PATENT OFFICE.

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APPARATUS FOR PERIODICALLY COMPLETING AND INTERRUPTING ELECTRIC CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 514,746, dated February 13, 1894.

Application filed October 6, 1893. Serial No. 487,367. (No model.)

To all whom it may concern:

Be it known that we, ERNEST LOWER BERRY and FREDERICK HARRISON, electrical engineers, subjects of the Queen of Great Britain and Ireland, residing at Lyric Chambers, Whitecomb Street, London, England, have invented certain Improvements in or Connected with Apparatus for Periodically Completing and Interrupting Electric Circuits, of which the following is a specification.

This invention relates to apparatus, or means for use for periodically completing and interrupting electric currents, and is more especially intended for use in cases where frequent makes and breaks have to be made in an electric circuit carrying a heavy current, and particularly when employing continuous currents.

According to this invention the requisite changes of contact are made by means of an electro-magnetic device such as a solenoid, or of solenoids, in a shunt from the main in which shunt the current is not sufficient to cause injury of the contact devices. The armature or armatures of the electro-magnetic device such as the core or cores, of the solenoid or solenoids, makes or make, and breaks, or break, the contact, or contacts, for the completion and interruption of the circuit in the main supply, the contact or contacts, preferably consisting of mercury cups immersed in a liquid medium of a high flashing point which medium covers the contact point and lessens sparking. The invention includes an arrangement whereby a timekeeper completes, and interrupts the circuit through the electro-magnetic device. The following is a suitable arrangement for this purpose which we will describe with reference to the accompanying drawings wherein—

Figure 1 is a view of the general arrangement. Fig. 2 is a transverse section of the dial and contact making and interrupting devices and Fig. 3 is one of the insulating disks thereof.

A hand or one of the hands a of the time keeper A, or some equivalent part operated thereby (we will refer to it as the hand) is connected by the rubbing contact spring a^2 and contact plate a^3 to one of the wires b of the shunt circuit B from the main C and a circular conducting strip a^4 on the clock face, or some part of the timekeeper traversed by the hand, is connected to the other of the

wires b^2 of the shunt circuit B so that the said circuit is completed by a contact piece a^5 (preferably consisting of a light spring) on the hand a coming into contact with the aforesaid circular strip a^4 .

In order to leave only so much of the strip a^4 exposed as corresponds to the period during which the circuit is to be completed we provide an insulating piece, or insulating pieces for covering so much of the said strip a^4 as corresponds to the period during which the current is to be off. To enable this to be set to any desired period a convenient device consists of two disks d , d^2 of insulating material with parts cut away at the portions corresponding to the circular strip a^4 so that these cut away portions of each disk can be made to coincide to their full extent, or less, and cover, or uncover, more or less, of the said circular strip a^4 . One of the disks is shown in Fig. 3 the cut away part being marked x . The contact piece a^5 as it moves round with the hand a does not complete the circuit so long as the said piece is on the disks d , d^2 but, as soon as it leaves the said disks and comes into contact with the conducting strip a^4 beneath the said disks, the shunt circuit is completed and the solenoid, or solenoids, is or are energized to complete the circuit from the main. We have shown one solenoid at E in the shunt circuit its core e being connected to a lever e^2 centered at e^3 and having at its other end a contact piece e^4 which when it enters the mercury cup F completes the circuit from the main. As soon as the said contact piece a^5 on the hand a comes again on to the uncut away portions of the disks d , d^2 the solenoid E (or solenoids) ceases (or cease) to be energized, and the solenoid core e falls so that the contact piece e^4 leaves the mercury cup F and the circuit from the main is broken.

The device above described is well adapted to be employed in combination with a device such as is described in the specification of an application for patent filed by us on the 6th day of October, 1893, under Serial No. 487,366, as the intermittent changes of the circuits carrying the main current to effect the illumination of different lamps or series of lamps, can be made by means of a solenoid or solenoids as herein described, energized by a shunt current in the circuit of which is situated a contact changing device such as is described in

our said specification. This is indicated at Y as being situated in the shunt circuit y in which the coils of the solenoids G G^2 are included. The cores g g^2 of the solenoids G G^2 are connected to either end of a lever H centered at h . The said cores therefore counter-balance each other. They have at their lower ends contact pieces which enter mercury cups I and J so that the circuit from the main is completed and interrupted as desired. In the arrangement shown there are two sets of lamps K and L and the circuits are so arranged that when the contact is made in the mercury cup I the circuit through the set of lamps K is completed and that through the other set L is interrupted and the reverse when the contact is made in the mercury cup J.

When the apparatus is to be put in operation the disks d d^2 are adjusted so that the gaps x between them leave a space exposing the contact piece a^4 to an extent and in a position corresponding to the period during which the apparatus is to be in operation. The circuit B is therefore completed when the spring a^5 by the movement of the hand comes into contact and while it remains in contact with the exposed portion of the contact piece a^4 and the solenoid E is energized so that its core e is raised and contact is made in the mercury cup F to connect the wires m at that place. The said wires m are connected by the wires m^2 with the ends of the solenoid cores g g^2 . The wire n leads from the main C to the central conductor n^2 between the sets of lamps K and L. The lamps K are also connected to the conductor p^2 which leads by the wire p to the mercury cup I and the lamps L are in like manner connected to the conductor q^2 which leads by the wire q to the mercury cup J. As the switching device Y is rotated by the clockwork motor Y^2 the current passes by the shunt y at intervals alternately around the coils G G^2 respectively. In the drawings it is presumed to be passing around the coil G^2 so that its core g^2 is attracted and raised from the mercury cup J and the core g falls and the contact is made in the mercury cup I and the current from the main then passes to the lamps K by the wire n conductor n^2 through the lamps K thence by the wire p^2 and p mercury cup I and solenoid core g wire m^2 and the wires m (and through the contact e^4 and mercury cup F) back to the main. When the next contact is made by the switch at Y the coil of the solenoid G is energized so that its core is lifted from the mercury cup I the core g^2 descending and making contact in the cup J and then the current is cut off from the lamps K and passes from the main by the wire n conductor n^2 to the lamps L and thence by the conductor q^2 wire q mercury cup J core g^2 wire m^2 and wires m (and contact e^4 and mercury cup F) back to the main. This takes place alternately as long as the shunt circuit B is completed but as soon as the spring a^5

leaves the conducting strip a^4 and comes upon the insulating disk d the circuit through B is interrupted the core e falls the contact e^4 is lifted from the cup F and the circuits through the lamps are discontinued the stem e^5 rising and stopping the clockwork motor Y^2 by coming in contact with its flier z . It will be seen that when the circuit through B is interrupted the circuit through y G , G^2 is also interrupted.

In place of the contacts with the mercury cups being made as described it will be evident that they may be made in the reverse sense that is that the contact in the cup F may be made when the solenoid E is not energized and broken when it is energized and that the contacts with the cups I and J may be made when their respective solenoids G or G^2 are respectively energized instead of as described.

The mercury cups F, I and J are shown as being immersed in a liquid medium r contained in the vessels s the said medium being one of a high flashing point.

Having now particularly described and ascertained the nature of the said invention and in what manner the same is to be performed, we declare that what we claim is—

1. In apparatus for periodically completing and interrupting electric circuits the combination of a time keeper provided with contacts which maintain a shunt circuit closed for any predetermined time and a clockwork or other motor operating a circuit changer or switch also in a shunt circuit in which is an electro-magnetic device such as a solenoid or solenoids operated at intervals to complete a circuit or circuits to lamps or the like all substantially as hereinbefore described.

2. In apparatus for periodically completing and interrupting electric circuits the combination of a time keeper provided with contacts which maintain a shunt circuit closed and open for any predetermined time a solenoid in the said shunt circuit operating a contact which completes or opens a circuit from the main to two or more sets of translating devices, a motor and a switch in a shunt from the main the said shunt being provided with solenoids in branches of the said shunt and contact pieces alternately operated by the solenoids to complete the circuits from the main to the two sets of lamps or translating devices alternately substantially as hereinbefore described.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

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