(No Model.)

M. E. HUNTER & J. H. GERRY.

ELECTRIC SYNCHRONIZER FOR CLOCKS.

No. 349,650. Patented Sept. 21, 1886.

Fig. 2.

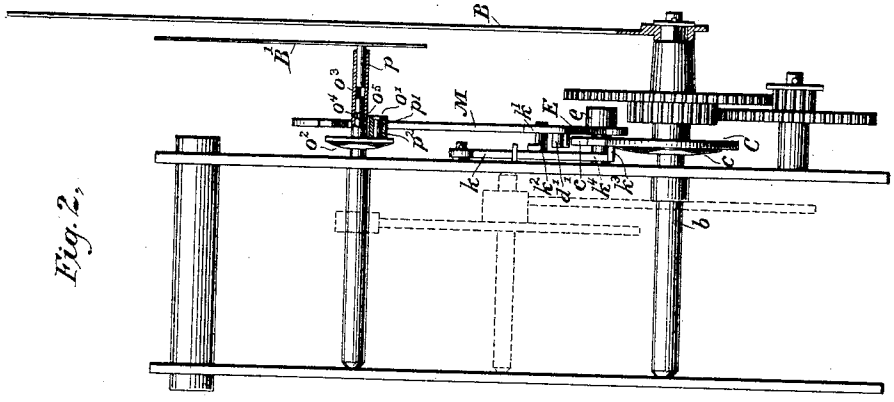
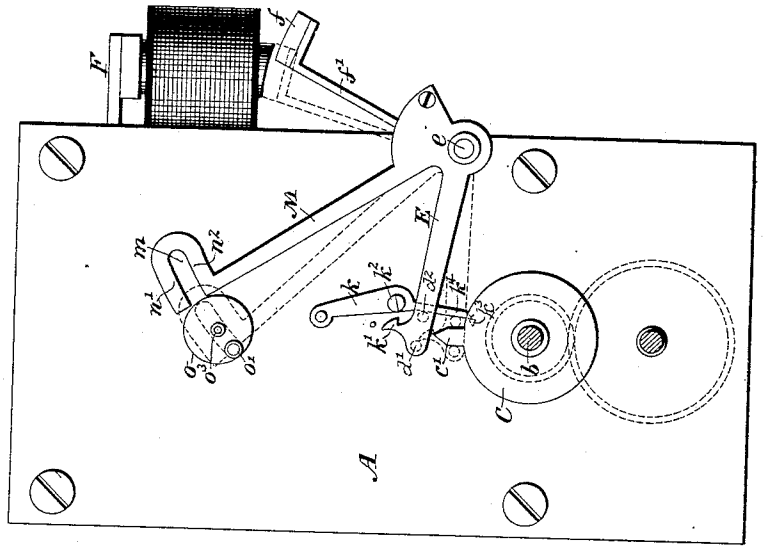


Fig. 1.



Witnesses

Geo. W. Breck.

Ulysses W. Cook

Inventors

Marshall E. Hunter.

James H. Gerry,

By their Attorneys

Popet & Edgecomb

N. PETERS, Photo-Lithographer, Washington, D. C.

UNITED STATES PATENT OFFICE.

MARSHALL E. HUNTER, OF OAKLAND, CALIFORNIA, AND JAMES H. GERRY, OF BROOKLYN, NEW YORK; SAID GERRY ASSIGNOR TO SAID HUNTER.

ELECTRIC SYNCHRONIZER FOR CLOCKS.

SPECIFICATION forming part of Letters Patent No. 349,650, dated September 21, 1886.

Application filed January 11, 1886. Serial No. 188,168. (No model.)

To all whom it may concern:

Be it known that we, MARSHALL E. HUNTER, and JAMES H. GERRY, citizens of the United States, residing, respectively, at Oakland, county of Alameda, and State of California, and Brooklyn, county of Kings, and State of New York, have invented certain new and useful Improvements in Electric Synchronizers for Clocks, of which the following is a specification.

The invention relates to the class of apparatus employed for periodically placing the hands of clocks, whether mechanically or electrically actuated, in position to indicate true time, correcting for any deviation therefrom.

The object of the invention is to provide means whereby an electric current transmitted at the proper moment shall cause two hand-setting devices—one for the minute and the other for the second hand of a clock—to be operated, and to provide means for preventing the operation of such devices at other than the predetermined times.

In an invention for which an application for Letters Patent No. 176,238 has been filed by James H Gerry there is described an apparatus wherein a correcting device is placed, by the movement of the clock itself, in position to be released at a predetermined moment, and then perform its operation of setting the hands. The present invention in some respects resembles that described in said application; but an essential point of difference lies in the fact that by the present invention the setting device automatically places itself in position to operate as soon as the current employed for correcting the hands ceases, and no work upon the part of the clock-movement is necessary.

The invention consists in organizing the parts substantially as follows: Upon the minute-hand arbor of the clock there is carried a wedge-shaped lug or extension, which at one point in the revolution of the arbor is designed to enter between two pins carried upon a movable lever, provided the lever be then actuated. If the clock is either slightly in advance or behind the true time, the pins will push the hand backward or forward the required distance to correct it. The lever is controlled by the armature of an electro-magnet through which an impulse is transmitted at a predetermined moment. Moving with the same lever there is a yoke, bow, or U-shaped lever, which is designed to engage a friction roller or pin carried upon a disk attached to the second-hand arbor. This yoke serves to place the second-hand upon the point corresponding to the position of the minute-hand.

For the purpose of preventing the correcting device from being actuated at other than the predetermined times by an accidental current transmitted through the electro-magnet, a detent normally holds the lever in its backward position, with the armature away from its electro-magnet. Immediately before the clock is to be set, a pin revolving with the minute-hand throws this detent out of the path of the lever, and it holds it removed therefrom a short time after the correcting-impulse has been sent. Upon the interruption of this impulse the correcting-lever is returned to its normal position by the force of gravity acting through a counterpoise.

In the accompanying drawings, Figure 1 is a front elevation, and Fig. 2 a side view, of such parts of the clock and the correcting devices as are necessary to illustrate the invention.

Referring to the drawings, A represents the front of the frame of the clock, and B the minute-hand.

Upon the arbor *b* of the minute-hand there is placed a disk, C, which is preferably secured thereto by a friction-clutch, *a*. The disk C is provided with a projection, *c'*, the sides of which are parallel a short distance and then converge, forming a wedge-shaped point. It is designed that two pins, d' and d^2, carried upon a lever, E, which is pivoted at *e*, shall drop over this wedge-shaped projection at the moment the clock is to be set. These pins, by falling beyond the wedge-shaped portion, pass into close contact with the parallel sides of the extension and hold the hand steady so long as the lever E is in its downward position. The lever is normally held away, out of the path of the projection by the superior weight of an armature, *f*, carried upon a lever, *f'*, and applied to an electro-magnet, F. When, however, the electro-magnet is vitalized the arma-

ture is drawn forward and the lever E thrust downward into the position indicated in dotted lines. Any deviation on the part of the minute-hand at the moment the electro-magnet is vitalized will be corrected, provided it be not so great as to cause the point of the wedge-shaped extension to pass outside the pins d' and d^2. In practice, a correction for two or three minutes in either direction may be readily made, and this will suffice for all practical purposes.

For the purpose of preventing the lever from being actuated at any other than the predetermined times for setting the clock, a pivoted lever or catch, k, is employed. This, by force of gravity, tends to swing toward a hooked extension, k', upon the lever E, and carry a detent, k^2, beneath the same, thereby serving to retain the lever in its upward position, with the pins d' and d^2 away from the extension. A pin, k^3, carried upon the disk C, engages an extension, k^4, of the pivoted arm k immediately after the minute-hand has advanced to such a position that upon the downward movement of the lever E the pins d' and d^2 would pass upon the respective sides of the extension c'. This pin k^3 will continue to hold the detent out of the path of the hook or catch until the extension c' has passed beyond the path of the pin d^2, whereupon it will release the arm k and allow it to fall beneath the detent k'. It will be evident, therefore, that during the remaining portions of the hour, even though the electro-magnet F should be vitalized, the lever E cannot be actuated. It is evident that without departing from the spirit of the invention the correcting arm or lug c' might be placed upon the lever E and the pins upon the arbor-disk.

For the purpose of setting the second-hand of the clock, as is sometimes desirable, an arm, M, carrying a yoke or U-shaped extension, m, is employed. The arms n' and n^2 of this yoke are intended to pass upon opposite sides of a friction-roller, o', carried upon a disk, o. The latter is coupled to the second-hand arbor by means of a friction-clutch, o^2, and a sleeve, o^3, which surrounds the arbor, and is connected therewith by a pin, o^4, extending into an annular groove, o^5. By this construction the disk is permitted to turn upon the arbor when sufficient force is applied to overcome the tension of the spring-clutch. The sleeve o^3 extends outward beyond the end of the arbor, and the second-hand B' is connected therewith by a pin, p, entering the end of the sleeve.

The friction-roller o' is preferably formed by surrounding a pin, p', extending from the disk by a movable roller or cylinder of steel, p^2. This will allow the hand to be corrected with but little loss of force by reason of the friction upon the arm m. It will be observed that the position of the pin or friction-roller, as shown in the drawings, is upon the side of the disk remote from the normal position of the correcting-arm. This is desired for the reason that if when the latter is actuated the second-hand is slightly out of position, the friction-roller will be engaged by the arm n' or n^2, and be pushed forward until it has entered between the two arms, the latter passing upon the respective sides of the sleeve o^3.

It remains to describe a special form of armature and its relation to the electro-magnet, which has been found especially well adapted to securing the requisite force for setting the clock without an undue expenditure of battery power. This consists in forming the poles of the electro-magnet with curved faces, and pivoting the armature-lever at a point eccentric with reference to the curve of the pole-faces, so that as the armature approaches the poles from one side it also approaches them axially—that is to say, the separation of the confronting faces diminishes as the armature approaches more nearly its position of rest. From this construction the armature may be placed in a strong magnetic field even when it is at its most remote point, and still a great movement of the same will be necessary before it reaches its point of rest, when the electro-magnet is vitalized.

We claim as our invention—

1. The combination, substantially as hereinbefore set forth, with a clock-hand and its arbor, of a hand-synchronizer consisting of an arm and two pins or arms for engaging the same, a lever for operating the synchronizer, an electro-magnet for moving said lever toward the arbor, means for moving said lever away from the arbor, a device for locking the same in the latter position, and a releasing device for said lever moving with the clock-hand, substantially as described.

2. The combination, substantially as hereinbefore set forth, with the clock-hand, a correcting-arm moving therewith, two correcting-pins for engaging opposite sides of said arm, a lever carrying the same, a detent for holding the lever in a given position, a releasing device moving with said clock-hand, and an electro-magnet, its armature, and armature-lever for actuating said lever after it has been so released.

3. The combination, substantially as hereinbefore set forth, with the hand of a clock and a correcting device for the same, of an electro-magnet for actuating said correcting device, an armature applied to said electro-magnet, and a lever carrying the armature and pivoted at a given point, the polar faces of said electro-magnet being curved to a center eccentric from said point.

4. The combination, substantially as hereinbefore set forth, with a clock-setting device, of an electro-magnet for operating the same having curved polar faces, a pivoted armature-lever, and an armature carried thereon and moved laterally with reference to the poles of said magnet and at the same time approaching said poles, substantially as described.

5. A device for setting the hands of a clock, consisting of the combination, substantially as described, of an arm or lever having a U-

shaped extension or bow, a pin revolving about the arbor of the hand and engaged by said bow when the setting device is operated, and means for actuating said arm or lever.

6. In a clock-setting device, a second-hand arbor and second-hand frictionally secured thereto, a disk moving with said second-hand, a pin carried upon said disk, and a correcting-bow for engaging said pin and placing the same in a given position, substantially as described.

7. In a clock-setting device, the arbor of the hand having an annular groove, an arm, M, carrying the bow *m*, the disk *o*, frictionally connected with the arbor, the frictional roller *o'*, carried upon said disk, and the frictional connection between said disk and arbor, consisting of the spring-clutch o^2 and the pin o^4, entering the annular groove formed in the arbor.

8. In a clock-setting device, the combination, substantially as hereinbefore set forth, of a device for setting the minute-hand, a lever moving therewith having the U-shaped extension or bow, a friction-roller turning about the arbor of the second-hand, and means for periodically actuating said lever to correct said second-hand by engaging said friction-roller.

In testimony whereof we have hereunto subscribed our names this 8th day of January, A. D. 1886.

MARSHALL E. HUNTER.
JAMES H. GERRY.

Witnesses:
DANL. W. EDGECOMB,
CHARLES A. TERRY.