(No Model.)

H. MUNSON.

SYNCHRONIZING MECHANISM FOR THE SECONDS HANDS OF CLOCKS.

No. 458,716. Patented Sept. 1, 1891.

Fig. 2.

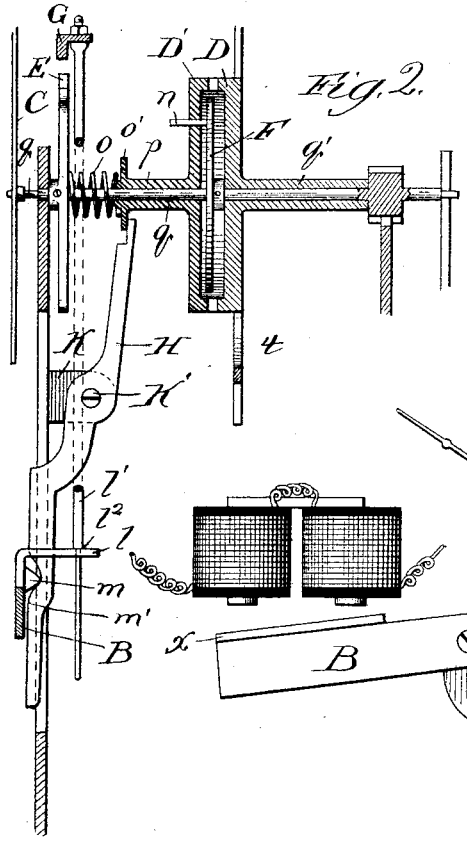


Fig. 1.

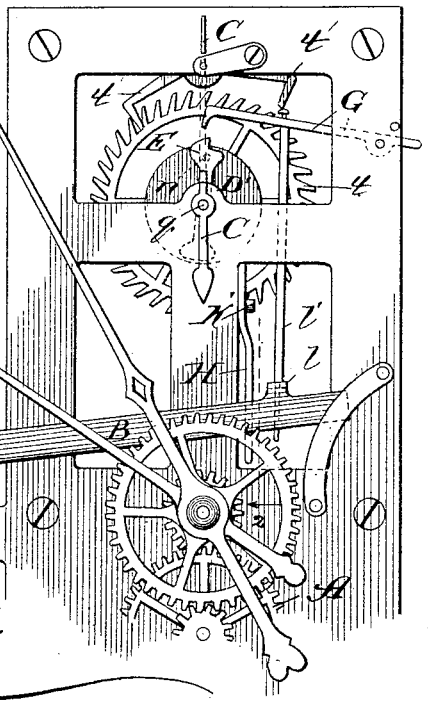


Fig. 3.

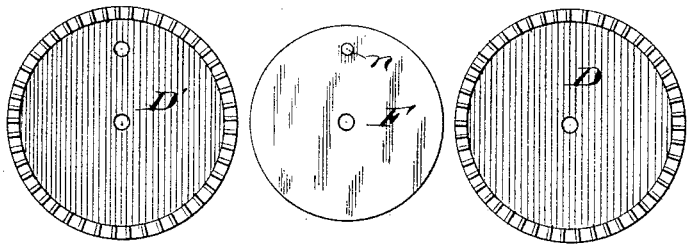
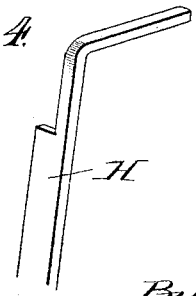


Fig. 4.



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UNITED STATES PATENT OFFICE.

HOMER MUNSON, OF MENDOTA, ILLINOIS.

SYNCHRONIZING MECHANISM FOR THE SECONDS-HANDS OF CLOCKS.

SPECIFICATION forming part of Letters Patent No. 458,716, dated September 1, 1891.

Application filed March 3, 1891. Serial No. 383,597. (No model.)

To all whom it may concern:

Be it known that I, HOMER MUNSON, a citizen of the United States, residing at Mendota, in the county of La Salle and State of Illinois, have invented a new and useful Improvement in Synchronizing Mechanism for Clocks, of which the following is a specification.

My invention relates to mechanism for synchronizing clocks, and has for its principal object to improve the structure and mode of operation of the mechanism relating particularly to the correction of the seconds-hand.

The common synchronizing mechanism for clocks heretofore employed may be described, generally, as follows: An electric circuit controlled at a central point (as the observatory) and including all the clocks to be synchronized energizes electro-magnets in each clock system, which attract armatures mounted upon a pivoted lever arranged in proper location to engage projecting pins upon the minute-hand-carrying disk. These pins are so located upon the disk (projecting laterally therefrom) that the predetermined period of synchronization shall be central between two pins, and the latter shall normally extend in a horizontal plane with each other. The lever, under the action of the armature pressing downward upon any pin above this horizontal plane, causes the pin to take the shortest line to the horizontal plane, turning the disk forward or backward and advancing or returning the minute-hand to the central point, which is usually at the noon or twelve-o'clock point on the dial of the hour. The gear connection of the hour-hand with the minute-hand causes the former to be advanced or returned to the proper extent. Generally the seconds-hand is also thus actuated by mechanism, whereby the synchronization may be effected in the fraction of a minute. So far as I am aware, however, the sychronization involving the employment of an electric circuit has always been produced by a direct action between the armature-lever and the minute-hand disk or between the lever or a branch thereof and the seconds-hand, and especially in the case of the last-described construction much uncertainty has resulted in the operation of the mechanism. In a majority of cases where synchronizing is practiced the actual difference to be rectified is less than a minute, and especial accuracy in the action of the seconds-hand is made necessary.

The purpose of my invention is to remedy defects in the synchronizing apparatus heretofore employed, one form of which is above described; and it consists, primarily, in actuating the seconds-hand in synchronizing by the clock-train released to perform its function by an electro-magnetic apparatus; secondly, in a synchronizing mechanism wherein the seconds-hand is actuated by releasing the escapement from the clock-train, thus permitting the latter to operate the seconds-hand; furthermore, in a synchronizing mechanism in which the seconds-hand is synchronized by the action of the clock-train released from the escapement and provided with a catch to interrupt the revolution of the seconds-hand at a predetermined point, and, finally, in the preferred general and specific construction which I employ, all as hereinafter more fully described and claimed.

In the drawings, Figure 1 is a front elevation of the upper part of a synchronizing clock, showing my improvements; Fig. 2, a vertical cross-section taken centrally through Fig. 1. Fig. 3 is a detail view showing the clutch-sections with interposed disk detached from each other, and Fig. 4 a perspective view of the upper end of the crank-arm which operates to open the clutch.

A represents the clock-train, (shown of the kind controlled by a spring,) and *t t'* represent the escape-wheel and anchor, respectively, mounted as usual.

B represents a lever, pivoted at *s* to extend across the front of the clock-frame in position to engage the pins upon the minute-hand disk in the usual manner for clocks of this description. The lever B carries an armature *r* at its outer end, which is attracted by the electro-magnets *r'* on the closing of the circuit, the weight of the armature causing its return when the circuit is broken. So far as relates to the synchronizing of the minute-hand the operation of the lever and disk is as heretofore—that is to say, the downward pressure of the inner part of the lever causes the alignment of two pins, thus bringing the minute-hand immediately opposite a five-minute point on the dial. The mechanism for

synchronizing the seconds-hand differs from that relating to the correction of the minute-hand in the essential particular that it is operated by the clock-train and not by a positive action by the lever, as by its downward pressure on the pins, and the means I prefer to employ to bring about this improved mode of operation is as follows:

C represents the seconds-hand mounted on its arbor *q*. The scape-wheel *t* is carried by the seconds-hand arbor through the loosely-mounted sleeve *q'*, and is caused to engage the arbor to revolve the same by a clutch mechanism D D' as follows: The clutch-section D is formed upon the escapement-wheel *t*, and the clutch-section D' is mounted on the sleeve *p* upon the arbor *q*. The sections D and D' are kept normally in engagement through their perimetal teeth by the coiled spring *o*, surrounding the arbor *q* and bearing on one side against the flanged end *o'* of the sleeve *p* and on the other against the catch E on the arbor *q*. Between the clutch-sections D D' is the disk F, which is mounted upon and revolves with the arbor *q*, and a pin or pins *n* hold the disk F and the clutch-section D' together in such manner that while they are caused to revolve together the section D' may move toward and from the disk. This is accomplished by securing the pin *n* to the disk and causing it to pass through a hole made in the section D'.

E is a catch in the form of a finger carried by the seconds-hand arbor *q* and having at its outer end the square recess, as shown in Fig. 1. It revolves with the arbor in a vertical plane below the line of movement of the detent G, presently to be described.

The lever B is provided on its rear face near its inner end with a projection or cam *m* and near the latter with a perforated horizontal bearing-strip *l*. The detent G, pivoted in the frame of the clock, has the rod *l'* extending downward therefrom, which rod is reduced at its lower end, where it passes through the perforation in the bearing *l*. The reduced part of the rod forms the shoulder *l²*, through the medium of which the rod, and with it the detent, is raised. An inward-projecting bearing-plate *k* on the clock-frame carries the pivot-pin *k'*. Upon this pin is pivoted the crank-arm H, the upper end of which engages the flange *o'* on the sleeve *p*, while the lower end carries the cam *m'*, the location of which, in the normal position of the parts, is immediately below the projection *m* on the lever B. It will be understood that the detent G has a limit of movement at its free end, which keeps it normally above the line of movement of the catch E and at its lowermost position in such line of movement, thereby to stop the revolution of the catch when the latter shall have reached a point in a vertical line above the arbor *q*. Depending upon the desired point in the seconds-scale at which synchronization shall take place, the seconds-hand may be coincident with or at an angle to the line of the catch E. Usually the synchronizing is done at the minute, so that usually the seconds-hand and catch are coincident. It follows that when the catch is detained by the detent at a point in a vertical line above the arbor the seconds-hand will point at sixty seconds.

The operation of the mechanism is as follows: The clock being wound and in operation, an upward attraction of the free end of the lever B depresses its inner end, drawing down the detent G. In the movement of the lever the projection *m* engages the cam *m'* at the end of the crank-arm H, forcing it inward and causing the upper end of the crank-arm to press outward the sleeve *p* against the resistance of the spring *o*, thus separating the clutch-sections D D' and releasing the section D', and with it the disk F, arbor *q*, seconds-hand C, catch E, and the clock-train, from the detaining action of the anchor *t'*. The result is obvious. The clock-train thus released immediately and with great speed revolves the arbor *q*, and thus the seconds-hand and catch, until the catch E reaches the vertical position, where it is met by the detent G and detained while the lever is in its attracted position. The release of the lever while causing the separation of the catch and detent at the same time causes the release of the crank-arm H, permitting the spring *o* to react to cause the re-engagement of the clutch-sections, thus again placing the clock-train and other mechanisms under the control of the escapement.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a clock-synchronizer, the combination, with the seconds-hand and the clock-train, of a releasing device and a stop whereby the clock-train may be released from the escapement and stopped at a predetermined point, substantially as described.

2. In a clock-synchronizer, the combination, with the seconds-hand, clock-train, and escapement, of a release between the escapement and clock-train and a stop located to prevent the operation of the clock-train when released at a predetermined point, substantially as described.

3. In a clock-synchronizer, the seconds-hand, clock-train, and escapement, in combination with a clutch between the clock-train and scape-wheel, a release for said clutch, a catch connected with the clock-train, and a detent adapted to engage said catch at a predetermined point, substantially as described.

4. A synchronizer for the seconds-hand of clocks, comprising, in combination, the seconds-hand arbor geared with the clock-train, a two-part clutch and escapement controlling the clock-train, a catch moving with the seconds-hand arbor, arranged to stop its movement at a predetermined point, and an electrically-actuated release for the clutch, arranged to operate substantially as described.

5. In a clock-synchronizer, the combination

of the arbor *q*, clutch D D′, mounted on separate sleeves upon the arbor, the disk between and engaging one of the clutch-sections and secured to the arbor, the lever B, a connection between the lever and clutch to release the same, and a detent and catch actuated through the lever B, substantially as described.

6. In a clock-synchronizer, the seconds-hand arbor and catch thereon, the detent normally out of engagement with the catch and arranged to engage the same at a predetermined point, the lever actuating the detent, the clock-train geared to operate the seconds-hand arbor, and a clutch and release connected with and operated by the lever to control and release the clock-train, substantially as described.

7. In a clock-synchronizer, in combination, the arbor *q*, clutch D D′, disk G, crank-arm H, engaging one of the clutch-sections, lever B, operating the crank-arm, and the catch and detent operated by the lever B, substantially as described.

8. In a clock-synchronizer, the arbor *q*, carrying the seconds-hand, the catch and the disk secured thereto, the clutch connected to and operated in one movement by the disk, the escapement connected to and operating the disk in the other movement, a crank-arm engaging and operating the clutch to open and close the same, a detent engaging the catch, and a lever operating both the detent and the crank-arm in a single movement, substantially as described.

HOMER MUNSON.

In presence of—
J. W. DYRENFORTH,
M. J. FROST.