E. A. HUMMEL.

AUTOMATIC CUT-OUT FOR CLOCK SYNCHRONIZING MECHANISM.

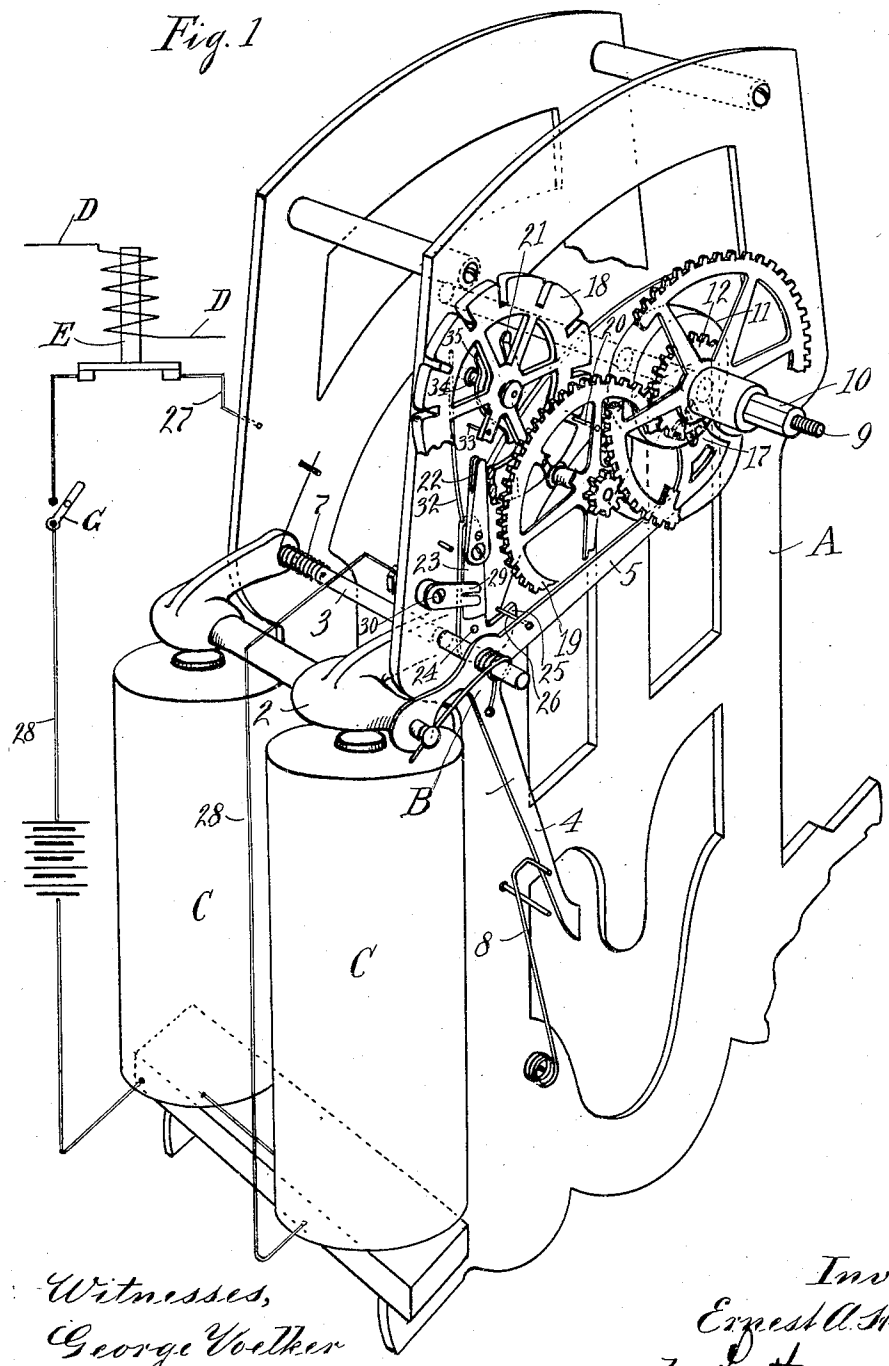
APPLICATION FILED AUG. 18, 1911.

1,066,961.

Patented July 8, 1913.

2 SHEETS—SHEET 1.

Fig. 1



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2 SHEETS—SHEET 2.

Fig. 2

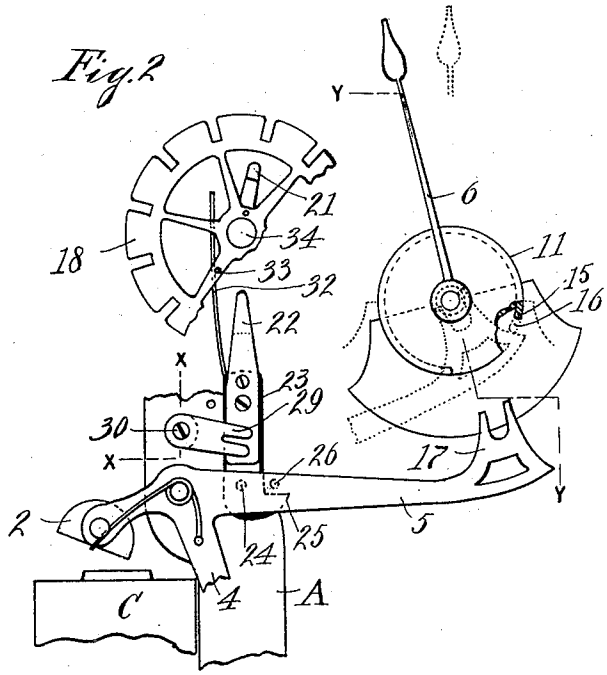


Fig. 5

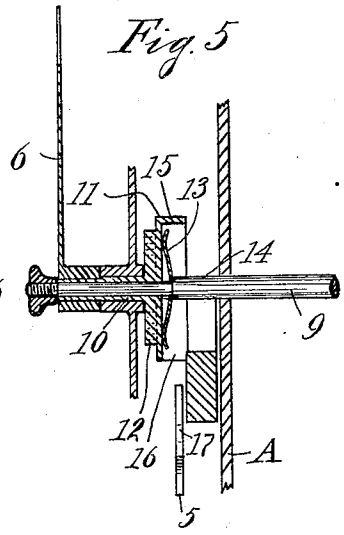


Fig. 6

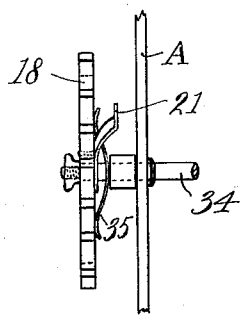


Fig. 3

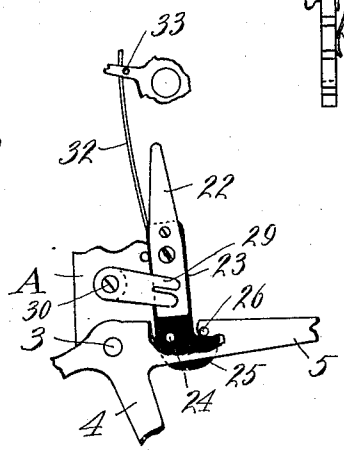
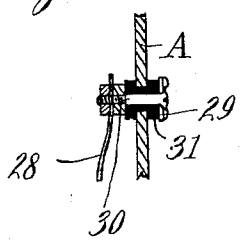


Fig. 4



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UNITED STATES PATENT OFFICE.

ERNEST A. HUMMEL, OF ST. PAUL, MINNESOTA, ASSIGNOR TO ALBERT L. HAMAN, OF ST. PAUL, MINNESOTA.

AUTOMATIC CUT-OUT FOR CLOCK-SYNCHRONIZING MECHANISM.

1,066,961. Specification of Letters Patent. Patented July 8, 1913.

Application filed August 18, 1911. Serial No. 644,762.

To all whom it may concern:

Be it known that I, ERNEST A. HUMMEL, a citizen of the United States, residing at St. Paul, in the county of Ramsey and State of Minnesota, have invented certain new and useful Improvements in Automatic Cut-Outs for Clock-Synchronizing Mechanism, of which the following is a specification.

My invention relates to improvements in automatic cut-outs for clock synchronizing mechanism, its object being to provide means for automatically cutting out the relay from the local circuit which energizes the synchronizing mechanism the moment the synchronizing impulse has been communicated to it.

It will be understood that each clock is arranged in a local circuit which receives its electrical impulses from the main line circuit through the medium of a relay. This local circuit is opened or closed by the local operator by means of a switch, whereby the relay will be cut out of the local circuit or connected up with it, as the case may be. Usually a spring switch is used which stands normally open. In the local circuit is an electromagnet which directly actuates the synchronizing mechanism. When the synchronizing period arrives the preparatory signals are sent over the line from the station where the master clock is situated. Then ensues a period of silence, usually 15 seconds, at the end of which the synchronizing impulse is sent. In this interval of silence the local operator closes the switch, and thereby the local circuit through the relay, so that the synchronizing impulse will energize the magnet and actuate the synchronizing lever. It is then necessary for the local operator to release or open his switch instantly before another electrical impulse passes over the main line. Unless he does this, the synchronizing lever will be again actuated and will synchronize the clock a second time, this time of course falsely. These subsequent impulses are apt to occur right on the heels of the synchronizing impulse owing to the impatience of the operators to resume telegraphing and working their keys. In order effectually to avoid these false contacts and synchronizing movements, I have arranged in the local circuit an automatic switch which, in the embodiment of the invention shown in the drawings, is adapted to be closed periodically by the clock-work mechanism, and to be automatically opened by the synchronizing lever in its return from the synchronizing stroke.

In the accompanying drawings forming part of this specification; Figure 1 is a perspective view of a clock, with some parts broken away, showing the invention applied thereto; Fig. 2 is a fragmentary front view of the synchronizing lever and switch contacts before the rocking contact has been set; Fig. 3 is a similar view of the synchronizing lever, rocking switch contact and trip after the contact has been set; Fig. 4 is a section on line *x*—*x* of Fig. 2; Fig. 5 is a section on line *y*—*y* of Fig. 2; and Fig. 6 is an edge view of the rotary switch contact and its wheel.

In the embodiment of the invention shown in the drawings A represents the frame of the clock and B the synchronizing lever. This lever is secured at the heel to the armature 2 of an actuating electromagnet C, and both armature and lever are pivotally supported upon the frame by means of a pivot bar 3 to which they are fast. The synchronizing lever has the usual divergent arms, an arm 4 for synchronizing the seconds hand (not shown) and an arm 5 for synchronizing the minute hand 6 (Fig. 2). The armature is held normally sprung up away from the magnet C by means of a spring 7, whereby the arms 4 and 5 of the synchronizing lever on the other side of the supporting pivot 3 will normally be held down away from the parts to be synchronized, and the arm 4 will lodge against the spring 8.

Journaled in the frame of the clock is the minute hand arbor 9, upon which is a sleeve 10 carrying the minute hand 6. Integral with this sleeve or fast upon it is a counterweighted disk 11 and also a gear 12. The sleeve is held frictionally to the arbor by means of a spring 13 interposed between the disk and a shoulder 14 upon the arbor, so that the sleeve and the parts carried thereby will turn with the arbor in the normal operation of the clock but can be turned independently of the arbor, when engaged by the synchronizing lever as will be hereinafter explained. The disk 11 is formed with a rim 15 having a slot or opening 16 to receive the beak 17 of the synchronizing

lever. This beak is formed on each edge with a concave cam face adapted to engage the rim on one side or the other of the opening 16 if the minute hand should be running fast or slow when the lever is actuated. In Fig. 2 is shown in full lines the position of the slotted disk 11 when the minute hand is running slow. If the synchronizing lever is now actuated, its beak 17 will be thrust into the slot 16 in the rim of the disk, and the inner cam edge of the beak will engage the adjacent side wall of the slot and thereby turn the disk and minute hand until the other side wall of the slot lodges against the outer cam edge of the beak, thereby bringing the parts into the position shown in dotted lines in Fig. 2.

Journaled in the frame independently of the minute hand arbor is a notched contact wheel 18, here shown with 12 notches, which is intermittently driven from the minute hand sleeve by means of the intermeshing gears 12 upon said sleeve and 19 journaled in the frame. The gear 19 carries a pin 20 in position to enter the notches of the wheel 18 and turn said wheel one notch or one twelfth of a revolution at each revolution of the gear 19; so that, if the gear 19 makes one revolution every two hours, the wheel 18 will make one revolution every 24 hours. The wheel 18 carries a switch contact leaf 21 in position to engage and wipe the split contact leaf 22 upon the rocking switch lever 23. This lever, which is made of insulating material, is pivotally supported on the frame at 24, and has a lateral arm 25 in position to be engaged by a pin 26 upon the arm 5 of the synchronizing lever B when this lever returns to normal position after a synchronizing stroke. The contact leaf 22 is bolted upon the face of the switch lever 23, and is electrically connected with the wire 28 of the local circuit by means of a spring plate 29, which presses elastically against it, and a binding post 30. This binding post passes through the plate 29 and frame A, and both plate and binding post are insulated from the frame by means of insulation 31, as shown in Fig. 4.

The rocking switch lever 23 carries an upwardly projecting spring trigger 32 in position to be engaged and wiped by a trip 33 upon the rear face of the notched wheel 18, whereby the lever 23 will be turned on its pivot from the position shown in Fig. 2 to the position shown in Fig. 3, so as to bring the lateral arm 25 against or close to the pin 26. The plate 29, by its elastic pressure, will hold the lever 23 in whatever position it may be moved into. Likewise, as will be seen from Fig. 6, the wheel 18 is elastically held upon its supporting stud 34 by means of a spring 35 interposed between the wheel and a shoulder upon the stud, so that the wheel 18 will be held against turning except when positively moved by means of the pin 20 upon the gear 19.

The electromagnet C which actuates the synchronizing lever is arranged in a local circuit which receives its electrical impulses from the main line D through the medium of the usual relay E; but the local circuit instead of passing merely from the relay to the electromagnet and then directly back to the relay as is now customary, passes on one side of the relay through the circuit wire 27 to the frame A, and thence through the frame and the wheel 18 to the contact leaf 21, while on the other side of the relay it passes through the wire 28 and electromagnet C to the binding post 30, and thence to the rocking switch leaf 22, so that the local circuit will not be closed through the relay and electromagnet until the rotary contact leaf 21 engages the rocking contact leaf 22, and will be opened the moment these contacts are disengaged. This disengagement is here effected automatically by the synchronizing lever, on its return from the synchronizing blow, striking the arm 25 of the rocking switch lever 23 and throwing the contact leaf 22 out of engagement with the rotary contact leaf 21.

The operation of the invention will be obvious from the foregoing description. When the synchronizing lever is at rest after a synchronizing operation, the parts will stand in the position shown in Figs. 1 and 2, with the lower synchronizing arm 4 lodged against the spring 8 and the lateral arm 25 of the rocking switch lever 23 below and out of contact with the pin 26 upon the upper synchronizing arm 5. With the switch lever 23 in this position the trigger 32 will stand inwardly toward the hub of the notched wheel 18. As this wheel revolves its trip 33 will engage the trigger 32 and push it out to one side, thereby tilting the switch lever 23 so that its arm 25 will be raised against or close under the pin 26 upon the synchronizing lever. The lever 23 will be held set in this position by the elastic pressure of the plate 29 in readiness to receive the blow of the synchronizing lever on its return from the next synchronizing stroke. In the continued revolution of the wheel 18 its switch leaf 21 will engage and wipe the switch leaf 22 upon the rocking lever 23, and thereby close the local circuit at this point. As the wheel 18 moves slowly and intermittently these leaves will remain in contact longer than the usual synchronizing period of four minutes. Everything is now in readiness for the synchronizing operation. When the preparatory signals have been received over the main line, the local operator throws the switch G and closes the local circuit to receive the synchronizing impulse. When this

comes it will momentarily energize the electromagnet and cause the synchronizing lever to take its forward synchronizing stroke. As the impulse is but momentary the synchronizing lever will be instantly thrown back by means of the armature spring 7, striking and carrying with it the arm 25 of the rocking lever 23, and thereby turning this lever and throwing its contact leaf 22 out of engagement with the rotary contact leaf 21. Thus the local circuit will be instantly and automatically broken by the action of the synchronizing mechanism itself, and can receive no further electrical impulses from the main line, whether the operator has been slow in closing his switch or not. At that instant the clock becomes independent of the main line.

The spring 8 which stands in the path of the arm 4 of the synchronizing lever at a point near the end of its return throw will first yield to the impact of the lever, and then kick it back so as to raise the pin 26 above the arm 25 of the switch lever 23, and leave the switch lever free to be again turned and set by the action of the trip 33.

I claim as my invention:

1. In a clock, the combination with synchronizing mechanism and its actuating electromagnet, of an electric circuit passing through said magnet, and means actuated by said mechanism for automatically breaking the circuit directly after the synchronizing blow has been struck.

2. In a clock, the combination with an electric circuit and synchronizing mechanism, of a pair of coöperating movable switch contacts in said circuit, one under the control of the clock-work mechanism and the other under the control of the synchronizing mechanism.

3. In a clock, the combination with an electric circuit and synchronizing lever, of a switch in the circuit adapted to be closed periodically by the clock-work mechanism and to be automatically opened by the synchronizing lever in its return from a synchronizing stroke.

4. In a clock, the combination with an electric circuit, of a synchronizing lever and its actuating electromagnet, a movable switch contact under the control of the clock-work mechanism, and a coöperating switch contact in position to be engaged by said movable contact and adapted to be thrown out of engagement therewith by the synchronizing lever in its return from a synchronizing stroke.

5. In a clock, the combination with an electric circuit, of a synchronizing lever and its actuating electromagnet, a pair of cooperating movable switch contacts, one of said contacts being adapted to be thrown out of contact with the other by the synchronizing lever in its return from a synchronizing stroke, and means for restoring said moved contact to position after the lapse of a predetermined interval of time.

6. In a clock, the combination with an electric circuit, of a synchronizing lever and its actuating magnet, a rotary switch leaf driven by the clock-work mechanism, a cooperating switch leaf in position to be periodically engaged by the rotary leaf and adapted to be thrown out of contact therewith by the synchronizing lever in its return from a synchronizing stroke, and means under the control of the clock-work mechanism for restoring said coöperating switch leaf to position after the lapse of a predetermined interval of time.

7. In a clock, the combination with an electric circuit, of a synchronizing lever and its actuating electromagnet, a rotary switch contact driven by the clock-work mechanism, and a coöperating rocking switch contact in position to be periodically engaged by the rotary contact and adapted to be turned out of engagement therewith by the synchronizing lever in its return from a synchronizing stroke.

8. In a clock, the combination with an electric circuit, of a synchronizing lever and its actuating electromagnet, a switch contact movable by the clock-work mechanism, a rocking switch contact in position to be periodically engaged by said clock-work-moved contact and adapted to be turned out of engagement therewith by the synchronizing lever in its synchronizing activity, and means for restoring said rocking contact to position after the lapse of a predetermined interval of time.

9. In a clock, in combination, an electric circuit and an electromagnet arranged therein, a synchronizing lever under the control of said magnet, a wheel driven by the clock-work mechanism and a switch leaf carried thereby, a coöperating rocking switch leaf in position to be engaged by said rotating switch leaf and adapted to be thrown out of contact therewith by the synchronizing lever in its return from a synchronizing stroke, and means carried by said wheel for restoring said rocking switch leaf to position after the synchronizing lever has come to rest.

10. In a clock, in combination, an electric circuit and an electromagnet arranged therein, a synchronizing lever under the control of said electromagnet, a wheel driven by the clock-work mechanism and a switch leaf carried thereby, a coöperating switch leaf adapted to be struck and thrown out of contact with the rotary leaf by the synchronizing lever in its return from a synchronizing stroke, a trip on said wheel for restoring said coöperating switch leaf to position, and a spring yieldingly receiving the impact of the synchronizing lever at the end of its return stroke.

11. In a clock, in combination, an electric circuit and an electromagnet arranged therein, a pair of coöperating switch contacts, one of said contacts being pivotally supported for rocking movement and having a lateral arm, a synchronizing lever under the control of said electromagnet and having means for engaging the lateral arm of said rocking contact in its return from a synchronizing stroke and thereby turning said rocking contact out of engagement with the other contact, a yielding stop in the path of the synchronizing lever at the end of its return stroke, and means under the control of the clock-work mechanism for restoring the rocking contact to position after the synchronizing lever is at rest.

12. In a clock, the combination with an electric circuit, of synchronizing mechanism under the control of said circuit, and means actuated by said mechanism for automatically breaking the circuit upon cessation of the synchronizing impulse.

13. In a clock, the combination with an electric circuit of a synchronizing instrumentality under the control of said circuit, a switch in the circuit adapted to be automatically opened by the synchronizing instrumentality upon cessation of the synchronizing impulse, and means for closing the switch at periodic intervals.

14. In a clock, the combination with an electrical circuit, and an electroresponsive device included therein, of a synchronizing instrumentality associated with said electroresponsive device and rendered active by the latter, and a pair of switch contacts also included in said circuit and movable relatively to each other into circuit-closing position, one of said contacts being actuated by the clock-work mechanism, the other being controlled by the synchronizing instrumentality and moved by the latter to circuit-opening position when the synchronizing instrumentality is returned to non-synchronizing position.

15. In a clock, the combination with an electrical circuit, and an electroresponsive device included therein, of a synchronizing instrumentality associated with said electroresponsive device and adapted to be rendered active thereby, a traveling switch contact included in said circuit and actuated by the clock-work mechanism, and a shiftable switch contact also included in said circuit and movable relatively to the traveling contact for engagement thereby to close said circuit, the shiftable contact being actuated to open the circuit by the synchronizing instrumentality on its return to non-synchronizing position.

In testimony whereof I affix my signature in presence of two witnesses.

ERNEST A. HUMMEL.

Witnesses:
ARTHUR P. LOTHROP,
H. SWANSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."