

May 9, 1933.

F. C. HOLTZ ET AL

1,908,148

CLOCK

Filed Oct. 23, 1929

Fig. 1.

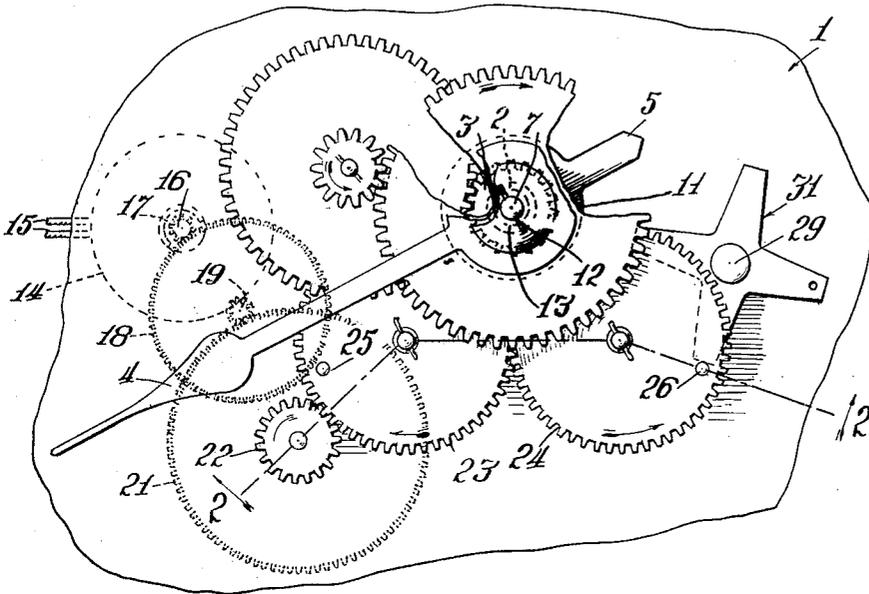


Fig. 2.

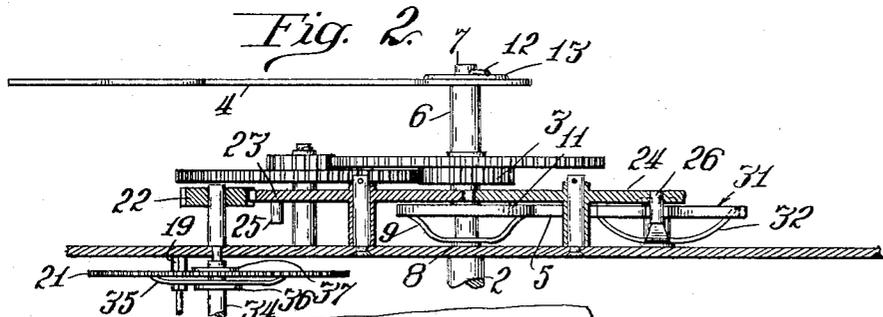
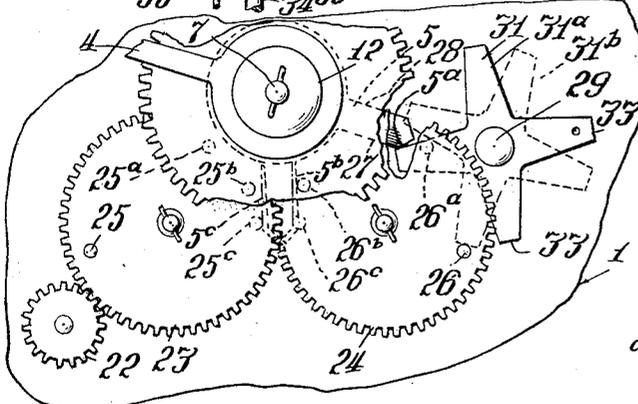


Fig. 3.



Inventors.
Frederick C. Holtz
and
Karl W. Struck

BY *Brown, Jackson, Boettcher & Diener*
Attorneys.

UNITED STATES PATENT OFFICE

FREDERICK C. HOLTZ AND KARL W. STRUCK, OF SPRINGFIELD, ILLINOIS, ASSIGNORS
TO SANGAMO ELECTRIC COMPANY, OF SPRINGFIELD, ILLINOIS, A CORPORATION OF
ILLINOIS

CLOCK

Application filed October 23, 1929. Serial No. 401,664.

This invention relates to clocks and more particularly to a resetting device therefor, whereby the hands may be reset at a predetermined time interval, having particular reference to secondary clocks which are adapted to be reset by an electric motor constituting a part of the secondary clock and controlled by a master clock.

In a centrally controlled clock setting system, a master clock usually controls the making and breaking of a resetting circuit including the independent motors mounted on each of the individual clocks controlled by the circuit, at predetermined intervals such for example, as hourly intervals.

A few seconds before the minute hand on the master clock reaches the hour point, the circuit is closed setting into motion each of the resetting motors on the individual clocks, which in turn actuate an arrangement either advancing or returning the minute hand to the hour mark on the dial of each clock in the circuit. A short interval thereafter the circuit is opened by the master clock permitting the individual clocks to continue to operate the hands individually, under their own mechanical power. This invention has particular reference to an improved clock resetting arrangement for a controlled secondary clock in such a system.

The main object of this invention is the provision of a novel and simple mechanical arrangement whereby a clock in a centrally controlled system is reset.

Another object is the provision of a resetting mechanism which is operated by automatic movement of the mechanism in one direction.

A further object is the provision of a resetting mechanism which is adapted to be automatically stopped after the completion of the setting.

Another object is the provision of such a stop mechanism as is controlled by a member moving with one of the indicating hands.

A further object is the provision of a stop mechanism which is moved to inoperative position by a member moving with one of the indicating hands of the clock between the resettings and which is actuated to operative

position by the resetting mechanism during the resetting operation.

Other and further objects will appear from the following detailed description of a preferred embodiment of the invention shown in the accompanying drawing, in which:

Fig. 1 is a fragmentary elevational view of the resetting mechanism on the face side of the clock, with the face thereof removed;

Fig. 2 is a section, with parts shown in elevation, taken along the line 2—2 of Fig. 1; and

Fig. 3 is a fragmentary elevational view similar to Fig. 1 showing the relative position of the parts during the resetting operation.

Referring to the drawing, 1 represents the front mounting plate of a clock through which a center staff 2 projects carrying the usual cannon pinion 3 and minute hand 4. The cannon pinion assembly comprises primarily the cannon pinion 3, resetting arm 5, cannon sleeve 6, and minute hand 4, all firmly riveted together as a unit. This assembly is arranged to rotate upon a reduced extension portion 7 of the center staff 2, projecting forwardly from the front mounting plate 1. The cannon pinion assembly is frictionally held on the center staff 2 for rotation therewith by a shoulder 8, against which a star spring 9 rests and the outer ends of which engage an enlarged hub portion 11 of the arm 5. A pin 12 passing transversely through a hole in the end of the reduced portion 7 of the staff 2 and retaining a washer 13 adjacent the hub portion of the hand 4, coacts with the star spring 9 to hold the pinion assembly friction tight on the center staff 2. The cannon-pinion assembly rotates with the center staff, and can also be rotated by other means relatively thereto without rotating the center staff. This arrangement is common to most clocks, as will be readily understood by those skilled in the art.

The resetting arrangement in accordance with the present invention is operated by a motor 14 connected to a master clock controlled circuit (not shown) by leads 15. The armature shaft 16 of the motor 14 carries a pinion 17, which through gears 18 and 19, rotate gears 21 and 22, which in turn

rotate the gears 23 and 24, which are of equal size and mesh with each other as shown. The rotation of the latter gears is always in the direction of the arrows indicated thereon in Fig. 1. Projecting from the rear face of and near the periphery of each of the gears 23 and 24, are pins 25 and 26, so positioned that both pins are always in a line parallel to a line between the centers of the gears 23 and 24, and such that the pins will arrive simultaneously in proximate positions on the line of the centers of the gears.

In the properly timed rotation of the minute hand 4 the resetting arm 5 is, at a particular time period, in a position midway between the circles of rotation of the pins 25, 26. The pins 25, 26 and the arm 5 are in the same plane and the distance between the pins, when in proximate position, is slightly greater than the width of the arm 5, so as to receive the arm therebetween without any binding action thereupon. When arm 5 is in a position so that the edges 24 and 28 thereof may be engaged by the pins 25 and 26 upon rotation of the gears 23 and 24, respectively, the arm 5 will be turned either to the right or left as seen in Fig. 3, depending upon which of the edges 27 or 28 is engaged. It will thus be seen that when the pins 25 and 26 are in proximate aligned position, the arm 5 will be left in a position substantially midway between the centers of the gears 21 and 22, while the latter may continue to rotate until stopped by an improved stop arrangement which will be hereinafter described. By choice, this position is such as to leave the minute hand 4 pointing exactly to the hour mark.

Mounted on a pin or shaft 29 on the front plate 1 and adjacent to gear 24 and in the plane of rotation of both the arm 5 and the pin 26, is a star wheel 31. The upper end of pin or shaft 29 is riveted over the star wheel. A star spring 32, mounted under star wheel 31, and the intermediate portion of which rests on the face of the front plate 1 with the free ends thereof engaging the arms of the star wheel 31, frictionally spaces the star wheel from the front plate 1. These two securing means retain the star wheel in the plane noted. The star spring 32 holds the star wheel against accidental displacement by vibration or other causes, while it permits of rotation of the star wheel by the force of engagement thereof by either the arm 5 or the pin 26.

In operation, as the hand 4 rotates, it carries with it the arm 5. At approximately 20 minutes before the hour the edge 27 of arm 5 engages one of the radial edges of the star wheel 31, as indicated at 5a in Fig. 3, and proceeds to rotate this star wheel in a counter clockwise direction until approximately ten minutes before the hour, when the arm 5 disengages the contracted radial edge.

At this time the star wheel is in a position slightly further advanced in a counter-clockwise direction than the full line position indicated 31a, being frictionally held in such position by the star spring 32. In this position the peripheral edge of the star wheel arm 33 is withdrawn from the path of the pin 26 so that the latter is free to be rotated. A few seconds before the hour, the master clock completes the resetting circuit, thereby energizing the motor which, through the train of gears 17, 18, 19, 21 and 22, rotates the gears 23 and 24 in the directions indicated by the arrows in Fig. 1. Assuming now that the secondary clock is running slow, the minute hand on the clock is at this time in a position not quite up to the hour mark so that the resetting arm 5 is now in a position, for example, such as that indicated at 5b in Fig. 3.

As the gears 23 and 24 rotate, the pin 26 on gear 24 moves upwardly between the two adjacent radial edges of the star wheel presented thereto by the engagement of the arm 5 therewith in passing. When the pin 26 reaches the position 26a thereof, the star wheel is rotated back to the dotted line position 31b so that the arm 33 of the star wheel again presents its peripheral edge perpendicularly across and in the path of movement of the pin 26 so that the pin will be stopped upon the completion of one revolution. As the gears 23 and 24 continue to rotate, it will be noted that when the position indicated 26b of the pin 26 is reached, the pin will engage the edge 28 of arm 5, and as the pin proceeds around to the position indicated at 26c, the arm 5 will be oscillated to the left, thereby advancing the hand 4 exactly to the hour mark. The gears 23 and 24 will, of course, continue to rotate until the pin 26 strikes the peripheral edge of the arm 33 of the star wheel 31, as is clearly shown in Figs. 1 and 3, when the gears will be stopped.

At about this time the master clock breaks the circuit and the minute hand 4 continues around again under the control of the mechanical movement of the clock itself. The cycle on the next hourly resetting is a repetition of that above described.

It will readily be understood that in the event the clock is running fast, the pin 25 on gear 23 will return the hand to the hour mark by the engagement thereof with the edge 27 of the resetting arm 5.

It will be apparent from the foregoing that only two adjacent radial edges of the star wheel are employed during the resetting operation, so that a bell-crank lever would operate in like manner. The star wheel is preferable, however, in that it is a balanced structure and further for the reason that in the clock assembly operation, there is no danger of improper placement of the member in position as might occur with a bell-crank

member. Thus with the employment of the star wheel, no matter what its initial position the arm 5 will properly position it upon its first hourly cycle.

5 As will be evident from the foregoing, upon the abutment of pin 26 against the peripheral edge 33 of the star wheel to bring the resetting means to a stop, the impact is normally such as would shock the gear train
10 back to the motor. In order to avoid this condition, the gear 21, is frictionally mounted on its arbor 34, the friction being imposed upon it by a star spring 35, the ends of which exert pressure upon the gear so that it frictionally engages a collar 37, the spring being
15 clamped between the gear and the collar 36. This arrangement acts as a relief clutch and absorbs the shock incident to the sudden stopping of the gears 23 and 24. The clutch
20 may be so constructed that after one or two revolutions of the gear 21, the gear is decelerated by the friction to a stand still thus stalling the motor 14, or it may freely rotate
25 until the line current to the motor fails when the master clock breaks the secondary control clock circuit.

Thus it will be seen that we have provided a simple and efficient motor operated means for resetting secondary clocks in a master
30 clock controlled circuit, such as will reset the secondary clock at predetermined intervals by movement of the resetting mechanism in one direction only. We have further provided a novel stop arrangement for such a
35 mechanism, in which there is very little possibility of the mechanism getting out of order.

While we have shown a preferred embodiment of the invention, it is to be understood that we do not wish to limit ourselves
40 thereto. As will be understood by those skilled in the art, numerous changes may be made therein without departing from the spirit and scope of the appended claims.

45 What we claim is:

1. The combination with a clock having a cannon pinion assembly, an indicating hand and an arm extending from said cannon
50 pinion assembly, of resetting means comprising intermeshing gears, and stop means for said gears adapted to be engaged and released by said arm.

2. The combination with a clock having a cannon pinion assembly, an indicating hand
55 and an arm extending from said cannon pinion assembly, of resetting means comprising intermeshing gears, and stop means for said gears adapted to be engaged and released by said arm, said stop means comprising an oscillatory element.

3. The combination with a clock having a cannon pinion assembly, an indicating hand
60 and an arm extending from said cannon pinion assembly, of resetting means comprising intermeshing gears, stop means for said gears

adapted to be engaged and released by said arm, and means on said gears adapted to be engaged by said stop means.

4. The combination with a clock having a cannon pinion assembly, an indicating hand
70 and an arm extending from said assembly, of resetting means, and stop means adjacent said cannon pinion assembly and in the path of movement of both said arm and said resetting means, said stop means adapted in one
75 position of movement to stop said resetting means.

5. The combination with a clock having a cannon pinion assembly, an indicating hand
80 and an arm extending from said assembly, of resetting means, stop means adjacent said cannon pinion assembly and in the path of movement of both said arm and said resetting means, said stop means being adapted in
85 one position of movement to stop said resetting means, and means for operating said resetting means.

6. The combination with a clock having a cannon pinion assembly, an indicating hand
90 and an arm extending from said assembly, of resetting means, stop means adjacent said cannon pinion assembly and in the path of movement of both said arm and said resetting means, said arm being adapted to move the
95 stop means to inoperative position, said resetting means being adapted to move said stop means to operative position, and adapted to engage said arm upon continued movement of said resetting means, thereby resetting
100 said hand.

7. In a clock, a mounting plate, a cannon pinion assembly on said plate and having an
105 indicating hand and an arm thereon, a resetting means on said plate comprising intermeshing gears and having depending pins, said pins moving in a path symmetrically with the
110 axes of said gears, a star wheel stop mounted on said plate in the path of movement of both said arm and said pin, said star wheel being adapted to be moved to inoperative position by said arm and subsequently by one of
115 said pins to operative position, said arm being subsequently engaged by one or the other of said pins to advance or return the hand to a predetermined point, and one of said pins adapted to engage the end of one arm of said star wheel to stop said resetting means after completion of the resetting operation.

8. In a clock, means for indicating time,
120 means cooperating with said indicating means for resetting at a predetermined interval, and means cooperable with said resetting means to limit the operation of said resetting means upon completion of a resetting operation and controllable by said
125 indicating means to release the resetting means between resetting operations.

9. In a clock, means for indicating time,
130 means cooperating with said indicating means for resetting thereof at a predeter-

mined interval, and means cooperable with said resetting means to limit the operation of said resetting means upon completion of a resetting operation and controllable by said
5 indicating means to release the resetting means between resetting operations, and controllable by said resetting means in the course of a resetting operation to be disposed in operative position prior to the completion of
10 the operation.

10. In a clock, a mounting plate, a cannon pinion assembly on said plate, said assembly having an arm thereon, rotatable resetting means on said plate adapted to engage
15 said arm, and rotatable stop means on said plate adapted to cooperate with said resetting means, said stop means being adapted to be engaged and rotated by said arm.

11. In a clock, a mounting plate, a cannon
20 pinion assembly on said plate, said assembly having an arm thereon, rotatable resetting means on said plate adapted to engage said arm, and rotatable stop means on said plate adapted to control the operation of the resetting means, said stop means being adapted
25 to be successively engaged by said arm and said resetting means for first releasing the resetting means and for subsequent operative disposition to limit operation of the resetting means upon completion of a resetting
30 operation.

12. The combination with a clock having a cannon pinion assembly, an indicating hand and an arm extending from said assembly, of resetting means disposed to engage
35 said arm at a predetermined interval to position the indicating hand at a definite point, and means disposed in the paths of operation of said resetting means and said arm and adapted to cooperate with said resetting
40 means to stop it upon completion of the resetting operation and to cooperate with said arm between periods of resetting to release the resetting means.

13. In combination with a clock having means for indicating time, of resetting means for resetting said time indicating means at a predetermined interval, comprising a movable element, means for moving said element
50 to effect a resetting operation, a movable stop means, and means on said resetting means engaged with said stop means during a part of the movement of said resetting means to positively move the stop means into
55 position to stop the resetting means at the completion of said operation.

In witness whereof, we hereunto subscribe our names this 16th day of October, 1929.

60 FREDERICK C. HOLTZ.
 KARL W. STRUCK.