

No. 768,421.

PATENTED AUG. 23, 1904.

R. CARLSTEDT & B. GUSTAFSON.

ELECTRIC STRIKING CLOCK.

APPLICATION FILED NOV. 19, 1903.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1.

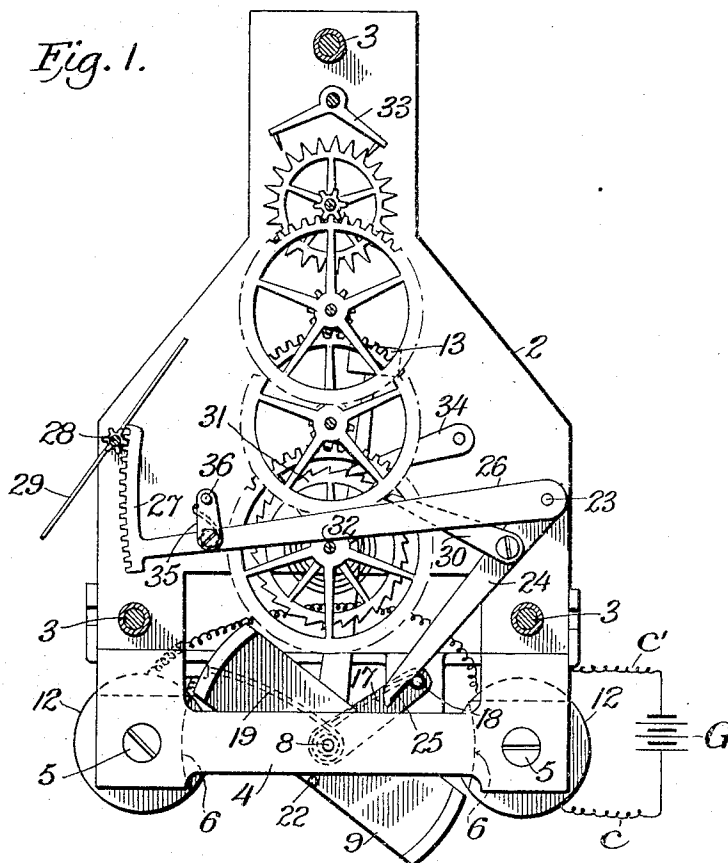
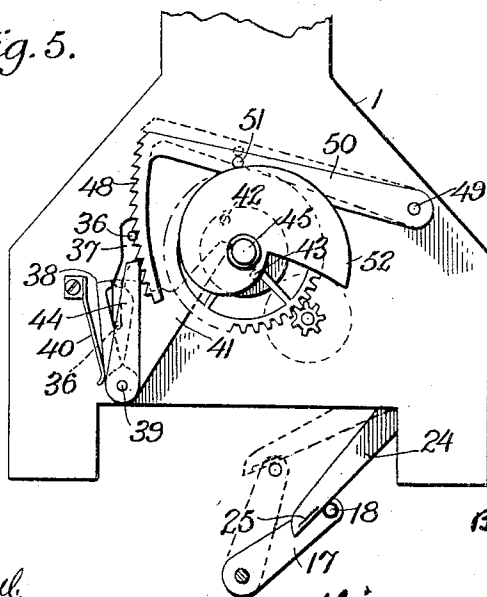


Fig. 5.



Witnesses  
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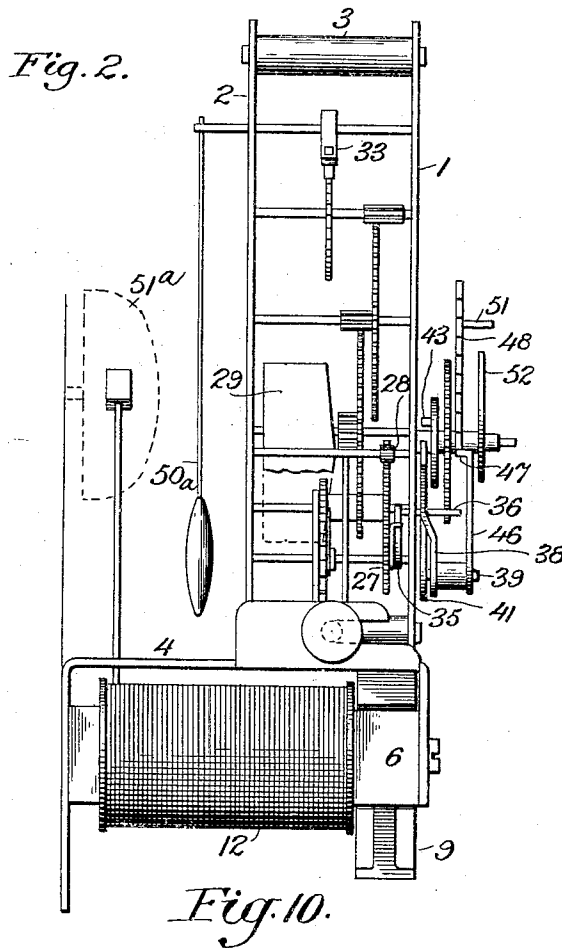
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3 SHEETS—SHEET 2.



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3 SHEETS—SHEET 3.

Fig. 3.

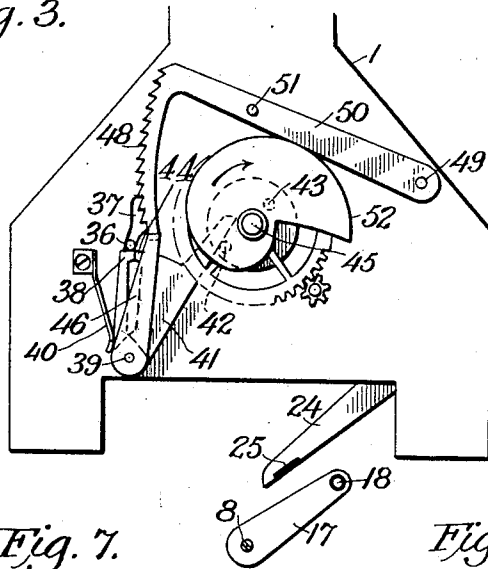


Fig. 6.

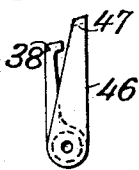


Fig. 7.

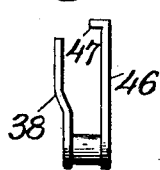


Fig. 4.

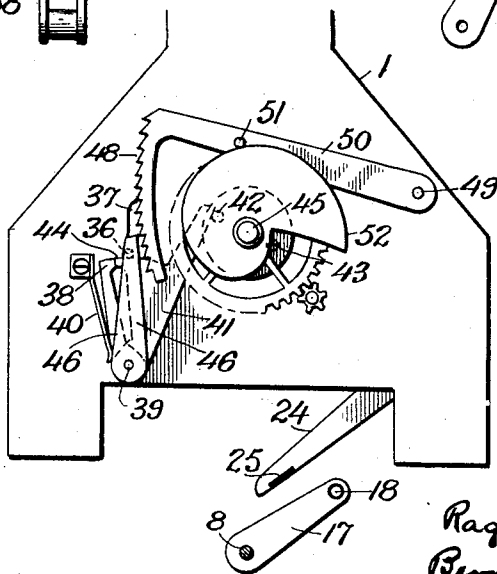


Fig. 8.

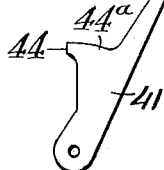


Fig. 9.



Witnesses

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# UNITED STATES PATENT OFFICE.

RAGNAR CARLSTEDT, OF RÄLLSÅ, AND BERNHARD GUSTAFSON, OF STOCKHOLM, SWEDEN.

## ELECTRIC STRIKING-CLOCK.

SPECIFICATION forming part of Letters Patent No. 768,421, dated August 23, 1904.

Application filed November 19, 1903. Serial No. 181,826. (No model.)

*To all whom it may concern:*

Be it known that we, RAGNAR CARLSTEDT, a resident of Rällså, and BERNHARD GUSTAFSON, a resident of Odengatan 88, Stockholm, Kingdom of Sweden, subjects of the King of Sweden and Norway, have invented certain new and useful Improvements in a Combined Latch and Releasing Device for Clocks, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a latch and releasing device for clocks, and especially for the striking mechanism in electric clocks of that class in which the winding up of the motor-spring for the time mechanism is effected by motion-transmitting means connected with the armature of an electromagnet as the said armature acts upon the hammer indicating hours and half-hours. In electric clocks of the said class it is of the greatest importance that the striking mechanism and the releasing device combined with the same shall operate in a reliable manner, as the clock otherwise will stop. For that reason we have constructed the said device of as few parts as possible, as the possibility of the device getting out of order is thereby reduced.

Our combined latch and releasing device may be employed in mechanically or electrically operated clocks of any kind provided with a toothed segment coöperating with a snail of well-known construction to determine, for instance, the number of strokes made by the hammer. In the following our device is described as applied to an electric self-winding clock of the class stated above.

In the accompanying drawings, which serve to illustrate the invention, Figure 1 is a front view of the clock, the front plate of the frame of the time mechanism being removed. Fig. 2 is a side view of the same. Fig. 3 is a front view of the latch and releasing device, showing the parts in their normal position. Figs. 4 and 5 are views similar to Fig. 3, showing the parts in two different operative positions. Fig. 6 is a detail front view showing a latch combined with a pawl, and Fig. 7 is an edge view of the same parts. Fig. 8 is a detail

front view, and Fig. 9 an edge view, of a releasing-lever. Fig. 10 is a fragmentary plan view showing the armature and connections of the wires.

The parts of the time mechanism are mounted in a frame consisting of a front plate 1 and a back plate 2, connected by a suitable number of bolts 3. The said frame is supported by and mounted on a frame 4, fixed in the casing of the clock and consisting of a metal plate suitably bent to form lugs or ears in which the iron cores 5 and the pole-shoes 6 of a horseshoe-electromagnet are fixed and the shaft 8 of the armature 9 is journaled.

12 12 indicate the coils of the electromagnet.

17 is an arm projecting from the shaft 8 and provided with a pin 18, which is insulated (see Fig. 10) from the arm and connected electrically with one of the ends of the wire surrounding the magnet-cores through a spring-wire 19. The said wire 19 is fixed to the frame 4 in an insulated manner and is coiled loosely about the shaft 8, from which it is insulated.

8<sup>a</sup> designates the insulating material about the shaft 8, and 17<sup>a</sup> designates insulating material on the arm 17. These insulating materials serve to prevent the wire 19, which is naked, from contact with the metal parts 8 and 17. Where the wire 19 is secured to the frame, it is embraced by insulating material 19<sup>a</sup>. Fig. 10. This spring-wire 19 extends to and is secured to the pin 18 and serves the double purpose of a conductor of the electric current and a spring for the armature 9 to hold it in the normal position, (seen in Fig. 1,) a pin 22 in the armature limiting the extent of movement of the latter by contact with the frame. The other end of the wire *c* of the magnet-coils is connected with a pole of the generator G, and the other pole of the latter is connected by a suitable conductor *c'* with the plate 2 of the frame, Fig. 1. When the armature 9 is attached by the magnet, a hammer 13, carried by the shaft 8, is drawn back, and when the spring-wire 19 (acting through the arm 17 and shaft 8) returns the armature to the normal position (seen in Fig. 1) the hammer 13 is caused to strike a suitable gong or bell. (Indicated by

dotted lines at 51<sup>a</sup> in Fig. 2.) This figure also shows the pendulum 50<sup>a</sup> of the clock.

In the frame of the time mechanism a shaft 23 is journaled, carrying an arm 24, which 5 through the said shaft is electrically connected with the said frame, and thus with the frame 4 and the battery. It will be seen that the pin 18 forms one of the terminals of the circuit of the electromagnet, the arm 24 forming the 10 other terminal of the said circuit. Arm 24 is provided in its under side with a piece 25 of ebonite or other suitable non-conducting material for the purpose mentioned below. From the shaft 23 projects an arm 26, carrying on 15 its end a toothed segment 27, engaging a pinion 28 on the shaft of a fly 29.

30 is a pawl pivoted to the arm 24 and engaging a ratchet-wheel 31, rigidly mounted on the arbor 32. The mainspring of the time 20 mechanism is connected with the said arbor, the usual train (diagrammatically shown in Figs. 1 and 2) being provided between the arbor 32 and the escapement 33.

34 is a counter-pawl engaging the winding-ratchet 31. 25

The armature 9 and its arm 17 are normally held in the position shown in Fig. 1. The normal position of the arm 24 is shown in Figs. 3 and 4. For holding the arm 24 in the said 30 position and releasing the same for the purpose mentioned below a mechanism is provided arranged in the following manner: Pivoted to the arm 26 is an arm 35, which a spring coiled about the pivot of the arm 35 tends to swing to the right, Fig. 1. From the 35 said arm 35 projects a pin 36, adapted to slide along a guideway 37, arranged in the front plate 1 and having the shape stated below. The said pin 36 is normally supported by a 40 latch or lever 38, Fig. 3, swinging on a pivot 39, fixed in the front plate 1. The end of the said latch, which is acted upon by a spring 40, tending to swing the same to the right, bears upon a releasing-lever 41, swinging on the 45 pivot 39 and having its end situated in the paths of let-off pins 42 43, fixed in the minute-hand wheel of the time mechanism. The said releasing-lever 41 has a projection 44, Figs. 3, 8, and 9, which forms an abutment 50 for the latch 38 and the upper cam-shaped edge 44<sup>a</sup> of which is flush with the end surface of the latch 38 and forms a continuation of the said surface, Fig. 3. The center of the said cam-shaped edge preferably coincides 55 with the center line of the pivot 39. The releasing-lever 41 normally rests at its end by gravity, on the shaft 45 of the minute-hand wheel or other suitable abutment, as seen in Fig. 3. Fixed to the hub of the latch 38 or 60 made integral with the said latch is a pawl 46, provided with a side projection or detent 47, (see Figs. 6 and 7,) normally supporting a toothed segment 48, the lower end of which bears upon the said detent 47. The said toothed 65 segment is carried by an arm 50, pivoted at

49 to the frame and provided with a pin or projection 51, which as the segment 48 is released in the manner stated below and drops impinges upon a snail 52. The said toothed segment 48 and the snail 52, coöperating with 70 the same, are commonly employed in clocks for determining the numbers of strokes to be made by the hammer 13 and form no part of this invention. The said snail 52 is mounted on the hour-hand sleeve and rotates with the 75 same.

The mechanisms described above operate in the following manner: The parts are normally in the position shown in Fig. 3, in which the pin 36 is supported by the latch 38 and the 80 toothed segment bears upon the pawl 46. When the pin 42 during the rotating movement of the minute-hand wheel in the direction indicated by the arrow in Fig. 3 meets the releasing-lever 41 and causes the same to 85 swing to the left, the latter will move the latch 38 and the pawl 46, connected with the same, also to the left. During this operation the pawl 46 is moved from under the end of the segment 48 in such manner that the seg- 90 ment will drop and its first tooth will catch on the detent 47. During the continued movement of the pawl effected by the releasing-lever the pawl is swung to such a position that the segment is free to fall to a level deter- 95 mined by the pin 51 and the snail 52, situated in the path of the said pin, Fig. 4. As the releasing-lever 41 and the latch 38 are swung to the left in the manner stated above the latch is withdrawn from under the pin 36 and 100 the projection 44 is placed beneath the same, thus keeping the said pin 36 in its position. When the pin 42 during the continued rotating movement of the minute-hand wheel leaves the releasing-lever 41, the latter will fall to 105 the right by gravity, thus withdrawing its projection 44 from under the pin 36 and permitting the spring-actuated pawl 46 to engage the toothed segment 48, Fig. 5. The said pawl 46 will at the same time prevent the latch 110 38 from following the releasing-lever in its movement to the right, a space between the said latch and the releasing-lever 41 being thus provided into which the pin 36 can enter, sliding along the guideway 37, Fig. 5. As the pin 36 115 is freed in the manner stated above the arms 26 and 24 will swing downward, acted upon by their weight, until the arm 24 forms a contact with the pin 18, situated in the path of the said arm, Figs. 1 and 5. Consequently the 120 current will pass from the battery through the coils 12 of the electromagnet, the spring 19, the pin 18, the arm 24, the frame of the time mechanism, and the frame 4 back to the generator, Fig. 1. The electromagnet energized 125 in this manner attracts its armature 9, swinging the arms 17 and 24 and 26 upward into the position shown in dotted lines in Fig. 5. Owing to the fact that the paths of the pin 18 and the arm 24 intersect, the pin 18 will slide 130

along the under side of the arm 24 during the said upward movement of the parts. The position of the non-conducting piece 25 in the arm 24 is so disposed that the pin 18 when moved upward will meet said piece 25. (See the position indicated by dotted lines in Fig. 5.) At this moment the current through the electromagnet is interrupted and the armature 9 is returned by the spring 19 to its normal position. (Shown in full lines in Fig. 5.) During the upward movement of the arms 24 and 26 the pin 36 is carried upward along the guideway 37, the lower portion of which is situated outside—i. e., to the left of the points of the teeth of the segment 48. The upper portion of the said guideway 37 is situated inside—i. e., to the right of the said teeth—so that the pin 36 sliding upward along the guideway will engage the toothed segment 48 and lift the same. The said guideway 37, being a slot in the front plate 1, is so shaped that the pin 36 when moved upward can pass by the detent 47 of the pawl 46 and then engage the toothed segment. The length of the said slot is so adjusted that the pin 36 having lifted the segment for a distance of one tooth is stopped. (See the position indicated by dotted lines in Fig. 5.) When the said lifting operation has been effected, the arm 26, with the pin 36 and the arm 24, will sink slowly, retarded by the fly 29, until the arm 24 again forms a contact with the pin 18 and the current through the electromagnet is closed. A further attraction of the armature 9 is consequently effected and the arms 17, 24, and 26 and the pin 36 are again moved upward in the described manner, the latter lifting the segment for a further tooth. The said operations will be repeated, and the pin 36 will lift the segment 48 step by step until the lower end of said segment is moved to the position above the detent 47 of the pawl 46. At this moment the pawl 46 and the latch 38 are swung by the spring 40 to the right into the position shown in Fig. 3, so that the pawl will engage the toothed segment 48 and the latch will engage the pin 36. The arm 24 will then cease to form contact with the pin 18, and the parts will occupy their original positions. (Shown in Fig. 3.) The striking mechanism has now performed its operation, and the tension of the mainspring of the time mechanism has been increased by means of the pawl 30 acting upon the winding-ratchet during the swinging movement of the arm 24. The pin 43 serves to release the striking mechanism when the hammer is to indicate half-hours. For that reason the said pin is mounted at a shorter distance from the axis of the minute-hand wheel than the pin 42, so that it can turn the releasing-lever 41 and the pawl 44 only for such a distance to the left that the toothed segment 48 will fall until its first tooth strikes the detent 47 of the pawl 46 and then remain in the said position. The arms 24 and 26 will

consequently be lifted only one time in the described manner, the hammer 13 striking the gong or bell.

Our combined latch and releasing device has been described as applied to an electric self-winding clock. We wish, however, to point out that our invention may be applied to any kind of electrically or mechanically operated clock provided with a toothed segment. Our invention may be applied even to such clocks electrically or mechanically operated in which the segment-lifting pin has another movement than that illustrated in the drawings—as, for example, a rotating movement. Our device may be applied even to clocks having no striking mechanism, the contact mechanism being then employed for winding up the mainspring, and, if desired, for transmitting electric impulses from a controlling clock or clocks connected to the same in series, as will be readily understood by those skilled in the art.

In the practical execution of the invention the arrangements shown in the drawings may be modified in many respects without departing from the essential spirit of the invention.

The retarding device for the arm 24 and the contact devices herein shown form a part of our invention embodied in another application of ours, Serial No. 181,825, and are not therefore claimed herein.

Having now described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a latch and releasing device for clocks, the combination with the swinging toothed segment, of a pawl, cooperating with the same, a movable part, returning the said toothed segment to its original position, a latch for the said part, said latch being connected with the pawl, and a releasing-lever, actuating the said latch and temporarily substituting the same, substantially as described and for the purpose set forth.

2. In a latch and releasing device for clocks, the combination with the swinging segment, of a pawl cooperating with the said segment, a swinging arm, actuated by the striking mechanism, a pin carried by the arm and returning the said toothed segment to its original position, a latch for the said pin, said latch being connected with the said pawl, a releasing-lever and a projection on the same actuating the said latch and forming a continuation of the bearing-surface of the same, substantially as described and for the purpose set forth.

3. In a latch and releasing device for clocks, the combination with the swinging segment, of a pawl cooperating with the same, a movable temporarily-actuated part, a pin supported by the said part in a movable manner and sliding along a guide crossing the path of the said segment, said pin returning the segment to its original position, a latch for the said

pin, said latch being connected with the said  
pawl, a releasing-lever and a projection on  
the same actuating the latch and forming a  
continuation of the bearing-surface of the  
5 same, substantially as described and for the  
purpose set forth.

In witness whereof we have hereunto signed

our names in the presence of two subscribing  
witnesses.

RAGNAR CARLSTEDT.  
BERNHARD GUSTAFSON.

Witnesses:

ERNST SVANQVIST,  
ROBERT APELGREN.