No. 768,511. PATENTED AUG. 23, 1904.

R. CARLSTEDT & B. GUSTAFSON.

CONTACT DEVICE FOR ELECTRIC CLOCKS.

APPLICATION FILED NOV. 19, 1903.

NO MODEL. 3 SHEETS—SHEET 1.

Fig. 1.

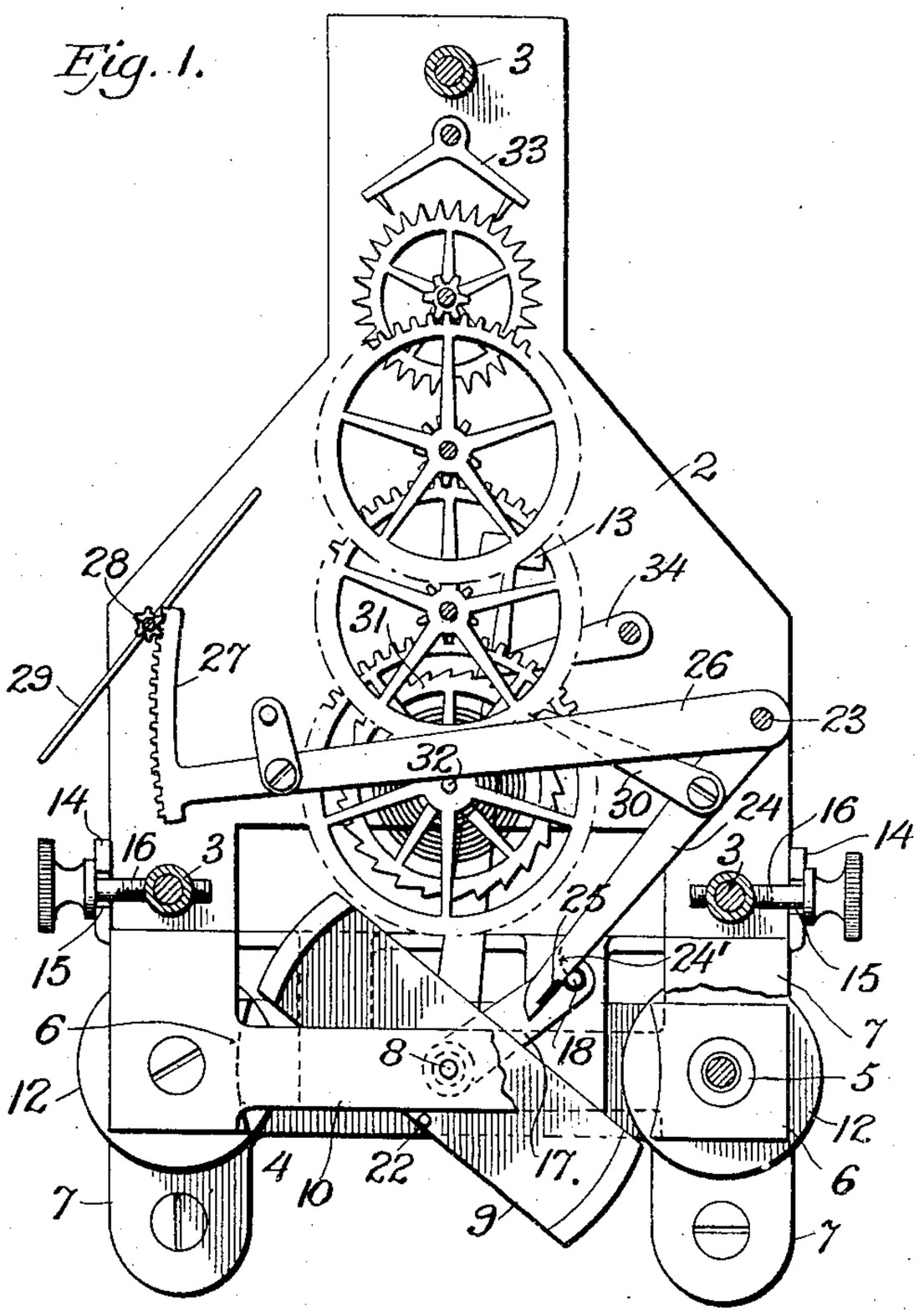
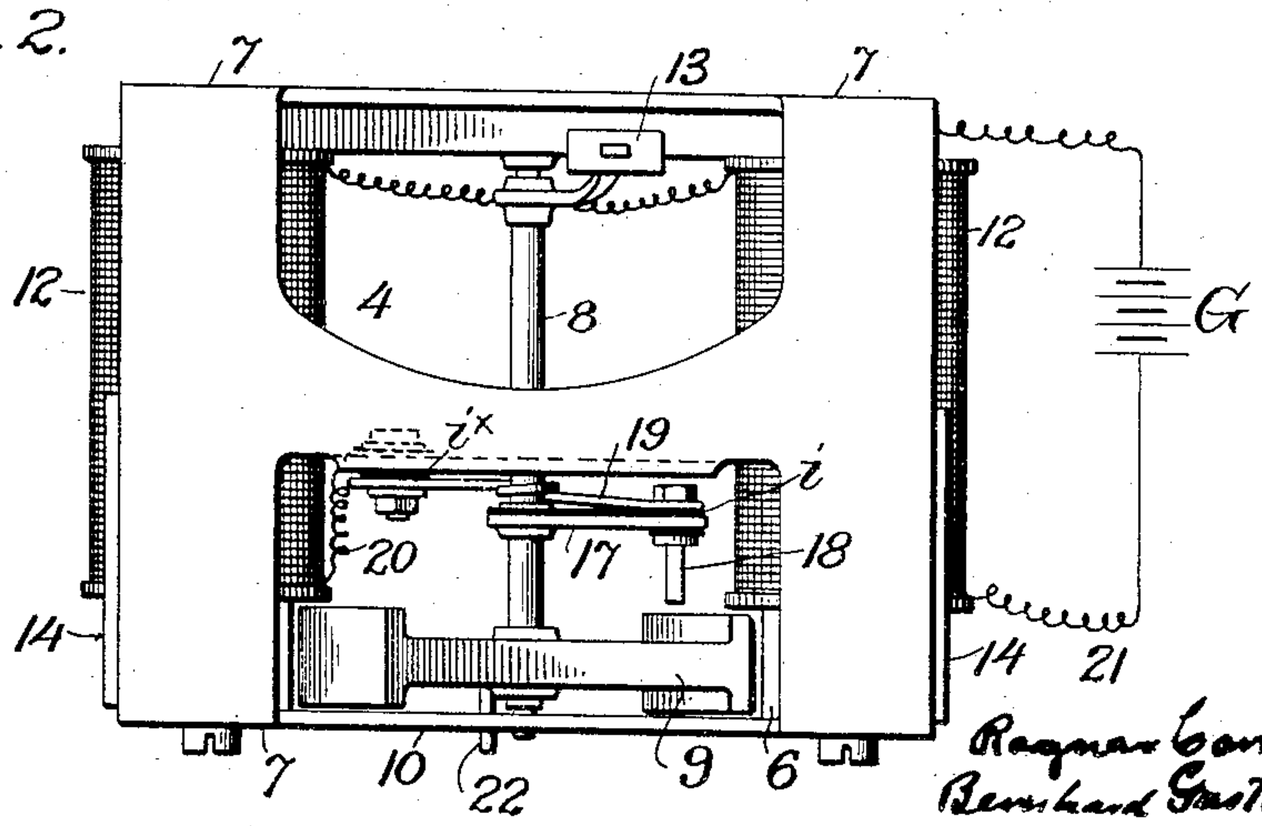


Fig. 2.



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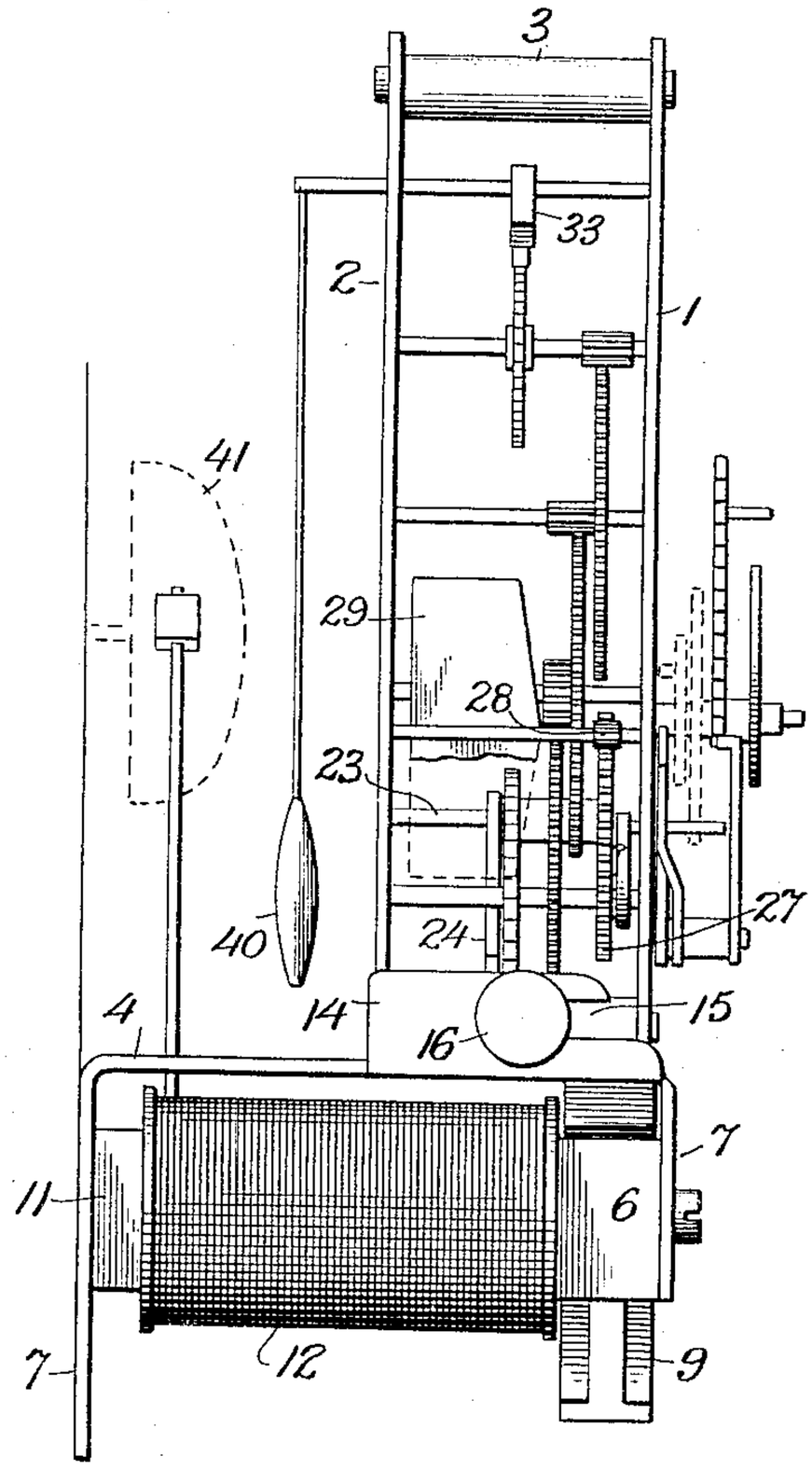
NO MODEL. 3 SHEETS—SHEET 2.

Fig. 3.



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NO MODEL. 3 SHEETS—SHEET 3.

Fig. 4.

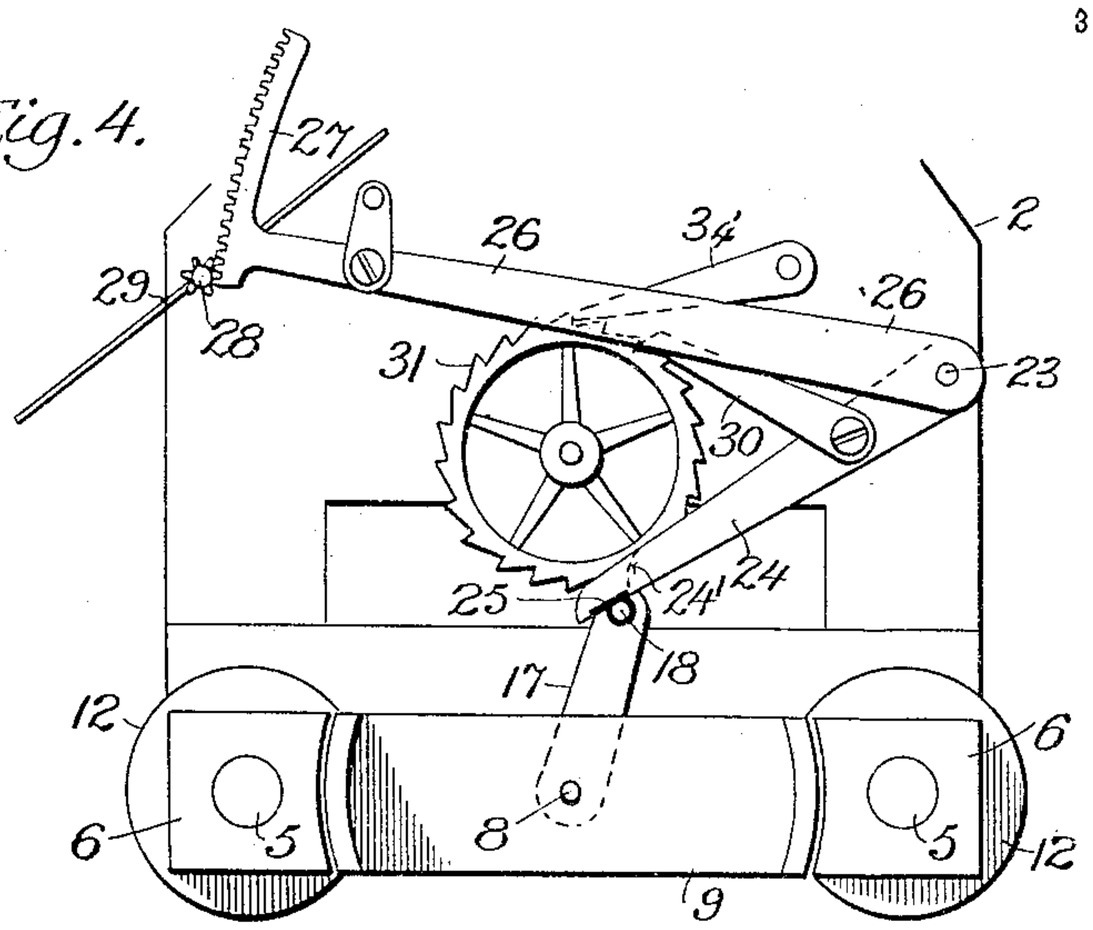


Fig. 5.

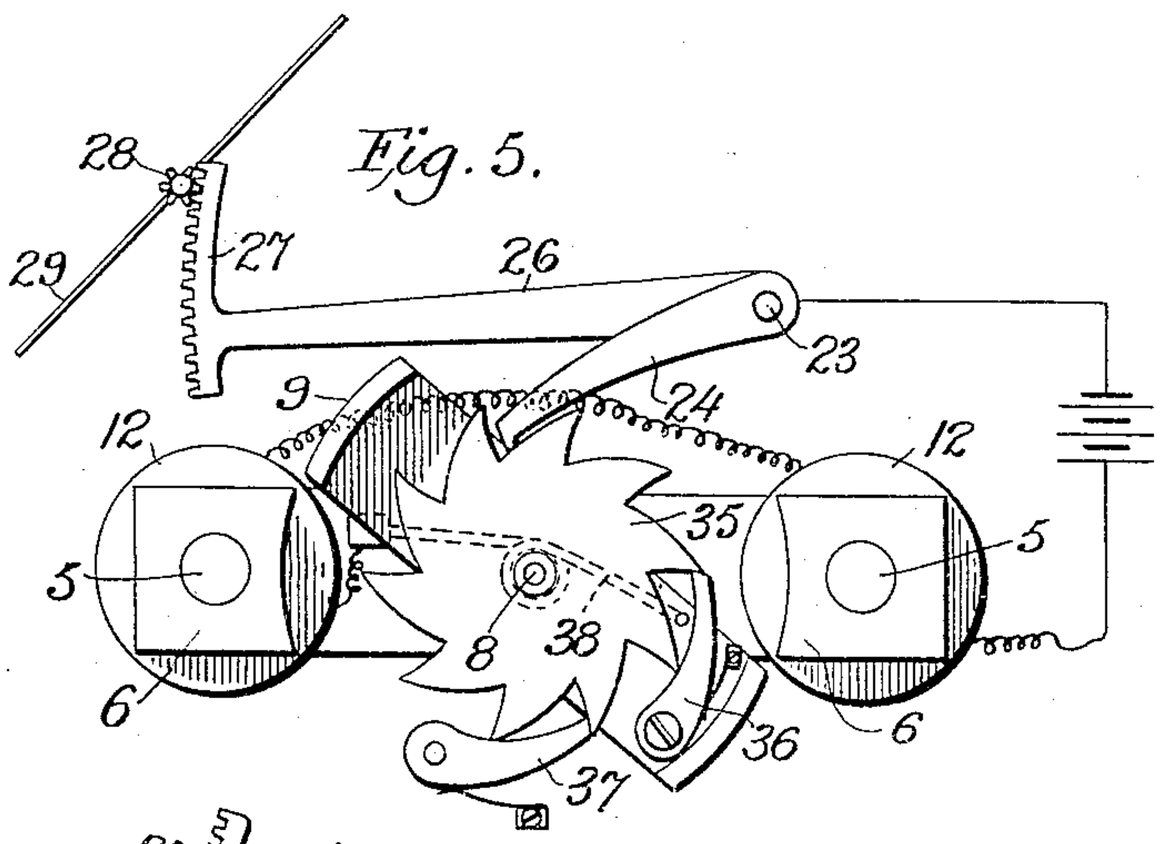
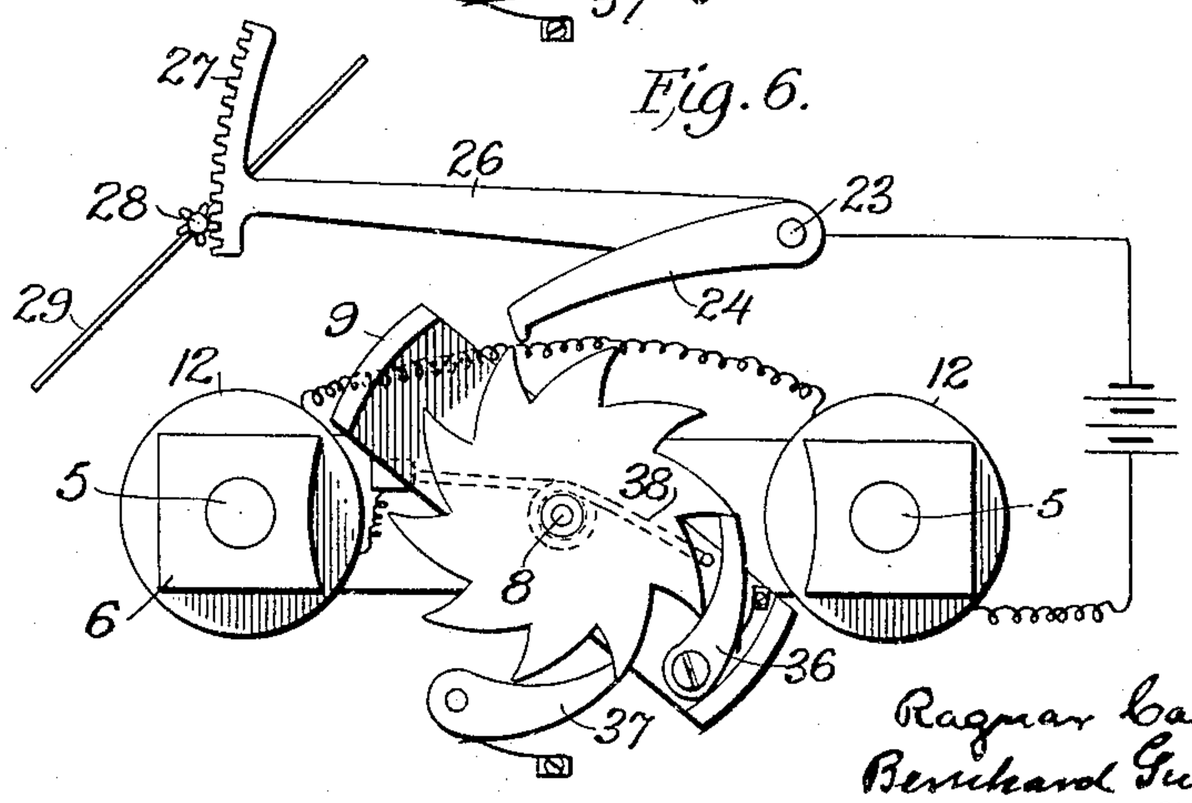


Fig. 6.



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No. 768,511. Patented August 23, 1904.

UNITED STATES PATENT OFFICE.

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

CONTACT DEVICE FOR ELECTRIC CLOCKS.

SPECIFICATION forming part of Letters Patent No. 768,511, dated August 23, 1904.

Application filed November 19, 1903. Serial No. 181,825. (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, in the Kingdom of Sweden, subjects of the King of Sweden and Norway, have invented certain new and useful Improvements in Electric Clocks, of which the following is a specification, reference being had therein to the accompanying drawings.

This invention relates to a contact device for electric clocks of that class in which the armature of an electromagnet acts upon one of the terminals of the circuit energizing the electromagnet or is connected with the said terminal.

The characteristic feature of our invention consists in combining a retarding mechanism with the other terminal of the said circuit, which terminal is movable and as the armature is attracted is acted upon and shifted in its position by the terminal first mentioned. The result of this arrangement is that when the attracted armature returns to its normal position after the contact has been broken the terminal connected with the said retarding mechanism is prevented from returning immediately, but first after a certain predetermined interval making again contact with the other terminal.

Our invention can be employed for winding up the motor-spring for the time mechanism as well as for transmitting electric impulses from a controlling-clock to clocks connected with the same in series.

Another characteristic feature of our invention consists in the fact that the electromagnet and the insulated terminal contact-piece connected with the same is mounted in a frame which is connected with the electric source and adapted to support the frame of the time mechanism carrying the other uninsulated terminal contact-piece, no special electric connecting means between the time mechanism and the said source being thus necessary.

In the accompanying drawings, which serve to illustrate the invention, our contact device is shown applied to an electric self-winding clock.

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 top view of the electromagnet and its frame. Fig. 3 is a side view of the clock. Fig. 4 shows the parts of the contact device in an operative position different from that shown in Fig. 1. Figs. 5 and 6 illustrate a modified form of the invention, the parts being shown in two different operative positions.

The time mechanism is mounted in a frame consisting in the drawings of a front plate 1 and a back plate 2, connected by a suitable number of bolts 3. The said frame is supported by a frame 4, fixed in the casing of the clock and consisting of a metal plate suitably bent to form lugs or ears, carrying the parts of the horseshoe-electromagnet. The iron cores 5 and the pole-shoes 6 of the electromagnet are fixed between two pairs of the said lugs 7, while the shaft 8 of the armature 9 of the electromagnet is journaled in a cross-piece 10, connecting the front lugs 7, and in an iron cross-piece 11, connecting the back ends of the cores. 12 12 are the coils of the electromagnet. The hammer 13, indicating the hours, is fixed on the said shaft 8, (see Fig. 2,) and strikes a gong 41 or the like, as indicated in dotted lines in Fig. 3. In this view 40 designates the pendulum. The frame of the time mechanism is mounted on the frame 4 between two side lugs or flanges 14, projecting upward from the same. The said lugs are each provided with a longitudinal slot 15, which is open at the front end and through which passes a screw-bolt 16, provided with milled head and screwed into one of the bottom bolts 3. The frame of the time mechanism is loosely passed on the frame 4 from the front end of the same and fixed by means of the said screws 16.

17 is an arm projecting from the shaft 8 and provided with a pin 18, which is insulated at *i* from the said arm and by means of a wire 19 is connected with one of the ends 20 of the coil surrounding the magnet-cores. The other end of the wire last mentioned is connected with one of the terminals of the battery G, Fig. 2, the other terminal of the battery being connected with the frame 4. The wire 19,

which is fixed to the frame 4 and insulated at $i^{\times}$ from the same, is coiled loosely about the shaft 8, as shown, but out of contact with the same. It is of a springy metal in order to serve as a spring returning the attracted armature 9 to its normal position, controlled by a pin 22, fixed in the armature and impinging against the cross-piece 10.

In the frame of the time mechanism is journaled a shaft 23, supporting an arm 24. The said arm is electrically connected with the frame by its shaft, and thus with the frame 4 and the battery. Thus it will be seen that the pin 18 forms one of the terminals of the circuit of the electromagnet, the arm 24 forming the other terminal of the said circuit. The normal position of the arm 24 is shown in Fig. 4, and the normal position of the armature 9 and the arm 17 is shown in Fig. 1 and in full lines in Fig. 4. The said 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. An arm 26 projects from the shaft 23 of the arm 24, carrying on its end a toothed segment 27, which is in engagement with 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, fixed to the arbor 32. The mainspring of the time mechanism is connected with the said arbor and the time mechanism is driven in the usual manner, a gearing (shown in Figs. 1 and 3) being provided between the said spring and the escapement 33.

The contact device described above operates in the following manner: Arms 24 and 26 are normally held in the position shown in Fig. 4 by a suitable mechanism controlled by the clockwork in such manner that the said arms are freed at certain intervals and are then again locked in the position shown in the said figure. As the said mechanism does not form any part of this invention, it is neither shown nor described. It may be of any suitable kind known by those skilled in the art. As the arms 24 and 26 are freed they will sink, acted upon by gravity until the arm 24 forms a contact with the pin 18, situated in the path of the said arm. (See Fig. 1.) Consequently the current will pass from the battery G through the coils 12 of the electromagnet, the wire 20, the spring 19, the pin 18, the arm 24, the frame of the time mechanism, the frame 4, and back to the battery. The electromagnet, which is energized in this manner, attracts its armature and swings the arm 17 upward. During the upward movement of the said arm the pin 18 bears against the under side of the arm 24, which is consequently moved upward. Owing to the fact that the paths of the pin 18 and the arm 24 intersect, the pin 18 will slide along the under side of the arm 24. The position of the non-conducting piece 25 in the arm 24 is so disposed that the pin 18 when moved upward will meet the piece 25. (See the position indicated in Fig. 4.) At this moment the current through the electromagnet is interrupted. Consequently the armature 9 is returned to the normal position. (Shown in Fig. 1.) During the movement of the arms 24 and 26 the tension of the mainspring is increased through the action of the pawl 30. A counter-pawl 34 serves to prevent the winding-ratchet 31 from returning with the pawl 30. The arrangement shown in Figs. 1 to 4 may be modified in such manner that the arm 24 is cut off at the point 24′, as indicated by the dotted line, so that the contact of the pin 18 with the arm is interrupted when the said pin has passed by the end of the arm 24. Owing to the *vis viva* imparted to the arms 24 and 26 and the fly 29 during the upward movement of the said arms, the arm 24 will be swung upward for a short distance after the pin 18 has left the same, thus permitting the arm 17 to return freely to its lower position.

In the modification shown in Figs. 5 and 6, 5 5 are the iron cores of the electromagnet; 6, the pole-shoes; 9, the armature; 8, its shaft; 12, the coils; 24, the swinging arm, journaled at 23 and connected with the arm 26, carrying the toothed segment 27; 29, the fly, and 28 its pinion. According to the said figures a toothed wheel 35 is loosely mounted on the shaft 8. The inner edges of the teeth of the said wheel are concave, as shown. The armature 9 carries a spring-actuated pawl 36, which engages the said wheel 35 in such manner that when the armature is attracted the said pawl turns the wheel 35. 37 is a spring-actuated counter-pawl engaging the said wheel 35. 38 is a spring which actuates the armature 9 in the same manner as the spring 19 before described, but in this case it is connected directly with the armature. It also serves as a conductor, as in the case of the spring 19. The arm 24 is connected with the battery in the same manner as stated above with reference to Figs. 1 to 4. From the foregoing it will be understood that the wheel 35 forms a substitution for the arm 17 in Figs. 1 to 4. When the parts are in the position shown in Fig. 5, the current passes from the battery through the coils 5 5, the spring 38, the armature 9, the wheel 35, the arm 24, bearing against the said wheel, and back to the battery. Consequently the electromagnet is energized and attracts the armature 9 until the point of the tooth which is in contact with the arm 24 has passed by the end of the said arm, in which moment the said contact is interrupted, owing to the stated form of the teeth. (See Fig. 6.) The armature 9 now returns to its normal position, acted upon by a spring 38, and the pawl 36 engages the next tooth of the wheel. The arms 24 and 26 will then sink slowly, retarded in their movement by the fly 29 in the same manner as stated above with reference to Figs. 1 to 4, and the arm 24 forms again a contact with the toothed wheel 35.

The arrangement shown in Figs. 1 to 4 is chiefly intended to be employed for increasing the tension of the mainspring of the clock or to be applied in self-winding clocks with or without time mechanism. The contact device may, however, be employed for transmitting electric impulses to electric clocks connected in series, as will readily be understood by those skilled in the art. The arrangement shown in Figs. 5 and 6 is chiefly intended to serve the purpose last mentioned.

From the foregoing it will be understood that the intervals between the contacts in a series are entirely dependent on the retarding device and can be varied by latering the wings of the fly. The retarding device may consist of a piston connected with the arm 26 and working in a cylinder in a well-known manner instead of the fly shown in the drawings. Owing to the fact that the paths of the contact-pieces in the arrangement shown in Figs. 1 to 4 as well as in the arrangement shown in Figs. 5 and 6 intersect, the said pieces will slide one on the other during their movement. The upper contact-piece (arm 24) being at the same time pressed against the lower one, the contact-surfaces are kept free from oxid, dust, and the like. This is an advantage and insures perfect operation of the device.

The simple construction of the contact device described above insures perfect and reliable operation of the clocks. Another advantage of the device consists in the fact that the time mechanism and the electromagnet, with its armature, are mounted in different frames. Through this arrangement the time mechanism may be taken out of the casing for cleaning, repairing, or the like after the screws 16 are loosened. When the time mechanism is to be mounted again in the casing, no special electric connections need be effected, as the only connection necessary is effected automatically through the contact between the two frames. Consequently the said cleaning, &c., can be made independent of the electromagnet, which is of importance, as it is to be supposed that the clocks may be handled by clockmakers not acquainted with electric devices.

In the practical execution of the invention the arrangements shown in the drawings may be modified in many respects without exceeding the limits of the invention defined in the claims.

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

1. In a contact device for electric clocks, the combination of an electromagnet, its armature, a swinging contact-piece forming one of the terminals of the circuit of said magnet and swung by said armature, a second arm-like contact-piece forming the other terminal of the magnet-circuit, said second contact-piece being actuated in one direction by the first-named contact-piece and provided with a non-conducting piece for breaking the circuit, and retarding means connected with the said second contact-piece to prevent it from following the other contact-piece when the circuit is broken, substantially as set forth.

2. In a contact device for electric clocks, the combination of an electromagnet, the rocking armature thereof, the armature-spring, the pin 18, forming one terminal of the circuit of said magnet, the arm carrying said pin and rocking with said armature, the swinging arm 24, forming the other terminal of said circuit, movable in the same path with the pin 18 and actuated by the latter, means for retarding the movement of the arm 24 toward said pin, and means carried by the arm 24 for breaking the electric contact between the two contacts when the contact-point is shifted by the movement, substantially as set forth.

3. In a contact device for electric clocks the combination of an electromagnet, its armature and a movable contact-piece forming an insulated terminal of the circuit of the said electromagnet, acted upon by the armature, the said parts being mounted in one frame, a second uninsulated contact-piece forming the other terminal of the circuit and movable to and fro the terminal first mentioned, and retarding means connected with the uninsulated contact-piece, the parts last mentioned being mounted in a second frame carried by the frame first mentioned, substantially as 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.