J. STEIGER & J. BESANCON.

ELECTRIC SELF WINDING CLOCK.

APPLICATION FILED FEB. 11, 1907.

931,157

Patented Aug. 17, 1909.

4 SHEETS—SHEET 1.

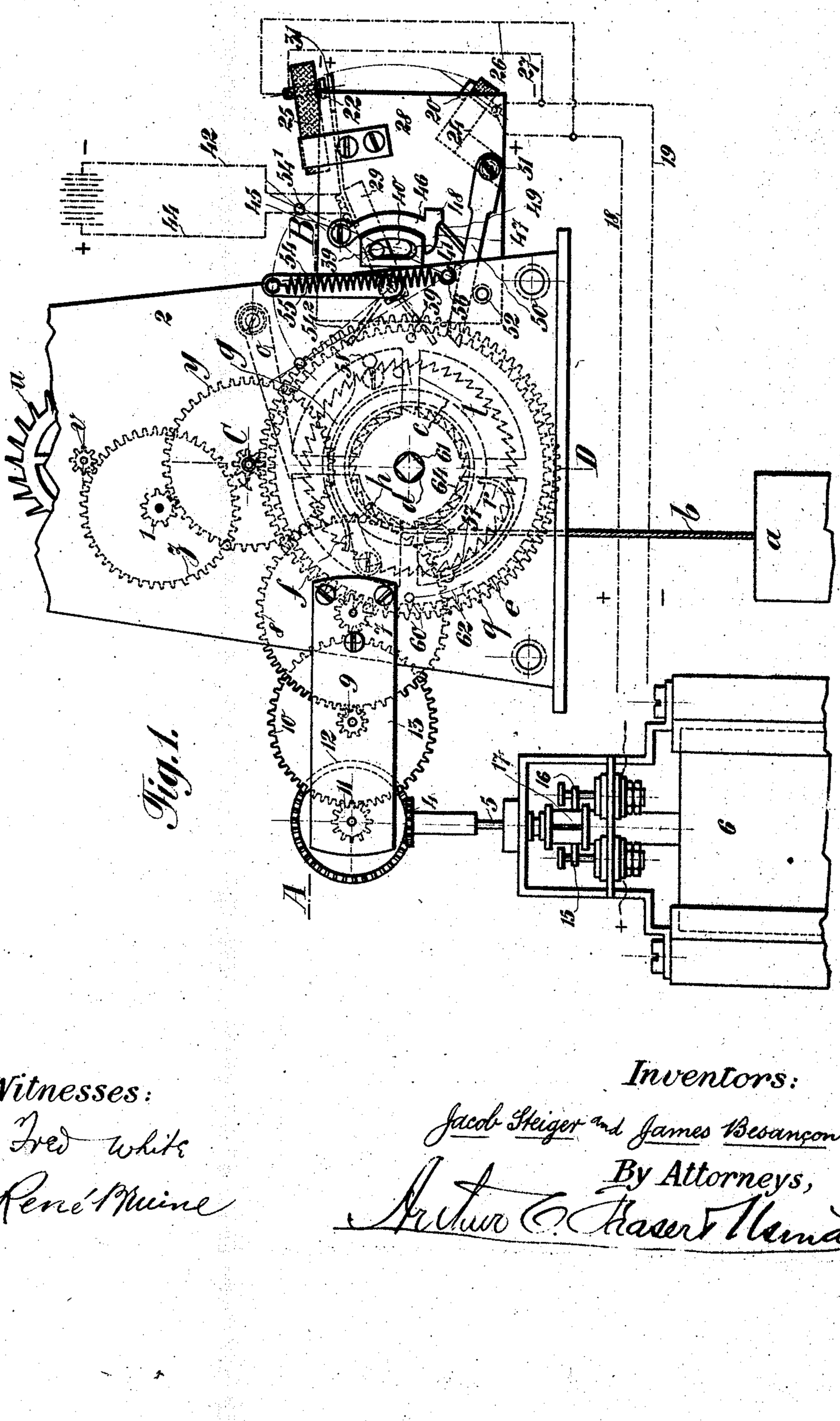

Fig. 1.

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4 SHEETS—SHEET 2.

Fig. 2.

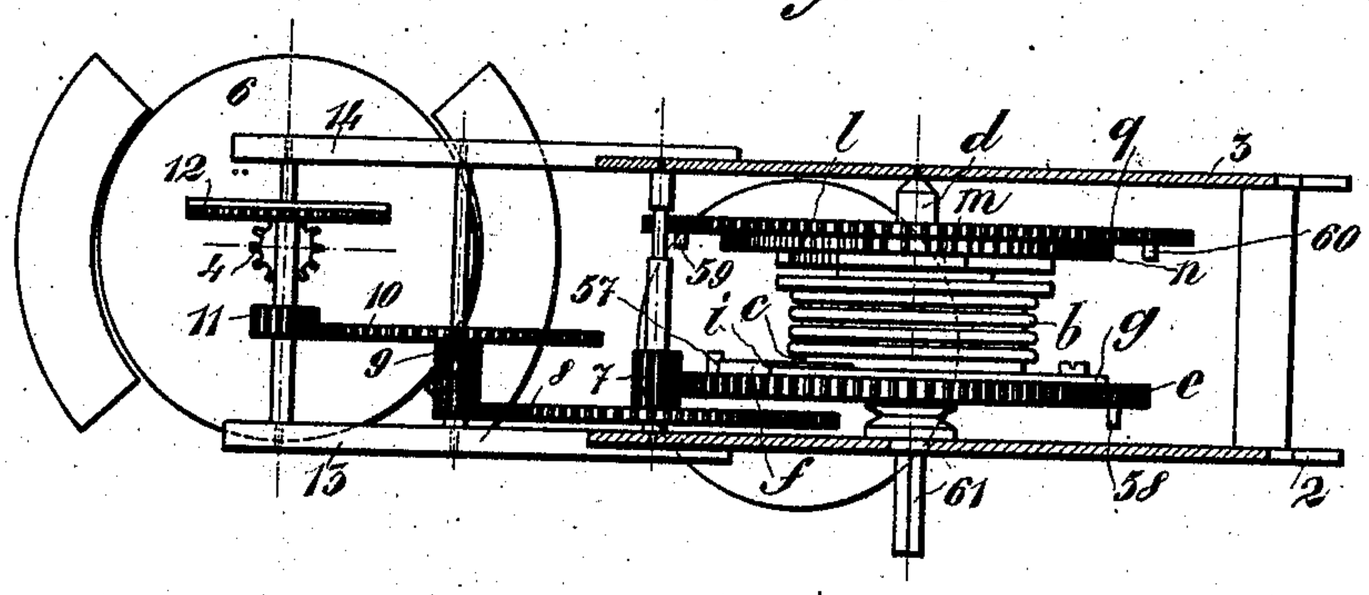


Fig. 3.

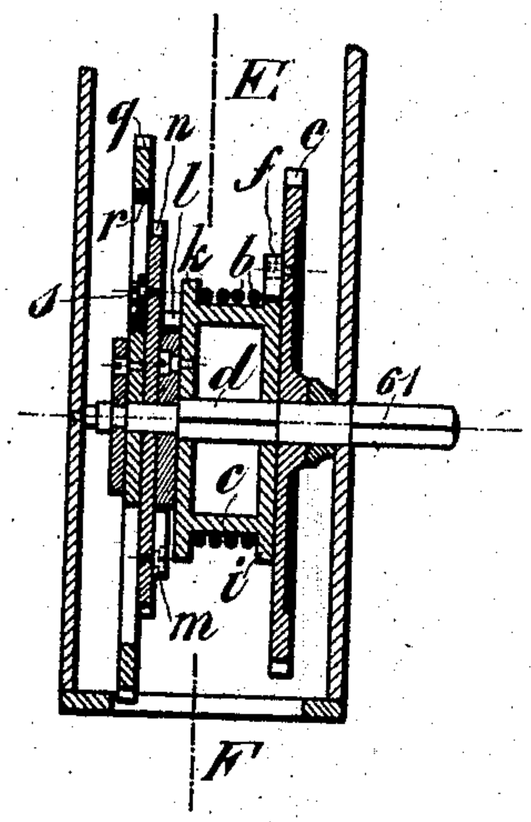
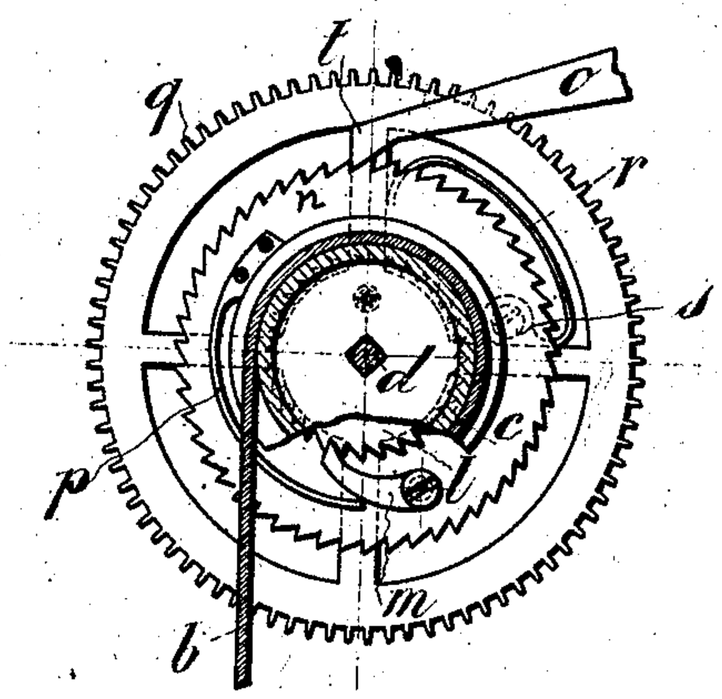


Fig. 3a



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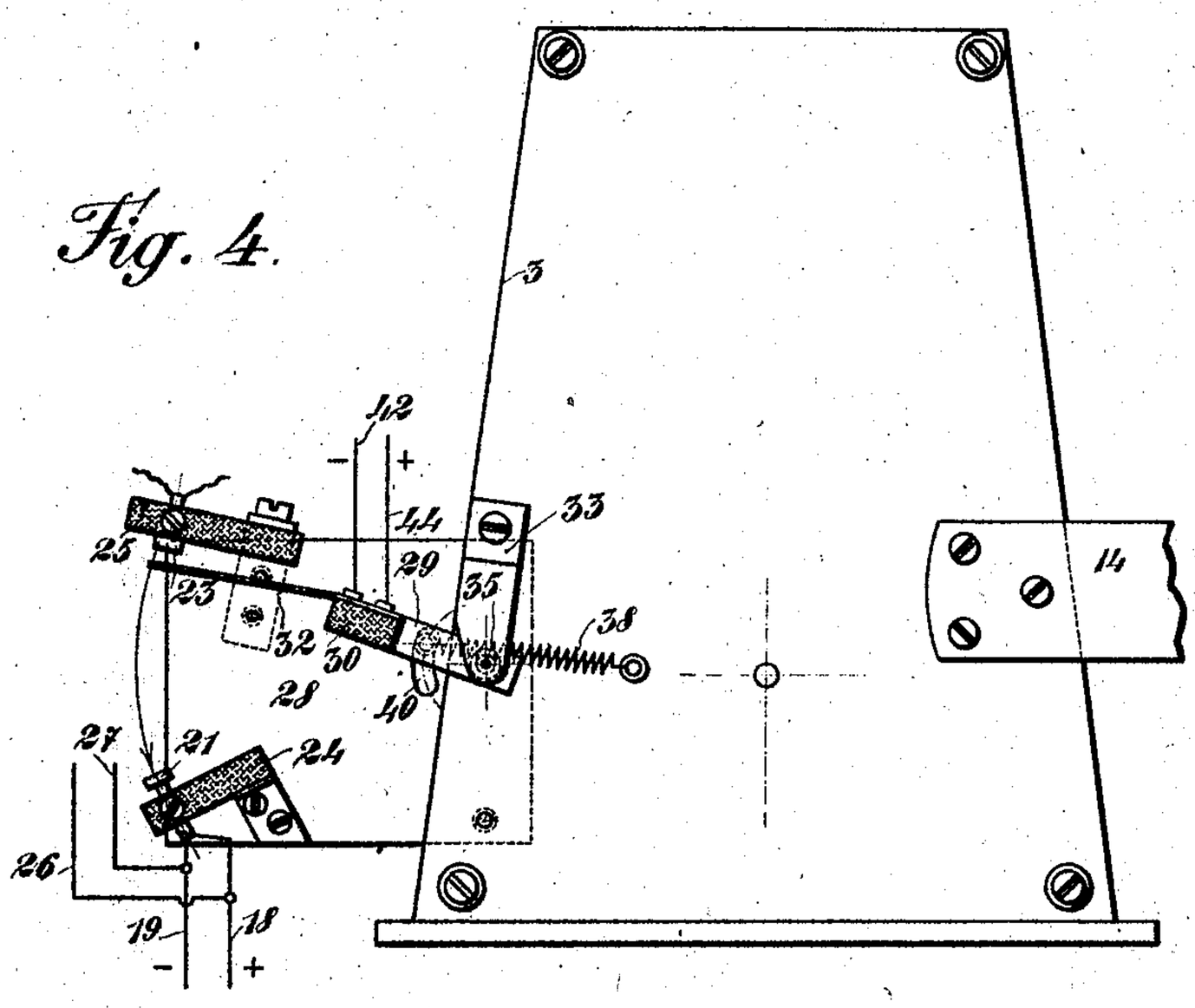
4 SHEETS—SHEET 3.

Fig. 4.



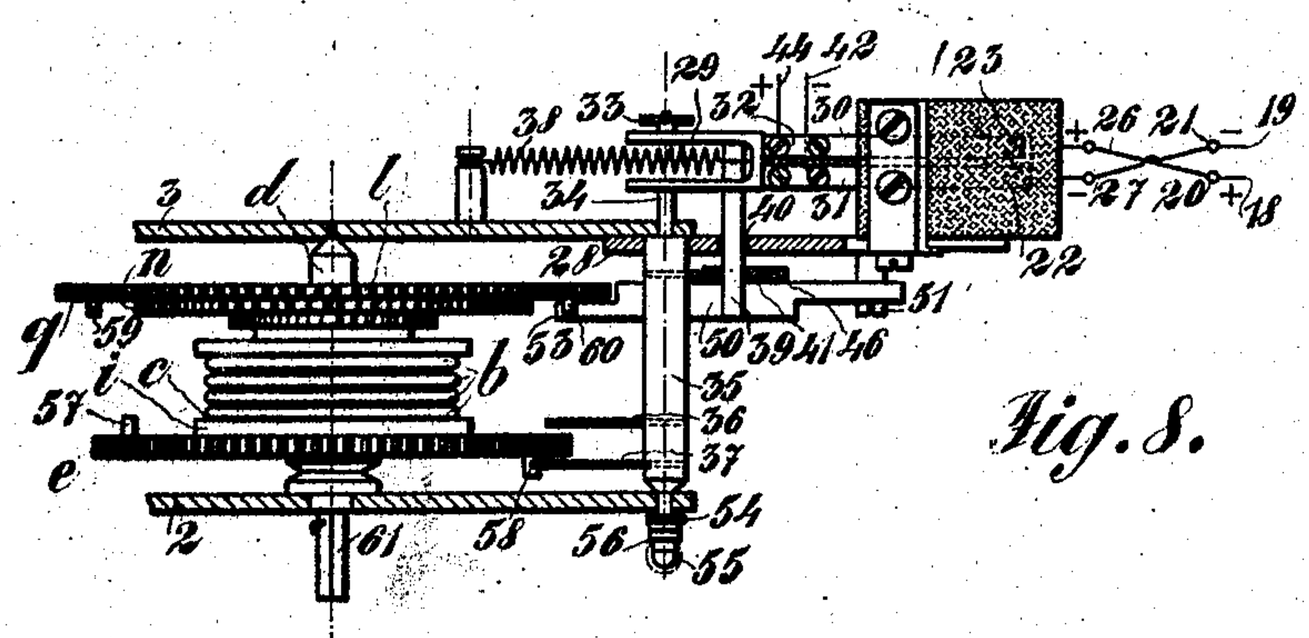


Fig. 8.

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4 SHEETS—SHEET 4.

Fig. 5.

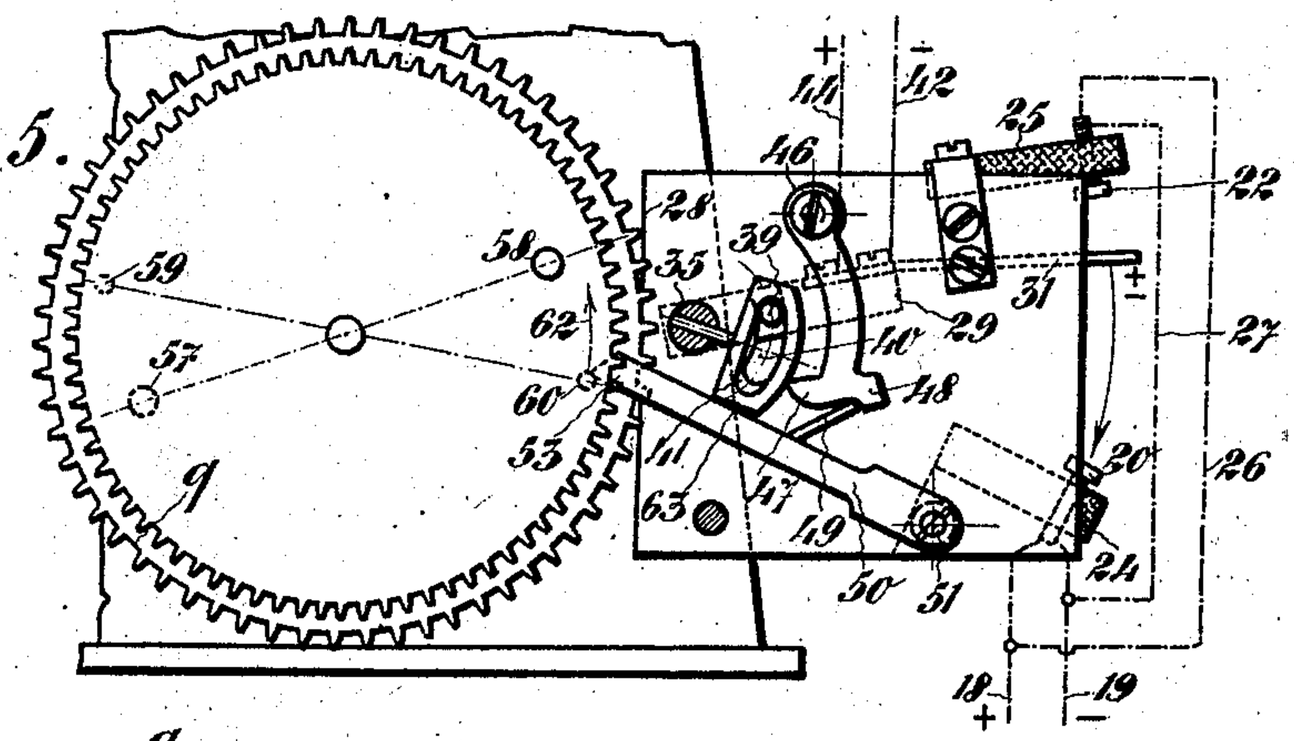


Fig. 6.

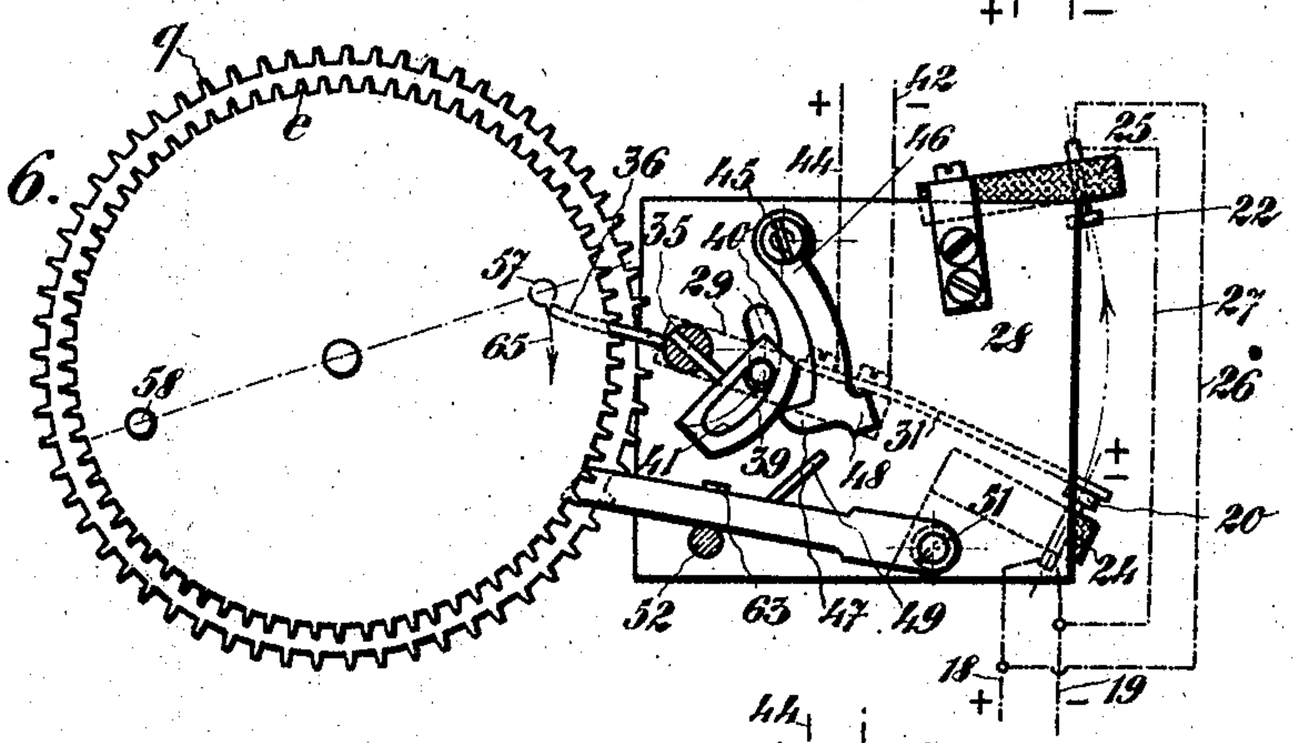
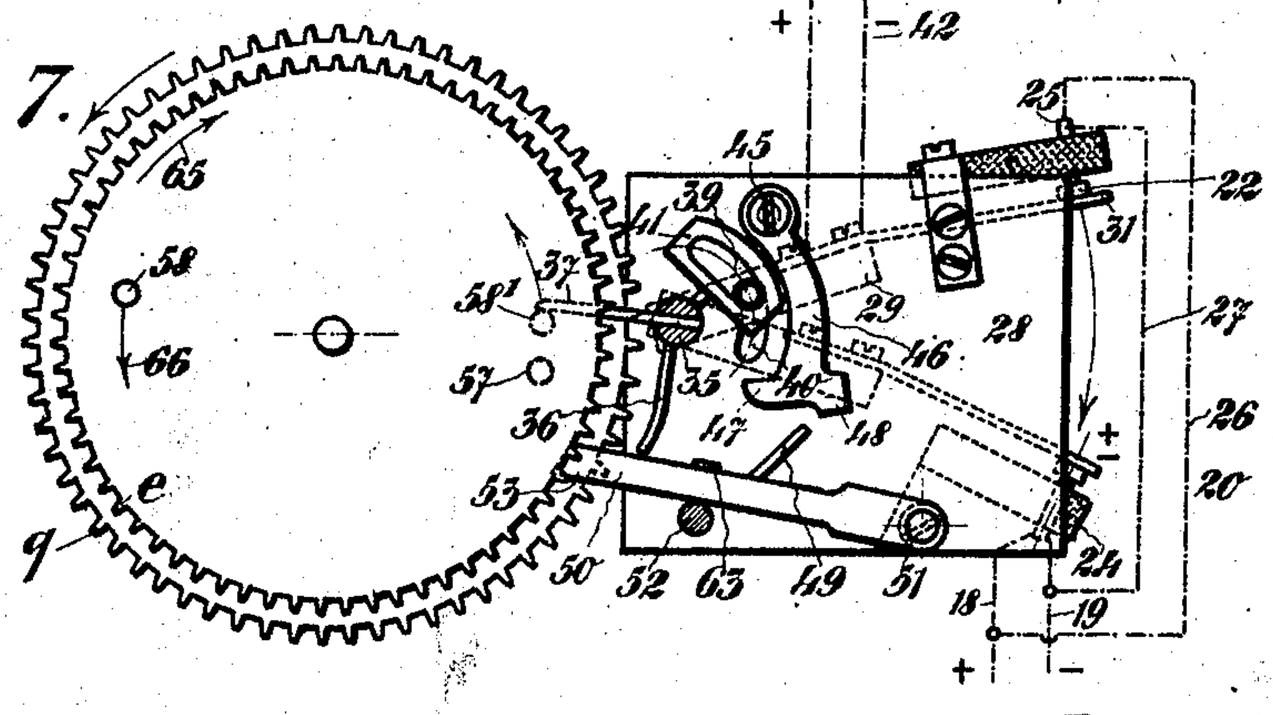


Fig. 7.



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UNITED STATES PATENT OFFICE.

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ELECTRIC SELF-WINDING CLOCK.

No. 931,157. Specification of Letters Patent. Patented Aug. 17, 1909.

Application filed February 11, 1907. Serial No. 356,849.

To all whom it may concern:

Be it known that we, JACOB STEIGER and JÄMES BESANÇON, citizens of Switzerland, residing at La Chaux-de-Fonds, Canton of Neuchâtel, Switzerland, have invented new and useful Improvements in Electric Self-Winding Clocks, of which the following is a specification.

The annexed drawing given by way of example shows an embodiment of the invention.

Figure 1 is a front elevation. Fig. 2 is a part section, following the line A—B of Fig. 1. Fig. 3 is a section following the line C—D of Fig. 1. Fig. 3ª is a section on line E—F of Fig. 3. Fig. 4 is a rear elevation, the electric motor not being shown. Figs. 5, 6 and 7 show in elevation the commutator in three different positions. Fig. 8 is a plan of the above mentioned interrupting commutator.

The driving weight *a* is suspended by the cord *b* which is wound around the drum *c* secured on the arbor *d*. In order to wind the clock, this drum is actuated by a wheel *e* by means of a click *f* pivoted on the wheel *e* and constantly tending, under the action of a spring *g* to enter a notch *h* in the end wall *i* of the drum *c*. On the other hand, this drum carries fixed against its opposite end wall *k*, a ratchet wheel *l*, which engages, when the weight *a* descends with a click *m* carried by a second ratchet wheel *n* which is loose on the arbor *d*. A safety click *o* carried by a plate of the movement engages the teeth of the ratchet *n*. A spring *p* acts on the click *m*.

Against the ratchet *n* is placed a wheel *q* loose on the arbor *d*: when the weight *a* descends this wheel is constrained to move by the ratchet *n* by means of a spring *r*, one end of which is secured to the ratchet by a screw *s*, while its other end acts against an arm *t* of the wheel *q*. This wheel actuates the clock movement, which comprises an escapement wheel *u* the pinion *v* of which is actuated by the said wheel *q* through the intermediary of pinions and wheels *x*, *y*, *z* and 1. These trains are pivoted in two plates 2 and 3.

The other members of the clockwork movement such as the motion work, hands, dial etc. are not shown in the drawing.

The wheel *e* is actuated by a pinion 4 fixed on the shaft 5 of a small electric motor 6 through the intermediary of pinions and wheels 7, 8, 9, 10, 11 and 12, the various spindles of which are pivoted in two bridges 13 and 14, secured respectively against the plates 2 and 3.

The brushes 15 and 16 in contact with the commutator 17 of the motor 6, are connected by the conductors 18 and 19 to the contact pieces 20 and 21, 22 and 23, carried by two fixed pieces 24 and 25 of insulated material: the piece 24 carries the two contacts 20 and 21 insulated and placed side by side, while the piece 25 carries the two contacts 22 and 23, similarly insulated and placed side by side.

The conductors 26 and 27 connecting the lower contacts 20 and 21 with the upper contacts 22 and 23, are crossed, as shown diagrammatically in the right hand side of Fig. 8, that is to say, the conductor 26 leading from the lower left hand contact 20 is connected to the upper right hand contact 23 while the lower right hand contact 21 is connected to the upper contact 22 at the left.

The pieces 24 and 25 are carried by a plate 28 secured against the plate 3.

A fork 29 carries a piece 30 of insulating material, on which are fixed, insulated from each other, two metal blades 31 and 32. The fork 29 is at one end pivoted in a bridge 33 screwed on the plate 3, and at the other end, loose on the end 34 of the arbor 35 carrying two arms 36 and 37.

A helical spring 38 is secured, on one hand, to the plate 3 and on the other hand, to a bar 39 which is secured to the fork 29, this bar traverses the plate 28, through an elongated opening 40 in this plate, and is engaged in a slide 41 solid with the arbor 35.

The position of the spring 38 relative to the fork is such that it tends always to maintain the blades 31 and 32 in contact either with the upper contacts 22 and 23 or with the lower contacts 20 and 21 according as the fork receives from the bar 39 and the slide 41 a certain impulse upwardly or downwardly.

The blade 31 is connected by a flexible conductor 42 to the negative pole of the source of electricity 45, while the blade 32 is connected by a flexible conductor 44 to the positive pole of this source. Thus, when the blades 31, 32 are not in contact with any of the contacts 20 to 23, no current reaches the motor and this is stopped. Inversely, if these blades are in contact with the lower contacts 20 and 21 the current from 43 will cause the motor 6 to rotate in one direction, and if these blades are in contact with the

upper contacts 22 and 23 the motor will rotate in the opposite direction.

On the plate 28, above the opening 40, is pivoted at 45 a dog 46 which tends to rest freely suspended by its own weight (Fig. 7) and which terminates toward the bottom at one side in a beak or nose 47 and at the other in a heel 48 against which may abut a finger 49 secured to an arm 50: this arm is pivoted at 51 on the plate 28, and tends to rest by its own weight on a stop 52 and terminates, near the wheel *q*, in a beak 53.

At the end of the arbor 35 opposite 34 is secured an arm 54, to the upper part of which is secured a helical spring 55 which is itself secured at 56 to the plate 2 in such manner that the axis is slightly inclined to the right. The slide 41 rests on the beak 47 of the dog 46 (Fig. 1): when the arbor oscillates through a sufficient angle in one direction or the other, it is powerfully pulled by this spring in the direction corresponding to the oscillation of the said arbor and thus may occupy either the position 54^1 or the position 54^2. This oscillatory movement of the arbor 35 is produced by the pins 57 and 58 fixed one on each side of the wheel *e* on the same diametrical line of this wheel. The arm 50 is actuated by two pins 59 and 60 secured on the same side of the wheel *q* and on the same diametrical line of this wheel.

The shaft *d* of the drum *c* is provided with an extension 61 of square section permitting of the application of a key for winding, when required, the weight *a*, for example at the time of first starting of the movement of the clockwork: this movement, in the example shown, gives to the wheel *q* one revolution in 16 hours.

The weight *a* being once wound up as above stated, and the clockwork movement starting by reason of the wheel *q* the members of the winding up device occupy the position shown in Figs. 1 and 4, no current passing to the motor.

The wheel *q* during the working of the clockwork movement rotates in the direction of the arrow 62 (Figs. 1 and 5) and in the course of the eighth hour of working the pin 60 lifts the arm 50 by its beak 53: the finger 49 of this arm then abuts against the heel 48 of the dog 46 and causes the same to oscillate, the beak 47 of which ceases to support the slide 41, which rests at 63 on the arm 50 (Fig. 5). At the moment when the pin 60 ceases to support the arm 50, this falls quickly on its stop 52, (Fig. 6) ceasing to support the slide 41, which moves the bar 39, oscillating the fork 29 and the arbor 35, which immediately puts the blades 31 and 32 in contact with the contacts 20 and 21, the arm 54 occupying the position 54^1 (Fig. 1). Immediately the current from the source 43 actuates the motor 6 which begins to rotate actuating the drum *c* in the direction of the arrow 65 (Fig. 6) until the moment when the pin 57 acts on the arm 36 of the arbor 35. During the winding period the continuation of the working of the clockwork movement is insured by the driving spring *r* (Figs. 1, 3 and 3^a) which has been tensioned by the action of the weight *a*.

When the pin 57 comes into the position in Fig. 7 the oscillatory movement produced on the arbor 35 is sufficient to cause the arm 54 to be quickly drawn back by its spring 55 and to occupy the position 54^2: during this rapid movement the lower part of the slide 41 operates on the bar 39 and produces the immediate contact of the blades 31 and 32 with the upper contacts 22 and 23 (Fig. 7) sending to the motor 6 the current from 43 in the opposite direction to the preceding. The motor then rotates the wheel *e* in the direction of the arrow 66 (Fig. 7): the weight *a* recommences to actuate the clockwork movement as soon as the click *f* is disengaged from the notch *h* of the drum. During this rearward movement of the wheel *l*, the pin 58 describes a half revolution with this wheel until the moment when, supporting the arm 37, this pin causes the arbor 35 to oscillate, causing the return of the arm 54 and the fork 29 to their first position (Figs. 1 and 4) corresponding to the interruption of the current. The clockwork movement operates thus under the action of the driving weight *a* during a period of eight hours, at the expiration of which the click *f* enters anew the notch *h* of the drum *c* while the pin 59 of the wheel *q* meets the beak 53 of the arm 50 and brings about the same operations as above described, causing the rewinding of the driving weight *a* by a semi-rotation of the drum *c*.

Having now described our invention we declare as new and wish to secure by Letters Patent.

1. A clock including an electric motor for automatically winding the same, a winding wheel *e*, a driven wheel *q*, means actuated by the driven wheel *q* for establishing a circuit through the motor and causing the forward movement of the winding wheel, and means controlled by the winding wheel for reversing the circuit and the direction of rotation of the motor at the end of a winding operation, the winding drum of the clock having a notch *h*, and the winding wheel having a click *f* adapted to engage said notch in order to transmit a winding movement to the drum.

2. A clock including an electric motor for automatically winding the same, a winding wheel *e*, a driven wheel *q*, a contact device adapted when moved to one position to cause a rotation of the motor in one direction and when moved to another position to cause a rotation of the motor in the opposite direction, a spring tending to throw said contact device in one or the other extreme position, a dog 46 for holding it in an interme-

diate position in which the circuit is broken, an arm 50 adapted to withdraw said dog 46 and to be operated by said driven wheel to release said contact device, and an arm 36 connected to said contact device and adapted to be actuated by the winding wheel *e*.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

JACOB STEIGER.
JÄMES BESANÇON.

Witnesses:
C. DUBOIS,
T. RICHARD.