(No Model.) 2 Sheets—Sheet 1.

E. KLAHN.

SELF WINDING ELECTRIC CLOCK.

No. 491,945. Patented Feb. 14, 1893.

Fig: 1.

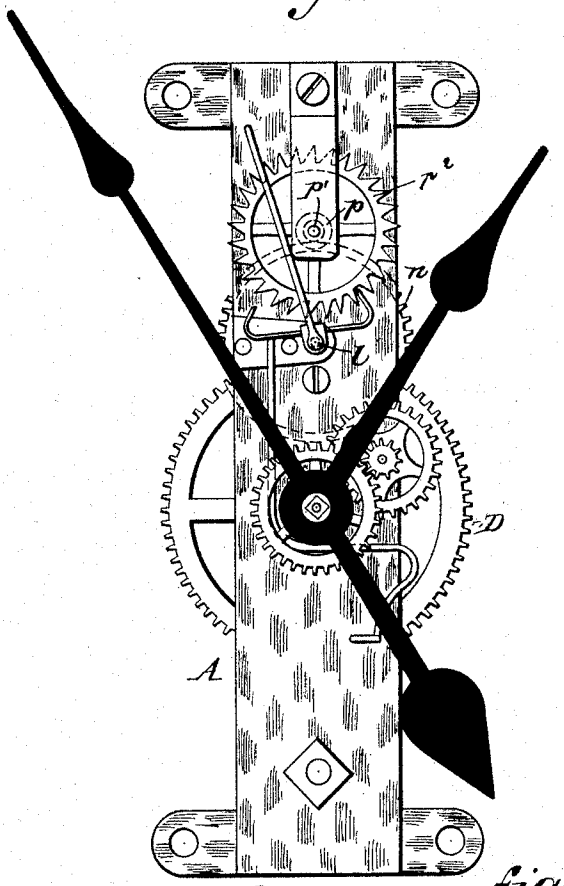


Fig: 2.

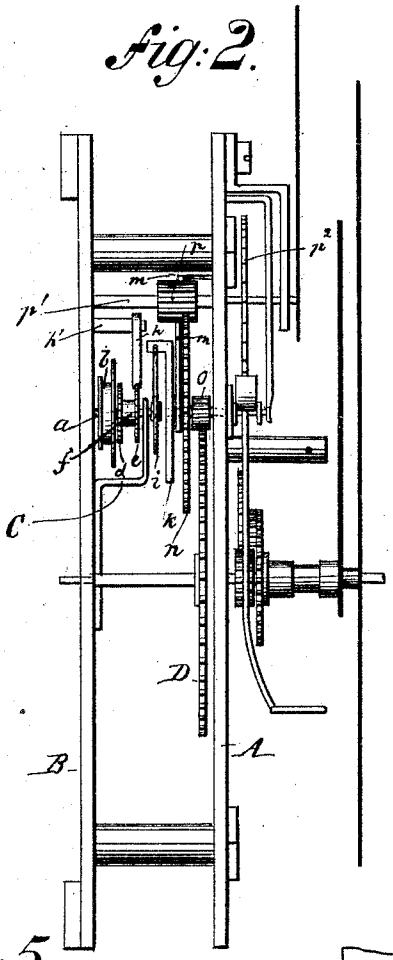


Fig: 3.

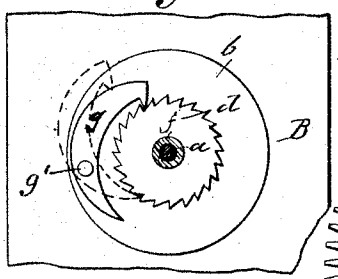


Fig: 5.

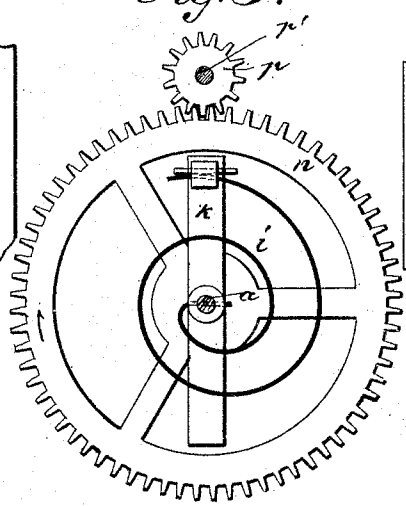
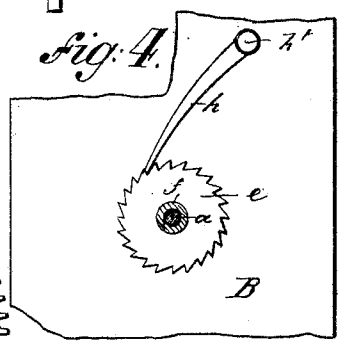


Fig: 4.



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(No Model.) 2 Sheets—Sheet 2.

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SELF WINDING ELECTRIC CLOCK.

No. 491,945. Patented Feb. 14, 1893.

Fig. 6

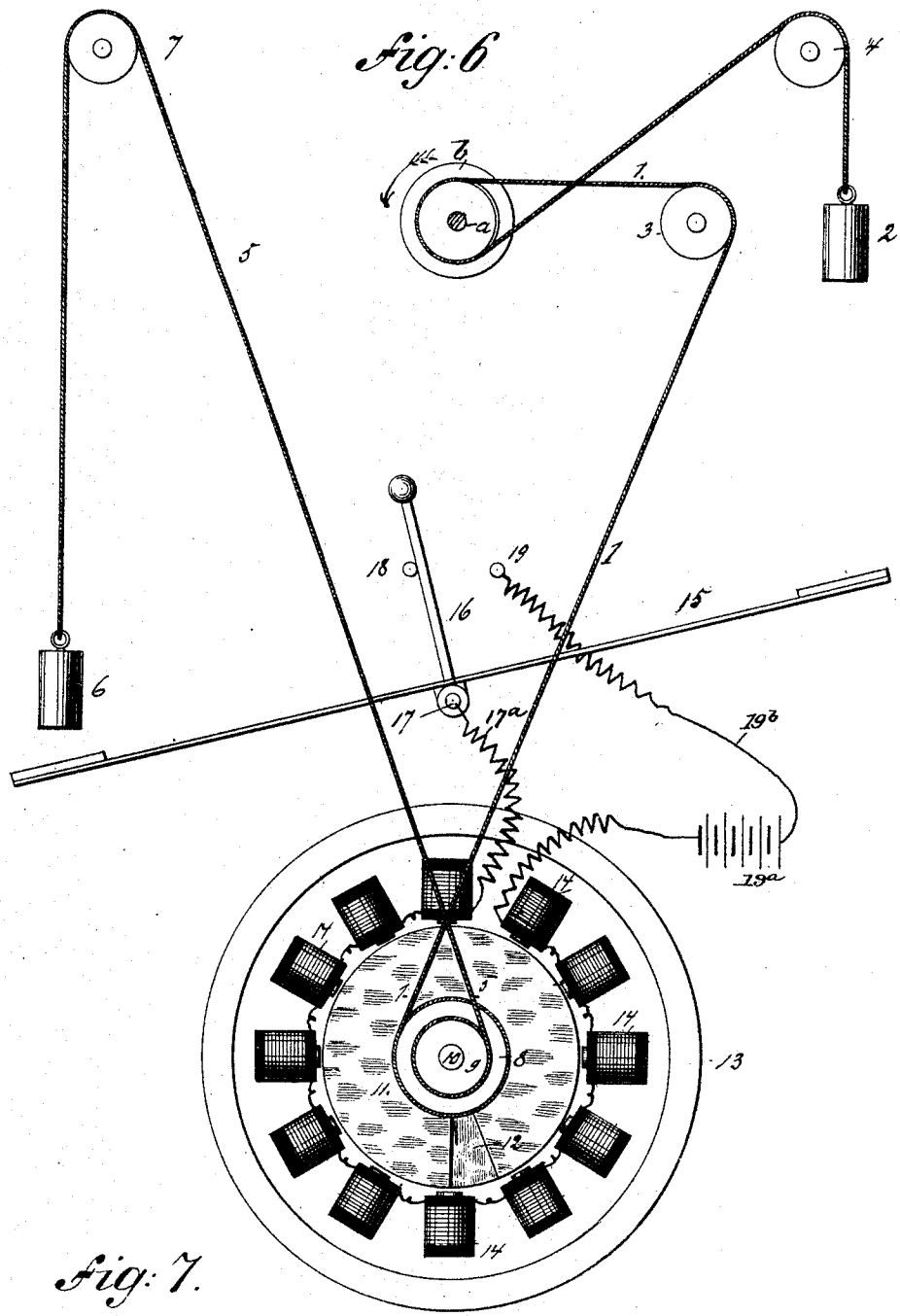
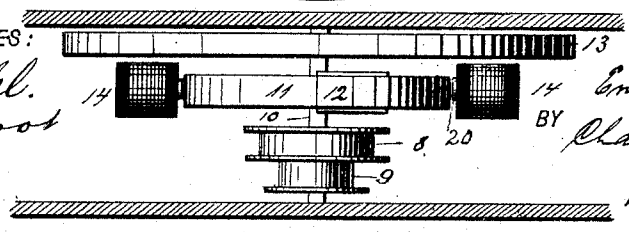


Fig. 7.



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UNITED STATES PATENT OFFICE.

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SELF-WINDING ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 491,945, dated February 14, 1893.

Application filed February 17, 1892. Serial No. 421,891. (No model.)

To all whom it may concern:

Be it known that I, EMIL KLAHN, a citizen of the United States, and a resident of West Hoboken, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Self-Winding Clocks, of which the following is a specification.

My invention relates to an improved self-winding clock, the object of the invention being to provide a novel form of winding apparatus which shall be operated upon the closure of an electric circuit and a further object is to provide a simple and efficient connecting device between the clock train and power roller, whereby all side pressure is avoided.

With these objects in view the invention consists in the detailed construction of the various parts and their novel combination or arrangement all of which will be fully described hereinafter and pointed out in the claims.

In the drawings forming a part of this specification, Figure 1 is a front view of the clock mechanism. Fig. 2 is a side view of the same. Figs. 3 and 4 are detail views of the pawls and ratchets employed in the mechanism. Fig. 5 is a detail view of the connection between the power shaft and clock train. Fig. 6 is a face view of the winding mechanism, and Fig. 7 is a top-plan view of the motor or shaft.

In carrying out my invention I employ the front and rear plates A and B respectively between which is fitted the clock mechanism. This mechanism is divided preferably into the power mechanism in the back and the usual clock train in the front said parts being connected by a novel construction hereinafter explained. An arbor *a* is journaled between the rear plate B and a bridge piece C secured to rear plate, said arbor projecting through the bridge piece as clearly shown. A winding roller *b* is loosely mounted upon the arbor *a* adjacent to the rear plate, and between the said roller and bridge piece is rigidly mounted a sleeve *f*, carrying the ratchet wheels *d* and *e*. A crescent shaped pawl *g* (Fig. 3) is pivoted to the front face of the winding roll by a pivot *g'* and is formed with a nose on one end, while the other end is pointed in such a manner that the teeth of the ratchet wheel can be engaged by either end of the pawl; the second ratchet wheel *e* is engaged by the pawl *h* swinging on the pin *h'* secured to the rear plate. A coiled spring *i* (Fig. 5) is fastened at its inner end to the front of the arbor *a*, projecting through the bridge piece while its outer, forward, end is connected to one end of a lever *k* which is keyed on the arbor *l*, journaled in the front plate A and a bridge piece *m*, secured to the front plate. The arbor *l* has the gear wheel *n* and pinion *o* rigidly mounted thereon, said wheel and pinion forming parts of the clock train, and it will be observed that by connecting the power mechanism at the back, with the train mechanism at the front, by means of the coiled spring *k* instead of having a straight shaft, all side pressure is relieved, and the movements of the power and clock trains greatly facilitated. The gear wheel *n* meshes with a pinion *p* mounted on the arbor *p'* of the escapement wheel p^2, which latter drives the pendulum in the usual manner, by the common verge or fork as clearly shown in Figs. 1 and 2. The pinion *o*, meshes with the center wheel D, by means of which, motion is transmitted to the hand work in the ordinary manner as indicated by Figs. 1 and 2. The movement thus constructed will run down in a comparatively short time, say two hours, and I therefore construct a special winding mechanism by which the movement will be automatically wound up as soon as the driving weight reaches its lowest point. This mechanism is shown in detail in Figs. 6 and 7 and consists of a cord 1 which carries the driving weight 2, at one end, while its other end is wound upon a roller, 8 mounted upon a shaft 10, journaled in the lower portion of the clock case. The cord 1 passes over the winding roller *b* and drives the same, said cord being also passed over idler rollers 3 and 4 to prevent contact with the movements and to throw the weight to one side of the case. A second weight 6, which acts as a counterbalance is attached to one end of a

cord 5, while the other end of said cord is wound upon a roller 9, which is also mounted upon the shaft 10. This shaft carries also a fly-wheel 13, and an insulator disk 11, having a single piece of soft iron 12, arranged in its periphery.

Around the disk 12, is arranged a series of electric magnets 14 which are fastened in the case in any suitable manner, and constitute, with the disk an electric motor, said magnets being connected with each other in the usual way, and with a battery by means hereinafter explained. A metal lever 15 is fulcrumed upon the pin 17, and is provided with a central upright metal arm 16 which is adapted to contact with the points 18 and 19, the latter point being connected with the battery 19^a by means of a wire 19^b. Each magnet is provided with the usual central core 20. The fulcrum 17 is electrically connected with the motor in any suitable manner by the wire 17^a so that when the lever 15 swings to bring the arm 16 in contact with the point 19 the circuit will be closed, revolving the disk 11 and shaft 12 and winding the cord 1 upon the roller 8 while the cord 5 is unwound from the roller 9. By this means the power is transmitted to the winding roller *b* and the mechanism automatically wound up.

In operation as the weight 2 descends by gravity the roller *b* will be turned as indicated by the arrow in Fig. 6 and at the same time the ratchet wheels *d* and *e* in consequence of the engagement of the pawl *g* with the wheel *d*. The spring *i* being secured to the end of arbor will be wound up as the arbor revolves, and the tension of the spring will cause the lever *k* to which it is fastened to revolve. This revolution of the lever *k* operates the arbor *l* and the pinions *o*, and *p* are accordingly revolved, which latter operates the pendulum, while the former operates the hand work. In this way the clock will run until the driving weight reaches the end of the lever 15. This weight then operates to reverse the position of said lever and by bringing the arm 16, in contact with the point 19, the electric circuit is closed, and the motor operated, winding up the weight 2, to its position and allowing the weight 6 to descend. The power of the spring *i* is not entirely exhausted so that the escapement is operated, during the operation of winding so that there is no stop or loss on account of the operation of winding. Immediately after the driving weight is wound up entirely the spring receives its lost tension again and is kept in this tension until the weight 2 is wound up again.

In order to render the winding up action noiseless and with the employment of the least power, I have constructed the pawl and ratchet wheel mechanism illustrated in Fig. 3. While the driving weight 2 is wound up the disk *b* with the pawl *g* turns from the left to the right hand side and as the end of the pawl with the nose is heavier than the pointed end of the same, the heavier end will drop from the teeth of the ratchet wheel, and the pointed end of the pawl engages at once the teeth of the said ratchet wheel so that the ratchet wheel is always kept in contact with the said pawl. At the moment the weight 2 is wound up the inner end of the spring *i* on the arbor *a* is kept in its position by the pawl *h* pressing on the ratchet wheel *e*, thus preventing the same and the arbor *a* from turning back. At the same time when the driving weights are almost wound up, the counter weight 6 will reach the corresponding end of the fulcrumed lever 15, thus causing the same to change its position and the arm 16 to leave the switch-pin 19. In this movement the electric current is broken. The swinging motion of the fly-wheel 13 on the shaft of the rollers 8 and 9 to which the cords of the weights are fastened, will not be stopped immediately with the breaking of the current, but will turn the said fly-wheel a few revolutions farther so that the counterweight is enabled to press the fulcrumed lever into its position as shown in the drawings. This automatic winding is repeated each time the weight 2 descends its full course, and as the battery is only used for a very short time at each operation, the clock can be run a very long time without attending to the batteries.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. In a self-winding clock the combination with a clock mechanism, of a winding roller connected therewith, the driving weight and cord, a counterbalancing weight and cord a shaft upon which said cords wind in opposite directions, an electric motor for revolving said shaft, and a vibrating lever carrying a contact arm adapted to make and break the current, to revolve or stop the shaft substantially as shown and described.

2. In a self-winding clock the combination of the winding roller carrying the driving weight by its cord, a secondary roller 7 carrying a counterweight in the same manner, rollers 8 and 9 to which the cords of the respective weights are fastened, a disk 11 of nonconducting material having a contact-piece 12 and rotating simultaneously with the said rollers 8 and 9, electro-magnets arranged around the said disk 11, and a switch arrangement by which the electric connection between the contact piece of the disk and the electro-magnets is established or broken, whereby the disk and the rollers 8 and 9 are rotated or stopped to wind the clock, substantially as set forth.

3. In a self-winding clock a driving weight and a counter-weight guided by their cords over corresponding rollers, in combination with a fulcrumed lever, having an upright

arm arranged in such a manner, that by the falling of the respective weights the lever is swung and the said upright arm comes in contact with or is removed from a switch-pin, whereby the electric circuit, to set the winding mechanism in operation, is established or broken, substantially as set forth.

Signed at New York, in the county of New York and State of New York, this 11th day of February, A. D. 1892.

EMIL KLAHN.

Witnesses:
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