

No. 618,670.

Patented Jan. 31. 1899.

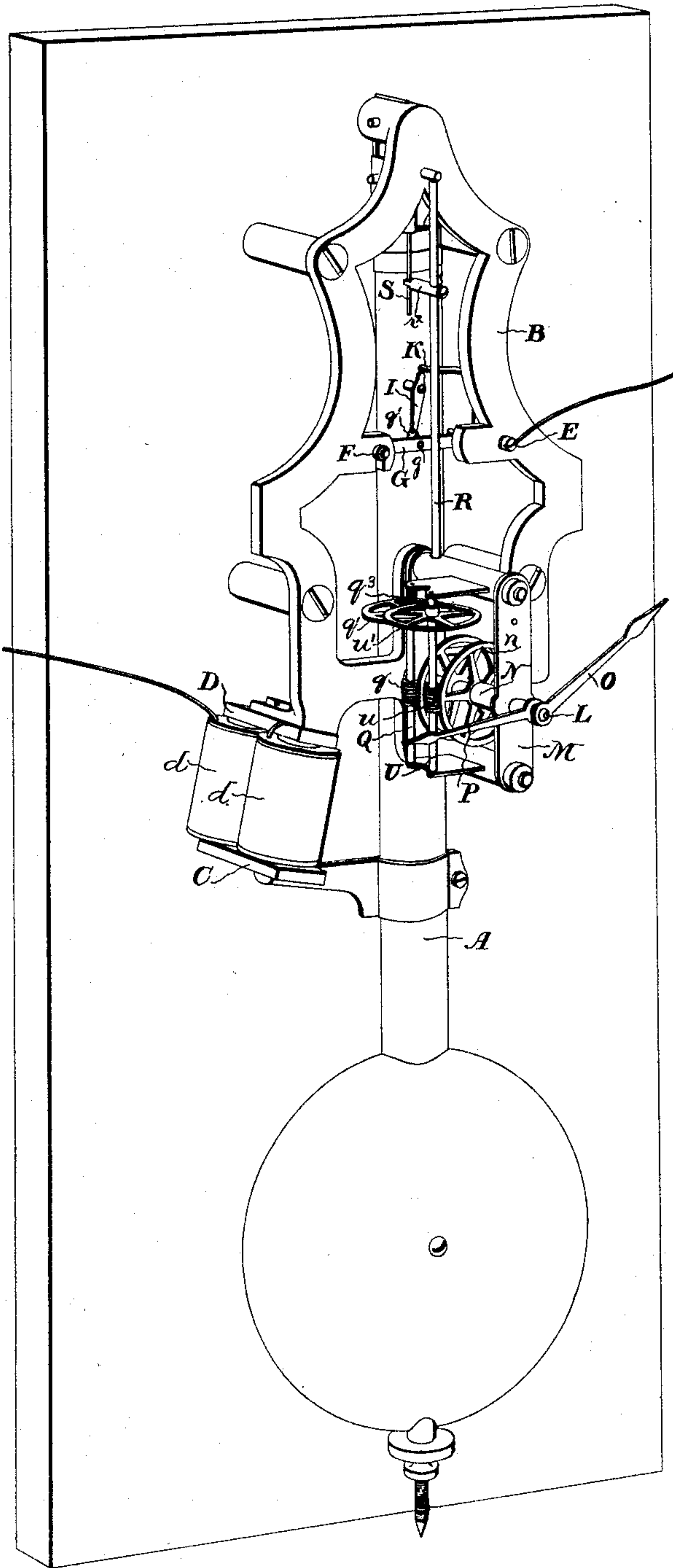
W. W. HASTINGS.
ELECTRIC CLOCK.

(Application filed Nov. 24, 1897.)

(No Model.)

3 Sheets—Sheet 1.

Fig. 1.



Witnesses:
Frank P. Prindle.
Henry L. Hazard.

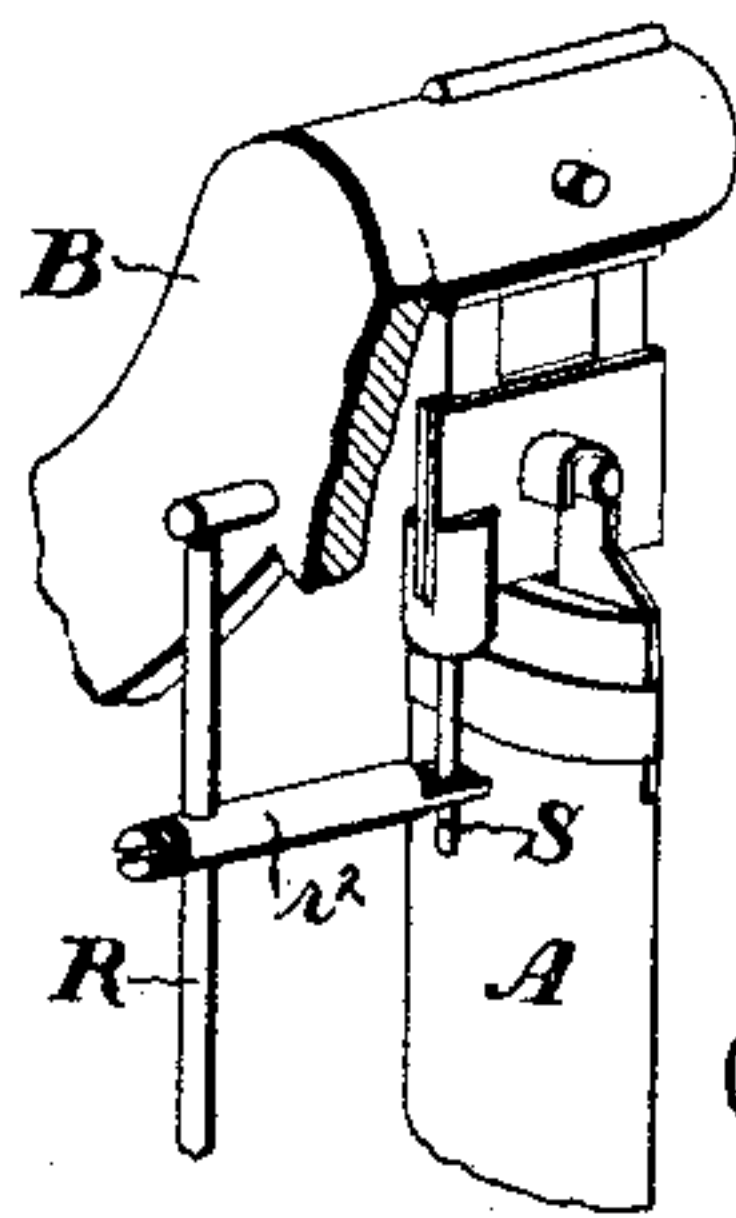
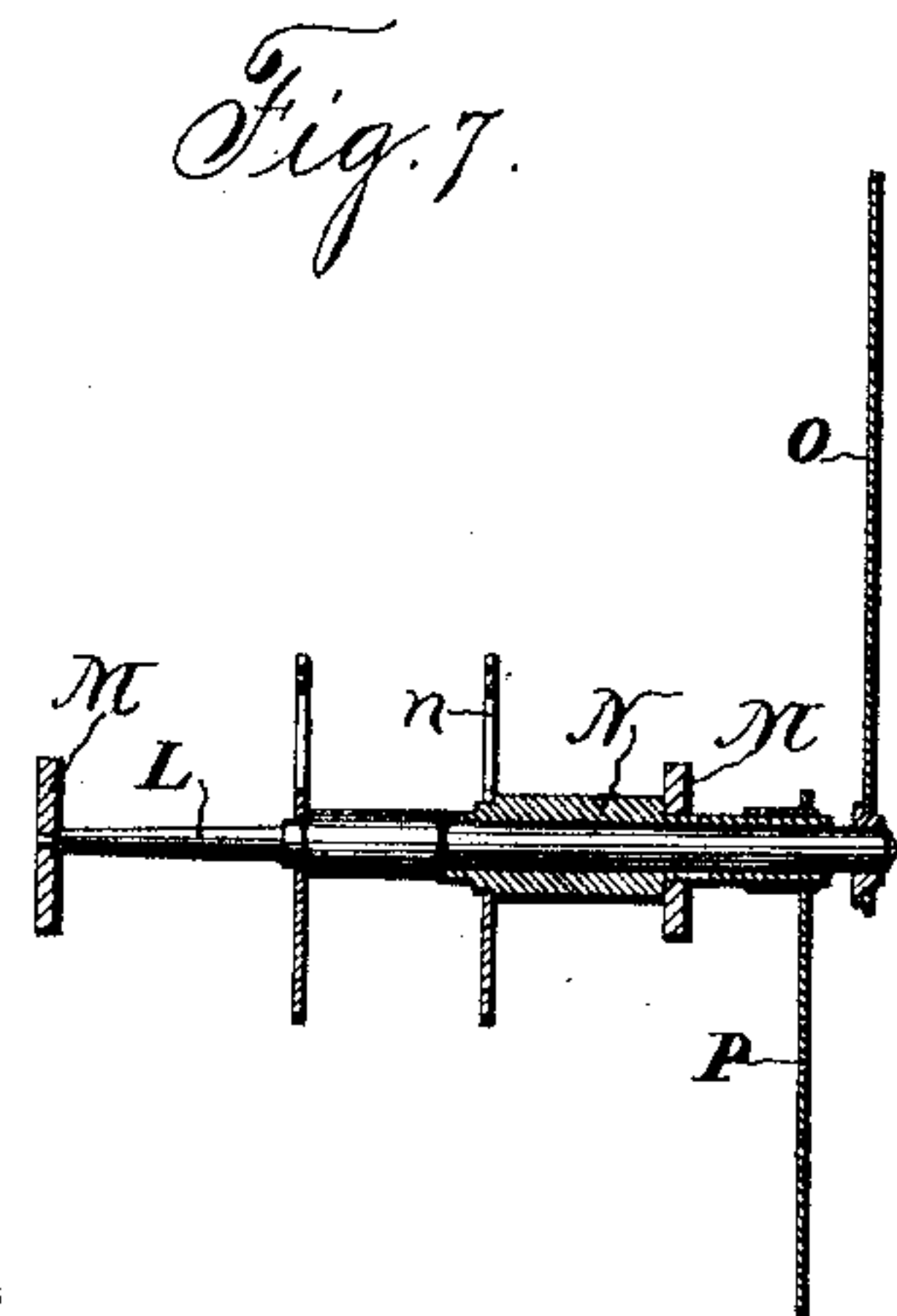
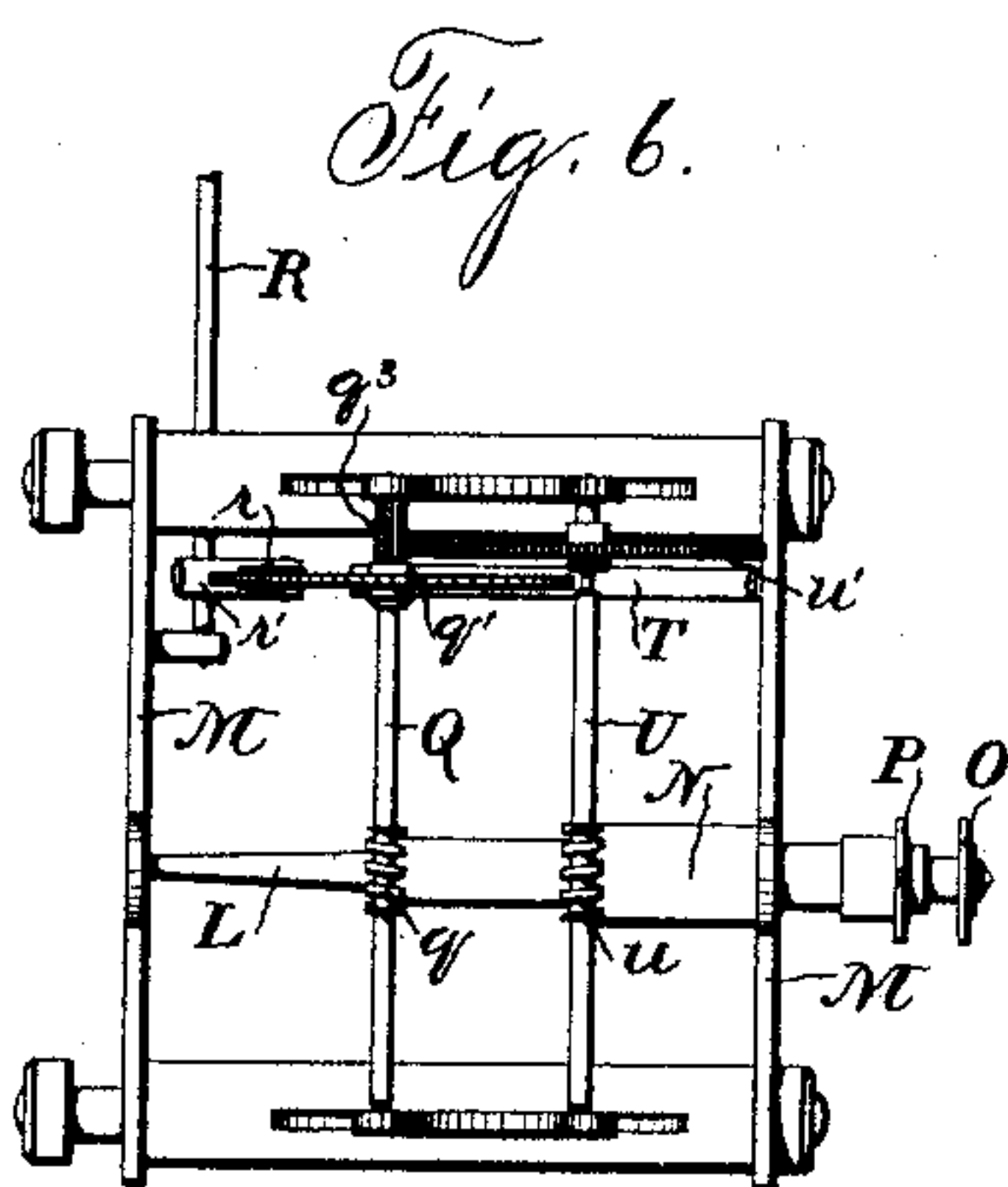
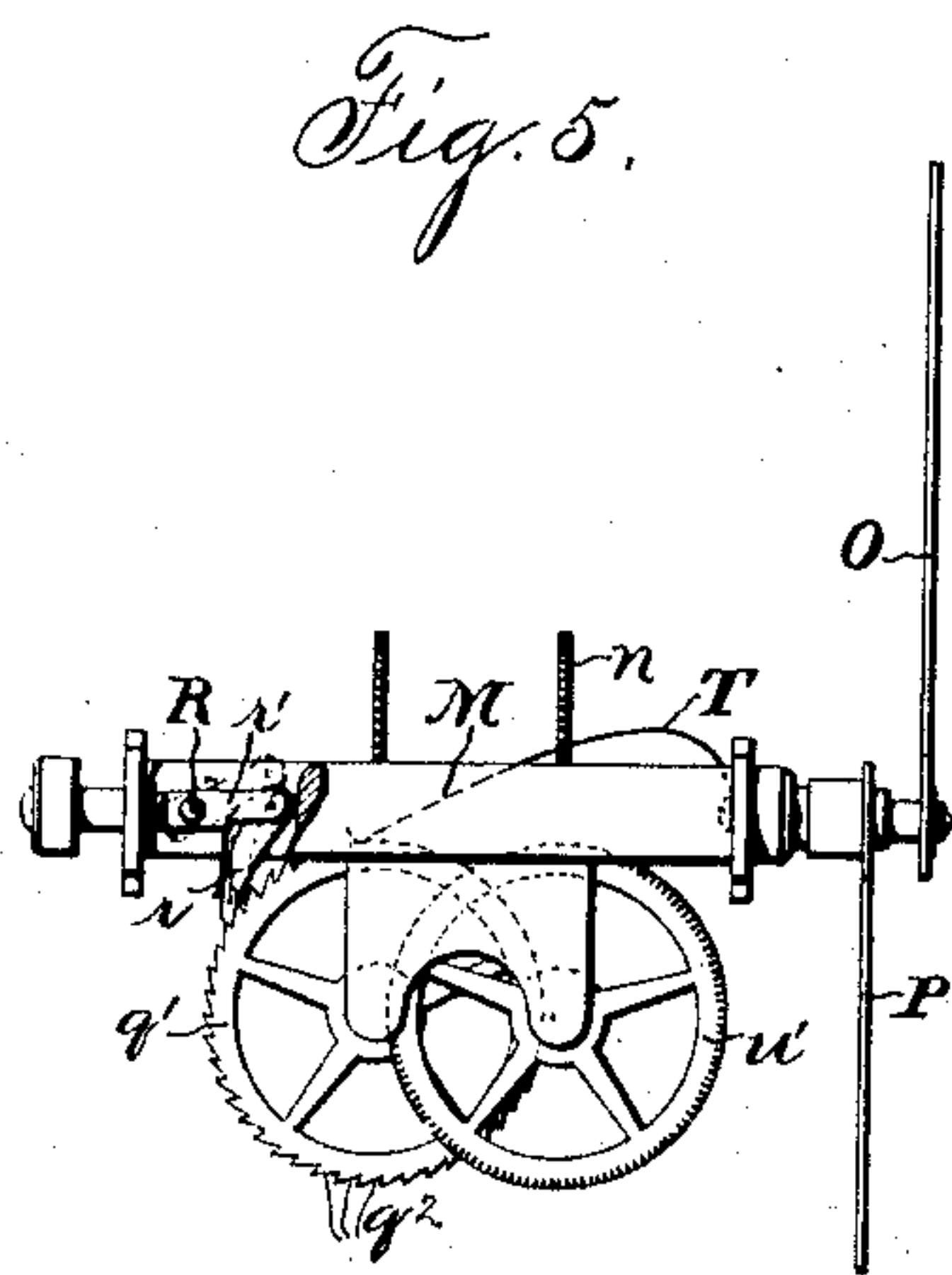
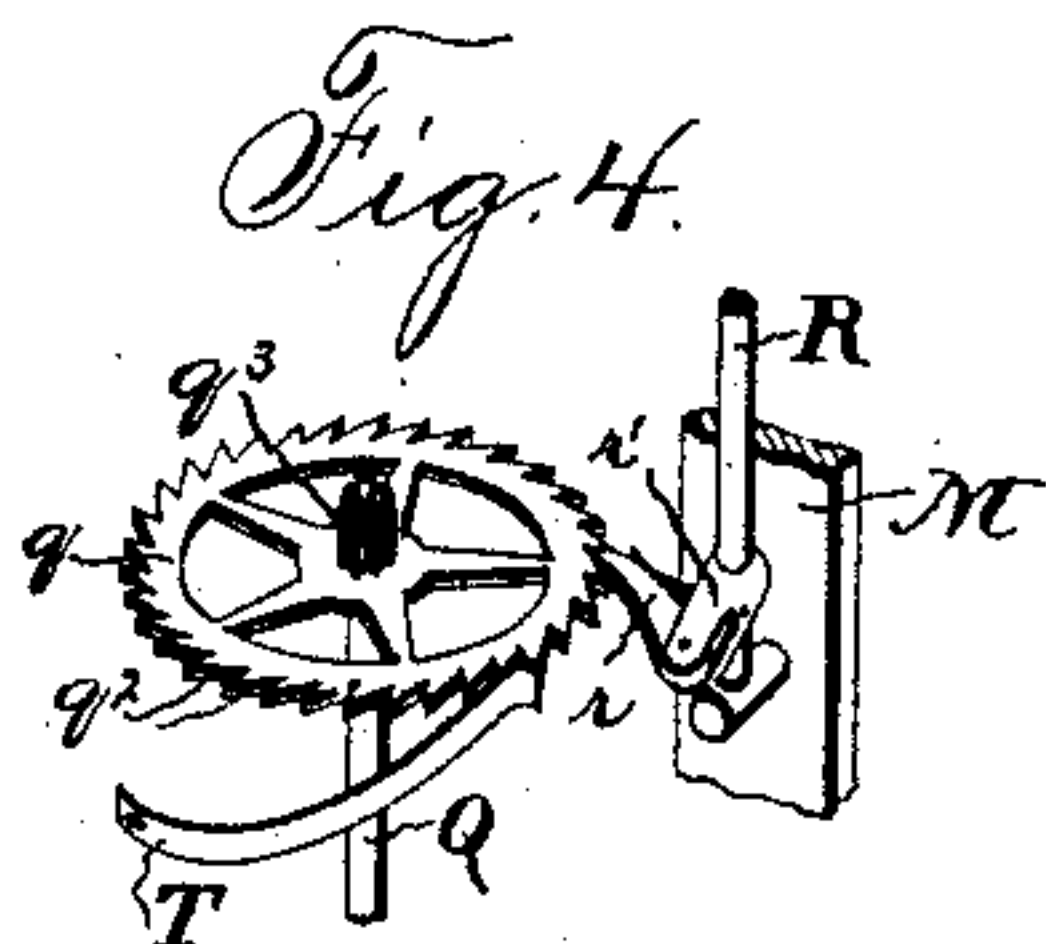
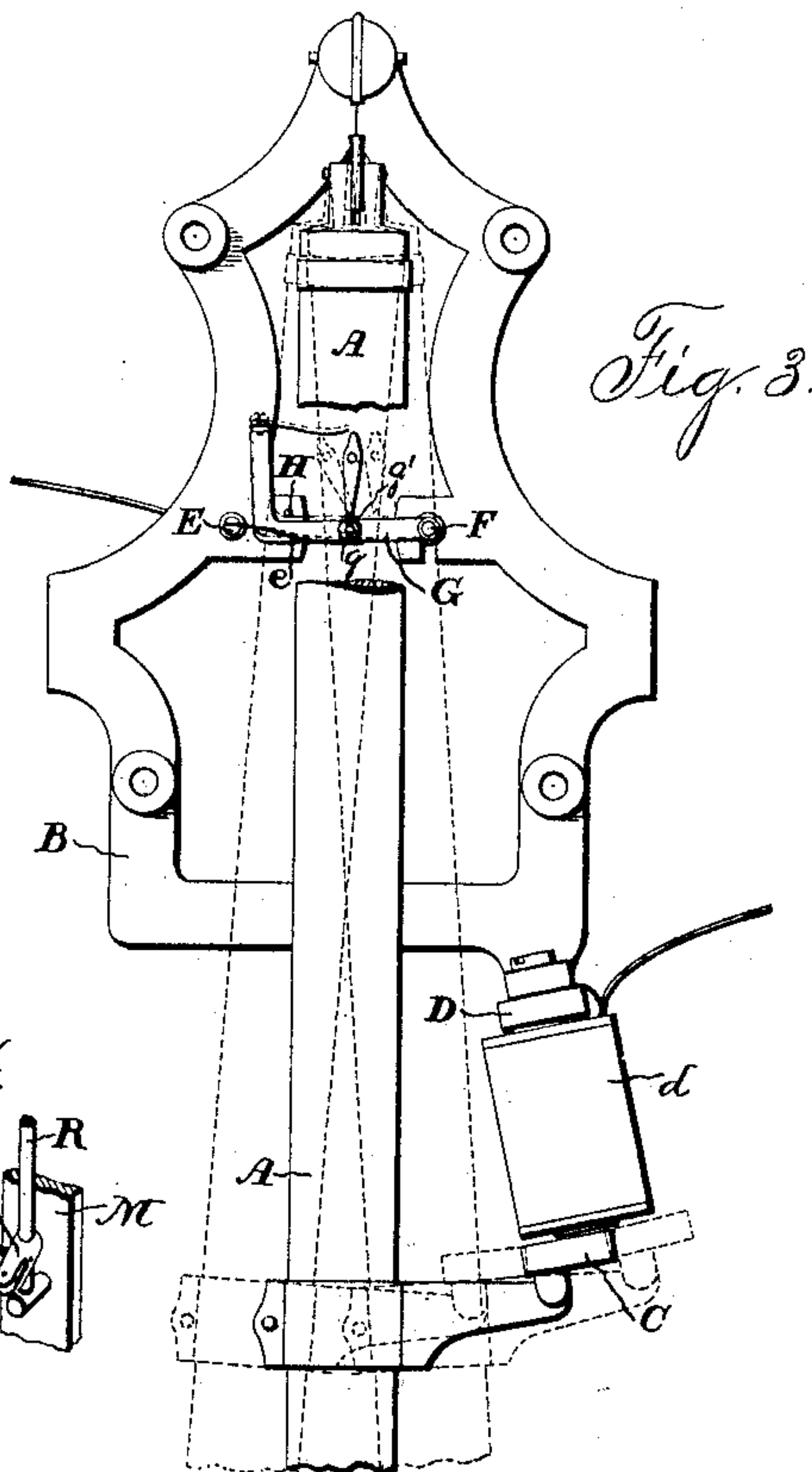
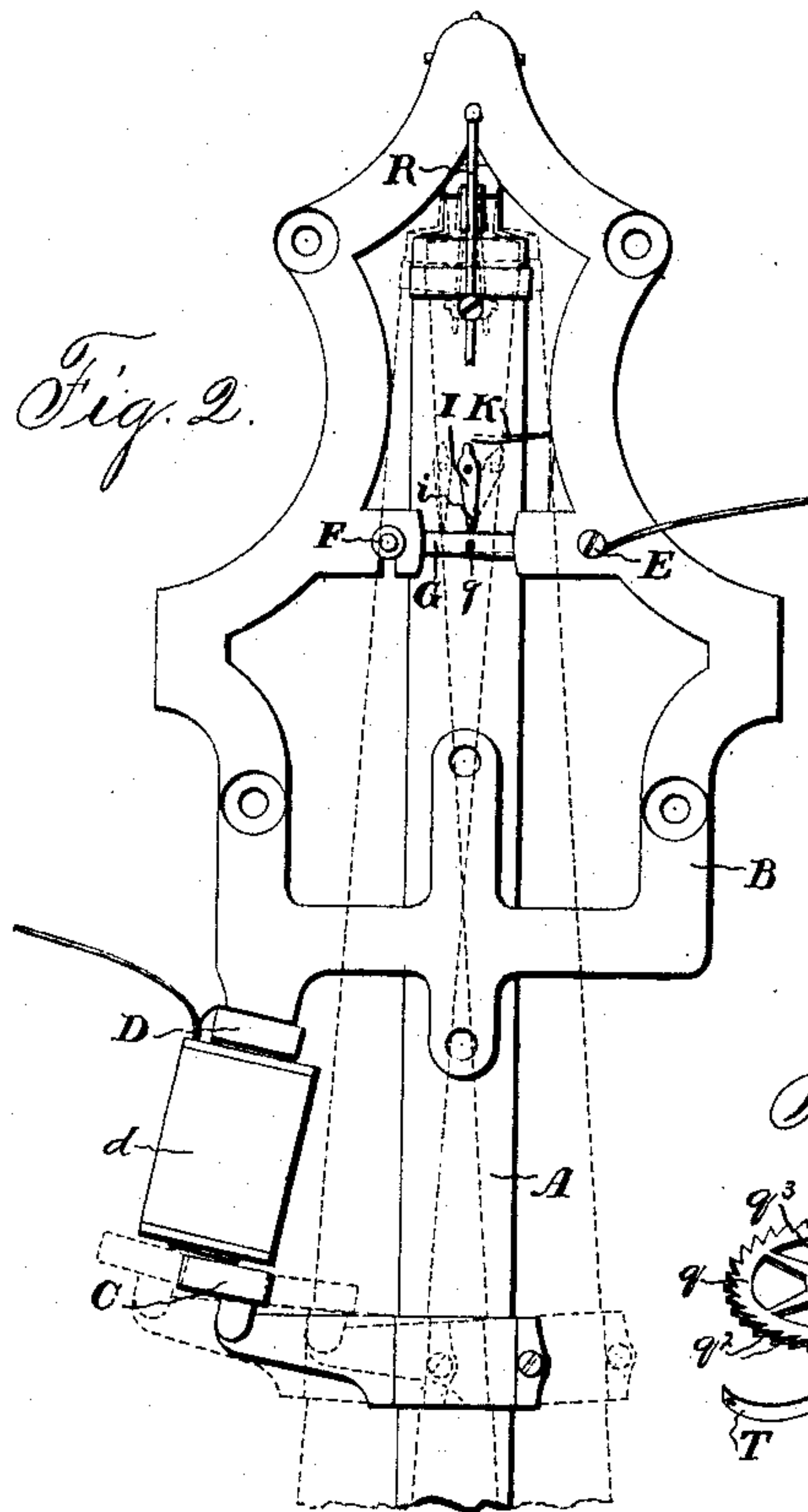
Inventor:
Walter W. Hastings, by
Prindle and Russell, his attys.

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(No Model.)

3 Sheets—Sheet 2.



Witnesses:
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Henry L. Hazard.

Inventor:
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3 Sheets—Sheet 3.

Fig. 9.

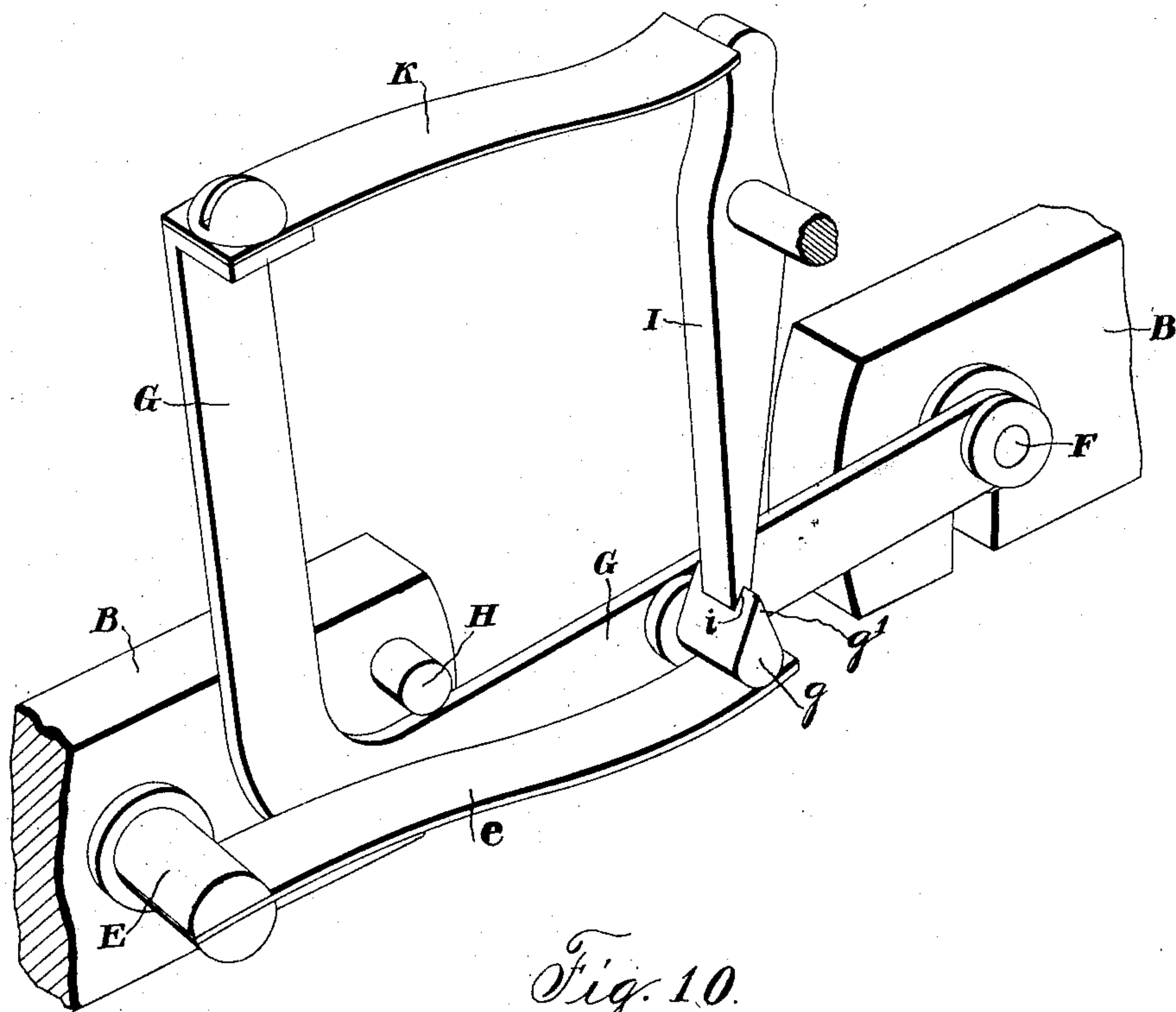
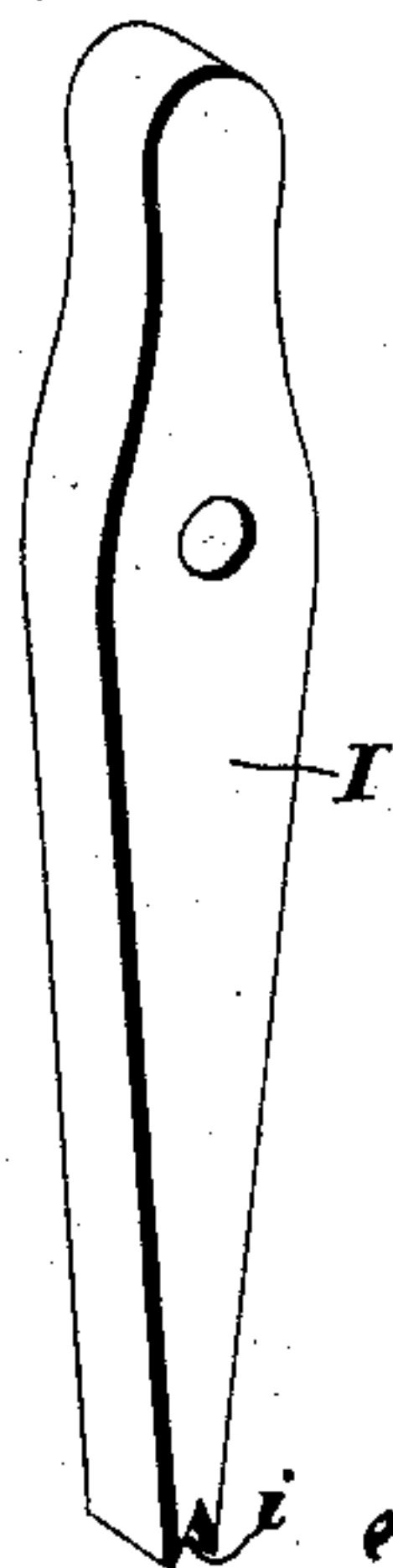


Fig. 10.



Witnesses.
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UNITED STATES PATENT OFFICE.

WALTER W. HASTINGS, OF JERSEY CITY, NEW JERSEY.

ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 618,670, dated January 31, 1899.

Application filed November 24, 1897. Serial No. 659,661. (No model.)

To all whom it may concern:

Be it known that I, WALTER W. HASTINGS, of Jersey City, in the county of Hudson, and in the State of New Jersey, have invented certain new and useful Improvements in Electric Clocks; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

10 Figure 1 is a perspective view of the mechanism of my clock separated from the case and with the dial removed. Fig. 2 is a front elevation of the pendulum and the impulsing mechanism, the time-train being removed, 15 the full lines showing the position of the parts when the pendulum is occupying a mid-position and the dotted lines their positions when said pendulum is at the limits of its oscillations. Fig. 3 is a like view of such train from the rear. Fig. 4 is a perspective view 20 of the operative parts of the time-train. Fig. 5 is a plan view of such train from the upper side. Fig. 6 is a side elevation of the same. Fig. 7 is a central longitudinal section of the 25 central arbors and shows the means employed for supporting and moving the hour and minute hands. Fig. 8 is a perspective view of the connecting portions of the pendulum-rod and the operating-arbor of the time-train. 30 Fig. 9 is a detail perspective view of the circuit-closing mechanism, and Fig. 10 a detail view of the pawl or pendant carried by the pendulum-rod.

Letters of like name and kind refer to like 35 parts in each of the figures.

My invention relates to clocks in which the time-train is driven by the pendulum and the vibrations of the latter are maintained by 40 electrically-produced impulses; and such invention consists in the means employed for closing an electric circuit at certain periods and in the mechanism used for transmitting the movements of the pendulum to the hands 45 of the clock, substantially as and for the purpose hereinafter specified.

In the carrying of my invention into practice I employ a pendulum A, which is suspended in any usual manner from the frame B of the clock and at a suitable point between the ends of the rod is provided upon 50 one side with a laterally-projecting armature C, which by the vibrations of said pen-

dulum is caused to pass to and fro beneath the end of an electromagnet D, that is adapted to be magnetized at a proper time by 55 the passage of an electric current through its coils *d d*, so as to draw the armature, with said pendulum, in the direction necessary for increasing the arc of vibration of the latter when such has fallen below a prede- 60 termined point. On one end the wire of the coil *d* of the magnet D is preferably connected electrically with the frame B, while the other end of such wire, beyond an interposed battery, extends to and is connected 65 with one end of an insulated stud E, which is secured within said frame below the point of suspension of the pendulum A and carries upon its opposite inner end a flat spring *e*, that from thence extends horizontally toward 70 the opposite side of the frame. At a point correspondingly opposite to the stud E is located a second stud F, which has pivoted upon its inner end one end of an L-shaped lever G, which bar extends from thence hori- 75 zontally across nearly to said stud E and from thence vertically upward, as seen in Fig. 3. A pin H, projecting rearward from the frame B, engages with and limits the movement of the free end of said lever above a horizontal 80 line, while an insulated stud *g*, which projects horizontally rearward from near the longitudinal center of said lever, engages with the inner free end of the spring *e* and receiving the upward pressure of said spring causes 85 said lever to be held with a yielding force at the upper limit of its movement.

Upon the upper side of the stud *g* is a knife-shaped spur *g'*, which extends lengthwise of the same, while pivoted upon the front side 90 of the pendulum-rod A is a pawl I, which, being pivoted near its upper end, maintains a vertical position, while free to oscillate upon its pivotal bearing. The lower end of said pawl is slightly below the edge of the spur *g'*, 95 so that as said pendulum swings to and fro said pivoted swinging pawl will trip over said spur *g'*, while the swing of said pendulum is sufficient to carry it out of engagement with the same. A A-shaped notch *i*, provided 100 within the lower end of said pawl, with one of its lips longer than the other, furnishes a means whereby when the swing of the pendulum has decreased sufficiently said pawl will

engage with said spur g' and upon the return swing of said pendulum will press the free end of the lever G downward, as shown by dotted lines of Fig. 3.

5 To the upper end of the vertical arm of the bar G is secured one end of a flat spring K, which from thence extends inward over the upper end of the swinging pawl I in such position that when the latter trips over the spur g' there
10 will be no contact between said spring and pawl; but when the latter engages with said spur g' and moves the lever G downward said spring K will be brought into contact with the upper end of said swinging pawl I and operate
15 to close the electric circuit, so as to cause a current to pass from the battery through the wire d , stud E, spring e , stud g , pawl I, spring K, bar G, and frame B to the magnet-coil and through the latter back to the battery, the
20 result being to render the electromagnet D operative and cause it to attract the armature C.

The arrangement of the mechanism described is such as to cause the closing of the
25 circuit just as or immediately after the pendulum commences to swing toward the electromagnet and to open or break the circuit before said armature reaches the center of the lower ends of said magnet, by which
30 means said pendulum is drawn in the direction of its movement with such force as to produce its maximum range of motion, such closing and opening of the electric circuit being automatically effected whenever the range
35 of movement of said pendulum falls to a predetermined point.

It will be seen that between the lower forked end of the pawl I and spur g' there is a rolling engagement which operates to keep the
40 contiguous surfaces clean and produce between them perfect electric contact, while between the upper end of said pawl and the spring K there is such rubbing engagement as to maintain between the same all conditions requisite for the passage from one to
45 the other of an electric current.

The time-train is in part composed of a center arbor L, which has its rear end journaled within a suitable supporting-frame M,
50 and upon its front portion has journaled a hollow arbor N, that is in turn journaled within such frame. The front end of the center arbor, which projects beyond the arbor N, carries a minute-hand O, while upon the front
55 end of said arbor N is secured an hour-hand P.

The minutes - arbor L receive motion through a vertically-journaled arbor Q, which at or near its longitudinal center is provided with a worm q , that engages with a toothed
60 wheel attached to the rear portion of said minute-arbor. A wheel q' , attached to the upper portion of said arbor Q and provided with peripheral ratchet-teeth q^2 and q^3 , is engaged by a spring-pressed pawl r , which is pivoted
65 within the end of a radial arm r' , that projects forward from a vertically-journaled arbor R, the arrangement being such that by the par-

tial rotation in opposite directions of the latter such pawl will when moving in one direction engage with one of the teeth q^2 and
70 give to its wheel a partial rotation and when moving in an opposite direction will trip over the tooth next in rear, said arbor R being thus given a step-by-step movement in one direction. The movements of said shaft R
75 are produced by the pendulum-rod through a radial arm r^2 , which projects rearward from or near the upper end of the former and has its rear forked end engaged by a rod S, that is connected to and moves with said pendulum. 80

It will be seen that with the construction described each swing of the pendulum in one direction will cause the minute-arbor to be partially rotated, while at each swing of said pendulum in an opposite direction the parts
85 will be placed in position for another forward movement. A spring T, secured at one end to the frame M and having its opposite end in engagement with the ratchet-teeth q^2 , operates to prevent rearward movement of the wheel
90 q' while the operating-pawl r is being retracted.

For giving motion to the hour-arbor N a toothed wheel n is secured upon its rear portion and is engaged by a worm u upon an arbor U, which is journaled vertically within
95 the frame M and is connected with the arbor Q by means of a pinion q^3 upon the latter, that meshes with a toothed wheel u' upon said arbor U, the relative proportions of said pinion and wheel being such as to cause said
100 arbor U to have one rotation for each twelve rotations of said arbor Q.

Having thus described my invention, what I claim is—

1. In an electric clock, the combination of
105 the pendulum-rod, a swinging pawl movably mounted thereon that forms part of an electric circuit, and means for closing the circuit operated by said pawl when the limit of movement of the rod reaches a predetermined, minimum point, substantially as and for the purpose specified. 110

2. In an electric clock, the combination of a swinging pawl which is pivoted upon and swings with a pendulum-rod, a lever that is
115 adapted to have one of its ends depressed by the action of the swinging pawl, and a contact-spring which is carried by such lever and impinges upon the upper end of said pawl to close the electric circuit whenever said lever
120 end is depressed, substantially as and for the purpose shown.

3. In an electric clock, the combination of a pivoted lever having electric connection with a battery and carrying upon its free end
125 a contact-spring, a swinging pawl pivoted upon the pendulum-rod and having a notched lower end and an insulated spur secured upon said lever between its ends, electrically connected with a battery and adapted to be engaged by the notched end of the pawl, whereby
130 when the motion of the pendulum falls to a predetermined point, said pawl will at its lower end engage with said spur, and depress said

lever and bringing the contact-spring into engagement with its upper end, close the electric circuit, substantially as and for the purpose set forth.

5 4. In an electric clock, a circuit-closing mechanism consisting of a swinging pawl which is pivoted upon and moves with the pendulum and is provided with a notched lower end, a lever that has one end pivoted
10 upon a support which is in electric connection with a battery and between its ends is provided with an insulated spur that is adapted to be engaged by the notched end of the pawl so as to depress the free end of the lever, a contact-spring that is carried by the
15 latter and when the same is depressed comes into contact with the upper end of the swinging pawl, and an electric connection between the spur and battery, by which construction
20 the depression of said lever will close the electric circuit and its release will open such circuit, substantially as and for the purpose shown and described.

5 5. In combination with the pendulum-rod and with the escape-wheel journaled by a vertical arbor, the vertically-journaled pallet-
25 arbor having near its upper end a rearward-

extending arm which engages with and is moved horizontally by said pendulum-rod, and provided near its lower end with a radial
30 arm that carries a spring-pressed pawl which engages with the teeth of said escape-wheel, whereby the vibrations of the pendulum will be communicated to the escape-wheel and
35 give to the same a step-by-step rotation, substantially as and for the purpose specified.

6. In combination with the minute and hour arbors, a wheel on each arbor, two worm-carrying arbors, the worms of which
40 respectively engage said wheels, gearing connecting the worm-carrying arbors, a pendulum-rod, a vertical arbor, connections between the latter and said rod, and means whereby
45 said arbor rotates one of the worm-carrying arbors, substantially as and for the purpose shown.

In testimony that I claim the foregoing I have hereunto set my hand this 22d day of November, 1897.

WALTER W. HASTINGS.

Witnesses:

WILLIAM C. ROBERTS,
J. B. WOLFGANG.

It is hereby certified that in Letters Patent No. 618,670, granted January 31, 1899, upon the application of Walter W. Hastings, of Jersey City, New Jersey, for an improvement in "Electric Clocks," an error appears in the printed specification requiring correction, as follows: In line 56, page 2, the word "receive" should read *receives*; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 7th day of February, A. D., 1899.

[SEAL.]

WEBSTER DAVIS,
Assistant Secretary of the Interior.

Countersigned:

C. H. DUELL,
Commissioner of Patents.