

(No Model.)

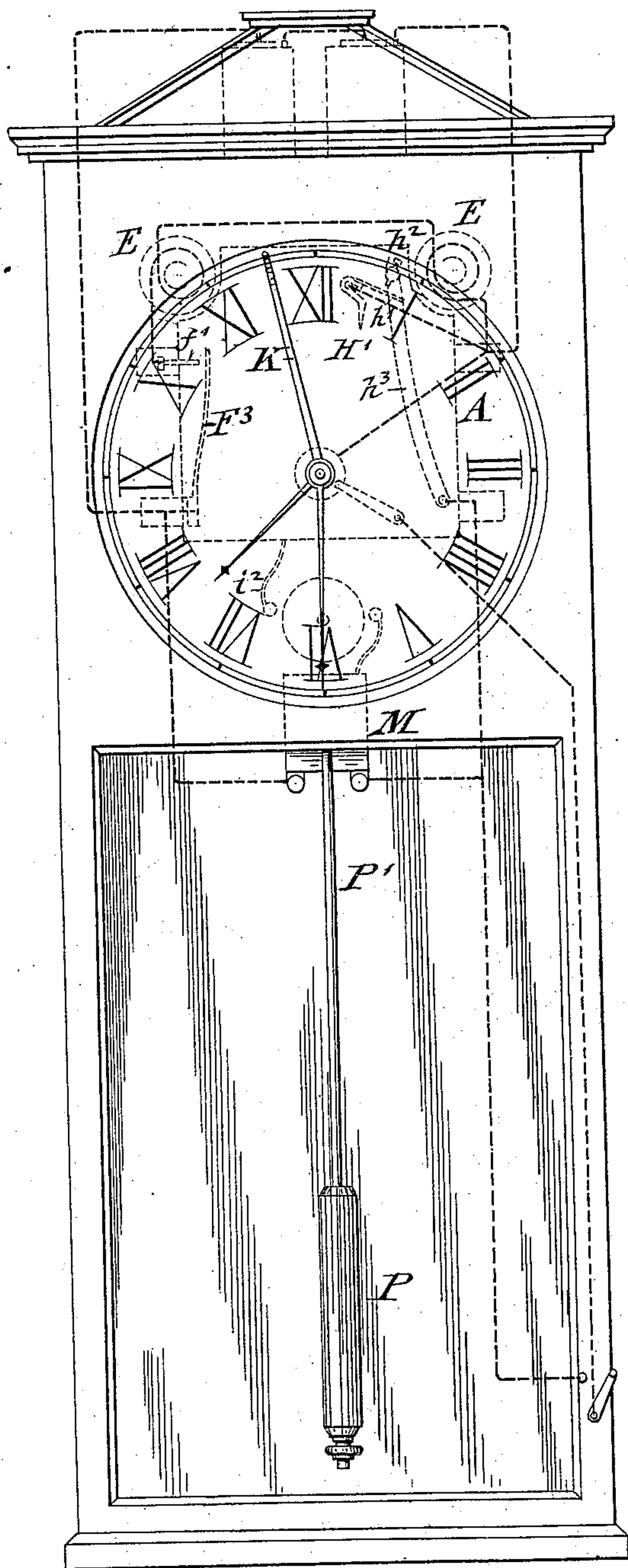
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S. FISCHER.
ELECTRIC CLOCK.

No. 555,313.

Patented Feb. 25, 1896.

Fig: 1.



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(No Model.)

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Fig. 2.

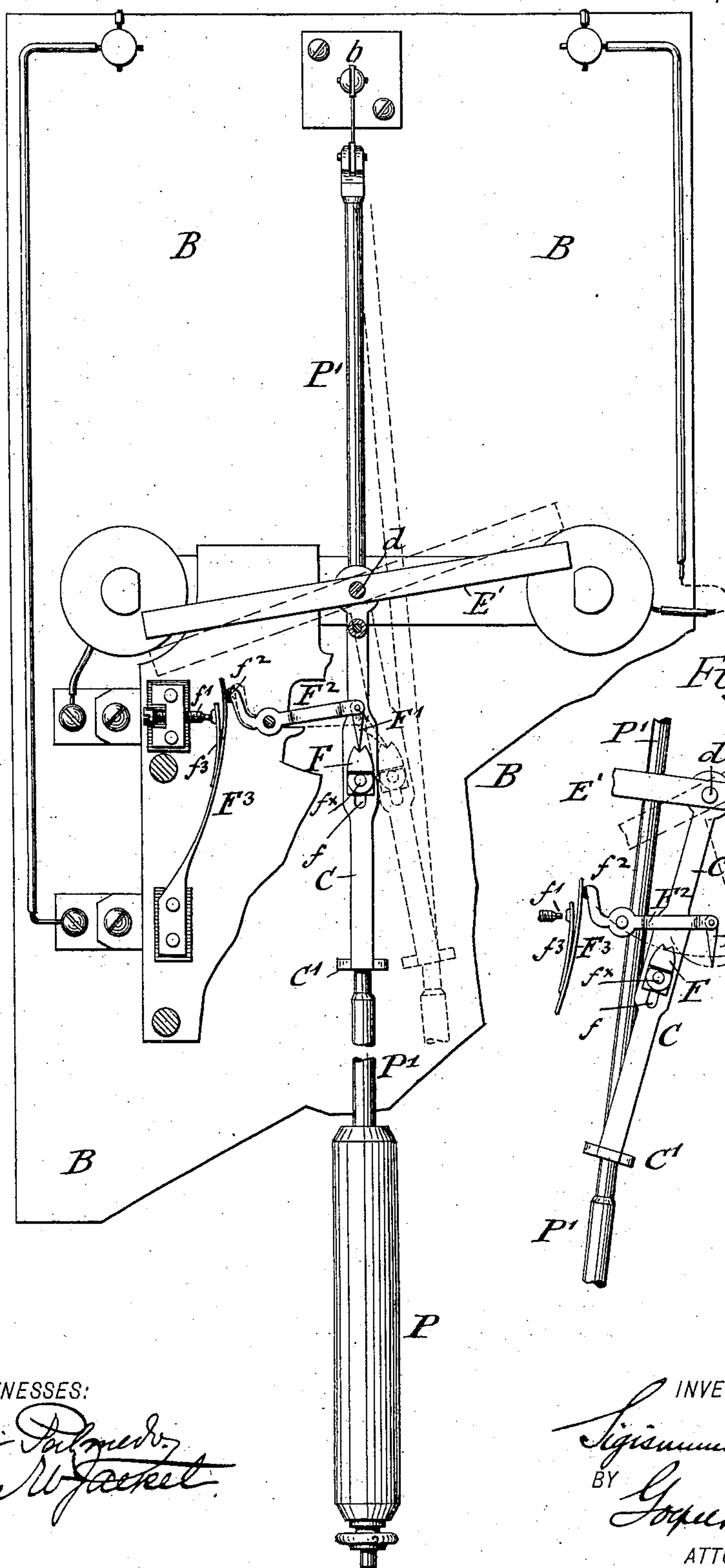
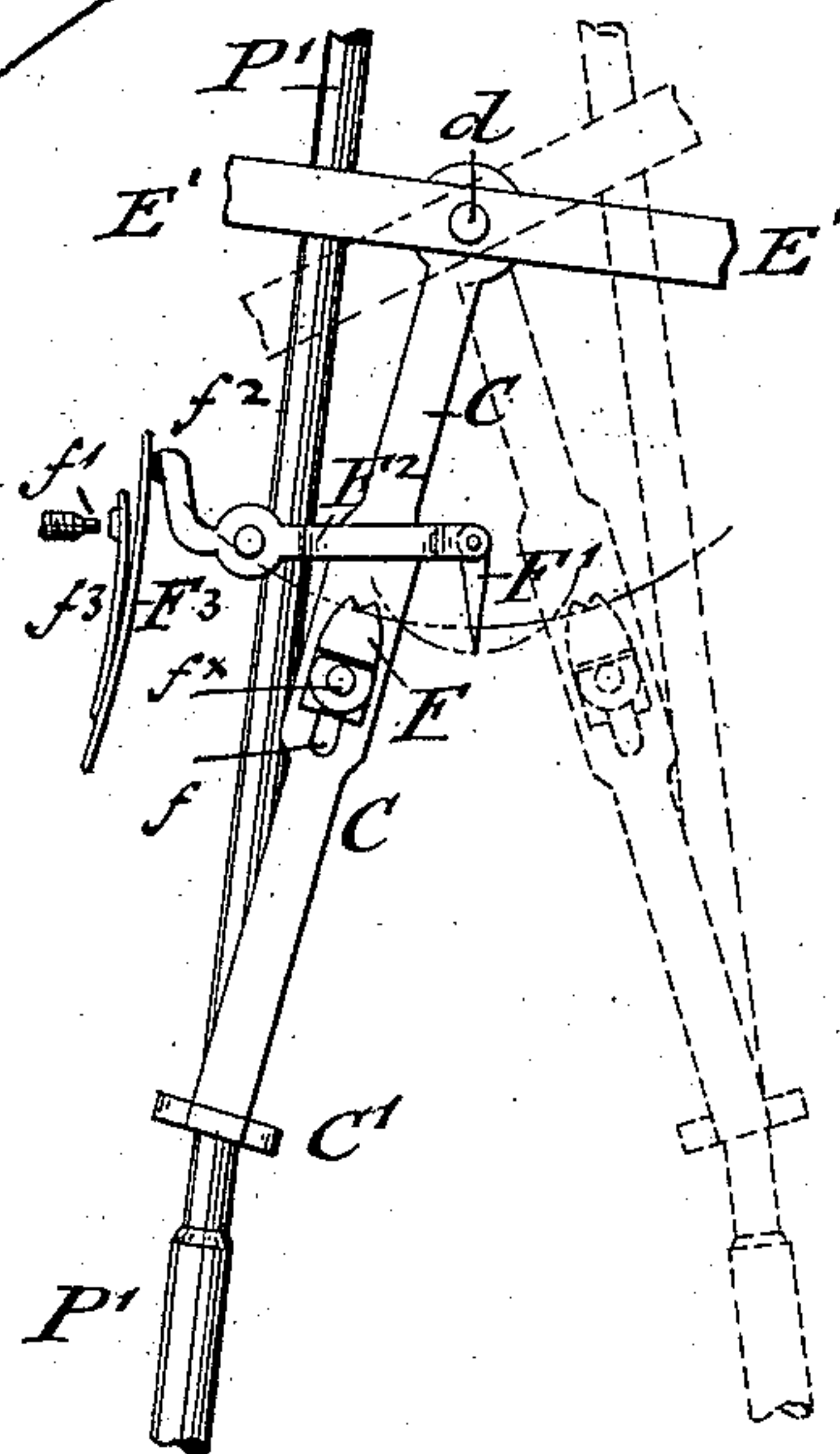


Fig. 3.



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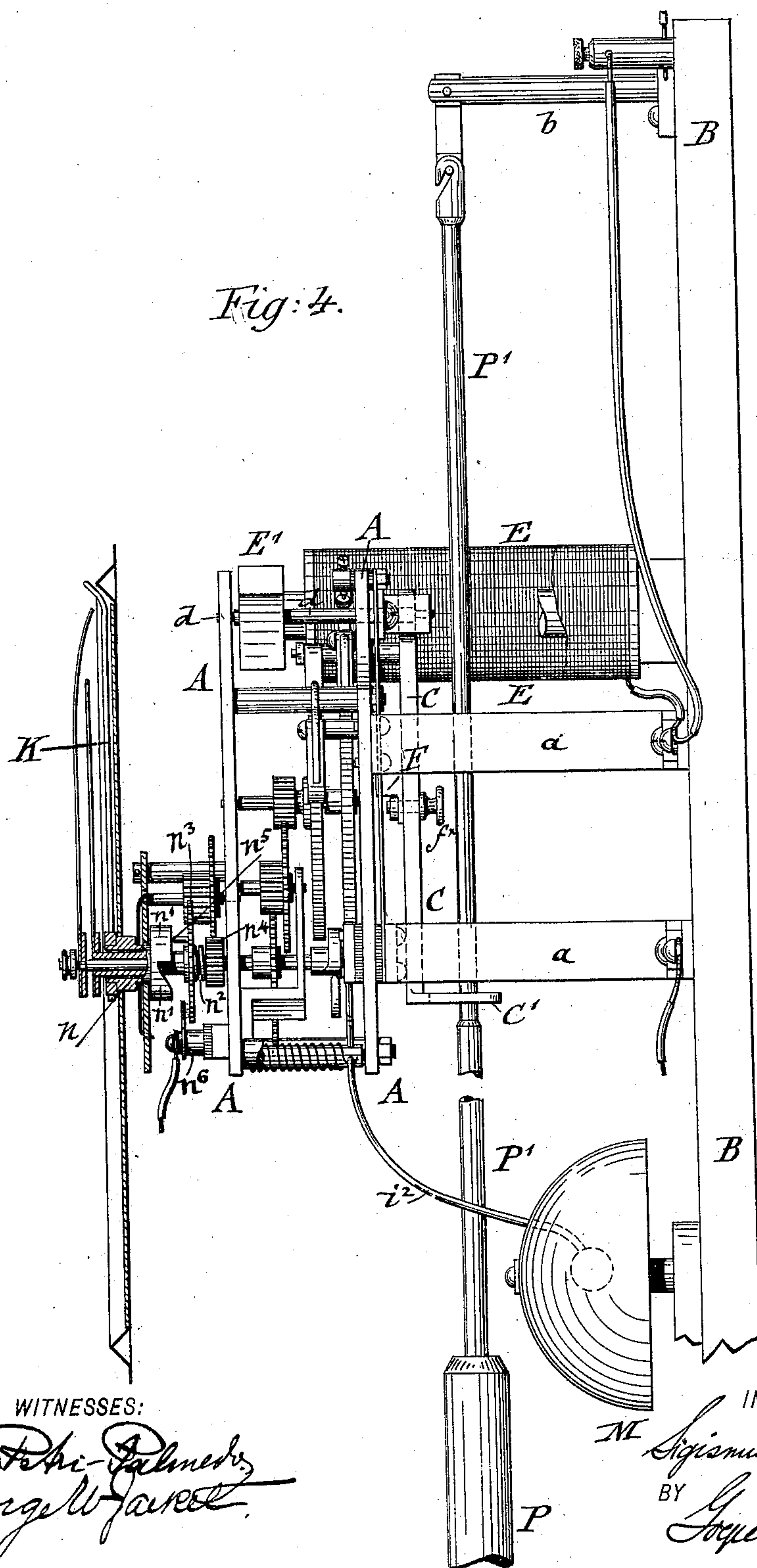
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S. FISCHER.
ELECTRIC CLOCK.

No. 555,313.

Patented Feb. 25, 1896.



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4 Sheets—Sheet 4.

S. FISCHER.
ELECTRIC CLOCK.

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Fig: 6.

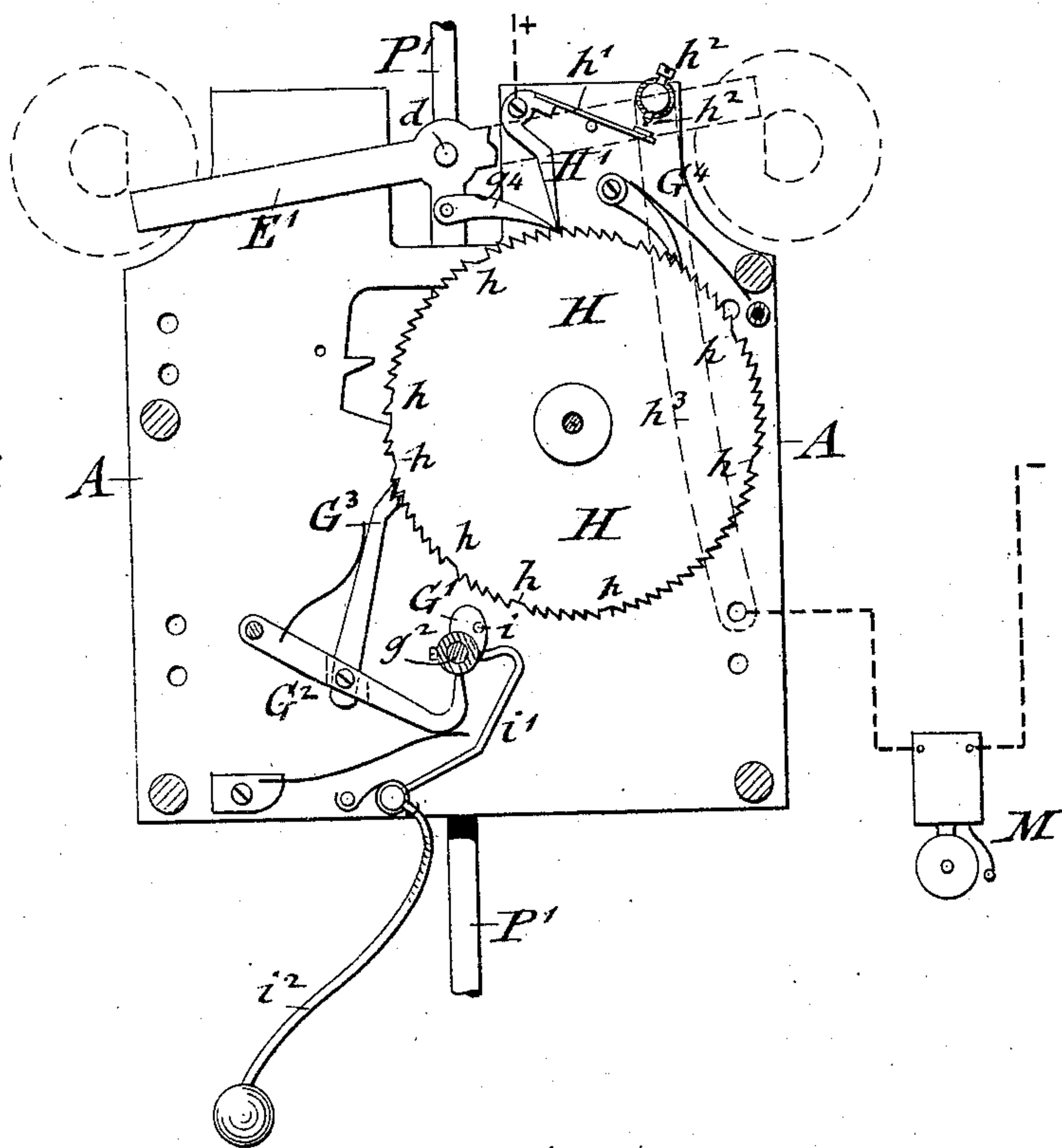
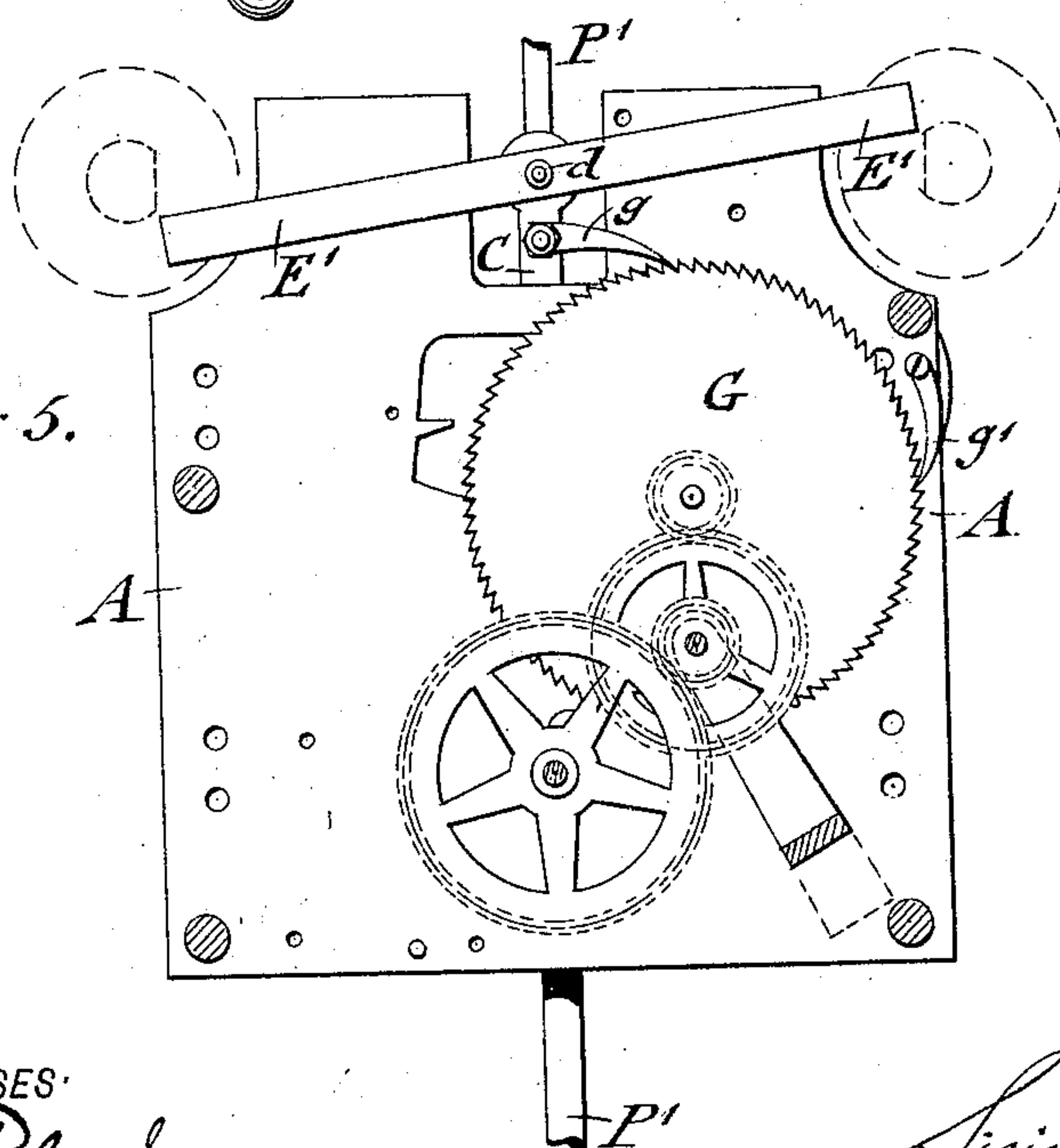


Fig: 5.



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UNITED STATES PATENT OFFICE.

SIGISMUND FISCHER, OF BROOKLYN, ASSIGNOR OF ONE-TENTH TO VICTOR D. BRENNER, OF NEW YORK, N. Y.

ELECTRIC CLOCK.

SPECIFICATION forming part of Letters Patent No. 555,313, dated February 25, 1896.

Application filed May 10, 1895. Serial No. 548,820. (No model.)

To all whom it may concern:

Be it known that I, SIGISMUND FISCHER, a subject of the Czar of Russia, residing at Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Electric Clocks, of which the following is a specification.

This invention has reference to certain improvements in electric clocks which are driven by electric impulses imparted intermittently to the pendulum of the clock; and the invention consists of an electric clock in which the pendulum is driven by electric impulses imparted to it, as from a primary battery, so as to operate a going-train and a striking-train. A recessed block on the crutch of the pendulum is engaged by a pendant pivoted to a fulcrumed lever, said pendant engaging the recess of the block when the beats of the pendulum are gradually becoming shorter, so that the lever actuates a circuit-closing device, closes the circuit and energizes an electromagnet which attracts an armature attached to the crutch and imparts an impulse to the pendulum. The going-train operates the minute and hour hands, while the teeth on the main wheel of the striking-train serve to close the circuit of an electric bell, so as to strike the full hours. The half-hour-striking mechanism is operated by a separate clapper in connection with an eccentric on the arbor of the hour-hand.

The invention consists further of an alarm device arranged in connection with the electric clock, said alarm device closing the circuit of the alarm-bell at the proper time, as will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 represents a front elevation of my improved electric clock, showing the arrangement of the circuits for the going-train, the striking-train, and the alarm device. Fig. 2 is a front elevation drawn on a larger scale and showing the mechanism by which the electric impulses are imparted to the pendulum. Fig. 3 is a front elevation of parts of Fig. 2, showing the pendulum when at full beat. Fig. 4 is a side elevation, partly in section, of my improved electric clock, also drawn on a larger scale; and Figs. 5 and 6 are detail sec-

tional views showing, respectively, the going and the striking train of my improved clock.

Similar letters of reference indicate corresponding parts.

Referring to the drawings, A represents the frame of my improved electric clock, which is attached by brackets *a* to an upright insulating-plate B, of slate or other suitable material. From a horizontal post *b* at the upper part of the plate B is suspended the pendulum P in the usual manner. The pendulum-rod P' is engaged by the lower forked end C' of a crutch C, which is attached at its upper end to a spindle *d*, that turns in bearings of the supporting-frame A.

On the front part of the spindle *d* is mounted the armature E' of an electromagnet E that is attached to the supporting-plate B. The ends of the armature E', as well as the pole-faces of the cores of the electromagnet, are made concentric to the axis of the spindle *d*, so that the ends of the armature can pass closely to said pole-faces as the armature is oscillated by the beats of the pendulum. On the crutch C is arranged a block F, which is capable of adjustment in a slot *f* of the crutch C by a clamping-screw *f*^x, as shown in Figs. 2 and 4. The block F is provided with a V-shaped recess in its upper end, said recess being engaged at certain intervals of time by a wedge-shaped pendant F', which is pivoted to the inner end of a fulcrumed contact-lever F², the outer end of which is provided with an agate heel *f*² that presses on a spring F³ provided with a contact-spring *f*³, which latter is placed in contact with a contact-screw *f*'. The spring F³, as well as the contact-pin *f*', are insulated from the frame A of the clock, the screw *f*' being connected with one pole and the spring F³ with the other of a primary battery which is located in any suitable position relatively to the clock. Whenever the contact-spring *f*³ is pressed by the agate heel *f*² of the fulcrumed lever F² against the contact-screw *f*', the current from the battery will pass from one pole of the same to the contact-spring F³, over the spring *f*³ to the contact-screw *f*', from the same through the coils of the electromagnet E and back to the other pole of the battery, as shown in dotted lines in Fig. 1 and in full lines in

Fig. 2. As soon as the circuit is closed, the current energizes the electromagnet, so that the poles of the same attract the armature E' and impart a turning motion to the same on its spindle. When the pendulum P swings at full beat, the block F on the crutch of the pendulum clears the point of the pendant F' , as shown in dotted lines in Fig. 3; but when the beats of the pendulum get gradually smaller the block will not be able to swing clear of the pendant F' , but will be engaged by the point of the latter, which drops in the V-shaped recess in the upper end of the block, as shown in Fig. 2, so that when the crutch arrives in its vertical position the contact-lever F^2 is oscillated on its fulcrum, as shown in Fig. 2, and thereby the contact-spring f^3 is placed in contact with the contact-screw f' , so that the circuit of the battery is closed, the electromagnet energized, the armature oscillated, and an impulse imparted to the pendulum. As long as the battery-current is of considerable strength, the closing of the circuit takes place at greater intervals of time as stronger impulses are imparted to the pendulum, while when the battery has been running for some time its electromotive force is diminished, the closing of the circuit of the battery takes place at shorter intervals of time and the impulses imparted to the pendulum are of less strength, so that thereby a certain compensation between the gradual losing of the strength of the battery and the increasing frequency of impulses imparted to the pendulum is produced which secures the regular running of the clock.

To the upper part of the crutch C of the pendulum P is applied a pivoted pawl g that engages the main spur-wheel G of the going-train. A check-pawl g' prevents the spur-wheel G from turning in the opposite direction. At each right-hand beat of the pendulum the pawl g engages one tooth of the spur-wheel G and turns it thereby on its axis, so as to impart by an intermediate train of gear-wheels motion to the minute-hand and from the same, by the usual transmitting mechanism, to the arbor of the hour-hand, as shown in Figs. 4 and 5.

The mechanism so far described forms an electrically-operated clock which receives all its impulses from a primary battery and which is of comparatively simple construction, so that it can be furnished at a small expense. When the clock is desired to strike hours and half-hours and give in addition thereto at certain predetermined intervals of time an alarm, then it is necessary to add a striking-train for striking full hours, a mechanism for striking the half-hours, and an alarm device which utilizes the bell of the striking mechanism. The striking-train is operated from the arbor g^2 of the hour-arbor, on which is mounted an eccentric G' that rotates with the arbor of the hour-arbor once every hour and actuates a pivoted and spring-actuated lever G^2 having a hook-shaped end, which latter is

engaged by the eccentric G' . The lever G^2 is provided with a pivoted and spring-actuated pawl G^3 having a double tooth at its end which engages the teeth at the circumference of the striking gear-wheel H . The circumference of the striking-wheel H is divided into a number of groups of teeth corresponding to the number of strokes of the clock from one to twelve, said groups of teeth consisting of one, two and so on up to twelve teeth, each group being separated from the adjacent groups by a recess h , formed by removing a tooth, so that when the striking-wheel H is turned entirely around on its axis, which takes place once in every twelve hours, all the hours have been struck by the striking mechanism. Besides the actuating-pawl G^3 , the striking-wheel H is engaged by a spring check-pawl G^4 , which is also provided with two teeth, and by a single pawl g^4 on which rests a fulcrumed lever H' that carries a contact-spring h' , which forms contact with a contact-screw h^2 that is insulated from the frame of the clock and connected by a metallic conducting-strip h^3 with the electromagnet of an electric bell M on the frame of the clock placed in the battery-circuit, as shown clearly in Figs. 1, 4 and 6. When the eccentric G' arrives gradually at its lowermost position, the lever G^2 is pressed against the tension of its spring in downward direction and the spring-actuated pawl G^3 moved so as to engage one of the teeth on the circumference of the striking-wheel H , the double-toothed end of the pawl G^3 securing the reliable action of the same with the teeth of the striking-wheel, even if it should pass into one of the recesses h .

During the motion of the eccentric toward its uppermost position the pawl G^3 is gradually lifted by the spring of the lever G^2 and the striking-wheel H moved for the distance of one tooth, so that the pawl g^4 on the crutch C is moved out of one of the recesses h between the groups of teeth on the circumference of the striking-wheel H and into engagement with the first tooth of the next following group. In passing over said tooth the fulcrumed lever H' is raised and electric contact formed between its contact-spring h' and the screw h^2 , so that the electric bell is sounded. At the next beat of the pendulum the pawl g^4 engages the next adjacent tooth of the group and makes the contact $h' h^2$, so as to again sound the electric bell, and so on until all the strokes of the respective hours have been sounded and the pawl g^4 arrives in the next recess, separating the group of teeth just actuated from the next adjacent group. As long as the pawl g^4 is in the recess its point will be moved forward and back in said recess, following the oscillations of the pendulum, without producing the actuating of the electric bell for striking a full hour. As soon as, however, a full rotation of the eccentric G' is completed and the striking-wheel H has been moved by the pawl G^3

for the distance of one tooth, the pawl g^4 on the crutch of the pendulum is moved out of the recess h into engagement with the first tooth of the next group of teeth on the circumference of the striking-wheel, whereby the next hour is struck, and so on. The battery by which the electric impulses are imparted to the pendulum and the going-train of the clock is also employed for causing the striking of the full hours, but in such a manner that the electric current is supplied always for the impulses of the pendulum when the latter is moving toward the left, while the current is supplied to the going and striking mechanisms when the pendulum is moving toward the right. When the circuit of the striking mechanism is closed by the contacts h' h^2 , the current flows from one pole of the battery to the electromagnet of the bell, through the coils of the same and the metallic connecting-strip h^3 to the insulated contact-screw h^2 , then over the contact-spring h' of the fulcrumed lever H' and the frame of the clock to a binding-post on said frame, and then to the opposite pole of the battery, as shown in Figs. 1 and 6.

When it is desired to strike besides the full hours also half-hours, a second clapper i^2 of the bell M is actuated by the eccentric G' , which for this purpose is provided with a pin i that engages the curved end of an upwardly-extending arm i on the fulcrumed and spring-actuated clapper i^2 , so that one stroke is given to the bell at every hour, but alternately with the full-hour strokes, which are imparted by the striking mechanism. This is accomplished by locating the pin i in such a manner on the eccentric G' that it engages the arm i' of the clapper once every hour, but midway between the full hours, so as to strike thereby one stroke entirely by mechanical means, which indicates the half-hour.

When the clock is to be provided with an alarm so as to start the bell in a similar manner as in alarm-clocks, the usual alarm-hand K is provided on the dial of the clock, which is to set the hour at which the alarm is to be sounded. The alarm-hand K is applied in the usual manner with a sleeve n , which is placed on the arbor of the hour-wheel and provided with a notched collar n' . The arbor of the hour-hand is actuated by a helical spring n^2 , which is interposed between a gear-wheel n^3 on the arbor of the hour-hand and a pinion n^4 on the arbor of the minute-hand, as shown in Fig. 2, the tubular arbor of the hour-wheel being adapted to slide on the arbor of the minute-hand. A pin n^5 is applied to the gear-wheel n^3 on the arbor of the hour-hand and is moved over the face of the notched collar n' until the pin n^5 arrives on the notch of the collar and permits the forward motion of the arbor of the hour-hand in the spring n^2 , so that the pin n^5 is moved into the notch of the collar n' . Simultaneously therewith the gear-wheel n^3 forms contact

with an insulated contact-plate n^6 , that is shown in Figs. 1 and 4. The contact-plate n^6 is insulated from the supporting-frame A of the clock and connected with a switch S , which is set into a closed position whenever the alarm is to be used. As soon as the pin n^5 of the gear-wheel n^3 on the arbor of the hour-hand arrives at the notch of the collar n' on the sleeve of the alarm-hand the contact between the gear-wheel n^3 and the contact-plate n^6 is made, whereby the circuit is closed and the current conducted from one pole of the battery to the electromagnet of the bell M , then to the switch S , from the latter to the contact-plate n^6 and gear-wheel n^3 , and then through the frame of the clock back to the opposite pole of the battery, as shown in Figs. 1 and 4. The bell is sounded until the switch S is disconnected, or until the pin i of the hour-wheel has gradually moved past the notch in the collar of the alarm-hand. As the latter takes a considerable length of time, during which it is unnecessary that the bell should be sounded, it is preferable to disconnect the switch and discontinue the ringing of the bell.

By the construction described an electric clock is obtained which is actuated by intermittent electric impulses from a primary electric battery and which is to some extent independent of the gradual weakening or running down of the battery, as with the running down of the battery the intervals of time at which the impulses are imparted are shortened, and correct and reliable time indicated by the clock independently of the greater or smaller electromotive force of the battery.

The striking of the half and full hours renders the clock more acceptable to persons who prefer a clock with a striking mechanism, while the alarm device is of advantage to persons who have to get up at a certain time, so that the electric clock combines thereby the advantages of a good timekeeper with an alarm-clock.

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

1. The combination with a swinging pendulum and its crutch, of a recessed block on said crutch, a fulcrumed circuit-closing lever, a gravity-pendant pivoted to one end of said lever adjacent to said block, and a circuit-closing device operated by the opposite end of the circuit-closing lever when the pendant is engaged by the recessed block.

2. The combination of a swinging pendulum, a crutch for said pendulum, a block on said crutch provided with a recess at its upper end, a fulcrumed circuit-closing lever, a gravity-pendant pivoted to said lever, spring-contacts operated by said lever when the pendant is engaged by the block, an armature mounted on the spindle of said crutch, and an electromagnet adapted to impart oscillating motion to said armature and an impulse to the pendulum when the circuit is closed by

the periodical engagement of the block with the pendant, substantially as set forth.

3. The combination with a pendulum and its crutch, said crutch being intermittently
5 operated by electric impulses imparted to the same, of a striking-train, the main wheel of which is provided in its circumference with groups of teeth for striking the hours, intermediate recesses between said groups of teeth,
10 an eccentric on the arbor of the hour-hand, a spring-pawl engaged by said eccentric and adapted to turn the main wheel of the striking mechanism for one tooth at each rotation,

a circuit-closing device operated by a pawl on the crutch, and an electric bell in said 15 circuit so as to strike the full hours at each full rotation of the hour-wheel, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in pres- 20
ence of two subscribing witnesses.

SIGISMUND FISCHER.

Witnesses:

PAUL GOEPEL,
GEORGE W. JAEKEL.