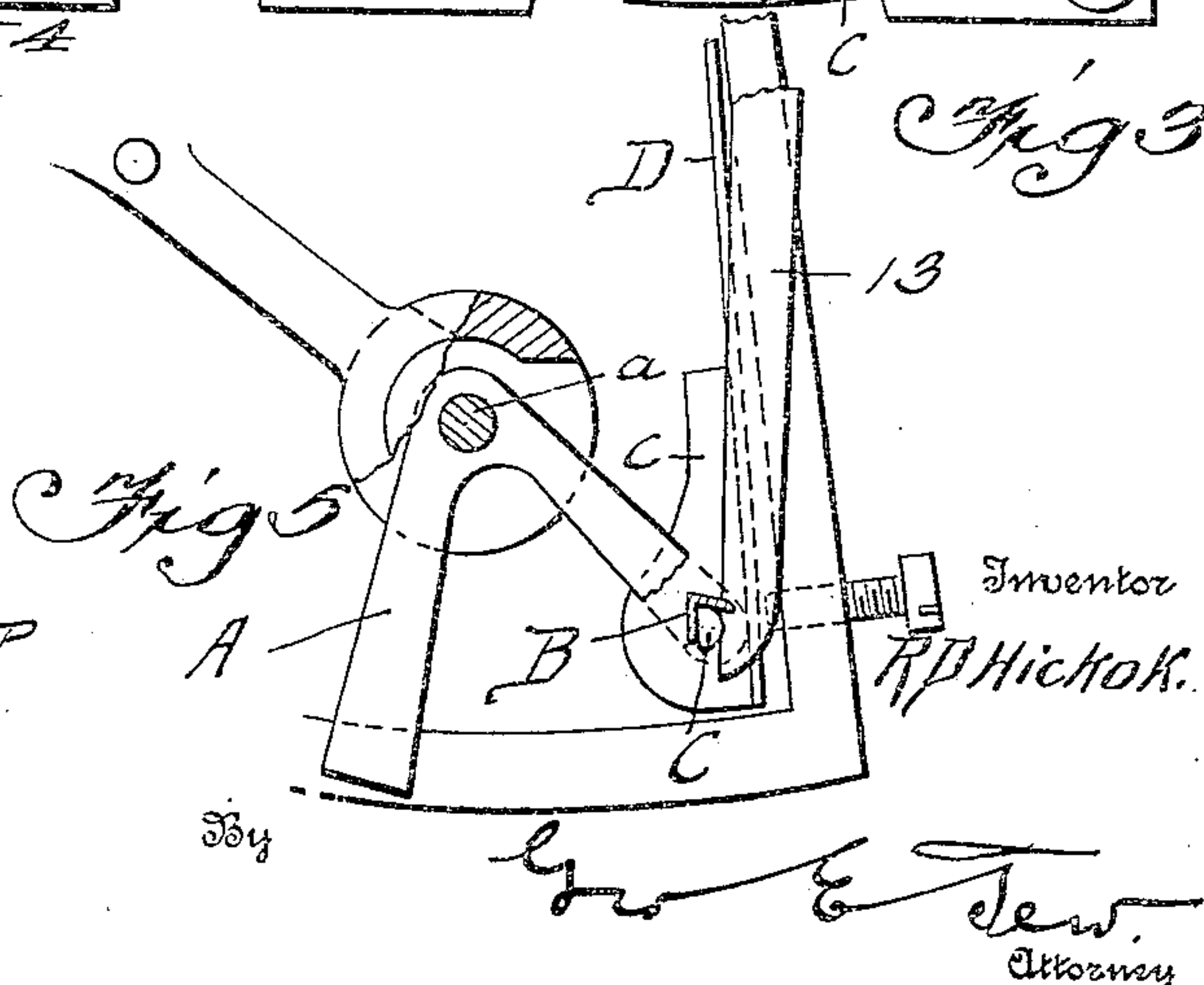
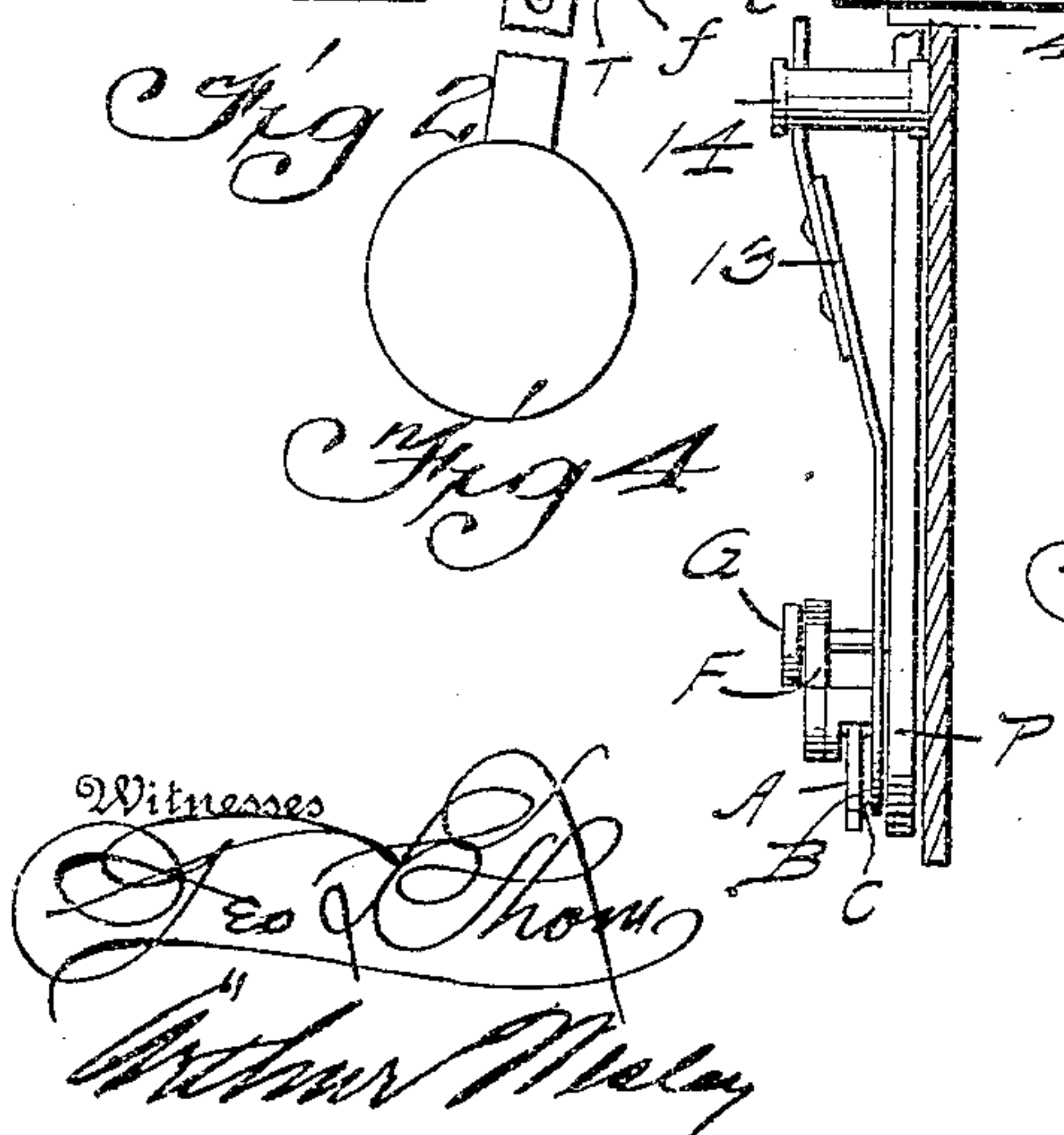
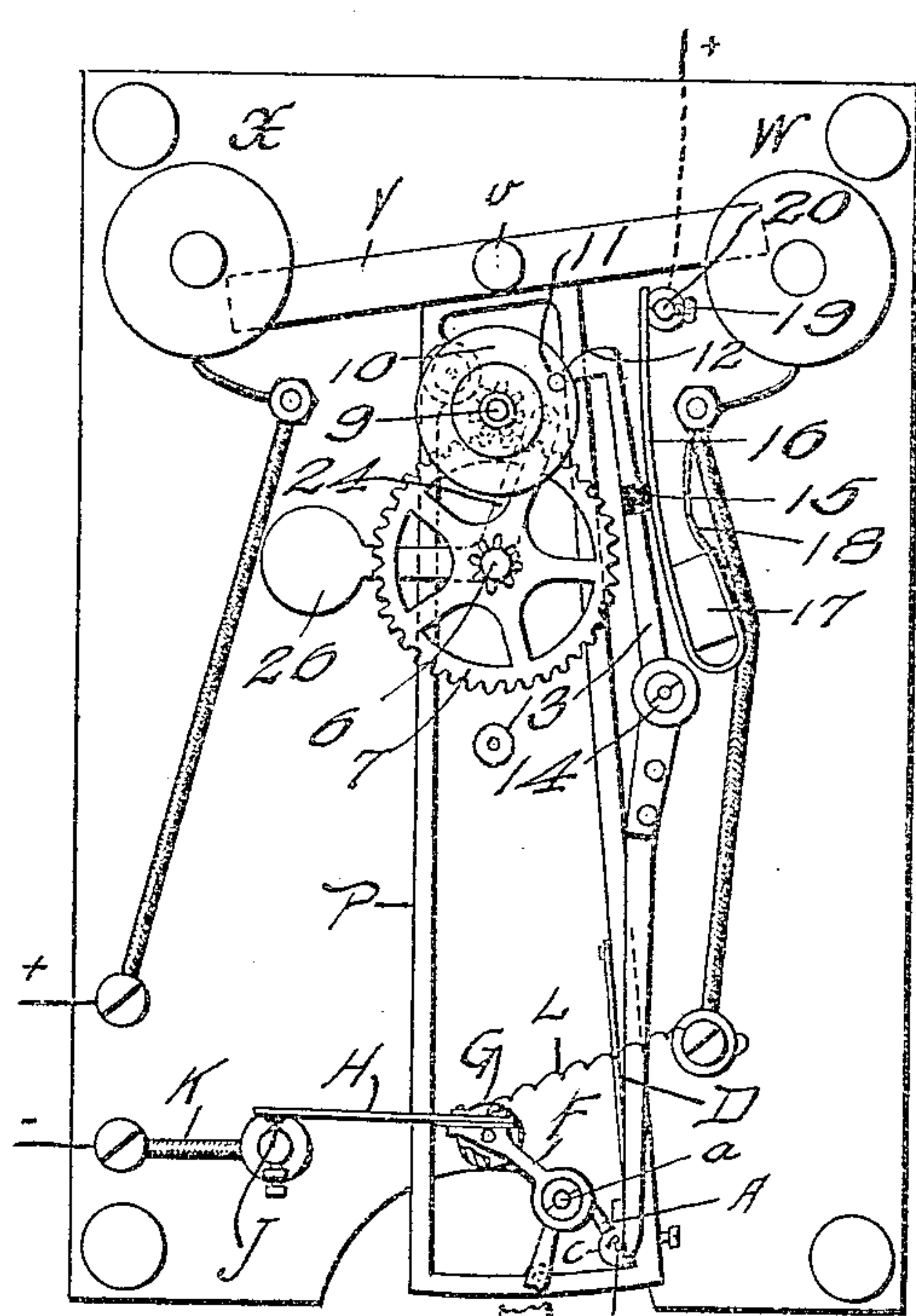
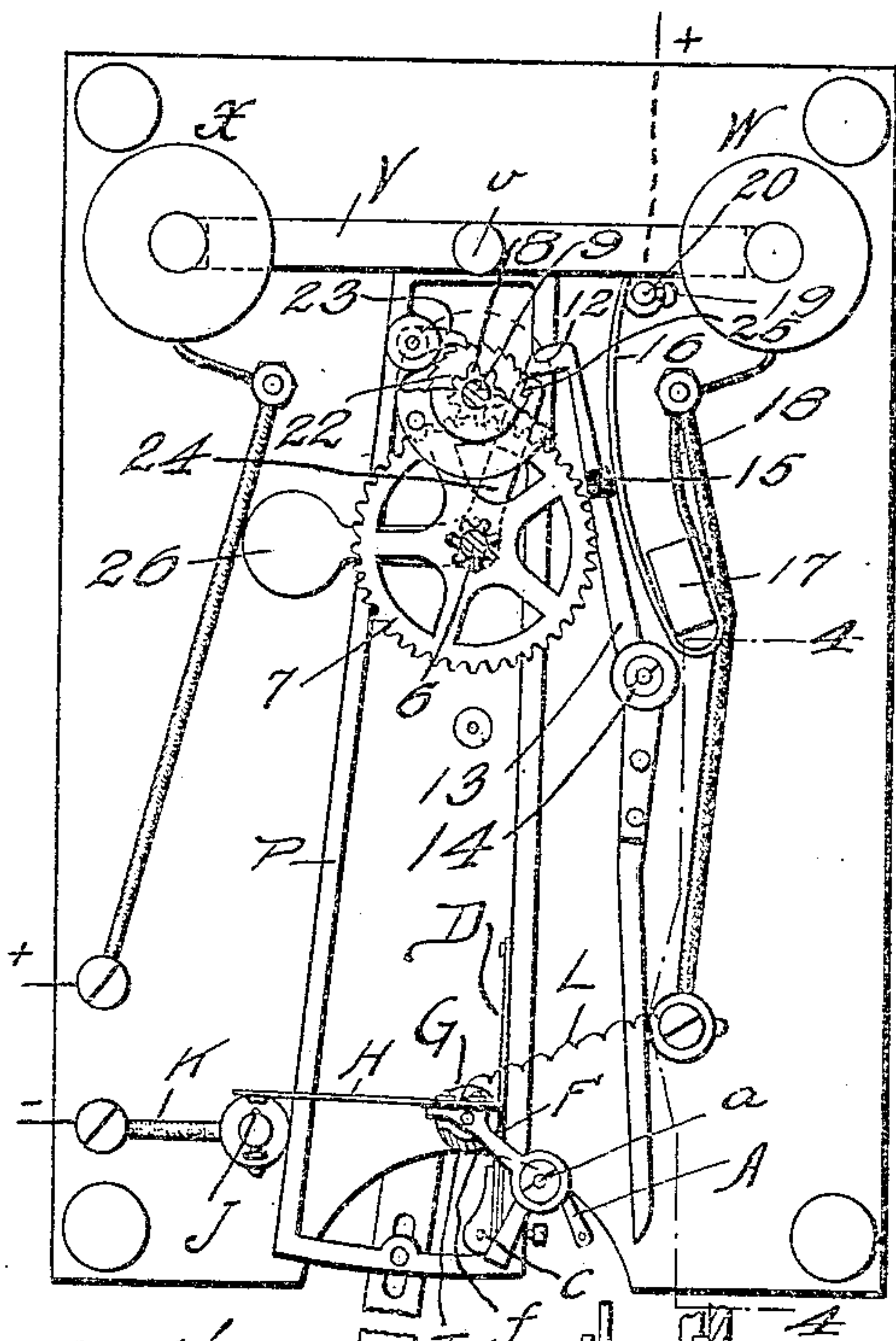
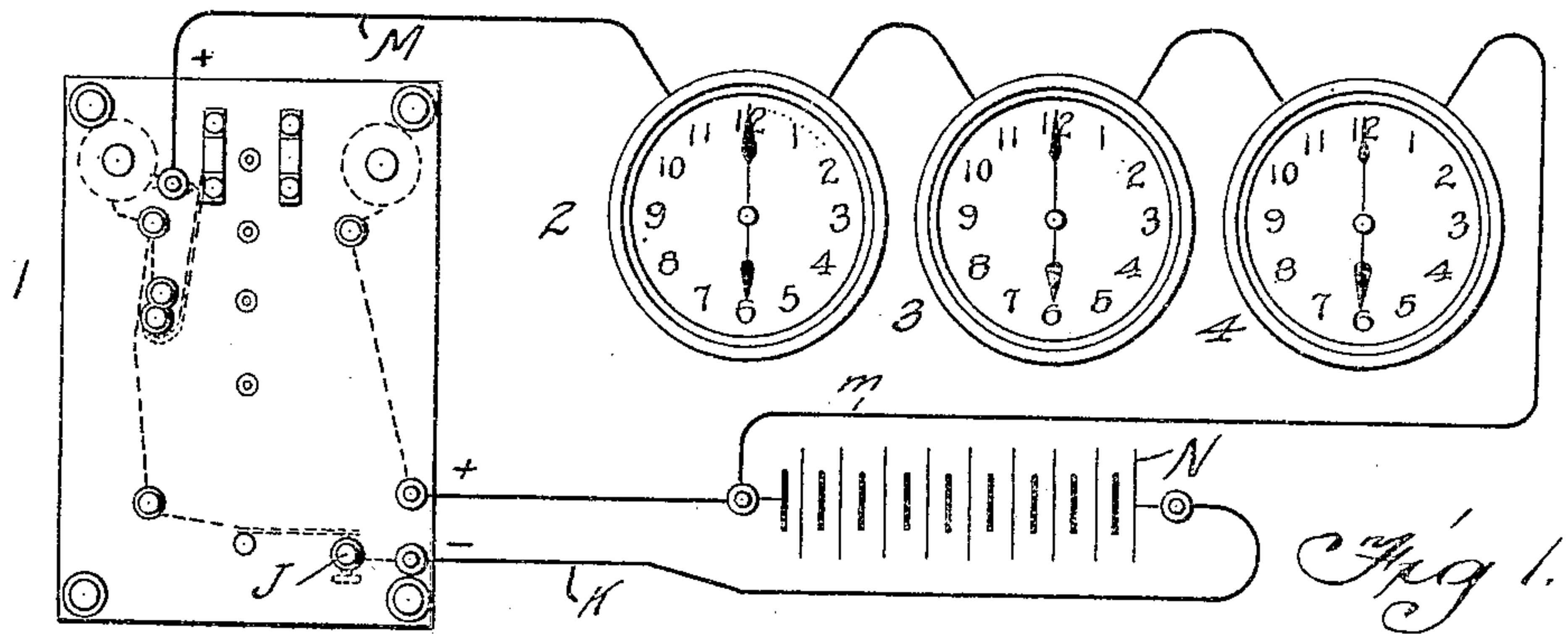


R. D. HICKOK.  
ELECTRIC CLOCK.  
APPLICATION FILED NOV. 5, 1908.

930,754.

Patented Aug. 10, 1909.



Witnesses

*Geo. S. Thorne*  
*Arthur M. May*

Inventor

*R. D. Hickok*

By

*Geo. E. Tew*  
Attorney



# UNITED STATES PATENT OFFICE.

ROBERT D. HICKOK, OF ATLANTA, GEORGIA.

## ELECTRIC CLOCK.

No. 930,754.

Specification of Letters Patent.

Patented Aug. 10, 1909.

Application filed November 5, 1908. Serial No. 461,171.

*To all whom it may concern:*

Be it known that I, ROBERT D. HICKOK, citizen of the United States, residing at Atlanta, in the county of Fulton and State of Georgia, have invented certain new and useful Improvements in Electric Clocks, of which the following is a specification.

In my Patent No. 904,128, dated Nov. 17, 1908, there is disclosed an electric clock mechanism for actuating a pendulum by means of electro-magnets at a "minimum beat", the mechanism operating to close the circuit of the magnets at intervals. In said patent the circuit-closing devices are confined or applied only to the clock in which said mechanism is contained. The present invention is an improvement on or addition to said mechanism, having for its object to provide improved means for operating secondary clocks, at predetermined intervals, and forming a system in which the master clock is actuated at the minimum beat, and in which the secondary clocks are actuated at predetermined intervals, such as once a minute, the master clock mechanism being utilized for both purposes.

The invention is illustrated in the accompanying drawings in which—

Figure 1 is a diagram of the system showing the electrical connections; Figs. 2 and 3 are elevations of the master clock mechanism in different positions; Fig. 4 is a detail in section on the line 4—4 of Fig. 2; Fig. 5 is an enlarged detail of part of the circuit closing means.

Referring specifically to the drawings, P indicates the pendulum frame carrying the armature V which is pivoted at *v* to vibrate between the poles of the electro-magnets X and W. G indicates a circular bridge or bearing support in which is mounted for vibration an arbor T which carries an arm F which stops against a shoulder *f* on the bridge, and which causes its position at rest to be as shown in Fig. 1. From the arm F is suspended, by a pivot *a*, an inverted V-shaped pendant A, pivoted at the angle at the top. The lower end of one arm of the pendant has a projecting piece B, which is notched on the under side and which projects backwardly from the pendant A. The arbor T carries a flat insulated spring H to which the wire L of one side of the circuit is connected, and the wire K on the other side terminates in a screw J with which the spring H contacts. These parts are substantially

the same as those described in the above mentioned patent, to which reference is made for a more detailed description. As described in said patent, when the pendulum reaches its minimum beat, the pin C which is carried by the pendulum frame will catch in the notch or groove on the under side of the piece B, and when the pendulum swings to the left will lift said pendant and the arm F and close the circuit between spring H and contact J, thereby imparting an impulse to the armature V by means of the electro-magnets; and continued swing of the pendulum to the left disengages the pin C from the piece B and the parts resume their normal position and operation until the minimum oscillation is again reached, when the operation for closing the circuit is repeated. This operates the master or primary clock indicated at 1.

The apparatus for use in connection with secondary clocks, indicated at 2, 3 and 4, is as follows: 6 indicates an arbor carrying a gear 7 which meshes with a pinion 8 on the arbor 9 which carries or may carry a seconds hand of the primary clock, although this is not material. This arbor has thereon a disk wheel 10 having a rearwardly projecting pin 11 which at each rotation of the arbor is adapted to strike the inclined head 12 of a lever 13 which is pivoted at 14 to the back plate of the movement. The upper arm of this lever carries a non-conducting block 15 which is adapted to strike a spring contact piece 16 fixed to a post 17 on the back plate, and the spring is connected at its fixed end by a wire 18 to the wire leading to the magnets X and W. The free end of the spring is adapted to strike a contact screw 19 fitted in a binding post 20, which is connected by a wire M to the secondary clock circuit which is completed by a wire *m* through the battery N and to the wire K which terminates at the contact J and thus to the circuit closing devices of the primary clock. The lower arm of the lever 13 projects to a position in the path of the pin C, which, as described in my said patent, projects from a block *c* carried by a flat spring D attached at its upper end to the pendulum frame P. The arbor 9 also carries a ratchet 22 which is engaged by a pawl 23 carried by the upper end of the pendulum frame P, for the purpose of turning the ratchet and the arbor 9 at each swing to the right of the pendulum. Back slip is prevented by a detent 24 having a projecting



pin 25 and a lower arm with a weight 26 which causes the pin to engage the ratchet after each movement thereof. The lower end of the lever 13 is so positioned that when actuated or swung to the left it will strike and stop the pin C in position directly under the piece B, as shown in Figs. 3 and 5, causing said pin to catch in said piece and close the circuit as above described.

10 In operation, starting with a vibration of the pendulum and its frame to the right, said vibration turns the arbor 9 and finally by continued vibrations the pin 11 is brought in contact with the head 12 of the lever 13  
15 thereby swinging the upper arm of the lever outwardly and pressing the spring 16 against the contact 19. The same action causes the lower end of the lever to stop the pin C and to close the circuit at J by the means already  
20 described. When these contacts are made as described the circuit is closed through the magnets and also through the secondary clocks. One circuit is through the magnet coils and the battery and the other branch  
25 of the circuit is through the secondary clocks to the battery. The arbor 9 being rotated once a minute, say, will thus close the secondary clock circuit once each minute, and this circuit may be utilized in said clocks,  
30 for the operation thereof, in any way desired. The battery power is made such that the contact which is thus made at every minute is not sufficient to maintain the vibration of the pendulum; therefore the contact maker described in my said patent, and  
35 which operates at the minimum beat, will also be actuated whenever it is necessary to maintain the vibration of the pendulum, but these contacts which occur at the minimum  
40 beats and which will take place between the periodical minute contacts, will not operate the secondary clocks, as the switch contact between the spring 16 and part 19 is not closed. To resume: The apparatus will op-  
45 erate to actuate the magnets of the primary clock whenever it is necessary to give an impulse to the pendulum to maintain its movement, and will further operate at each minute (or other selected interval) to close the  
50 circuit of the secondary clocks and thereby operate the same.

The apparatus may be modified in various ways within the scope of the invention, and no limitation is implied by reason of the  
55 particular devices shown and described.

I claim:

1. In an electric clock system, the combination with a primary clock having an operating circuit, and a secondary clock having  
60 an operating circuit in shunt to said circuit, of means controlled by the primary clock to simultaneously close both circuits.

2. In an electric clock system, the combination with a primary clock having a pendu-  
65 lum actuated operating circuit, and a sec-

ondary clock having an operating circuit including part of said circuit, of means to close the former circuit at minimum beats of the pendulum, and means including part of said means and controlled by the primary clock  
70 to close the latter circuit at predetermined intervals.

3. In an electric clock system, the combination with a primary clock having a pendulum-actuated operating circuit, and a sec-  
75 ondary clock having an operating circuit including part of said circuit, of means to close the former circuit at minimum beats of the pendulum, and means controlled by the primary clock to close both the circuits at pre-  
80 determined intervals.

4. In an electric clock system, the combination with a primary clock having a pendulum-actuated operating circuit, and a sec-  
85 ondary clock having an operating circuit in shunt to said circuit, of means to close the circuit of the primary clock at intervals, and means to close the circuit of the secondary clock at other intervals.

5. In an electric clock system, the combination with a primary clock having a pendulum-actuated operating circuit, and a sec-  
90 ondary clock having an operating circuit in shunt to said circuit and with a circuit-closer therein, of a circuit-closer operated by minimum beat of the pendulum to close the circuit of the primary clock, and means actuated by the pendulum to operate both of the  
95 said circuit-closers at predetermined intervals.

6. In an electric clock, the combination of a swinging pendulum frame and an operating circuit, means to close said circuit, including a circuit closer, and a spring-supported device which swings with the frame  
100 and which operates the circuit closer at minimum beat, a stop movable into the path of said device, to arrest its swing at the minimum point, and means actuated by the pendulum to so advance said stop at predeter-  
105 mined intervals.

7. In an electric clock system, the combination of a swinging pendulum frame and an operating circuit, means to close said circuit at minimum swing of the frame, including a  
110 circuit closer and a spring supported device which swings with the frame and which operates the circuit closer at minimum beat, a stop movable into the path of said device, to arrest its swing at the minimum point, a sec-  
115 ondary clock and its circuit in shunt to the said circuit including a circuit closer, and means actuated by the pendulum to simultaneously advance the stop and operate the circuit-closer of the circuit of the secondary  
120 clock at predetermined intervals.

8. In an electric clock system, the combination of a swinging pendulum frame and an operating circuit, means to close said circuit at minimum swing of the frame, including a  
130



circuit-closer and a spring supported device which swings with the frame and which operates the circuit-closer at minimum beat, a lever movable into the path of the said device, to arrest its swing at the minimum point, a secondary clock and its circuit in shunt to the said circuit and including a circuit closer in position to be operated by the lever, and means actuated by the pendulum

to swing the lever at predetermined intervals, to stop said device and to operate the last-mentioned circuit closer.

In testimony whereof, I affix my signature in presence of two witnesses.

ROBERT D. HICKOK.

Witnesses:

JOHN B. WOODS,  
C. R. JAMES.