

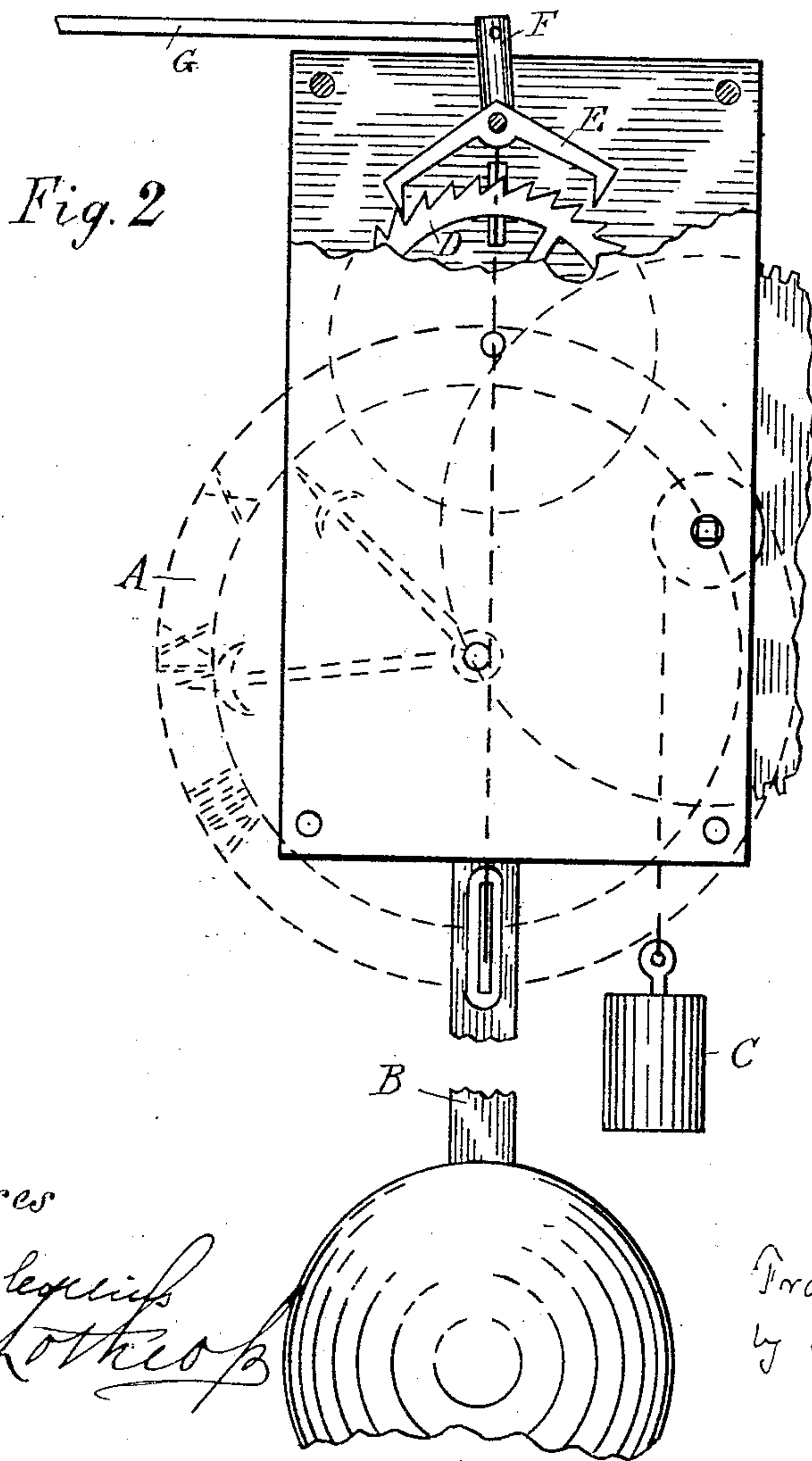
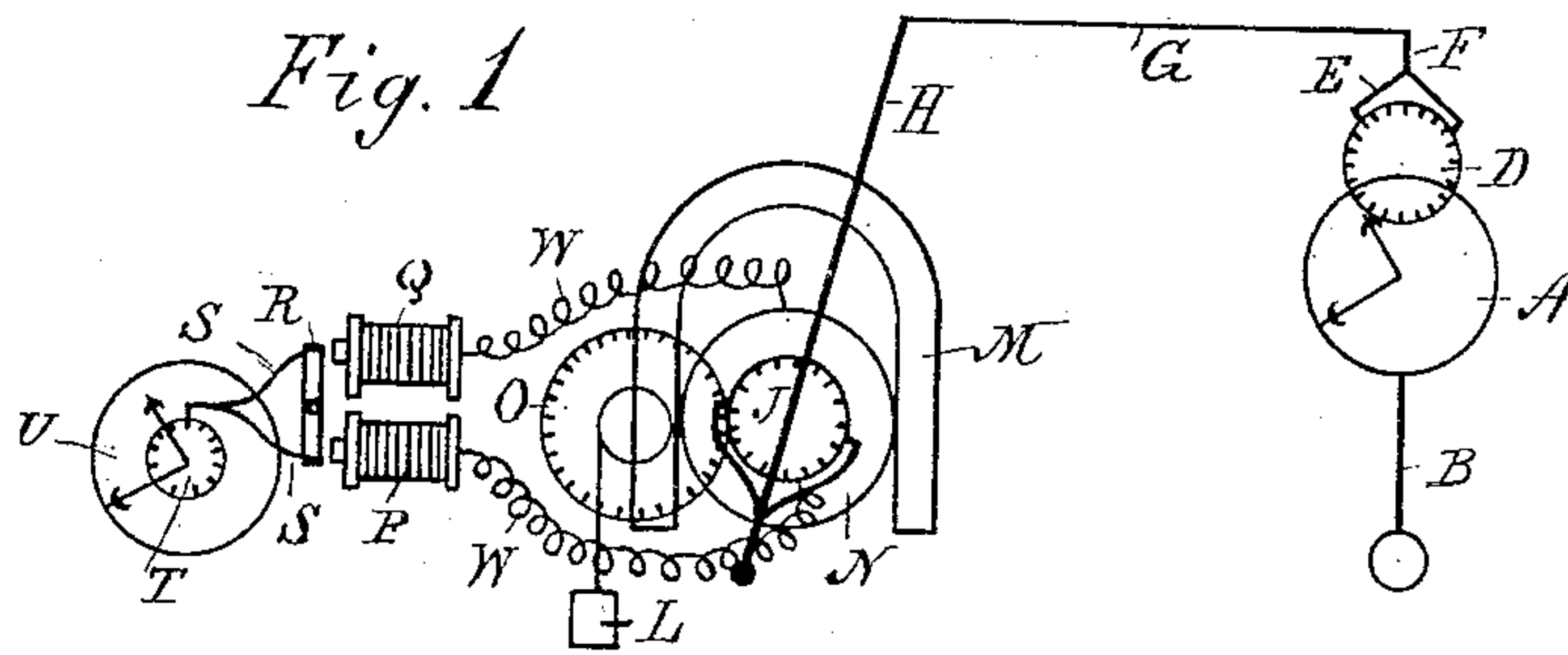
(No Model.)

4 Sheets—Sheet 1.

F. E. FISHER.
ELECTRIC CLOCK SYSTEM.

No. 336.004.

Patented Feb. 9, 1886.



Witnesses
Samuel Lewis
Geo. H. Lothrop

Inventor
Frank E. Fisher
by Geo. H. Lothrop
Atty.

(No Model.)

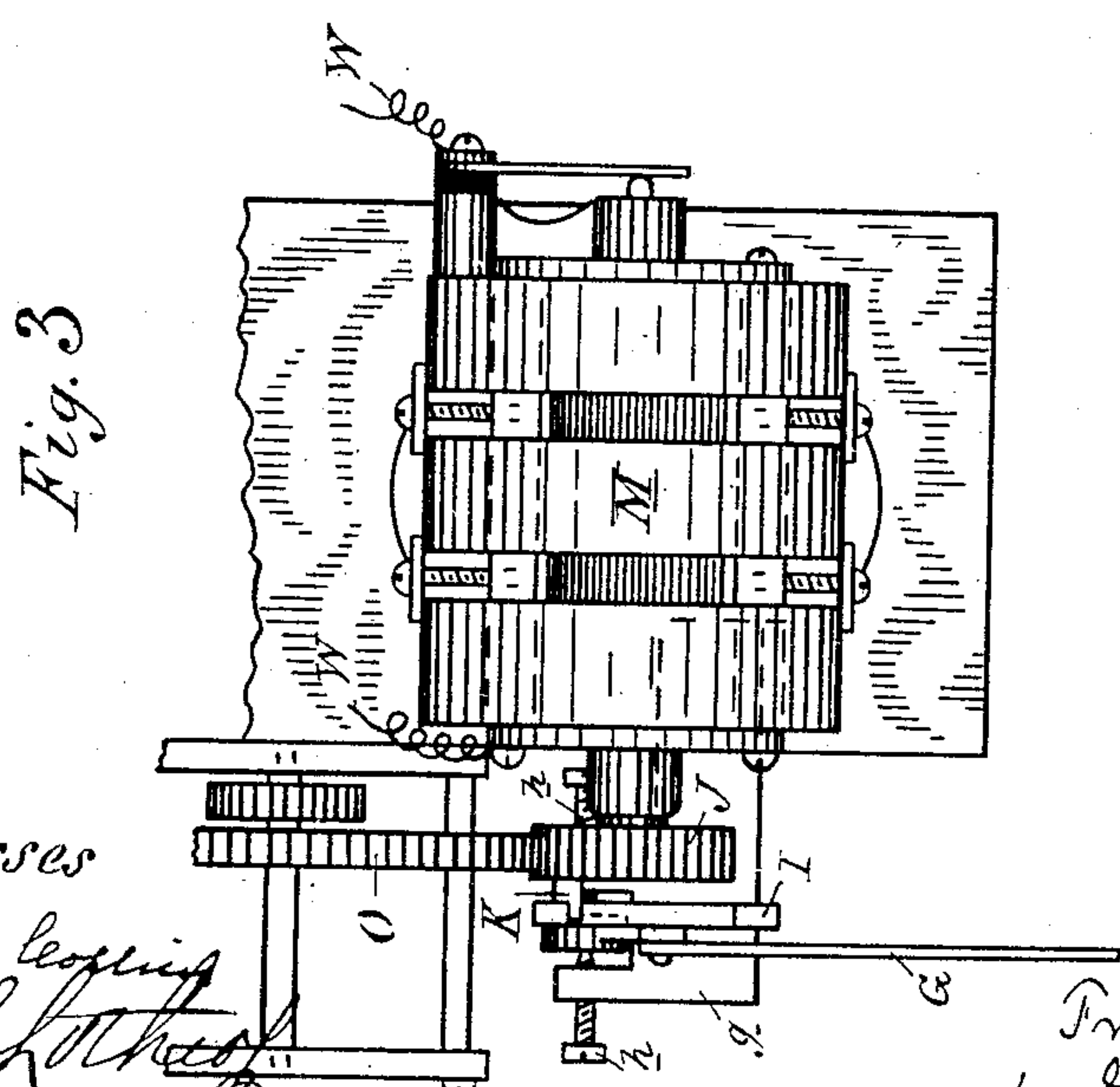
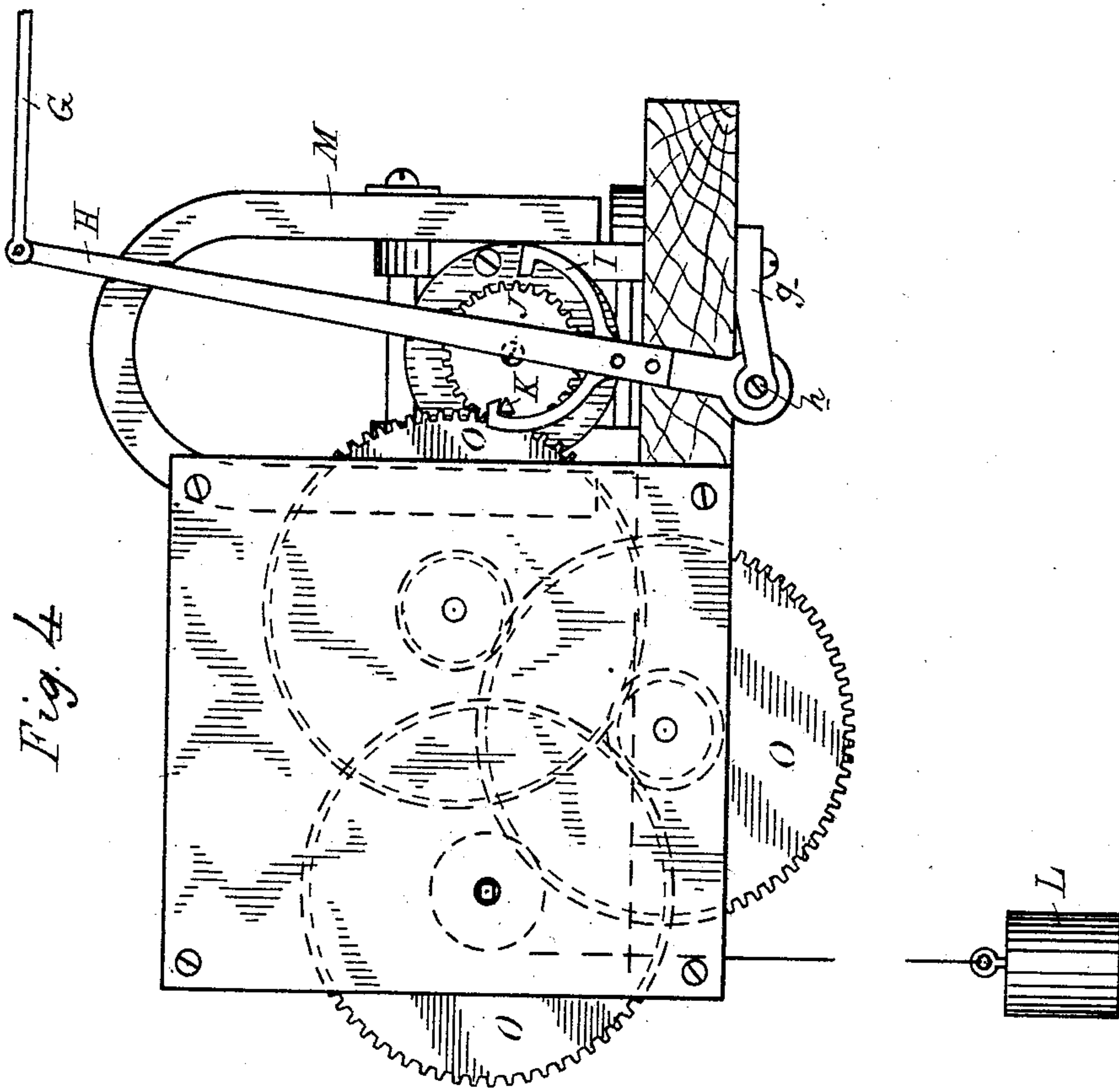
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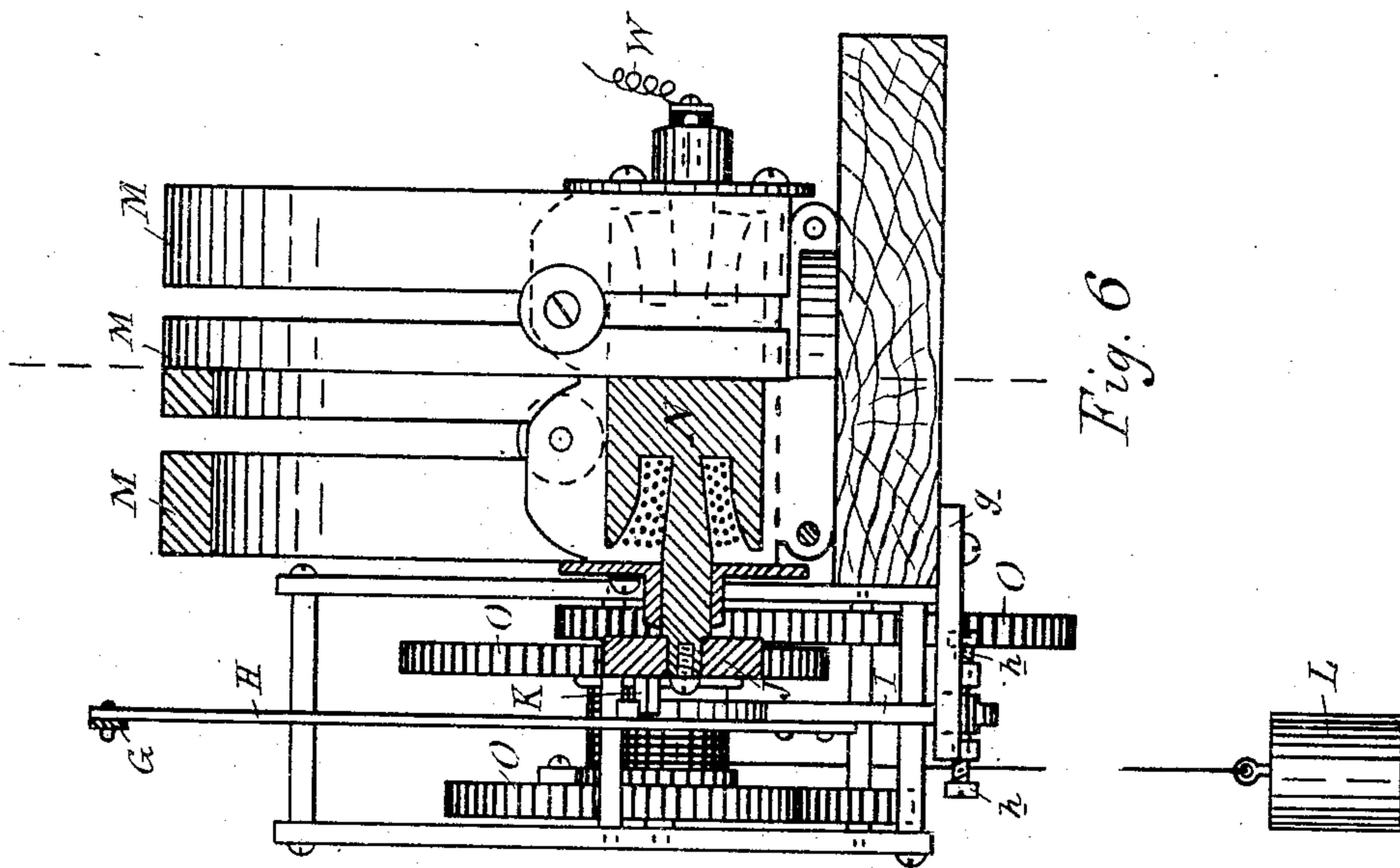


Fig. 6

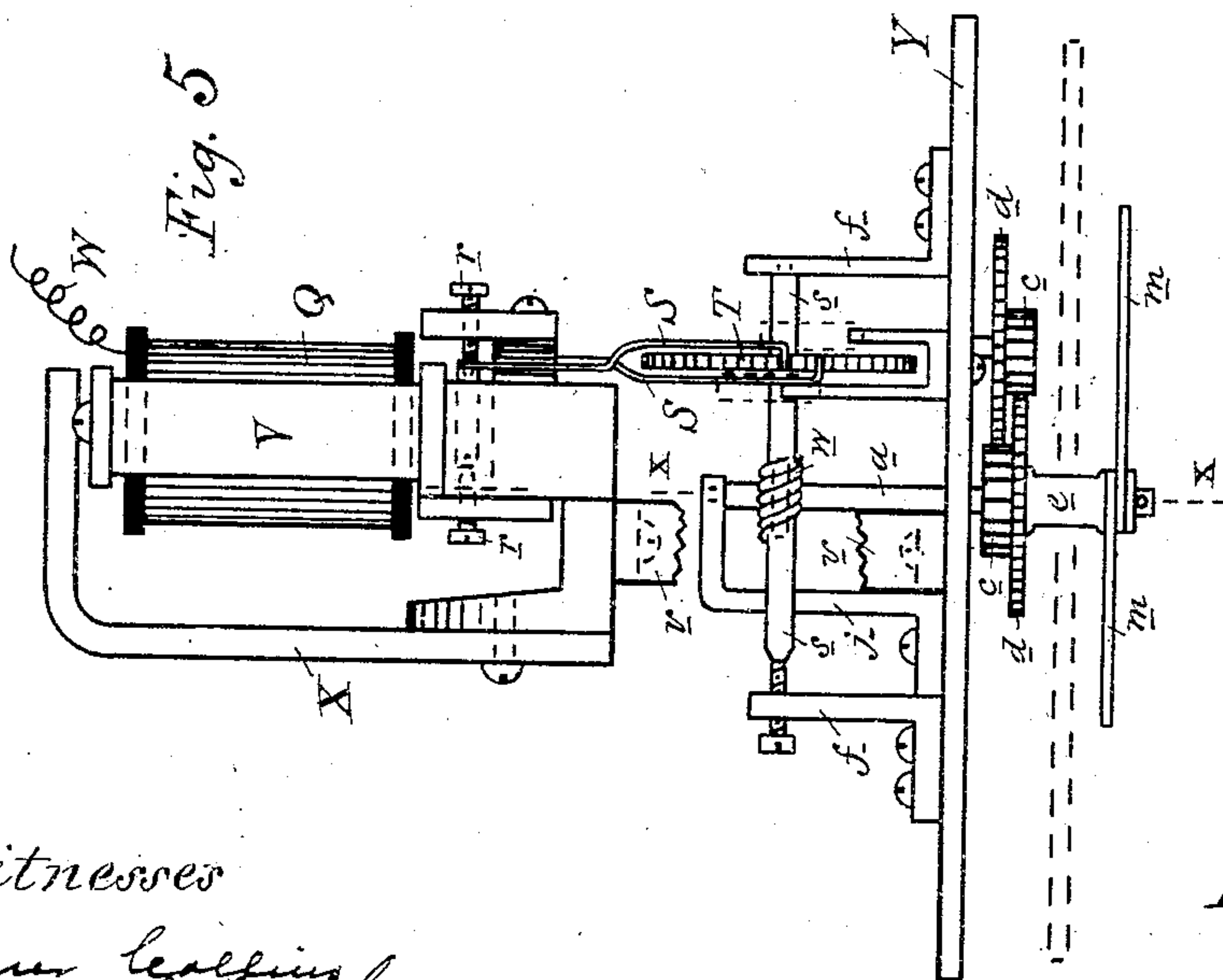


Fig. 5

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Fig. 7

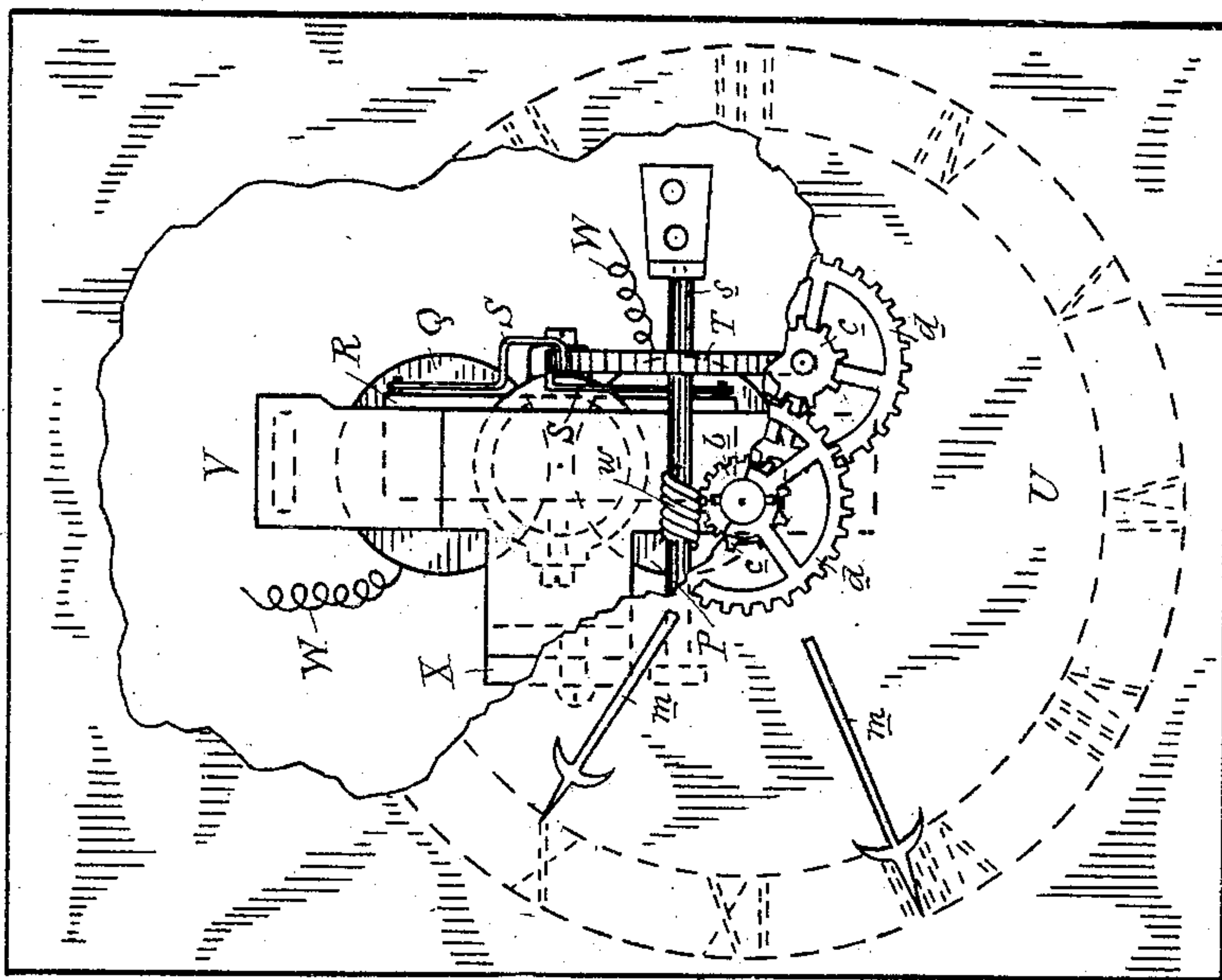
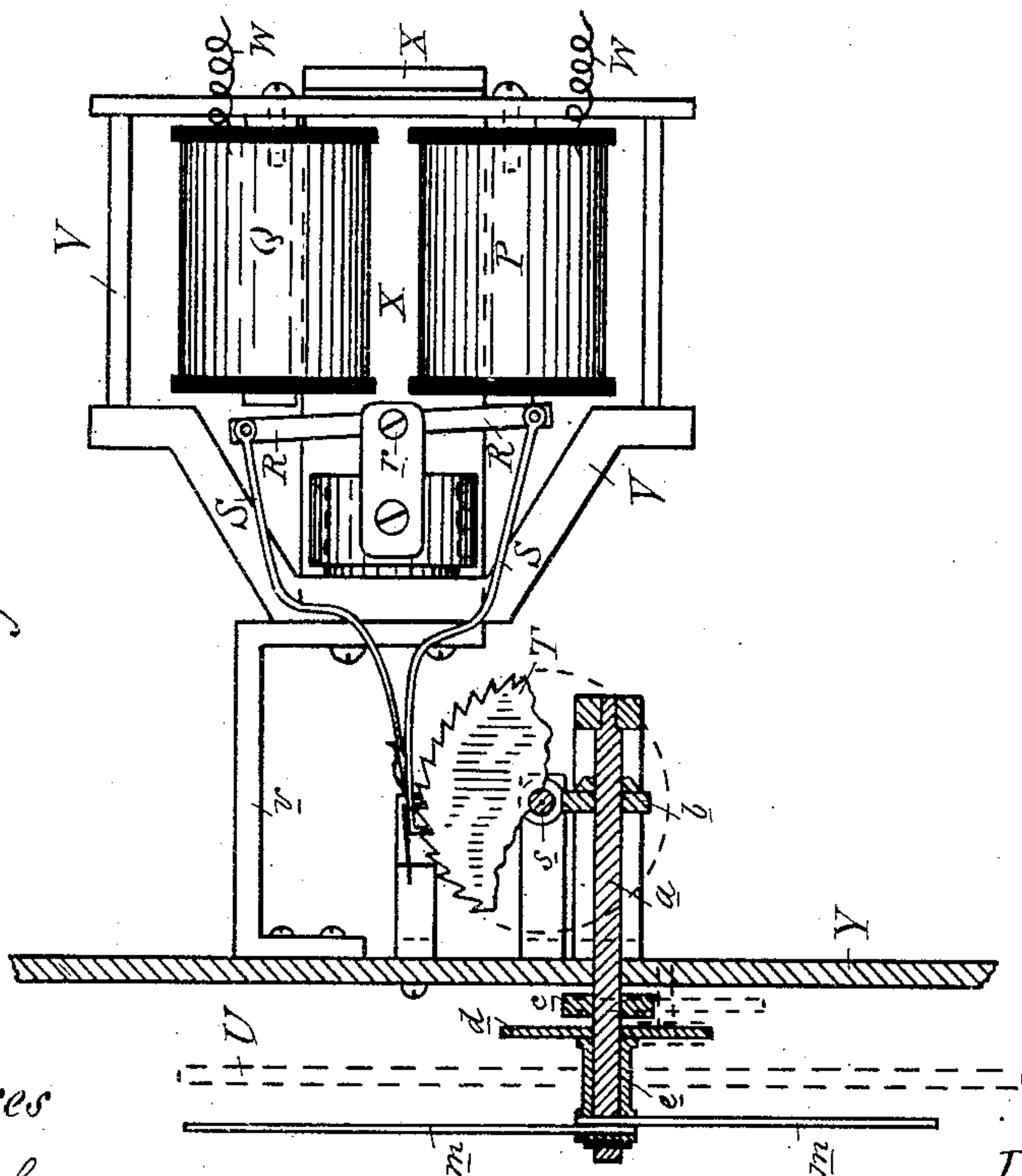


Fig. 8



Witnesses

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UNITED STATES PATENT OFFICE.

FRANK E. FISHER, OF DETROIT, MICHIGAN.

ELECTRIC-CLOCK SYSTEM.

SPECIFICATION forming part of Letters Patent No. 336,004, dated February 9, 1886.

Application filed October 6, 1885. Serial No. 179,156. (No model.)

To all whom it may concern:

Be it known that I, FRANK E. FISHER, of Detroit, in the county of Wayne and State of Michigan, have invented a new and useful Improvement in Electric-Clock Systems, of which the following is a specification.

My invention consists in an improvement in electric-clock systems, hereinafter fully pointed out in the claims.

Figure 1 is a detail showing the connections between the regulator and one of the clocks. Fig. 2 is an enlarged front elevation of a portion of the regulator. Fig. 3 is a plan view of the generator, and Fig. 4 is a side elevation thereof. Fig. 5 is a plan view of the mechanism of one of the clocks. Fig. 6 is an elevation of the magneto-generator, partly in vertical section. Fig. 7 is a front elevation of one of the clocks, with the dial and case partly broken away to show the mechanism. Fig. 8 is a vertical section on the line *x x*, Fig. 5.

My invention relates to that class of clocks in which a central regulator is electrically connected with one or more clocks, which are operated by electrical impulses controlled by the mechanism of the regulator.

A represents a regulator of the ordinary type having a pendulum and pendulum-rod, B.

C represents the going-weight of the regulator.

E represents the pallet of the regulator, and D the escape-wheel thereof.

F represents a short rod, one end of which is secured to the shaft that carries the pallet E, so that rod F will rock with said shaft.

G represents a connecting-rod, one end of which is pivoted to the free end of rod F, and the other end is pivoted to the free end of a lever, H, the other end of which is pivoted at the point *h* to a suitable support, *g*, secured to the frame of the regulator, or in any convenient adjacent place.

M represents the permanent magnets, and N the armature of an ordinary magneto-electric generator, the construction and connection of which are so well understood that I do not deem detailed description thereof necessary.

J represents a pinion secured to one end of the armature-shaft, carrying thereon a projecting tooth, K.

O represents a train of wheel-work connect-

ing with pinion J, and L represents a weight adapted to run said wheel-work.

I represents a pallet secured to lever H, and acting upon tooth K exactly as the pallet E acts upon the teeth of the escape-wheel D, except that, as there is only one tooth upon pinion J which engages with the pallet I, said pinion will make a half-revolution at each oscillation of the pallet.

P Q represent the cores of an ordinary polarized electro-magnet—such as is used in magneto call-bells—having a frame, V, to carry the coils, and a permanent magnet, X, secured to the frame. This electro-magnet is placed in each clock to be driven from the regulator, and its coils P Q are connected with the poles of the generator by wires W, so as to form a continuous closed circuit.

R represents an armature centrally pivoted at *r*, so that its ends are opposite the cores of the coils P Q.

S S represent two pawls, one pivoted at each end of armature R, and having their free ends resting on the top of a ratchet-wheel, T, one pawl being shorter than the other, so that both can work freely on said wheel, as shown in Fig. 5. Ratchet-wheel T is mounted on a shaft, *s*, journaled in brackets *f*, secured to the frame Y of the clock, and on said shaft is secured a worm, *w*, which meshes into a pinion, *b*, secured on a shaft, *a*, which projects through the frame Y and dial U of the clock, and carries on its end the minute-hand *m*.

e represents a sleeve surrounding the outer end of shaft *a*, on which is fastened an hour-hand, *m*, and a slow motion is transmitted to this sleeve from shaft *a* by the ordinary train of pinions, *c*, and wheels *d*, commonly employed in clocks for that purpose.

Any of the ordinary mechanisms used in clocks to transmit motion to the hands may be used to transmit the motion from wheel T to the hands instead of the worm-gear shown; and it is evident that instead of employing two coils P Q only one of them may be used, in which case the armature R would be provided with a retracting-spring, such as is commonly used on the armature of a telegraph-relay.

The operation of my invention is as follows: Each beat of the pendulum B in the regulator oscillates pallet E and rocks rod F. The mo-

tion of rod F is communicated through connecting-rod G to lever H, so that said lever oscillates in unison with pallet E and oscillates pallet I. At each oscillation of pallet I
 5 tooth K is released from one arm of the pallet, and the weight L sets in motion the train of wheel-work O, and causes pinion J, and with it armature N, to make a half-revolution, which is arrested by tooth K coming in contact with the other arm of pallet I. When-
 10 ever tooth K leaves one arm of pallet I, it gives said pallet an impulse precisely such as pallet E receives from the escape-wheel, and thus compensates for the friction of the connections between the pendulum of the regu-
 15 lator and pallet I, so that no additional load is thrown on the pendulum of the regulator. The circuit composed of the magneto-generator M N, wires W, and coils P Q being constantly
 20 closed, each semi-revolution of the armature N sends an electric current through said circuit and magnetizes the cores of the coils P Q W; but the direction of the current is reversed at each semi-revolution of the armature N, so
 25 that the cores of the coils P Q have their polarity reversed with each electrical impulse, and each core alternately attracts and repels the adjacent end of armature R, and this causes said armature to oscillate on its pivot
 30 r, thus communicating motion to the pawls S S, and advancing wheel T one step at each movement of armature R. As the pendulum B of the regulator usually beats seconds, it will be seen that each clock driven from said

regulator will also mark seconds. It will also
 be seen that I employ a continuously-closed circuit and alternating electrical impulses, and thus avoid all oxidation of contact-points, and the consequent failure of the circuit to transmit a current. 35

What I claim as my invention, and desire to secure by Letters Patent, is— 40

1. The combination, with the pendulum of a regulator, of a magneto-electric machine, suitable power to drive said magneto, a pal-
 45 let connected with the pendulum of the regulator and adapted to operate upon a tooth on the armature of the magneto, and a clock having therein an electro-magnet connected with the poles of the magneto by a continuously-
 50 closed circuit, substantially as shown and described.

2. In combination with the pendulum Band pallet E of the regulator A, the rod F, connecting-rod G, lever H, pallet I, and magneto
 55 M N, having the tooth K on its armature, substantially as shown and described.

3. In an electrical clock, the combination of the ratchet-wheel T, electro-magnet P Q, connected with a magneto-electric machine, and
 60 pivoted armature R, having thereon the pawls S S, adapted to operate said wheel T, substantially as shown and described.

FRANK E. FISHER.

Witnesses:

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