N° 19,261 A.D. 1899

Date of Application, 25th Sept., 1899

Complete Specification Left, 25th June, 1900—Accepted, 11th Aug., 1900

PROVISIONAL SPECIFICATION.

Improvements in Means for Electrically Re-winding Clock or similar Mechanism.

We, THE BRITISH THOMSON-HOUSTON COMPANY, LIMITED, and FRANK HOLDEN, all of 83, Cannon Street, in the City of London, Electrical Engineers, do hereby declare the nature of this invention to be as follows:—

This invention relates to a mechanism for rewinding clocks or other similar apparatus by electrical means. Devices of this kind heretofore used or described, have, in general, either failed in practice from one cause or another or have possessed undesirable complications, and we believe the present invention to be both novel and an improvement on these.

The novelty of this invention consists essentially in the contact opening and closing device which is applicable to many of the well known electro-magnetic arrangements used for obtaining a reciprocating motion by the use of electric currents, which are periodically interrupted. This reciprocating motion may, by the use of a pawl and ratchet or other common expedient, be made to wind the clock.

The contact device may also be applied so that the reciprocating part itself corresponds to the balance wheel of the clock, and the clock work being actuated by a pawl and ratchet arrangement or otherwise. The contact arrangement is such that when the movable member "A" of the electro-magnetic device has reached a certain position in unwinding, it, by its movement, closes the circuit of the electro-magnet.

The movable member "A" carries a contact "B" extending at least over the angle through which it is desirable to have the magnetic pull take place. When the first contact is made the parts become magnetized and at once attract a second contact piece "C" on to the movable contact "B" in opposition to the spring attached to "C" which otherwise would keep the circuit open. The movable member "A" as soon as it moves, breaks the first contact, but the circuit is held closed till the movable contact "B" breaks the circuit by sliding by the attracted contact "C."

By this means the circuit of the electro-magnet is kept closed by continuous contact between "B" and "C" for a greater or lesser fraction of the whole motion of the movable member "A." During this period the magnetic pull is continuously exerted on "A" causing it to increase its velocity to any desired extent before the circuit of the electro-magnet is opened by the contact "B" sliding away from "C."

Part of the energy required for rewinding the clock or other device is stored kinetically in the movable member "A" while under the influence of the

[*Price* 8*d.*]

magnetic pull. The arrangement described affords a very simple means for obtaining a cyclical movement of parts and enables all contacts to be of a rubbing character, and we have found further that it enables us to entirely avoid all injurious sparking of the contact pieces. In some cases we find it advantageous to connect a small condenser between the contacts "B" and "C" or shunting the magnetizing coil.

Dated this 25th day of September 1899.

THE BRITISH THOMSON-HOUSTON CO., LTD.,
A. R. MONKS,
Director,
ALFRED CLEMENTS,
Assistant Secretary,

and

FRANK HOLDEN,

COMPLETE SPECIFICATION.

Improvements in Means for Electrically Re-winding Clock or similar Mechanism.

We, THE BRITISH THOMSON-HOUSTON COMPANY, LIMITED, and FRANK HOLDEN, all of 83, Cannon Street, in the City of London, Electrical Engineers, do hereby declare the nature of this invention and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to a mechanism for rewinding clocks or other similar apparatus by electrical means. Devices of this kind heretofore used or described, have, in general, either failed in practice from one cause or another or have possessed undesirable complications, and we believe the present invention to be both novel and an improvement on these.

The novelty consists essentially in the contact closing and opening device which is applicable to many of the well known electro-magnetic arrangements whereby a reciprocating motion is obtained by the use of electric currents. This reciprocating motion may be used for winding the clock in any one of the ways now well understood.

Referring to the drawings in which the same letters indicate the same part, Fig. 1 is a plan view of the clock and winding mechanism for use on either alternating or direct current circuits, Fig. 2 is a side elevation of the same; Fig. 3 is a sectional view on plane Z, Z (Fig. 2); Fig. 4 a detail of the winding mechanism; Fig. 5 a detail of the contacts; Fig. 6 a plan view of a modified form of the contact mechanism of Figs. 1 and 2; Fig. 7 a plan of a simpler winding mechanism for use on continuous current circuits and Fig. 8 a side elevation of the mechanism shewn in Fig. 7.

The apparatus is composed of a clock mechanism and a winding mechanism. The former comprising a main spring, intermediate gears, pinions and escapement device, one of the several types of clock mechanism being clearly shewn in Figs. 3 and 4; the winding mechanism, shewn in plan in Fig. 1, comprises an electro-magnetic motor device for rewinding the main spring of the clock mechanism together with suitable contacts for making and breaking the electric circuits of the motor device at intervals as determined by the design of the motor device.

Improvements in Means for Electrically Re-winding Clock or similar Mechanism.

The electro-magnetic motor, as shewn in the accompanying figures, has been found to work well but we do not intend to limit ourselves to this precise arrangement as there are evidently many equivalents which would be quite as satisfactory to which the contact device may be equally well applied.

Referring to Figs. 2, 3 and 4, one end of the main spring E is fastened to the stud J fixed in the base F of the frame supporting the entire clock and winding mechanisms. The other end of the main spring E is attached to the rotatable shaft S. The ratchet wheel V, fastened to the shaft S, drives the gear G by means of the pawl x attached to the gear G by the pivot y. A small spring z fastened by stud z^1 to gear G maintains the pawl x in contact with the teeth of gear V. The gear G, mounted loosely on shaft S, drives the pinion L mounted on the shaft b^1.

The main shaft S passes through the plate F^1 and carries the armature A of the electro-magnetic motor device. The relative movements of the several parts of the clock and winding mechanisms during the unwinding period are indicated by arrows. Referring to Figs. 1 and 2, the motor rewinding device is shewn as an electro-magnet, P representing the iron core of the magnet and M the magnetising winding with terminals at screws e and b. The armature A is of iron and provided with two curved wings W and W^1 also preferably of iron. A block T of insulating material serves to support the steel or iron spring I and the metallic contact support I^1, the former being attached by screws a and b, and the latter by screws c and d. The block T^1 of insulating material serves as a terminal support; the screw e is connected to wire X of the current supply and the return is made through screw H to wire Y. The iron core P of the electro-magnet is attached to the non-magnetic plate F by means of screws Q, Q. The wing W^1 of the armature A carries a contact piece D and contact piece C^1 is mounted on the end of a flexible contact support I^1. The spring I carries a smaller spring B on which is mounted a contact piece C. N, N, are pieces of insulating material serving to prevent spring I from touching the iron core P.

The spring E in unwinding causes the armature A to rotate as shewn by the arrows. When contact D touches C^1, the circuit of the magnet winding M is closed on the current supply mains X, Y; and current flows as follows:—from wire X to screw e, magnet winding M to screw b, thence by the resistance R to screw d, spring I^1 contacts C^1 and D to wing W^1, armature A, shaft S, plate F and by screw H to main Y. The resistance R is used to limit the current flowing through the winding M on establishing contact at C^1, D. Upon the closure of the circuit of the magnet winding M at the contacts C^1, D, the core becomes magnetized, attracts the spring I and brings together the contacts C, W thereby short circuiting the resistance R. The magnetic forces due to the first contact are preferably not great enough to rotate the armature A, but with the increased current consequent on making the second contact C, W the armature A rotates.

The wing W is made of such a length that C does not leave it till the armature has almost reached the position of maximum pull, as shewn by dotted lines, but the armature continues to rotate through a considerably greater angle until its kinetic energy is given up in winding the spring E of the clock.

The contacts C^1 D are separated by the first movement of A but as the contacts C W are touching there is no spark at C^1, D, and when C and W are separate the velocity of C is so great that serious sparking is prevented.

While the device works well without a condenser it is advantageous to connect a condenser K in multiple with the winding M thereby reducing possible sparking between C and W to a negligible quantity; a resistance R^1 of suitable value being connected in series with the condenser with the object of preventing excessive charging currents.

By this arrangement a cyclical movement of the parts is obtained and all contacts are made of a rubbing character and therefore self cleaning; good electrical contacts are thus obtained, an indispensable condition to successful operation of such devices.

The contact C, is, as already stated, carried by a light spring B, itself attached to the spring I. This precaution is necessary in the case of alternating currents to avoid vibration and sparking at the contacts. The same arrangement will of course operate equally well on continuous current, but a simpler form to be described hereafter, is cheaper and quite as satisfactory.

In place of the spring I in Figs. 1 and 5, the arrangement of Fig. 6 may be employed without further modifications of the remainder of the apparatus shewn in both Figs. 1 and 5.

P is the core of the electro-magnet with its winding M as in the other figures; on the insulated block T is fastened a support U and acts as a pivot for the iron armature A^1 carrying the spring B^1 to which is attached the contact C rubbing on the surface wing W of the armature A of the motor device. The screw *g*, in contact with the support U, serves as a common terminal for the magnet winding M and the resistance R. Y^1 is a counter-weight sufficient to raise the armature A^1 from the unmagnetized core P. N and N are insulating pieces to prevent the contact of armature A^1 with the core P. *f* is an adjusting screw to limit the upward motion of A^1. The resistance R and the condenser K, together with the resistance R^1 are used for the same purposes and connected in the same manner as has already been elicited in connection with the mechanism of Figs. 1 and 2.

For use on continuous current circuits only, the form of winding mechanism shewn in Fig. 6 may be simplified by suppressing the contacts C^1 D support I and the resistance R.

It is obvious that with the arrangement the axis of the shaft S of the armature A, and the axis of the coil M must both lie in the same horizontal plane.

Figs. 5, 7 and 8, shew a simplified form of winding mechanism for use on continuous current circuits only. The contacts C^1 D, support I^1 and the resistance R of the mechanism if Figs. 1 and 2 are suppressed. The contact C is now mounted directly on the spring I and on the rotation of the armature A by the unwinding of the main spring E, contact is established between C and D^1.

The details of these contacts are shewn in Fig. 5. The circuit of the magnet winding M is closed when the contacts C and D^1 touch one another. Thereupon the contact C is at once brought into firm touch with the surface of the wing W because of the magnetic attraction between the wing W and the spring I due to the creation of a magnetic field of force by the magnet, some of the lines of the interpolar space being closed through the path offered by the iron wing W and the spring I.

The magnetic attraction between the electro-magnet and its armature A returns the latter to or beyond the medial position, thus winding the main spring. At the same time the circuit of the motor device is interrupted rapidly at the contact C when this leaves the tip of the wing W. A condenser K in series with a resistance R^1 and connected to the terminals of the magnet-winding M, as shewn, is also used with this mechanism and practically avoids any sparking.

To anyone skilled in the art it is obvious that the contacts C, W may be operated by an electro-magnet the winding of which is connected in series or shunt with the winding M of the motor device.

We believe the idea of having the contacts operated by the magnetic attraction of the winding magnet to be novel whether applied in the particular way described or otherwise.

Having now particularly described and ascertained the nature of our said invention and in what manner the same is to be performed, we declare that what we claim is:—

1.—Electrical winding mechanisms having a contact or contacts actuated by the magnetic field of the electro-magnetic motor device or by the magnetic field of an electro-magnet connected in series or shunt with the aforesaid motor winding, substantially as herein described.

Improvements in Means for Electrically Re-winding Clock or similar Mechanism.

2.—Electrical winding mechanisms comprising a winding device actuated by an electro-magnetic motor, circuit making and breaking contacts and the clock mechanism as described and shewn in the accompanying drawings.

Dated this 25th day of June 1900.

THE BRITISH THOMSON-HOUSTON CO., LTD.,
and
FRANK HOLDEN.

ALFRED CLEMENTS,
Assistant Secretary,

J. J. MANHEIM,
W. MARTINDALE, } Directors.

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THE BRITISH THOMSON—HOUSTON CO. [LD.] & another's Complete Specification.

SHEET 1

18 SHEETS.
SHEET 1

Fig. 1.

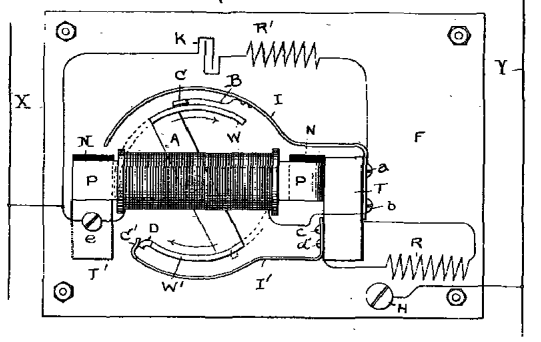


Fig. 2.

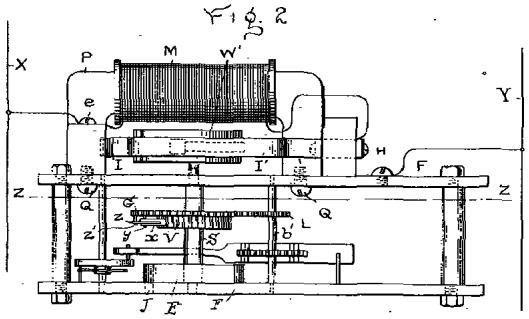


Fig. 3.

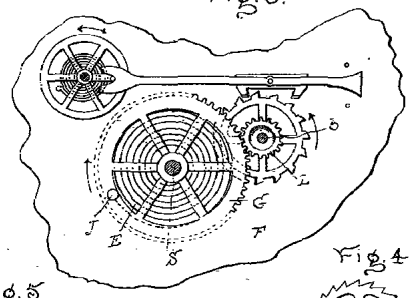


Fig. 5.

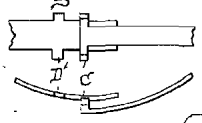


Fig. 4.

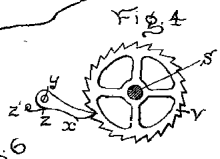
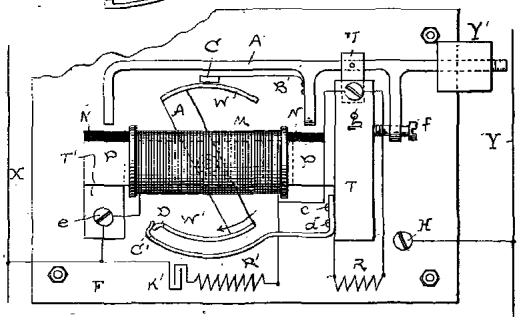


Fig. 6.



[This Drawing is a reproduction of the Original on a reduced scale.]

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A.D. 1899. Sep. 25. N.º 19,261.

THE BRITISH THOMSON—HOUSTON CO. [LD.] & *another's* COMPLETE SPECIFICATION.

Fig. 1.

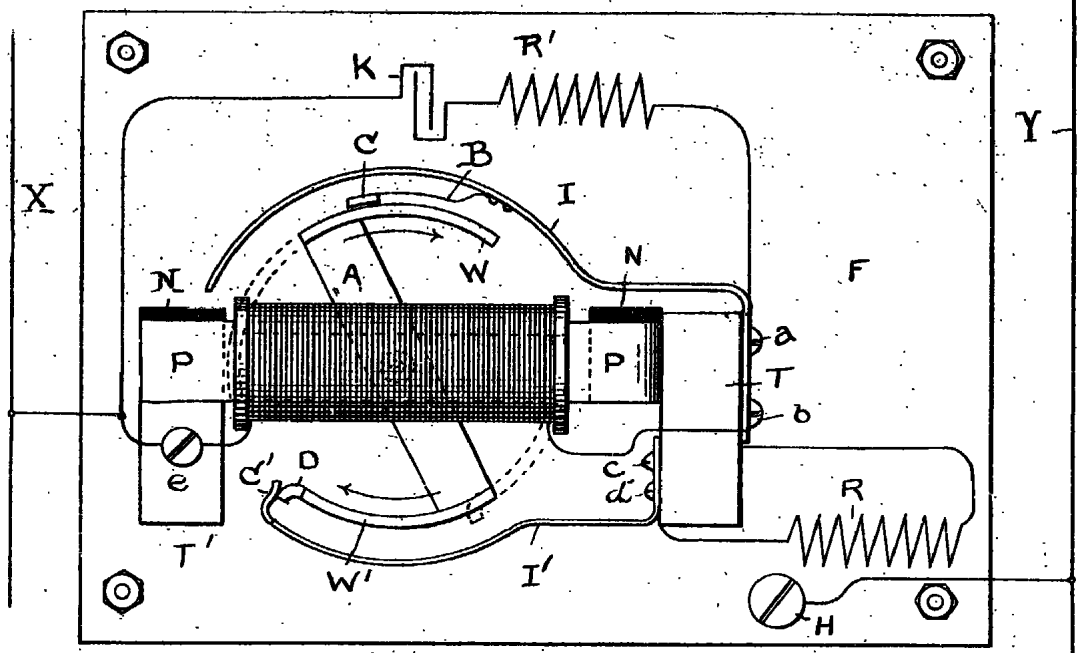

Fig. 2.

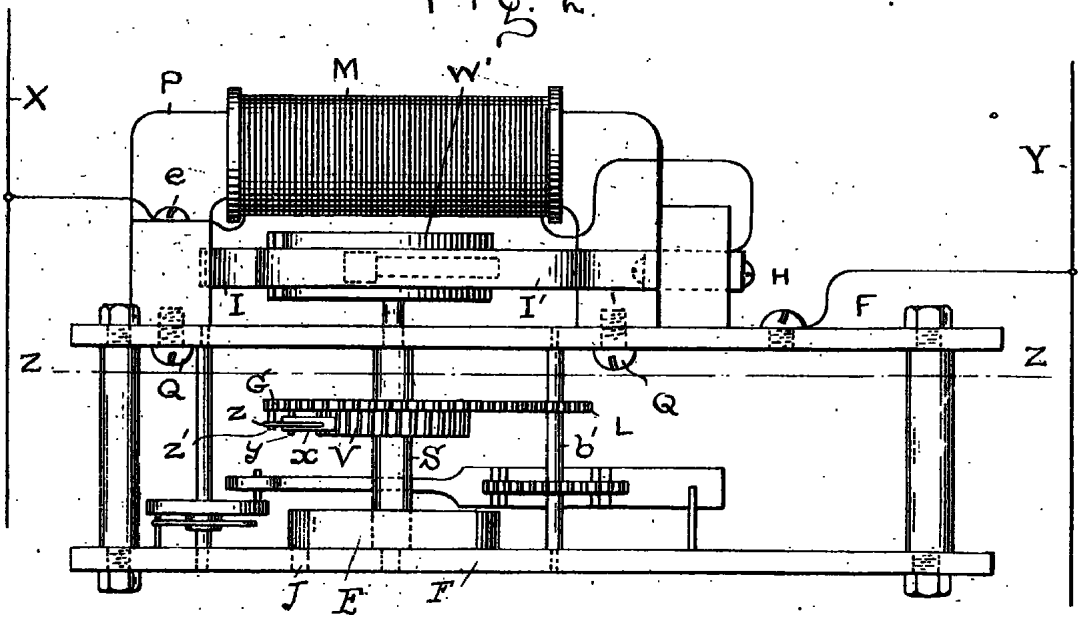

Fig. 3.

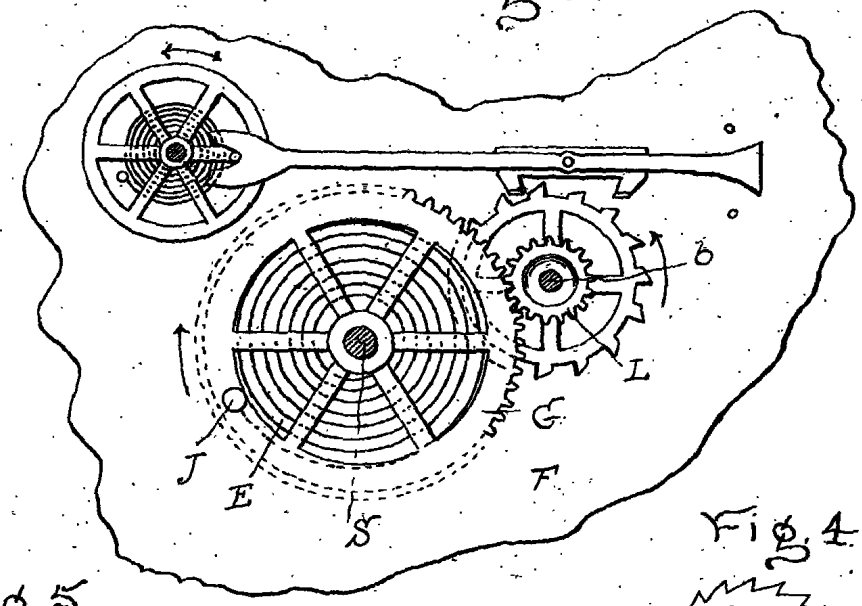

Fig. 4.

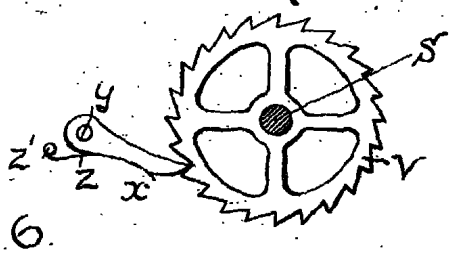

Fig. 5.

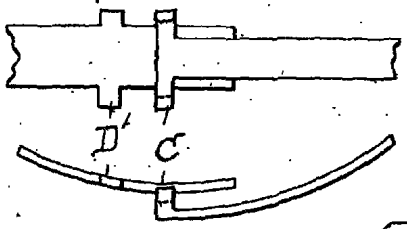

Fig. 6.

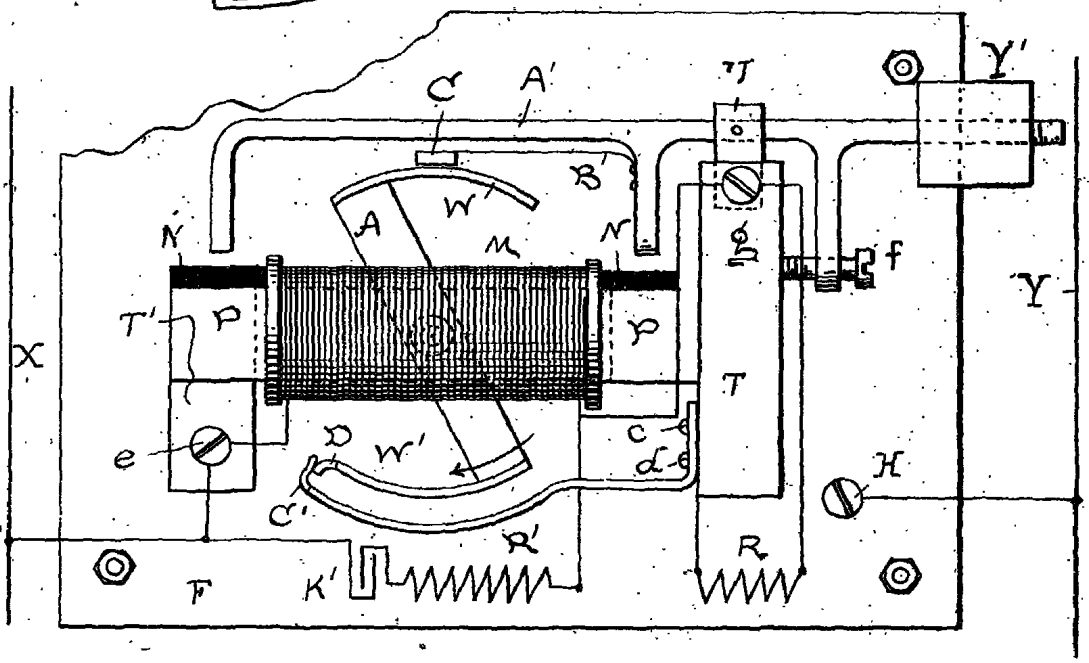

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Fig. 7.

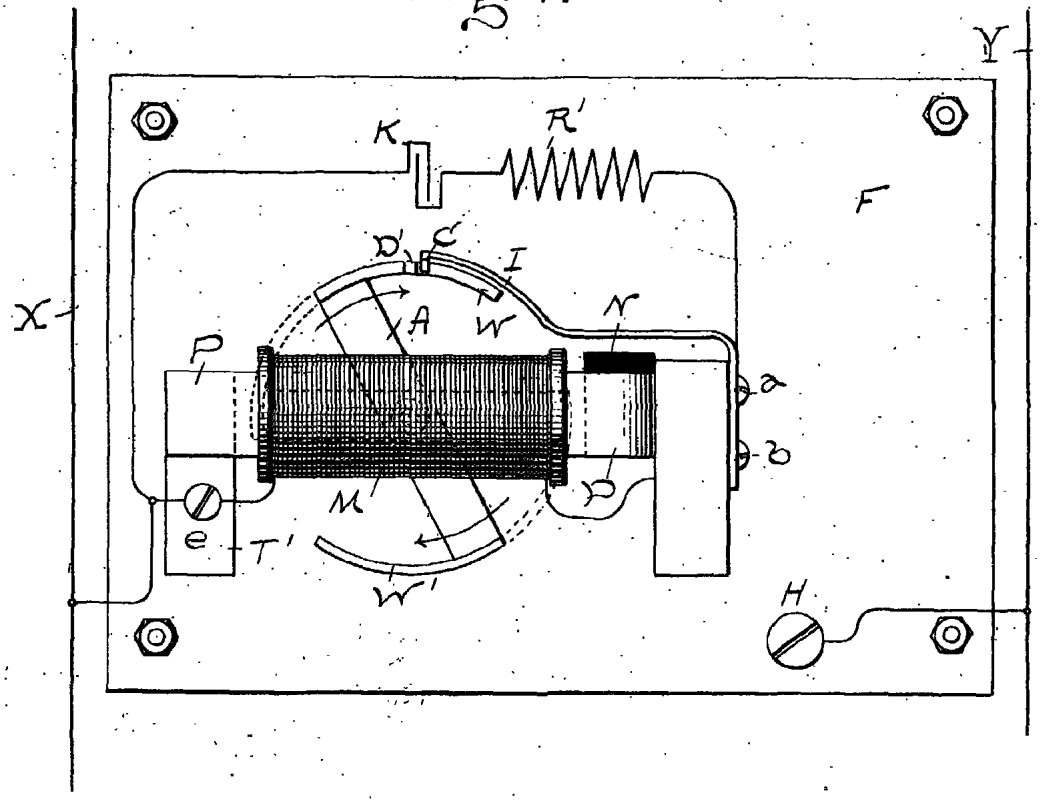
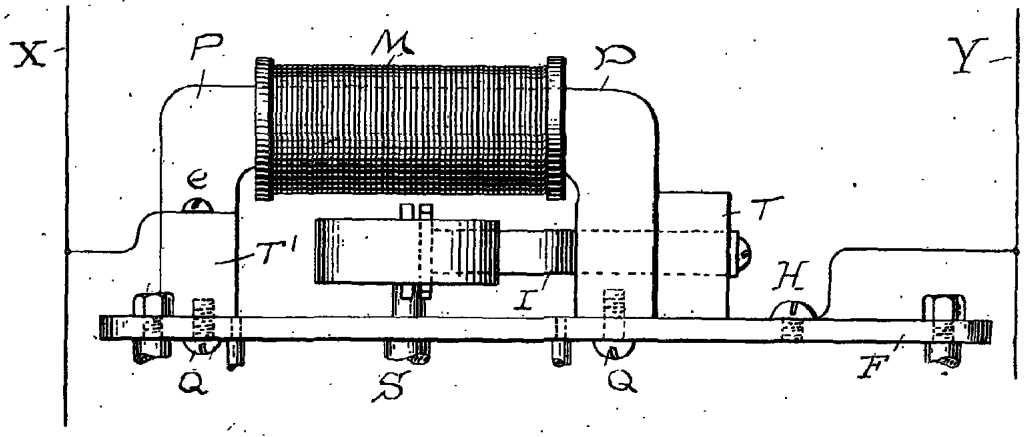


Fig. 8.



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