(No Model.)

E. J. MALLETT.

AUTOMATIC POLE CHANGER.

No. 384,323. Patented June 12, 1888.

Fig. 2.

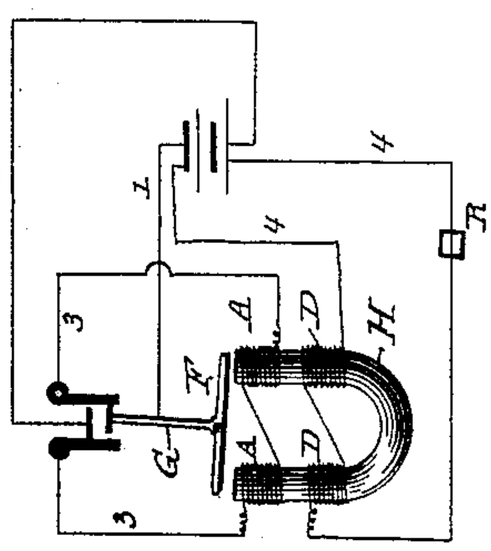
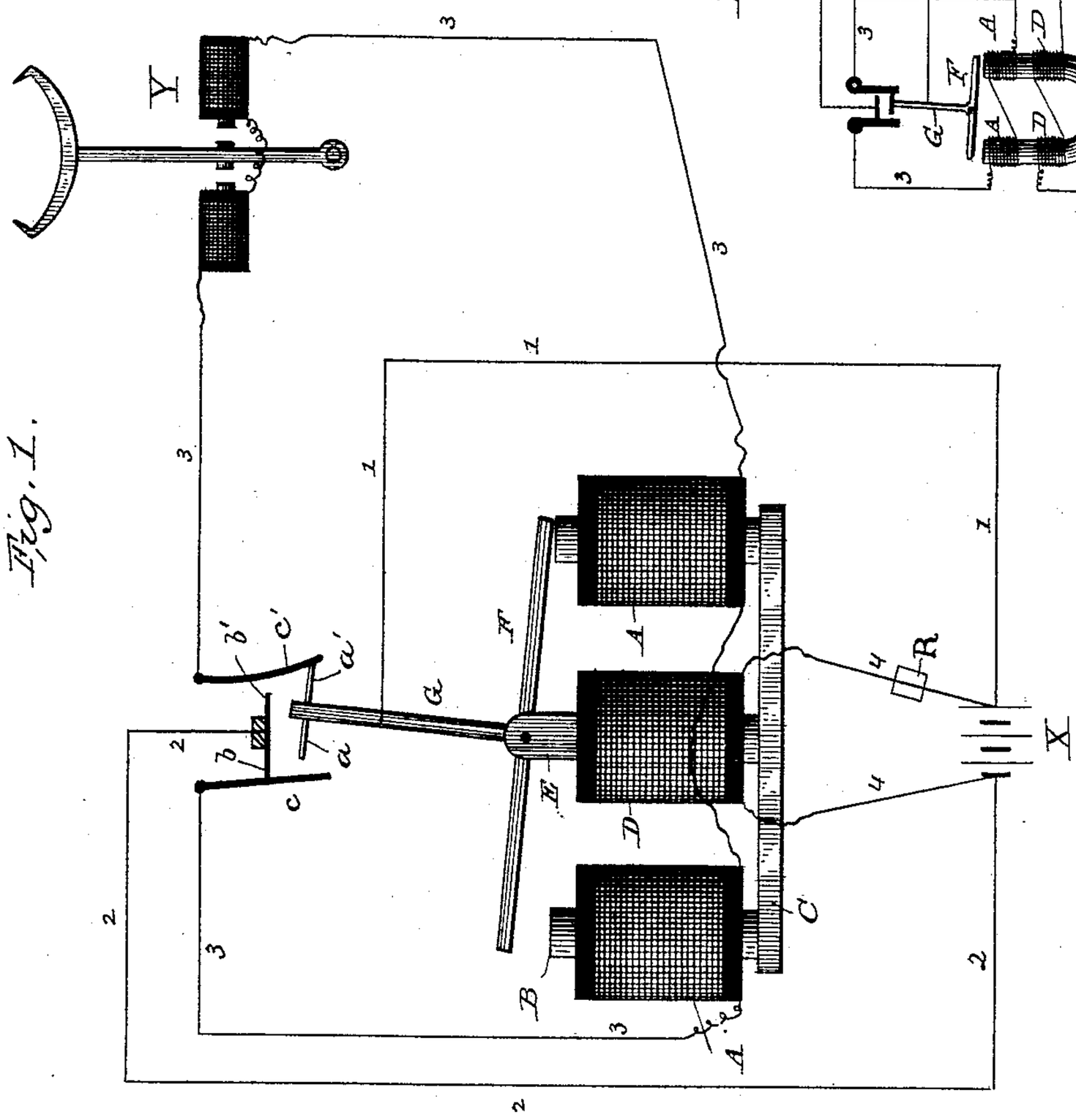


Fig. 1.



WITNESSES,

Edwin L. Yewell.

Everett A. Dick

INVENTOR,

Edward J. Mallett.

by J. Mauldin Smith

his Attorney.

UNITED STATES PATENT OFFICE.

EDWARD J. MALLETT, OF NEW YORK, N. Y.

AUTOMATIC POLE-CHANGER.

SPECIFICATION forming part of Letters Patent No. 384,323, dated June 12, 1888.

Application filed April 5, 1888. Serial No. 269,684. (No model.)

To all whom it may concern:

Be it known that I, EDWARD J. MALLETT, of the city, county, and State of New York, have invented a new and useful Improvement in Automatic Pole-Changers and Polarized Magnets, of which the following is a specification.

In observing the operation of automatic pole-changers I have found that the speed of vibration of the automatically-vibrating polarized armature is directly proportionate to the quantity of current which passes through the contacts of such armature and inversely proportionate to the quantity of current which acts with permanent induction on the armature. If, therefore, there be a division of the current supplying such a magnet, so that a part shall pass through the contacts and a part shall act with permanent induction upon the armature, the relations between these two divisions of the current will be maintained, and the rate of vibration of the armature will be uniform, notwithstanding variations in current strength, because these variations affect proportionately each division of the current.

The division of the current just referred to can readily be obtained by the use, in connection with the coil or coils in circuit with the contacts, of a coil included in a permanently-closed derived circuit thereto. This derived circuit-coil acts with permanent induction upon the armature and maintains it in polarized condition. The degree of polarization is determined by the quantity of current passing through the derived circuit-coil. If, therefore, the relative resistance of this circuit to that of the circuit which includes the contacts be adjusted so as to obtain a field of the proper character, this adjustment, when once made, will be maintained, notwithstanding variations in battery or current strength, because both divisions of the current, being proportionately affected by such variations, will preserve their relations to each other unchanged.

In Figure 1 of the accompanying drawings I have illustrated to some extent diagrammatically a pole-changer and circuit-connections therefor embodying the invention. Fig. 2 is a diagram of a modification which will be hereinafter explained.

The automatic pole-changer shown in Fig. 1 is substantially the same, in a general way, as that described and claimed in my application for Letters Patent filed November 19, 1885, Serial No. 183,264, comprising, as it does, the combination of an electro-magnet, an induced magnetic armature therefor pivoted over such magnet and between its poles, and contact-points controlled thereby, the magnet and the contacts being in the circuit to be reversed. So far as this feature is concerned, the only difference between the device shown in my present application and that shown in my aforesaid prior application is that in the latter I have represented a two-contact pole-changer with a split battery and the appropriate circuit-connections therefor, while in the present case I have represented a four-contact pole-changer, a single unsplit battery, and the circuit-connections appropriate for such an organization. Both types, however, are well known in the art and are interchangeable.

In the present instance A A are the spools or coils of the magnet in circuit with the contacts, and B are their cores affixed to a yoke, C. Between these two spools A, I place a third spool, D, whose core E is also fixed at one end to the back yoke, C. To the other end of this core E is pivoted at its middle the armature F in such position that its ends overhang the cores B of the main electro-magnet. From the middle of armature F extends upward standard G, having at its upper end two contacts, *a a'*, projecting laterally one from each side of the upright G. Contacts *a a'* are the movable contacts. Above them are the two corresponding fixed contacts, *b b'*, supported in the usual way by a bracket or by some suitable part of the frame-work of the instrument. Supported also upon the frame-work of the instrument are two leaf-spring contact-strips, *c c'*, which are so set as to normally press toward each other and against the contiguous contacts *a b* and *a' b'*.

The circuit-connections are as follows: From one pole of battery X by wire 1 to the upright G, which is electrically connected to contacts *a a'*; from the opposite pole of the battery by wire 2 to the stationary contacts *b b'*; from one contact-strip, *c* or *c'*, by wire 3 through the spools A A of the main electro-magnet, and thence to the opposite contact-strip.

In the circuit I have indicated at Y a polarized escapement typical of any number of

printing or other instruments, which may be placed in the circuit to be operated by reversals thrown thereon.

In the position in which the parts are shown in the drawings the armature has been attracted in such direction as to move the upright G to the right, thus causing a' to contact with strip c', breaking the contact between c' and b' and a and c, and permitting c to contact with b. The circuit under these conditions is from one pole of battery by wire 1, upright G, contact a', strip c', wire 3, through the spools A, thence by continuation of wire 3 to contact-strip c, contact b, wire 2, back to the opposite pole of the battery. The connections are such that when the current passes in this direction it gives such polarity to the main electro-magnet that the armature is attracted to the left, breaking the contacts at a' c' and c b, and closing them at a c and c' b', thus reversing the polarity of the circuit and causing the armature to be again attracted to the right, and so on. Thus far there is in the circuit-connections nothing essentially new beyond what is disclosed in my prior application, hereinbefore referred to.

With a view to inductively magnetizing the armature, I connect the spool D with the battery X in derived circuit to that in which the spools or coils A are included, this derived-circuit connection being shown at 4.

The character of the field of the pole-changer is determined by the distribution of the current between this derived circuit and the main circuit, only such proportion being allowed to pass over the derived circuit as is required to inductively magnetize the armature to the extent necessary to produce the best results. When once this is ascertained and the circuits are adjusted accordingly, the relations will be maintained for the reasons before indicated, notwithstanding variations in current strength. For my purpose I have obtained very satisfactory results by interposing in the derived circuit a resistance, R, of two hundred ohms, the resistance in this instance of the two spools A of the main electro-magnet being two and one-half ohms each, and that of the armature spool D being forty ohms. In this way the instrument can be adjusted so as to be extremely sensitive and to respond with great rapidity and certainty, while the adjustment when once made will be retained, notwithstanding variations in battery or current strength.

I am not limited to the use of this invention with a polarized magnet of the particular form shown in Fig. 1. Any form of polarized magnet in which the armature is inductively magnetized by an electric current in lieu of a permanent magnet may be employed. For instance, in Fig. 2 I have represented a form of polarized magnet in which there are two cores and spools only, instead of three, as in Fig. 1.

The magnet-cores are represented typically at B. The one winding A corresponds to the like designated part in Fig. 1, and is in circuit with the armature-contacts. The other winding D corresponds in function to the similarly-lettered part in Fig. 1, and is in the permanently-closed relatively-high-resistance derived circuit 4. The magnet H, thus influenced by the coils D, forms a field by means of which the armature F is permanently magnetized by induction, and this although the armature is pivoted (as indicated in the figure under consideration) on bearings which are electrically and magnetically independent of the other parts of the instrument. The arrangement of circuits, contacts, &c., is the same in this figure as in Fig. 1.

Having now described my improvement, what I claim herein as new and of my own invention is as follows:

An automatic pole-changer which contains two coils or sets of coils, the one in circuit with the contacts of the pole-changer, the other in a permanently-closed circuit in derivation thereto, whereby a division of the current supplying the pole-changer is effected, a part passing through the contacts and a part acting with permanent induction upon the armature, substantially as and for the purposes hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 4th day of April, A. D. 1888.

EDWARD J. MALLETT.

Witnesses:

EWELL A. DICK,

MARVIN A. CUSTIS.