No. 880,485. PATENTED FEB. 25, 1908.

M. FISCHER.

MAGNETO ELECTRIC INDUCTOR.

APPLICATION FILED JAN. 10, 1905.

Fig. 1.

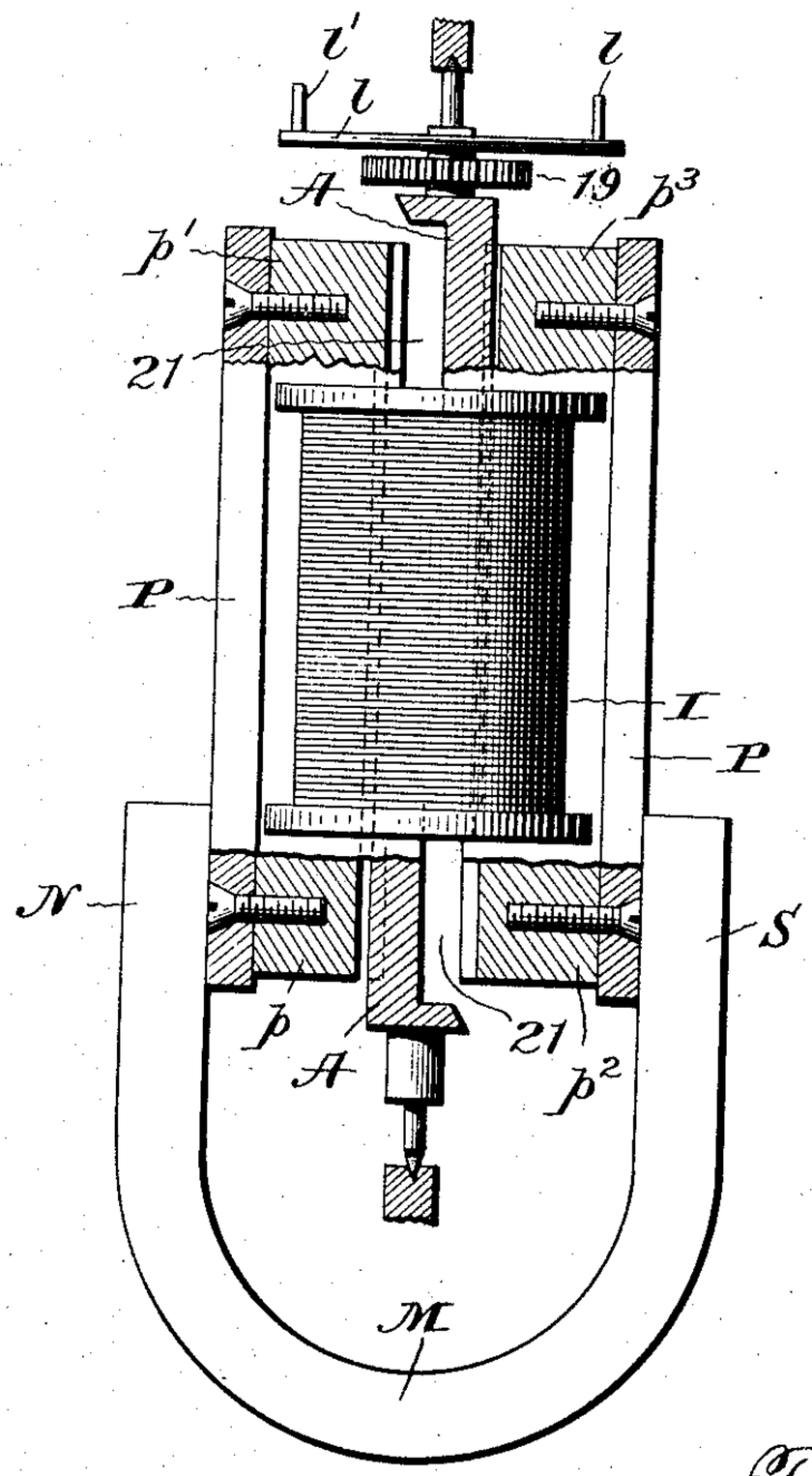
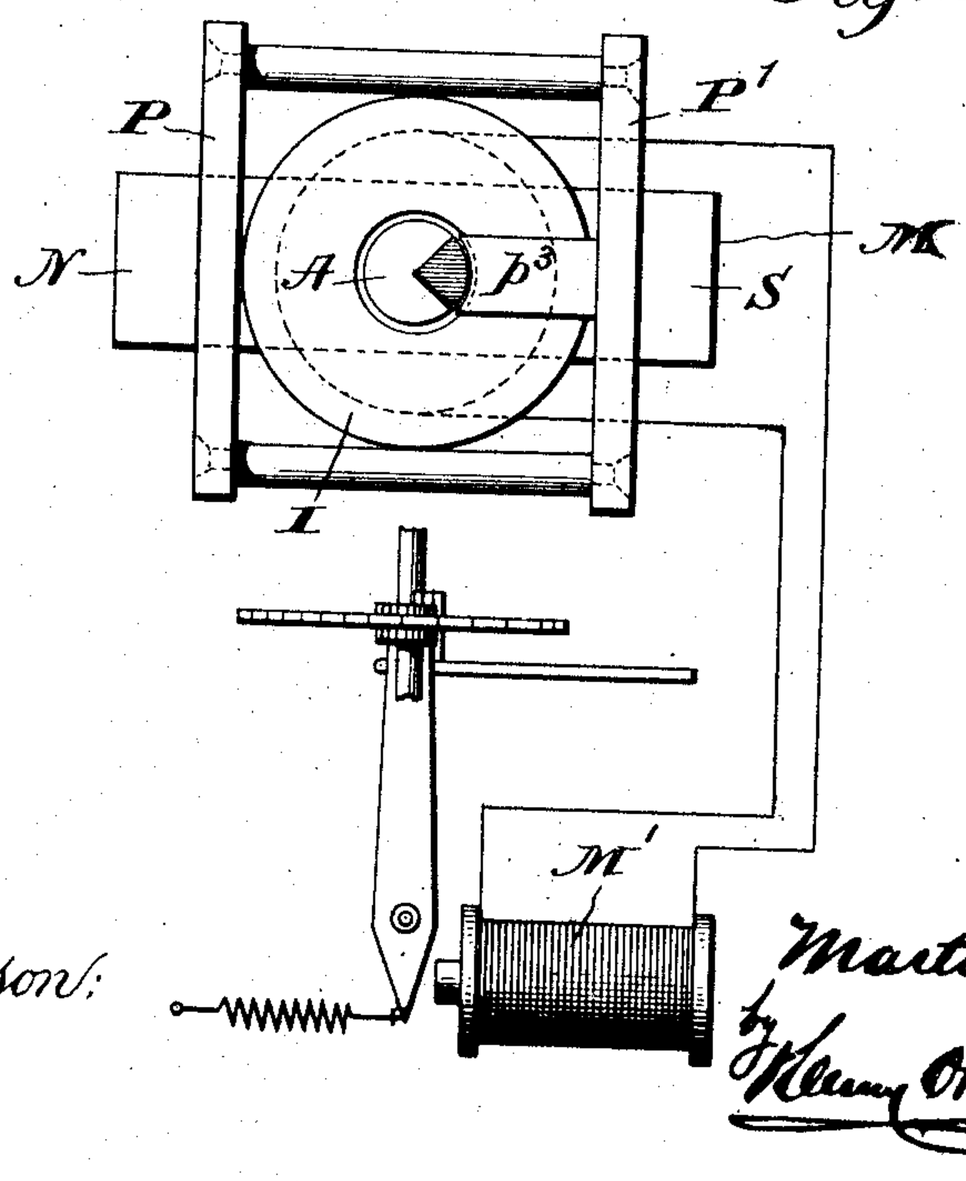


Fig. 2.



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MAGNETO-ELECTRIC INDUCTOR.

No. 880,485. Specification of Letters Patent. Patented Feb. 25, 1908.

Original application filed July 5, 1900, Serial No. 22,582. Divided and this application filed January 10, 1905. Serial No. 240,441.

To all whom it may concern:

Be it known that I, MARTIN FISCHER, a citizen of the Republic of Switzerland, residing at Zurich, Switzerland, have invented certain new and useful Improvements in Magneto-Electric Machines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention has relation to electric generators of that type known as magneto electric generators, comprising, broadly speaking, a permanent magnet, an armature between the poles thereof and arranged to close the magnetic circuit and consisting of a soft iron core carrying an induction coil, in combination with means for controlling the direction of the magnetic flux with relation to the coil. This type of generator may be divided into two distinct classes, one in which the induction coil of the armature is adapted to rotate about its core, and the other in which a pole changer is adapted to rotate or oscillate about the armature. The first-named class of generators has been found practically useless for many purposes on account of the heavy mass to be moved, as the coil must have a sufficient number of ampere turns to produce current of requisite strength to perform the work in view, requiring comparatively great power, and the difficulty in checking the momentum acquired by the coil in its periodical sudden angular movements. It has been proposed to avoid these difficulties by the use of a pole changer capable of rotating or oscillating about the armature, but even in this construction the pole changer is of necessity of considerable weight, it being generally composed of a disk at either end of the armature and of soft iron segments connected to said disks, which latter are journaled in bearings in a suitable support, means being provided to oscillate or rotate the pole changer. Another arrangement is known in which two armatures are interposed between the poles of a permanent magnet and a rotatable or oscillating disk having soft iron segments is arranged to rotate or oscillate over the armature cores. In either case the weight of the pole changer is sufficiently great to render it difficult to overcome its momentum if operated mechanically to impart to it sudden angular or oscillatory movements, while the construction of either class of generators is costly and more or less difficult.

My improved generator is particularly designed for use in systems of time distribution in which current is sent to line at frequent predetermined periods, as for instance, every minute, and in which the pole changer is controlled by the master clock, as fully described and shown in an application for patent filed by me July 5th, 1900, Ser. No. 22,582, of which the present application is a division.

The object of this part of the invention is not only to simplify the construction and reduce the cost of the generator to a minimum, but essentially to minimize the weight of the movable element thereof, and consequently its momentum, so that a power such as may be derived from a clock movement may be used to impart the aforesaid periodical sudden movements to said movable element and obviate the difficulties above referred to, due to the momentum of said movable element.

A characteristic feature of my invention, broadly speaking, lies in a stationary permanent magnet arranged to form an open magnetic circuit, in a stationary coil between the poles of said magnet, in a soft iron bar and in means to move the latter to close said circuit through the coil. But that my invention may be fully understood, I will describe the same in detail, reference being had to the accompanying drawings, in which—

Figure 1 is an elevation, partly in section, of the preferred form of generator; Fig. 2 is a top plan view of Fig. 1, showing a modified arrangement of the magnetic poles, and also showing the continuous or loop circuit, including a translating device.

Referring to Fig. 1, M indicates the permanent magnet, P, P′ soft iron plates secured to its poles, N, S, respectively, and p, p', p^2 p^3, pole shoes having concave faces, secured to the upper and lower proximate ends of said plates. The pairs of pole-shoes p, p', and p^2, p^3 represent, respectively, divided poles of the magnet M, having an open magnetic circuit.

A indicates a soft iron core or field pole-changer which is preferably cylindrical, as

shown in the figure referred to, and may be polygonal in cross-section, *i. e.*, in the form of a flat bar, and is mounted on or provided with suitable end journals to rotate on its longest axis between the pole-shoes, the faces of the latter being cylindrical in contour and of slightly greater diameter than that of the core, so that the latter may rotate close to the shoes but out of contact with them.

The core A is recessed or cut-away at diametrically opposite points where it extends between the pole-shoes, as shown at 21, the relative arrangement of the core and pole shoes being such that the magnetic flux will traverse the length of the core in opposite directions as the latter is rotated through angular distances of 180 degrees to close the magnetic circuit. Thus, in the position indicated in Fig. 2 the magnetic flux will pass from the N-pole of the permanent magnet M through pole-shoe p, through the core A from the bottom to the top and from thence through the pole-shoe p^3 to the S-pole of the magnet. Upon reversing the position of the core A, the flux from the N-pole will pass through the pole-shoe p', through the core A in a direction the reverse of that just mentioned, to the pole-shoe p^2 and the S-pole of the permanent magnet.

The stationary induction coil I is located in the magnetic field and circuit between the plates P, P′, and surrounds the core A in such a position as to be in the path of the magnetic lines, so that upon a change of direction of the magnetic flux through the core A a current is produced in the winding of said coil.

As shown in Fig. 2, the terminals of the coil I are permanently secured to the conductors leading to a translating device, for instance, to the terminals of an electro-magnet M′, whose armature oscillates a pawl acting on a ratchet wheel, for instance on the minute hand arbor of a secondary clock, the circuit in practice including a number of such electro-magnets, as described in my pending application hereinabove referred to.

The advantages of a generator of electricity as above described are manifold. The coil, being stationary, may have any desired number of ampere turns, the pole changer or circuit closer extending through the coil may be made very light as compared with the weight of the coil or with the weight of a pole-changer oscillating about the coil, which in systems of time distribution in which the current has to traverse comparatively great lengths of conductors, must have an adequate number of ampere turns and is therefore quite bulky, while the construction of the generator is greatly simplified, as is obvious.

The pole charger or circuit closer A may be so geared or otherwise connected to a prime mover as to impart angular movements in one and the same direction to said pole changer, as for instance, through a pinion 19, the movements being controlled by an arrester l, the pins l' l' of which are engaged by a detent controlled by a time train of gearing; or said pole changer A may be so connected to the prime mover as to be oscillated as described in my aforementioned application.

In the construction described, the direction of the currents generated is reversed at each change of polarity or closure of the magnetic circuit, but it will be readily understood that by the removal of the upper left hand pole shoe p', Fig. 2, and the lower right hand pole shoe p^2, supposed to be removed in said Fig. 2, impulses will be sent to line, which with some forms of translating devices may be found preferable or necessary, as in the case of an ordinary electro-magnet M′, shown in said Fig. 2.

By the provision of suitable mechanism whereby the field pole-changer D is caused to slowly recede from the magnetic poles and then to suddenly move back to its normal position, the armature is first de-polarized and its polarity suddenly restored, whereby currents are also generated in the induction coil.

I do not limit my invention to the construction of generator shown and described, as this may be variously modified without departing from the principle upon which its construction is based.

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

1. A permanent magnet forming an open magnetic circuit, soft iron extensions secured to the magnet ends and pole pieces at the ends of the extensions a coil between the pole pieces and extensions, a soft iron bar extending through the coil and means to operate the bar to close the magnetic circuit between diagonally opposite poles, substantially as described.

2. A permanent magnet having two pairs of pole pieces, a coil arranged between them and a soft iron bar passing through the coil to close the magnetic circuit first between one pair of diagonally opposite pole pieces and then between the other pair of diagonally opposite pole pieces, substantially as described.

3. A permanent magnet having soft iron pole extensions secured thereto, pole pieces secured to the ends of the extensions, a coil between the extensions and pole pieces, and a bar having oppositely directed faces at its ends, each face to coöperate with a pole piece, whereby the magnet circuit will be closed thereby between diagonally opposite pole pieces, substantially as described.

4. In a generator, the combination of a permanent magnet provided with forked pole pieces, a metallic block rotatably mounted

between said forked pole pieces and a winding arranged in inductive relation to said forked pole pieces and said metallic block, substantially as described.

5. A permanent magnet forming an open magnetic circuit, soft iron extensions of said magnet and a pole piece at each end of said extensions thereby forming four poles, a coil extending between the pairs of poles, a soft iron bar of suitable form extending through the coil, and means to rotate the bar to close the magnetic circuit between diagonally opposite poles, substantially as described.

6. A permanent magnet forming an open magnetic circuit, a soft iron extension at each end of said magnet, a pole piece at each end of said extensions, a coil located between the pole pieces and forming part of a closed electric circuit, a translating device also included in said circuit, a soft iron bar passing through the coil, and means to rotate the bar to close the magnetic circuit through the coil in directions that cross each other, substantially as described.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two subscribing witnesses.

MARTIN FISCHER.

Witnesses:
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