(No Model.)

J. B. BLAIR.

HAND MAGNETO ELECTRIC MACHINE.

No. 391,224. Patented Oct. 16, 1888.

Fig 1.

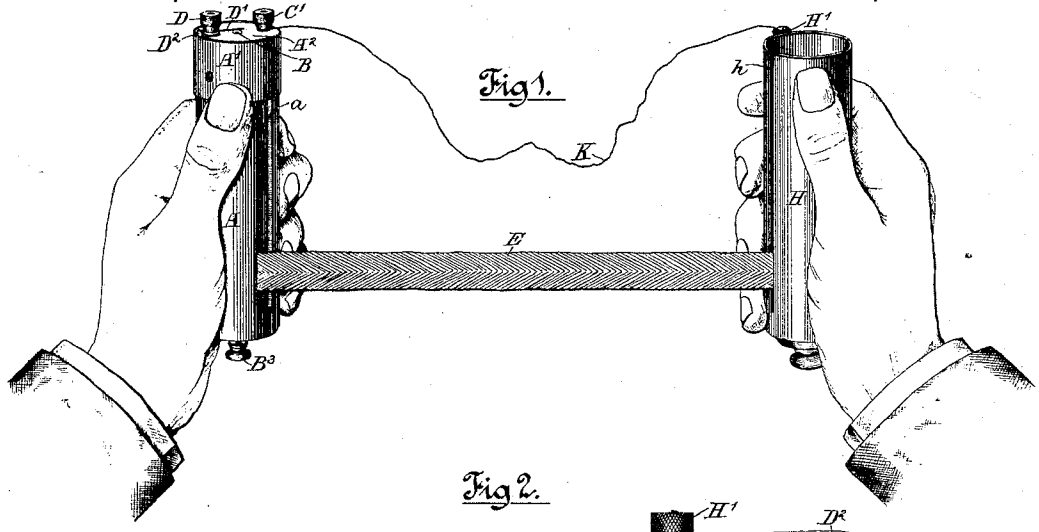


Fig 2.

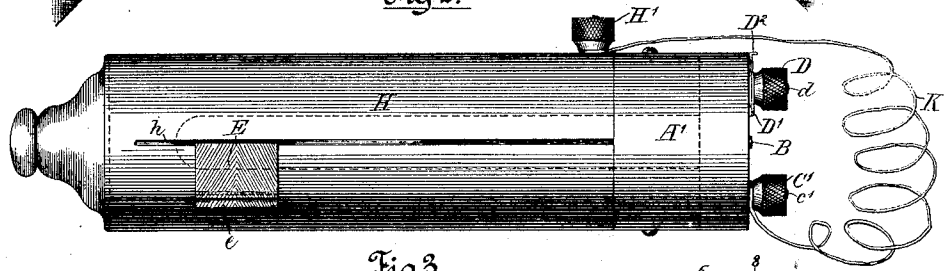


Fig 3.

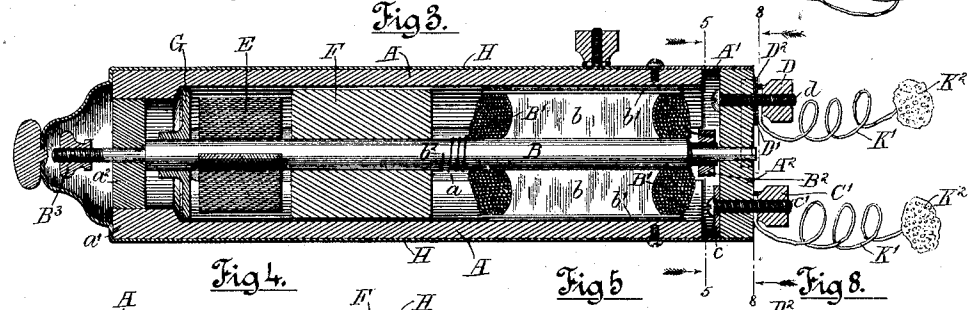


Fig 4.

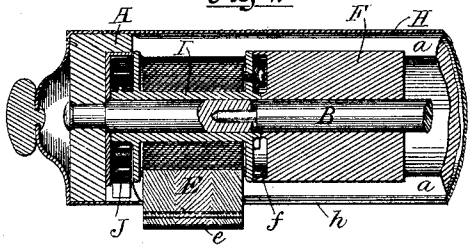


Fig 5

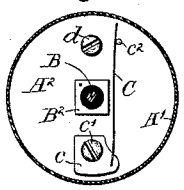


Fig 8.

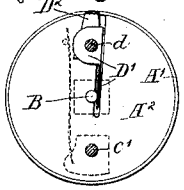


Fig 6

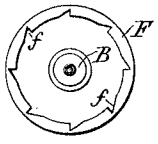
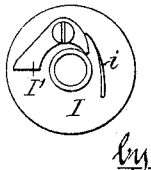


Fig 7



Witnesses.
Wm. F. Fleming.
Louis M. F. Whitehead.

Inventor.
John B. Blair.
by Dayton, Poole & Brown
Attorneys.

UNITED STATES PATENT OFFICE.

JOHN B. BLAIR, OF CHICAGO, ILLINOIS, ASSIGNOR TO J. B. BLAIR & CO., OF SAME PLACE.

HAND MAGNETO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 391,224, dated October 16, 1888.

Application filed April 3, 1888. Serial No. 269,435. (No model.)

To all whom it may concern:

Be it known that I, JOHN B. BLAIR, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Magneto-Electric Generators; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to an electric generator operated by hand. In its complete form, as here represented, the invention is adapted to the purpose of sending an electric current through the arms of the operator, and also, by a change of connections, of applying a current to another part of the body of the operator, or to a person other than the operator.

The invention consists, primarily, in a hand magneto-electric generator composed of a conveniently-shaped magnet and a revolving armature mounted in proper relation thereto, together with a tape or band so applied to the shaft of the armature that as the magnet is held in one hand the other hand may revolve the armature by successively pulling out the tape and allowing it to rewind itself by movements of the hands successively away from and toward each other, such movements being continued during the operation of the device.

The invention also embraces the feature of a pair of electrodes adapted to be held one in each hand, one of said electrodes being provided with a magnet and a rotating coiled armature and suitable contact devices, and the other electrode being connected with the revolving armature by means of an electric conductor and a flexible band or other similar connection, by which latter, upon rapid separation of the hands, a rotating motion may be imparted to the armature and an electric current thereby generated.

In the accompanying drawings the revolution of the armature is illustrated as being accomplished in two different ways. In one case the band which rotates the shaft of the armature by a rapid movement of the hands away from each other—one hand holding the part containing the armature and the other pulling on its band—is rewound upon the shaft in the opposite direction when the hands approach by the momentum of the revolving parts, and the armature is thus successively rotated in opposite directions. In the other case the band is attached to a spool, which, after being unwound by separation of the hands, (one of which holds the part containing the armature and spool and the other of which pulls on the band,) is rotated in the opposite direction by a spring to again wind up the band as the hands approach, the armature-shaft being connected with the spool by means of a ratchet and dog or equivalent device, which allows the armature to continue its motion in the same direction in all movements of the hands.

In the accompanying drawings, Figure 1 is a perspective view illustrating the electrodes held in the two hands of the operator as in the act of working the device. Fig. 2 is a side view of the apparatus in the form in which I prefer to make it—namely, in which one electrode slides over the other to form a unitary and compact cylinder when the device is not in use. Fig. 3 is a central longitudinal section of Fig. 2, showing one of the two forms of interior construction hereinbefore referred to. Fig. 4 is a horizontal section showing the other of the two forms of interior construction hereinbefore referred to. Figs. 5, 6, 7, and 8 are detail views of parts seen from sections taken across the apparatus.

A represents a magnet made in the form of a cylinder, with opposite slots, *a*, extending from one end to a point near the other end to give essentially a horseshoe form thereto. That end of the cylinder at which the slots are closed has a head, *a'*, provided with a central plug, a^2, of hard rubber or other insulating material.

A' is a brass band embracing the free ends or poles of the magnet A and closed by a head, A^2, of hard rubber.

B is a soft-iron shaft mounted axially within the cylindric magnet, having its trunnions in the hard rubber end pieces, a^2 and A^2, and provided with laterally-projecting webs *b b*, terminating in longitudinal bars *b'*, which are longer than the webs. Around these webs is wound a suitable coil, B', one end of the wire of which coil connects with the shaft at b^2, or

elsewhere, and the other of which connects with a square or oblong metal nut, B^2, secured upon but insulated from the shaft B, near the head A^2. Attached to the head A^2 is a thin metal plate-spring, C, supported at one end by a metal piece, *c*, which is fastened to the inner surface of the head A^2 by means of a screw, *c'*, that projects through the head A^2 and beyond the outer face of said head far enough to receive a binding-nut, C'. The plate-spring C is arranged to stand free of the nut B^2 when the latter has its shorter radii directed toward it, but near enough to come in contact with the more prominent corners or parts of said nut B^2 in the rotation of the latter with the shaft B. This arrangement is plainly shown in Fig. 5. The spring C may be additionally sustained at its opposite end, if desired, by means of a pin, c^2.

D is a second binding-nut threaded upon a screw, *d*, which projects from the outer surface of the head A^2, and which is in electric communication with the trunnion of the shaft B by any suitable means, such means in the present instance being a plate or strip of metal, D', set in a narrow slot in the outer surface of the head A^2, so as to bear at one end upon the side of the trunnion of the shaft B and at the other end folded down flat against the outer surface of said head A^2, with the screw *d* passing through it.

D^2 is a button rotatably supported about the screw *d*, beneath the nut D, in contact with the plate D'. Said button D^2 is adapted to be turned so as to bring its free end into contact with the end of the brass sleeve A', or to be thrown out of contact with said sleeve by turning its free end inward. It is held in either of these positions by the clamping action of the nut D.

In the construction shown in Fig. 3 of the drawings one end of a tape, E, is fastened to the shaft B, so that the tape may be wound upon said shaft, as illustrated in said Fig. 3. The opposite or free end of the tape passes out of the cylinder through one of the slots *a*, so that by pulling on said free end of the tape after the latter has been wound upon the shaft a rotary movement may be given to the shaft and armature.

F is a cylindric weight applied to the shaft B for the purpose of giving the latter greater momentum.

G is a disk attached to the shaft to serve as a guide for the tape on one side of the latter, while the weight F may be so placed, as shown, as to serve the same purpose at the other side of the tape.

B^3 is a handle attached to a protruding end of the shaft B for the purpose of winding up the tape E on the latter preparatory to operating it in the manner first hereinbefore set forth.

H is a brass cylinder having one end open and provided with a longitudinal slot, *h*, to receive the free end of the tape E, which is provided with a beaded end, *e*, for its retention in the slot. This brass cylinder H is provided with a binding-post, H', or other means of attaching a wire thereto. In using the apparatus for the purpose of sending a current through the arms of the operator it constitutes a second electrode of the apparatus of which the other is the magnet A, above described.

The electrode H is made cylindric and tubular for the purpose of adapting it to be placed over the magnet, and thus enabling the two electrodes to be put together in a compact form for transportation. It may, for the general purposes of my invention, be of other form, if desired, and the tape may be secured thereto, manifestly by other means than the slot *h*.

In the construction shown in Fig. 4 the tape E is wound on the spool I, which is unsecured to the shaft B, and which is connected with the head of the magnet by a coiled spring, J, arranged like a watch-spring, to retract the spool and rewind the tape thereon after the latter has been drawn out by the hand. The weight or disk F is provided at one end with ratchet-teeth *f*, (see Figs. 4 and 6,) and the end of the spool is provided with a dog, I', and a spring, *i*, which causes the dog to engage the ratchet in that direction of motion of the spool which is given it by drawing out the tape.

In the use of the apparatus, to send a current through the arms of the operator, the electrode H is taken in one hand, and the electrode, composed of the magnet and its attachments, is taken in the other, somewhat as shown in Fig. 1, the free end of the tape E being connected with the electrode H, either by means of the slot *h* or otherwise. Pulling the hands apart and bringing them toward each other again alternately while holding the electrodes about parallel with each other, causes the tape to impart to the shaft B and its armature a rotating motion within the magnet A, by which a current of electricity is generated, the force of said current being in proportion to the rapidity with which the armature is revolved. In the construction shown in Fig. 3 the armature is revolved first in one direction and then in the other by successive outward movements of the hands, while in the construction shown in Fig. 4 the armature continues to revolve in the same direction through the medium of the loose spool and its ratchet-connection with the weight or disk F.

For the purpose of sending the current through the arms of the operator, one end of the wire K (which is long enough to allow the necessary spreading movement of the hands) is attached by the binding-post H' or otherwise to the electrode H, and the other end of the wire will be connected with the binding-post C', and the proper electric connection secured with the hand of the operator through the magnet by placing the button D^2 in contact with the brass sleeve A', as shown in Fig. 2. For the purpose of sending the current through another part of the person operating the device, or through a part of another per-

son than the operator, separate wires K′ K′ will be used having sponges K^2 attached at their free ends and connected severally with the two binding-posts C′ and D. In this case the button D^2 will be first rotated out of contact with the brass sleeve A′. In this use of the apparatus it is not necessary that the tape E be connected with the electrode H, or that the latter be taken in hand, but the tape may be grasped directly by the hand which is to pull it. The hand having hold of the tape or hold of the electrode H may obviously be given the entire movement, while the other, which grasps the magnet, may be held still.

For the purposes of the following claims the shaft or arbor of the spool shown in Fig. 4 is to be regarded as a part of the shaft B, since it is in effect a mere prolongation of said shaft in the active movement of unwinding the tape or band by pulling the latter. For the purpose of brevity of expression in said claims, the actuating mechanism comprising the tape or its equivalent filament, applied and operating substantially as described, will be called in said claims a "self-winding traction-band mechanism."

It should be observed that the substitution of a metallic for the insulating plug a^2 will give permanent contact of the shaft with the magnet, whereby the latter may serve as an electrode for the use of the device in sending a current through the arms of the operator, and will render the button D^2 unnecessary.

I claim as my invention—

1. In combination with the magnet A, a cross piece or head, A^2, of insulating material, supported at the free ends of the arms of the magnet, a longitudinal shaft rotatably mounted between the arms of the magnet, an insulated nut having one or more peripheral projections secured upon the shaft, a coiled armature on the shaft having the ends of the coil connected, respectively, with the shaft and the nut, a stationary metal piece in position to have contact with the projections of the nut in the revolutions of the latter and having conductive connection with a binding-post or its equivalent, a second binding-post in conductive connection with the shaft, and a self-winding traction-band mechanism.

2. The combination, with a magnet, A, provided with a cross piece or head, A^2, at the free ends of the arms of the magnet, of hard rubber or other insulating material, of a longitudinal shaft, B, in conductive communication with the magnet, an insulated nut on the shaft for one or more peripheral projections, a coiled armature on the shaft the coil of which is connected with the shaft and the nut, a binding-post or its equivalent attachment for a wire connected to a part arranged to have interrupted contact with the nut, a separate electrode, as H, connected by a flexible wire with the said binding-post, and a self-winding traction-band mechanism for revolving the armature.

3. A hand-operated magneto-electric apparatus consisting, essentially, of two electrically-connected electrodes severally adapted to be grasped by the hand, one of said electrodes having a horseshoe-magnet, an axially-arranged rotatable shaft carrying an armature, and a self-winding traction-band mechanism for rotating the shaft and armature, and the other electrode being connected to the band of the said traction-band mechanism, substantially as described.

4. The hand-operated magneto-electric generating apparatus described, consisting, essentially, of two electrodes adapted to fit one within the other, one of said electrodes consisting of a cylindric horseshoe-magnet, A, provided with an axially-arranged shaft-armature and self-winding traction-band mechanism, together with attachments for conductive wires, and the other electrode consisting of a hollow cylinder adapted to fit over the magnet, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

JOHN B. BLAIR.

Witnesses:
M. E. DAYTON,
TAYLOR E. BROWN.