

(No Model.)

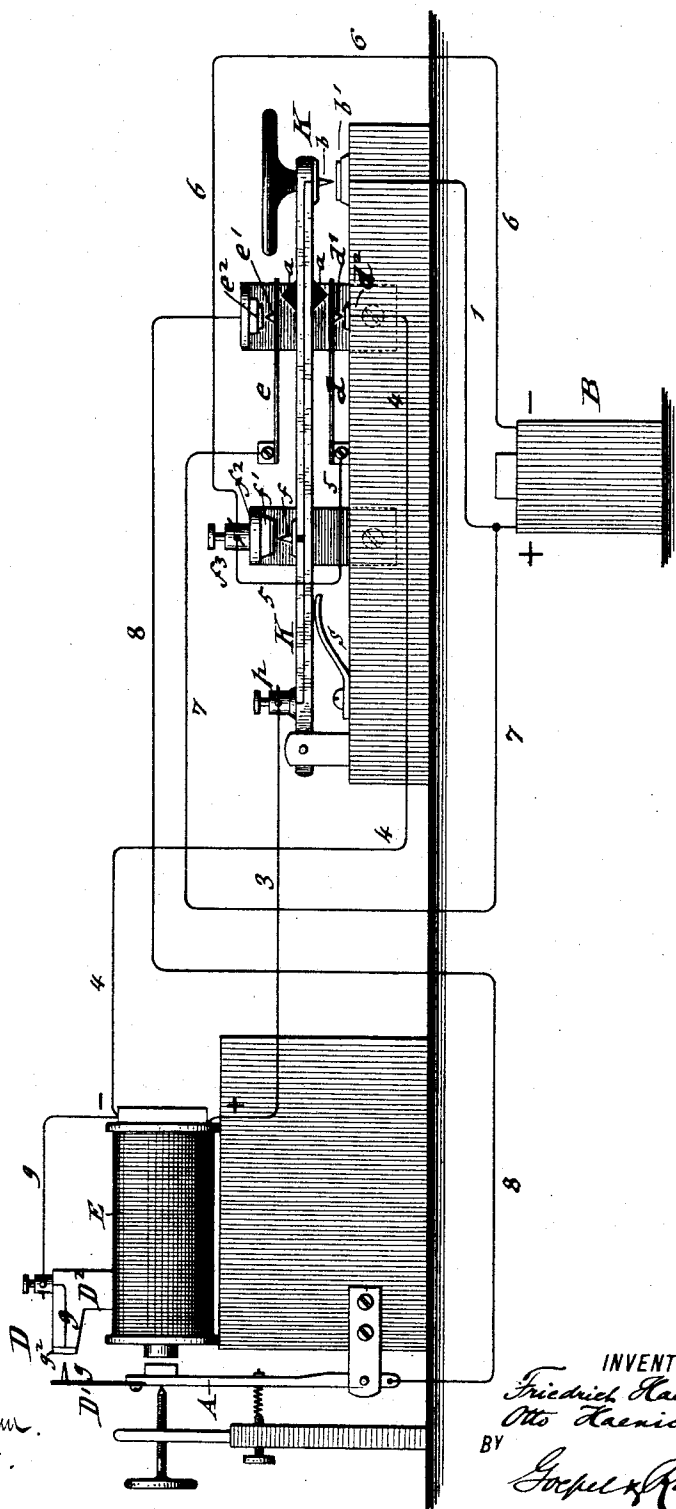
F. & O. HAENICHEN.
METHOD OF NEUTRALIZING THE RESIDUAL MAGNETISM IN
ELECTRO MAGNETS.

No. 410,276.

Patented Sept. 3, 1889.

WITNESSES:

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UNITED STATES PATENT OFFICE.

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METHOD OF NEUTRALIZING THE RESIDUAL MAGNETISM IN ELECTRO-MAGNETS.

SPECIFICATION forming part of Letters Patent No. 410,276, dated September 3, 1889.

Application filed September 13, 1885. Serial No. 177,422. (No model.)

To all whom it may concern:

Be it known that we, FRIEDRICH HAENICHEN and OTTO HAENICHEN, both of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful improvements in Methods of Neutralizing the Residual Magnetism in Electro-Magnets, of which the following is a specification.

It is well known that in operating electrical instruments inconvenience and loss of battery-power are caused by the residual magnetism in the cores of electro-magnets, which heretofore could not be effectively neutralized.

The object of this invention is to furnish a method of neutralizing the residual magnetism in electro-magnets, so that the latter release the armature promptly and quickly, and produce not only a considerable saving in the battery materials, but also a more perfect control of the electro-magnets used in the electric apparatus.

The invention consists of a method of neutralizing the residual magnetism in electro-magnets by the following steps: First, sending a current in one direction through the coils of the electro-magnet, so as to attract the armature; secondly, sending a current in a reverse direction through the coils of the electro-magnet, so as to neutralize the residual magnetism of the cores and cause the dropping of the armature and the automatic breaking of the circuit when the complete neutralization of the residual magnetism has taken place.

The accompanying drawing represents a diagram which illustrates the application of our improved method of neutralizing the residual magnetism in electro-magnets to a telegraph key and sounder.

In the drawing, E represents an electro-magnet; A, the armature of the same; K, a telegraph-key or other circuit closing and breaking device; B, a battery, and D a disconnecter by means of which the current is automatically interrupted at the proper moment. The key K is pivoted at one end and provided with a knife-edged contact-piece b

at the opposite end, that makes connection with a similar contact-piece b', arranged at right angles to the former. The key K is acted upon by a spring s, so as to be raised instantly when released. The oscillating circuit closing and breaking key K is provided at opposite sides with insulated projecting studs a a, that act upon springs d e at opposite sides of the key K, said springs being arranged, respectively, with knife-edged contact-pieces d' e', which form alternately contact with fixed knife-edged contact-pieces d² e², according as the key K is depressed or released and raised by the spring s. The contact-pieces d' e' are arranged at right angles to the contacts d² e², so as to reduce the contact-surface as much as possible and prevent the wear of the contacts. The key K is further provided with a knife-edged contact-piece f, that forms connection with a knife-edged contact-piece f' of a yoke f², said contact-pieces being also at right angles to each other.

The armature A is pivoted in the usual manner and provided with a stop-screw and spiral spring. It is further provided with an extension-arm D', having a knife-edged contact-piece g, which, in connection with the contact-piece g' of a supporting-piece D², forms the disconnecter D.

The positive pole of the battery is connected by a wire 1 with the contact-point b', while the contact-point b of the key K is connected by the key K with a binding-post p of the same, and then by wire 3 to one end of the coils of the electro-magnet E. The opposite end of the coils of the electro-magnet is connected by wire 4 to the contact-piece d², and the contact-piece d' of spring d by wire 5 to a binding-post f³ on the yoke f², and by a wire 6 to the negative pole of the battery B. The contact-piece e' of the spring e is connected by wire 7 to the positive pole of the battery, while the contact-piece e² is connected by wire 8 to the armature A and the contact-piece g of the disconnecter. The contact-piece g' of the disconnecter D is connected by wire 9 to that end of the coils of the electro-magnet to which the wire 4 is connected.

By pressing down the key K connection is formed by the contact-points $b\ b'$ and $d' d^2$, whereby the current flows as follows: From the positive pole of the battery, wire 1, contact-pieces $b\ b'$, key K, and wire 3 to the coil of the electro-magnet; thence over wire 4, contacts $d^2 d'$, spring d , wire 5, binding-post f^3 , and wire 6 to the negative pole of the battery. The armature is thereby attracted and the connection between the contacts $g\ g'$ of the disconnecter D produced. On releasing the key K it is returned to its normal position by the spring s , whereby the connection between the contacts $b\ b'$ and $d' d^2$ is broken and new contacts made at the points $e' e^2$ and $f\ f'$, so that the current flows as follows: From the positive pole of the battery, wire 7, spring e , contacts $e' e^2$, wire 8, armature A, contact-pieces $g\ g'$, wire 9, through the coils of the electro-magnet, wire 3, binding-post p , key K, contacts $f\ f'$, and wire 6 to the negative pole of the battery. This causes the current to pass in a reverse direction through the coils of the electro-magnet, so as to neutralize the residual magnetism in the cores of the same and cause the instant dropping of the armature and the simultaneous breaking of the circuit by the separation of the contacts $g\ g'$ of the disconnecter D. By the oscillations of the key the current is sent first in one and then in the opposite direction through the coils of the electro-magnet, one current serving to vitalize the cores of the same, so as to attract the armature, while the reverse current serves to neutralize the residual magnetism in the cores of the magnet and the instant release of the armature, whereby the prompt and ready action of the magnet is secured and the armature caused to respond to the key without fail. The reverse current is automatically interrupted by the action of the disconnecter, which breaks the said reversed current at the moment when the complete neutralization of the cores of the electro-magnet has taken place. The neutralization of the residual magnetism by the reverse current sent through the coils of the electro-magnet takes place so rapidly and instantly that the operation of the electrical apparatus is not retarded thereby, but, on the contrary, its effectiveness considerably increased.

The method described has the advantage that the armature can be placed in close contact with the cores of the magnet, (whereas heretofore the same had to be adjusted at

some distance from the same,) and that electrical apparatus of all kinds can be worked with weaker currents to produce the same effect as with stronger batteries, whereby a considerable saving in battery-power and expenditure for the same is obtained.

We are aware that "shunt-currents" have been used to weaken or neutralize the strength of a line or vitalizing current and produce thereby the dropping of the armature of an electro-magnet, and we do not claim such an arrangement.

In our method of neutralizing the residuary magnetism in the cores of electro-magnets, the full strength of the line-current, after the same is interrupted, is sent, by forming a new contact, in a reverse direction through the coils of the electro-magnet, so that the residuary magnetism of the cores is completely neutralized, and not in part only or by sacrificing a portion of the attractive power of the magnet, as is the case with shunt-currents.

We are aware that it has been before proposed to neutralize residual magnetism in the cores of electro-magnets, as will appear by reference to the patent of Foote and Randall, No. 153,064, dated July 14, 1874, and Smith, No. 306,187, dated October 7, 1884, and we do not claim anything in the patents referred to.

Having described our invention, we claim as new and desire to secure by Letters Patent—

The method herein described of neutralizing the residual magnetism in electro-magnets, which consists of the following steps: first, sending a current in one direction through an electric circuit and the coils of an electro-magnet in the same; secondly, sending a current of the same strength, but of the reverse direction, through said circuit, so as to neutralize completely the residual magnetism in the cores of the electro-magnet, and, thirdly, interrupting the circuit automatically by the action of said reversed current as soon as the neutralization of the residual magnetism in the cores has taken place, substantially as set forth.

In testimony that we claim the foregoing as our invention we have signed our names in presence of two subscribing witnesses.

FRIEDRICH HAENICHEN.
OTTO HAENICHEN.

Witnesses:

PAUL GOEPEL,
OSCAR SEEBASS.