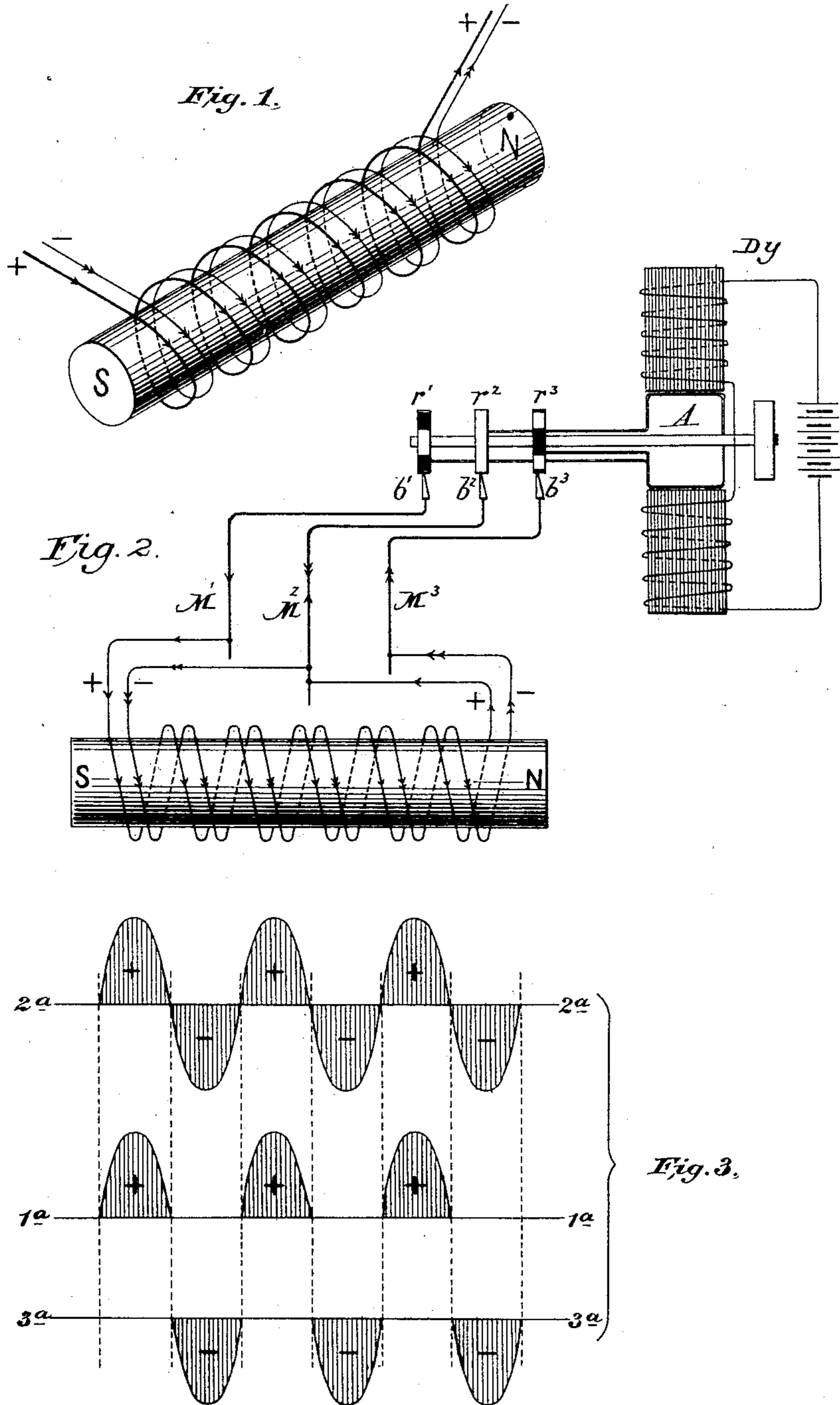


(No Model.)

F. J. PATTEN.
ELECTRO MAGNET.

No. 427,606.

Patented May 13, 1890.



Witnesses
Geo. W. Breech
Henry W. Lloyd.

Inventor
Francis J. Patten.
By his Attorney

UNITED STATES PATENT OFFICE.

FRANCIS JARVIS PATTEN, OF NEW YORK, N. Y.

ELECTRO-MAGNET.

SPECIFICATION forming part of Letters Patent No. 427,606, dated May 13, 1890.

Application filed December 28, 1889. Serial No. 335,206. (No model.)

To all whom it may concern:

Be it known that I, FRANCIS JARVIS PATTEN, a citizen of the United States, residing at New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Electro-Magnets and Magnetic Helices, of which the following is a description.

My invention consists in a way of producing a magnet or of magnetizing iron by the use of alternating currents or currents of continually-reversed direction.

My improvements will be understood from the accompanying drawings, in which—

Figure 1 is a perspective, and Fig. 2 is a diagram, view showing my improved magnet with its helices, a generator, and the circuit-connections between the helices and the generator, while Fig. 3 is a graphic representation of the currents flowing in the different circuits connected to the different helices.

It is well known that if an alternating current be sent through the magnetizing-coils surrounding an iron bar such current will constantly reverse the magnetism of the bar, and no perceptible polarity will result, owing to the rapid reversals of current direction that are constantly taking place. I avoid this effect by the method here shown by causing the opposed currents of alternating direction to pass around the magnet through separate but contiguous and continuously-wound magnetizing-coils, these coils being so connected to external leads or mains that carry, respectively, the separate alternating waves of current that each successive wave of current, positive and negative, as they successively follow each other, are caused to pass around the iron in such direction that each produces the same polarity as to the other in its own helix, and consequently in the mass of iron surrounded by the helices, each of which magnetizes it rapidly in turn, but producing always the same polarity as a result of the circuit-connections.

Fig. 1 is a perspective view of such a magnet; the two helices (shown side by side in light and dark lines) are contiguously and continuously wrapped over the iron from end to end of the bar, two wires or strands being wrapped on the iron together, instead of one wire, as is usual. They are then connected in such a way to mains that carry, respectively, posi-

tive and negative currents that both currents, irrespective of their own polarity, pass around the iron in the same direction, and so maintain the polarity of the iron constant as regards its polarization. This is indicated in the perspective view, the heavy helix, the ends of which are designated + +, carrying the positive waves of current, and the light magnetizing-helix, the ends of which are designated - -, carrying the negative currents shown by double arrows; but it will be noticed that the current is still in the same direction as in the other coil as regards its circular flow around the iron, thus maintaining the polarity N and S of the bar, and the magnetizing-coil unchanged with an alternating current. The manner in which this result is brought about is shown better in Figs. 2 and 3, where the connections of different helices to the mains or leads are shown. Thus in Fig. 2 are shown three main leads $M^1 M^2 M^3$, which are connected by brushes $b^1 b^2 b^3$ with the commutator-rings $r^1 r^2 r^3$ on the shaft of the armature A of the alternating generator Dy. The rings $r^1 r^3$ are divided into a series of segments, while the ring r^2 is plain or undivided. The main leads $M^1 M^2 M^3$ have the termini of the magnetizing-helices connected to them. On the middle or central lead M^2 flows a true alternating current, (indicated by the full diagram at 2^a in Fig. 3;) but the main M^1 conveys all the + (positive) currents out, say, from the alternating-current generator, and they return along the lead M^3 , and are indicated by single arrows pointing along the helix + +, Fig. 2, from circuit M^1 to M^3 . The negative currents (indicated by double arrows and flowing, of course, in the reverse direction as concerns the leads) come out of the generator on the lead M^2 , and, passing through the helix designated - -, return on M^3 ; but, as shown by the single and double arrows, both these currents are caused to circulate around the bar N S in the same direction, and as these impulses follow each other in succession without break or interruption they maintain an unchanged polarity of the helices and inclosed iron bar N S. Thus of the complete alternating wave shown at 2^a , Fig. 3, all the plus impulses shown at 1^a pass through the helix + +, and all negative impulses shown at 3^a , Fig. 3, pass through M^3 ,

each in turn flowing along the main M², according to its direction, but both around the iron in the same direction, and through continuously-wound but separate helices of wire.

5 Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. A magnetizing-helix consisting of two contiguously-coiled strands of wire, one of
10 which conveys only positive currents and the other only negative currents, but in such direction as to produce the same magnetizing effect within the coils.

2. A magnetizing-helix consisting of two

contiguously-coiled strands of wire arranged 15 around a mass of iron, one of which wires conveys only positive and the other only negative currents, but in such direction as to magnetize the iron with the same polarity.

In testimony that I claim the foregoing as 20 my invention I have hereunto set my hand, in the presence of two witnesses, this 23d day of December, 1889.

FRANCIS JARVIS PATTEN.

Witnesses:

EDWARD B. IVES, .
W. M. MINER.