(No Model.) 6 Sheets—Sheet 1.

W. HUMANS.

MAGNETO ELECTRIC MACHINE.

No. 386,071. Patented July 10, 1888.

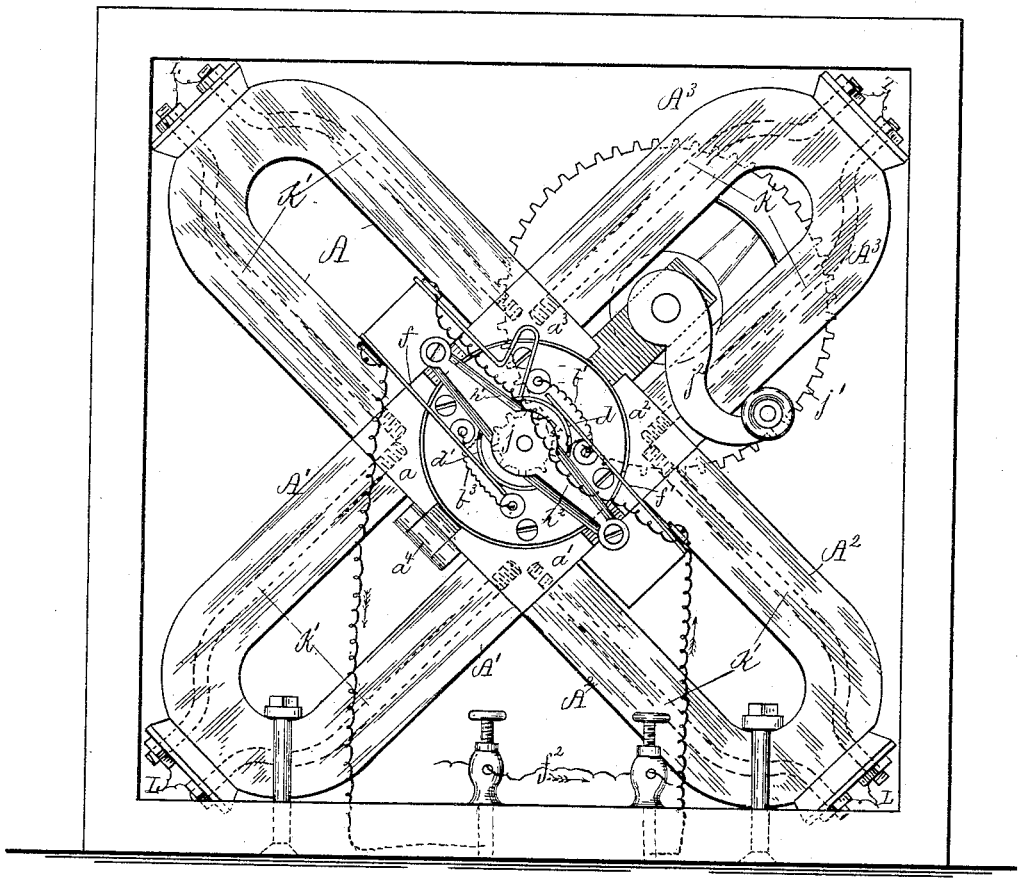

Fig. 1.

WITNESSES.
Chas. S. Gooding.
John R. Snow.

INVENTOR:
William Humans
by
J. E. Maynadier
Atty.

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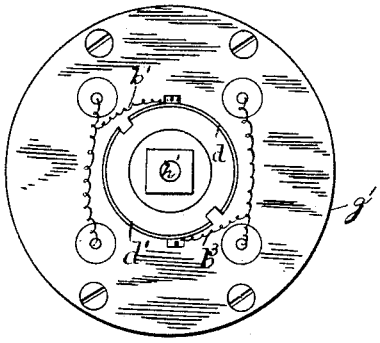

Fig. 2.

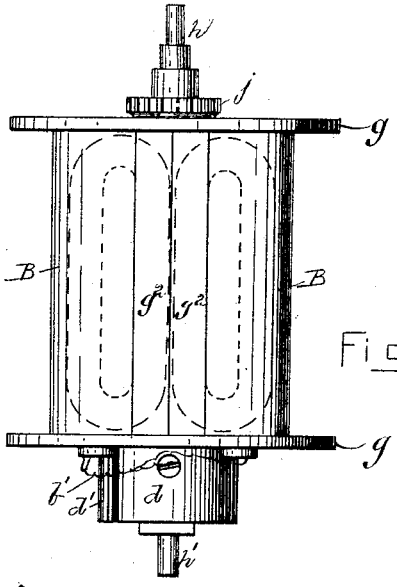

Fig. 3.

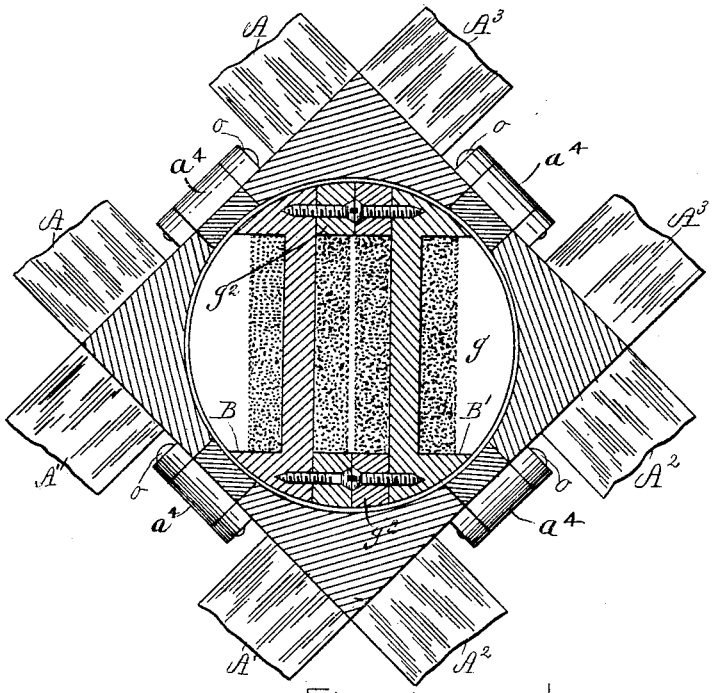

Fig. 4

WITNESSES:
Chas. S. Gooding.
John R. Snow.

INVENTOR:
William Humans.
by J. Edwards Maynadier.
Atty

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W. HUMANS.

MAGNETO ELECTRIC MACHINE.

No. 386,071. Patented July 10, 1888.

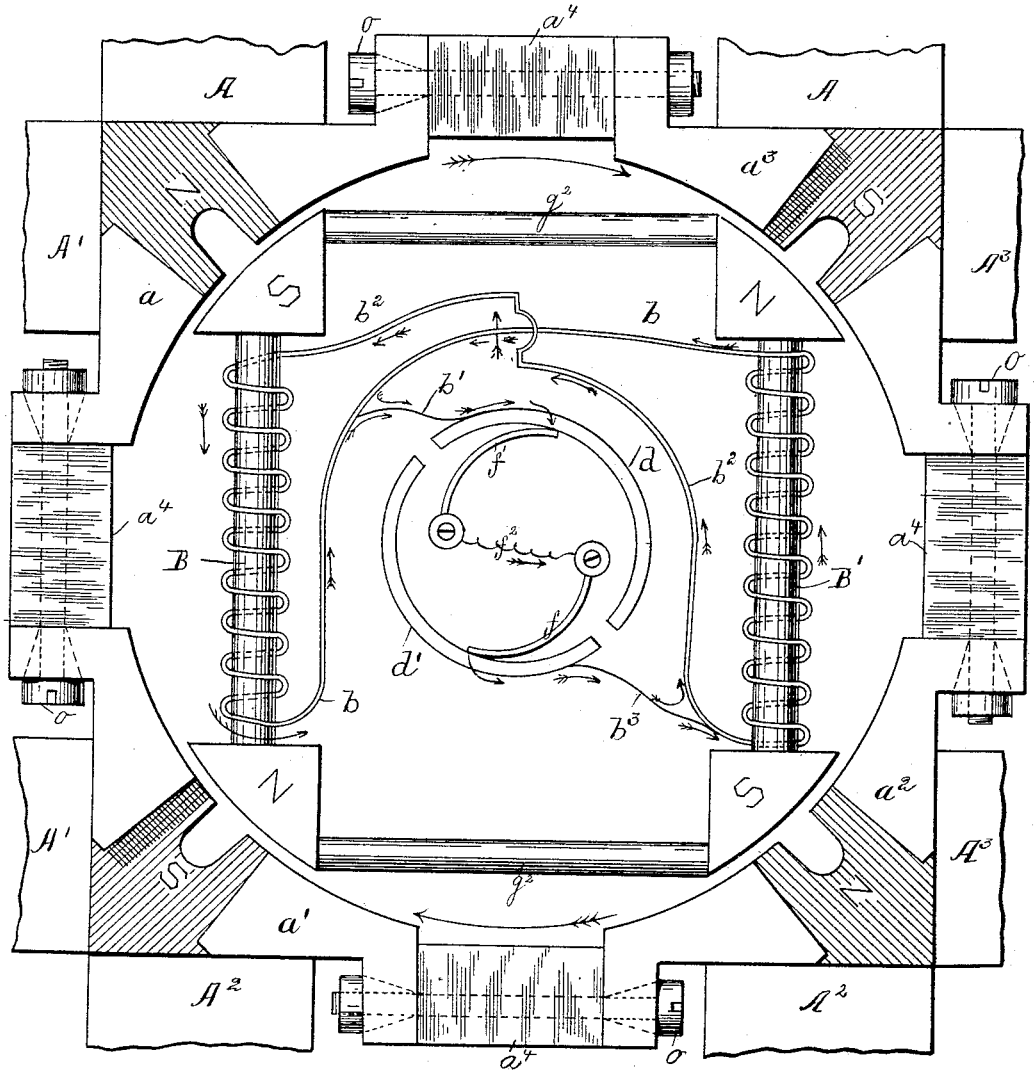

Fig. 5.

WITNESSES:
Chas. S. Gooding.
John R. Snow.

INVENTOR:
William Humans.
by J. L. Ellsworth
Atty

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W. HUMANS.

MAGNETO ELECTRIC MACHINE.

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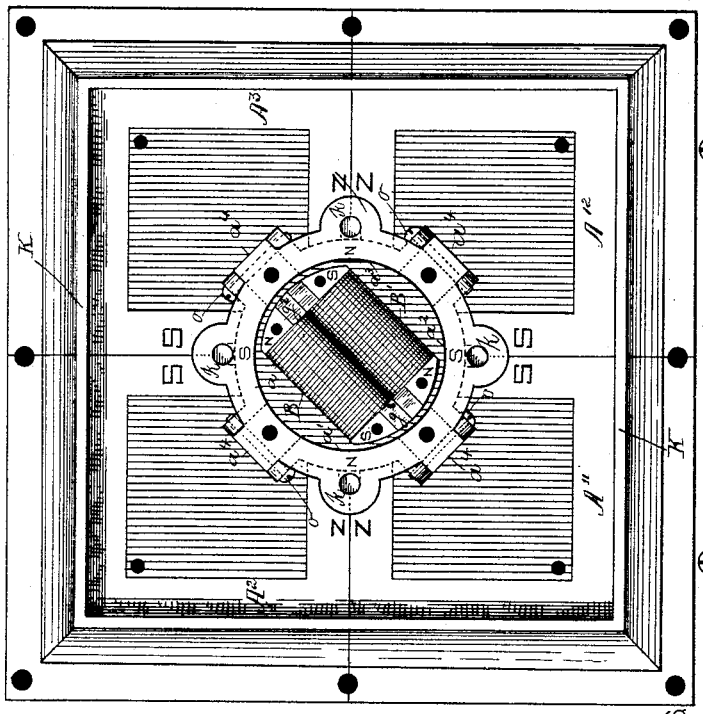
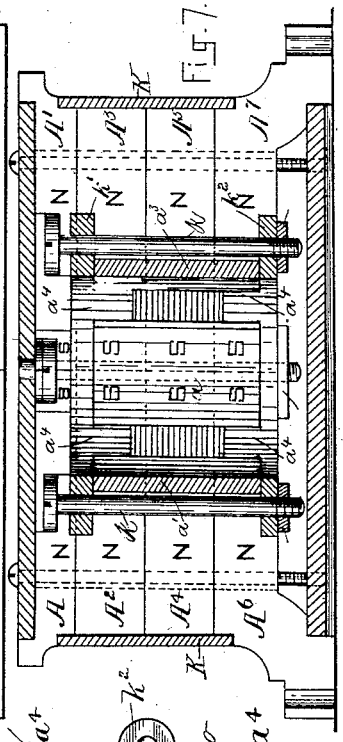


Fig. 7.



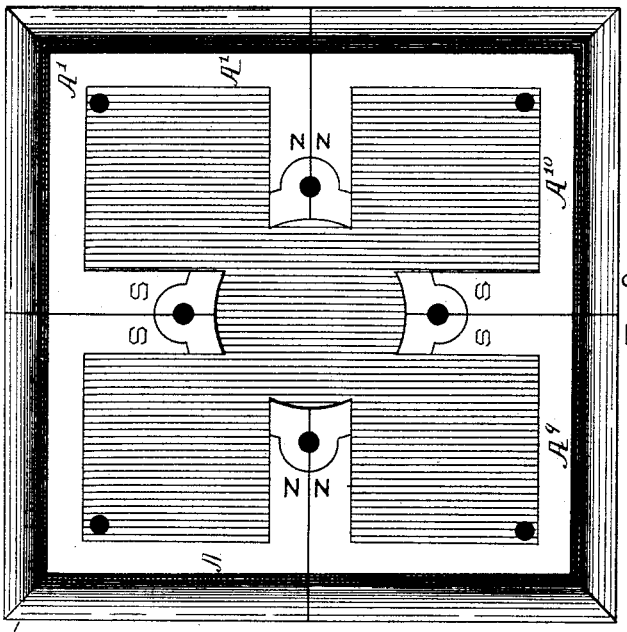


Fig. 8.

Fig. 6.

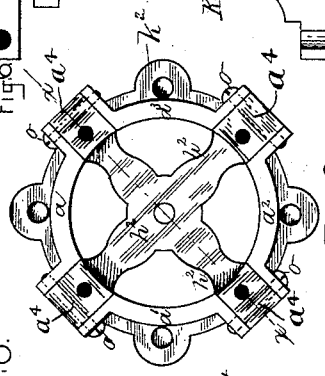


Fig. 9.

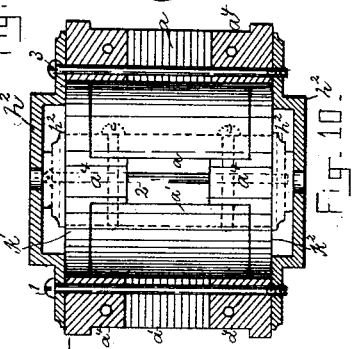


Fig. 10.

WITNESSES:

Chas. S. Gooding.

John R. Snow.

INVENTOR:

William Humans.

by

J. E. Maynadier

Atty

(No Model.)

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W. HUMANS.

MAGNETO ELECTRIC MACHINE.

No. 386,071. Patented July 10, 1888.

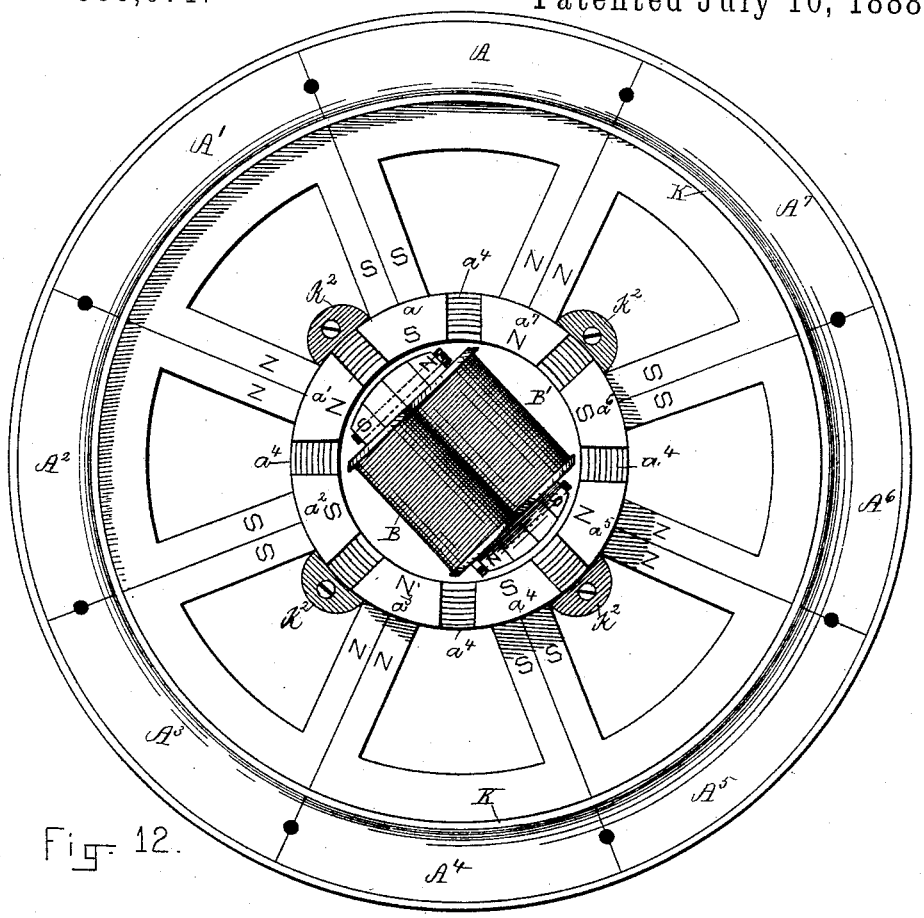

Fig. 12.

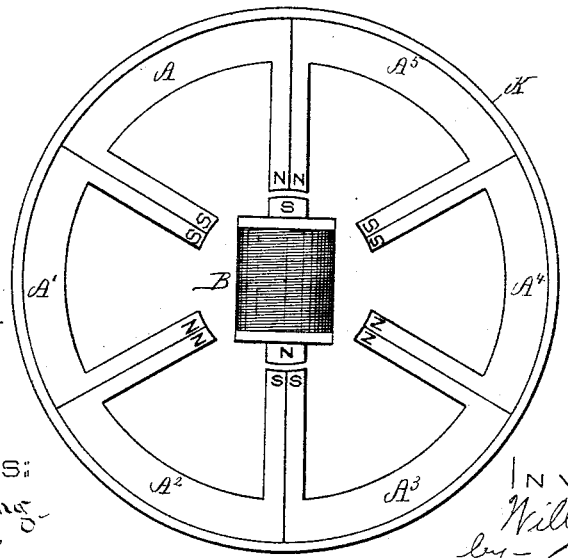

Fig. 11.

WITNESSES:
Thos. S. Gooding.
John R. Snow.

INVENTOR:
William Humans.
by J. E. Maynadier
Atty

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W. HUMANS.

MAGNETO ELECTRIC MACHINE.

No. 386,071. Patented July 10, 1888.

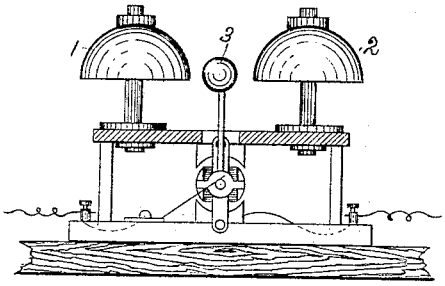

Fig. 13.

Witnesses.

H. C. Young.

John R. Snow.

Inventor

William Humans,

by his attorney,

J. H. Magruder.

UNITED STATES PATENT OFFICE.

WILLIAM HUMANS, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO THE AMERICAN MAGNETIC ELECTRIC COMPANY, OF JERSEY CITY, NEW JERSEY.

MAGNETO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 386,071, dated July 10, 1888.

Application filed July 23, 1885. Serial No. 172,437. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM HUMANS, of Cambridge, in the county of Middlesex and State of Massachusetts, have invented a new and useful Magneto-Electric Apparatus, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a plan of my apparatus in a box or case. Fig. 2 is an end view, and Fig. 3 a side view, of the armature. Fig. 4 is a cross-section showing the armature and the pole-pieces of the magnet. Fig. 5 is a diagram for explanation. The other figures show modified forms of my apparatus in which the magnet itself forms the box or case.

Fig. 13 shows a bell-hammer arranged between two bells.

The main feature of my invention is a double armature composed of two cores, each with its coil, both cores and both coils being arranged on a single axis, as shown clearly in Fig. 4, in order to form an armature adapted for use as a double revolving armature, as more fully described below.

In the drawings, A A′ A^2 A^3 represent four magnets whose eight poles are arranged together to form two north poles and two south poles. When arranged as in Fig. 1, the pole-piece *a* presents a north pole to the armatures B B′; the pole-piece *a′* a south pole; a^2 a north pole, and a^3 a south pole; and when the armatures are in the position shown in the diagram, Fig. 5, the current in both armature-coils is in the same direction, as shown by the arrows—that is, the current leaves the coil of B, and also leaves the coil of B′ at N and enters the coil of B and of B′ at S. It will be seen that the wire *b*, which extends from the N end of B coil to the N end of B′ coil, is in electrical connection by wire *b′* with the half-ring *d*, while wire b^2, which connects the S end of B coil to the S end of B′ coil, is in electrical connection by wire b^3 with the half-ring *d′*. Consequently the brush *f* is one pole and the brush *f″* the other pole of the apparatus, and the wire f^2, joining these poles, represents the line-wire. When the armatures are in the position shown in Fig. 5, the polarity of the half-ring *d* will obviously depend upon the way in which the coils are wound; but when the N end of B′ leaves the pole-piece a^3 and the S end of B′ the pole-piece a^2 (and simultaneously the N of B leaves pole-piece *a′* and S of B pole-piece *a*) the current is reversed. Consequently there are two currents in one direction and two currents in the opposite direction for each revolution of the armatures B B′. The polarity of the half-ring *d* is always opposed to that of the half-ring *d′*, and these rings are electrically insulated one from the other; but one is in electrical connection with one end of the line-wire and the other with the other end of the line-wire by means of the brushes *f f′*. It will also be clear that two entire rings may be used instead of the two half-rings *d d′*, and in that case the brush *f* will be in contact with one of the rings and the brush *f′* with the other, the two rings being insulated one from the other and each ring being alternately plus and minus.

The armatures B B′ are connected by disks *g g′*, and are separated by wooden or other non-magnetic bars, g^2, these bars being merely for convenience, as the cores of the armatures are sufficiently held apart by the disks. The disk *g* supports the journal *h* and the disk *g′* the journal *h′*, and these journals enter boxes in the bridge-pieces h^2, one on each side of the apparatus. The pinion *j* meshes with the driving-gear *j′*, to the shaft of which the handle j^2 is attached.

Figs. 6, 7, and 8 show a modified form of my magnet, each magnet A A′, &c., being shaped to form a section of a box or case, as described in my application for patent, Serial No. 172,432, of even date herewith.

The magnets are held together in one direction by the hoop K, and in the other direction by bolts *k*, as shown in Fig. 7.

Each pole-piece *a a′*, &c., is arranged in a mold in its proper place—that is, each being at the proper distance from the other—and melted non-magnetic metal poured in, such as brass, lead, or the like. The non-magnetic metal enters holes in the pole-pieces, or flows around non-magnetic bolts *o*, so that the four pole-pieces are firmly held together and adapted to receive the magnets and also the armatures. In Figs. 4 and 5 the non-magnetic

metal a^4 is held mainly by the bolts *o*, by which the pole-pieces are held together, while in Figs. 6, 7, 8, 9, and 10 the non-magnetic metal forms the rings $k\ k^2$.

In Fig. 5 the half-ring *d* is plus and the half-ring *d'* minus when the armatures are as shown in that figure, and the current through the line is from *f'* to *f*; but when the armatures are moved through ninety degrees the half-ring *d* becomes minus and *d'* plus; but as the brushes *f f'* have changed contact with the half-rings—that is, *f* is in contact with *d* and *f'* with *d'*—the current over the line f^2 is as before—that is, from *f'* to *f*. On the next quarter of the revolution—that is, when the armatures have been moved the second ninety degrees (or one hundred and eighty degrees from their position shown in Fig. 5)—the half-ring *d* will be plus and the half-ring *d'* will be minus; but the current will nevertheless be from *f* to *f'*, because *f* is then in contact with *d* and *f'* with *d'*. On the next quarter of the revolution the half-rings *d d'* again change their polarity, *d* being minus and *d'* plus; but the current is the same as before, for *f* is then in contact with *d'* and *f'* with *d*. In this way there are two pairs of currents of the same polarity—that is, in the same direction—sent through the wire at each revolution of the armatures, and the purpose of this arrangement of the half-rings *d d'* and brushes *f f'* is to cause a bell-hammer arranged between two bells and actuated by the currents generated by my device to strike two blows upon one bell, then two upon the other, for each revolution of the armatures B B'.

In Fig. 13 I show two bells, 1 and 2, arranged with a bell-hammer, 3, between them, and this is a convenient arrangement of the hammer and the two bells, as will be readily understood without further description. When simple alternate currents are required, the half-rings *d d'* are not necessary; but this arrangement, whereby I get currents in pairs, is an important feature of my invention.

Fig. 11 is a diagram illustrating one of my magnets with six poles, and Fig. 12 with eight poles; and from the drawings it will be clear to all skilled in this art how to multiply the poles to any desired extent. In Fig. 11 no advantage is derived from using a double armature, and I have therefore indicated an ordinary armature; but while I have shown my magnets as adapted to induce a current in the coil of an armature I do not of course limit myself to such use.

One of the chief advantages of my new apparatus is that multiplying-gear can be dispensed with; for although I have shown such gear in Fig. 1, that is solely because I wished to indicate the medical use of my apparatus; but with my double armature each revolution will give four currents with a four-pole magnet, eight currents with an eight-pole magnet, and so on, for each revolution of the armature, and consequently no multiplying-gear is needed for many uses of my apparatus. This is a practical matter of considerable consequence, as it greatly lessens the expense of construction.

What I claim as my invention is—

1. The double armature above described, composed of the two cores and the two coils, the cores being held together back to back, but magnetically insulated, substantially as shown.

2. In combination, the double armature B B' and its two coils, the magnets A A', &c., and the electrodes *d d'* and *f f'*, whereby the currents are sent in pairs over the line, as set forth.

WILLIAM HUMANS.

Witnesses:
J. E. MAYNADIER,
JOHN R. SNOW.