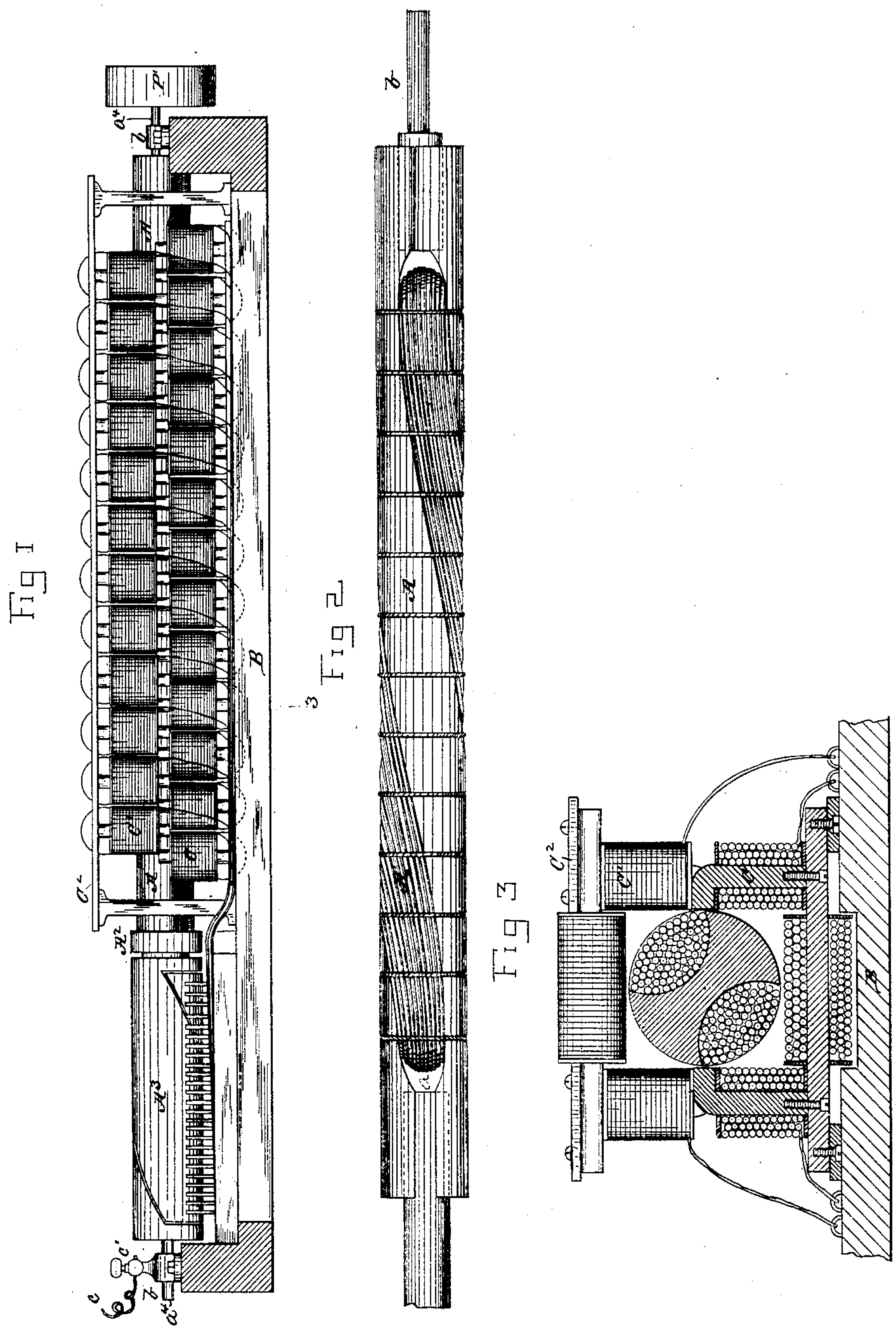
(No Model.) 2 Sheets—Sheet 1.

J. B. BLAIR.

MAGNETO ELECTRIC MACHINE.

No. 253,577. Patented Feb. 14, 1882.



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(No Model.) 2 Sheets—Sheet 2.

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MAGNETO ELECTRIC MACHINE.

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Fig 6

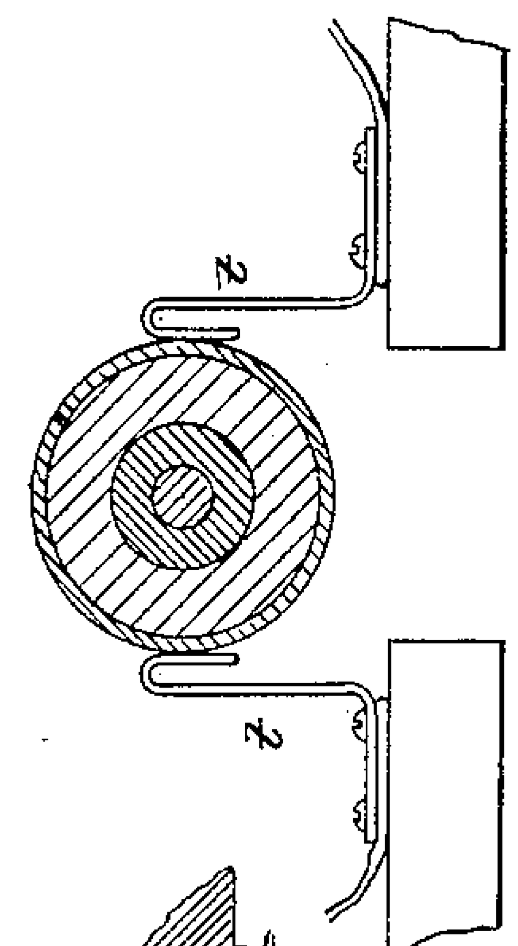


Fig 4

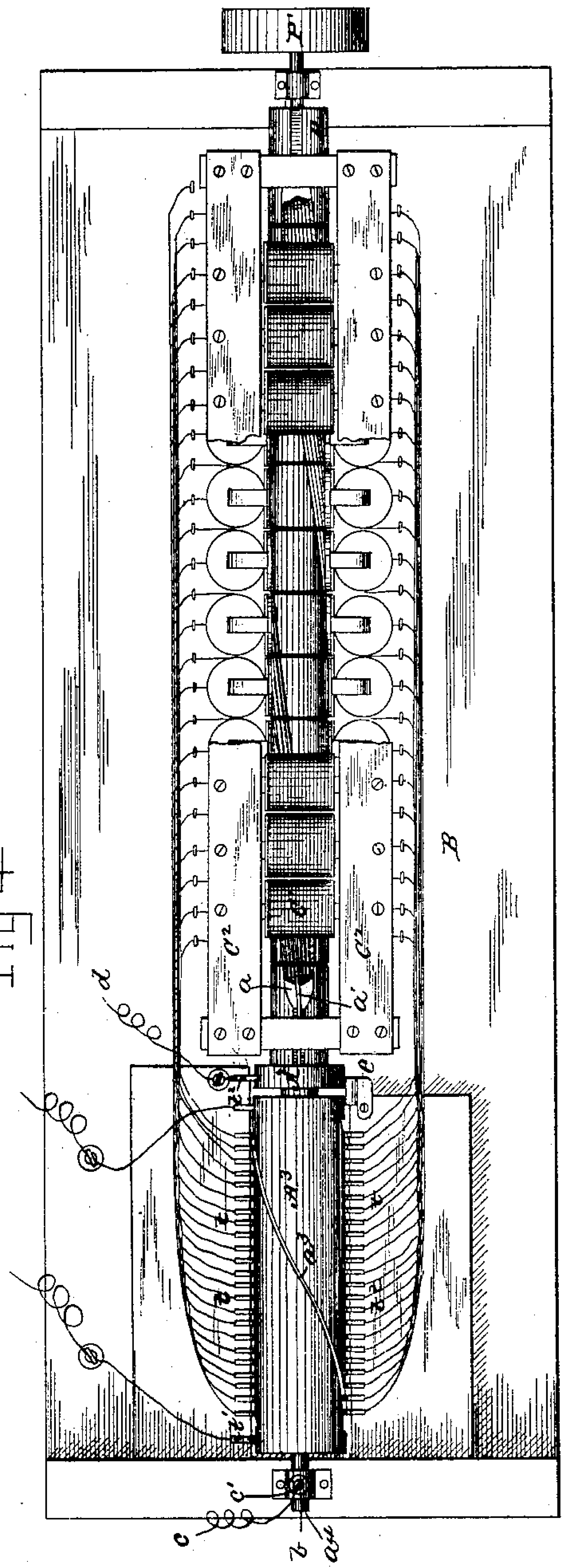


Fig 5

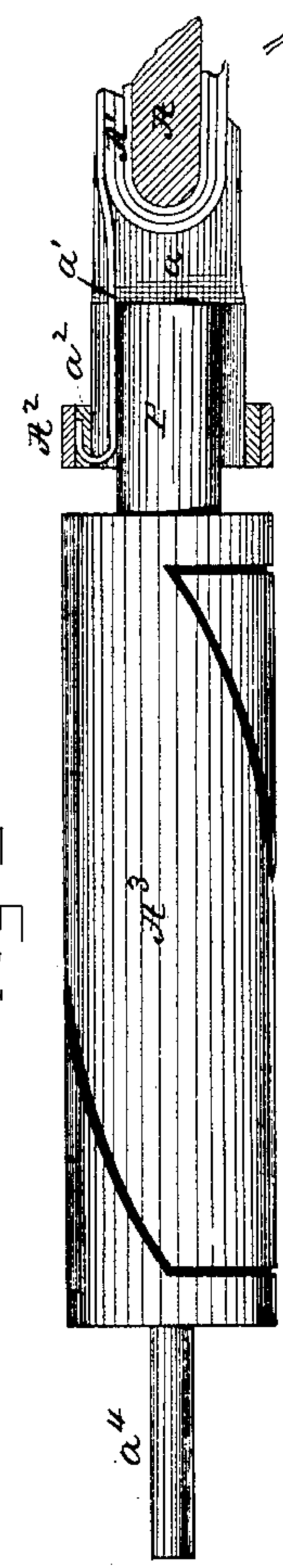
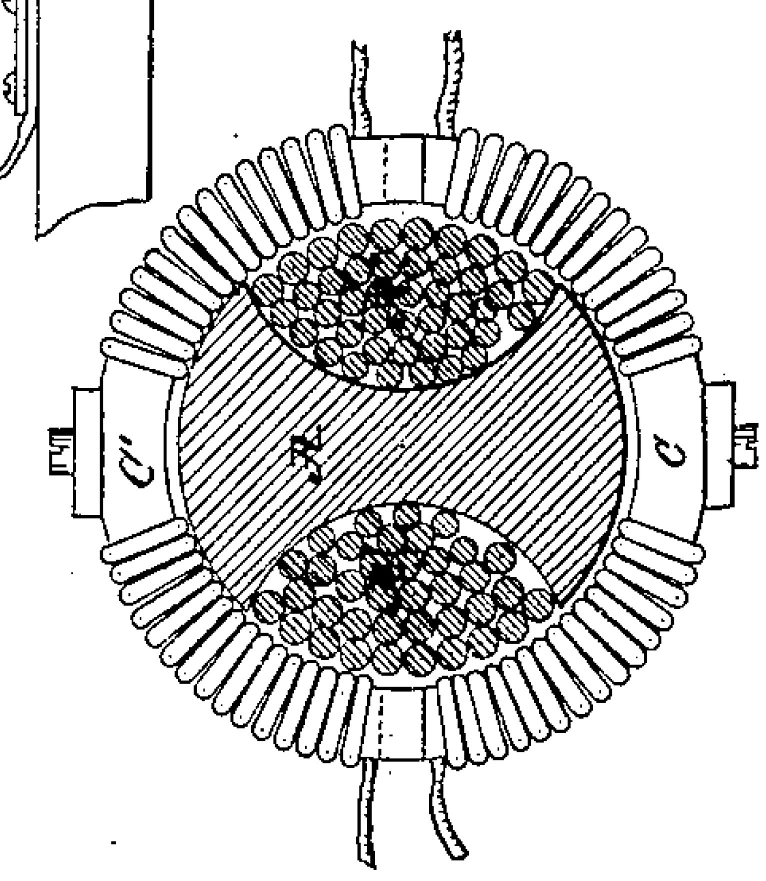


Fig 7



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UNITED STATES PATENT OFFICE.

JOHN B. BLAIR, OF CHICAGO, ILL., ASSIGNOR OF SIX-TENTHS TO AARON P. M. JEFFERS AND WILLIAM S. COFFMAN, BOTH OF SAME PLACE.

MAGNETO-ELECTRIC MACHINE.

SPECIFICATION forming part of Letters Patent No. 253,577, dated February 14, 1882.

Application filed September 27, 1881. (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 Machines; 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.

Among the objects of my invention are, first, to provide in a magneto-electric machine giving a continuous current of induced electricity, a construction whereby the least possible power is required to produce a given effect, which object is accomplished by employing a field-magnet consisting of single cylindric bar spirally grooved on opposite sides and apertured to receive a longitudinal coil which fills the grooves, in combination with surrounding series of magnets; and, second, to increase the effectiveness of the machine, which is accomplished by a close and compact arrangement of the stationary magnets about such field-magnet on all sides, as will be hereinafter fully set forth and claimed.

In the accompanying drawings, Figure 1 is a side elevation of my improved machine. Fig. 2 is an elevation of the novel field-magnet detached from the machine and enlarged. Fig. 3 is a transverse section of the machine through 3 3 of Fig. 1, enlarged. Fig. 4 is a plan or top view of the machine, having several of the upper magnets removed. Fig. 5 is an enlarged elevation of the commutator and a fragment of the field-magnet with which it is rigidly connected. Fig. 6 is a transverse section of the commutator, showing the tangents in side elevation. Fig. 7 shows an alternative form of the secondary magnets.

A is the field-magnet, consisting of a cylinder of soft iron of any desired length and diameter, provided with two apertures, *a a*, each of size equal to, say, half the diameter of the cylinder and located near its ends. Extending from each end of one of these apertures to the opposite end of the other aperture a party-cylindrical spiral groove is cut, each groove making a half-circuit of said cylinder, and in these opposite grooves the coil A′ is laid, passing through the apertures *a a*. The inner end of the wire forming this coil is in contact with the metal of the cylinder, and the outer end (seen at *a′*, Figs. 4 and 5) is connected with the ring A^2, which is secured to the cylinder, but is insulated therefrom by the interposed non-metallic ring a^2, Fig. 5.

The cylinder is provided with steel spindles a^4 a^4, one at each end, set in brass plugs P in the cylinder ends. One of these is made long enough to support the concentric cylinder-commutator A^3, similar to the ordinary commutator, except that the longitudinal lines of separation a^3 are spiral, and each extends half-way around it in the same direction as the spiral grooves of the magnet A. The termini of the lines of separation in the commutator are in a plane at right angles with the apertures *a a* in the magnet A. Said commutator is set at a sufficient distance from the ring A^2 to be insulated therefrom.

The magnet A, provided with the commutator, as set forth, is mounted by its spindles in the bearings *b b* of a suitable frame or support, B, and a pulley, P′, is secured to one of the spindles for the rotation of said magnet.

Beneath the magnet A, and extending from end to end thereof, are set and secured to the bed B a series of secondary magnets, C, consisting of three connected coils at right angles with each other and having a continuous core, the projecting poles of which are directed inward toward and nearly in contact with the cylindric magnet A. These are essentially horseshoe-magnets. Above the magnet A a series of similar horseshoe-magnets, C′, are supported by bars C^2, or otherwise, having their poles arranged in alternation and in the same plane with those of the lower series, C, as plainly shown in Fig. 1. These magnets C and C′ are preferably of such dimensions that their several coils as well as their poles are in proximity with the magnet A, as shown by Fig. 3. Each of these several magnets connects with opposite tangents of the series shown at *t t*, Figs. 1 and 4, and the tangents with which such connection is made bear the same relation to the spiral line of separation in the commutator as the poles of the magnet bear to the central lines of the soft-metal surfaces which are the poles of the magnet A—that is to say, when the poles of the magnet A are fairly opposite the poles of a given magnet, C or C′, the tangents *t* with which said magnet is connected will be opposite the spiral line of separation in the commutator.

Tangents *t′ t′*, taking off the working-current, are arranged to bear on the unbroken surface of the commutator, as in other machines.

For the purpose of making the cylinder A a field-magnet, connections *c d* are provided, one connecting with the core of said magnet through the binding-post *c′* on one of the spindle-bearings, and the other through the tangent t^2, bearing on the ring A^2. Those wires are connected with a battery for the purpose of giving the required initial magnetism preliminary to putting the machine in operation.

In the operation of the machine the magnet A is rotated at a suitable speed through the pulley P′. The polarity in the several magnets, C C′, is of course reversed twice at each rotation of the magnet A, and the current is converted in the commutator as in ordinary machines. As the elongated poles of the magnet A are spiral, as described, the magnetic axis of said magnet is always at some point in the same polar relation to some or other of the double series of magnets C and C′. Such coincidence of polar relation is therefore constant, beginning, say, at one end of the magnet A and proceeding to the other, such movement being constantly and uninterruptedly repeated as long as the magnet A is in motion. As a result a continuous and unbroken current is produced in the working circuit in quantity equal to the combined power due to the entire series of magnets C C′ and in intensity due to the power of each of this series.

By making the rotating field-magnet of the cylindric form shown and providing it with spiral grooves and apertures, as described, for the reception of the coil A, a short radius of motion is obtained, by which the machine is made more compact, and, owing to the contraction of the field of magnetic resistance thus effected, less power is required in driving it.

In Fig. 7 an alternative form of secondary magnet or stationary armature is shown which still more closely embraces the field-magnet.

The battery connected with the magnet A may be continued in the circuit therewith or thrown out after the machine has been started, and if desired or necessary the induced current may be wholly or in part sent through the magnet A by means of a suitable shunt or movable tangent, *e*, which may be brought to bear upon both the ring A^2 and the commutator A^3, as shown in Fig. 4.

Obviously it will be the equivalent of the construction here shown to make the magnet A flat or without the spiral, like the old Siemens armature, and to surround the same with a spirally-arranged series of secondary magnets or armatures, and the effect of such relative spirality will of course be the same, whether the magnet A or the surrounding armatures revolve.

I claim as my invention—

1. In a magneto-electric machine, the rotating cylindric field-magnet A, consisting of a shaft spirally grooved on opposite sides and apertured as shown, and provided with the coil A′, combined with a series of surrounding stationary armatures, substantially as described, and for the purposes set forth.

2. In combination with the field-magnet A, the series of secondary magnets C C′, arranged in alternation and surrounding the field-magnet, as shown, and for the purposes stated.

3. In combination with the field-magnet A, the series of secondary magnets C C′, arranged in alternation about and in proximity throughout their length with the field-magnet, substantially as and for the purposes described.

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

J. B. BLAIR.

Witnesses:
M. E. DAYTON,
JESSE COX, Jr.