S. F. Van Choate.

Electro Magnet.

No. 40,133. Patented Sep. 29, 1863.

Witnesses.
Wm. H. Harrison
Wm. F. Block

Inventor
S. F. Van Choate
by his atty
A. Block,

UNITED STATES PATENT OFFICE.

S. F. VAN CHOATE, OF NEW YORK, N. Y.

IMPROVEMENT IN RECEIVING-MAGNETS.

Specification forming part of Letters Patent No. **40,133**, dated September 29, 1863.

To all whom it may concern:

Be it known that I, S. F. VAN CHOATE, of the city, county, and State of New York, have invented certain new and useful Improvements in Electro-Magnets; and I hereby declare that the following is a full, clear, and exact description of the same.

The object of this my invention is to produce, by means of an electro-magnet, a greater magnetic effect from a given battery-power than could heretofore be obtained; and my invention consists, first, in locating the armature or vibrator of an electro-magnet, together with the core, within the coils and concentrically therewith or otherwise, so that the armature shall be magnetized at the same time the core is magnetized; second, in combining with an armature located within the cylinder of the spool or coils a horseshoe-magnet, so shaped that both of its ends are within the cylinder of the spool or in line of its axis.

Electro-magnets are constructed on the well-known principle that an insulated wire coiled about a piece of soft iron is rendered suddenly magnetic on a current of electricity being sent through the coil, and that on cessation of the current circulating around it the iron as suddenly loses this power. Usually they are made of a piece of iron of the shape of a horseshoe having a quantity of fine silk-covered wire wound around it, the ends of such wire being joined to the wire on the line, so that when a current is sent through this main wire it must pass around the coils upon the soft iron. The iron, then becoming magnetic, would attract a small armature or piece of iron or steel placed opposite the ends of the horseshoe, and the motion of the vibrator is used as an indicator or operating a mechanism, as is well understood, for telegraphing and other purposes.

In order to produce practical effects a large quantity of wire is required, which creates resistance proportionate to its length, whereby the battery-power is greatly reduced.

I have imagined a new arrangement or combination of apparatus, whereby, with a less quantity of wire, and consequently with less resistance, I am enabled to produce magnetic effects much greater with a battery of given power.

To enable others to make and use my invention, I shall now proceed to describe the same, reference being had to the accompanying drawings, in which—

Figures 1 and 2 are, respectively, front and side elevations of an electro-magnet constructed in accordance with my invention. Figs. 3 and 4 are sectional elevations of the same on lines *a b* *c d*. Fig. 5 is a plan view of the same; and Fig. 6 a perspective view of the core and vibrator, representing, by letters N S and N′ S′, their relative polarity, this relation being, of course, reversed if the magnetic currents be reversed.

The instrument is firmly established on a base or foundation plate, *i*, and is composed of a horseshoe-magnet, a coil of wire wound upon a spool, a vibrator, and a device for regulating the tension and vibration.

The horseshoe-magnet A is composed of two angular pieces of soft iron, united by a screw at *j*, the ends *s n* being made to face each other. The horseshoe is secured to the base-plate by a screw passing through it and up into the branch *c* of the angular piece A′. By this arrangement the two ends or end branches are vertical in relation to the base-plate.

Before the two pieces are united at their juncture at *j*, I insert upon the lower upright branch a spool made of bone-rubber, around which is wound a silk-covered wire. The coil is protected by a bone-rubber sleeve or cap G.

Within the cylindrical bore of the spool there is the armature or vibrator C, hung in adjustable screw-journals *h* upon an axle or spindle *d*. To this spindle is fixed an arm, *g*, whose end is connected, by a spring-wire, with a winding-shaft operated by a knob, *k*. By this shaft the spring-tension on the vibratory bar is regulated, so that on cessation of the magnetizing currents the vibrator may be drawn back from the core.

A spring, *m*, inserted between the knob and the bearing of the shaft, creates sufficient friction to make the adjustment of tension permanent. Two screws, respectively in the upper branch of the core or horseshoe-magnet and in a bracket, regulate the play of the vibrator.

The operation, it will be understood, is similar to apparatus heretofore in use. An electric fluid being passed through the wire, the core will be instantly magnetized and attract the vibrator.

The great advantage of my apparatus is due

to the magnetization of both the core and the vibrator, and this is done at the center of the coil, where the magnetic effect is most intense, and I am enabled by this arrangement to produce the effects with four ounces of wire, which in the old apparatus could only be produced by two pounds of wire.

Having thus fully described my invention, I shall state my claims as follows:

1. Locating the armature or vibrator of an electro-magnet, together with the core, within the coils and concentrically therewith, substantially in the manner hereinbefore set forth.

2. In combination with an armature located within the cylinder of the spool or coils, the horseshoe-magnet, so shaped that both of its ends are within the cylinder of the spool or in line of its axis, substantially as set forth.

In testimony whereof I have signed my name to this specification before two subscribing witnesses.

S. F. VAN CHOATE.

Witnesses:

A. POLLOK,

EDM. F. BROWN.