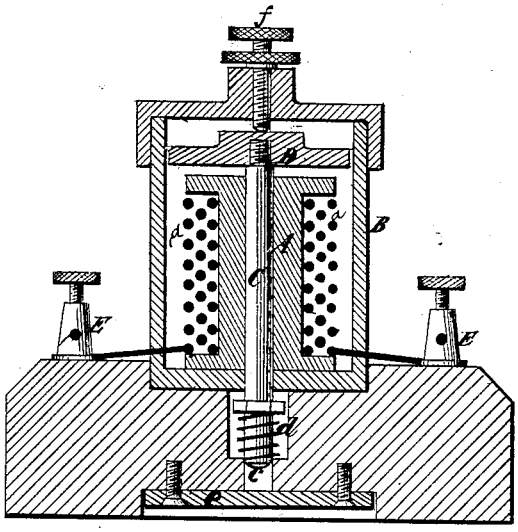
E. L. PAINE.

Electro-Magnet.

No. 200,929. Patented March 5, 1878.



Witnesses:

A. J. DeLacy

Mortimer Clarke.

Edwin L. Paine

Inventor.

by J. C. Clayton,

Atty.

UNITED STATES PATENT OFFICE.

EDWIN L. PAINE, OF NEWARK, NEW JERSEY, ASSIGNOR TO ANDREW ALLBRIGHT, OF SAME PLACE.

IMPROVEMENT IN ELECTRO-MAGNETS.

Specification forming part of Letters Patent No. **200,929**, dated March 5, 1878; application filed October 8, 1877.

To all whom it may concern:

Be it known that I, EDWIN L. PAINE, of the city of Newark, county of Essex, and State of New Jersey, have invented a new and useful Improvement in Electro-Magnets, which improvement is fully set forth in the following specification and accompanying drawing.

The object of my invention is to simplify the construction of that class of electro-magnets required for percussive action (as in dental pluggers, telegraph-sounders, and electro-magnetic stencil-tools) by increasing the efficiency of magnet, thereby enabling a weak battery to supply, in connection with my magnet, an effect equal to that heretofore attained with a much stronger battery when used with all ordinary magnets; and the accompanying drawing, making part of this specification, is a vertical section of the several parts described, and which, for purpose of illustration, represents the improvement as used in a telegraph-sounder.

A soft-iron bobbin, A, wrapped with wire *a* in the usual way, is set in the bottom of a soft-iron cylinder, B. The axis of the bobbin is traversed by a brass rod, C, on the head of which is a disk-armature, D, also of soft iron, and on the foot *c* of the rod is secured a spiral spring, *d*. E E are binding-posts, connecting with the coil around the bobbin.

When the current traverses the bobbin A, the bobbin becomes a magnet of a given polarity by direct action of the current. The lower end of bobbin, resting on the bottom of the cylinder B, by magnetic induction polarizes the upper end of the cylinder, and the cylinder-pole is the opposite of that of the bobbin-pole.

When the circuit is closed, the armature D is drawn down and the foot *c* strikes the sounding-plate *e*; and when the circuit opens, the spring at *d* drives the armature against the adjusting-screw *f*.

Although it is essential to the successful working of this magnet that the cylinder B should be of soft iron or other material susceptible of magnetic induction, I do not claim the same, broadly, as my invention, but limit myself to the employment of a soft-iron cylinder differing from that shown in patent to Dexter, No. 186,234, January 16, 1877, dental plugger. While it is found of great advantage to employ about the bobbin a soft-iron cylindrical shell, it is further found to conduce largely to the strength of the magnetic effects to extend the cylindrical shell above the upper portion of the bobbin, thereby completely incasing the armature within the said cylinder, the projecting portions of the shell here covered by a soft-iron cap; for should the cylinder be of copper or other diamagnetic material, the action of the armature will be weak and sluggish under a given battery as compared with the iron cylinder; and without any cylinder incasing the bobbin, double the number of cells will be required to actuate the armature that works it with the cylinder.

The upper end of the bobbin should always be free from contact with the cylinder, the space being at least one-eighth the diameter of the bobbin's head; but the armature may be fitted as closely to the cylinder as it can be, and not induce frictional contact. I have made the valuable discovery that the cylinder surrounding the bobbin, so as to have a small space for air between the cylinder and the bobbin, adds greatly to the working power of the magnet.

I claim—

The combination of the bobbin A, the continuous shell B, and the paramagnetic armature D placed within the shell and below the top edge of the same, being substantially an improvement in electro-magnets.

In testimony that I claim the above improvements in telegraph-sounders I have hereunto set my hand this 22d day of September, 1877.

EDWIN L. PAINE.

In presence of—
W. M. PAINE,
J. C. CLAYTON.