Fig. 2

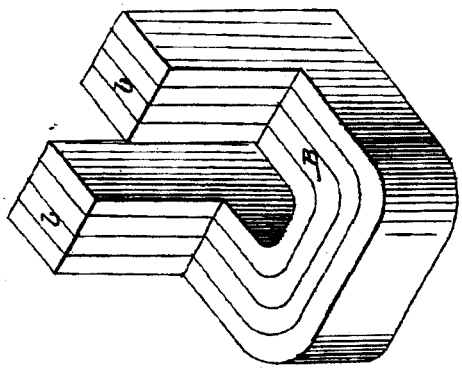
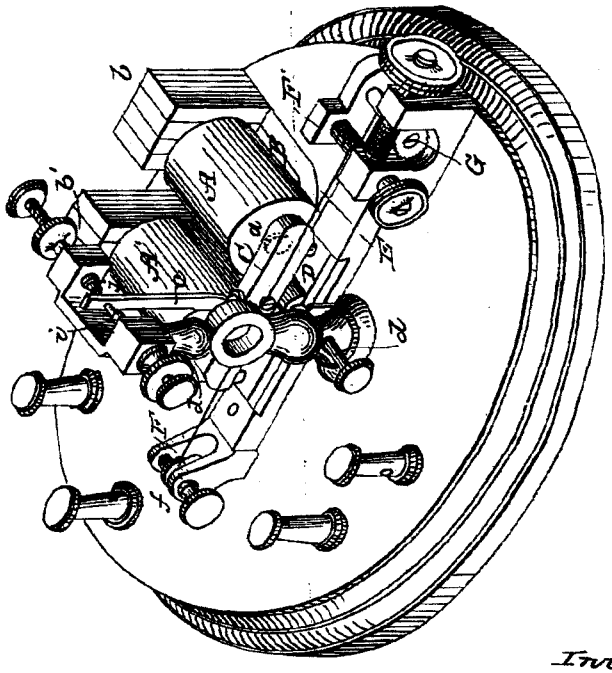


Fig. 1



Witnesses
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32478

UNITED STATES PATENT OFFICE.

ALFRED G. HOLCOMB, OF NEW YORK, N. Y.

IMPROVED ELECTRO-MAGNET.

Specification forming part of Letters Patent No. **32,478**, dated June 4, 1861.

To all whom it may concern:

Be it known that I, ALFRED G. HOLCOMB, of the city, county, and State of New York, have invented certain new and useful Improvements in Electro-Magnets; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of a relay-magnet embodying my improvements. Fig. 2 is a perspective view of a permanent magnet hereinafter described.

Similar letters of reference indicate corresponding parts in both figures.

My invention consists, first, in a peculiar manner of applying induced magnetism from a permanent magnet in conjunction with electro-magnetism, as hereinafter explained; second, in a peculiar construction and arrangement of the permanent magnet in connection with the electro-magnet; third, in a device for supporting and adjusting the armature; fourth, in an improved device for adjusting the armature-spring.

To enable others skilled in the art to make and use my invention, I will proceed to describe its construction and operation.

A A′ represent helices of common construction, provided with soft-metal cores *a a′*.

B is a permanent horseshoe-magnet placed horizontally beneath the helices and turned up vertically in the rear, its poles *b b′* being connected with the rear ends of the respective cores *a a′*.

C is the armature, supported upon points in cup-bearings upon a slide, D, which, by means of an insulated set-screw, *d*, may be moved toward or from the cores *a a′*.

The armature-spring consists of a straight steel wire, E, stretched between a loose nut, *f*, upon a screw-shaft, F, and a tightening-shaft, G, a threaded shaft, F′, being placed near the shaft G to hold the wire and adjust its position.

e is the armature-lever.

i is the insulating-point, and *j* the platina point for closing the circuit.

The magnetism induced in the cores by the permanent magnet B operates in combination with the electro-magnetism, and by this means a magnetic force is developed greatly in excess of the sum of the forces of the induced and electro magnetism when used separately. I am thus enabled, without increased expense or chemical action in the battery, to exert a greater force upon the armature than is possible without the combination of the permanent magnet. The length of the coil may thus be reduced and the armature may be worked successfully at a greater distance from the cores. Reducing the length of the coils lessens the resistance to the passage of the electric current, and removing the armature farther from the cores removes the necessity of frequent and delicate adjustment of the armature or spring. By placing the permanent magnet in a position parallel with the axes and near the periphery of the helices it is influenced by the electric current passing through the latter, and by this means the power of the induced magnetism in the cores is increased.

In working the instrument the tension of the spring is adjusted so as to overcome the power of the induced magnetism from the permanent steel magnet, thus holding the armature *in equilibrio* while the battery is disconnected.

In the illustration here given my invention is represented as applied to the electro-magnetic telegraph; but it is equally applicable to other uses of the electro-magnet.

I am aware that a permanent magnet has previously been combined with an electro-magnet, and do not therefore desire to be understood as claiming the said combination, broadly, without reference to the particular manner and object of its use by me; but

What I do claim as new and of my invention herein, and desire to secure by Letters Patent, is—

1. Combining with the positive or attractive force of the electro-magnet that of a permanent steel magnet placed at or near the end of the core or cores of the electro-magnet opposite to that of the armature.

2. The use of a permanent steel magnet connected with the rear end of the core or

cores of the electro-magnet and carried round in a position parallel, or nearly so, with the periphery of the helix or helices.

3. The combination, with the armature C, of the adjustable slide D and set-screw *d*, in the manner and for the purposes set forth.

4. The adjusting-screws F F′, or either of them, when used in the described combination, with the stretched wire spring E, of the armature, for the purpose explained.

A. G. HOLCOMB.

Witnesses:
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JAMES H. GRIDLEY.