C. T. Chester.

Electro Magnet.

No. 29,862. Patented Sept. 4, 1860.

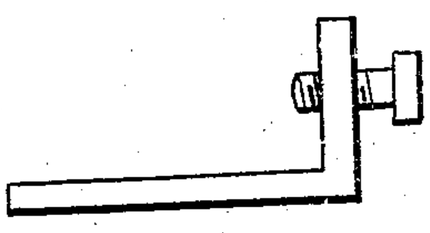
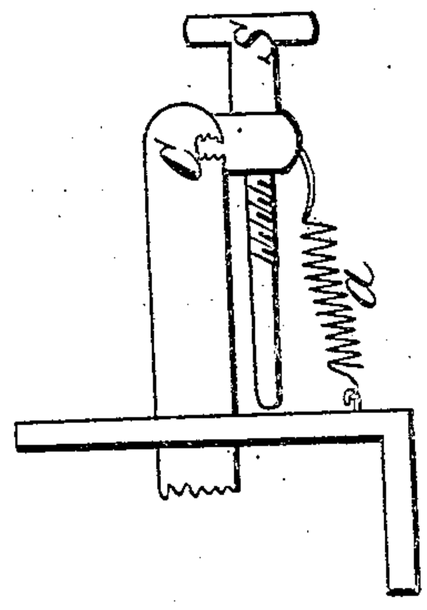


Fig. 2.



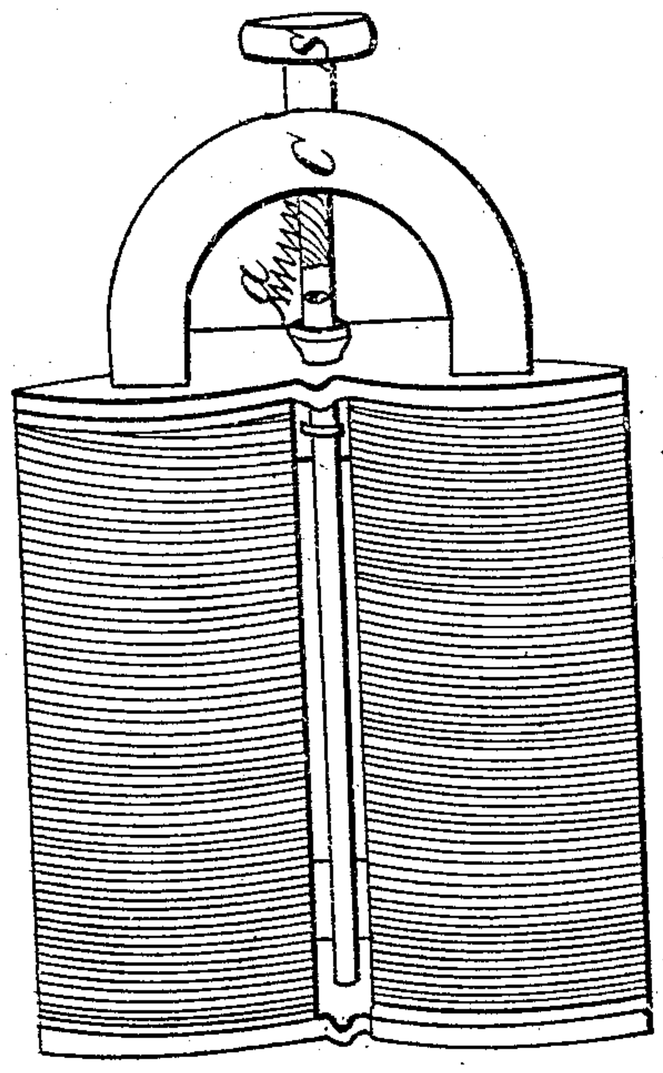


Fig. 3.

Fig. 1.

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UNITED STATES PATENT OFFICE.

CHARLES T. CHESTER, OF NEW YORK, N. Y.

IMPROVEMENT IN ELECTRO-MAGNETS.

Specification forming part of Letters Patent No. **29,862**, dated September 4, 1860.

To all whom it may concern:

Be it known that I, CHARLES T. CHESTER, of the city, county, and State of New York, have invented a new and Improved Mode of Constructing Electro-Magnets; and I do hereby declare that the following is a full and accurate description of the said invention, reference being made to the accompanying drawings.

My invention relates to electro-magnets principally used to impart motion to an armature, as in telegraph-instruments. Such magnets have heretofore been made by winding insulated wire upon the soft-iron cores, with flanges so placed upon the iron cores as to confine the wire. A flat bar of soft iron unites the cores of two such straight electro-magnets, and this flat bar is generally employed to connect the entire magnet to a brass support; but as this support is thus only at one end of the magnet the weight of the coils requires that some additional support should be placed forward, and this support is almost always made to embrace the wire. This mode of construction is objectionable for the following reasons: first, because it does not admit of removing the cores for annealing without unwinding the wire and removing, and generally destroys the flanges; second, because it does not admit of relative adjustment of the helices and cores for the purpose of varying and regulating the power of the magnet when required by variation of the current; third, because by the mode adopted of securing the magnets and helices to the instrument the wire is liable to be crushed, &c.

The nature of my said invention consists in several improvements in construction and arrangement, designed to obviate the above-mentioned objections. They are as follows, viz:

First, in constructing the helices independent of the cores by winding them on hollow reels or spools of hard rubber or other suitable material and placing within suitable cores of soft iron, the cores being confined so as to have no motion within the helices, by reason of the action of the current.

Secondly, in a means of adjusting the position relatively of the cores within the helices. This I effect by a set-screw and spring operating antagonistically to each other on the cores, the helices having an independent means of support.

Thirdly, to a mode of supporting the helices independently of the cores and without possible injury to the wire.

To describe more particularly the construction, reference being made to accompanying drawings, &c.:

I wind my helices upon spools of hard rubber—the substance employed in making combs, &c., and a well-known fabric possessing very high insulating properties. The cylinders of these spools are as thin as possible. Their flanges are thick enough to allow the outer portion of their peripheries to be cut away as in a car-wheel, Fig. 1, A. The substance cut away is replaced by an accurately-fitting metal ring. Two spools thus formed are placed side by side and connected by a brass shaped as in Fig. 2, and being, in effect, two metal rings firmly fastened together. This brass I will refer to as double ring.

The spool flanges are made accurately to fit the rings by a simple machine, and a double ring being provided for each end of the spools as soon as the spools are set in the rings and the double rings drawn together in a direction parallel to the spool-axes, the structure is complete and firm and ready to be fastened down to any proper base. It is only necessary to wind the spools with insulated wire and the electro-magnet is complete, except its iron core. This core is made of the finest and softest iron bent into U form. When properly finished it will exactly pass into and fill up the hollow spool-cylinders. The curve will project semicircularly from the flanges, Fig. 3, C. A small piece of brass, easily removable, is now attached under the center of this curve of the iron core. This brass, being drilled and tapped in a direction parallel with the axes of the spools, receives a screw, *s*, when the screw is driven in by turning its milled head till its point presses against the double ring. The iron core is forced slowly out from the spools. A strong short spiral spring, *a*, extending between and fastened to the double ring and core, pulls the core in again as soon as the pressure of the screw is withdrawn. Thus, between the screw-pressure and the spring drawing, the core is moved slowly, firmly, and steadily in and out of the spools.

If an armature receive the power of the electro-magnet, it is evident that the power will be least when the core is pressed out and great-

est when it is drawn in so as to touch the armature. By this combination of screw and spring any hesitation to move (and thus any inaccuracy of adjustment) is prevented. In other words there is no "dead-point" when the cores do not move. This dead-point must exist where a screw alone is depended on for adjustment.

It will be seen by this description, first, that the core which in telegraphing continuously always acquires some fixed and permanent magnetism, to the great annoyance of telegraphic operators, may be easily removed and reannealed and replaced. The core is not hammered or wrought in any way after leaving the annealing process. Secondly, the peculiar double-ring support, grasping only the hard-rubber spool-flanges, does not press upon the fine wire in any way.

In the common way of supporting helices the more firmly they are held the more is the wire crushed, and lightning is always sure to find out this weak spot first. Of more than two hundred magnets constructed by me in this method none have yet, to my knowledge, been burned by lightning. The method of winding the wire on hard-rubber spools also secures the best insulation of the wire from the iron cores and facilitates repairs, as a new helix can be put in the place of an injured one.

What I claim as my invention and improvement in magnets used to impart motion to armatures, as in telegraph-instruments, is as follows, viz:

1. In combination with cores confined so as to prevent the action of the current through a surrounding helix from imparting motion to them, helices wound on spools of hard rubber or other suitable material surrounding the cores and so arranged that the cores may be removed from them when requisite, substantially as described, and substantially for the purposes set forth.

2. Holding, moving, and adjusting the cores by means of the screw and spring, substantially as described.

3. Coupling and supporting the helical spools by the double rings, substantially as described.

CHARLES T. CHESTER.

Witnesses:
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