(No Model.)

H. A. CHASE.

ELECTRO MAGNETIC DEVICE.

No. 389,196. Patented Sept. 11, 1888.

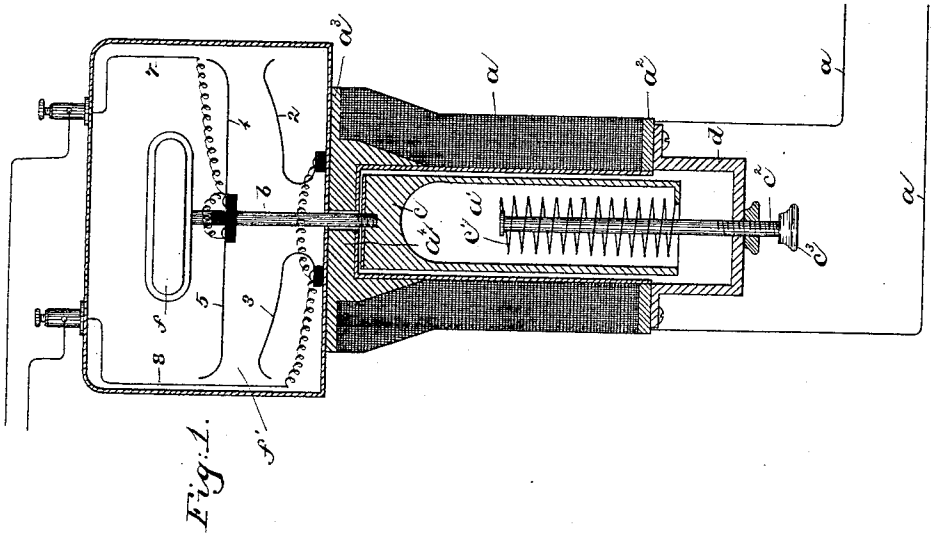


Fig. 1.

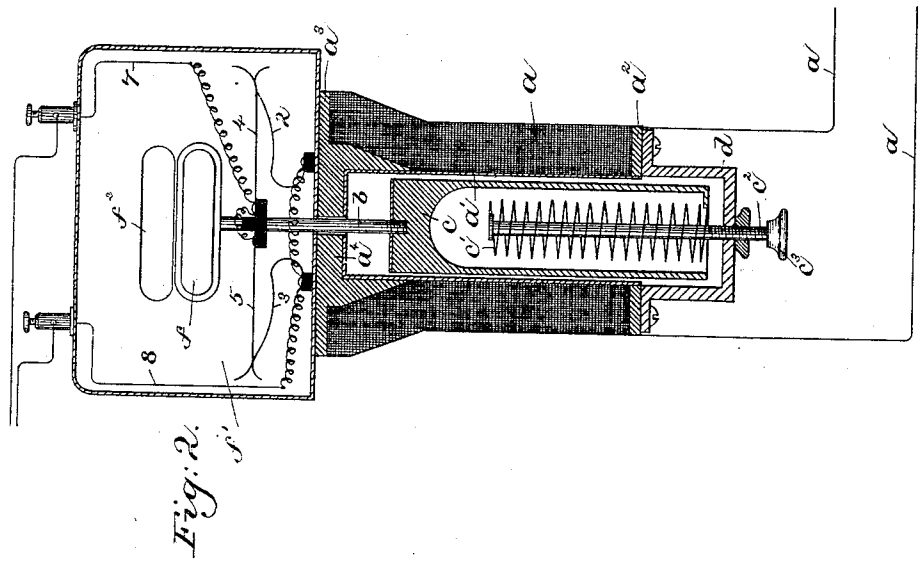


Fig. 2.

Witnesses.
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UNITED STATES PATENT OFFICE.

HENRY A. CHASE, OF STONEHAM, MASSACHUSETTS.

ELECTRO-MAGNETIC DEVICE.

SPECIFICATION forming part of Letters Patent No. 389,196, dated September 11, 1888.

Application filed April 3, 1888. Serial No. 269,504. (No model.)

To all whom it may concern:

Be it known that I, HENRY A. CHASE, of Stoneham, county of Middlesex, State of Massachusetts, have invented an Improvement in Electro-Magnetic Devices, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention has for its object to construct an electro-magnetic device or solenoid the movable core or armature of which moves in so strong a magnetic field that great movement may be obtained.

In accordance with this invention, the successive coils of wire are wound upon a spool, the shank and one end or flange of which are preferably made of brass and the other end made of soft iron. The shank portion is made tubular to receive within it the movable hollow soft-iron core or armature. The movable core or armature is suspended by its retractile spring upon an adjustable rod. Suitable contact-points are herein shown as attached to or connected with but insulated from the soft-iron end or head of the spool and with the movable core, and when the current passes through the coils of wire wound upon the spool the magnetic force accumulated in the soft-iron end piece is exerted upon the movable core to thereby lift it, separating the contacts. Adjustment of the rod upon which the movable core is mounted regulates the extent of movement of said core.

Figure 1 shows in vertical section an electro-magnetic device embodying this invention, the relative parts of the apparatus being shown in the position they will occupy when the current is passing through the wire; and Fig. 2, a similar view with the parts in the position they will occupy when the current ceases or is cut off.

The spool upon which the wire *a* is wound consists of a tubular shank portion, a', and the end piece a^2, made preferably of brass, and the end piece a^3, made of soft iron, said end piece a^3 having a shank, a^4, also of soft iron, extending inwardly toward the center of the spool for a short distance and recessed to embrace a portion of the tube a', to thereby form of magnetic material a portion of the tubular shank and a solid body which closes the open end of said shank. The shank a^4 is preferably tapering.

The upper end of the tubular shank portion a', or that end which terminates contiguous to the soft-iron piece or body a^4, is preferably closed by a cap of brass, with the exception of a small orifice at the center, through which passes the rod *b*, and the lower end of the said shank is open, communicating with the interior of the hollow cap, or it may be a bracket, *d*, secured to the lower end of the spool. A soft-iron core, *c*, made hollow or tubular for the greater portion of its length, is placed within the tubular shank a', extending upward into the recess formed in the shank a^4 of the cap a^3, and preferably extending downward some distance into the hollow cap *d*. The hollow core receives within it a spring, c', one end of which is connected with the core and the other end with the rod c^2, passing vertically upward through the cap *d* and into the core, so that the core will be mounted loosely upon the rod c^2 by the spring, which spring serves as a retractile spring for the core.

The rod c^2 is screw-threaded for a portion of its length, that it may be adjusted by turning the nut c^3, fixed to the lower end of the rod. The contact-points are herein shown as four in number, 2 3 4 5, two of which are attached to but insulated from the soft-iron end piece a^3, and the remaining two are attached to but insulated from the rod *b*, which passes up through the soft-iron end piece a^3 and is connected with the core, such contact-points being herein shown as made of bent springs, to thereby effectuate a rubbing contact.

As the current passes over the wire *a*, the magnetic force accumulated in the soft-iron end piece a^3 a^4 by induction is exerted upon the soft-iron core or armature, lifting it against the tension of the retractile spring. The tubular shank a', being made of brass, prevents the soft-iron core from sticking. A very strong magnetic field is produced by this construction or form of device, which enables the core or armature to be moved a considerable distance; but if it is desired to attach a weight of some kind to the core or armature a considerable weight may be lifted.

As herein shown, I have greatly increased the strength of the device by employing a large

quantity of material for the shank a^4, and also a large quantity of material for the solid end of the core c, said end always lying in the magnetic field of the magnetic material, and by making the core c hollow all the lines of force are centered in the solid end, so that the action upon the coil other than that upon its end is very slight, even should any at all exist.

I have herein shown a disk, f, of oblong shape attached to the upper end of the rod b, which disk is normally concealed within the box or inclosing-case f', said case being provided with an opening, f^2, with which the disk f registers when lifted, thereby displaying a visual signal.

Two wires, 7 8, are connected, one with the contact-pieces 2 3 and the other with the contact-pieces 4 5, said wires forming a part of a circuit which contains any suitable instrument or instruments desired, the device in this instance serving as a circuit-controlling device.

Instead of employing soft iron for the core and end piece a^3, any other magnetic material may be employed.

I claim—

1. An electro-magnetic device comprising a spool having a tubular shank and a soft-iron end piece substantially closing the open end of the shank, and successive coils of wire wound thereon, a hollow core or armature having a closed end located within the said spool, a retractile spring for the core and contained within it, and a rod for supporting the said spring, substantially as described.

2. An electro-magnetic device comprising a spool having a soft-iron end piece and successive coils of wire wound thereon, a hollow core or armature located within the spool and mounted upon a rod by a retractile spring for the core, and a visual signal connected with and operated by the movable core, substantially as described.

3. An electro-magnetic device comprising a spool having a tubular shank and an end piece, a^2, of brass, and an end piece, a^3, of soft iron, successive coils of wire wound upon the spool, a movable core or armature contained within the tubular shank, and a retractile spring, substantially as described.

4. An electro-magnetic device comprising a spool having a tubular shank, a', an end piece, a^2, an end, a^3, having a shank portion, a^4, a hollow cap, d, and a core or armature, c, contained within the tubular shank and mounted adjustably upon a rod by a retractile spring, substantially as described.

5. An electro-magnetic device comprising a spool having a tubular shank around which successive coils of wire are wound, a portion only of said shank being of magnetic material, combined with an armature placed within the tubular shank, one end of which lies in the field of force of the magnetic material.

6. An electro-magnetic device comprising a spool having a tubular shank around which several coils of wire are wound, a portion only of said shank being of magnetic material, combined with the hollow armature having the end portion placed within the tubular shank, said end portion lying in the field of force of the magnetic material, substantially as described.

7. An electro-magnetic device comprising a spool having a tubular shank, an end piece of magnetic material having the flange, and the tapering shank a^4, recessed for a short distance, as described, combined with the armature movable within the field of force of the magnetic material, substantially as described.

8. An electro magnetic device comprising a spool having a tubular shank around which several coils of wire are wound, a portion only of said shank being of magnetic material, combined with the movable hollow armature having the closed end, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

HENRY A. CHASE.

Witnesses:
BERNICE J. NOYES,
J. C. SEARS.