

(No Model.)

F. L. POPE.

AUTOMATIC CUT-OUT FOR ELECTRO MAGNETIC HELICES.

No. 294,669.

Patented Mar. 4, 1884.

Fig. 1.

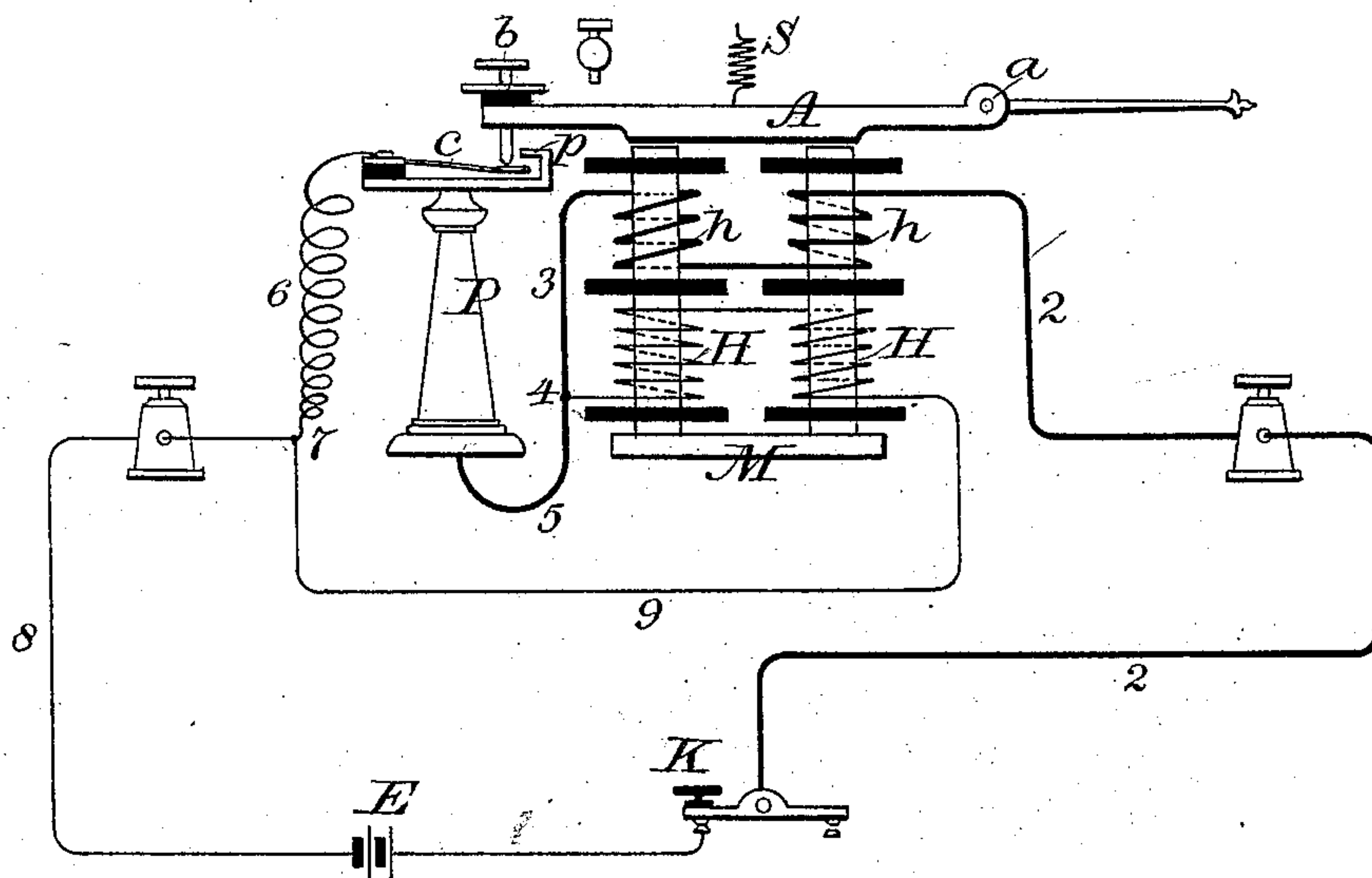
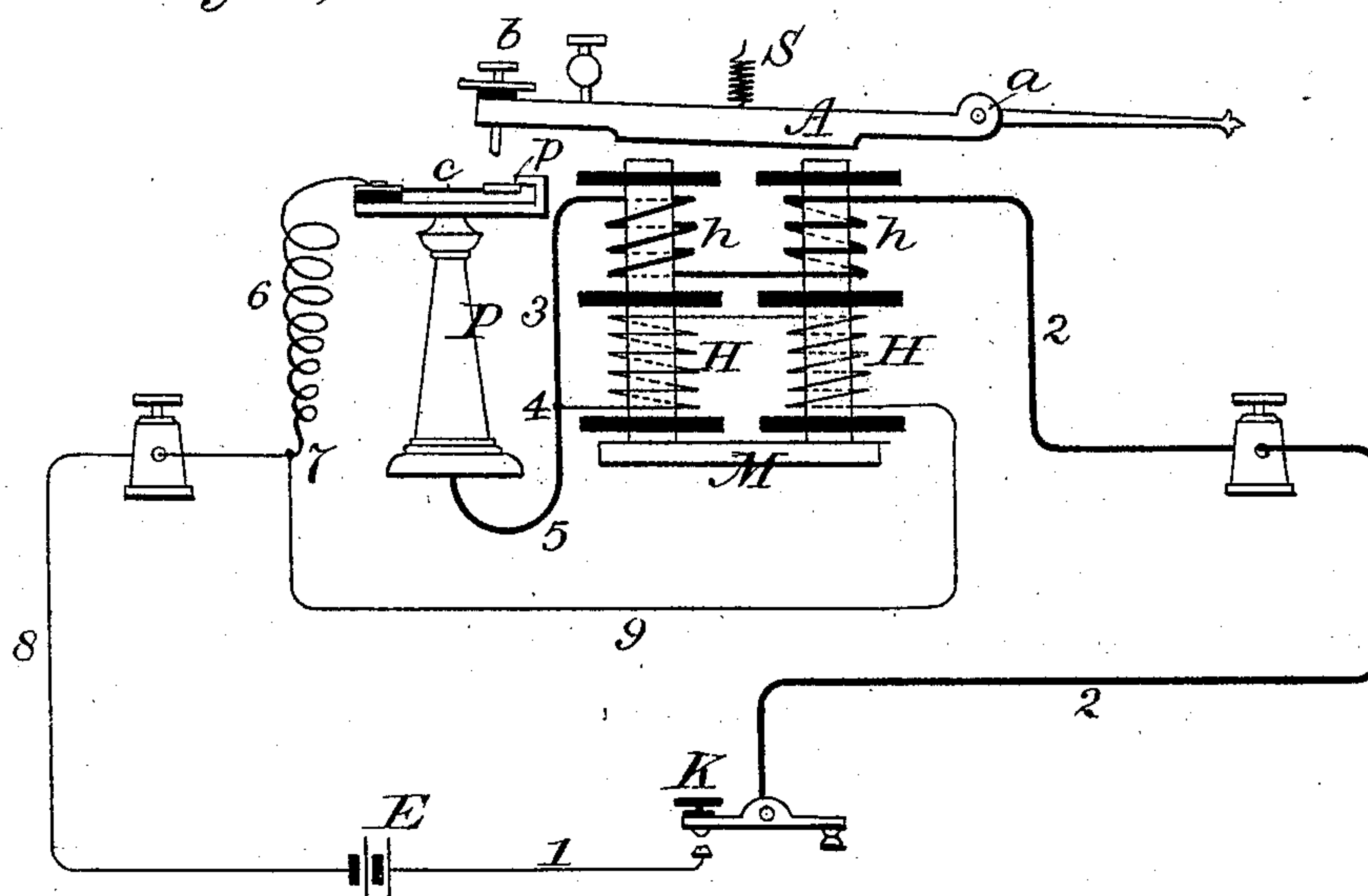


Fig. 2,



Witnesses:

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UNITED STATES PATENT OFFICE.

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AUTOMATIC CUT-OUT FOR ELECTRO-MAGNETIC HELICES.

SPECIFICATION forming part of Letters Patent No. 294,669, dated March 4, 1884.

Application filed June 22, 1883. (No model.)

To all whom it may concern:

Be it known that I, FRANK L. POPE, a citizen of the United States, and a resident of Elizabeth, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Automatic Cut-Outs for Electro-Magnetic Helices, of which the following is a specification.

My invention relates to an automatic cut-out for electro-magnetic helices; and its object is to diminish the consumption of battery materials in operating electro-magnets in circuits which are closed for a great portion of the time.

It consists in applying to an electro-magnet two independent assisting helices, which are included in the same electric circuit, one of said helices being spanned by a normally-closed shunt. A contact-spring or other equivalent device is attached to the movable armature of the electro-magnet, which, when the latter moves toward the poles of the electro-magnet, interrupts said normally-closed shunt, thereby bringing the second helix into conjoint action with the first one; hence when the armature is in a position adjacent to the poles of the electro-magnet the actuating-current will pass through a greater number of convolutions of its coil than when it is in its most distant position. Thus the current traverses an increased resistance when the armature is adjacent to the poles of the electro-magnet, and the consumption of materials in the battery is correspondingly diminished, particularly when the helix which is spanned by the shunt is of a comparatively great resistance, which is preferably the case in practice.

In the accompanying drawings, Figure 1 is a diagram illustrating my invention, which shows the course of the electric current when the armature of the electro-magnet is in proximity to its poles; and Fig. 2 represents the same when the armature has been drawn away from the poles.

In the drawings, M represents an electro-magnet having a movable armature, A, which is pivoted at *a*, and provided with a retracting-spring, S, of the usual construction. The electro-magnet M is provided with two sets of helices, H H *h h*, which are all wound in the same direction upon the core, so that when in

action they mutually assist each other. It is immaterial in what particular manner these independent helices are wound upon the core provided the foregoing condition is observed. The core may be wound throughout with two independent parallel wires, or one helix may be superposed upon the other upon each leg of the core, or one helix may be placed upon one leg and the other upon the other leg of the core; or they may be arranged in other well-known ways, not necessary to be described. An insulated contact-spring, *c*, is mounted upon a post, P, and normally rests against the fixed stop *p*, forming an electrical contact therewith, as shown in Fig. 2. Upon the extremity of the armature A is placed a pin or screw, *b*, which, when the armature approaches the poles of the electro-magnet M, bears against the contact-spring *c* and pushes it away from the stop *p*.

When the apparatus is at rest and no current is passing, the several parts occupy the position illustrated in Fig. 2. If, now, the battery-circuit be closed, by depressing the key K the electric current will pass from the battery or electric generator E by wires 1 and 2 to the helix *h* of the electro-magnet M, and thence by the wire 3 through the point 4 and wire 5 to the post P, thence through the stop *p*, contact-spring *c*, wire 6, point 7, and wire 8 back to the battery. The portion of current passing through the helix H will be so small as to be inappreciable. The electro-magnet M will now attract its armature A and draw it forward; but when it is nearly in contact with the poles the pin *f* will depress the contact-spring *c*, and thereby break the shunt between points 4 and 7, which will thereafter cause the electric current, upon reaching the point 4, to traverse the helices H H and the wire 9 to the point 7, as shown in Fig. 1, and the current will accordingly take that course, successively traversing both sets of helices upon the electro-magnet M so long as the key K remains closed.

In practice, it is preferable that the helices H H should be composed of a great number of convolutions of fine wire, so as to offer a considerable resistance to the current from the battery E, while at the same time the magnetic force developed thereby will be sufficient to hold the armature up to the poles of the

electro-magnet after it has once been attracted.

By means of my invention a powerful current may be employed to act upon the electro-magnet to draw up the armature, which will
5 be automatically replaced by a weaker one after the armature has been brought into position, although the latter will still be sufficient to retain the armature and prevent it from falling back. Such a device will be found
10 especially useful in electric signaling apparatus of various kinds.

I claim as my invention—

1. The combination, substantially as hereinbefore set forth, of an electro-magnet provided
15 with two independent assisting helices included in the same electric circuit, an armature movable toward the poles of said electro-magnet by virtue of the attractive force induced therein by one of said helices, a normally-closed
20 shunt spanning the other or inactive helix, and mechanism, substantially such as described, for interrupting said shunt by such movement of the armature, thereby bringing the second helix into conjoint action with the first one as
25 the armature approaches the poles of the electro-magnet.

2. The combination, substantially as hereinbefore set forth, of an electro-magnet provided with two independent assisting helices, one having a greater electric resistance than the
30 other, and both being included in the same electric circuit, an armature movable toward the poles of said electro-magnet by virtue of the attractive force induced therein by the helix of lesser resistance alone, a normally-
35 closed shunt spanning the helix of greater resistance, and mechanism, substantially as set forth, for interrupting said shunt by such movement of the armature, thereby bringing the
40 helix of greater resistance into conjoint action with the helix of lesser resistance as the armature approaches the pole of the electro-magnet.

In testimony whereof I have hereunto subscribed my name this 21st day of June, A. D. 1883.

FRANK L. POPE.

Witnesses:

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