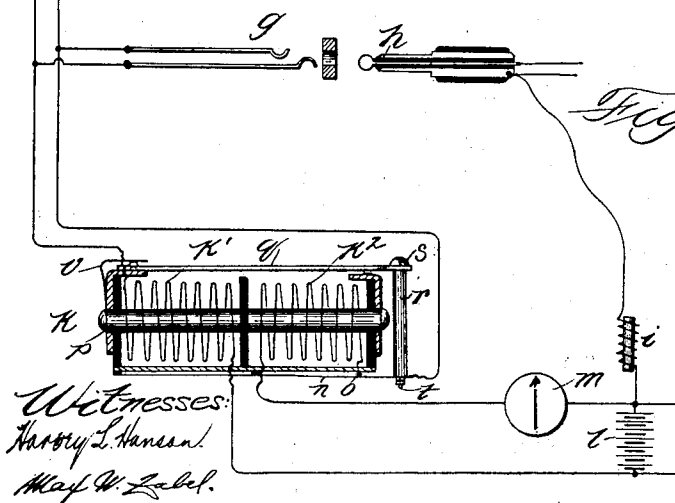
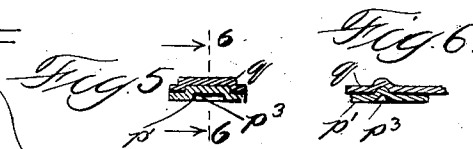
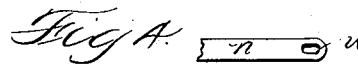
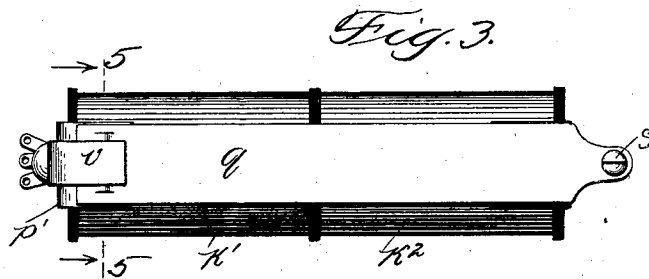
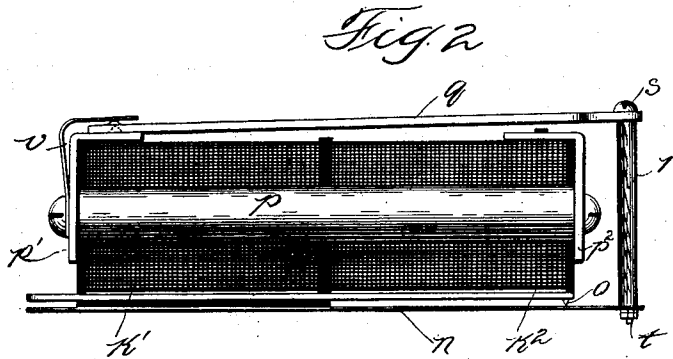
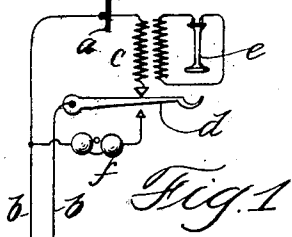


W. M. DAVIS.
ELECTROMAGNET.

APPLICATION FILED APR. 26, 1901.

NO MODEL.



Witnesses:
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UNITED STATES PATENT OFFICE.

WILLIAM M. DAVIS, OF CHICAGO, ILLINOIS, ASSIGNOR, BY MESNE ASSIGNMENTS, TO STROMBERG-CARLSON TELEPHONE MANUFACTURING COMPANY, OF ROCHESTER, NEW YORK, A CORPORATION OF NEW YORK.

ELECTROMAGNET.

SPECIFICATION forming part of Letters Patent No. 737,589, dated September 1, 1903.

Application filed April 26, 1901. Serial No. 57,594. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM M. DAVIS, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Electromagnets, of which the following is a full, clear, concise, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to relays or operating electromagnets employing movable armatures.

The invention has for one of its objects the provision of means whereby the magnetic circuit may include the most limited air-gap, whereby the efficiency and power of the electromagnet is increased.

The invention has for its further object the construction of an electromagnet employed for the purpose of effecting circuit changes wherein a positive thrust of the circuit-changing switch may be secured in a desired direction.

In practicing my invention I prefer to provide the core of the electromagnet with extensions of magnetic material, with one of which the armature has pivotal or swinging connection, this armature being normally removed from the other extension a short space, this space being preferably the only gap in the magnetic circuit. The free end of the armature is preferably maintained in its normal position by means of a spring that acts as the circuit-changing switch, the helix of the electromagnet being preferably interposed between the armature and the said spring, while the connection between the armature and spring is secured by means of a distance-piece, preferably in the form of a rod of insulating material.

I will explain my invention more fully by reference to the accompanying drawings, showing the preferred embodiment thereof, in which—

Figure 1 illustrates a subscriber's station united with the telephone-exchange; Fig. 2, a sectional elevation of the electromagnet of my invention; Fig. 3, a plan view thereof;

Fig. 4, the detail of a circuit-changing spring; Fig. 5, the detail of the hinge connection of the armature on line 5 5 of Fig. 3; Fig. 6, a sectional view on line 6 6 of Fig. 5.

Like parts are indicated by similar characters of reference throughout the different figures.

I have illustrated the electromagnet of my invention as employed in connection with a telephone-exchange system; but I do not wish to be limited to this construction.

The telephone system illustrated in Fig. 1 is a common battery system. At the substation I have illustrated that type of apparatus which is adapted for use in connection with common battery systems wherein the transmitter *a* is included in series with the main lines *b b* and the primary coil *c*. A telephone-switch hook *d* is employed for cutting the primary coil and the transmitter into circuit with the main line when the receiver *e* is removed from its hook and to cut this transmitter and primary coil out of circuit when the receiver is replaced upon its hook, in which position the signal-bell *f* is cut into circuit.

I have illustrated the lines *b b* as being connected with the line-springs of a spring-jack *g* and have illustrated one plug *h*, having in this instance its sleeve connected with one terminal of the common battery through the impedance-coil *i*. I have not deemed it essential to illustrate the telephonic apparatus in detail, as it is sufficiently well known to those skilled in the art.

The relay *k* is in this instance provided with a differential winding that normally includes a battery *l* and a line-indicator *m* and also a circuit-changing spring *n*, which in its normal position rests against an upper contact *o*, that constitutes a terminal of the differential winding. When the relay is in the normal position illustrated, circuit through the battery *l* and indicator *m* may be completed by the removal of the receiver *e* from its telephone-switch hook, the switch thereupon serving to close this circuit. As the windings are differential and equal in magnetizing effect, the relay will not be energized

sufficiently to actuate the switch n , so that the indicator m may be operated by the subscriber. When the operator inserts the plug h into this subscriber's jack, the coil k' of the differential winding may receive more current than the companion coil k^2 , whereupon the magnetizing effects of the differential coils are unbalanced, so that the relays may be energized sufficiently to effect an actuation of the switch n to open contact through the coil k^2 , and thereby cut the line-indicator m out of service during the insertion of the plug h within said jack.

The relay or electromagnet of my invention preferably comprises a centrally-disposed core p , having angular extensions p' p^2 at its ends, said core and extensions being of magnetizable material, preferably soft iron. These extensions p' p^2 preferably project first at right angles to the core and then at their upper ends a slight distance parallel therewith, the portions of the extensions that are parallel with the core preferably projecting toward each other. The extension p' is preferably provided with a projection p^3 , preferably formed integrally therewith, which projection constitutes a fulcrum or pivotal point for the armature q , that is provided with a corresponding recess that engages the projection p^3 , whereby the armature is afforded a pivotal connection that has intimate contact with the extension p' , so that the magnetic circuit including the armature is not impaired by reason of the connection. The armature extends longitudinally of the core and helix of the magnet and is normally maintained in a separated relation with the extension p^2 by means of the circuit-changing switch n . This circuit-changing switch is placed upon the opposite side of the electromagnet, and connection is afforded between the same and the armature by means of the insulating-rod r , that is preferably rigidly secured to the free end of the armature by means of a screw s and is adapted for sliding engagement with the circuit-changing spring by having its threaded extension t movable in the slot u . To maintain the armature in its pivotal engagement with the extension p' , I employ a spring v , which is preferably in the form of a leaf-spring, secured to the corresponding end of the core and bent at right angles at its upper portion to engage the ridge formed in the armature where the projection p^3 is engaged therewith.

While I have herein shown and particularly described the preferred embodiment of my invention, I do not wish to be limited to the precise construction herein set forth; but, Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. In an electromagnetic circuit-changing device, the combination with an electromagnet-core, of an extension on either end of said core, an armature pivotally associated with one of said extensions and substantially par-

allel to said core, a circuit-changing spring substantially parallel to said armature, the electromagnet-winding being interposed between the armature and said spring, and a mechanical connection intervening between and engaging the free end of said armature and of said spring, substantially as described.

2. In an electromagnetic circuit-changing device, the combination with an electromagnet, of a pivoted armature, a circuit-changing spring, the electromagnet-winding being interposed between the armature and said spring, and a mechanical connection intervening between the free end of said armature and the said spring, the said mechanical connection having fixed engagement with the armature and a sliding engagement with the spring, substantially as described.

3. In an electromagnetic circuit-changing device, the combination with an electromagnet-core, of an extension on said core, and an armature pivotally connected with said extension by an enlargement upon said extension engaging a depression in said armature, substantially as described.

4. In an electromagnetic circuit-changing device, the combination with an electromagnet-core, of an extension on said core, an armature pivotally connected with said extension by an enlargement upon said extension engaging a depression in said armature, and a spring adapted to maintain said armature in pivotal connection with said extension, substantially as described.

5. In an electromagnetic circuit-changing device, the combination with an electromagnet, of an armature pivotally connected with the core of said electromagnet by an enlargement on said core engaging a corresponding depression in said armature, a spring adapted to maintain said armature in engagement with said electromagnet-core, a circuit-changing spring, the electromagnet-winding being interposed between the armature and said circuit-changing spring, and a mechanical connection intervening between the free end of said armature and said circuit-changing spring, substantially as described.

6. In an electromagnetic circuit-changing device, the combination with an electromagnet-core, of extensions on either end of said core, an armature pivotally connected with one of said extensions by an enlargement on said extension engaging a corresponding depression in said armature, a winding on said core, a circuit-changing spring, the electromagnet-winding being interposed between the armature and said circuit-changing spring, and a mechanical connection intervening between the free end of said armature and said circuit-changing spring, substantially as described.

7. In an electromagnetic circuit-changing device, the combination with an electromagnet-core, of extensions on either end of said core, an armature pivotally connected with one of said extensions by an enlargement on

said extension engaging a corresponding depression in said armature, a winding on said core, a spring adapted to maintain the pivotal association of said armature with said extension, a circuit-changing spring, the electromagnet-winding being interposed between the armature and said circuit-changing spring, and a mechanical connection intervening between the free end of said armature and said circuit-changing spring, substantially as described. 10

In witness whereof I hereunto subscribe my name this 20th day of April, A. D. 1901.

WILLIAM M. DAVIS.

Witnesses:

GEORGE L. CRAGG,
MAX W. ZABEL.