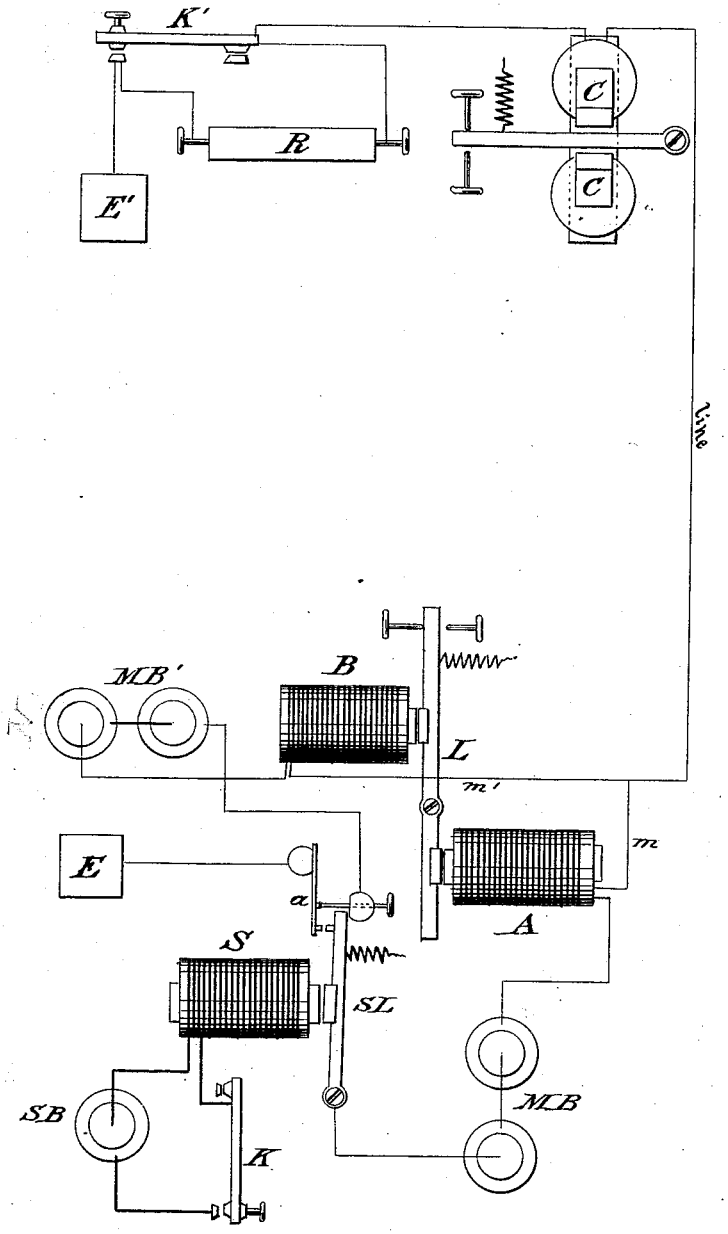
T. A. EDISON.

Duplex Telegraph.

No. 162,633. Patented April 27, 1875.



Witnesses:

Chas Nida

Sedgwick

Inventor:

T. A. Edison

Per

Attorneys.

THE GRAPHIC CO. PHOTO-LITH. 39 & 41 PARK PLACE, N.Y.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF NEWARK, NEW JERSEY, ASSIGNOR TO HIMSELF AND GEORGE HARRINGTON, OF WASHINGTON, D. C.

IMPROVEMENT IN DUPLEX TELEGRAPHS.

Specification forming part of Letters Patent No. **162,633**, dated April 27, 1875; application filed April 26, 1873.

CASE H.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of the city of Newark, in the county of Essex and State of New Jersey, have invented a new and useful Improvement in Duplex-Telegraph Apparatus, of which the following is a specification:

The invention has for its object the simultaneous transmission of two different dispatches or signals over the same line-wire from opposite directions, or in the same direction; and the invention consists in the transmission of positive and negative currents over the line to effect the reception of one message, and the increase and decrease of the strengths of these currents, either positive or negative, to effect the reception of the other message.

The accompanying drawings represent a plan view of my improved apparatus in this case, part of the apparatus being placed at one end of the line and part at the other end.

A and B are electro-magnets of equal strength, and are placed at an equal distance from and on the opposite sides of the armature-lever L, pivoted between them. Both magnets are arranged with separate batteries. The battery M B is connected with the magnet A, and with its positive pole to the line, and the battery M B′ is connected with the magnet B, and has its negative pole to the line. The batteries M B and M B′ are alternately placed into the circuit by the sounder-lever S L and the double-spring contact *a*, which is in contact with the earth. The key-lever S L is operated, as usual, by the local battery S B, key K, and magnet S. The magnets A and B are connected to the main-line wire and polarized relay C by the wires *m* and *m′*. The polarized relay C, being either at the same station or at the distant station, is operated by the positive and negative currents sent over the line. K′ is a Morse key, and R a resistance-coil or rheostat, connected to the key K and earth E.

The object of the key K′ and rheostat R is to increase and decrease the strength of the current upon the line, so as to affect the lever of the relay A B. The increase and decrease in the strength of the line-current do not affect the polarized relay C, as this is dependent for working upon the direction of the current or polarity, independent of its strength, so that signals may be transmitted by S L, batteries M B and M B′, or by any other battery-reversing device, and these currents, acting upon the relay C, cause its tongue to be thrown to the right or left, according to the polarity of the current transmitted. At the same time another set of signals may be sent over the same wire by the depression of the key K′, which causes a decrease in the resistance of the line, and a consequent increase in the strength of the current on the line, and this increased strength of current produces sufficient magnetism in either A or B to overcome the attraction of its spring, and it is drawn toward the magnets.

On closing the key K the magnet attracts the lever S L, throwing the battery M B′ and magnet B out of circuit, and the magnet B and battery M B, with its positive pole, is placed in circuit and toward the line. In a like manner, when the key-lever is not attracted by its magnet, the magnet A and battery M B is thrown out of circuit, and the magnet B and battery M B′, with its negative pole toward the line, is thrown in circuit, the armature-lever L remaining constantly attracted (if K′ be closed) by either A or B, as the instantaneous transfer of polarity permits no separation of the same.

If both positive and negative currents were passed through one magnet only, a charge and discharge would be produced with a change of polarity in the iron cores, and the armature would be drawn away from the cores of the magnet for an instant by its retractile spring, at the moment when the cores were changing their polarity. In this arrangement the wires upon the magnets, connections, and arrangement of batteries are such that the polarity of both magnets are never changed.

The polarized relay is self-adjustable, and follows the positive and negative currents, whether the tension of the same is suddenly increased or decreased.

The polarized relay C can be placed at a number of stations on the line, and each will

be able to receive the signals from the stations, transmitting positive and negative currents. The relay A B may also be placed at a number of stations, if A or B be dispensed with, and other devices applied to prevent the mutilation of the signals by change in the polarity of its iron core.

I claim as new and desire to secure by Letters Patent—

1. The armature-lever L, pivoted between the magnets A and B, and operated by an increase and decrease in the tension of the line-current. in combination with the key K′ and rheostat R, for the purpose set forth.

2. The sounder-lever S L, double-spring contact *a*, and batteries M B and M B′, arranged substantially as set forth, and for the purpose specified.

3. The combination, with the main-line circuit, of a receiving-instrument operated by changes in the polarity of the current independently of tension, with another receiving-instrument operated by changes of tension independent of polarity, means of changing the polarity of the current, and means of changing the tension of the current, substantially as and for the purpose specified.

THOMAS A. EDISON.

Witnesses:
PAUL GOEPEL,
T. B. MOSHER.