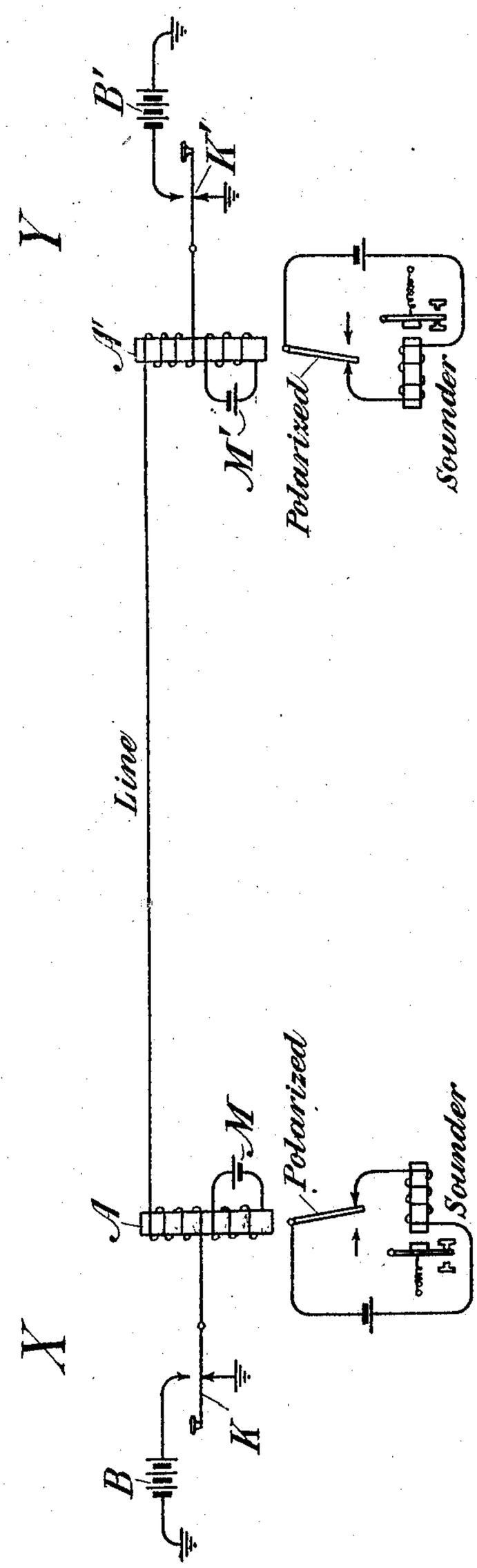
Jan. 27, 1925. 1,524,357

G. E. HUDSON

TELEGRAPHY

Filed May 20, 1920



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UNITED STATES PATENT OFFICE.

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TELEGRAPHY.

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To all whom it may concern:

Be it known that I, GEORGE E. HUDSON, residing at Brooklyn, in the county of Kings and State of New York, have invented certain Improvements in Telegraphy, of which the following is a specification.

This invention relates to telegraphy, and it is concerned particularly with telegraph systems in which transmission is limited to one direction or the other at a time; which systems are generally designated in the art as "single" telegraph systems.

In the single telegraph systems now in common use the line relays are of the type which is responsive to the presence or absence of line current irrespective of the direction thereof. Systems of this character are troublesome, when used on long lines, due to leakage and capacity. In such instances it is not uncommon to employ a duplex telegraph system modified for one-way operation, the advantage of this system being that it employs relays responsive to the direction of current, as for example, relays with polarized armatures. The duplex systems, however, necessitate the use of balancing artificial lines and other equipment which is expensive to install and troublesome to keep in adjustment.

The object of the present invention is to provide a single telegraph system which employs relays of the type responsive to current reversals, thus securing the operating advantages of these relays for the single systems without the use of balancing artificial lines and similar equipment.

The invention contemplates the employment in a system of this character of a relay equipped with a local winding which serves to bias the armature into one position and a line winding which serves to overcome this bias and operate the armature to another position, in response to an actuation of the transmitter at a distant station.

A good understanding of the various features and objects of the invention may now be had from the following description of one form and arrangement of apparatus embodying the invention, illustrated in diagrammatic view in the accompanying drawing.

In this view a telegraph line is shown extending between stations X and Y, provided with similar apparatus designated by like reference characters; prime marks (′) being employed to distinguish the apparatus of Y from that of X. Relays A and A′ of the polarized armature type are associated with the line, each relay being provided with two windings, one of which, herein termed the local winding, is permanently energized by current from a source M, M′, and the other of which, the line winding, is connected between the pivot of an adjacent telegraph key K, K′, and the line. The local winding of each relay serves to create therein a flux which biases the armature into such position that it closes the circuit of a sounder. The keys have their front contacts connected to ground and their back contacts associated with batteries B, B′, of opposite polarities.

The apparatus is normally in the positions indicated in the drawing, so that there is no current in the line circuit, both terminals thereof being connected to ground through the keys. The relays at both stations consequently maintain the sounder circuits closed in response to the biasing forces of their local windings. To transmit a spacing signal from X to Y the operator at X opens his key so that current from the positive battery B flows through the line and the line windings of both relays to ground at Y. This current is of such strength and the line windings have such number of turns and directions that the magneto-motive forces set up thereby in the relays are in opposite directions to, and of greater value than, the biasing magneto-motive forces therein, so that both of the relays reverse their contacts and open the circuits of their sounders. The spacing signal is thus transmitted to Y. To send a marking signal, the operator at X closes his key so that battery is taken off the line and the current ceases to flow therein. The biasing magneto-motive forces of the relays cause the return of the armatures thereof to their normal positions, thus bringing about a reenergization of the sounders. The marking signal is thus given at Y.

If the operator at Y desires to "break" the message from X he opens his key K′, so that current flows in the line no matter whether the operator at X holds his key open or closed, the battery B′ having series-aiding relationship to battery B. The sounder at X is thus held open and its failure to respond to the transmitting key serves

to give notice that Y is "breaking." The operator at X then closes his key and receives Y's message, which is transmitted to X, similarly as hereinbefore described for transmission in the opposite direction.

Although I have shown and described herein only one form and arrangement of circuits and apparatus embodying the invention, it is readily understood that various changes and modifications may be made therein within the scope of the following claims without departing from the spirit and scope of the invention.

What is claimed is:

1. In a telegraph system, a plurality of relays, a local and a line winding for each relay, means associated with the local winding of each each relay for normally biasing the armature thereof into one position, a line circuit for operatively associating said line windings, and means between each relay and the corresponding ground connection for the said line circuit for causing the reversals of the armature of the non-adjacent relay.

2. In a single telegraph system, a line circuit comprising a pair of polarized relays and a pair of transmitting devices, one of each adjacent to each end of the line, said devices having four different relative positions, sources of current associated with said transmitting devices and arranged to cause flow of current in said line circuit in any one of three of said relative positions of said transmitting devices, ground connections associated with said transmitting devices for preventing flow of current in said line circuit in the fourth relative position of said devices, and a winding for each of said relays for normally creating therein a magneto-motive force in opposition to that created therein by the flow of line current.

3. In a telegraph system, a line circuit comprising polarized receiving relays and transmitting devices adjacent each end, sources of current and ground connections associated with the said transmitting devices and arranged to cause, in any one of three predetermined relative positions, flow of current in the same direction in said circuit and magneto-motive forces of predetermined directions in said relays, and in a fourth predetermined relative position, no flow of current in said circuit and no magneto-motive force in said relays, windings on said relays and sources of current associated therewith for normally creating therein magneto-motive forces opposite in direction but smaller in magnitude than said predetermined magneto-motive forces.

4. In a telegraph system, a line circuit, relays at the ends each having a winding in series with the line, means normally biasing said relays, transmitting means at the ends of the line normally in marking position and grounding the ends of the lines without battery, and batteries to be connected to the line by the spacing condition of the transmitting means.

In testimony whereof, I have signed my name to this specification this 14th day of May 1920.

GEORGE E. HUDSON.