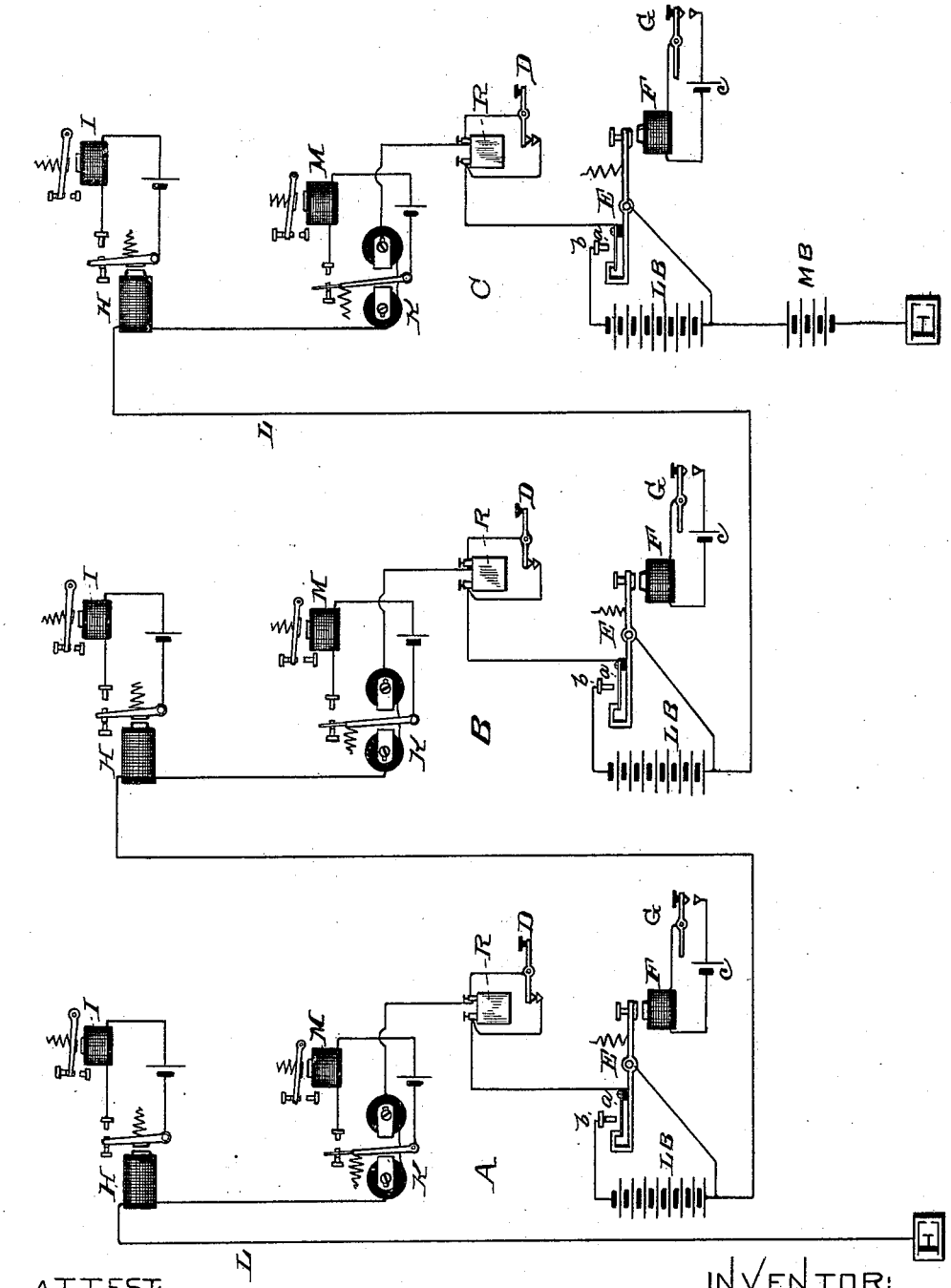
(No Model.)

T. A. EDISON.

WAY STATION QUADRUPLEX TELEGRAPH.

No. 333,291. Patented Dec. 29, 1885.



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THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY.

WAY-STATION QUADRUPLEX TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 333,291, dated December 29, 1885.

Application filed May 16, 1885. Serial No. 165,703. (No model.)

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, have invented a new and useful Improvement in Telegraphy, (Case No. 650,) of which the following is a specification.

The object I have in view is to increase the capacity of local telegraph-lines, or those lines having one or more way-stations in addition to the terminal stations, by the production of apparatus by means of which two sets of independent and non-interfering Morse signals can be sent back and forth over the line between terminal stations, or terminal and way-stations, or way-stations alone.

In carrying out my invention I employ for receiving-instruments at each terminal and way-station an ordinary non-polarized relay, which acts by changes in the strength of current without regard to its polarity, and a polarized relay acting by changes in the polarity of current without regard to its strength. The line is provided with a constant current from a main battery of, say, sixteen cells, which is decreased by the manipulation of a Morse key at each station, such keys normally short-circuiting a large resistance (say five thousand ohms) and throwing such resistance into line when depressed. The non-polarized relays close sounder-circuits at their back points. To reverse the polarity of the constant line-current, I provide at each terminal and way-station a battery which has twice the number of cells as the main battery, and which is thrown into circuit reverse to and opposing the main battery. This local battery is normally out of circuit, and when thrown in neutralizes the current of main battery and produces a current of opposite polarity equal to the normal current of the main battery. By these means it will be seen the line-current can be reversed at any station, whether way or terminal, thus operating the polarized relays.

In the accompanying drawing, forming a part hereof, the figure represents two terminal stations and a way-station having apparatus embodying my invention.

L L is a line grounded at its ends, as usual, and A, B, and C are terminal and way stations upon said line.

M B is the main battery, composed, for illustration, of sixteen cells. These are shown located at the terminal office C with zinc to line, in which case the terminal station A at the other end of the line would have no main battery; but this battery may be divided between the terminal stations or located anywhere in the line.

R is a standard resistance-box (say of five thousand ohms) which is located in line at each station. This is shunted normally by a back-point key, D, by depressing which the resistance is thrown into circuit.

At each station there is a local battery, L B, having twice the number of cells as the main battery. The line passes through a circuit-preserving lever, E, and spring *a*, carried thereby on a block of insulation, which spring closes circuit normally, as usual, by making contact with the hook end of lever; and the local battery is located between the line connection of lever E and the contact *b*. The lever E is worked by a magnet, F, controlled by a key, G, and local battery *c*. Normally, the battery L B at each station is out of circuit, as shown in the drawing. By closing key G magnet F moves lever E forward until spring *a* strikes contact *b*, and is forced away from the hook end of the lever. This throws the battery L B into circuit with carbon to line, overcoming main battery M B and producing a current on line equal to the normal current of M B, but of opposite polarity.

H is a non-polarized relay at each station, its armature-lever being normally on the front contact, and controlling at its back contact the circuit of sounder I. At each station is also a polarized relay, K, controlling circuit of sounder M at its front contact. When current of M B is on line, the armatures of the polarized relays are not moved. The reversal of the current, by throwing in and out a battery, L B, works the polarized relays without changing strength of currents, and hence without affecting the non-polarized relays and independently of any decrease or increase of current produced by throwing a resistance, R, into and out of circuit, to which decrease and increase of current the non-polarized relays alone will respond.

What I claim is—

1. In a system of Morse telegraphy, the combination, with a telegraph-line, of terminal and way stations, each of such stations hav-

ing a Morse signal-transmitter changing the strength of the line-current, and a Morse signal-transmitter reversing the line-current without changing its strength, and receiving-instruments at each station responding separately to such transmitters, substantially as set forth.

2. In a system of Morse telegraphy, the combination, with a telegraph-line, of terminal and way stations, each of such stations having as receiving-instruments a polarized relay and a non-polarized relay, and two Morse signal-transmitting instruments at each terminal and way station, acting one to change the strength of the line-current and the other to reverse such line-current, substantially as set forth.

3. In a system of Morse telegraphy, the combination, with a telegraph-line, of terminal and way stations, a main-line battery constantly in circuit, a local battery at each terminal and way station, having double the power of the main battery, said local battery being normally out of circuit, and a key for each of such local batteries throwing the local battery into circuit reverse to the main battery, whereby the line-current can be reversed at a terminal or way station without changing its strength, substantially as set forth.

4. In a system of Morse telegraphy, the combination, with a telegraph-line, of a main-line battery constantly in circuit, terminal and way stations, each provided with a local battery of double the power of the main battery, normally out of circuit, a key at each station throwing the local battery into and out of circuit reverse to the main battery, thus reversing the line-current without changing its strength, a key at each station varying the strength of the line-current without regard to its polarity, and polarized and non-polarized relays, substantially as set forth.

5. In a system of Morse telegraphy, the combination, with a telegraph-line, of a main-line battery constantly in circuit, two or more stations, each provided with a local battery of double the power of the main battery, normally out of circuit, a key at each station throwing the local battery into and out of circuit reverse to the main battery, thus reversing the line-current without changing its strength, a key at each station varying the strength of the line-current without regard to its polarity by throwing resistance into and out of the line, and polarized and non-polarized relays, substantially as set forth.

This specification signed and witnessed this 6th day of May, 1885.

THOS. A EDISON.

Witnesses:

ALFRED W. KIDDLE,

E. C. ROWLAND.