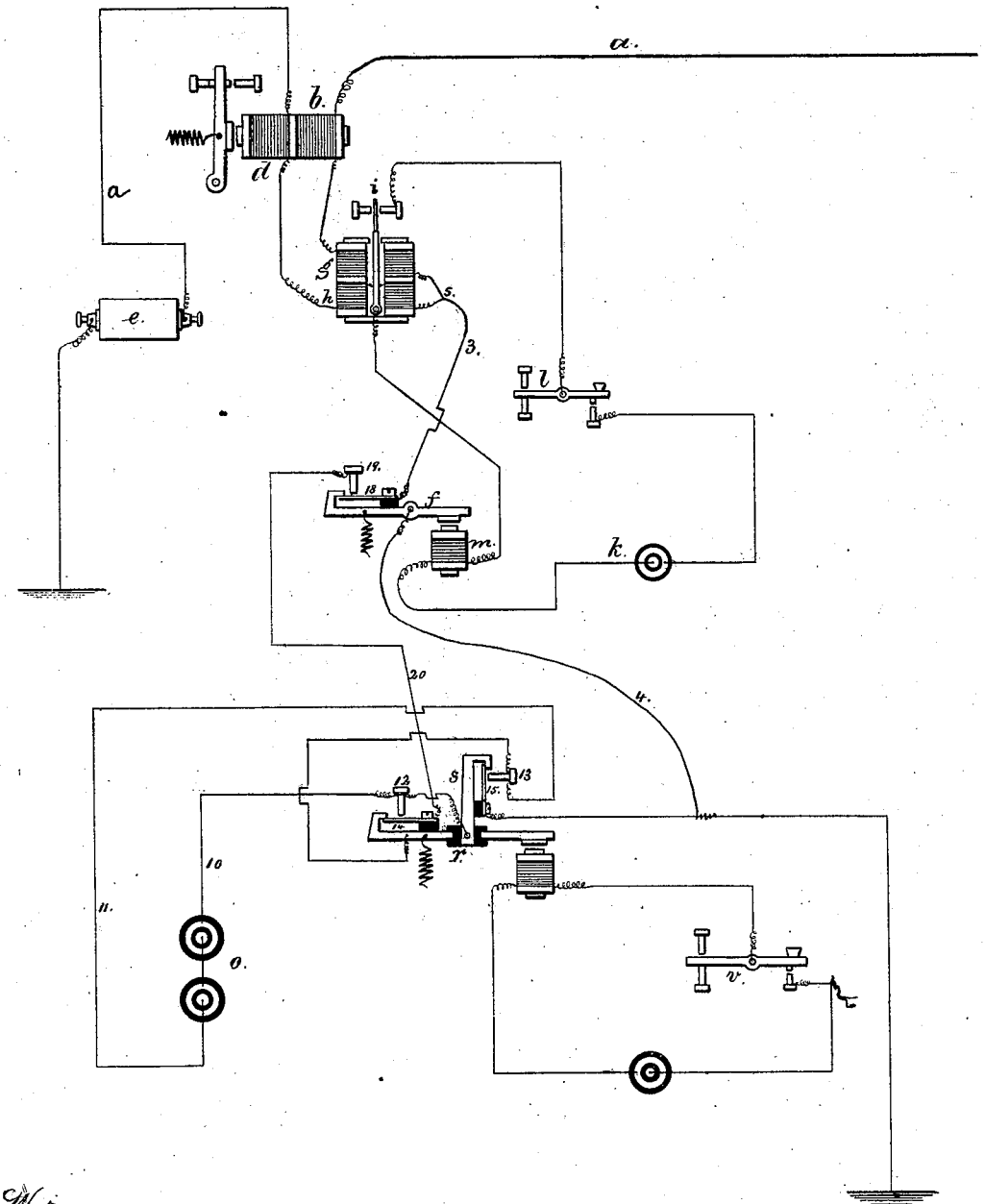
T. A. EDISON.
Duplex Telegraphs.

No. 207,723. **Patented Sept. 3, 1878.**



Witnesses

Chas. H. Smith

Harold Serrell

Inventor

Thomas A. Edison

per L. W. Serrell

atty.

UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF NEWARK, NEW JERSEY, ASSIGNOR OF ONE-HALF HIS RIGHT TO GEORGE B. PRESCOTT, OF NEW YORK CITY.

IMPROVEMENT IN DUPLEX TELEGRAPHS.

Specification forming part of Letters Patent No. **207,723**, dated September 3, 1878; application filed September 1, 1874.

To all whom it may concern:

Be it known that I, THOMAS A. EDISON, of Newark, in the State of New Jersey, have invented an Improvement in Duplex Telegraphs, of which the following is a specification:

Where two persons are sending and two receiving, one at each end, the entire line is sometimes deranged by a signal from one of the receivers to repeat. My invention is made to allow either party that is receiving to interrupt the person sending to him, so that he is thereby warned to repeat, and that without interfering with the other message that is being sent or received.

In the diagram drawing, *a* is the line; *b*, the receiving relay-instrument. *d* is a helix around the same core as *b;* and this helix is in a circuit passing to the artificial line and rheostat *e*, and this rheostat is to be adjusted to equal the line, so that the pulsation from the sending-station, acting in reverse in the helices *b* and *d*, produces no magnetizing effect in the core, but the pulsation from the distant station, passing along *a*, acts in *b*, unbalanced, and either produces the sound by the armature-magnet or else works a local circuit and sounder. The pulsation received from the distant station passes by 3, *f*, and 4 to the earth-connection.

The lever *f* is operated to give the pulsations that are sent upon the line, and these pulsations divide at 5, passing equally through the helices *g* and *h*, thence through the helices *b* and *d* aforesaid.

The helices *g* and *h* are of a differential polarized relay, the tongue or polarized armature-lever *i* of which forms a circuit-breaker in the local circuit *k l m*, and in this circuit the key *l* acts to open or close the circuit, and, by the electro-magnet *m*, operate the lever *f* and send the pulsations upon the line.

The main battery *o* is connected by wires 10 11 to closing-points 12 13, and the reversing-lever *r* has springs 14 15 and an insulated arm, *s*. When the key *l* is operated the lever *f* closes 18 and 19, and with the lever *r* in the position shown the circuit is closed by 10 12 *s* 15 to the ground, there dividing, part returning through *e d h* to 3, part going to distant station, thence by *a b g* to 3, whence the united currents pass by 3, 18, 19, 20, 14, *r*, 13, and 11 to the battery. By these connections the pulsations are sent to the distant station and received there in a similar instrument. It will be apparent that at the sending-station the current divides at 5, and, passing through both *g* and *h*, the polarized armature will be retained in the normal position, with the circuit of *k l m* closed, regardless of whether the current sent is reversed or not; but the current from the distant station only acts in *g;* hence the polarized tongue is changed by the reversal of the battery-connection at the distant station, so that if the receiver closes the key *v* he does not interfere with the party sending by the key *l* from his own station, but, the battery-connection being reversed, the differential relay at the distant station is changed by the change of polarity in *g*, and the party sending the message is warned to repeat by the fact that his own magnet *m* does not work, because the polarized tongue has broken the circuit of the magnet *m*, and it will not respond to his key *l*. It is to be remarked that the receiving-operator only closes his key *v* sufficiently long to give the signal, and then releases it, so that the parts resume their normal condition to allow of the message being again sent to him. The reversal of the polarity at the sending-station does not change the balanced condition of *b d*, nor make any difference in the action at the distant station, because that current sent is operative in *b* at the receiving-station, whether of one polarity or the other.

I do not herein claim the construction or arrangement of the reversing lever or key *r*, except in combination with other portions of the apparatus, as hereinafter specified, as the same is fully described in another application of even date herewith, and designated as Case 99.

I claim as my invention—

The differential polarized relay-magnet *g h* and local circuit containing the key *l*, armature-lever *i*, and magnet *m*, in combination with the reversing-key *r* and circuit-connections, substantially as set forth.

Signed by me this 19th day of August, A. D. 1874.

THOS. A. EDISON.

Witnesses:

CHAS. H. SMITH,

GEO. T. PINCKNEY.