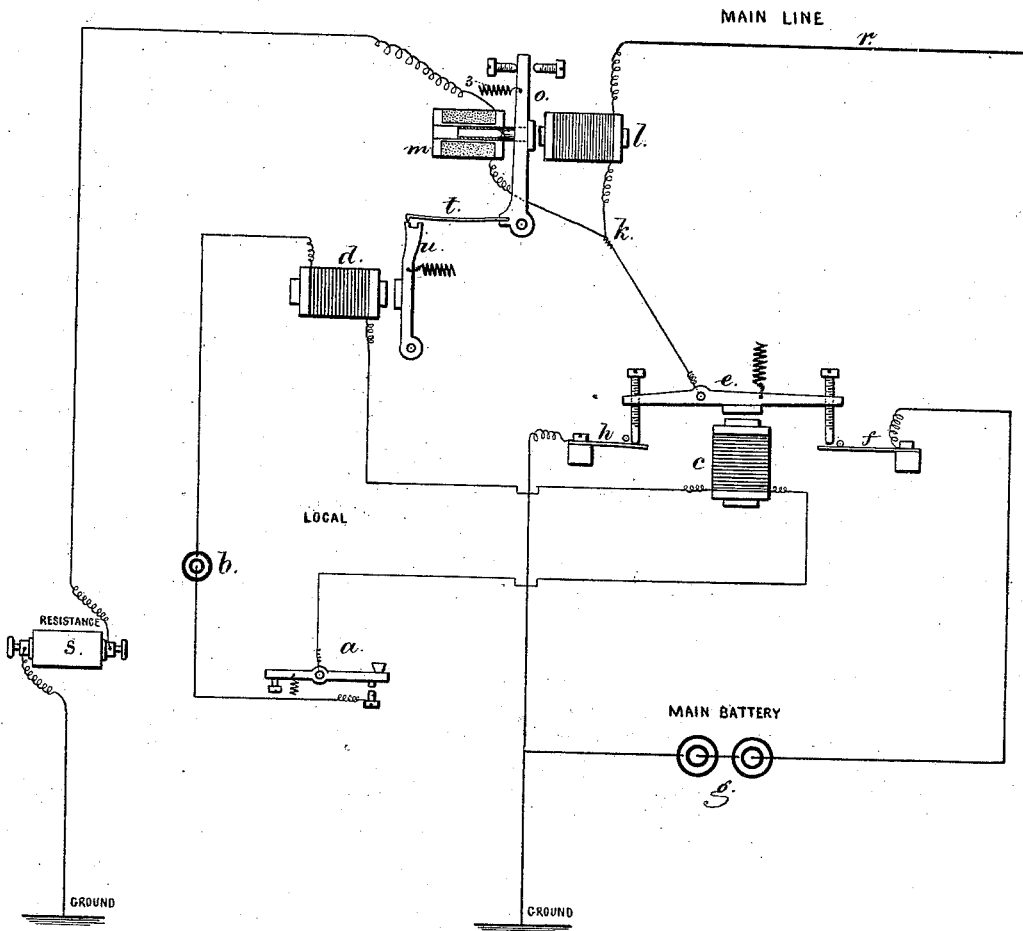


T. A. EDISON.
 DUPLEX TELEGRAPH.

No. 178,223.

Patented May 30, 1876.



Witnesses

Chas. H. Smith
 Harold S. Sewell

Inventor

Thomas A. Edison
 per Lemuel W. Sewell
 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. 178,223, dated May 30, 1876; application filed September 1, 1874.

To all whom it may concern:

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

The transmitting-battery is connected with the line by a lever that simultaneously breaks the earth-connection, so as not to interrupt the continuity of the circuit. The current sent divides and operates equally in two helices. In one helix there is a sliding core that moves with the armature of the other helix, and this latter responds to the pulsation from the distant instrument and closes a local circuit to a sounder or other receiving instrument, and there is a mechanical device that serves to compensate the attraction in one of the magnets that is due to the reverse action of the static discharge, thereby causing the forces to be accurately balanced.

In the diagram of the drawing, the transmitting-key *a* opens and closes the local circuit of battery *b* to the helices of the electromagnets *c* and *d*.

The lever *e*, actuated by the armature of *c*, closes the line-connection *f* from the battery *g* just before breaking the earth-circuit of the line at *h*, so that there is always a path for the pulsation from the distant station.

The circuit from *e* bifurcates at *k*, and a portion of the pulsation sent passes through *l* and upon the line *r*, and an equal portion of the pulsation passes through *m* to the artificial line composed of the rheostat *s* and ground-connection, said rheostat being adjusted to equal the resistance of the line.

The armature-lever *o* is inoperative by the current sent, because the action of the two magnets on the same is balanced, the attractive forces of such magnets being equal; and I make the core of the magnet *m* to slide in the helix, and attach it to the armature-lever *o*, so that the cores of *l* and *m* may be equally energized, and not influenced by the current sent, whether the armature is near the

core of *l* or drawn back therefrom by the spring *3*.

It will now be understood that the lever *o* will not respond when the pulsation sent passes through *l m*, but that the armature-lever *o* will respond to the pulsation from the distant station, because the same only acts in *l*, and by this lever *o* a local circuit and sounder or other receiver is operated.

The pulsation sent from *g* upon the line *r* is increased by the static charge, and upon cessation of the pulsation the static charge reacts and these operations might disturb the balance between *l* and *m*. I therefore employ the mechanical compensator formed of the spring *t* and notched armature-lever *u*, to the magnet *d*; hence, when the current is closed at *a*, and the armatures of *e* and *u* are attracted, the motion of the lever *u* brings the notch at the end of such lever across beneath the ∇ -projection on the spring *t*. Thereby the force of the spring *t* is relieved, and then again bent, and when relieved the spring *3* exerts its full power. And when the spring *t* is bent, its force lessens the power of the spring *3*; hence this spring *3* is able to resist the increase of magnetism due to the static condition of the line when the circuit is closed, and to compensate for the reaction of the static charge as the circuit at *a* is broken, thus leaving the magnet *l* entirely uninfluenced by the current sent, and capable of the most delicate adjustment by the spring *3* for receiving from the distant station.

It is to be understood that the effect of the static electricity is apparent when the magnet *l* is charged and discharged, and that at that moment the notch in the end of *u* relieves the end of the spring *t*, allowing the increased power of the spring *3* to compensate for the static electricity acting in the magnet *l*.

I claim as my invention—

1. The magnets *l m*, through which the current sent passes to the line, and artificial line, in combination with the armature-lever *o*, and sliding core, substantially as specified.

2. The electro-magnets *c d*, in the local circuit containing the circuit-breaker *a*, in combination with the circuit-closing lever *e*, notched armature lever *u*, spring *t*, and armature-lever *o*, substantially as set forth.

3. The mechanical compensator, consisting of the spring *t* and notched lever *u*, for neutralizing the effect of the static charge

in a duplex telegraph, 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.