# T. A. EDISON.

## Telegraph Relays.

No. 150,846. Patented May 12, 1874.

Fig. 1.

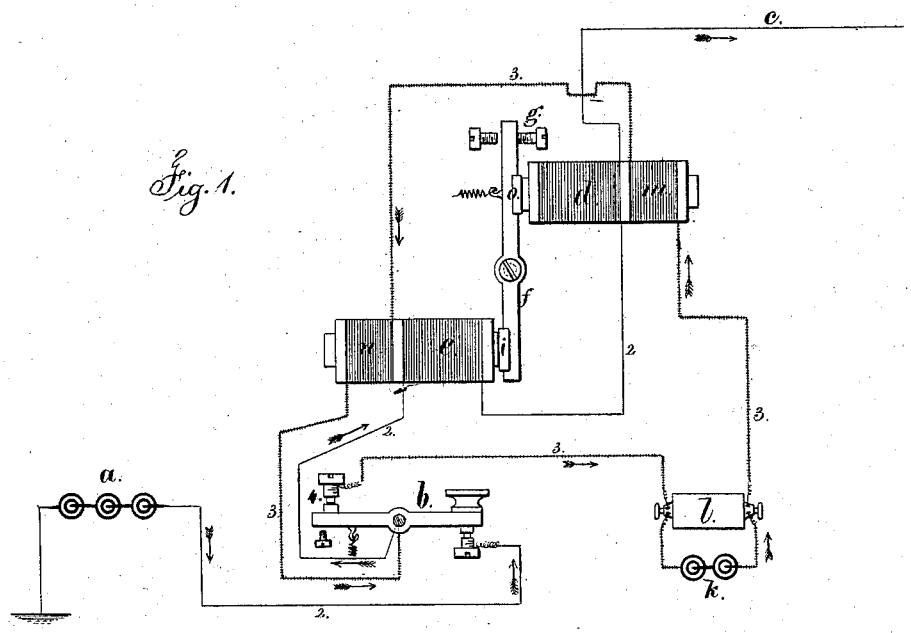



Fig. 3.

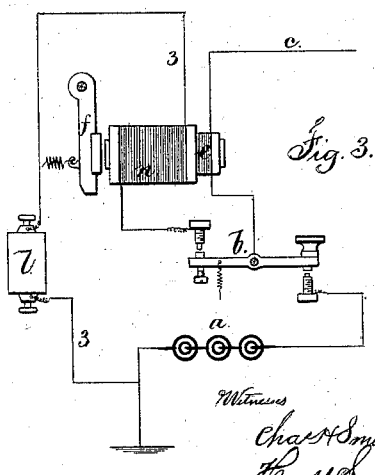
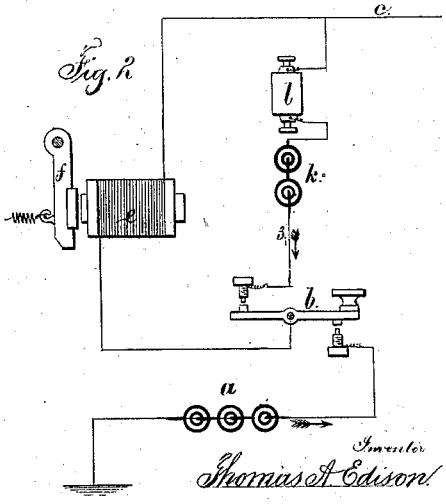



Fig. 2.




Witnesses
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# UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF NEWARK, NEW JERSEY.

## IMPROVEMENT IN TELEGRAPH-RELAYS.

Specification forming part of Letters Patent No. **150,846**, dated May 12, 1874; application filed June 27, 1873.

CASE 81.

*To all whom it may concern:*

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

In the most usual way of arranging the circuits for telegraphing, the main-line batteries are nearly equal, and connected in the same line at the two stations, and the circuit composed of these batteries, the line, the instruments, and the earth, is broken or closed at either end to operate the instrument at the other end. In practice, this ordinary mode of arranging the circuits is found very troublesome, because the leaks from the line, especially in wet weather, return to one station, and hence the magnet of the sounder or other receiving-instrument is often powerfully energized when the circuit is broken at the distant station.

My invention is to overcome this difficulty; and consists in connecting, with the electro-magnet, a reverse-acting circuit, that shall neutralize the effect of the escaping current when the instrument is at rest, and thereby maintain the electro-magnet in a condition to respond to the rise of electric tension when the main circuit is closed.

By adjusting the reverse-acting current, the magnet is maintained in the proper condition without resorting to the usual expedients of adjusting the spring, or the relative positions of the core and magnet, and deranging the conditions most favorable for rapid and reliable action in the magnet.

The diagram, Figure 1, in the accompanying drawing, represents the said improvement, and Figs. 2 and 3 show modifications.

The battery *a* and finger-key *b* connect with the line-wire *c*, through the helices *d* and *e*, by the wires 2, and the cores of these helices act upon the armatures *i* and *o* of the lever *f*, and, being at opposite sides of such lever and its fulcrum, the pairs of magnets can be made smaller, and act with greater rapidity upon such lever *f*, either to open and close another circuit at *g*, or perform any other duty. The battery *k* is provided with an adjustable rheostat, *l*, that is in the circuit 3, leading through the secondary helices *m n* of the electro-magnets *d e*, and to the anvil 4. The battery *k* acts in opposition to the current of the battery *a*, and hence tends to neutralize its action in the magnets *d e*; but the rheostat *l* is adjusted so that the current thereof only neutralizes any excess resulting from escape-currents.

The key *b* is to be kept closed when not in use, so that the circuits 2 and 3 will both be closed, and the reverse circuit from *k*, acting in *m n*, will only neutralize any magnetism resulting from the electricity escaping from *a*, through *e* and *d*, due to the defective insulation of the line; but, when the circuit is opened and closed at the distant station, the magnets *d e* will respond with promptness and accuracy by the rise in tension or energy.

By adjusting the rheostat *l*, it becomes unnecessary to adjust the tension of the armature-spring, or the relative position of the armature and core.

When the key *b* is employed in transmitting, the circuit 3 is opened and closed, as well as the circuit 2, to the main line; thereby the armatures will respond, and not be held, as they would by the action of the battery *k* and circuit 3, if that were not broken.

It will be apparent that the electricity of the reverse battery *k* and circuit 3 might be applied to the magnet *e* by a connection between the line and the key, as seen in Fig. 2, and the adjustment be made by the rheostat *l*, as before, or a coil, *n*, may surround the helix *e* of the magnet, wound in reverse directions, so that a portion of the main current passing through a shunt-circuit, 3, and adjusted by a rheostat, *l*, may react to neutralize the escape-current. The diagram, Fig. 3, shows this character of connection.

I claim as my invention—

1. The magnets *d* and *e*, arranged to operate at opposite sides of the armature-lever *f*, in combination with the battery *k*, circuit 3, rheostat *l*, key *b*, and connections 2 thereto

from the main line *c*, and the circuit 3, as set forth.

2. An electro-magnet connected in a circuit with a battery at both stations, combined with a rheostat and counter-current, to neutralize the effect in the magnet of a current arising from leakages in the line, substantially as specified.

Signed by me this 23d day of April, A. D. 1873.

THOS. A. EDISON.

Witnesses:
GEO. T. PINCKNEY,
CHAS. H. SMITH.