(No Model.) 2 Sheets—Sheet 1.

T. A. EDISON.

TELEGRAPHY.

No. 435,689. Patented Sept. 2, 1890.

Fig. 1.

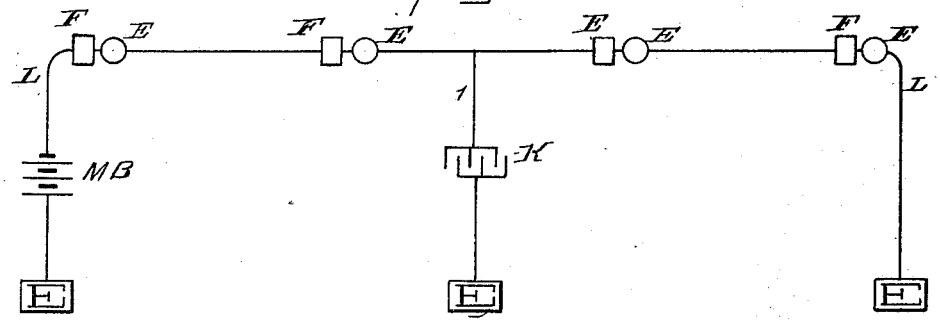


Fig. 2.

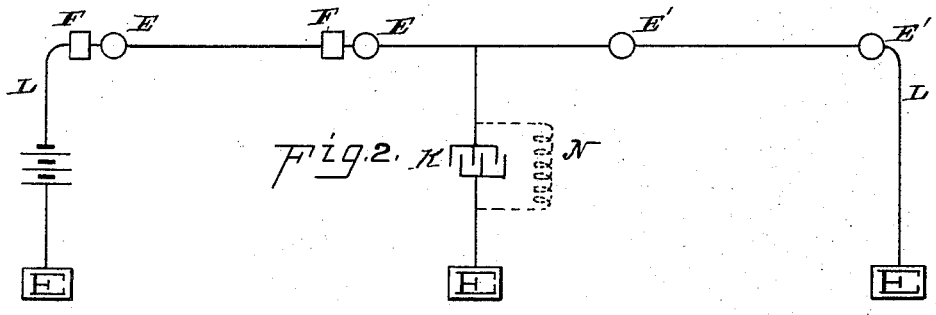


Fig. 3.

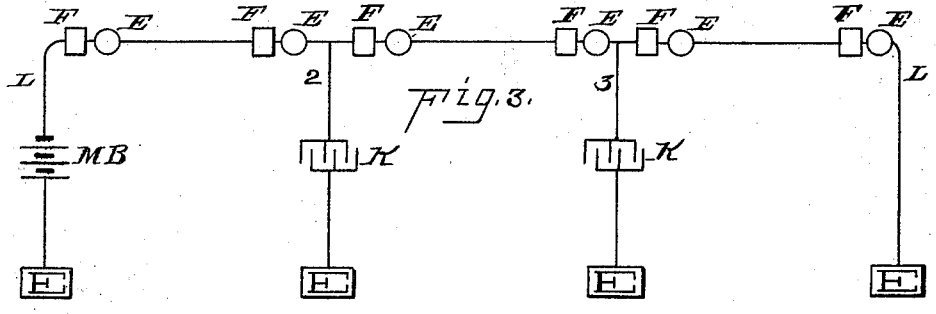
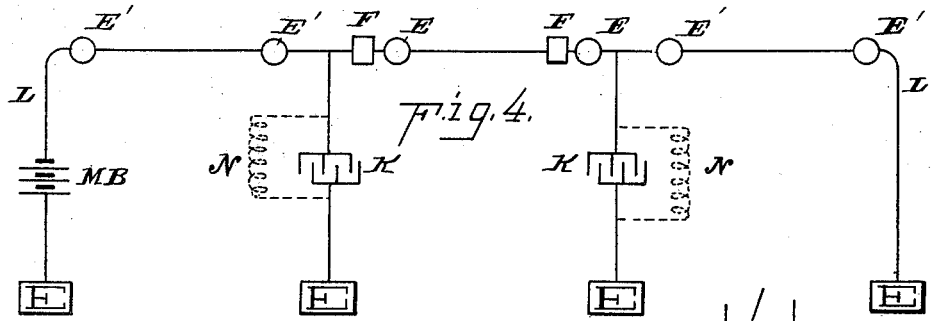


Fig. 4.



ATTEST:

E. C. Rowland.

A. W. Tiddle.

INVENTOR:

Thomas A. Edison

By Dyer & Seely

Attys

(No Model.)

2 Sheets—Sheet 2.

T. A. EDISON.

TELEGRAPHY.

No. 435,689. Patented Sept. 2, 1890.

Fig. 5.

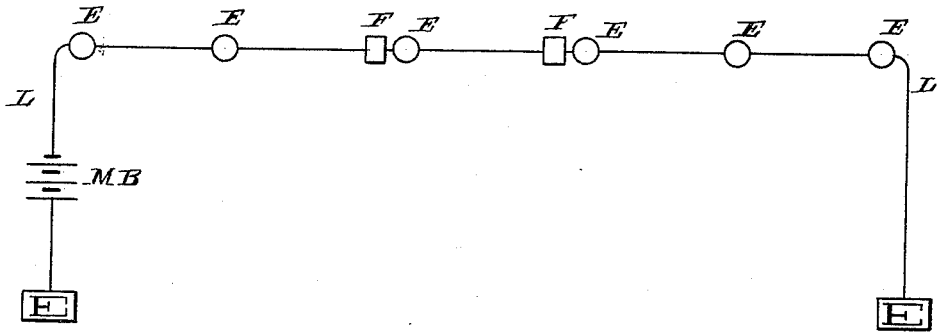
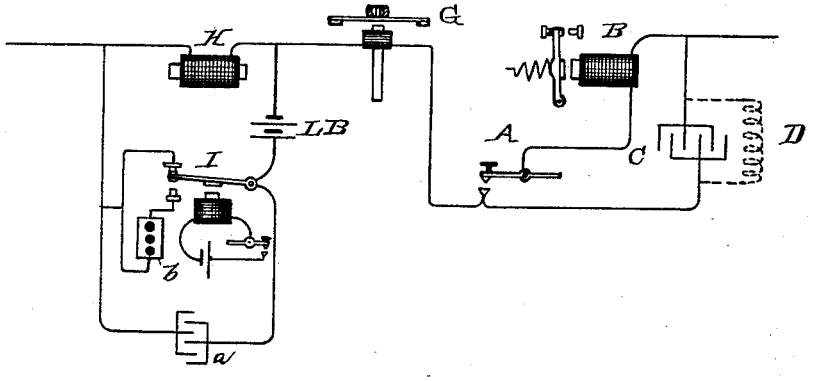


Fig. 6.



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UNITED STATES PATENT OFFICE.

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

TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 435,689, dated September 2, 1890.

Application filed February 19, 1886. Serial No. 192,484. (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 Telegraphs, (Case No. 657,) of which the following is a specification.

My invention relates to induction-telegraphs described in applications for patents already filed by me, (Serial Nos. 164,856, 164,857, and 183,895, Patents Nos. 333,289, 333,290, and 422,073,) wherein two independent sets of Morse signals can be sent back and forth over the line, one set being transmitted and received by the ordinary Morse instruments, consisting of ordinary Morse signaling-keys and relays and a line-battery, and the other set being transmitted and received by Morse induction apparatus, consisting of induction-transmitters with separate batteries and diaphragm receivers or sounders, the Morse keys being shunted to keep the line constantly closed for the induction-signals.

The object I have in view is to utilize sections of the line only or independently of other sections for the induction-signals, while the entire line is employed, as heretofore, for the ordinary Morse signals.

In the accompanying drawings, forming a part hereof, Figures 1 to 5, inclusive, are diagrams of different arrangements of instruments and circuits embodying the invention; and Fig. 6, a view, principally in diagram, illustrating more in detail the two classes of signal transmitting and receiving apparatus employed.

The preferred arrangements are based upon the discovery made by me that by grounding the line at any point through a condenser of sufficiently large capacity the line becomes practically divided at that point for the induction-signals, which will pass to ground through the condenser from either section of the line without affecting induction apparatus on the other section, while the line remains intact from end to end for the ordinary Morse signals. I have also found that with some arrangements an extremely high resistance will answer the same purpose as a condenser.

L L represent lines grounded at their ends, as usual, and having line-batteries M B to work the line for ordinary Morse signals produced by signaling-keys A, Fig. 6, and received by relays B, Fig. 6. When any Morse set is in a section of line forming part of an induction-circuit, the key and relay are shunted by a condenser C, Fig. 6, or by a resistance D, (shown in dotted lines,) as described in the applications referred to, to keep the line constantly closed for induction-signals.

Ordinary Morse sets are indicated in Figs. 1 to 5 by the circles E E′, the Morse sets being each like that shown in Fig. 6, with the exception that the Morse sets indicated by circles E′ do not have the shunts around the keys and relays. The squares F indicate induction sets, which may be of any of the forms described in the applications referred to; but are preferably, as shown in Fig. 6, each composed of a diaphragm-sounder G for receiving signals and of a magnet H in line, shunted by a local battery L B and circuit-controlling double-point sounder I for transmitting signals, a condenser *a* being used to sharpen signals and absorb the spark, and a resistance *b* to vary alternate signals. In Fig. 1 the line has a central ground-connection 1 through a condenser K, dividing the line into two sections for the induction-signals, each section having two or more induction sets. In Fig. 3 the line has two intermediate ground-connections 2 3 through condensers K, dividing the line into three sections, each provided with two or more induction sets. The induction-circuits are completed to ground by the condensers, which absorb the induction-signals entirely, or practically so, and hence there is no interference between the induction-signals of different sections. Since the sections are thus made independent circuits for induction-signals, all need not have induction apparatus. In Fig. 2 a section at one end of line only is used for induction-signals, while in Fig. 4 an intermediate section is alone used for induction-signals. Where, as in Figs. 2 and 4, one section only of each line is used for induction-signals, the ground-connections may have each an extremely high resistance N, (shown in dotted lines,) which may be, for illustration, ten thousand ohms, instead of a condenser. The ground connection or connections through the high resistance will com-

plete the induction-circuit while preserving the line practically intact for the ordinary Morse signals. While the high resistances might not absorb the induction-signals so as to prevent interference between induction-signals of different sections, still grounds through high resistance will perform the function of condenser grounds in completing the induction-circuits through isolated sections of lines, and thus obviating the necessity for shunting the Morse signaling-keys on other sections.

The ordinary Morse apparatus on other sections than the induction-sections in Figs. 2 and 4 do not have the signaling-keys shunted; but by shunting all the ordinary Morse signaling-keys throughout the line an isolated section of the line may be used for induction-signals without making ground-connections, as shown in Fig. 5.

What I claim is—

1. In telegraphs, the combination, with a line grounded at its ends, of two or more Morse induction sets, each composed of a diaphragm-receiver and an induction-transmitter located directly in said line, and one or more intermediate ground-connections dividing such line into independent non-interfering induction-circuits, substantially as set forth.

2. In telegraphs, the combination, with a line grounded at its ends and two or more ordinary Morse sets and a line-battery located in said line and working over the entire line, of two or more Morse induction sets, each composed of a diaphragm-receiver and an induction-transmitter located directly in said line, and one or more intermediate ground-connections dividing such line into independent non-interfering induction-circuits, substantially as set forth.

3. In telegraphs, the combination, with a line grounded at its ends and two or more ordinary Morse sets and a line-battery located in said line and working over the entire line, the keys of such ordinary Morse sets being shunted for induction-signals, of two or more Morse induction sets, each composed of a diaphragm-receiver and an induction-transmitter located directly in said line, and one or more intermediate ground-connections dividing such line into independent non-interfering induction-circuits, substantially as set forth.

This specification signed and witnessed this 30th day of November, 1885.

THOMAS A. EDISON.

Witnesses:
A. W. KIDDLE,
E. C. ROWLAND.