

(No Model.)

T. A. EDISON.  
TELEGRAPHY.

No. 422,074.

Patented Feb. 25, 1890.

Fig 1.

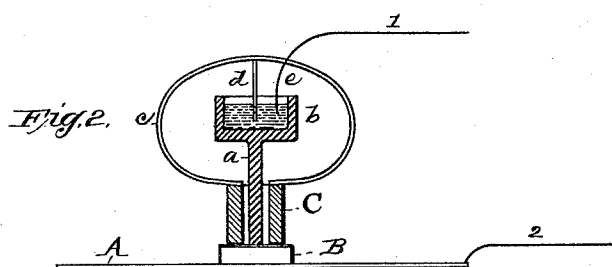
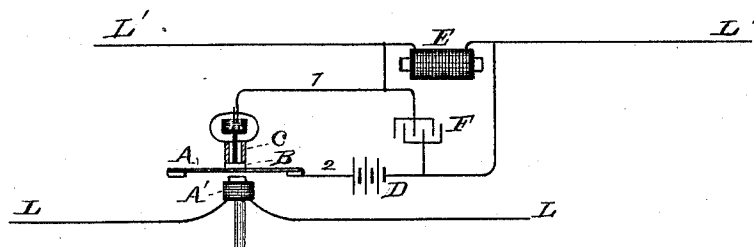


Fig 3.

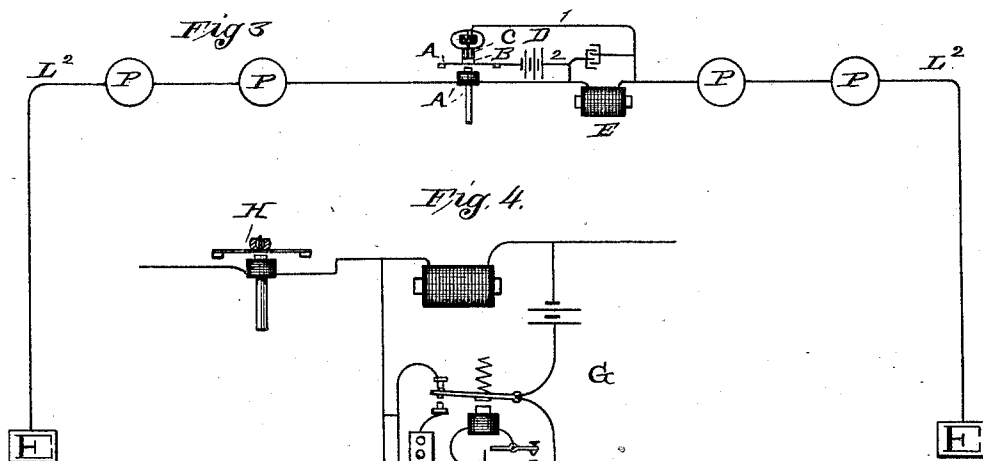
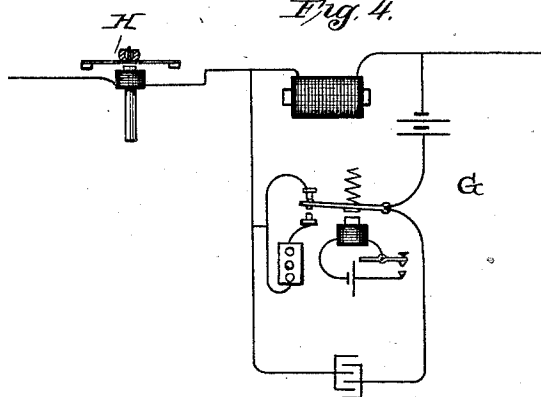


Fig 4.



ATTEST:

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# UNITED STATES PATENT OFFICE.

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

## TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 422,074, dated February 25, 1890.

Application filed February 19, 1886. Renewed October 11, 1889. Serial No. 326,653. (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. 656,) of which the following is a specification.

The object I have in view is to produce a repeater or relay for the induction telegraphs employing transmitters and receivers of induction impulses, and hereinafter referred to as "induction" apparatus, which apparatus is described in applications for patents already filed by me—Serial Nos. 164,856, 164,857, 333,289 and 333,290, and 183,895. This I accomplish by constructing a diaphragm sounder or phonetic receiver (the receiving-instrument of my induction telegraph) to operate an induction-transmitter circuit. This apparatus may be used to relay or repeat from one circuit to another, or it may be employed to act directly upon the same circuit, the effect in either case being to introduce additional battery-power and increase the volume of the induction signals.

In the accompanying drawings, forming a part hereof, Figure 1 is a view, principally in diagram, showing the relay or repeater in connection with two circuits; Fig. 2, a detail view, partly in section, of repeater or relay diaphragm and circuit making and breaking devices operated thereby; Fig. 3, a view, principally in diagram, showing relay or repeater acting on one line; and Fig. 4, a view showing the preferred form of induction transmitter and receiver.

The induction repeater or relay is composed of a diaphragm A, of any suitable form of phonetic receiver, which diaphragm is itself vibrated by induction signals, and the movement of which is utilized to open and close an induction-transmitter circuit. A construction for accomplishing this is shown in the drawings. The diaphragm A is horizontally arranged. It has a platinum-faced block B on its center, from which rises an insulating-pin *a*, carrying a mercury-cup *b* at its top. A small metal weight C, faced with platinum, rides on block B and surrounds pin *a*, which holds the weight in place. A metal hoop *c* from weight C extends over cup *b* and has a pin *d* dipping in the mercury for maintaining

connection between the weight and a wire *e*, also dipping into the mercury. The wire *e* forms one side of an induction-transmitter circuit 12, the other side of which runs to the diaphragm A if it be of metal, or to the block B if diaphragm is of insulating material. This circuit 12 is opened and closed by the hopping of weight C on block B, the contacts being the meeting faces of weight and block. Circuit 12 includes a battery D, and is connected with line L' L', Fig. 1, by a device translating the battery impulses into induction impulses upon the line, such induction impulses forming the short sharp waves of high tension of which the induction signals are composed. This device may be any of those described for this purpose in the applications referred to, but is preferably an electro-magnet E, located directly in line L' L' and shunted by the circuit 12. The contacts are formed by adjoining faces of block B and weight C are preferably shunted by a condenser F. Line L L, Fig. 1, includes the operative element A' of the induction repeater or relay. This may be coils similar to those of a magneto-electric telephone-receiver or the chalk cylinder and spring of an electromotographic receiver, as described in the applications referred to. The repeater or relay will repeat or relay induction signals from circuit L L to circuit L' L'. These circuits will have an induction transmitter and receiver, which may be of any of the forms described in the applications referred to, but are preferably of the form shown in Fig. 4, the transmitter being shown at G and the receiver at H.

The relay or repeater may be used to increase the volume of the induction signals in the same line as shown in Fig. 3. The line L<sup>2</sup> L<sup>2</sup> is provided with a number of induction sets represented by the circles P. Each of these sets may be composed of the devices shown in Fig. 4.

At one intermediate point on the line or at each of two or more intermediate points will be located a repeater or relay, the operative element A' being directly in the line, and also the magnet E, shunted by induction-transmitter circuit 12, containing the local battery D.

The induction apparatus, as will be under-

stood from the applications referred to, may be used alone for telegraphing by means of Morse signals or in connection with ordinary Morse telegraph apparatus, consisting of signaling keys and relays, the circuit at the signaling-keys being kept constantly closed for the induction signals by condenser or resistance shunts.

What I claim is—

10 1. In telegraphs, the combination, with a signaling-key and an induction device for transmitting induction telegraphic impulses, of a diaphragm relay or repeater receiving  
15 by such diaphragm relay or repeater, an induction device in such relaying or repeating circuit for transmitting induction telegraphic impulses, and a diaphragm receiver for receiving the latter induction impulses, substantially as set forth.

20 2. In induction telegraphs, the combination, with a telegraphic transmitter and a diaphragm receiver, of a circuit-controller operated by the movement of the diaphragm and  
25 a circuit opened and closed by said circuit-

controller, a battery in said circuit, and an induction device for translating the battery-waves into telegraphic induction impulses, and a condenser shunting said circuit-controller, substantially as set forth. 30

3. An induction-telegraph repeater or relay having, in combination, an electro-magnet with coils in one circuit, a horizontal diaphragm vibrated by such electro-magnet, a hopping weight carried by such diaphragm, 35 and a repeating or relaying circuit controlled by the movement of such weight, substantially as set forth.

4. An induction-telegraph repeater or relay having, in combination, a diaphragm, an operating element therefor, a circuit-controlling 40 weight carried by the diaphragm, and a mercury-cup with points maintaining circuit with such weight, substantially as set forth.

This specification signed and witnessed this 45 24th day of November, 1885.

THOS. A. EDISON.

Witnesses:

A. W. KIDDLE,

E. C. ROWLAND.