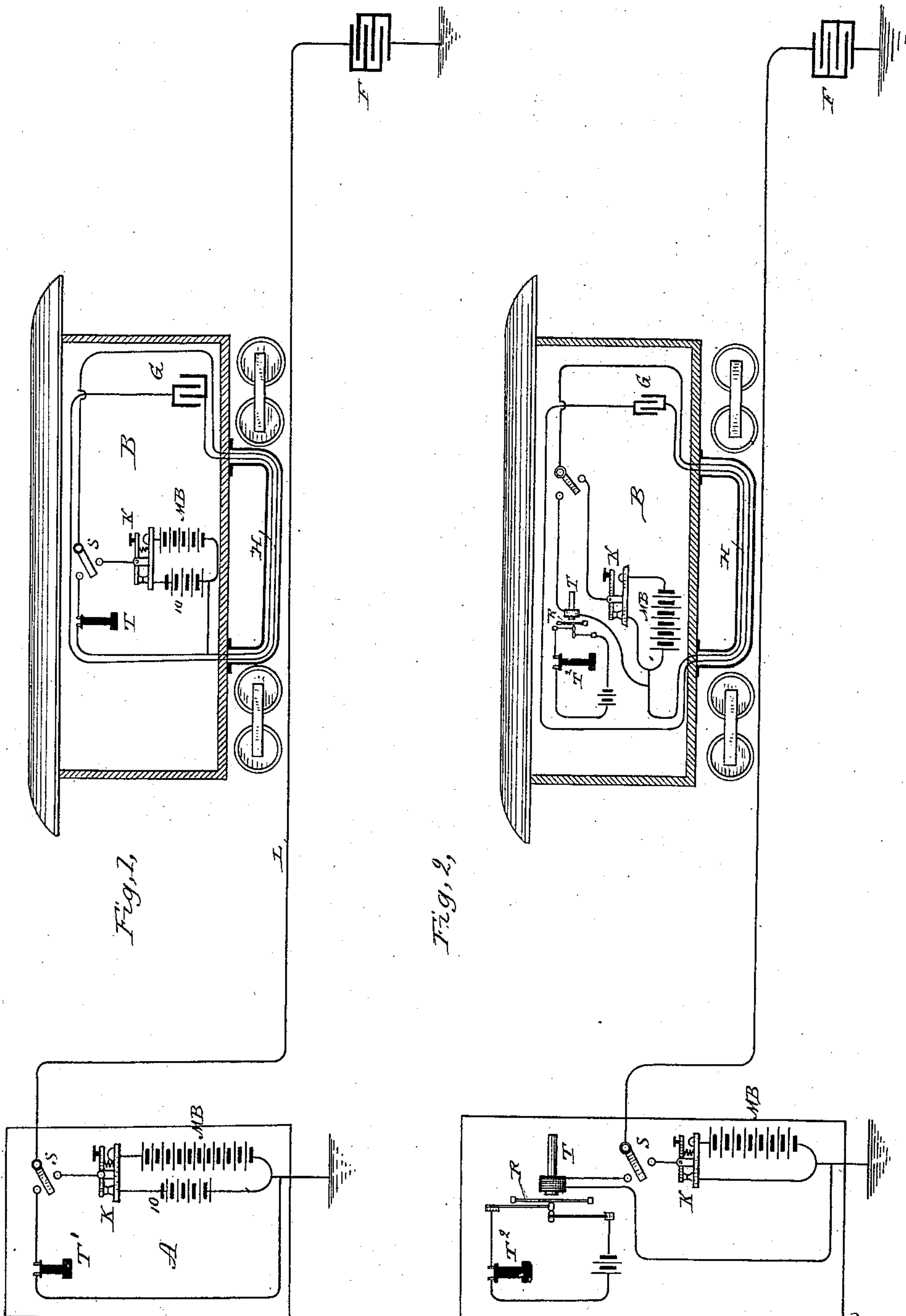


(No Model.)

L. J. PHELPS.
RAILWAY CAR TELEGRAPH.

No. 334,189.

Patented Jan. 12, 1886.



Witnesses:
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UNITED STATES PATENT OFFICE.

LUCIUS J. PHELPS, OF NEW YORK, N. Y., ASSIGNOR TO THE RAILWAY TELEGRAPH COMPANY, OF SAME PLACE.

RAILWAY-CAR TELEGRAPH.

SPECIFICATION forming part of Letters Patent No. 334,189, dated January 12, 1886.

Application filed March 3, 1885. Serial No. 157,630. (No model.)

To all whom it may concern:

Be it known that I, LUCIUS J. PHELPS, a citizen of the United States, and a resident of New York, in the county of New York and State of New York, have invented certain new and useful Improvements in Apparatus for Maintaining Electrical Communication with Vehicles in Motion or at Rest, of which the following is a specification.

10 The object of my present invention is to provide a means of communicating between a vehicle in motion or at rest and a fixed station by the principle of electric induction, one element of the induction apparatus consisting of a conductor parallel to the path or way over which the vehicle moves, while the other element is carried on the vehicle in inductive proximity to the first.

My invention consists in certain novel elements and combinations of elements which will be described in connection with the accompanying drawings, and then specifically stated in the claims.

25 In the drawings, Figure 1 is a diagram of apparatus arranged in accordance with my invention. Fig. 2 illustrates an improved detail.

Referring to Fig. 1, A indicates a fixed station—such, for instance, as a train-dispatcher's office of a railway—and B the vehicle or car that moves over the line of rails. Extending from the station A is a conductor, L, preferably an insulated conductor, which conductor is supported either upon posts beside the track or upon a stringer or strip of wood resting upon the ties between or beside the rails. The conductor L extends for any desired distance, and, according to my present invention, is preferably an open-circuit conductor—that is, there is no complete closed circuit that can be formed from the apparatus at the station A, through the conductor L, and on earth or metallic return-conductor.

45 The communicating apparatus at the station A may be of any desired kind; but for the purpose of exemplifying my present invention I have shown it as consisting only of a receiving-instrument, composed of an ordinary telephone-receiver, T', and of a transmitter consisting of a "Morse" key, K.

The transmitting-battery is indicated at M

B, and is connected, as usual, to the front stop of the key, one pole of said battery—to wit, that opposite to the one connected to the stop—being connected to earth. The back stop of the key in the present arrangement is, in order to assist in the changes of electrical condition of the line L, connected also to earth through a wire, 10. In the wire or branch 10 may, if desired, be placed a battery having a pole connected to the stop of the opposite sign to the pole of M B, connected to the front stop. A switch, S, serves to connect a line, L, either to the telephone-receiver or to the key K, according as the communications are to be transmitted or received. Upon the vehicle B is supported a conductor, H, arranged parallel to the conductor L, and in inductive proximity thereto. The conductor H may be an ordinary insulated wire, or may be a strip or sheet of metal, and may be supported, as indicated, by brackets or standards secured to the car-floor. One or more turns of conductor H may be employed, as desired. The terminals of the conductor H, instead of being connected in a metallic closed circuit, as described and shown in my Patent No. 312,506, end, respectively, in the opposite plates or poles of a condenser, G, located upon the car. In the connections to the condenser are placed the transmitting and receiving apparatus to be used by the operator upon the vehicle. Such apparatus may be of any desired kind; but is preferably the same as that employed at the fixed station, as indicated. The switch S on the vehicle serves to connect into the circuit including the conductor H and the condenser either the telephone-receiver T or the transmitting apparatus consisting of the key K and the battery M B. The line L, by preference, is provided with a condenser, F, connected, as shown, so as to heighten the amplitude of the changes of electrical condition that it is possible to produce in said conductor.

95 In the operation of transmitting from the station A to the vehicle, the transmitting-key K, when depressed, connects the line L to the battery M B, thus giving an electrical charge to said line, which charge, by induction, produces in the conductor H an electrical change of condition that will produce in the telephone T or other receiving-instrument con-

nected therewith a corresponding change or action. If a telephone be employed, simply a click will be heard. When the key K returns to its normal position, the line is discharged
5 through the conductor 10, and by induction a change of electrical condition at the same time occurs in the circuits connected to the conductor H, so as to again affect the telephone. To assist in the discharge of the line,
o a second battery with a reverse pole, as shown, may be placed in the branch 10.

In the operation of transmitting from the vehicle the key K is operated in a similar way, so as to produce, by means of the battery M B, a charge or change of electrical
5 condition in the described circuit, and afterward, by the return of the key to its back stop, a discharge or second change, each of which is accompanied on the circuit or conductor L by a similar change of electrical
o condition induced thereon. No particular length of conductor H parallel to conductor L is necessary; but of course the greater its length the greater the inductive effects.

I do not limit myself to the employment of the telephone as a receiver, but have described the same only because of its simplicity and sensitiveness to induced currents.

Other transmitting devices can be employed
o in place of the transmitter K and the battery M B without departing from the spirit of the invention.

The connection of the circuit or conductor upon the car or vehicle to the opposite poles
5 of the condenser G, as described, forms one of the leading characteristics of my invention.

The action of the condenser G is probably to permit an equalization of potential in the conductor H, and in so far as the apparatus
o acts in this way it is in a measure but a substitute or equivalent for a continuous metallic connection, such as described in my prior patent above referred to.

In order to obtain louder sounds in the receiver, either upon the car or upon the vehicle in a system of telegraphy by induction such as described, I find it desirable to employ what I term an "amplifier," which consists in substance of a telephone-transmitter
o operated by the telephone-receiver connected to the line, or the car-circuit, and in turn controlling a local or sub-circuit in which is placed a second telephone-receiver and local battery; the latter receiver being the instrument through which communications are received. Such an arrangement is shown in Fig. 2, and will not require further description. If desired, the same arrangement might be employed upon the vehicle.

The telephone-transmitter is indicated at R, and consists simply of a diaphragm acted upon by the receiver T, and having contact in a local circuit, including the receiver T², which latter is the instrument actually used
5 to receive communications.

I do not limit myself to any particular means of charging or discharging the line L

and the conductor or circuit upon the vehicle.

The devices shown are simply typical of
70 apparatus whereby such charge and discharge may be effected.

The branch 10 is not necessary, but is desirable, as it assists materially in producing a quick discharge or charge of electrical
75 condition in the circuit to which the transmitter is connected. This special arrangement, in connection with a system of communication by static induction to and from a vehicle, is not herein claimed, as it is claimed in another
80 application for patent filed by me.

I do not limit myself to the particular location of the condenser shown, as it might be inserted at other points, even close to the station A, instead of at a remote point. The
85 conductor H, if made of wire, might be inclosed in a pipe, after the manner described in my prior patent, above referred to.

It is obviously not necessary that the conductor L should be placed between the tracks,
90 as it might be supported on the post and strung over the car-roof. In the latter case the conductor H might consist of a sheet of conducting material—such as tin or copper—tacked upon the roof and inclosed in sheets of
95 rubber or other insulating material, described in an another application for patent.

What I claim herein, and desire to secure as my invention, is—

1. The combination, substantially as described, of a line-conductor parallel to the path over which a vehicle moves and a conductor upon the latter arranged in inductive
100 proximity to the line-conductor and terminating in the opposite poles of a condenser.

2. The combination, substantially as described, of an open-circuit line-conductor and transmitter at a fixed station for alternately charging and discharging said line-conductor,
105 a conductor upon a vehicle arranged in continued inductive proximity to said line, in combination with a condenser upon the said vehicle having its opposite poles connected, respectively, to opposite terminals of the conductor upon the vehicle.
115

3. The combination of a line-conductor, as L, a condenser, F, connected thereto, a local conductor moving in continued inductive proximity to the line, and a condenser upon the vehicle, the poles of which form the terminals of the vehicle-conductor.
120

4. In an apparatus for intercommunication between a vehicle in motion or at rest and a fixed station by the principle of induction, an amplifier consisting, substantially as described,
125 of a telephone-receiver and telephone-transmitting contacts operated thereby, said amplifier being connected to the line or to the vehicle-circuit and controlling in turn a local circuit upon which is placed the instrument
130 through which communications are received.

5. The combination, substantially as described, of a line-conductor open-circuited, a telephone-receiver connected thereto, a tele-

phone-transmitter operated by said receiver, and a local circuit containing a second telephone-receiver.

6. The combination, in an apparatus for
5 communicating with a vehicle in motion or at rest, of a line-conductor, a vehicle-conductor, a conducting-surface in inductive proximity thereto, a telephone-receiver connected to the vehicle-conductor, and a local circuit controlled by said telephone, including a tele-

phone-receiver, battery, and telephone-transmitter.

Signed at New York, in the county of New York and State of New York, this 2d day of March, A. D. 1885.

LUCIUS J. PHELPS.

Witnesses:

THOS. TOOMEY,
GEO. H. EVANS.