(No Model.)

T. A. EDISON & E. T. GILLILAND.

SYSTEM OF RAILWAY SIGNALING.

No. 350,234. Patented Oct. 5, 1886.

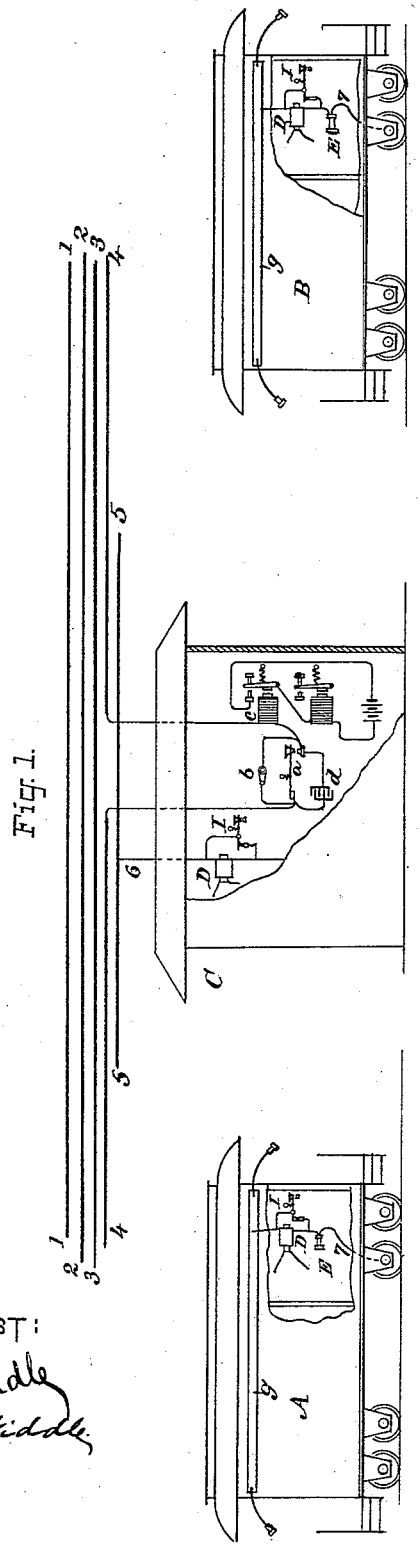

Fig. 1.

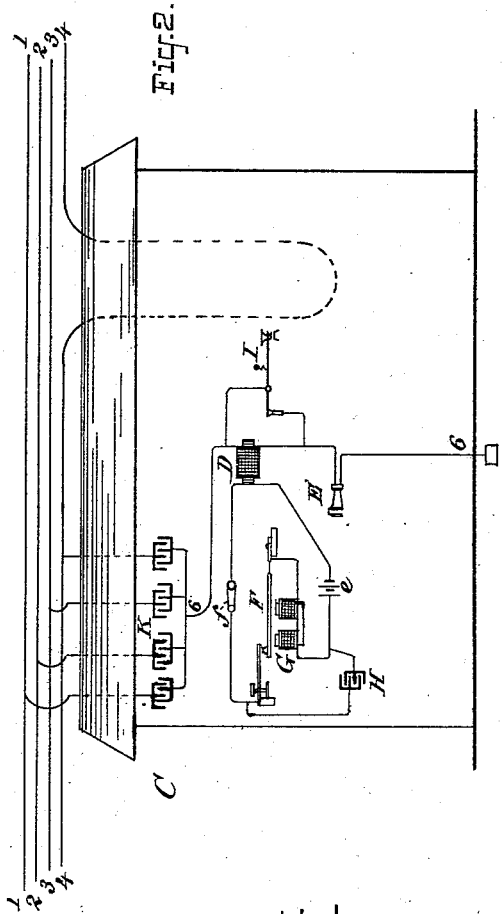

Fig. 2.

ATTEST:

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UNITED STATES PATENT OFFICE.

THOMAS A. EDISON, OF MENLO PARK, NEW JERSEY, AND EZRA T. GILLILAND, OF BOSTON, MASSACHUSETTS, ASSIGNORS TO THE RAILWAY TELEGRAPH AND TELEPHONE COMPANY.

SYSTEM OF RAILWAY SIGNALING.

SPECIFICATION forming part of Letters Patent No. 350,234, dated October 5, 1886.

Application filed April 7, 1885. Serial No. 161,438. (No model.)

To all whom it may concern:

Be it known that we, THOMAS A. EDISON, of Menlo Park, in the county of Middlesex and State of New Jersey, and EZRA T. GILLILAND, of Boston, in the county of Suffolk and State of Massachusetts, have invented a certain new and useful Improvement in Systems of Railway Signaling, (Case B,) of which the following is a specification.

The object we have in view is to utilize the ordinary telegraph-wires extending along a railroad for the line of an inductive signaling apparatus for reciprocal signaling between stations and trains and between trains without interference between the two classes of signals. The numerous wires running along trunk railway lines would give a large inductive surface, which is a point of great advantage in inductive apparatus operating by condenser action upon the principle of static induction.

In carrying out our invention we connect at each signaling-station each of the passing telegraph-wires (or each of as large a number as desired) with a condenser in the station. The condensers on their other sides are all connected together and with a circuit extending to ground. In this circuit are arranged our signal transmitting and receiving devices, which are preferably for the receiving device, a telephone, and for the transmitting device, a musical vibrator and an induction-coil. The Morse keys upon the telegraph-wires are all shunted by condensers to increase the clearness of the telegraph-signals. Instead of connecting the wires to condensers in each station, the transmitting and receiving devices in station may be connected with a wire or wires run for a greater or less distance upon the telegraph-poles in proximity with the telegraph-wires, but not connected therewith. Each train has its cars equipped with inductive strips coupled together and connected with receiving and transmitting devices similar to those used in the stations, such devices being included in a circuit between the inductive strips and the ground.

In the accompanying drawings, forming a part hereof, Figure 1 is a view, principally in diagram, of a signaling system embodying our invention, the signaling-instruments not being developed; and Fig. 2, a view of a station, showing a modified condenser arrangement, the signaling-instruments being shown.

A and B are cars of two trains, and C is a station.

1 2 3 4 are telegraph-wires running along the line of the road. Wire 4 is looped into station and has the regular instruments for Morse telegraphy. There are shown a Morse key, *a*, and switch *b*, and a relay, *c*, controlling local sounder-circuit. The key *a* is shunted by a condenser, *d*. Running a short distance with the telegraph-wires 1 2 3 4 is a condenser-wire, 5, Fig. 1. This is connected with wire 6, running through the station to ground. Within the station this wire has connected with it signal transmitting and receiving devices, which are particularly described and claimed in our application (Case A) of even date herewith. They consist of an induction-coil, D, the secondary of which is of high resistance—say one thousand ohms—and is located in line of wire 6, in which is also the high-resistance receiving-telephone E. The primary of D includes a local battery, *e*, vibrating musical reed F, opening and closing circuit, a magnet, G, acting on the reed, and a simple switch, *f*. The contact-points at which the musical reed opens and closes circuit are shunted by a condenser, H. The secondary of induction-coil is short circuited by the normal position of a key, I, by depressing which the short circuit is broken. These parts are shown in Fig. 2, and their operation is fully explained in the application referred to.

The cars A B have external inductive strips *g*, insulated from car, and connected with ground by a wire, 7, extending through the car to a truck. This wire has connected with it the signal transmitting and receiving devices described, and shown in Fig. 2.

Instead of using a condenser wire or strip, 5, external to station, the telegraph-wires 1 2 3 4 may be connected with condensers K in station, Fig. 2, which, on their other sides, are coupled together and form the upper terminal of wire 6.

The telegraph-wires are, as usual, grounded lines.

The trains and stations, as will be understood by the foregoing, are connected with this line by condensers arranged in multiple arc. The system of signaling is by dots and dashes, as explained in the application referred to; but the high-resistance telephone-receivers are capable of receiving through the condensers static impulses, which are not sufficient to work the Morse instruments.

The condensers, which shunt the Morse keys, form for the high-tension impulses of induction a constantly-closed circuit, so that the railway signaling is not interfered with by the working of the Morse keys in telegraphing.

The broad invention of utilizing a number of telegraph-wires collectively as the line for the inductive railway-signals is not claimed herein, but will be embodied in another application for patent.

What we claim is—

1. In railway inductive signaling apparatus, the combination, with one or more telegraph-wires and their instruments, of a train having railway signaling, transmitting, and receiving instruments operating to transmit and receive signals produced by induction impulses, and acting inductively upon and from the telegraph wire or wires, a station having transmitting and receiving instruments for such induction railway-signals, and shunts around the telegraph-keys to maintain a closed line-circuit for the induction railway-signals, substantially as set forth.

2. In railway inductive signaling apparatus, the combination, with one or more telegraph-wires and their instruments, of a train having railway signaling, transmitting, and receiving instruments operating to transmit and receive signals produced by induction impulses, and acting inductively upon and from the telegraph wire or wires, a station having transmitting and receiving instruments for such induction railway-signals, and condenser-shunts around the telegraph-keys to maintain a closed line-circuit for the induction railway-signals, substantially as set forth.

3. In railway inductive signaling apparatus, the combination, with several telegraph-wires and their instruments, of a train having railway signaling, transmitting, and receiving instruments operating to transmit and receive signals produced by induction impulses and acting inductively upon and from the telegraph-wires collectively, a station having transmitting and receiving instruments for such induction railway-signals, and shunts around the telegraph-keys to maintain a closed line-circuit for the induction railway-signals, substantially as set forth.

4. In railway inductive signaling apparatus, the combination, with several telegraph-wires and their instruments, of a train having railway signaling, transmitting, and receiving instruments operating to transmit and receive signals produced by induction impulses, and acting inductively upon and from the telegraph-wires collectively, a station having transmitting and receiving instruments for such induction railway-signals, and condenser-shunts around the telegraph-keys to maintain a closed line-circuit for the induction railway-signals, substantially as set forth.

5. In railway inductive signaling apparatus, the combination, with several telegraph-wires and their instruments, of trains and stations having railway signaling-instruments operating inductively upon and from such telegraph-wires collectively, and condensers in shunts around the telegraph-keys, substantially as set forth.

6. In railway inductive signaling apparatus, the combination, with several telegraph-wires and their instruments, of trains and stations having railway signaling-instruments connected in multiple arc with such telegraph-wires by condensing-surfaces, and condensers in shunts around the telegraph-keys, substantially as set forth.

7. The combination, with the series of telegraph wires or circuits used for ordinary purposes, of a series of condensers connected individually with one set of poles to said wires, and having their other or opposite poles joined together and connected to the apparatus at the fixed station of a railway-telegraph, substantially as set forth.

This specification signed and witnessed by the said EDISON on the 27th day of March, 1885, and by the said GILLILAND on the 28th day of March, 1885.

THOMAS A. EDISON.
EZRA T. GILLILAND.

Witnesses as to signature of T. A. Edison:
A. W. KIDDLE,
E. C. ROWLAND.

Witnesses as to signature of E. T. Gilliland:
GEO. WILLIS PIERCE,
THOS. D. LOCKWOOD.