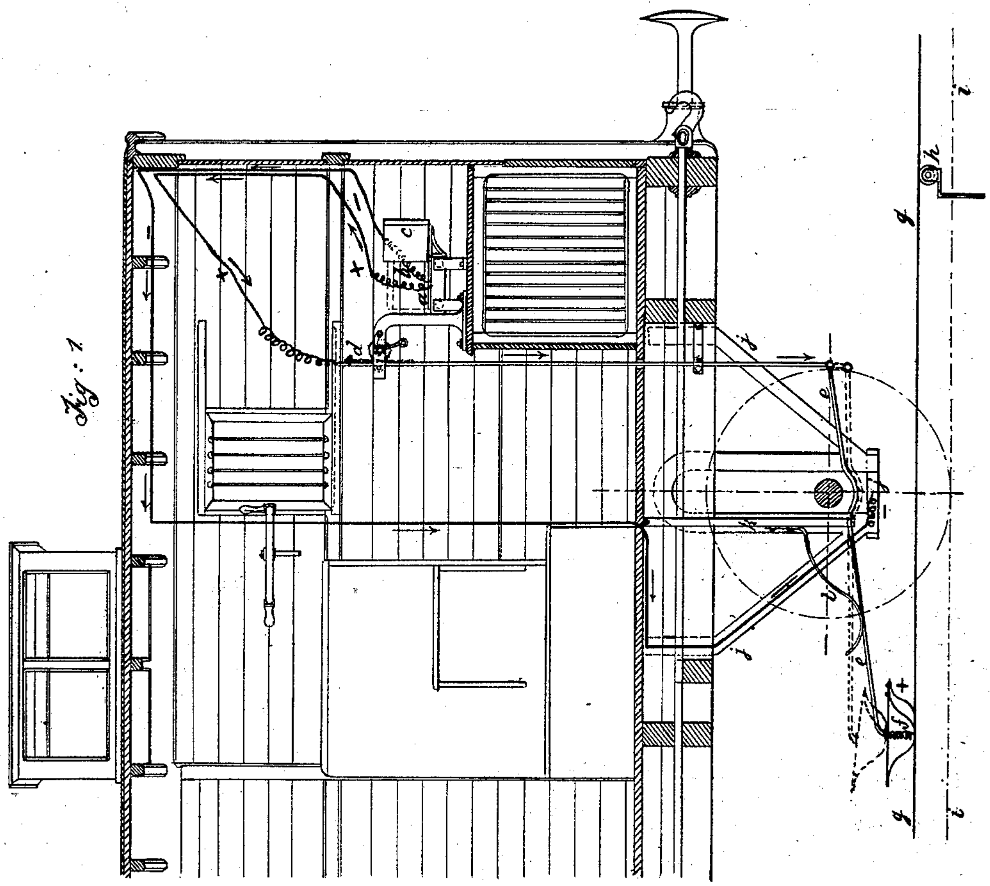
E. J. J. de BAILLEHACHE.

Railroad-Car Telegraph.

No. 216,716. Patented June 24, 1879.

Fig: 1



Witnesses:

Inventor:

2 Sheets—Sheet 2.

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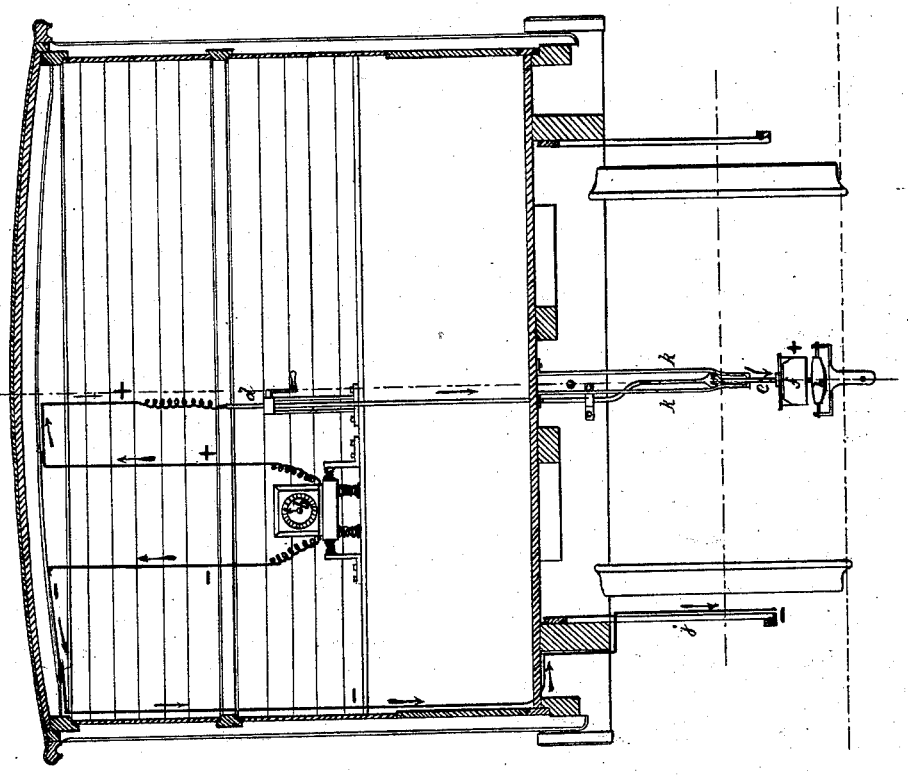
Fig. 2.



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UNITED STATES PATENT OFFICE.

EUGÈNE J. J. DE BAILLEHACHE, OF PARIS, FRANCE.

IMPROVEMENT IN RAILROAD-CAR TELEGRAPHS.

Specification forming part of Letters Patent No. **216,716**, dated June 24, 1879; application filed June 11, 1878; patented in France, April 8, 1878.

To all whom it may concern:

Be it known that I, EUGÈNE JACQUES JÉRÔME DE BAILLEHACHE, of Paris, France, civil engineer, have invented improved electric apparatus for communicating between railway stations and trains, between trains, and between the different parts of trains; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the annexed sheets of drawings, making a part of the same.

This invention relates to improved electric apparatus for effecting communication between railway-trains, whether in motion or stationary, and stations, for communicating between trains in the same or different lines, and also for communicating between the different parts of railway-trains.

Hitherto all attempts at utilizing electricity for the prevention of accidents on railways have been limited to the employment of ingeneous arrangements of apparatus for attracting the attention of the train or station officials by the use of semaphores, worked either mechanically or electrically, which answer well enough for signaling at certain points—such as crossings or stations; but the object of this invention is to supply a want hitherto unfulfilled, the invention consisting in placing trains, while traveling between stations, or to which any accident has happened, in constant electric communication with the stations in front and rear, and vice versa.

According to this invention the guard's van, or any other carriage of the train, is converted into a traveling bureau, furnished with the necessary telegraphic transmitting and receiving apparatus.

In order that the invention may be readily understood, I will describe it with reference to the accompanying drawings, in which—

Figures 1 and 2 show longitudinal and transverse sections of a guard's van with the apparatus in position.

In order to put the guard of the train in constant electrical communication with the stations on the line without interfering with existing apparatus, the requirements are: First, a complete set of telegraph apparatus such as in use at stations—viz., alarm, transmitter, galvanometer, conducting-wires and battery; or, to economize space, a small Bréguet apparatus may be employed, consisting of a transmitter, *a*, receiver *b*, alarm *c*, and a battery, preferably dry.

One pole communicates by a copper wire with a rack-rod, *d*, operated by a pinion and crank-handle, for raising and lowering an arm, *e*, carrying a trailing-spring contact-plate, *f*, through which, when lowered, a continuous contact is made with a galvanized-iron wire, *g*, hereinafter termed the "line-wire," supported upon porcelain insulators *h*, disposed along the line at about ten or twelve meters apart. These insulators are mounted upon short posts sunk in the ground and rising about twelve centimeters above the level of the rails *i;* or the insulators may be mounted upon the sleepers so as to prevent the ash-pan of the locomotive touching the wire *g*. These insulators may be either conical or spherical, and may be made of wood, tarred, painted, or varnished, insulated by a tubular core of india-rubber, through which a pin passes mounted in a forked bearing or otherwise.

The other pole of the battery is to earth through the axle-guard *j*, the wheels, and rails. The trailing contact *f* follows all the undulations of the line-wire *g*, along which it slides, being maintained constantly in contact therewith by the weight of the rod *e*, which is free to play laterally, to a slight extent, in its hanger *k*, the contact being assisted by the pressure of a spiral spring, and, if necessary, by that of a spring, *l*.

The trailing contact is formed of a copper plate and two thin steel-spring plates, about twenty centimeters wide, and the elasticity of the largest of the two, which is about forty centimeters long, being increased by two spiral springs.

In order to neutralize the longitudinal transverse and vertical oscillations and vibrations of the van in traveling, a system of spiral springs is placed beneath at the side or at front and back of the telegraph apparatus, in order to keep the needle of the receiving-dial always in a vertical plane.

To prevent the trailing contact becoming heated, the springs may, if necessary, be kept cool by moistened cotton wicks or by a small stream of water from a vessel in or beneath the van; but the air alone is sufficient, owing to the speed of the train to keep the contact cool.

To avoid interfering with the working of junctions, the line-wire *g* is connected at these points with the nearest station by a wire supported on telegraph-posts beside the line. To prevent the electrical communication being interrupted at level crossings, where the line-wire *g* is necessarily removed from its position and carried overhead or otherwise for a few feet, there may be a second trailing-spring contact, also raised and lowered by a rack, the one being at the front and the other at the tail of the train, and the two connected by a conducting-wire or through the couplings, so that when the one is passing the gap at a crossing the other is still in contact with line-wire *g*, and vice versa.

The line-wire current at level crossings and gates may pass through a vibrating alarm with relay to warn the gate-keeper of the presence of a train.

The system of which the above are heads is simple, practical, inexpensive in application, and of general utility on railways.

There is no danger of the line-wire wearing, as the trailing-spring contact may be so regulated by the rack *d* as, at any speed, only just to touch the wire in passing over the insulators.

At sixty kilometers an hour contact will be made once every half-second, and it is only necessary to make it constant by dressing the trailing contact by means of rack *d* when a message is being sent or received.

The wire is not liable to wear, even at the insulators, as it drops by its own weight, and, being free to move along the insulators, the points of contact are constantly changed by the effect of its own expansion and contraction.

The wire is put in tension by ratchet-gear—such as used for ordinary wire fencing—placed so as to avoid all risk of the trailing contact striking against any uneven surfaces.

A wire brush may be attached in front of the trailing contact to keep the wire clear of snow in winter. The brush also adds to the number of points of contact with the wire for the transmission of the current.

The following are further details for the transmission of messages:

First. When the train is in motion the ratchet should be at the stop-point indicated on the rack, in order that the trailing contact may rub with slight friction upon the wire near the insulators.

Second. To send a message from a train in motion to another train or to a station, the rack is raised to position No. 2, to increase the pressure of the trailing contact, and similarly when a message is to be received.

Third. When the traveling telegraph-van is to be cut out of the circuit to allow a message to pass to another point, or in consequence of storms, the rack should be lowered to position No. 3, in order that the trailing contact may be raised entirely off the wire.

Fourth. The train in motion always communicates directly with the arrival-station—*i. e.*, that to which it is proceeding—provided that the instrument at the departure station is disconnected immediately the train starts.

Fifth. Therefore, if the guard wished to communicate with the station just left he would apply to the arrival-station to be put in direct communication with the departure-station, which would be effected through the ordinary telegraph-wire connecting the two stations.

Sixth. Reciprocally, if a message is to be sent from the departure-station to a train which has just left, it would apply to the arrival-station to be put in direct communication with train.

Seventh. If a train has passed beyond station No. 2 when so applied to by station No. 1 the call is passed on to station No. 3 in advance through the ordinary telegraph-wire, and communication would be effected with the train through the wire between the rails, as in the previous case.

Eighth. The special regulations for the working of single lines may be continued without in any way affecting the employment of the above system for the transmission of train-messages; but in order to still further increase these measures of security it is necessary that each train, although signaled by the departure to the arrival-station on entering upon the single line, should signal its approach to the gate-keepers ahead, and also announce its presence on the line to the arrival-station. Communication being established, as described in section 2, the gate-keepers ahead of the train would be warned by their alarms, which only cease sounding when the train has passed them.

Ninth. In case of accident or when the train has a message to send, the direction of the current from the van being always the same as the direction of motion of the train, the alarms of those signal-boxes only which the train has not passed will be acted on when a message is dispatched.

Tenth. The line in front of the first signal-box is not considered clear until the vibrating alarms sound.

Eleventh. When a train is approaching another upon the same line, as it would be the rule that a train should not leave a station without warning the next box in the direction in which it is going of its approach, there is no fear of collision, as all the trains on this same line, whatever may be their number, will receive the message announcing the starting of the train.

I claim—

1. The combination, in a railway-vehicle, of the electric transmitter *a*, receiver *b*, and alarm

c with the sliding bar *d* and electric conductor connecting thereto, and with the pivoted arm *e*, carrying contact-plate *f*, substantially as herein shown and described.

2. The combination of the wire *g* and insulators *h* with the pivoted arm *e*, contact-plate *f*, and slide *d*, all arranged so that said parts *d e f*, when in contact with the wire *g*, constitute part of an electric circuit, substantially as herein shown and described.

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Witnesses:
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