(No Model.) 2 Sheets—Sheet 1.

W. S. & M. C. COOK.

RAILWAY CAR TELEGRAPHY.

No. 447,943. Patented Mar. 10, 1891.

Fig. 1.

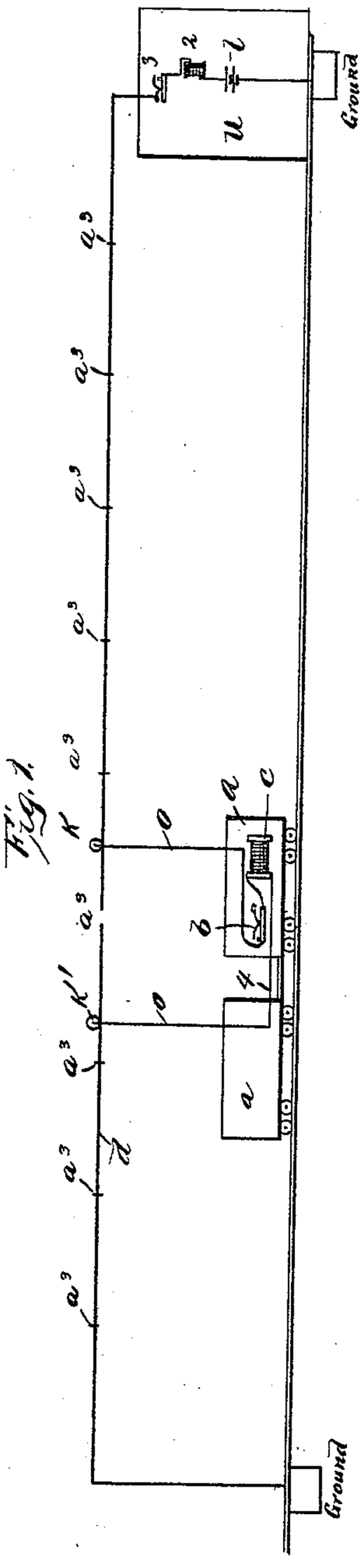


Fig. 2.

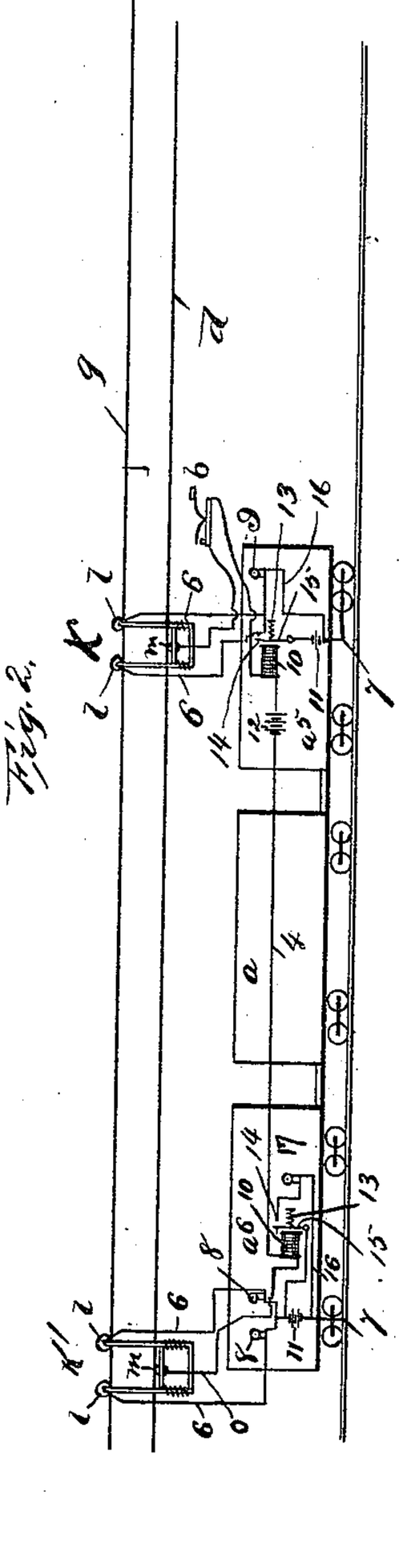


Fig. 3.

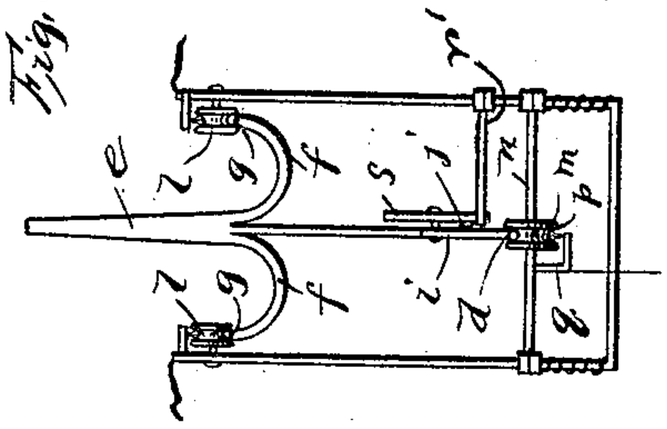
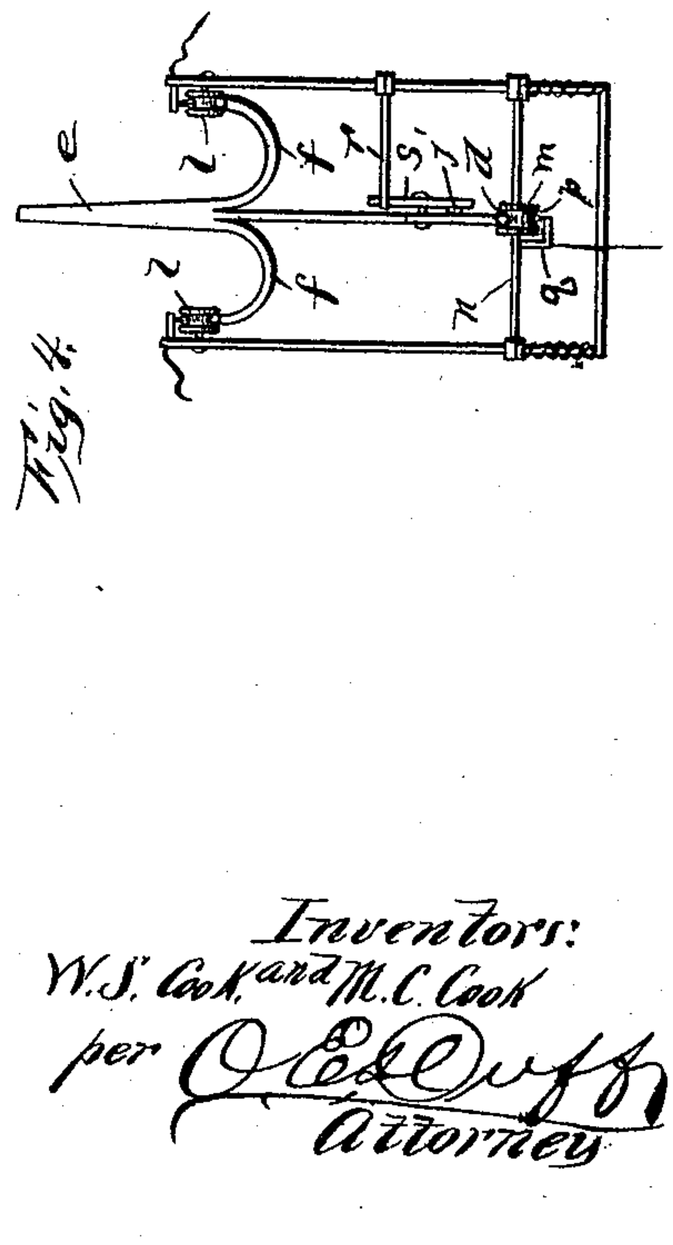


Fig. 4.



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Attorney

(No Model.) 2 Sheets—Sheet 2.

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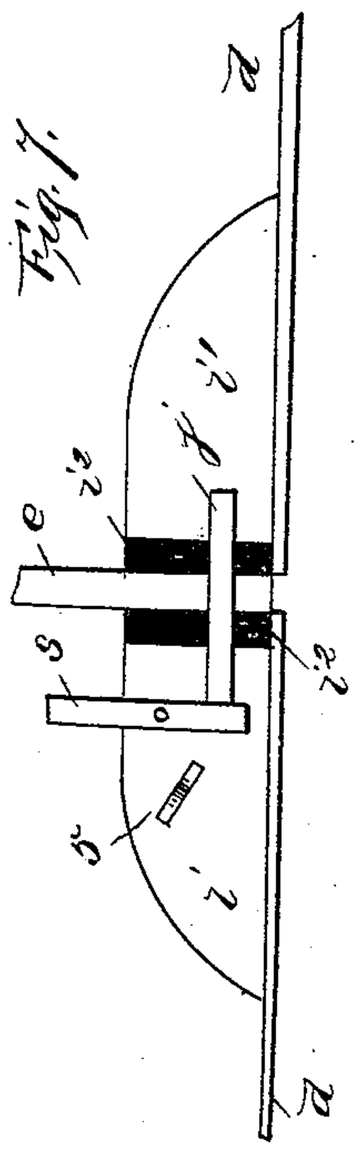

Fig. 3.

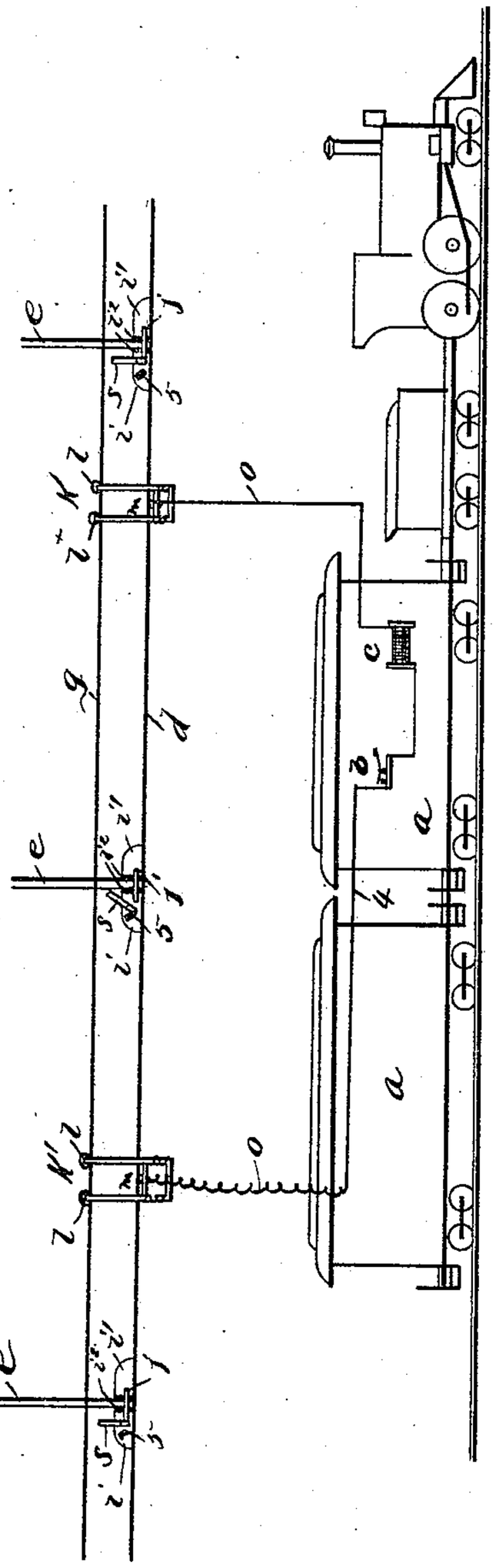

Fig. 6.

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UNITED STATES PATENT OFFICE.

WILLIAM S. COOK AND MOSES CHALMER COOK, OF SOUTH OMAHA, NEBRASKA.

RAILWAY-CAR TELEGRAPHY.

SPECIFICATION forming part of Letters Patent No. 447,943, dated March 10, 1891.

Application filed April 21, 1890. Serial No. 348,762. (No model.)

To all whom it may concern:

Be it known that we, WILLIAM S. COOK and MOSES CHALMER COOK, of South Omaha, in the county of Douglas and State of Nebraska, have invented certain new and useful Improvements in Railway-Car Telegraphy; and we do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters and figures of reference marked thereon, which form part of this specification.

This invention relates to certain improvements in electric railway signaling and telegraphy, and more particularly to an improved system of telegraphing or transmitting signals between a station or stations and a moving train, vehicle, or railway-car, and to an improved system of electric railway signaling.

The object of the invention is to provide an improved system of telegraphing between stations and a moving train exceedingly simple in construction, arrangement, and operation, requiring a minimum number of instruments and circuits; and a further object is to provide an improved system of signaling and telegraphing particularly adapted for freight-trains, and whereby the engineer and also the occupants of the caboose will be notified if the train parts. These objects are accomplished by and this invention consists in certain novel features of construction and in combinations of parts more fully described hereinafter, and particularly pointed out in the claims.

Referring to the accompanying drawings, Figure 1 is a diagrammatical view of the system, showing a moving train and the station. Fig. 2 is a diagrammatical view showing the system adapted for a somewhat different purpose. Fig. 3 is an enlarged detail elevation of the line-conductor and supports, showing the trolleys of a train or car thereon. Figs. 4 and 5 show the front and rear trolleys, respectively, in elevation. Fig. 6 is a top plan of one of the circuit-closers in the line-wire of Fig. 3. Fig. 7 is an enlarged elevation of one of the circuit makers and breakers in the line-circuit.

In the drawings, the reference-letter *a* indicates a vehicle or car or train on a railroad-track. One car of the train is provided with a telegraph-key *b* and relay *c* of any ordinary or suitable construction.

A line-conductor *d* extends parallel with and above the track, and is supported by suitable hangers *e*, located a distance apart and supported by suitable posts or the like and cross-wires secured thereto. Each hanger preferably consists of a vertical stem or rod having the two oppositely-branching arms *f f* turned up at their outer ends to support the two parallel signaling-wires *g g* a suitable distance apart and above the lower extremity of the stem of the hanger. The telegraph line-wire *d* is carried by the lower ends of said stems, and hence is located in a vertical plane, extending substantially centrally between said wires *g g*. The line-wire is broken into separate sections, each section extending from one hanger to the next adjoining hanger. The opposite ends of these sections are suitably, rigidly, and electrically secured to the lower edges of vertical metal plates *i i'*, and these plates at their inner vertical edges having flanges firmly bolted to the lower ends of the hanger-stems.

The two plates *i i'*, secured to each hanger, are insulated from each other and from the stem by insulating material i^2, interposed between flanges of the plates and the stem. Each pair of plates carries a circuit maker and breaker to electrically connect and disconnect the two line-wire sections carried thereby, each circuit-breaker consisting of a stationary contact or strip *j*, of conducting material, electrically secured to plate *i'* and extending beside but insulated from the plate *i*, and the movable contact consisting of a metal rod *s*, pivoted within its length by a bolt to a side of the plate *i*, so that its lower end can swing into or out of electrical engagement with the stationary contact.

Each train is provided with a front trolley *k* and a rear trolley *k'*, each trolley consisting of a U-shaped frame having rollers *l l* mounted on the upper arms of the frame and running on the wires *g g*, and thus suspending the trolley therefrom. In its lower portion the trolley-frame is provided with a con-

tact-roller *m*, yieldingly bearing up against the line-conductor and carried by and insulated from a horizontal rod *n*, vertically movable between the vertical arms of the frame and held up by springs, as shown. A coiled conducting-wire *o* extends down from each trolley to the train, and these two trolleys are electrically connected, as shown, by a partial circuit 4, extending through the train and including said telegraph-instruments in one car thereof. The wire *o* of each trolley is in electrical connections with the line-wire through the roller *m*, a brush *p*, bearing on the periphery thereof, and a bracket *q*, carrying such brush.

The front trolley of each train is provided with an inwardly-extending rod *r*, arranged to strike the upper end of the movable rod *s* of each circuit-closer of the line-conductor, and thereby swing the lower end of said rod from engagement with the stationary contact and break the continuity of the main circuit through the line-wire, and cause the circuit to be completed through the front trolley and wire *o*, the train-circuit, and the rear trolley and wire *o* on the other side of the break caused by the circuit-breaker. As the rod *s* is rocked to break the circuit by the front trolley, the lower end of said rod is caught and held by a spring-catch 5. The rear trolley of each train is provided with an inwardly-extending rod *r'*, arranged to strike the lower end of the movable contact-rod of each circuit-closer as the trolley passes along and throw them to their normal positions in engagement with the stationary contact, and hence completing the continuity of the line-wire behind the train. It will thus be seen that as the train proceeds the front trolley breaks the line-wire at each hanger, while the rear trolley again closes the break. Hence the train-circuit forms a branch closing the line-circuit between the sections of the line-wire. The telegraph-instruments of the train are thus directly in the line-circuit, as in ordinary telegraph-lines between stations, avoiding all the difficulties heretofore experienced in railway-car telegraphy.

In Fig. 1 the reference-letter *u* indicates a station anywhere along the railway-line, provided with a suitable source of electricity 1 and any ordinary telegraph-instruments 2 and 3, such as in the train. The line-circuit is of course grounded at opposite ends, as shown. There can be any desirable number of stations or trains in the one-line circuit.

The operation of the system is clearly obvious and evident from the foregoing description and the drawings.

In Fig. 2 this same general system is shown arranged and particularly adapted for freight-trains. In this figure the wire 4 extends throughout the length of the train, from the engineer's cab a^5 to the caboose or last car of the train a^6.

The telegraph line-wire *d* is not broken into the sections or provided with the closers described in Fig. 1, nor are the front and rear trolleys provided with the circuit breaking and closing devices. 6 6 indicate the connections from the signal line-wires *g g*, extending down from each trolley to the locomotive and caboose, respectively, each pair of wires 6 6 being normally grounded by connections 7, and through the car-axles or gearing and wheels. In the caboose each connection 6 passes through the operating-magnet of a bell 8, and in the locomotive both connections 6 6 forming a circuit through the electro-magnetic operating mechanism of a bell 9. This signaling system over the line-wires *g g* and in the train is set forth and claimed in our pending application, Serial No. 330,414, filed November 15, 1889.

The locomotive and caboose are each provided with a relay or other suitable electro-magnetic mechanism 10 and with a local battery 11, and a battery 12 is located in the connection 4 through the train. The parts are so constructed that the circuit is through connection *o* of the locomotive from the telegraph line-wire to the relay 10 of the locomotive, and through the same and connection 4 (and its source of electricity) to and through the relay of the caboose, and the connection *o* of the caboose to the telegraph line-wire again. In the locomotive or caboose this circuit is provided with suitable telegraph receiving and transmitting instruments, (not here shown,) as seen in Fig. 1. It will thus be seen that a circuit is normally closed through the relays and battery 12 over connections 4, thereby normally energizing the relays and holding the armatures against the tension of springs 13 and out of contact with the stationary contacts 14. The armature 15 and contact 14 in the locomotive and in the caboose form the terminals of normally-open local circuits 16 in the locomotive and in the caboose, the locomotive local circuit including battery 11 and bell mechanism 9, and the caboose local circuit includes battery 11 and bell mechanism 17. Thus if the train happened to break, of course the connection 4 will be parted and the circuit through the same broken, whereby the relays lose their energizing power, and the armature 15 is drawn back by its springs into contact with contacts 14, thereby closing the local circuits and sounding the alarms therein, and thereby instantly notifying the occupants of the caboose and of the locomotive that the train has parted. The relay in the caboose is so connected as to engage the connection from the signal-wires to the ground, and automatically ground the signal-wires through the rear trolley and the gearing of the car when the local circuit is closed. Hence when a train is parted and the lagging portion of the train should maintain such a distance from the advance portion as to be in danger from an approaching train the approaching train would receive a "danger-signal" in time to stop.

It is evident that various changes might be

resorted to in the form and arrangement of the parts described without departing from the spirit and scope of our invention. Hence we do wish to limit ourselves to the precise construction herein set forth.

What we claim is—

1. In an electric-railway system, the combination of the line telegraph-wire broken into insulated sections, normally-closed circuit-closers located at the breaks between the sections, a vehicle or train having a partial circuit extending therethrough, including telegraphing-instruments, a front contact device electrically connected with the front end of said partial circuit and engaging said line-conductor and carrying means to throw open said circuit-closers, and the rear contact device connected with the rear end of said partial circuit and engaging said conductor and provided with means arranged to close the closers opened by the front contact, as set forth.

2. An electric railway-signal comprising a line telegraph-conductor divided into insulated sections, normally-closed circuit-closers at the breaks between said sections, a vehicle or vehicles, a partial circuit extending therethrough, including telegraph-instruments, a front and a rear contact-trolley connected, respectively, with the opposite ends of said partial circuit and maintaining constant electric connection with said line-conductor, the front trolley provided with means arranged to open said closers and the rear trolley provided with means arranged to close the closers opened by the front closer.

3. An electric railway-signal comprising a line-conductor divided into insulated sections, normally-closed circuit-closers at the breaks between the sections, each comprising a swinging contact, a vehicle or vehicles having a partial circuit therethrough, including telegraphing-instruments, a front and a rear trolley electrically connected with opposite ends of said circuit, respectively, and traveling on and maintaining constant contact with said conductor, the front contact having an arm or projection arranged to engage said swinging contacts to open the closers and the rear trolley having an arm or projection arranged to engage said contacts to close the closers.

4. In an electric railway-signal, the line-conductor divided into insulated sections, supports therefor, and normally-closed circuit-closers at the breaks between the sections, each comprising a rigid metal strip electrically connected with one section, and a vertical swinging bar electrically connected with the adjoining conductor-section and arranged to be swung into or out of engagement with said strip, and the trolleys to swing said bars.

5. In combination, hangers, vertical metal plates rigidly secured on opposite sides of and insulated from the hangers, the line-conductor sections at their ends secured to said plates, and the circuit-closers located at the breaks between the sections and comprising the stationary and swinging metal strips carried by said plates.

6. In combination, the signal and telegraph conductors, a train of vehicles, the front and rear contact devices having separate contacts traveling on the telegraph and signal conductors, a partial circuit connecting the telegraph-conductor contacts and extending throughout the vehicles, a source of electricity in said circuit, separate circuits from the signal-conductor contacts in the front and rear vehicles and grounded through the same, a source of electricity and alarm in each signal-circuit, normally-open local circuits in the front and rear vehicle, each having an alarm and including the source of electricity in the signal-circuits, and electric magnetic devices in said partial circuit controlling circuit-closers in said local circuits, as set forth.

7. The hangers supporting a pair of parallel wires, the line-conductor formed in sections, each section at its ends being secured to plates secured to and insulated from said hangers, and a circuit maker and breaker for each break between the line-conductor sections carried by said plates, in combination with a train or vehicle having trolleys traveling on said wires and bearing on said conductor and adapted to operate said circuit-closers, substantially as described.

8. A line-conductor extending along the track, in combination with a moving train having front and rear contacts electrically engaging said conductors, a partial circuit extending through the train and at its opposite ends respectively connected with said conductors, telegraphing-instruments in said partial circuit, a source of electricity, open local circuits at the opposite ends of the train having batteries and alarms, and electro-magnetic devices in circuit with said partial circuit and controlling circuit-closers in the local circuits and arranged so that the local circuits will be closed when said partial circuit is broken.

In testimony that we claim the foregoing as our own we affix our signatures in presence of two witnesses.

WILLIAM S. COOK.
M. CHALMER COOK.

Witnesses:
C. H. SOBOTKER,
E. K. WELLS.