(No Model.)

4 Sheets—Sheet 1.

L. F. JORDAN.

TRAIN SIGNALING APPARATUS.

No. 455,510. Patented July 7, 1891.

Fig 1.

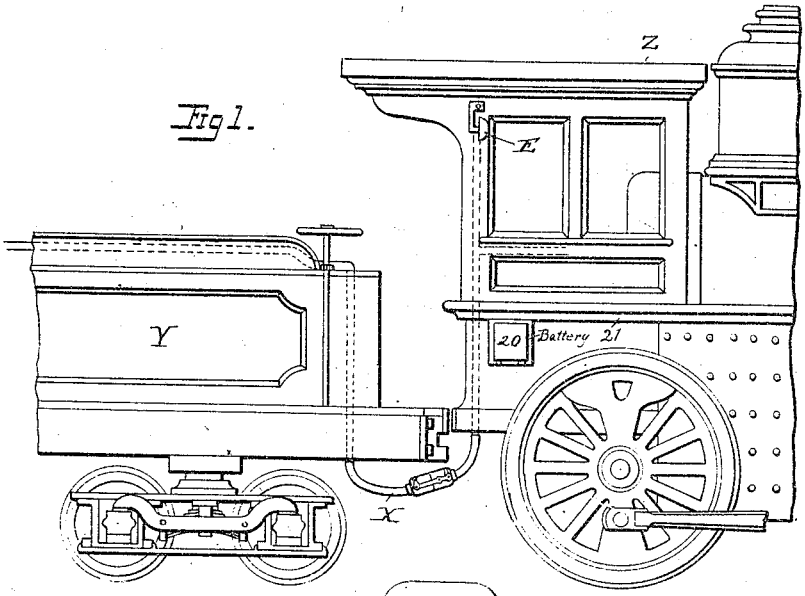


Fig. 6.

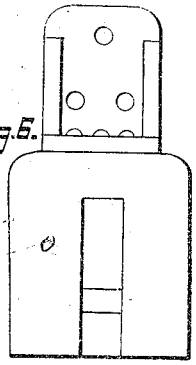
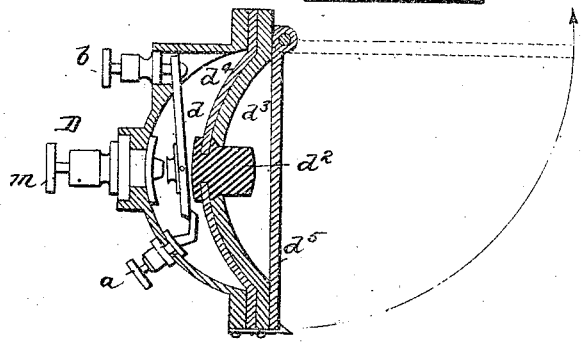


Fig. 5.



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TRAIN SIGNALING APPARATUS.

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Fig. 2.

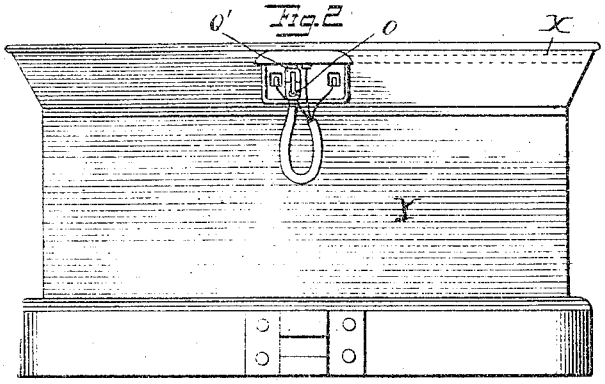


Fig. 7.

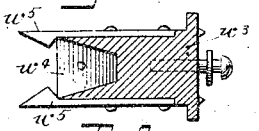


Fig. 8.

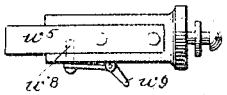


Fig. 9.

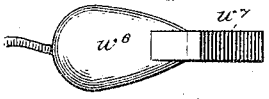


Fig. 10.

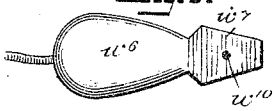
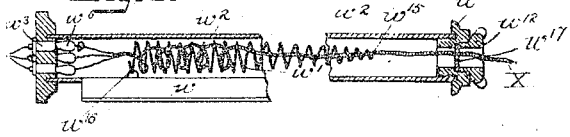


Fig. 3.

Fig. 4.



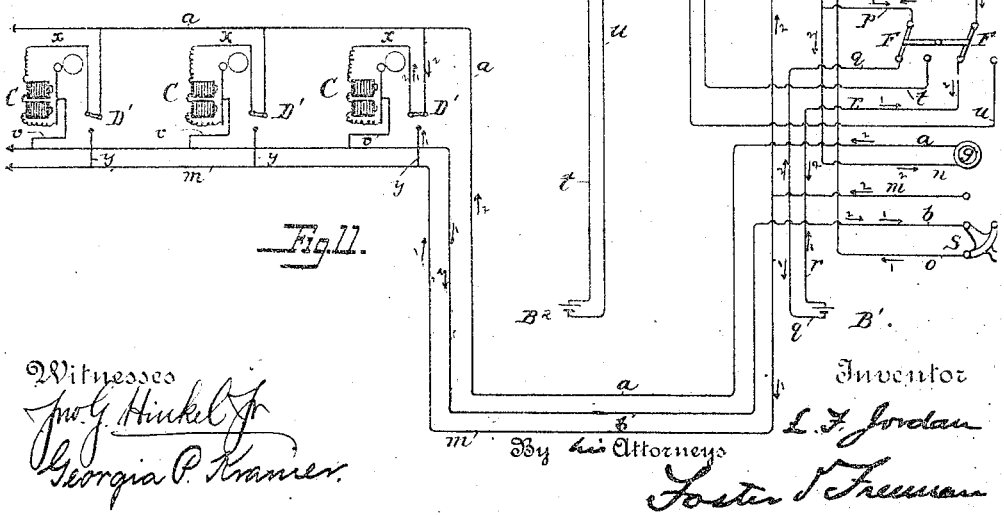


Fig. 11.

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(No Model.) 4 Sheets—Sheet 3.

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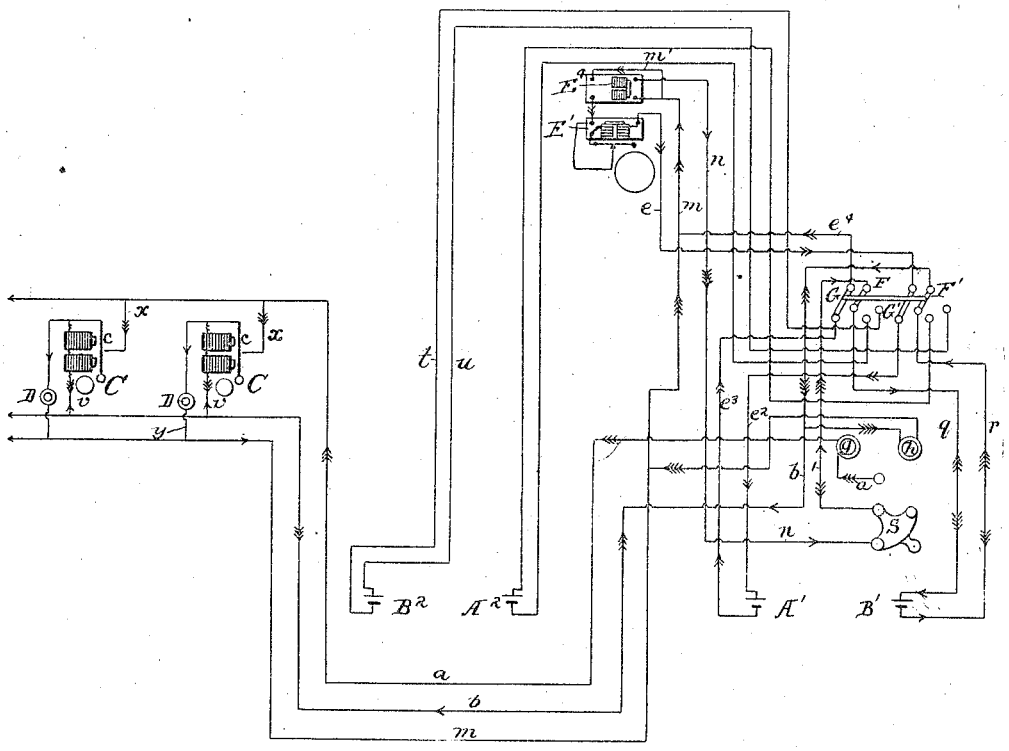
Fig. 12.



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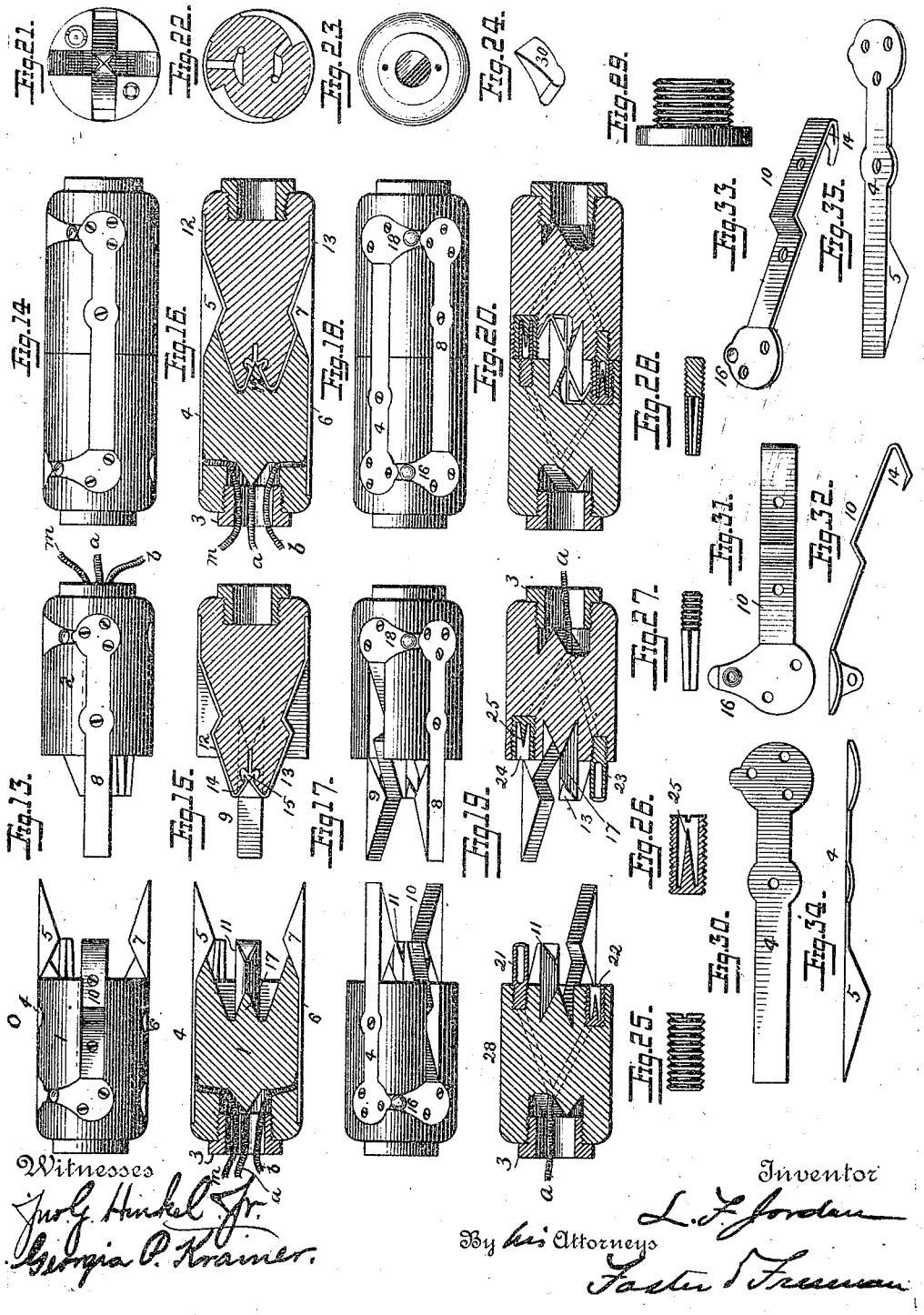

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UNITED STATES PATENT OFFICE.

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TRAIN-SIGNALING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 455,510, dated July 7, 1891.

Application filed November 16, 1889. Serial No. 330,599. (No model.)

To all whom it may concern:

Be it known that I, LINWOOD F. JORDAN, a citizen of the United States, residing at Somerville, Middlesex county, State of Massachusetts, have invented certain new and useful Improvements in Train-Signaling Apparatus, of which the following is a specification.

My invention relates to electric appliances used upon railway-trains for establishing ready communication between the engineer in the engine-cab and the conductor or other person within or on any of the carrying-vehicles of the train; and the objects of my invention are to provide a system of electrical communication between the engine and the train which shall operate instantly when required to give an audible signal to the engineer and also to the operator, to provide means for the engineer to signal to the train, to provide more reliable forms of couplings and connections for the same, to more suitably locate the operative appliances employed in this class of devices, and generally to perfect the ordinary systems of railway-car telegraphs.

My invention consists in the various features of construction and arrangement of parts hereinafter pointed out.

Referring to the accompanying drawings, Figure 1 is a side elevation of the rear of a locomotive and the front of a tender with certain of my improvements applied thereto. Fig. 2 is a rear elevation of the tender, showing the manner of protecting the coupling and the way the pipe is placed on the tender. Fig. 3 is a side elevation of a portion of the hood or end of the car, showing the arrangement for taking up the slack of the conductor. Fig. 4 shows a detail thereof which I prefer to use. Fig. 5 is a cross-section of one of the push-buttons which I prefer to make use of. Fig. 6 indicates the construction of the dummy-coupler for supporting the free end of the line. Figs. 7 and 8 are respectively a cross-section and a side elevation of the terminal-connector, and Figs. 9 and 10 are two views of a block for fitting said terminal-connector when the circuit is in use. Fig. 11 is a diagram showing one of the preferred arrangements of circuits. Fig. 12 is a diagram showing another arrangement of circuits with relays and local circuits, and Figs. 13 to 35 are views showing details of construction of the connector.

In the drawings, Z represents the engine, Y the tender, W a portion of one of the cars of a train, and X is the conductor or cable connecting the signal mechanism in the cab of the engine with the signal mechanism in the cars. The conductor or cable is preferably incased in pipes and passes around the end of the tender, as indicated in dotted lines, where it terminates in a coupler and normally when not in use is supported in the dummy-coupler O′. (Shown in detail in Fig. 6.) The cable passing though the cars is connected to the spiral spring w', arranged in a brass tube w^2, situated under the cap or hood of the car and to which the coupling O between the cars is connected to allow for the extension and contraction of the conductor as the cars separate or come together, so that there never shall be undue tension on the coupler which would be liable to separate the coupler accidentally.

In Fig. 4 I have shown in detail the preferred form of connecting a three-wire cable with the tube, and Figs. 7, 8, 9, and 10 are enlarged details of the construction therein shown. The part w^3 consists of a metal block to which one of the wires of the cable is connected by a screw, which serves also to hold the block in position. This is recessed in the forward end at w^4 and is provided with springs w^5 on opposite sides. The block w^6 is also connected to one of the wires and is made of metal with a head w^7, adapted to fit the recess w^4 and to be held in position by the springs w^5. A locking-pin w^9, controlled by a thumb-lever w^9, is adapted to enter the opening w^{10} in the block and secure it in position. The several wires from the blocks are grouped in a cable, which is coiled, as shown, within the coils of the spring w'. One end of the spring being secured to the conductor, as by being wound closely around it, as shown at w^{15} in Fig. 4, and the other end of the spring being fastened to the case at the point w^{16}, it will be evident that the loosely-coiled conductor inside the spring can follow the movements of the spring. If for any reason the connections are bad, or it is desired to change them, the door w of the tube can be opened and the blocks w^6 removed and others substituted.

These same connections may be used on the rear of the locomotive-tender in Fig. 2, or in other positions on the cars, when desired. The forward end of the tube is closed by a socket w^{11}, screwed into the end of the tube, and into this socket is screwed a collar w^{12}, and between their ends is placed a rubber washer or diaphragm w^{13}, which allows the cable X to move freely through it, but prevents the entrance of extraneous matter.

The tube w^2 is provided with a slot w^{15}, having a series of notches, as shown, and a cross-bar w^{14}, connected with the spring w', engages these notches and regulates the length of cable hanging between the two cars.

The batteries for energizing the circuit are preferably arranged on the cab of the engine, and I have shown a box 20, arranged under the running-board, in which the batteries are to be placed, although of course they may be differently situated.

In the engine is mounted a suitable bell or gong E, which is preferably in the form of a single-stroke bell, and suitable switches F F′ S and push-buttons g h, as indicated in Fig. 12, are arranged in convenient position in the cab.

In the cars there are arranged suitable bells C, which are preferably of the ordinary vibrating or trembly form, but capable of being operated as a single-stroke bell, and a push-button D or other circuit-closer is located in connection with each bell.

There are three conductors or wires extending from the cab to the cars, and I will now explain the preferred arrangement of the circuits, although it will be understood I do not limit myself to the precise arrangement shown. B′ B² represent two batteries, either one of which may be connected in circuit by means of the switches F F′, the circuit of battery B′ being shown as closed, while the circuit of battery B², through the wires l u, is shown connected to the open terminals of the double switch F F′, and can be connected in case of accident to the other batteries. We will suppose the circuits to be arranged in the manner indicated in Fig. 11, and the conductor or other person on the train desires to signal to the engineer. He presses push-button D, or, as indicated in Fig. 11, moves the switch D′ onto the terminal of the conductor y. Thence the circuit passes through conductor x, bell C, and wire r to the line-wire b to the switch S, thence by the wire o to the bell E by the wire n and branch p to the switch F, thence by wire q to the battery and by wire r to switch F′, and thence by the wire m to wire y to button, closing the circuit through the bells in the cab of the engine and in the car, and if the latter bell rings the conductor knows he has operated the bell in the engine.

It will be understood that the conductor or other person can send any prearranged code of signals which will be understood by the engineer. Now supposing the engineer desires to signal the conductor or other person on the train, the switch S is moved from the terminal of the wire o to the terminal of the wire m and the button g is closed, completing the circuit between the wires a and n at the button, and the circuits will be as follows: From the button g, through a to the switch D′, which is normally closed at this point through x, the bell C, wire r, line b, through the switch S to the wire m, thence through the switch F′, wire r to battery B′, wire q to switch F, and through wires p and n to button g. This operates the bells in the cars without operating his own signal-bell.

It is obvious that instead of having the bells operated by a direct circuit I may make use of relays and local circuits for operating the bells, as is usual in telegraph systems, and such arrangement is shown in Fig. 12. In this diagram B′ B² are the main batteries, either one of which may be connected in circuit by means of the switches F F′, and A′ A² are the batteries of the local or relay circuits, either one of which may be connected in circuit by the switches G G′. The magnet E⁴ is in the main circuit and closes the circuit to the local magnet E′. The bell C is shown as an ordinary trembly-bell, but connected so that it may be operated either as a single-stroke bell or as a trembly-bell, according to the circuit closed through the magnet.

Supposing the conductor or other person in the car desires to signal the engineer, the push-button D is pressed, closing the circuit y, through the wire m, (the direction of this circuit being indicated by a single arrow-head,) to the relay-magnet E⁴, thence by the wire n to the switch S, thence by the wire l to the switch F, thence by the wire q to battery B′, thence by the wire r to the switch F′, and thence by the wire b and wire r, through the coils of the magnet, to the push-button. The local circuit may be traced from the relay through the magnet E′, (being indicated by a double-pointed arrow,) through the conductor e to the switch G′, conductor e^2, battery A′, conductor e^3, switch G, conductor e^4 to a portion of conductor m, and by a branch m' to the point of starting. In this way the bell at the engine will sound and the bell in the car will give a single stroke, indicating that the relay in the engine operated correctly and closed the local circuit to give the signal to the engineer.

Now, supposing the engineer desires to signal to the train, as before he moves the switch S to the terminal a, and the circuits (indicated by the triple-headed arrows) are as follows: From the switch S, through the push-button g, (if it should be used, although it is not necessary,) by the wire a to wire x, which in this instance is connected to one of the terminals of the trembly-bell, thence through the armature c, the magnet-wire v to the conductor b, and thence to the switch F′, thence by wire r to battery B′, wire q to

switch F, and wire *l* to switch S. This will operate the trembly-bell in the car, but does not operate the bell in the engine.

h is a push-button connected with a test-circuit by which the engineer can determine whether the battery is in operating condition or not, and by pressing this button *h* the circuit indicated by the four-pointed arrows passes through the relay-magnet E^1, switch S, switch F, battery B′, switch F′, and back to the push-button *h*, as will be clearly understood.

Such being the general arrangement of the system, I will now describe the coupling devices by which the three wires of the cable can be connected between the cars and other portions of the circuit. Such device is fully illustrated in Figs. 13 to 35. The coupler O consists of two portions 1 and 2 of some insulating material, upon which are mounted the springs and connections for the wires entering the ends, as indicated, each portion being a duplicate of the other, so that they are interchangeable, no matter which ends of the cars come together. The conductor *m*, for instance, enters through a plug 3 and passes up through the body of the portion 1 and is connected to the main spring 4 of the connector. This spring is provided at its end with an enlarged portion 5, tapering to a point and extending beyond the body 1. On the opposite side of the body 1 is another spring 6, having an enlargement 7, and to this the other wire *b*, coming through the plug 3, is connected in the same way. The opposite terminals of the conductors are connected to the main springs 8 9 of the other portion 2 of the coupler in the same way. Also mounted on the body 1 at ninety degrees from the main springs are the plates 10 11 12 13, and these are fitted in recesses in the blocks and are of the form shown in Figs. 31 and 32. The free ends of these plates are bent as shown at 14, and fit in a recess 15 in the center of the blocks, and normally the terminals 14 of the plates 10 and 11 and 12 and 13 are respectively in contact. The other ends of the plates are formed in the shape best shown in Fig. 31 to constitute a key or signal device 16, which is arranged so that its free end is normally in contact with the fixed portion of one of the main springs, as 4, so that the circuit from 4 is closed through the portion 16 to the plate 10 and from the opposite main spring 6 through the plate 11, thereby forming a closed terminal to the circuits *b m* when the coupler is apart. The same is true of the other terminals of the conductors *b m* in the portion 2 of the coupler, the terminals of the plates 12 and 13 being in contact at the points 14. When, however, the parts of the coupler are put in position, as shown in Figs. 14, 16, and 18, the main springs 4 and 6, respectively, make electrical contact with the plates 12 and 13, and the main springs 8 and 9 make contact with the plates 10 and 11, and at the same time the wedge-shaped portions 17 of the couplers force the terminals 14 apart, breaking the closed circuits at these points, and it results that the ends of wires *m* and the ends of wires *b* at each side of the coupler are connected together by two paths, one, for instance, being through the main spring 4, extension 5, and plate 12 to the key 18, to main spring 8, plate 10, key 16, and again to the plate 4. In this way I insure good contact, for, if perchance, anything interrupts one path the other is likely to be free. More than that, this arrangement furnishes a means of signaling at the coupler, for by pressing both of the keys 16 and 18 simultaneously the current through the conductor *m* is interrupted, and again by pressing both of these keys and the complementary keys connected with the conductor *b* (which are the same in every respect as those previously described) both circuits can be opened and the coupler disconnected without sounding an alarm. The third conductor *a* passes plug 3 and is divided, as shown in Fig. 19, and connected to the plug 21 and socket 22, and the other terminal in the portion 2 is similarly connected to the plug 23 and socket 24. These plugs and sockets are preferably formed as shown in detail in Figs. 25 to 28, and when the portions 1 and 2 of the coupler are brought together the plug 21 enters socket 24 and the plug 23 enters socket 22, and the points 25 in the sockets enter the openings in the ends of the plugs, and thereby a good electrical contact is insured. It will thus be seen that all three of the conductors *a*, *b*, and *m* have duplicate paths or connections between the two portions 1 and 2 of the coupler, and when thus joined signals may be sent by operating the keys of the couplers, and when the portions of the coupler are separated the circuits *m* and *b* are automatically closed, while the circuit *a* is open.

In order that the keys 16 and 18 may be retained in close contact with the respective springs, I insert a block of rubber 30, Fig. 24, under each key in a recess in the block.

While any suitable push-button or circuit-controller may be used on the car, I prefer to use with the arrangement of circuits shown in Fig. 11 that shown in Fig. 5, in which the circuits *a*, *b*, and *m* are connected to the binding-posts bearing the same letters. The terminals of *a* and *b* are normally closed by the rod *d*; but when the button d^2 is pressed the contact between *d* and *a* is broken and the circuit is closed through *m* and *b*. The plug d^2 projects through metal plate d^3, and is supported by an elastic diaphragm d^4 beneath the plate, and which normally holds it out of contact with the arm *d* and serves to protect the contacts from extraneous matter. The button is preferably protected by a hinged cover d^5.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a railway-car telegraph, the combina-

tion, with a single-stroke bell located on the engine, a battery, a push-button, and a switch also located on the engine, of a three-way circuit leading from the switch and push-button and bell to the cars and each car provided with a trembly-bell normally included between two of the circuits, and a switch arranged to break the bell-circuit and close the circuit through the third conductor, whereby a signal may be sent from the car to the engine and the bells in the car rung at the same time, and whereby the engineer can signal to the cars without operating the bell in the engine, substantially as described.

2. In a railway-car telegraph, the combination, with a single-stroke bell, a battery, a push-button, and a switch on the engine, of an additional battery and switch for connecting it in place of the first battery, a three-wire circuit running from the engine to the cars, a trembly-bell located in each car and normally included in two of the wires of the circuits, and a switch located in the car for including the bell in the circuit with the third wire, substantially as described.

3. In a railway-car telegraph, the combination, with the cable in the car, of a tube, a spring take-up in the tube connected with the external portion of the cable, the tube being closed by a cap containing a diaphragm, through which the cable passes and by which it is supported, substantially as described.

4. In a railway-car telegraph, the combination, with the bell, duplicate battery, push-button, and switch on the locomotive, of a three-wire circuit leading from the locomotive to the cars, three-wire coupler connecting the circuits between the locomotive and car, bells located on each car and normally included in two of the wires of the circuit, and a switch for connecting the bell with the third wire of the circuit, substantially as described.

5. A coupler consisting of two complementary portions, each portion being provided with springs, to each of which a conductor is connected, plates connected to the spring, and a plug and socket, to both of which a conductor is connected, whereby when the coupler is in position two paths for the passage of the current from each conductor are formed through the coupler, substantially as described.

6. A coupler consisting of two parts, each part consisting of a block provided with two bent plates fitting in recesses on opposite sides thereof and having spring ends normally in contact with each other, two springs arranged parallel to the plates, but in planes in right angles to the planes of the plates, arranged to make contact with the plates on the opposite part, and a wedge-shaped projection arranged on the end of the block to separate the spring-contact portions of the plates on the opposite block when the parts of the coupler are in position, substantially as described.

7. A coupler consisting of two parts, each part being provided with two main springs, two bent plates arranged parallel to the main springs and electrically connected therewith, and a key for breaking the connection between the plates and the main springs, whereby when the parts are together there are normally two paths for the current through the coupler, including the springs and plates, which paths may be broken by the keys, substantially as described.

8. A coupler for a three-wire circuit, consisting of two parts, each part being provided with two main springs, each connected to a separate conductor, two plates arranged parallel to the main springs and electrically connected therewith, and a plug and socket, each connected to the third conductor, whereby when the parts are together each conductor has two paths through the connecting portions of the coupler, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

LINWOOD F. JORDAN.

Witnesses:
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F. L. FREEMAN.