(No Model.) 2 Sheets—Sheet 1.

F. A. SHAW & H. E. JUDKINS.

ELECTRIC SIGNALING APPARATUS FOR RAILWAY TRAINS.

No. 277,358. Patented May 8, 1883.

Fig. 1.

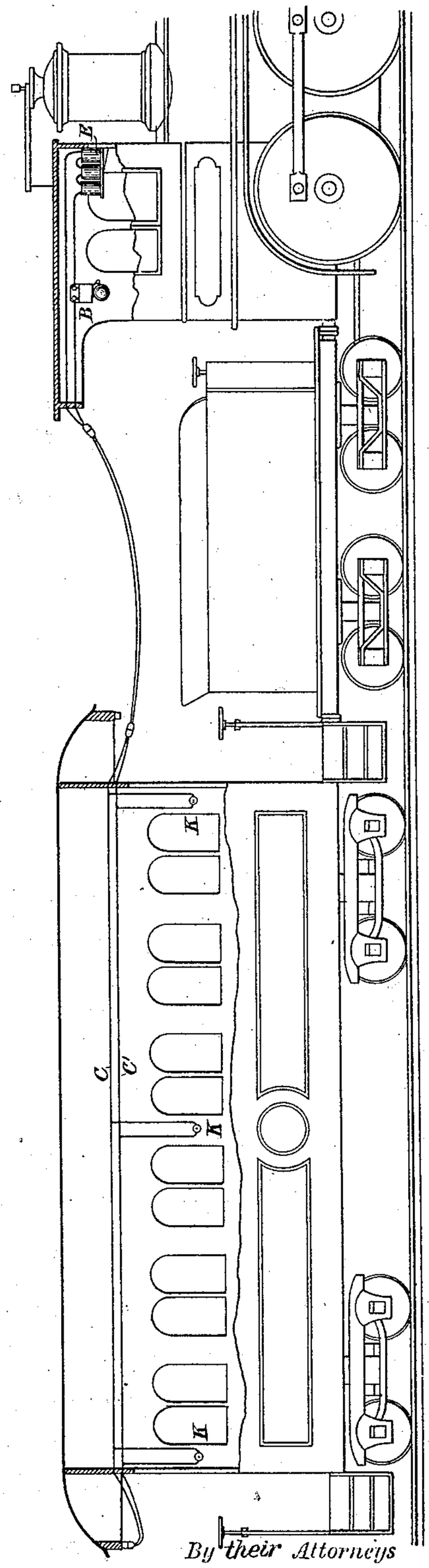
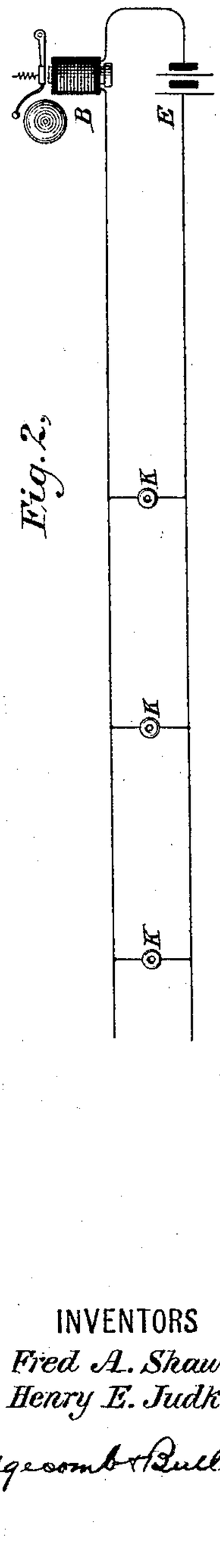


Fig. 2.



WITNESSES

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 5.

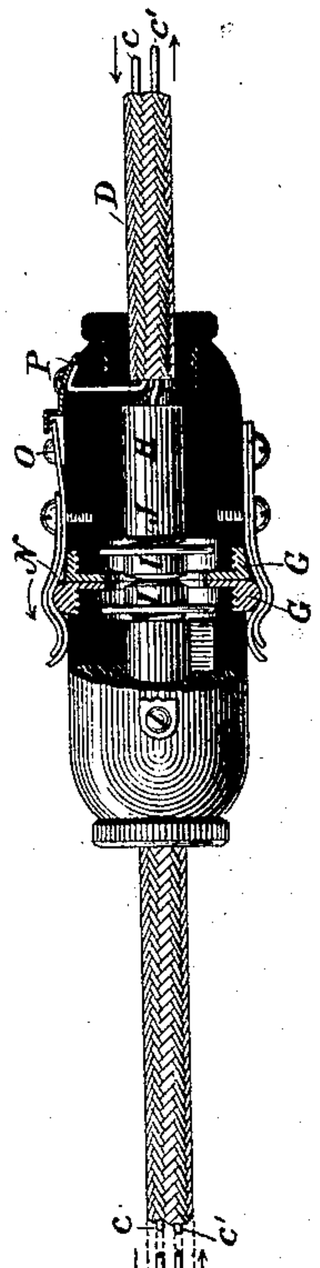


Fig. 4.

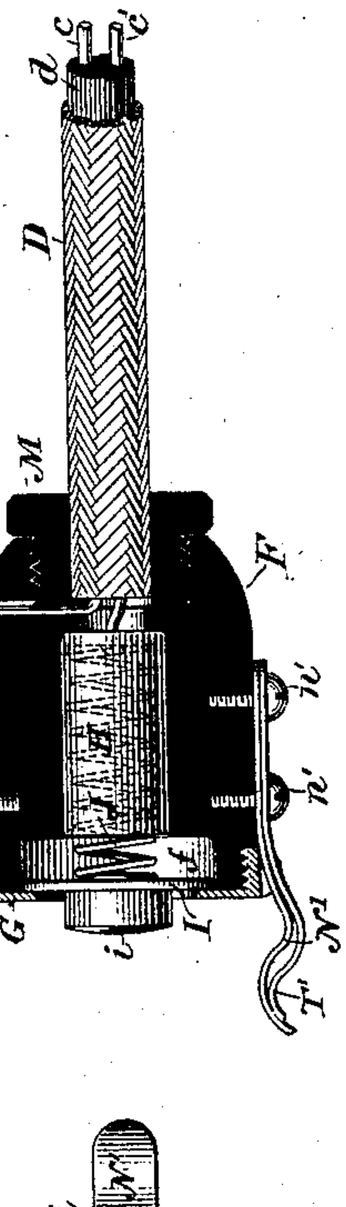


Fig. 7.

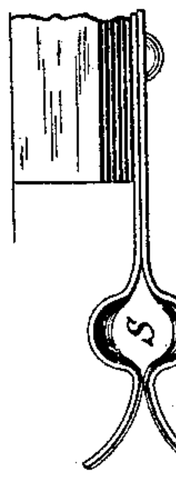


Fig. 3.

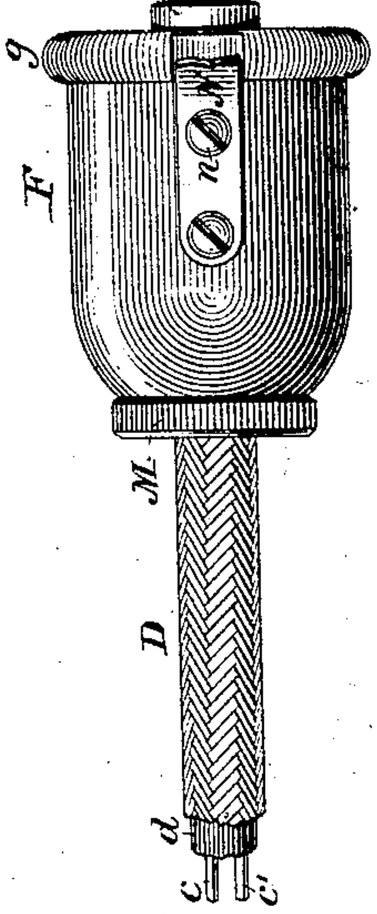
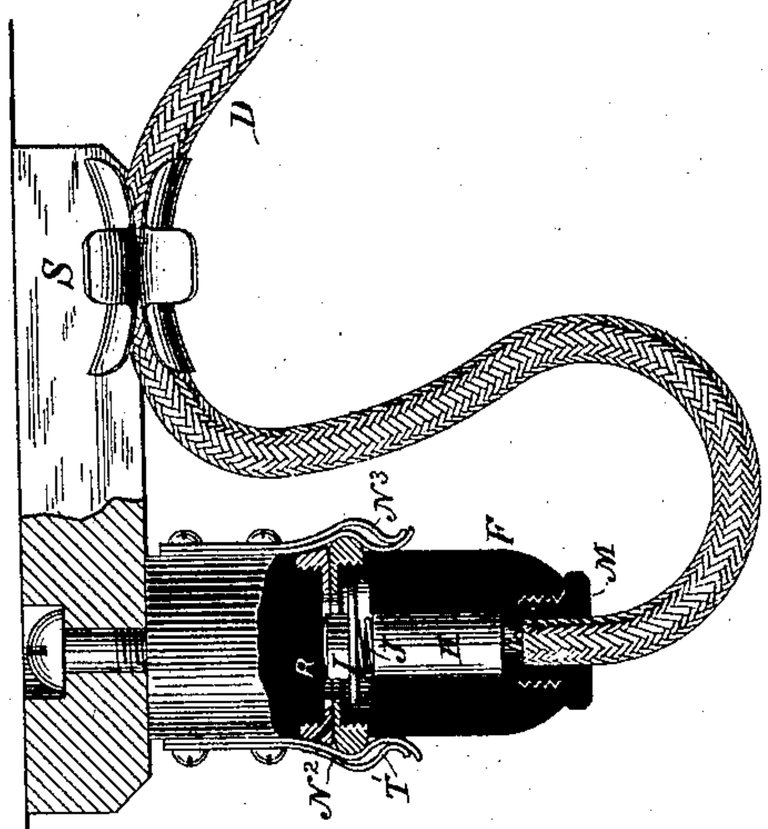


Fig. 6.



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UNITED STATES PATENT OFFICE.

FRED. A. SHAW AND HENRY E. JUDKINS, OF PORTLAND, MAINE; SAID SHAW ASSIGNOR TO SAID JUDKINS.

ELECTRIC SIGNALING APPARATUS FOR RAILWAY-TRAINS.

SPECIFICATION forming part of Letters Patent No. 277,358, dated May 8, 1883.

Application filed January 10, 1883. (No model.)

To all whom it may concern:

Be it known that we, FRED. A. SHAW and HENRY E. JUDKINS, citizens of the United States, residing in Portland, in the county of Cumberland and State of Maine, have jointly invented certain new and useful Improvements in Electric Signaling Apparatus for Railway-Trains, of which the following is a specification.

The object of our invention is to establish and maintain an efficient means of intercommunication between the cars and the locomotive composing an ordinary railway-train, whereby determinate signals may be instantaneously transmitted from any desired portion of a train of any length to the locomotive, and an alarm also given automatically in the event of the accidental uncoupling or the breaking apart of the train, thereby not only furnishing an economical, convenient, and efficient substitute for the mechanical bell-cord and alarm-gong heretofore in general use, but constituting an additional safeguard against accidents arising from the separation of the train.

To this end our invention comprises an electric signalizing apparatus consisting of a battery or other suitable electric generator, preferably placed upon the locomotive, to the poles of which are connected two electrically-continuous but independent conductors extending throughout the train, which are formed by uniting or coupling the respective ends of separate sectional conductors extending from end to end of each individual car; an alarm or signal of suitable character, actuated or controlled by an electro-magnet included in the circuit of one of said conductors, and mounted upon the locomotive, and keys or circuit-closers situated at suitable points upon or within the different cars of the train, which, when actuated, electrically unite the respective conductors, and thereby complete the circuit of the electric generator through the alarm, by which means determinate signals may be given upon the locomotive from any desired point in the train.

The invention further comprises automatic circuit-closing devices upon each car, or attached to each separable section of said conductors, so arranged as to give a continuous alarm by electrically uniting the two conductors whenever any two cars are accidentally detached from each other, together with manual circuit-breakers or keys upon each of said sections, whereby the said automatic operation of the alarm may be prevented when the cars are to be purposely separated.

The invention further comprises certain improvements in the construction of the couplings for uniting the sectional conductors, whereby the above results are conveniently and efficiently attained, together with special devices for grasping and holding the ends of the conductors at the rear of the train, at the same time keeping them electrically separated from each other.

The invention also embraces certain details in the construction of the various parts of the apparatus, as hereinafter more particularly set forth.

In the accompanying drawings, Figure 1 is an elevation showing the locomotive and one car of a railway-train and exhibiting the general arrangement of our improved signaling apparatus in its application thereto. Fig. 2 is a theoretical diagram illustrating the electrical circuits. Fig. 3 is an elevation of one portion of the two-part coupling for uniting the sections of the conductors, of which certain portions are broken away to exhibit the construction more clearly. Fig. 4 is a vertical longitudinal section of the other portion of the same coupling, showing its internal construction. Fig. 5 represents the two parts of the coupling when united to form two electrically-continuous conductors insulated from each other. Fig. 6 is an elevation, partly in section, of the dummy-coupling and clip, constituting devices for grasping and holding the open ends of the conductors at the rear of the train; and Fig. 7 is a detached view of the clip shown in Fig. 6.

The organization of the electric circuit in our apparatus is substantially the same as that used in the ordinary electric call, and is shown in Figs. 1 and 2. It consists of a normally-open direct and return circuit extending throughout the length of the train, and including an electric generator, E, and electro-magnetic bell B upon the locomotive, which may be either a self interrupting or vibrating or a single-stroke bell, the former being considered preferable. Suitable keys, circuit-closers, or

press-buttons, K K, of well-known construction, are placed in any required number of convenient locations upon or within the several cars, preferably at the ends, and sometimes in the middle thereof, as shown in the figures. Upon the completion of circuit of the generator E through the alarm-bell B by the closing of any one of the keys K K, an alarm is sounded upon the bell B, and by the use of a predetermined code of signals any required information may be conveyed to the engineer by the conductor in a well-known manner, in whatever part of the train the latter may be.

The detached longitudinal conductors extending through each car of the train, as shown at C and C′ in Fig. 1, may consist of any suitable insulated metallic wires or rods, and these may be fastened to the interior or the exterior of the car, or may be inclosed within the woodwork of the sides or roof. At each end of each car, over the exterior end platform, these conductors terminate, preferably in a flexible electric cord, D, (see Figs. 3, 4, 5, and 6,) which is preferably made up of two-stranded conductors *c c′*, enveloped in an insulating-covering, *d*, which should be protected by a braided or woven covering in a well-known manner. The extremity of the flexible double conducting-cord D terminates within one portion of a two-part coupling, which is so arranged that it may be united with the corresponding part attached to the conductors of the adjacent car of the train. When these are united, which may be done, as hereinafter explained, by merely pressing them together, the two-part coupling is completed and the two sections of conductors upon the two adjacent cars are electrically united longitudinally, and at the same time insulated from each other.

The two parts of the coupling hereinbefore referred to are precisely similar to each other in every respect, and it will therefore suffice to describe the internal construction of one of them, as illustrated in Figs. 3 and 4. The body of the coupling consists of a hollow shell or case, formed of suitable insulating material—such as hard rubber or vulcanite—and is preferably of a cylindrical form, with one flat and one hemispherical end.

A shallow cylindrical chamber, *f*, is formed in the flat end or face of the shell F, and this chamber is partially closed by a metallic contact-ring, G, of annular form, which is provided with a threaded flange, *g*, whereby it is screwed upon the face end of the shell F. The flange *g* is of a semicircular or beaded cross-section, and projects radially beyond the circumference of the shell F, as best seen in Fig. 3.

Within the chamber F is placed a metallic contact-plate, I, which is in the form of a flat disk, but has a central cylindrical projection, *i*, upon its outer surface, normally extending through the opening of the contact-plate *g*, but without touching the same, as seen in Fig. 4. The contact-plate I is normally held against the inner surface of the contact-ring G by means of a spiral spring, J, inclosed within a metallic cylinder or tube, H, which is inserted into the central opening passing through the shell F, to which opening it is closely fitted. The central opening of the shell is made of enlarged diameter at the rear end, and is closed by a screw-plug, M, having a central aperture large enough to receive the flexible conducting-cord D, which plug is capable of being removed for the more convenient attachment or adjustment of the terminals of the electric conductors, as hereinafter shown.

Each shell F, with its attachments, forms one-half of the two-part coupling, and is provided with resilient spring-fingers N and N′, which are fixed longitudinally to its exterior by means of screws *n* and *n′*, or otherwise. One of these two spring-fingers, as shown at N, is extended backward, and terminates in a little spring-key or circuit-breaker, O, provided with a button or knob, which key normally bears against a contact-stop, *o*, upon a bracket, P, secured to the exterior of the shell F, and to which one of the conductors, as *c*, of the flexible cord D is electrically united. The remaining spring-finger, N′, which is placed at a point diametrically opposite the spring-finger N, is constructed and arranged in the same manner, but has no electrical connections, and is therefore not provided with a key or circuit-breaker. It will be understood, therefore, that one of the conductors, as *c*, entering the coupling, terminates in the spring-finger N, passing intermediately through the key or circuit-breaker O. The other conductor, as *c′*, of which the spiral spring J forms a part, terminates in the metallic projection *i* upon the yielding contact-plate I; but, inasmuch as both these terminals are normally in electric contact with the metallic contact-ring G, as long as the two parts of the coupling are separated the conductors *c* and *c′* will thereby be electrically united. When, however, the two parts of the coupling are pressed together, as shown in Fig. 5, the spring-finger N of the one part of the coupling slips over the projecting flange *g* of the other part, and vice versa, while at the same time the projections *i i* of the respective parts of the coupling are brought into contact with each other, and thus by the yielding of their respective springs J J are forced away from the contact-plates G G, thus interrupting the previously-existing electric connection therewith.

By tracing the connections in Fig. 5 it will be understood that an electric current entering by the conductor *c*, as denoted by the arrow, will now pass first to the bracket P, thence through the key O and the spring-finger N to the contact-rings G G of the two parts of the coupling which are now in contact, and thence out by the corresponding spring-finger N of the other part of the coupling, (not shown,) and so on through the next section, returning (in case the circuit is closed) by the conductor *c′*, and passing directly through the yielding contact-plates I I, which are now in contact

with each other, but are detached from the contact-plates G G. If, however, the coupling be again pulled apart or separated—an occurrence which will take place whenever sufficient force is applied to overcome the elasticity of the spring-fingers N and N′—the spring J will instantly force the contact-plate I against the contact-ring G, establishing a connection between the two conductors and sounding a continuous alarm upon the locomotive.

In order to maintain the separation between the two conductors *c* and *c′* at the rear of the train, which is essential to the proper operation of the apparatus, I provide at each end of each car in a suitable position a stationary or dummy coupling, as shown in Fig. 6, which consists of a block of insulating material of cylindrical or other proper form, corresponding to that of the couplings hereinbefore described, and which is provided with similar spring-fingers, N^2 and N^3, for engaging the adjacent half-coupling. This dummy-coupling is provided with an insulated surface, R, which serves to press back the yielding contact-plate I of the terminal half-coupling, separating it from the contact-ring G in the manner hereinbefore explained, and clearly shown in Fig. 6, so that when this is inserted into the dummy the circuit is held open at the rear of the train, as required. I also provide a spring-clip, S, (shown in Fig. 6 and in the detached view, Fig. 7,) which is affixed in a convenient position to the upper portion or roof of each car, over the end platform, and which serves to hold the slack or bight of the flexible conductor D.

In order that the train-men may be able to uncouple any portion of the train when necessary without giving a false alarm, it is only necessary to depress the key O upon that part of the corresponding coupling nearest the locomotive before separating the other part therefrom, and to keep the key thus depressed until the same has been inserted into the dummy-coupling, as shown in Fig. 6. In this manner separate cars of a train may be coupled up and uncoupled by the attendants at will without transmitting an unnecessary alarm to the locomotive. Supplementary springs T T′ are preferably made use of, which bear against the spring-fingers N N′, and thereby assist in holding the couplings more firmly together.

We claim as our invention—

1. The hereinbefore-described electric signaling apparatus for railway-trains, consisting in the combination, substantially as hereinbefore set forth, of an electric generator, two continuous independent conductors, respectively forming extensions of the opposite poles of the generator, extending throughout the train and formed by uniting the respective ends of sectional conductors traversing the individual cars of the train, an alarm or signal actuated or controlled by an electro-magnet placed upon the locomotive and included in one of said conductors, manual circuit-closers upon or within the train for producing determinate signals upon the locomotive by electrically uniting the respective conductors, automatic circuit-closers attached to each section of said conductors for giving an alarm by electrically uniting them when the cars are accidentally separated, and manual circuit-breakers upon each section of said conductors for preventing said automatic operation of the alarm when the cars are purposely separated.

2. The hereinbefore-described coupling for both mechanically and electrically uniting the detached sections of a direct and return electric conductor, constituting a railway-train-signaling circuit, which consists in the combination, substantially as hereinbefore set forth, of two hollow shells or cases of non-conducting material, having open abutting ends, resilient fingers upon the exterior of each shell for grasping and holding the adjacent shell, which respective fingers are also electrically united with each other when in this position, to form a continuous conductor outside of the coupling, and yielding contact-plates within the respective shells, which make contact with each other to form a second continuous conductor inside the coupling.

3. The hereinbefore-described coupling for both mechanically and electrically uniting the detached sections of a direct and return conductor, constituting a railway-train-signaling circuit, which consists in the combination, substantially as hereinbefore set forth, of two hollow shells or cases of non-conducting material, having their open ends faced with surrounding metallic contact-rings, resilient contact-fingers secured longitudinally to the exterior of each shell and projecting beyond the open end thereof to grasp and make electric contact with the metallic ring upon the opposite shell, and yielding contact-plates which, when brought together, mutually hold each other out of electric contact with the inner surfaces of the metallic contact-rings against which they are normally pressed.

4. The combination, substantially as hereinbefore set forth, of a hollow shell or case of non-conducting material, a metallic contact-ring surrounding the open end of said shell, a resilient contact-finger normally in electric contact with said ring, secured longitudinally to the exterior of the shell and projecting beyond its open end, a yielding contact-plate normally held against the inner surface of the metallic contact-ring by the elasticity of a spring, and two electric conductors united, respectively, to the external contact-finger and to the internal yielding contact-plate.

5. The combination, substantially as hereinbefore set forth, of a railway car or vehicle, a direct and a return electric conductor extending throughout the length of said car, terminal couplings at each end of said conductors, whereby they may be united to the corresponding conductors upon the adjacent cars to form continuous conductors throughout a train, and a circuit-breaking or dummy coupling at each end of said car for grasping and holding the

neighboring terminal coupling when the car is placed at the rear of the train.

6. The combination, substantially as hereinbefore set forth, of a railway car or vehicle, a direct and a return electric conductor extending throughout the length of said car, terminal couplings at each end of said conductors, whereby they may be united to the corresponding conductors upon the adjacent cars to form continuous conductors throughout the train, a circuit-breaking or dummy coupling at each end of said car for grasping and holding the terminal coupling when the car is placed at the rear of the train, and a spring-clip at each end of the car for holding the slack of the electric conductors when attached to said dummy-coupling.

7. The combination, substantially as hereinbefore set forth, of a shell, case, or block of non-conducting material, resilient fingers secured longitudinally thereto and projecting beyond its outer end, for grasping and holding the contact-ring upon the abutting end of one part of a double coupling, a non-conducting abutting surface for forcing the yielding contact-plate of said coupling out of electric contact with said contact-ring, thereby forming a circuit-breaking or dummy coupling for the attachment of the terminal coupling of the train and preventing the automatic closing of the circuit.

8. The combination, substantially as hereinbefore set forth, of a separable two-part coupling, forming when united parts of a continuous direct and a continuous return electric conductor, a spring circuit-closer attached to each part of said coupling, for automatically connecting the direct and return circuit when the same is separated from the other part of the coupling, and a manual circuit-breaker or key upon each part of the coupling, for interrupting the circuit through said conductors at will, thereby enabling the cars to be separated, when necessary, without closing the circuit.

In testimony whereof we have hereunto subscribed our names this 8th day of January, A. D. 1883.

FRED. A. SHAW.
HENRY E. JUDKINS.

Witnesses:
GEORGE E. BIRD,
WM. M. PAYSON.