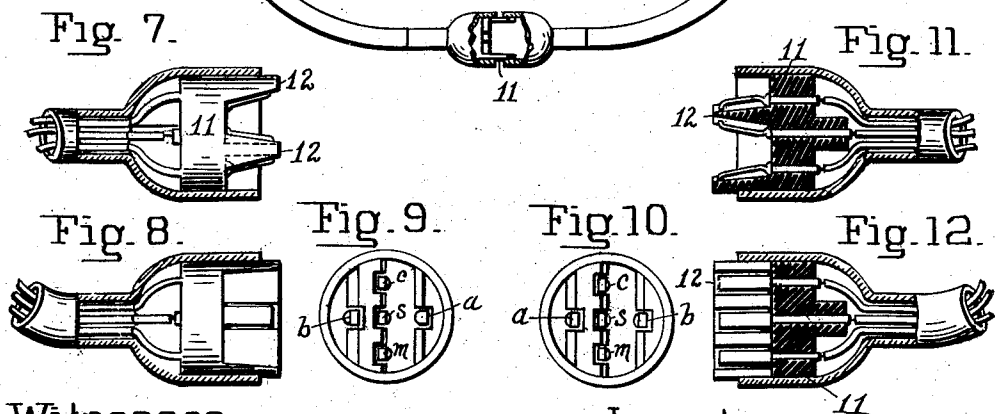
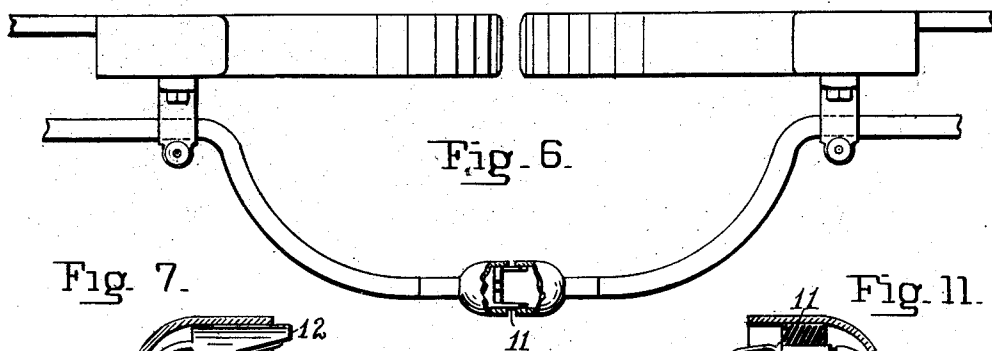
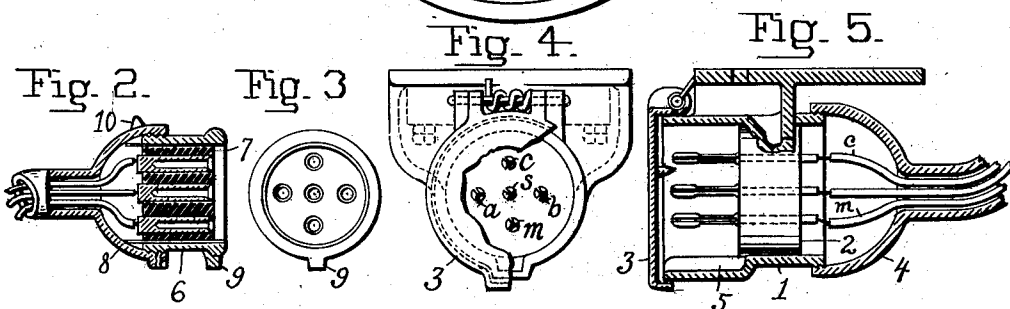
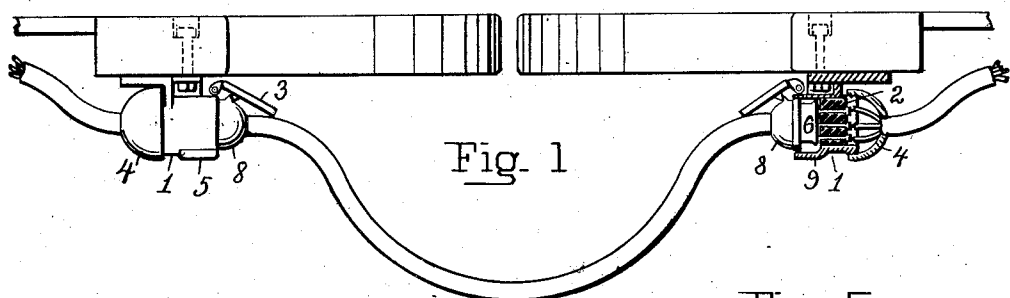


No. 774,611.

PATENTED NOV. 8, 1904.

F. J. SPRAGUE.
ELECTRICAL COUPLING.
APPLICATION FILED JULY 7, 1900.

NO MODEL.



Witnesses:

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UNITED STATES PATENT OFFICE.

FRANK J. SPRAGUE, OF NEW YORK, N. Y., ASSIGNOR TO SPRAGUE ELECTRIC COMPANY, OF BLOOMFIELD, NEW JERSEY, A CORPORATION OF NEW JERSEY.

ELECTRICAL COUPLING.

SPECIFICATION forming part of Letters Patent No. 774,611, dated November 8, 1904.

Original application filed April 30, 1898, Serial No. 679,239. Divided and this application filed July 7, 1900. Serial No. 22,807.
(No model.)

To all whom it may concern:

Be it known that I, FRANK J. SPRAGUE, a citizen of the United States of America, and a resident of the city of New York, borough of Manhattan, in the county of New York and State of New York, have invented certain new and useful Improvements in Electrical Couplers, of which the following is a specification, for which I have received foreign patents in France, No. 278,105, dated May 20, 1898, and in Great Britain, No. 11,158 A, dated May 16, 1898.

This application is filed by way of division of my former application for improvements in traction systems, Serial No. 679,239, filed April 30, 1898.

The invention consists in certain devices for coupling cables of electrical wires, and they are especially applicable for coupling the train-wires of the several cars of a train equipped in the manner described in my said former application.

In the electrical equipment of each car there are a number of wires, each of which has a different function. For the simultaneous control of a number of cars coupled together to form a train it is necessary that conducting-wires of like function on different cars be coupled at the meeting ends of the cars. For convenience in effecting the coupling, wires of each car at each end terminate in suitable contacts. These contacts are gathered together at each end of the car and are supported in a coupler of suitable construction. Through the couplers at the meeting ends of the cars the conducting-wires of like function on adjacent cars are coupled together. This coupling of the wires of adjacent cars may be effected either by cable of wires with the couplers on the cars or by directly mating the couplers at the ends of the conducting-wires of the cars. The several conducting-wires at each end of the car are gathered, preferably, in a single unitary coupler in order that they may be coupled at one operation. The couplers are constructed so as to go together in but one way, and as the contacts bear a fixed

relation to the couplers only the intended wires can be connected. The contacts are similar, and as the wires to which they are attached are not connected and have different functions they are independent. They are disposed in different lines, with the outer contacts in circle, and the relative position affords the greatest degree of compactness consistent with a sufficient separation for insulation. They can therefore be surrounded by a smaller protecting-casing than would be required if the contacts were otherwise arranged.

In the accompanying sheet of drawings, which forms a part of this specification, Figure 1 shows the couplers on two abutting cars and a jumper consisting of a flexible cable of conducting-wires with couplers for connecting the cars. Fig. 2 shows a transverse section through the coupler at one end of the jumper. Fig. 3 is an end view of the coupler of the jumper. Fig. 4 is an end view of the coupler which is attached to the car with the cover partly broken away. Fig. 5 is a transverse section of the coupler which is attached to the car. Fig. 6 shows a form in which the conducting-wires at the ends of the car terminate in a flexible cable with couplers at their ends which may be directly mated. Figs. 7 and 8 are views of one of the two couplers shown at the left of Fig. 6 with the protecting-casing in section. Fig. 9 is an end view of the coupler of Figs. 7 and 8. Fig. 10 is an end view of the couplers shown at right of Fig. 6. Figs. 11 and 12 are sectional views of the coupler of Fig. 10.

In both forms of couplers the conducting-wires of the train end in contacts *a b c s m*, which are disposed in a cluster and suitably supported by the coupler. The functions of the wires attached to these contacts are explained at length in my application above mentioned. Briefly stated, current in the wire attached to contact *a* sets the controller mechanism of the car for movement ahead. Current in the wire of contact *b* sets the mechanism for movement backward. Current in the wire of the contact *c* cuts off the current

in the car-motors and permits the car to coast. Current in the wire of contact *s* turns on current in the car-motors in series, and current in the wire of contact *m* turns on current in the car-motors in multiple. The number of conducting-wires or the particular functions which they possess, however, is not essential to the invention as claimed in this divisional application.

In the form shown in Figs. 1 to 5 the coupler for the conducting-wires of the car is provided with a protecting-casing 1, of metal, which is bolted to the under side of each car-platform. In the casing a block 2 of insulating material is tightly fitted, and the plugs which constitute the contacts are placed parallel to each other and extend through and project from the face of the insulating material. The three contacts *c*, *s*, and *m* are in the same line or plane; but the other contacts, *a* and *b*, are placed on each side of this plane, and consequently in different planes, so that the contacts as a whole form a cluster with the outermost contacts in a circle. It may be noted that the arrangement of these contacts can be described as being in three vertical planes and also in three horizontal planes. In the middle vertical plane are the contacts *c*, *s*, and *m* and in each of the other vertical planes the contacts *a* and *b*, respectively. In the middle horizontal plane are the contacts *a*, *s*, and *b* and in the other horizontal planes the contacts *c* and *m*, respectively. The positions of all the contacts are such as will secure the most compact physical arrangement and their compact inclosure by a cylindrical casing. The casing is provided with flanges by which it is bolted to the under side of the car-platform. A hinged cover 3 is attached to the front of the casing and is closed when the coupler is not in use. The conducting-wires are connected to the rear ends of the plugs. The back of the casing is threaded to receive a protecting-cap 4. On one side of the sleeve or casing is a keyway 5. The couplers at the abutting ends of the cars are connected through a jumper. This consists of a flexible cable containing the connecting-wires and terminating at each end in suitable couplers. Each of these couplers comprises a protecting-casing 6, in which is a block of insulating material 7, and sockets to which the coupling-wires are connected and which are contained in the block of insulating material. There is a protecting-cap 8 for the connections between the coupling-wires and the sockets and a key 9, which mates with the keyway in the protecting-casing of the coupler on the car, so that the two will go together in one way only. The casing of the coupler at the end of the jumper fits inside of the casing of the coupler attached to the car. The two casings are therefore unlike and complementary. On the casing of the

jumper-coupling is a horn 10, which is engaged by the cover of the coupler attached to the car. The cover latches over the horn and locks the pair of couplers together. The sockets of the jumper-coupler mate with the plugs of the coupler attached to the car-platform and are likewise positioned so as to secure the most compact physical arrangement and to permit their inclosure by a cylindrical protecting-casing of the smallest possible diameter consistent with a sufficient separation of the contacts from each other and the casing for their proper insulation. This is especially important because the jumper is portable, and the weight of the couplers at the ends should be as little as possible. The connecting-cable of conducting-wires between the two couplers of the jumper requires a high degree of flexibility, and in order to secure this the conducting-wires lead spirally through the cable in the usual way. Care, however, is taken to properly connect the two terminals in the two couplers according to the wiring scheme of the car, which depends on the functions of the conducting-wires attached to the contacts and the position of the contacts in the couplers, as set forth in my above-mentioned application for patent. Usually contacts in the two jumper-couplers which are opposite to each other are connected, as would be the case if the wires were run through the cable in parallel instead of spiral lines. It will be seen that the contacts in the couplers at the ends of the jumper are sockets, which I have completely protected by the metal casing. This manner of construction is of great importance, since the jumpers are portable and the trainmen in handling the jumpers are apt to strike them carelessly or by accident, and if the form of coupler with plug-contacts and cover such as is used on the car were used on the jumper the danger of breakage would be much greater. The contacts of the mating couplers are plugs and sockets and are therefore unlike and complementary. When the couplers of the car-wires are attached near the sides of the car-platforms, they are duplicated at each corner of the car to permit of the coupling of the car-wires from either side of the train. The couplers when thus located have a movement to and from each other of nearly three feet when the train is passing around curves, and there will be times when the abutting platforms will be also displaced laterally with respect to each other. The connecting-cable of the jumper must be of sufficient length to reach between the couplers on the cars without being drawn too tight when the couplers are at their maximum distance apart; but it cannot be much longer than is necessary, for if too long it will at times sag sufficiently to touch either the third rail or the track-rail. The wires of the flexible cable after passing through the protecting-cap are spread out, and the space within the cap

is filled with insulation. This forms an inside shoulder, and in pulling a cable, either in uncoupling normally or when the train parts by accident, the strain is not taken on the ends of the wires where they are connected to the contacts. They are also made waterproof.

Another manner of constructing my coupler is illustrated in Figs. 6 to 12; but I prefer the one first described. In this second form the contacts are flat springs which are provided with stems that pass through blocks of insulating material 11, the conducting-wires being connected to the ends of the stem. The contact-springs lie in notches in the sides of tongues 12, which project from the faces of the blocks and are protected by the tongues. These couplers are of such a shape that they will go together in one way only without the necessity of employing a key and keyway. In this form the mating couplers are alike throughout. They may be used in connection with the supporting-casing of the first form above described.

What I claim, and desire to secure by Letters Patent of the United States, is—

1. A pair of mating-couplers, each consisting of a supporting-casing, an insulating-body supported and protected by its casing, and contacts held by the insulating-body, and a cover for one of the casings which serves as a latch between the couplers, substantially as described.

2. A coupler for a train-line, composed of a plurality of independent sets of wires in circuit respectively with different sets of trans-

lating devices upon the several cars, the coupler having a plurality of contacts symmetrically disposed in intersecting vertical and horizontal planes, the contacts connected with one set of wires being all located in the vertical plane, and the contacts of the other set of wires being located in the horizontal plane, whereby upon reversing a car the connection of the set of translating devices upon the said car in circuit with the contacts in the central vertical plane of the coupler will not be reversed in relation to the corresponding set of translating devices upon the other cars, and whereby the other set of translating devices in circuit with the other contacts on the coupler will be reversed in relation to the corresponding set of translating devices on the other cars, substantially as described.

3. A coupler for a train-line composed of a plurality of direction-controlling wires and a plurality of speed-controlling wires, having contacts symmetrically disposed thereon in intersecting planes, the contacts connected with the speed-controlling wires being arranged in a vertical plane, and the contacts connected with the direction-controlling wires being arranged in a horizontal plane, substantially as described.

Subscribed by me in New York city this 6th day of July, 1900:

FRANK J. SPRAGUE.

Witnesses:

SAMUEL W. BALCH,
CHAS. M. SPRAGUE.