

W. W. GRISCOM & H. N. WEIDNER.

CONNECTION OF ELECTRICAL CIRCUITS.

No. 397,424.

Patented Feb. 5, 1889.

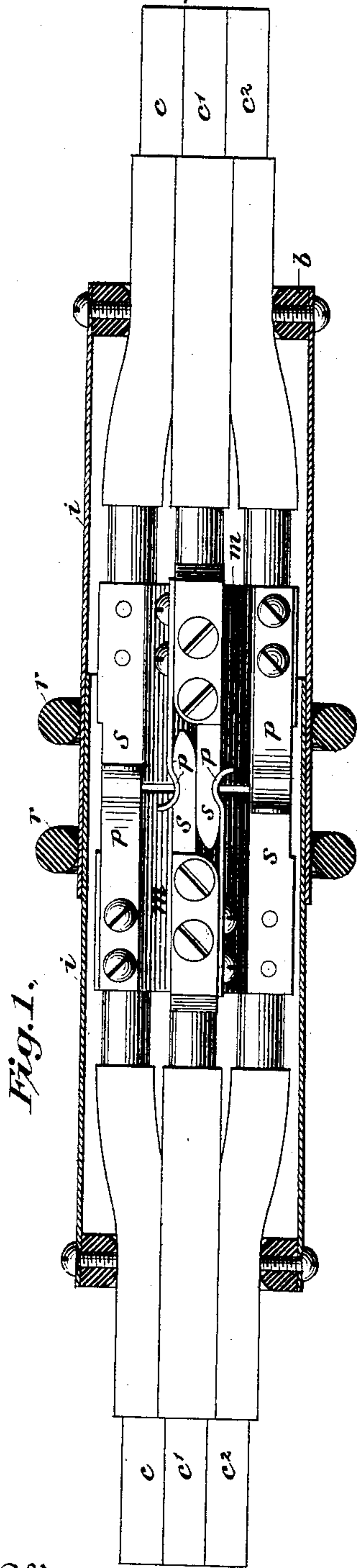


Fig. 1.

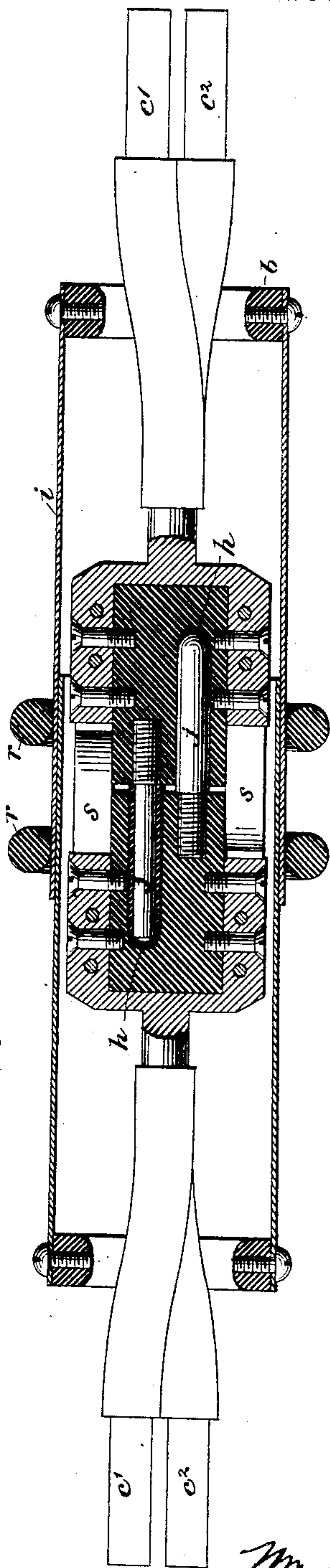


Fig. 2.

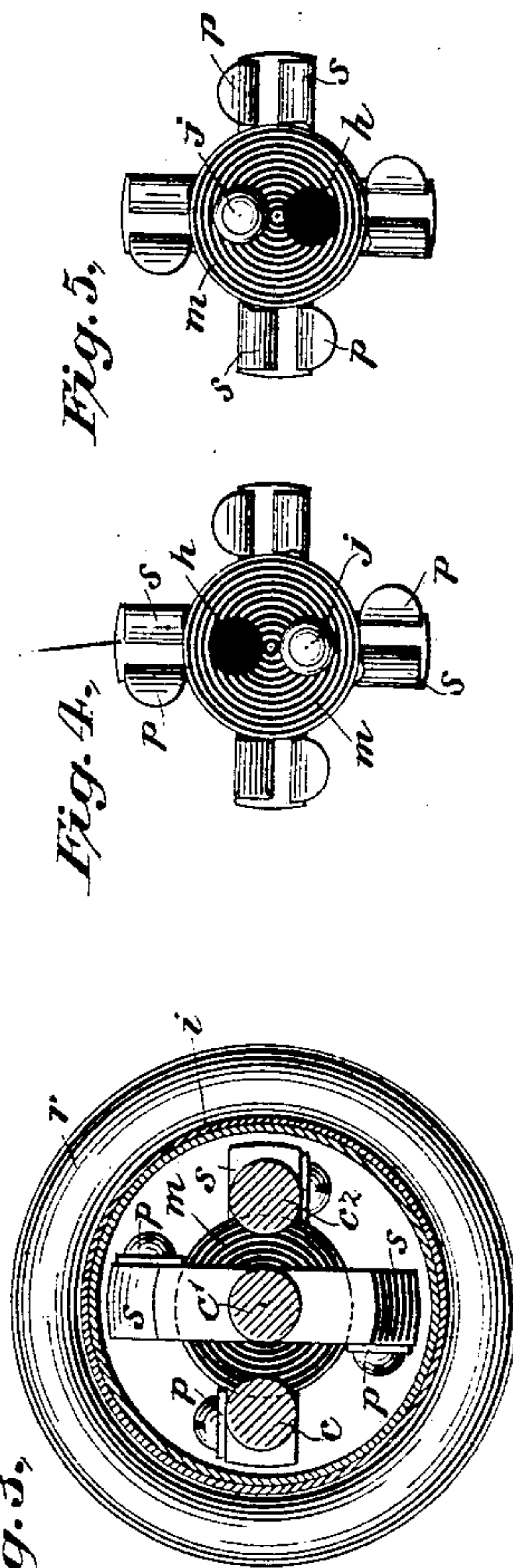


Fig. 3.

Fig. 4.

Fig. 5.

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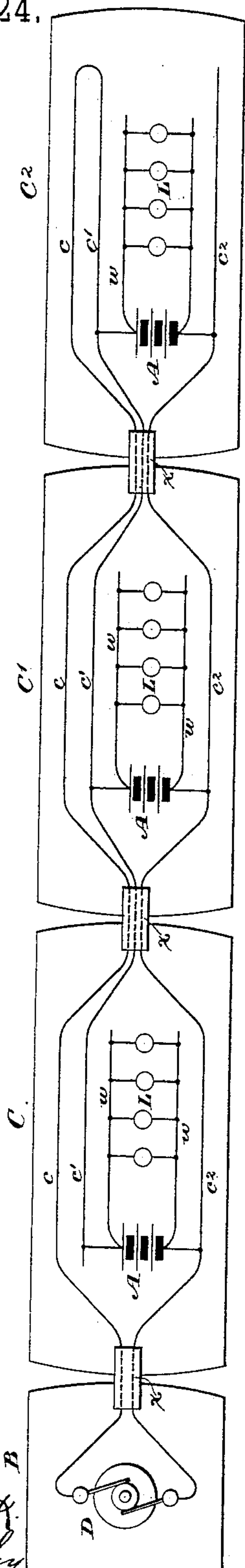
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Fig. 6.



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# UNITED STATES PATENT OFFICE.

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## CONNECTION OF ELECTRICAL CIRCUITS.

SPECIFICATION forming part of Letters Patent No. 397,424, dated February 5, 1889.

Application filed August 27, 1888. Serial No. 283,934. (No model.)

*To all whom it may concern:*

Be it known that we, WILLIAM W. GRISCOM and HENRY N. WEIDNER, citizens of the United States, and residents, respectively, of Haverford College, in the county of Montgomery and State of Pennsylvania, and of the city of Philadelphia, in the county of Philadelphia and State of Pennsylvania, have jointly invented certain new and useful Improvements in the Arrangement and Connection of Electrical Circuits, of which the following is a specification.

Our invention is an improvement in the arrangement of electrical connectors for uniting the circuits of two or more cars into a train. We prefer to make each car of a train electrically independent by placing a storage-battery in each car, and we charge these storage-batteries from a dynamo located on one car—say the first—of the train. To equalize the potential at any point in the circuit, the charging-current is led to the batteries from opposite ends of the train. This necessitates the use of three main conductors, and when these conductors are joined between the cars of a train it is very desirable that the right connections should be made, and as trainmen and workmen unskilled in the use of electrical apparatus are called upon to perform this operation we have invented a circuit-connection which is so arranged as to render it difficult or impossible to make an error in this respect. Our connector is composed of two cylinders or sections of insulating material carrying four contact-points, which are fixed on the surface at the extremities of two diameters drawn at right angles to each other—that is, each contact-point is separated by an arc of ninety degrees from the next adjacent contact. The contact-points are in every respect duplicate. Each contact consists of a rigid strip and a spring of conducting material separated from but parallel therewith. Each rigid strip is notched, and each spring has a corresponding projection arranged to catch in the notch of the opposing rigid strip, so that each conductor terminates in a rigid strip and a spring, the rigid strip of one entering between the rigid strip and spring of

the other, the two terminals being thus locked and held. There are three conductors provided for and extending through the train. Two of these conductors terminate in contacts located at the ends of one diameter of the cylinder, as described. The third conductor terminates in two contacts located at opposite ends of the second diameter of the cylinder—that is, this third conductor terminates in two parallel branches meeting two parallel branches on the complementary connector of the adjoining car. Each cylinder of insulating material is perforated to receive an insulated pin fixed in the opposing connector. There is, therefore, a pin and a perforation in each connector. These are so located with respect to the contact-points that no junction can be effected between the two connectors unless the pin of one enters the perforation of the other, and when this occurs the connections will and must be correctly made.

The accompanying drawings illustrate our invention.

Figure 1 is a longitudinal section of the car-circuit connector. Fig. 2 is a longitudinal section at right angles to the section in Fig. 1. Fig. 3 is a cross-section. Figs. 4 and 5 are end views of two connectors in position to be united. Fig. 6 is a plan of the train and circuits with which the connector is designed to be used.

In Fig. 6, B is a baggage-car carrying dynamo D. C C' C<sup>2</sup> are passenger-coaches. Each coach carries a secondary battery or accumulator, A, supplying a working-circuit, w, feeding lamps L. In order to charge each battery A from the dynamo D and to have the electro-motive force at the terminals of each battery in the charging-circuit equal, we connect one pole of the dynamo D with a conductor, c<sup>2</sup>, connected to one terminal of each and every battery, beginning with the nearest one. The second terminal of the dynamo we connect with the second terminal of each and every battery by a conductor, c c', beginning with the most distant battery. This necessitates the use of three conductors, which are severable between cars, and in order that we may trust the operation of making the proper



connection to unskilled labor we have devised the improved car-circuit connector *x*.

Referring to Figs. 1 to 5, *m m* are two cylindrical sections of insulating material. Fixed at points on the circumference of each section separated by ninety degrees are four contact-points. Each point is composed of a rigid strip of brass, *s*, having a notch or depression near its free end upon the outside surface. Fixed in a parallel plane, separated therefrom by a space about equal to the thickness of such strip, is a spring-strip, *p*, having a projection from its surface near the free end in a line with the notch on the strip *s*. The strip and the spring form the terminal of one conductor—say the first. At the end of a diameter is a similar strip and spring forming the terminal of, say, the second conductor. Midway between these two contact-points on the surface of the insulating-section are two other and similar contact-points. These are electrically connected at their base, as shown in Fig. 2, and form parallel branches terminating the third conductor. Another section of insulating material and a similarly-arranged set of four contacts form the terminals of the circuit. From the adjoining car the contacts of one section register with the contacts of the other section, and when placed together, as shown in Fig. 1, the strip *s* of one section enters between the strip *s* and spring *p* of the other section. The projections of the springs entering the notches in the strips lock the two together. It is to be understood that the two parallel contacts on one section must always join with the two parallel contacts of the other section, and this being so no error in connection can occur; but as an additional safeguard we provide the device shown in Figs. 2, 4, and 5.

*j* indicates a pin, of insulating material, fixed in the insulated section *m*, and in close proximity to it is a hole, *h*, of similar dimensions, to receive the pin *j* of the other section. The pin and the hole of each section are placed in such position with respect to the contacts that these can only be made to engage with each other when the pins and all contacts are in their proper registering position. By this arrangement an error in forming the junction is rendered absolutely impossible.

To prevent the access of dust, dirt, and moisture, we provide two cylinders of waterproof insulating material, *i*, which form a lap-joint at their meeting ends, around which are placed rubber rings *f*. Rings *b*, of insulating material of considerable mechanical strength, are placed on the opposite ends of these insulating-cylinders.

The operation of the apparatus constructed and arranged as described is evident.

We do not herein claim, in a system of electric lighting for railway-trains, the combination of a generator of electricity located in one car, two or more cars, each containing

a secondary battery, a working-circuit for each battery, a main conductor connecting one terminal of the dynamo with one terminal of each battery in succession, beginning with that located in the nearer car, and a main conductor connecting the second terminal of the dynamo with the second terminal of each battery in succession, beginning with the battery located in the more distant car, for that is the invention of William W. Griscom, for which he has obtained United States Letters Patent No. 393,757, December 4, 1888.

What we claim, and desire to secure by Letters Patent, is—

1. In a connecting device for electric conductors, the combination of two sections of insulating material, each section having located thereon a rigid projecting strip of conducting material with a notch or depression in its surface, a flat spring separated therefrom, but parallel thereto, with a projection upon its surface, the strip and spring of each section forming a complementary contact for the strip and spring of the other section, the rigid strip of one section entering between the strip and spring of the other, whereby both are locked together.

2. In a connecting device for electric conductors, the combination of two sections of insulating material, each section having located thereon a rigid projecting strip of conducting material, a flat spring separated therefrom, but parallel thereto, the strip and spring of each section forming a complementary contact for the strip and spring of the other section, the rigid strip of one section entering between the strip and spring of the other, and means for locking or catching the two sections in such position, substantially as described.

3. The combination, in a connecting device for car or train circuits, of two sections of insulating material, each having fixed thereto the terminals of three circuits, the terminal of the first and second circuits being composed of two projecting strips of conducting material located at diametrically-opposite points, and the terminal of the third circuit composed of two projecting strips of conducting material in two parallel branches located at diametrically-opposite points midway between the terminals of the two first-named circuits.

4. In a connecting device for car or train circuits, the combination of two sections of insulating material, each having fixed thereto the terminals of two or more circuits, the terminals on one section registering with the terminals on the other, a hole, and an insulated pin on the meeting surfaces of each section, the pin of one section entering the hole in the other, whereby erratic junction is rendered impossible.

5. In a car-circuit connector, the combination of a series of fixed registering conducting-terminals in two separate divisions and

two cylindrical casings of insulating material united by a lap-joint, whereby dust, dirt, and moisture are excluded.

5 6. A series of railway-cars, a circuit composed of three wires extending from end to end of each car, and a pair of connectors between each car, each connector having one contact-point for two of the said wires and

two parallel contacts for the third wire, all arranged substantially as described.

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