No. 894,644. PATENTED JULY 28, 1908.

G. H. HILL.

BUSLINE COUPLING SOCKET.

APPLICATION FILED OCT. 1, 1904.

2 SHEETS—SHEET 1.

Fig. 1.

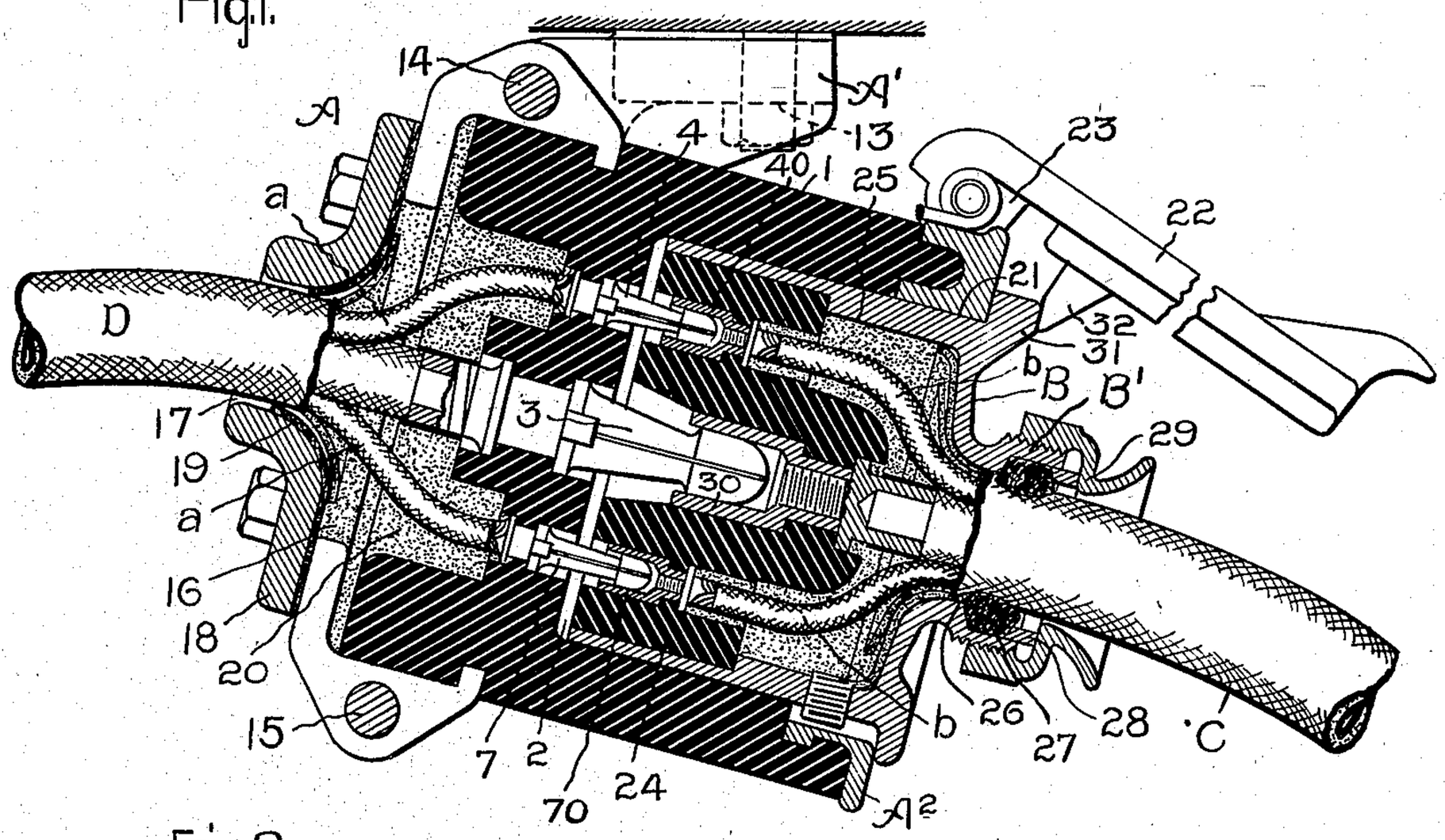
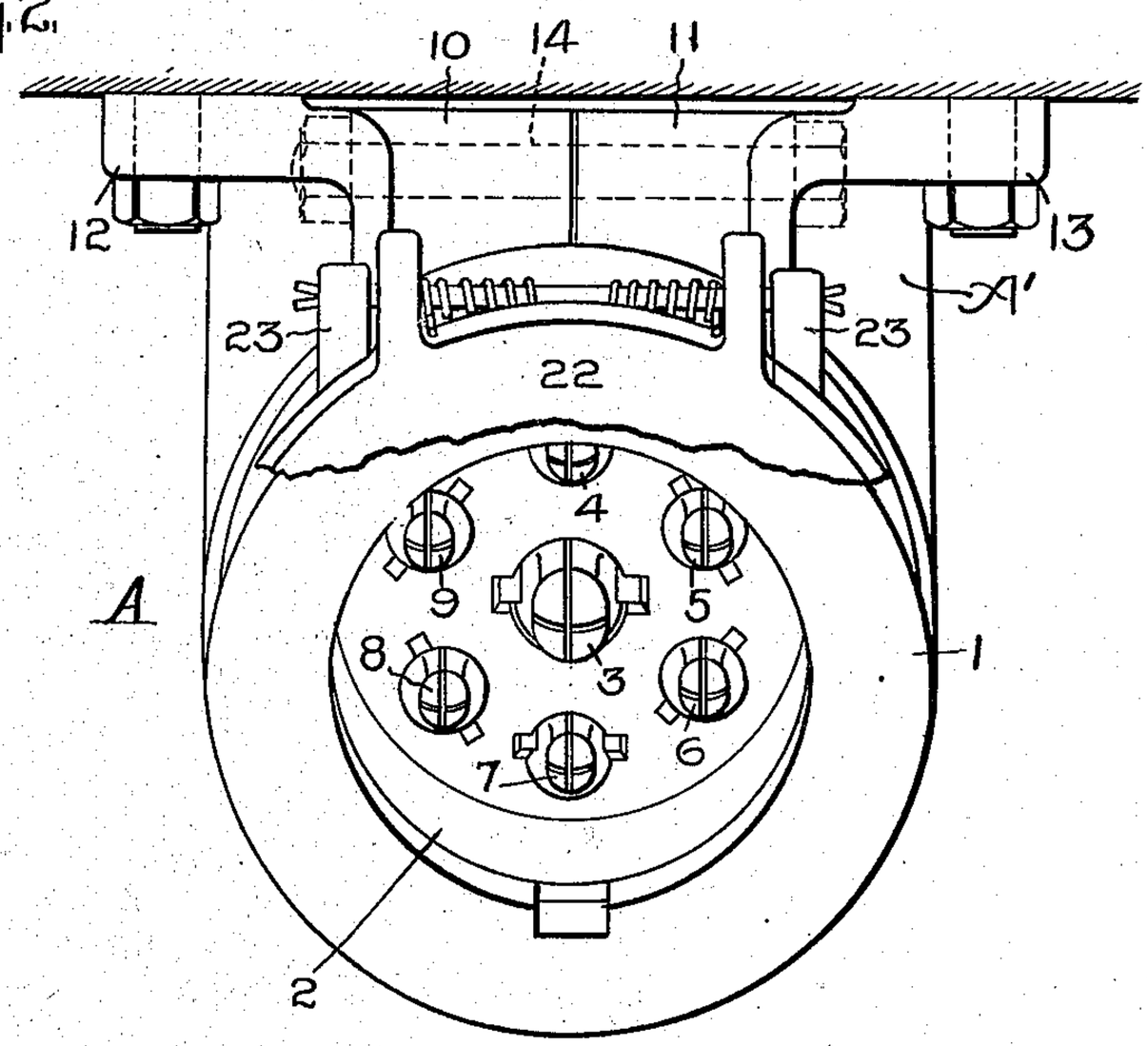


Fig. 2.



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2 SHEETS—SHEET 2.

Fig. 3.

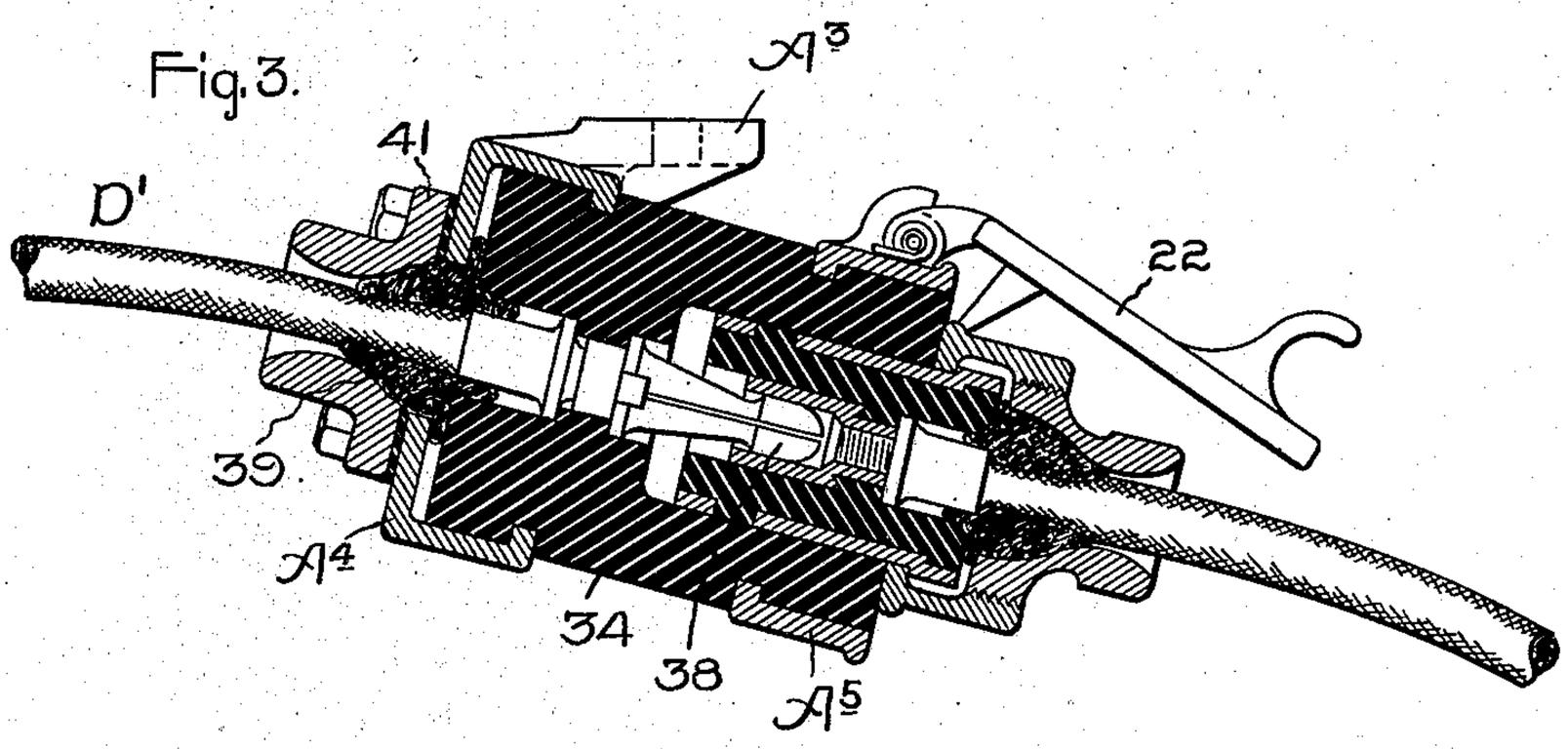


Fig. 4.

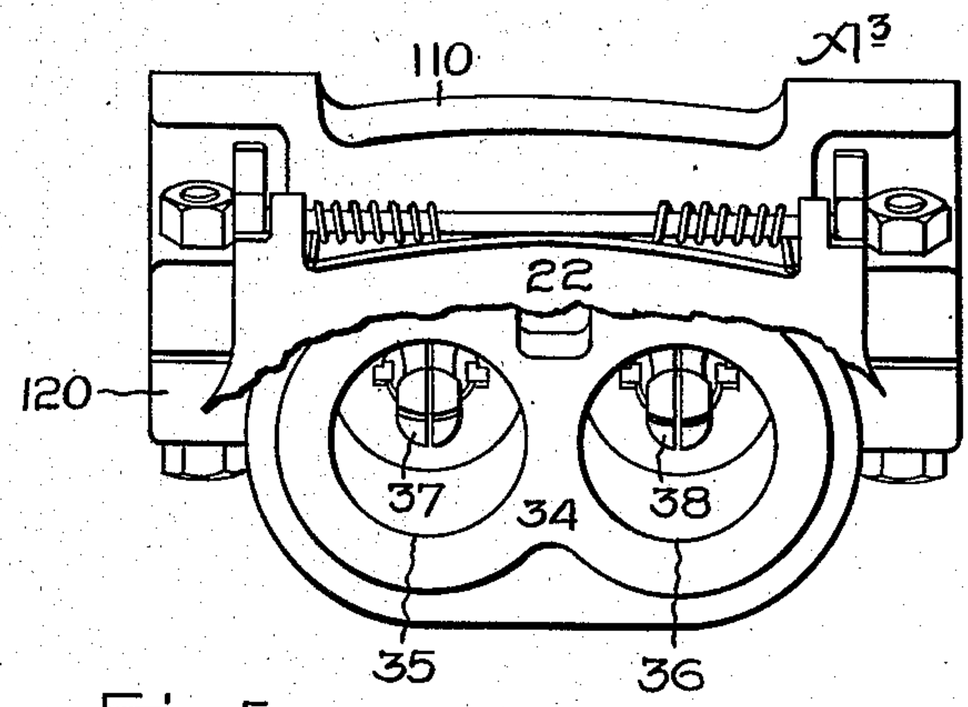
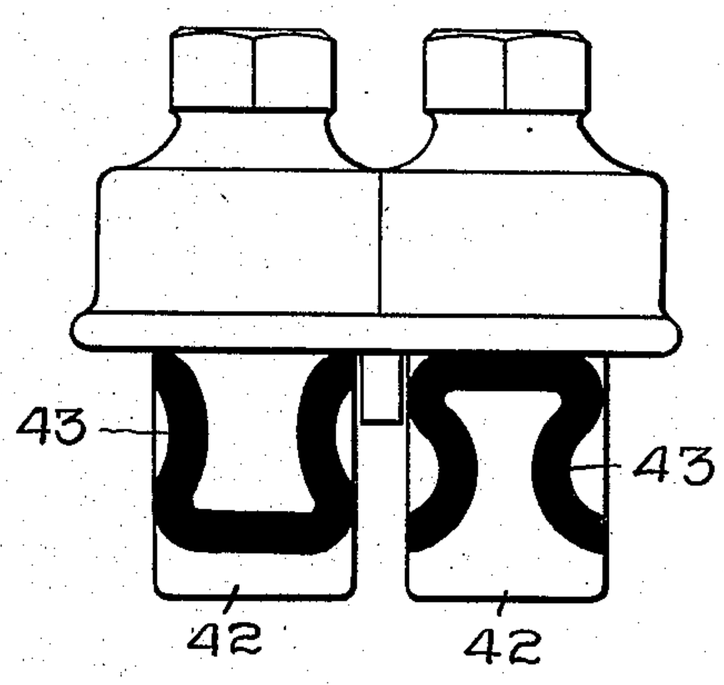


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE H. HILL, OF SCHENECTADY, NEW YORK, ASSIGNOR TO GENERAL ELECTRIC COMPANY, A CORPORATION OF NEW YORK.

BUSLINE COUPLING-SOCKET.

No. 894,644. Specification of Letters Patent. Patented July 28, 1908.

Application filed October 1, 1904. Serial No. 226,745.

To all whom it may concern:

Be it known that I, GEORGE H. HILL, a citizen of the United States, residing at Schenectady, county of Schenectady, State of New York, have invented certain new and useful Improvements in Busline Coupler-Sockets, of which the following is a specification.

The present invention relates to connectors for electric current conductors and more particularly to connectors adapted for use in railway equipments wherein it is desired to couple together conductors carried by the individual cars of a train.

It is usual in trains made up of electrically propelled vehicles to have a number of train wires which serve to light and heat the train, to operate signals, and to connect the local motor controllers to a master controller whereby the motors of the several cars may be simultaneously and similarly controlled; and in some cases one or more train wires carry the motor currents. Many of these train wires carry only small currents but those directly in the motor circuits must at times necessarily carry heavy currents and the light and heating wires also act as main buslines; and in the case of these wires great care must be exercised in properly safeguarding them, not only on the cars but at the points at which the wires of two cars are coupled together. The connections between cars is made by means of coupler sockets secured to the car body at opposite ends thereof into which the local wires are led, and a jumper which joins the coupler sockets at the adjacent ends of consecutive cars. The coupler sockets being secured directly to the car frame, are electrically connected to the ground and, where the terminals are connected to the collector shoes of the car or train, then in case the jumper plug is withdrawn while there is current flowing through the coupler, as might occur should a trainman pull out the plug with the lights and heaters in circuit or in case the train pulled apart while the motors were running, an arc may at times be established from the energized terminal or terminals of the coupler socket to the framework of the car to the ground. This difficulty might be overcome by constructing the entire socket member of insulating material, but it would have to be extremely bulky and costly in order to be strong enough to prevent it from being broken in ordinary usage.

The object of the present invention consists in so constructing and arranging the parts of a connector of the character described that the danger of arcing to ground upon breaking the connection while current is flowing is obviated.

A further object of the present invention consists in features of construction whereby a compact and serviceable connector is produced.

To the above ends I contemplate constructing that member of the connector which is supported upon the car, preferably the socket member, although the plug member might be so placed with a body composed of insulating material having sockets within which the contact members are disposed and metal caps at opposite ends thereof but insulated from each other. One cap is secured to the car frame and supports the connector member, while the other protects the face of the member and carries a cover for closing the end of the member when disconnected from its complementary member. By this arrangement, should an arc be started between terminals and reach the outer cap there would be no circuit therefor to the ground from that point, since the cap is insulated from the supporting cap and from the ground. The supporting cap and its accessories also act to hold the leads securely in place.

The present invention will be more fully understood in connection with the following description and the accompanying drawings in which,

Figure 1 is a longitudinal section through two coupling heads forming part of a connector arranged in accordance with the present invention; Fig. 2 is a front elevation of the coupler head forming the socket member; Figs. 3 and 4 are views similar to Figs. 1 and 2 but showing a further modification; Fig. 5 is a plan view of the plug member shown in Fig. 3.

Similar reference characters will be used to denote the corresponding parts throughout the specification and drawings.

Reference being had to Figs. 1 and 2, in which there is illustrated a connector adapted for use in railway systems having the return

circuit through the rails requiring therefore only single main bus wires: A indicates the coupler head which serves as the socket member and B the head which serves as the plug member of the connector. The head A is mounted upon the car, and a coupler head similar to B is secured to each end of the jumper cable C. The head A comprises a body portion 1 of insulating material, this being conveniently made cup-shaped as shown, although it is evident that any other shape may be given thereto, and it is provided with a socket 2 within which the plug member B is adapted to fit. Into this socket project a series of contacts or terminals 3, 4, 5, 6, 7, 8 and 9, and leads *a* extend rearwardly from these contacts and out of the coupler head; the leads being preferably collected into the form of a cable D in the usual manner. A cap or frame A^1 comprising preferably two sections 10 and 11, is clamped upon the rear end of the body 1 and, by means of flanges 12 and 13 upon the respective halves of the cap, the coupler head is secured to the frame of the car. It is evident that the cap may be formed of a single piece molded in position or that it may be made of more than two sections; but I have found that it may be conveniently constructed of two separate halves which are placed about the body portion and fastened together by means of bolts 14 and 15, or by other suitable means. The cable D passes through an opening 16 in the cap, and through a smaller opening 17 in a plate 18 bolted or otherwise secured to the cap. A flexible washer 19 between the cable and the walls of the opening 17 positions the cable centrally of the opening and prevents the escape of a non-conducting composition 20 which is poured into the space surrounding the leads *a* and between the end of the body 1 and the cap; this composition being poured through suitable openings, not shown, and while in a plastic state afterwards hardening so that the various parts are united into a rigid whole. Upon the opposite end of the body 1 there is arranged a metal cap A^2 having an opening 21 which registers with the socket 2. This cap extends entirely across the front face of the body so as to prevent it from being injured, but need not extend longitudinally along the exterior of the body, or only partially so, since the exterior is not a working surface, and the insulation may be made heavy enough to enable it to withstand ordinary usage without breaking. The two caps are therefore separated from each other by a comparatively wide gap across which it is impossible for an arc to pass. A cover 22 is hinged upon lugs 23 projecting from the top of the cap A^2, this cover dropping down in the usual manner so as to close the opening in the coupler head when the jumper is disconnected.

The member B consists of a plug of insulation 24 having a socket 25 containing contacts or terminals 30, 40, 50, 60, 70, 80 and 90, which coöperate with the terminals 3 to 9, inclusive, within the head A. Leads *b* pass from these terminals to the jumper cable and out of the rear of the coupler head. The rear end of the member B is not grounded and therefore the same precautions need not be taken to insulate the front portion from the rear portion thereof as in case of the member A; but the plug of insulation may be surrounded entirely by a protecting metal cup B^1 provided with an opening 26 through which the cable C passes. The cable is securely positioned and held by means of a cushion or washer 27 of rubber or other elastic material, arranged within the opening 26 and surrounding the cable; the washer being compressed by means of a sleeve 28 which is forced inwardly by the gland 29 when the latter is screwed upon the cup. The cup is provided with a lug 31, and the cover 22 has a coöperating lug 32 which engages with the lug 31 and yieldingly locks the coupler heads together in the usual manner. When the coupler heads are disconnected while energized, it is impossible for an arc to pass from the terminals to ground since any arc would be unable to cross the gap between the caps even if one should reach the cap A^2. While I have illustrated a connector adapted to couple seven different wires, it is of course evident that the number of contacts made in the coupler heads is immaterial.

In Figs. 3 to 5, I have illustrated a two-point connector which is adapted for use upon railways in which there is a metallic return circuit. No auxiliary connections are shown and therefore the socket member A^3 is somewhat simpler in form than the socket member A. The body 34 consists of insulating material as before, and the supporting cap A^4 of two sections, 110 and 120. Two separate sockets 35 and 36 are preferably provided in this coupler head; these sockets containing, respectively, contacts 37 and 38, which carry currents of opposite potentials, and which must be insulated from each other as well as from the ground. Magnetic fields, opposite in character, are set up about the terminals 37 and 38 when current is passing, forming a consequent pole between the terminals and serving to blow any incipient arc outwardly and away from the coupler head; thereby providing an additional safeguard against short circuits. Instead of employing a plastic compound for holding the cable D^1 rigidly in position in the coupler head, I provide a thick rubber washer 39 which surrounds the cable and bears against the body portion of the coupler head and against the cap and the plate 41 carried thereby. The cap A^5 is substantially the same as the cap A^2 and also carries a

cover 22. In this instance, although the coupler-head B^1 is not grounded, still the two terminals carried thereby differ in potential when current is passing, and upon a sudden breaking of a coupling connection an arc might pass between the two terminals unless provision were made to prevent it. Instead of surrounding the body 42 by a sleeve or cup extending from end to end, which would permit an arc to pass readily from one terminal to the other, the sleeves are formed with an irregular curved section or band 43, removed therefrom in such a manner that each sleeve is divided into two pieces which interlock with each other but which do not engage with each other; thereby providing a space of insulation across which an arc must pass in order to go from one terminal to the other, and at the same time affording substantially the same protection to the insulation that would be given by continuous metal sleeves.

Although I have described two preferred forms of my invention in detail, the present invention is not limited to the details described further than is indicated in the appended claims since, in its broader aspects, the present invention may be embodied in various other forms.

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

1. A coupler the socket member of which comprises a supporting frame, a cup-shaped body of insulating material held by said frame, a terminal projecting from the bottom of said cup, and a reinforcing cap secured to and covering the outer edge of said cup, the plug member of the coupler comprising a body of insulating material containing a socket, a terminal in said socket complementary to the terminal in the other member, and a reinforcing shell made in two parts spaced apart surrounding the body of insulating material.

2. A coupler one member of which comprises a supporting frame, a cup-shaped body of insulating material held by said frame, a terminal projecting from the bottom of said cup, and a reinforcing cap secured to and covering the outer edge of said cup, the other member comprising a body of insulating material, a terminal carried thereby complementary to the terminal in the other member, and a reinforcing shell made in two parts surrounding said body of insulating material, said two parts of said shell being arranged to intermesh but being separated by a peripheral band of insulation.

3. A coupler head comprising a supporting frame, a cylindrical body of insulating material having a socket therein clamped to the frame, a terminal in the bottom of said socket, a conductor leading through said frame to the terminal, an insulating filling surrounding the conductor between the frame and body of insulating material, and a reinforcing cap covering the outer end of the body portion.

4. A coupler head comprising a body of insulating material having a socket containing a terminal, separated metallic caps on and covering the ends of said body portion, a conductor passing through one of said caps, and an insulating compound between said latter cap and said body portion and surrounding said conductor.

In witness whereof I have hereunto set my hand this 30th day of September, 1904.

GEORGE H. HILL.

Witnesses:
HELEN ORFORD,
G. C. HOLLISTER.