April 8, 1947. F. G. BORN 2,418,457

ELECTRICAL COUPLING PLUG

Filed Dec. 21, 1942

Fig. 1.

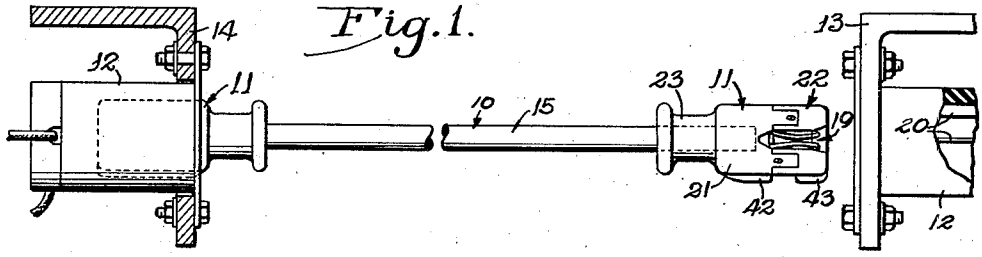


Fig. 2.

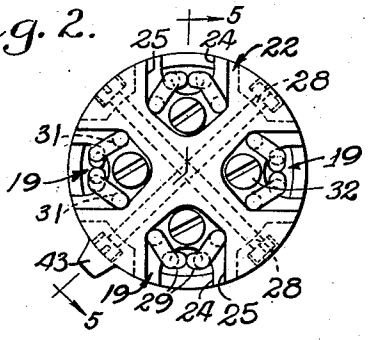
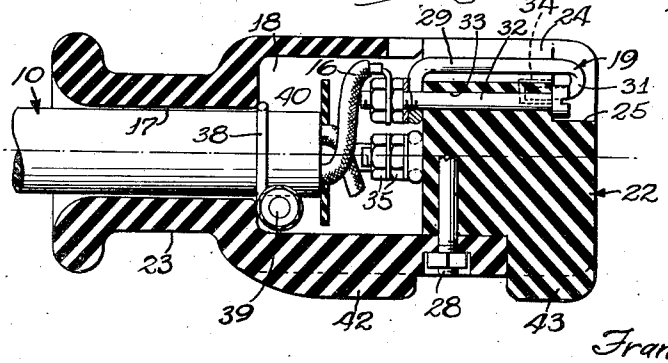


Fig. 3.

Fig. 4.

Fig. 5.



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Patented Apr. 8, 1947

2,418,457

UNITED STATES PATENT OFFICE

2,418,457

ELECTRICAL COUPLING PLUG

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Application December 21, 1942, Serial No. 469,652

11 Claims. (Cl. 173—328)

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The invention relates to electrical couplings and particularly to couplings of the type adapted for establishing circuits between vehicles as, for example, between a tractor and a trailer; and the general object of the invention is to provide in an electrical coupling an improved plug of strong and rugged construction, capable of withstanding severe strains without danger of breaking or short circuiting the electrical conductors embodied in the plug.

A further and important object is to provide a plug of improved construction facilitating assembly and permitting easy repair or replacement of parts.

Another object is to provide in a coupling plug having a plurality of connectors respectively attached to the ends of the conductors, an improved construction and arrangement for mounting the connectors and for enclosing the conductors leading to the connectors to the end that the parts may not only be assembled easily but may be readily disassembled for purposes of repair or replacement.

Still another object is to provide an electrical plug having connectors of advantageous character adapted for disengageable association with the blades of the socket member.

The objects of the invention thus set forth together with other and ancillary advantages which are obtained by the construction and arrangement are shown by way of example in the accompanying drawings forming a part hereof, of which:

Figure 1 is a fragmentary elevational view illustrating the improved plug forming part of a coupling between two vehicles, the frame member of one of the vehicles being shown in section.

Fig. 2 is an end view of the improved plug.

Fig. 3 is a fragmentary perspective view showing the parts of the plug in a partially assembled relation.

Fig. 4 is a perspective view of one of the connectors.

Fig. 5 is a longitudinal sectional view through the plug taken approximately in the line 5—5 of Fig. 2.

For purposes of exemplification, the invention has been shown herein as embodied in a coupling adapted to connect the electric brake and lighting circuits of a trailer to a source of current in a tractor. It will be obvious, however, that the invention is susceptible of a wide variety of other applications or uses.

Referring first to Fig. 1, a flexible cable 10 extends between two circuit outlets and is connected thereto at its opposite ends by two plugs 11 attached to its opposite ends and received in corresponding sockets 12. These sockets may, for example, be fixed respectively on the front end 13 of a trailer and the rear end 14 of a tractor. The cable 10 is of conventional form. It comprises an outer tubular sheath 15 of rubber or the like within which is enclosed a plurality of conductors 16 (herein four) the opposite ends of which are attached to the plugs 11 forming the subject of my invention.

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Each of the plugs comprises an elongated generally cylindrical body of suitable insulating material having an axial passage 17 at one end opening into a chamber 18 (Fig. 5) for receiving and enclosing the inner end of the cable, together with the projecting end portions of the conductors 16. On the exterior of the body, forwardly of the chamber 18 are mounted in peripherally spaced relation a plurality of terminals or connectors 19 made of resilient metal and adapted to receive and grip between them blades 20 of the socket members 12.

In the preferred embodiment, the body of the plug is formed in two sections detachably secured together in axially opposed but interfitting relation. Thus, as clearly shown in Figs. 3 and 5, one section is in the form of a shell 21 and the other a head 22. The shell provides a cavity to form the chamber 18, and preferably has formed integral therewith a handgrip 23 in which is formed the axial opening 17 for the passage of the cable 10. The head 22 carries the connectors 19 and coacts with the shell to form the chamber 18.

In the preferred embodiment the head 22 is provided on its periphery with a plurality of longitudinal grooves 24 communicating at their rear ends with the chamber 18. The grooves open radially of the plug and form elongated channels for receiving the connectors 19. At their forward ends the grooves terminate in recesses 25 which receive and form a partial protection for the forward ends of the connectors.

Between the grooves 24 at the rear end of the head, are a plurality of recesses 26 shaped to receive snugly a plurality of fingers 27 projecting forwardly from the shell. The parts are secured in assembled relation by means of two diametrically disposed bolts 28 (Figs. 2 and 5) entered through holes in the fingers and the head. This interfitting relation of the two sections of the plug provides for a rigid fastening of the two parts together in an axially compact form.

The connectors 19 are made of resilient metal

and preferably of round wire stock. As best shown in Fig. 4, each is made from a suitable length of wire bent into generally U-shape to provide opposed legs or jaws 29 which are substantially in contact with each other intermediate their ends and diverge away from each other toward opposite ends. A tapered throat is thus provided which facilitates entry of the socket blade 20. At the same time, the resilient force applied by the connectors to grip the blade is concentrated near the center of the connector thereby insuring firm electrical contact. The bight end of the connector is bent at right angles to form an anchoring yoke 30 and the free ends of the legs are bent reversely to form hooks 31.

As seen in Fig. 5, the connectors are secured in position in the grooves 24 by means of bolts 32 extending through holes 33 in the head immediately inward of the bottoms of the grooves. To hold the legs or jaws 29 together at their outer ends, the hooked ends 31 are seated in sockets 34 disposed on opposite sides of the holes 33 in the forward recesses 25, and the anchoring yokes 30 are secured to the rear face of the head by nuts 35. The fastening bolts also provide terminal posts for the wires 16.

It will be seen that with this construction the connectors are firmly secured in position upon the head, that the rear ends thereof may be securely clamped to the conductors and effectually closed within the plug, and that the opposed jaws formed by the legs 29 are adapted to receive between them the socket blades 20.

Within the chamber 18, the cable 10 is preferably equipped with a wire clip 38 encircling the cable and rigidly secured thereto by means of a bolt 39. The clip serves to bind the conductors 16 in the cable and also serves as a stop engaging with the inner end of the chamber 18 to restrain endwise movement of the cable relative to the plug. 40 is a disk of insulating material centrally apertured for the passage of the wires 13 and serving to confine them at the point of emergence from the cable.

It will be seen that when the two sections of the plug are fastened together with the parts in the relative positions shown in Figs. 1 and 5, the connectors 19 are exposed radially of the plug and also at the outer end thereof. When the plug is inserted into a socket, the blades 20 enter between the jaws 29 of the connectors with a wiping engagement, dislodging any dirt or other substance. In this connection, the shell section is formed with notches 41 at the bases of the spaces between the fingers 27. These notches are alined with the grooves 24 in the head 22 and permit the discharge of dirt or the like dislodged from the connectors.

When it is desired to replace or repair any of the connectors, it is only necessary to remove the securing bolts 28 and separate the two sections axially, thus exposing both ends of the bolts 32 by which the connectors are secured in position in the head 22. To facilitate assembly of the two sections in proper angular relation, each section is formed upon its exterior with projections 42 and 43 forming two matching sections of a rib, which sections must be alined when the parts are assembled properly.

It will be seen that by the construction and arrangement set forth I have provided a plug for electrical couplings which is of strong and rugged construction. The connectors or terminals are of an extremely simple form and advantageously mounted for quick and easy assembly. Finally, the sectional construction of the plug permits the parts to be disassembled for purposes of repair, while the interfitting relation of the head and shell sections of the plug body lends compactness thereto.

I claim as my invention:

1. An electrical coupling plug comprising, in combination, a generally cylindrical head of insulating material, said head having a plurality of peripherally spaced channels extending in a direction parallel with the axis of the head and opening at opposite ends, and a series of peripherally spaced recesses between said channels and opening at the inner end of the head, connectors mounted in said channels, an annular shell forming a cup-shaped conductor-receiving cavity with an open end adapted to be received in and closed by said head, said shell having a series of fingers at its open end adapted to enter said recesses, and means holding said head and shell in assembled relation.

2. An electrical coupling plug comprising, in combination, a generally cylindrical shell of insulating material providing a cavity with an opening at one end for the passage of a plurality of conductors, an annular head detachably secured to said shell so as to close the other end of said cavity, said head having on its periphery a plurality of equidistantly spaced channels opening at opposite ends of the head, connectors detachably mounted in said channels and arranged for connection with conductors enclosed in said cavity, said shell having a plurality of fingers and said plug a plurality of recesses disposed between the channels thereof for receiving said fingers, and means securing the shell and head together with said fingers and recesses in interfitting relation and with said connectors exposed at opposite ends of said head.

3. An electrical coupling plug comprising in combination a body including a head portion and a rear portion, said rear portion having therein a hollow chamber for receiving and enclosing a conductor, said head portion having a radially opening groove extending parallel with the axis of the body and opening rearwardly into said chamber, and a generally U-shaped connector of resilient wire mounted in said groove, the legs of said connector lying adjacent the walls of said groove and spaced from the bottom thereof, the yoke portion connecting the legs at one end of the connector and bent at right angles to said legs, the other ends of said legs being bent reversely and interengaging with the body of the plug, and a bolt extending lengthwise of the head portion and fastening said yoke portion thereto.

4. In an electrical coupling, a plug having a body of insulating material providing a chamber for the entry of a conductor and a head portion forwardly of said chamber, said head portion having an axially extending groove in its periphery opening outward of the plug with its rear end communicating with said chamber, and a connector mounted in said groove and having its rear end connected with said conductor within said chamber, said connector being made of resilient metal and having opposed legs lying adjacent the walls of said groove, and a bolt extending lengthwise of said head portion and coacting with the connector to fasten it securely in said groove spaced from the bottom thereof, the rear end of said bolt also having means for connection with said conductor.

5. An electrical coupling plug comprising, in combination, a body having a head portion and a

rear portion, said rear portion having a hollow chamber therein for the entry of a conductor into said plug, said head portion having a recess in its forward end and a groove in its periphery opening at one end into said recess and at its other end into said chamber, and a connector mounted in said groove with opposite ends bent laterally, one into said recess and the other arranged for connection to said conductor in said chamber, said connector having resilient peripherally spaced opposed conductors disposed adjacent the side walls respectively of said groove, said groove extending radially inward beyond said conductors to enable insertion of a coacting radially disposed contact blade between said conductors and into said head portion.

6. An electrical coupling plug comprising, in combination, a body having a head portion and a rear portion, said rear portion having a chamber for the entry of a conductor, said head portion having a recess in its forward end and an axially extending groove in its periphery opening at one end into said recess, and at its other end into said chamber, and a connector mounted in said groove and arranged for connection to said conductor within said chamber, said connector being made of resilient metal and comprising legs disposed adjacent the side walls of said groove and presenting opposed conducting surfaces forming a jaw, said groove extending radially inward beyond the opposed conducting surfaces to enable reception therebetween and into said head portion of a coacting radially disposed contact blade.

7. An electrical coupling plug comprising, in combination, a body having a head portion and a rear portion, said rear portion having a hollow chamber for the reception of a conductor, said head portion having a recess in its forward end and an axially extending groove in its periphery opening at one end into said recess and at its other end into said chamber, a connector mounted in said groove and arranged for connection to said conductor within said chamber, said connector being made of resilient metal and comprising generally parallel legs disposed adjacent the side walls of said groove and extending into said recess at their forward ends and into said chamber at their rear ends, said legs having reversely bent hooks at one end of said groove and an anchoring yoke at the other end of the groove, said body having spaced sockets for the respective entry of said hooks, and a bolt extending lengthwise of the plug and clamping said anchoring portion thereto with said hooks entered in said sockets.

8. In an electrical coupling, the combination of an insulating support having a side surface and opposite end surfaces at the ends of the side surface, one of the said end surfaces having spaced holes therein, a U-shaped conductor of resilient wire having its yoke portion disposed transversely with respect to the plane of its legs and abutting said other end surface, said legs projecting along said side surface and presenting opposed contacting surfaces outwardly spaced from said support to enable reception of a contact blade inserted longitudinally between them, projections integral with and bent laterally from the ends of said contact legs along said first mentioned end surface and into said holes, and a

fastening member anchored in said support and projecting through said yoke portion to clamp the latter against the support.

9. An electrical coupling plug comprising an insulating body having an abutment at one end, spaced outwardly opening holes at the other end paralleling the axis of the body, a piece of wire bent intermediate its ends to form two legs disposed side by side along the periphery of the body and gradually converging toward each other from opposite ends, the yoke portion of said wire being bent laterally to form an eye lying against said abutment and the free ends of the wire being bent laterally and reversely and projecting into the respective ones of said holes to fasten the bent ends to said body while permitting separation of said legs upon the longitudinal insertion of a coacting contact blade therebetween, and a fastening element extending through said closed wire end and anchored in said body to clamp said closed end to the body.

10. An electrical coupling plug comprising an insulating body having an abutment at one end and a laterally opening side recess, a piece of wire bent intermediate its ends to form two legs disposed side by side adjacent the respective side walls of said recess and converging toward each other from at least one end, the yoke portion of said wire being bent laterally to form a loop lying against said abutment and the free ends of the wire being bent laterally across the other end of the body, a fastening element extending through said closed wire end and anchored in said body to clamp said closed end to the body, and means engaging said free wire ends to hold the latter in said body while permitting separation of the contact portion of said legs.

11. An electrical coupling plug comprising an insulating body having an abutment at one end and a laterally opening side recess, a piece of resilient wire of circular cross section bent intermediate its ends to form two contact legs disposed side by side adjacent the respective side walls of said recess and converging toward each other from at least one end, the yoke portion of said wire being bent laterally to form a loop lying against said abutment and the free ends of the wire being bent laterally to lie adjacent the other end of the body, a fastening element extending through said loop and anchored in said body to clamp the loop to the body, and means engaging said free wire ends to hold the latter in said body while permitting separation of the opposed contact surfaces formed by the adjacent sides of said legs.

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