

Jan. 13, 1959

S. L. ARSON

2,869,095

ELECTRICAL CONNECTOR WITH POSITIONING RIBS

Filed Oct. 25, 1954

2 Sheets-Sheet 2

fig. 5.

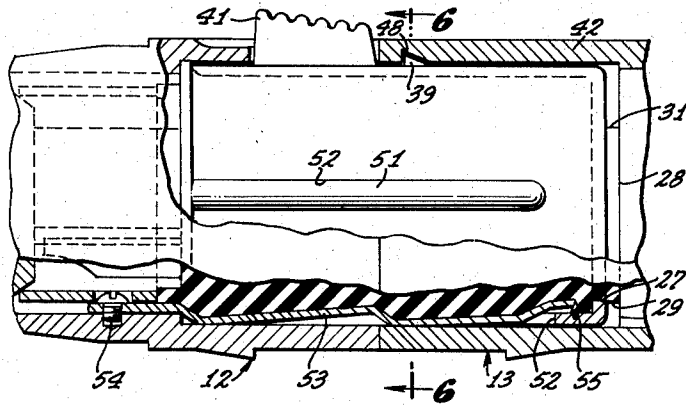


fig. 6.

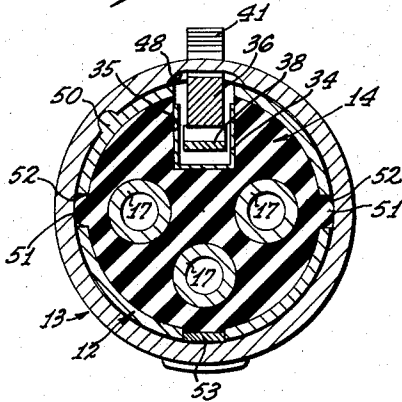


fig. 8.

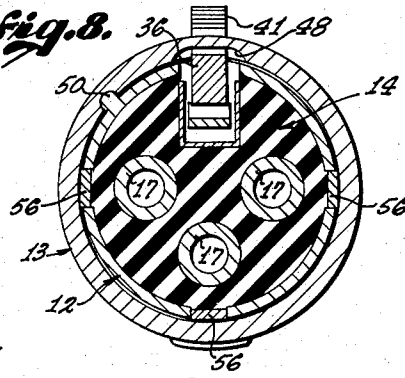


fig. 7.

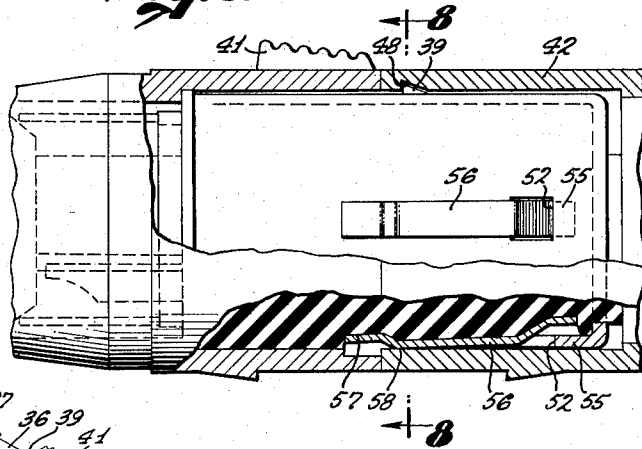
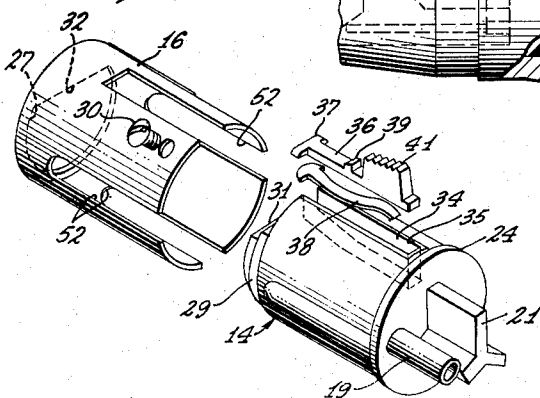


fig. 4.



Samuel L. Arson,
INVENTOR.

HUEBNER, BEEHLER,
WORREL & HERZIG,
ATTORNEYS.

BY Warren T. Jessup

1

2,869,095

ELECTRICAL CONNECTOR WITH POSITIONING RIBS

Samuel L. Arson, Glendale, Calif., assignor to Cannon Electric Company, Los Angeles, Calif., a corporation of California

Application October 25, 1954, Serial No. 464,368

5 Claims. (Cl. 339—61)

This invention relates to electric connectors and more particularly to electric connectors of the plug and socket type.

Where electric conductors carry intelligence in the form of an electric signal, as for example a cable carrying audio-frequency current, it has been found in practice that intermittent making and breaking of contact between conducting members in the vicinity of the cable injects a high frequency audio-interference into the cable itself. This is true even though the conducting members which are engaged in such intermittent make and break are essentially non-current carrying members. In the past, such interference has been relatively insignificant because the other portions of the audio circuit, such as the amplifier, speaker, etc., have a frequency response characteristic which does not respond to high audio-frequencies. With the development of higher fidelity audio equipment, which is more sensitive or responsive to the higher audio-frequencies, this intermittent making and breaking becomes very troublesome, because the resultant high frequency interference is then noticeable at the receiving end of the cable.

One place where such interference has been found to be injected is in connectors wherein two sections of a cable are electrically joined together. Such connectors are generally housed or sheathed with metallic casings which intermittently make and break contact upon the slightest movement of the connector. Such movement is very common when audio-frequency cables are dragged around over the floor.

It is an object of this invention to provide a connector which is free of interference injected by intermittent making and breaking of contact between metallic portions of the connector.

It is an object of this invention to provide an electric connector which is free of interference-producing contact of the type described above.

It is another object of this invention to provide an electric connector in which relative movement between the two members of the connector is virtually precluded, or at least limited to an insignificant amount, with consequent elimination or minimization of interference producing contact.

It is a further object of this invention to provide means for resiliently positioning together two members of a connector against relative movement with respect to each other, thereby precluding intermittent making and breaking of contact.

It is a still further object of this invention to provide an electric connector of the plug and socket type having means for resiliently positioning the plug within the socket against relative lateral movement, thereby to preclude intermittent making and breaking of contact between conducting portions of the plug and socket.

In accordance with these and other objects which will become apparent hereinafter, preferred forms of the present invention will now be described with reference to the accompanying drawings, wherein:

2

Fig. 1 is a longitudinal view, partially sectioned, of a connector embodying the present invention;

Fig. 2 is a longitudinal section of a fragmentary portion of the connector of Fig. 1;

Fig. 3 is a cross section taken on line 3—3 in Fig. 2;

Fig. 4 is an exploded fragmentary perspective view illustrating certain parts of one of the connector members shown in Figs. 1—3;

Fig. 5 is a fragmentary longitudinal section, generally similar to Fig. 2, illustrating a second form of the present invention;

Fig. 6 is a cross section taken on line 6—6 of Fig. 5; Fig. 7 is a fragmentary longitudinal section, similar to Fig. 2, of a third form of the present invention; and

Fig. 8 is a cross section taken on line 8—8 in Fig. 7. In Fig. 1 there is illustrated a connector 11 composed of a pair of mating connector members, one being a plug 12, the other being a socket 13.

The plug 12 is comprised basically of a body portion 14 of resilient, deformable material, such as rubber or neoprene, over which is fitted a metal shell 16. Imbedded longitudinally within the body 14 are a plurality of female contacts or contact members 17. The forward faces of the contacts 17 communicate with the forward face of the plug 12 by means of a corresponding plurality of bores 18, and receive male contact members, as will be explained hereinafter.

Integrally formed with each contact 17 is a terminal portion 19, which extends rearwardly from the body 14. The exposed portions of the terminals 19 are walled off from each other by radial walls 21 formed integrally with the body 14 and extending rearwardly therefrom.

Fitted over the rear of the body 14 and shell 16 is a housing 22 which surrounds the terminals 19 and into which is secured a non-conducting sleeve 23, which surrounds the cable conductors as they are brought to the terminals 19. Another non-conducting sleeve 25 is interposed around the terminals 19 for giving added insulation and weather sealing around the terminals.

The rear of the shell 16 is completely open and is abutted by a circumferential flange 24 formed integral with the body 14. The front face 26 of the shell 16 is provided with a large opening 27 through which protrudes the front face 28 of the resilient body 14.

The plug body 14 is provided on its forward face 28 with an annular groove or shoulder 29 which permits the slight protrusion of the face 28, through the opening 27 in the shell 16, as mentioned above. The groove 29 has a flat or chordal portion 31 corresponding to a similar chord 32 in the opening 27. These complementary flats 30 provide for polarization of the body 14 within the shell 16. Further polarization is achieved by a pair of opposite flats 33 formed respectively on the body 14 and on the interior of the shells 16. A screw 30 in the shell 16 presses into the body 14 to secure the body in the shell.

A longitudinal groove 35 communicating with the front face of the plug body 14 is formed therein and is lined with a metal shell 34. Loosely positioned in the shell 34 is a latch member 36, having a T-shaped tongue 37 which rests on a deepened portion of the flat 31 to form hinged means about which the latch member 36 may pivot slightly. The latch 36 is biased outwardly by a leaf spring 38 interposed between the latch and the bottom of the shell 34.

The latch 36 is provided with a knurled, projecting finger portion 41 by which it may be depressed into the groove 35 in order to unlatch the plug from the socket. When the body plug 14 is positioned within the shell 16, the portion 41 abuts the inside forward portion of the shell 16 to prevent the latch 36 from coming out of the groove 35. The latch 36 has a hook 39 which engages

3

a slot within the socket 13 in order to keep the plug and socket engaged.

The socket 13 comprises a housing 42 adapted to fit over and around the forward portion of the plug 12. Secured within the housing 42 is an insulator 43 in which are imbedded a plurality of longitudinal male contact members 44. The forward portions of the members 44 extend into the female members 17 of the plug 12, while the rearward portions of the contact members 44 extend rearwardly from the insulator 43 and terminate in conductor receiving terminals 46. The conductors which are connected to the terminals 46 are brought out, in the form of a cable, from the rear of the socket 13 through an insulating sleeve 47.

Inside the housing 42, adjacent the front edge thereof, is provided a small notch 48 into which fits the hook 39 of the latch member 36 on the plug 12. This engagement between the hook 39 and notch 48 serves to lock the plug and sockets together. A longitudinal groove-and-ridge 50 serves to relatively polarize the plug 12 and socket 13.

In accordance with the present invention, one of the connector members, the plug 12, in the particular example shown in Figs. 1-4, is provided with a plurality of elongate, resilient members spaced circumferentially therearound and disposed generally parallel to the axis of the connector, which extend into resilient engagement with the other member (in this case, the socket 13) in order to resiliently position the plug within the socket against relative lateral movement. This positioning substantially precludes intermittent making and breaking of contact between the metal shell 16 of the plug 12 and the metal housing 42 of the plug 13, such as might occur as cables using this connector are moved around over the floor.

In the form of the present invention shown in Figs. 1-4, these elongate resilient members comprise three longitudinal ribs 51 formed integrally on the surface of the plug body 14 and hence formed of resilient, deformable material, such as rubber or neoprene. The ribs 51 extend through three corresponding slots 52 formed in the shell 16 of the plug 12, and into engagement with the inner face of the housing 42 of the socket 13.

If desired, one or more of the ribs 51 shown in Figs. 1-4 may be replaced by resilient spring members, as shown in Figs. 5 and 6. In the embodiment shown in these figures, two of the ribs 51 are constructed of deformable material integral with the plug body 14, while the third rib, opposite the latch 36, is made in the form of an elongate leaf spring 53 which likewise extends through a slot 52 in the shell 16. The leaf spring 53 is secured to the inside of the housing 22 of the plug 12 by means of a screw 54.

The leaf spring 53 is biased outwardly by its natural resilience, and the forward end is restrained against complete departure from the plug 12 by being caught under the forward lip 55 formed on the shell 16 where the slot 52 terminates. The leaf spring 53 is naturally bowed outward, so that it is continually biased into engagement with the socket housing 42 during the residence of the plug within the socket. The spring 53 thus serves a function similar to that of the ribs 51 in resiliently positioning the plug 12 within the socket 13 against lateral displacement, thereby virtually precluding intermittent making and breaking of contact between metallic parts of the plug and socket, respectively.

A third form of the invention is illustrated in Figs. 7 and 8, wherein all three of the ribs 51 of the embodiment shown in Figs. 1-4 are replaced by resilient leaf springs 56. In this modification the three springs 56 are not screwed to the plug but reside more or less loosely in a specially shaped groove 57 formed in the plug body 14 in registry with the shell slots 52. The springs 56 are restrained in the plug by causing one end to engage beneath the forward edge of the housing 22 while the

4

other end engages beneath the flange or lip 55 formed where the slot 52 terminates in the shell 16. As in the modification of Figs. 5-6, the spring 56 is naturally bowed outward so that when the plug and socket are engaged, the springs 56 are biased into yielding engagement with the socket housing 42, as shown at 58.

The longitudinal resilient members thus described in conjunction with these various embodiments virtually preclude lateral displacement of the plug within the socket, thereby to prevent intermittent metal-to-metal contact. At the forward end of the plug, the slight protrusion of the non-conducting face 28 of the plug body 14 insures that there will be no metal-to-metal contact between the plug and socket at the face of the plug, thereby insuring against the undesired intermittent metal-to-metal contact mentioned hereinbefore.

While the instant invention has been shown and described herein in what is conceived to be the most practical and preferred embodiments, it is recognized that departures may be made therefrom within the scope of the invention, which is therefore not to be limited to the details disclosed herein but is to be accorded the full scope of the claims.

What is claimed is:

1. Electric connector comprising a socket, a plug adapted to mate within said socket, complementary electrical contacts on said plug and socket respectively, adapted to engage and complete a circuit when the plug is engaged in the socket, the plug having a body of insulating material, a plurality of elongated ribs of resilient, a deformable material formed integrally with the body, the ribs being spaced circumferentially around the plug and being disposed generally parallel to the axis of the connector and extending radially outward from the plug into resilient engagement with the socket, and a shell embracing the body and having a plurality of longitudinal slots through which said ribs protrude for engagement with the socket, thereby to resiliently position the plug in the socket against relative lateral movement.
2. Electric connector comprising a pair of connector members and a resilient member for maintaining the connector members in interengagement against relative lateral movement, one of said connector members being a socket, the other of said connector members being a plug adapted to mate within the socket; the socket comprising a body of insulating material, a housing around and extending forwardly of the socket body to receive the plug, and a plurality of electrical contacts in the body; the plug comprising a body of insulating material, a plurality of electrical contacts in the plug body for engagement with the contacts respectively of the socket to complete a circuit when the plug is engaged in the socket, and a shell embracing the plug body, the shell having an elongate slot formed therein for accommodating the resilient member, the resilient member being elongate and disposed generally parallel to the axis of the connector and extending radially from one of said connector members through said slot and into resilient engagement with the other connector member.
3. Electric connector comprising a pair of connector members and a plurality of resilient members for maintaining the connector members in interengagement against relative lateral movement, one of said connector members being a socket, the other of said connector members being a plug adapted to mate within the socket; the socket comprising a body of insulating material, a housing around and extending forwardly of the socket body to receive the plug, and a plurality of electrical contacts in the body; the plug comprising a body of insulating material, a plurality of electrical contacts in the plug body for engagement with the contacts respectively of the socket to complete a circuit when the plug is engaged in the socket, and a shell embracing the body, the shell having a plurality of elongate slots formed therein spaced circumferentially around the shell

5

and disposed generally parallel to the axis of the connector; the resilient members being elongate and spaced circumferentially around the plug body and disposed generally parallel to the axis of the connector and extending radially from one of said connector members through said slots respectively and into resilient engagement with the other connector member. 5

4. Connector according to claim 3 wherein said elongate resilient members comprise longitudinal ribs made of resilient, deformable material and formed integrally with at least a portion of said plug. 10

5. Connector according to claim 3 wherein said resili-

6

ent members comprise elongate resilient metal springs mounted to said plug and biased by their natural resilience outwardly of said plug into engagement with said socket.

References Cited in the file of this patent

UNITED STATES PATENTS

1,222,721 Bissell et al. ----- Apr. 17, 1917

FOREIGN PATENTS

276,174 Great Britain ----- Aug. 25, 1927