Nov. 21, 1939. S. M. DEL CAMP 2,180,923

ELECTRICAL PLUG AND SOCKET CONNECTION

Filed May 15, 1937

Fig. 1

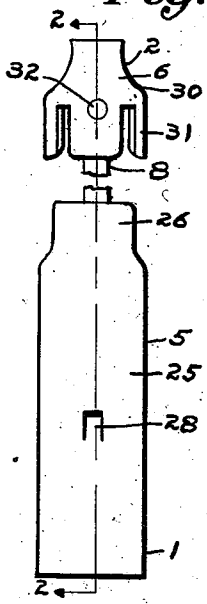


Fig. 2

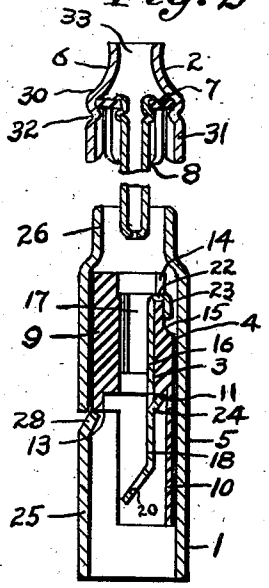


Fig. 3

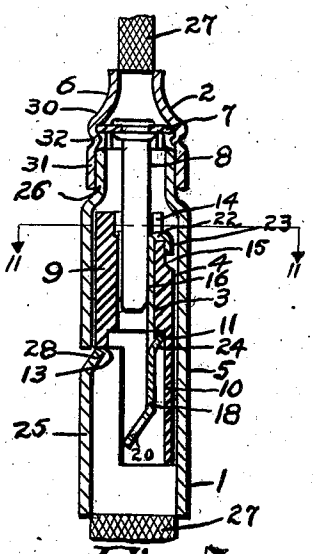


Fig. 4

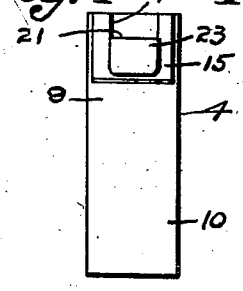


Fig. 5

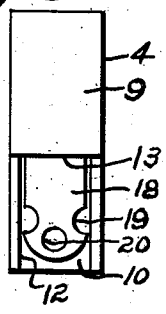


Fig. 6

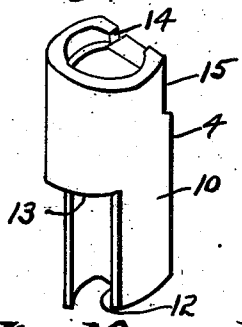


Fig. 7

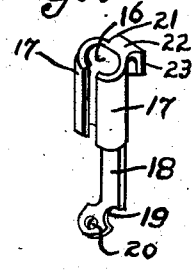


Fig. 8

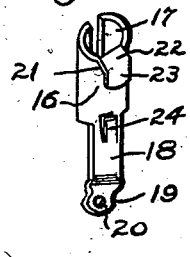


Fig. 9

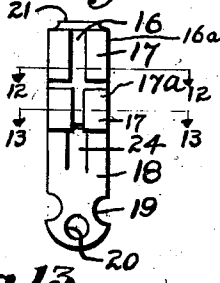


Fig. 10

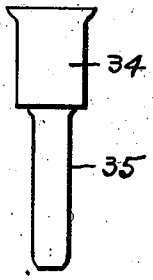


Fig. 11

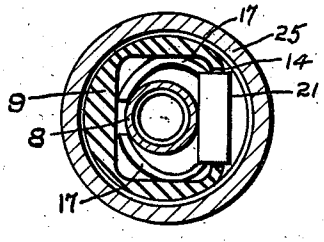


Fig. 12

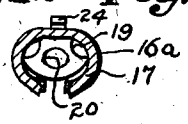
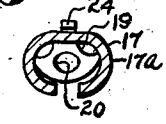


Fig. 13



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UNITED STATES PATENT OFFICE

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ELECTRICAL PLUG AND SOCKET CONNECTION

Scipione M. Del Camp, Maywood, Ill., assignor to Cinch Manufacturing Corporation, Chicago, Ill., a corporation of Illinois

Application May 15, 1937, Serial No. 142,857

4 Claims. (Cl. 173—363)

This invention relates to improvements in electric plug and socket devices.

One object of my invention is to produce an electrical connection having an outer protective shield preventing any damage of the interengaging contact members of the plug and socket devices.

Reference is hereby made to my divisional application Serial No. 188,086, filed February 1, 1938.

Another object of my invention is to provide plug and socket devices having outer shield members constructed in a way to be interengaged when the respective contacts members of the devices are in electrical contact thereby causing a continuous metal shielding of the electrical connection.

A further object of my invention is to provide a socket device of which the component parts are of relatively simple construction and may be assembled quickly and easily without the aid of machines.

Other objects and uses of my invention will be apparent from inspection of the drawing and the specification hereinbelow set forth.

Referring to the drawing, in which I have illustrated a preferred form of my invention:

Figure 1 is a front view of my improved electrical connection showing the plug device in position to be moved into electrical engagement with the socket device;

Fig. 2 is a section taken along the line 2—2 of Fig. 1;

Fig. 3 is a section similar to that of Fig. 2 showing the parts in electrical engagement, the contact member of the plug device being shown in full;

Fig. 4 is a rear view of the retainer part of my socket device showing a contact member in assembly therewith;

Fig. 5 is a front view of the assembly shown in Fig. 4;

Fig. 6 is a perspective view of my retainer part per se;

Fig. 7 is a front perspective of my preferred contact member;

Fig. 8 is a rear perspective of the contact member shown in Fig. 7;

Fig. 9 is a front view of a modified form of contact member;

Fig. 10 is a plan view of a modified form of plug device;

Fig. 11 is an enlarged plan section taken on the line 11—11 of Fig. 3;

Fig. 12 is a section taken along the line 12—12 of Fig. 9; and

Fig. 13 is a section taken along the line 13—13 of Fig. 9.

Referring to the drawing, my preferred electrical connection, as illustrated in Figs. 1–3, comprises a socket device 1 and a plug device 2. The socket device 1 comprises a socket contact member 3, a retainer part 4 of insulating material, with which the contact member 3 is assembled, and an outer metal shell 5 adapted, in my preferred device, to enclose completely the retainer part and contact member assembled therewith. My preferred plug device comprises a metal shield member 6, an insulating plate 7 secured to one end of the shield member, and a tubular prong 8 carried by the insulating plate and adapted for cooperating electrical engagement with the socket contact 3 of the socket device. The metal shell 6 is provided with yieldable fingers adapted to resiliently engage the material adjacent an end of the shell 5 of the socket device when the contact members are in electrical engagement thus causing a continuous metal shielding of the connection.

Referring in detail to the component parts of my socket device, the retainer part 4, as most clearly shown in Figs. 4–6, comprises, in my preferred form, a substantially tubular body portion 9 having an apron 10 formed as a continuation of one end of the tubular portion 9. The apron 10 is preferably of less thickness than the tubular portion thereby providing a face 11 on the inner side of the retainer at the junction of the apron 10 with the tubular portion, as most clearly shown in Figs. 2 and 3. As a means for providing access to a wire-receiving terminal of the socket contact 3 when the last-mentioned part is assembled with the retainer, I have formed a slot 12 (Figs. 5 and 6) extending from the free end of the apron 10 toward its junction with the tubular portion 9. The material adjacent the inner end of the slot 12 forms an abutment 13 adapted to be engaged by a fastener means of the metal shell 5 for securing the shell to the retainer part, as will be hereinafter more fully described. At the other end of the tubular portion 9 from that from which the apron 10 extends I have provided a notch 14 extending from adjacent the outermost free end of the tubular portion toward the apron 10. The side of the tubular portion 9 in which the notch is disposed has, in my preferred form, a cut-away portion 15 (Figs. 2, 3 and 6) providing a substantially flat surface against which the flat face of an at-

taching portion of the socket contact member 3 may abut.

The socket contact member 3, a preferred form of which is shown in Figs. 7 and 8 of the drawing, has a prong-receiving portion comprising a back portion 16 and side portions 17 extending from the sides of the back portions and being bent to form an enclosed region with their free edges separated throughout their entire length. A wire-receiving terminal 18, formed as a prolongation of the back portion 16, has notches 19 and an opening 20 at its lower end (Figs. 5 and 7) for attachment of the desired leads or conductors thereto. As a means for securing my socket contact member in assembly with the retainer part 4, I have provided a hook portion 21 integral with the free end of the back portion 16 of the prong-receiving portion at the opposite end of the back portion from that from which the wire-receiving terminal 18 extends. The hook portion 21 has an outwardly-extending portion 22 and a free end portion 23, which last-mentioned portion extends downwardly in substantially parallel relation to the back portion 16. A resilient finger 24 is formed from the material of the wire-receiving terminal 18 and extends outwardly from the plane of the terminal 18 on the same side of the contact member as that upon which the hook-shaped portion 21 is disposed. The outer extremity of the finger portion 24 is spaced from the outwardly-extending portion 22 of the hook portion 21, a distance substantially equal to the length of the tubular portion 9 of the retainer part, for purposes of assembly.

The modified form of contact member 3 illustrated in Figs. 9, 12 and 13 differs from my preferred form in that instead of providing a single prong-receiving portion, I have provided two pairs of prong-receiving portions 16^a and 17^a, each of which is adapted to receive a contact prong of different diameter. Each of the prong-receiving portions 16^a and 17^a comprises a pair of side portions 17 extending from the sides of the common back portion 16 and being bent to form enclosed regions of different diameters (Figs. 12 and 13) with the free edges of said respective pairs separated throughout their entire length. The prong-receiving portions 16^a and 17^a are preferably disposed one below the other with the lower prong-receiving portion adapted to receive a pin-like prong of smaller diameter than the upper prong-receiving portion. As a result of the construction of my modified form of contact member, I have provided a device which is very useful in connection with testing equipment, as, for example, testing vibrators for automobile radios wherein there are a variety of vibrators in use having pin-like contact prongs of varied diameters.

Assembly of the contact member 3 with the retainer part 4 is a relatively simple matter and is carried out without the use of machinery through moving the terminal end of the contact member into the body of the tubular portion 9 at that end of the tubular portion having the notch 14 with the hook-shaped portion 21 in superposed relation to the notch. During passage of the terminal 18 of the contact member through the bore of the tubular portion, the yieldable finger 24 will contract until the outwardly extending portion 22 of the hook portion engages the material of the tubular portion adjacent the inner end of the notch 14, at which time the finger portion passes the end of the tubular portion and expands so that the extremity of the finger portion substantially abuts the face 11 of the tubular portion (Figs. 2 and 3). The socket contact member is now in secure assembly with the retainer part with the inner flat side of the free end portion 23 of the hook-shaped portion 21 in engagement with the flat cut-away face 15 of the retainer part (Figs. 2 and 3). Rotation of the contact member relative to the retainer part is prevented through reason of engagement of the hook-shaped portion 21 with the retainer walls adjacent opposed sides of the notch 14.

The metal shell 5, adapted to shield and protect the socket contact member, has, in my preferred form, an elongated tubular body portion 25 and a neck portion 26 at one end. The neck portion 26 has a smaller diameter than that of the retainer part thereby serving to limit movement of the retainer part in one direction through the tubular body portion 26. A metal shield device 27 (Fig. 3) of any suitable form for covering insulated wire (not shown) may be soldered or otherwise secured to the other end of the body portion 25 from the neck 26 after the retainer part has been assembled with the metal shield. An attaching means in the form of a yieldable finger 28 extends inwardly out of the plane of the body portion 25 at a distance relative to the neck portion 26 which is substantially equal to the distance between the free end of the retainer part 4 having the notch 14 and the abutment 13 adjacent the notch 12 in the apron 10. After a wire or suitable lead means (not shown) has been connected to the wire-receiving terminal 18 of the socket contact member, the retainer part 4 is quickly and easily assembled with the metal shell 5 through moving an end of the retainer part into the neckless end of the tubular portion 25 and forcing the retainer part along the bore of the tubular portion in the direction of the neck 26. During movement of the retaining part through the bore of the tubular portion, the spring finger 28 is contracted until the free end of the tubular portion 9 of the retainer part abuts the neck portion 26, at which time the finger 28 expands so that its extreme end is in substantial engagement with the abutment 13 adjacent the inner end of the slot 12 of the retainer part, as most clearly shown in Figs. 2 and 3.

Referring now to my preferred plug device as illustrated in Figs. 1–3, I have provided a metal shield member 6 which, in my preferred form, has a flared end portion 30. An angular series of relatively straight yieldable fingers 31 extend from the flared portion 30 in a direction substantially parallel with the axis of the metal shield member 6. Projecting means 32 extend inwardly from each of the fingers 31 cooperating with the flared portion 30 of the metal member to hold the insulating plate 7 in assembly with the flared end of the metal member. The contact prong 8 carried by the insulating plate 7 extends beneath the extreme ends of the yieldable fingers 31 and is adapted for cooperative electrical engagement with the socket contact member 3 of the socket device. An opening 33 (Fig. 2) is provided at the other end of the metal member 6 from the flared end which has a diameter large enough to allow the entrance of a wire or group of wires (not shown) into the metal member for attachment to the prong 8. a metallic wire-protective device 27 may be permanently secured to the end of the metal mem-

ber adjacent the opening 33, as shown in Fig. 3.

In connecting my preferred plug and socket devices, the contact prong 8 is moved toward the socket contact member 3 for the purpose of electrical connection with the same. During this connecting action the yieldable fingers 31 of the plug device ride over the slightly rounded free end of the neck portion 26 so that when the prong 8 is in final connection with the socket contact member 3, the fingers 31 resiliently engage the outer surface of the neck 26 thereby providing an uninterrupted electrical connection between the respective shield members of the plug and socket devices.

If a continuous metal shielding of the electrical connection should not be desired, a modified plug member may be provided, as shown in Fig. 10, having a cup-shaped retainer part 34 of insulating material carrying a contact prong 35 which extends from one end of the part 34. If such a plug member is used, the construction of the metal shell 5 of the socket device may be modified slightly through omitting the neck 26 and merely turning the free end of the tubular portion 25 inwardly so as to reduce the diameter of the tubular portion at one end for preventing the retainer part from passing through the end. In such a case my modified metal shell would serve merely to protect the retainer part and socket contact member from injury, it not then being adapted to serve as a component part of a continuous shielding device for keeping out external electrical interferences.

Thus by my invention I have provided an improved electrical connection comprising component parts of simple construction which may be easily assembled together to form efficient plug and socket devices for carrying out the desired purposes. I realize that parts of the respective stud and socket members could be interchanged and many other modifications of the particular construction and uses of my invention made without departing from the spirit and scope thereof, and for that reason my invention is best defined by the following claims.

I claim:

1. In a shielded electric socket device, the combination of an insulating retainer part having a tubular portion open at both ends, a contact member seated within said tubular portion, said contact member comprising a prong-receiving portion positioned within the tubular retainer portion, an integral hook-shaped portion in engagement with the material at one end of the tubular retainer portion, a wire-receiving terminal extending from an opposite end of the prong-receiving portion, a resilient tongue member formed as a part of said wire-receiving terminal and presenting a shoulder engaging a shouldered portion of said retainer, and a hollow metal shield assembled with the retainer and enclosing the same, and snap fastener means on said shield engaging said retainer part for holding said parts securely together.

2. An electric socket device comprising a retainer part having a continuous wall portion bounding an opening extending therethrough and an apron extending from one end of said wall and being open at one side, and a contact member seated within said opening, said contact member having a prong-receiving portion in said opening and a wire-receiving terminal integral with an end of said prong-receiving portion and extending beneath said continuous wall portion and at least partially surrounded by said apron, and means integral with said contact member comprising spaced hook and resilient tongue members engaging spaced shouldered portions of the retainer for securing said contact member to said retainer.

3. In a shielded electric socket device, the combination of an insulating retainer part having a tubular portion open at both ends, a contact member seated within said tubular portion, said contact member comprising a prong-receiving portion positioned within the tubular retainer portion, an integral hook-shaped portion in engagement with the material at one end of the tubular retainer portion, a wire-receiving terminal extending from an opposite end of the prong-receiving portion, a resilient tongue member formed as a part of said wire-receiving terminal and presenting a shoulder engaging a shouldered portion of said retainer, and a hollow metal shield assembled with the retainer and enclosing the same, said contact member being maintained in spaced relation to said metal shield.

4. A device of the class described including an electric socket device comprising a retainer part of insulating material having a tubular portion open at both ends and an apron formed as a continuation of one end of said tubular portion, said apron being of less thickness than said tubular portion whereby a face is formed at the free end of said tubular portion, and said tubular portion having a notch adjacent the other end from which said apron extends, a contact member seated within said tubular portion, said contact member having a prong-receiving portion and a wire-receiving terminal extending from an end of said prong-receiving portion and at least partially surrounded by said apron, said contact member having a hook-shaped portion integral with an end of said prong-receiving portion and a resilient finger portion extending from said terminal, said hook-shaped portion engaging material at the end of said tubular portion adjacent said notch, and said finger portion having its free end engaging said face formed by the junction of the other end of said tubular portion from said notched end and said apron whereby said contact member is secured in assembly with said retainer.

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