Nov. 4, 1947. J. K. CHENIER 2,430,159

ELECTRICAL SOCKET CONTACT

Filed Oct. 3, 1942 2 Sheets-Sheet 1

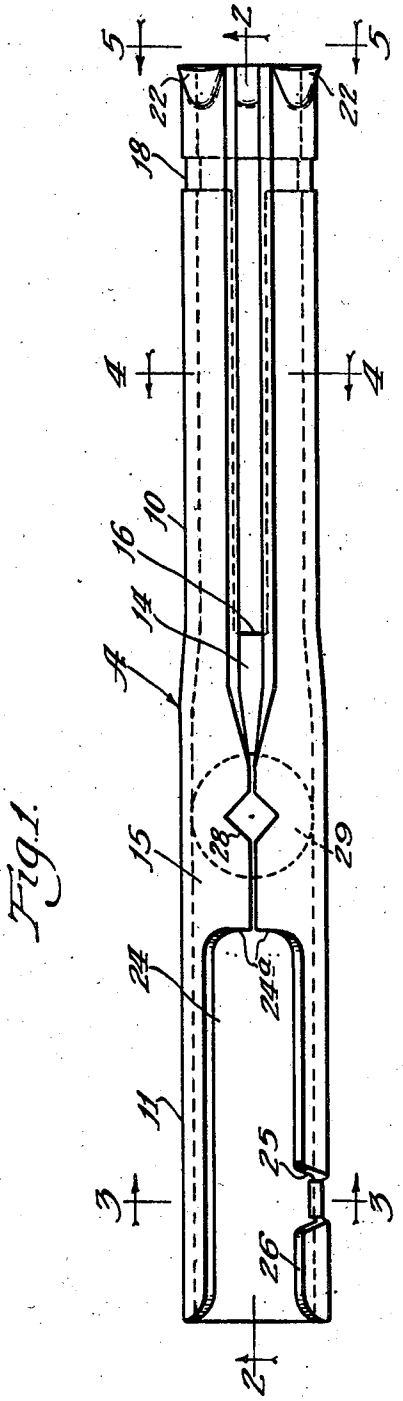


Fig. 1.

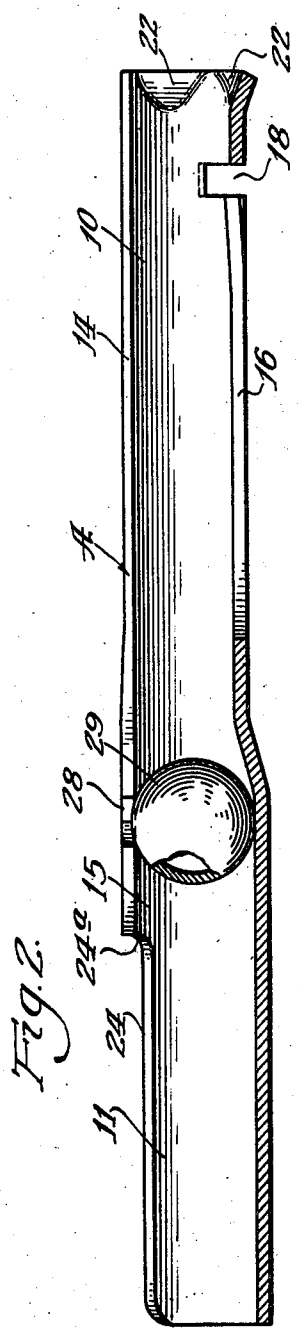


Fig. 2.

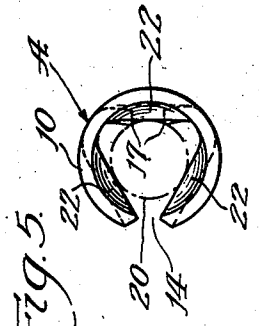


Fig. 5.

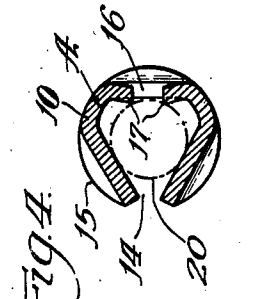


Fig. 4.

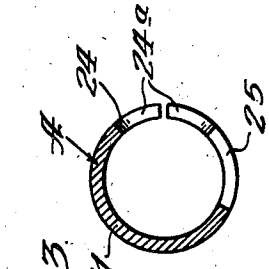


Fig. 3.

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ELECTRICAL SOCKET CONTACT

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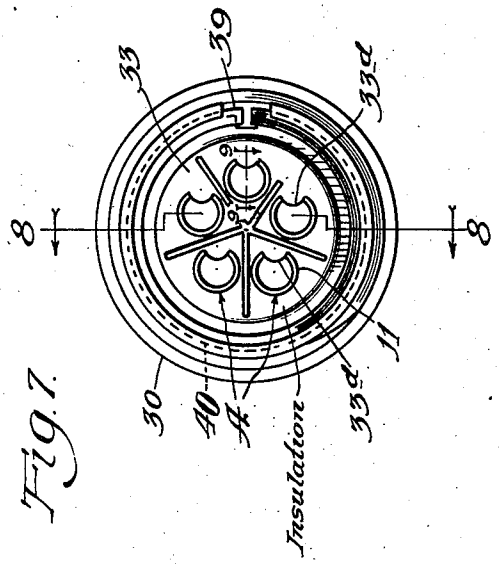


Fig. 7.

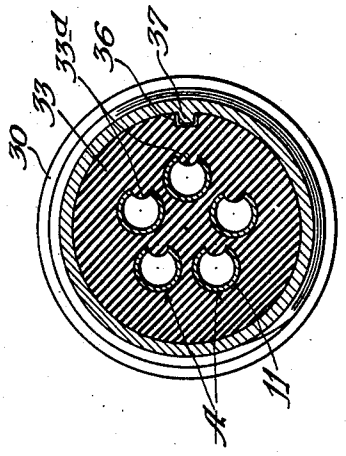


Fig. 10.

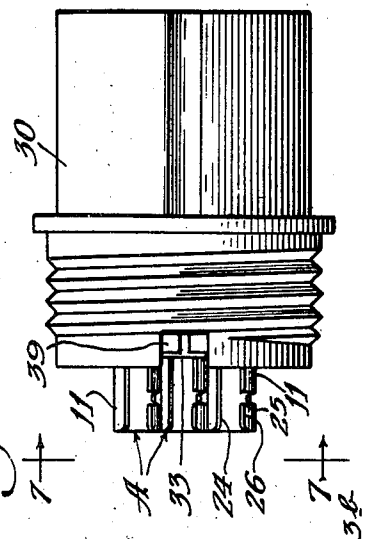


Fig. 6.

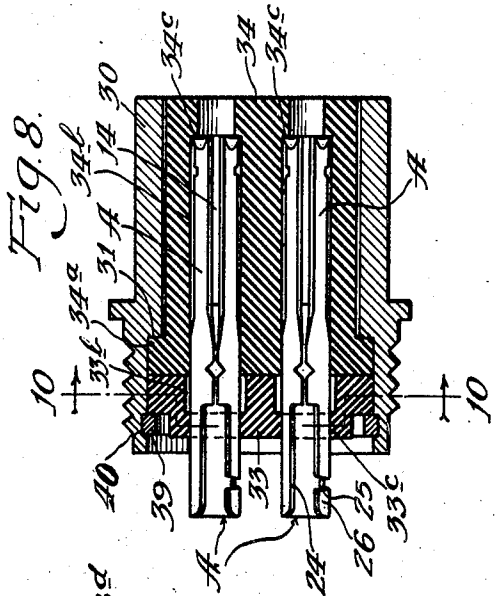


Fig. 8.

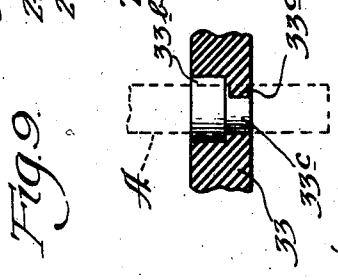


Fig. 9.

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UNITED STATES PATENT OFFICE

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ELECTRICAL SOCKET CONTACT

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Application October 3, 1942, Serial No. 460,593

15 Claims. (Cl. 173—328)

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The present invention relates to axially separable electrical connectors of the general class for conveniently connecting and disconnecting cables or conduits containing one or a multiplicity of conductor wires constituting parts of electrical circuits. Connectors of this general type usually include male and female elements together with suitable detachably connectable means for firmly securing the cooperating elements in connected relation.

More particularly this invention is directed to a novel and improved electrical contact socket or female contact for use in such connectors. Connectors of this general class are adapted to a relatively wide field of use, such as in radio control work, aircraft, industrial machines, and numerous other uses. In certain uses, such as in aircraft, the matter of weight of such connector devices is of considerable importance and it is highly desired, wherever possible, to so construct such devices as to obtain minimum weight without sacrifice of highly desirable operating characteristics such as high efficiency, dependability and serviceability of such devices.

Heretofore, female electrical contacts or sockets for such connectors have usually been made from bar or rod stock or brass or bronze or similar high conductivity metal. Sockets made from solid metal stock require a relatively large number of machining operations. Sockets thus made are relatively costly due to the substantial waste of material, the excessive amount of machine time required, as well as relatively high labor costs. Moreover, due to the large number of machine operations necesary in the making of such sockets, the rate of production is comparatively low per machine and man hour, necessitating the use of a large number of machines and men in order to obtain high production. Furthermore, such sockets made of solid metal are open to the further objection of excessive weight. In present-day aircraft design it is desirable that every item or device used therein be of minimum weight while still retaining requisite strength and the other desirable operating characteristics of the device.

One of the objects of this invention is to provide a novel and improved contact socket of the character indicated which is of relatively light weight and possessing the requisite characteristics of high efficiency, dependability and serviceability.

Another object is to provide an improved socket contact of the character indicated which is formed as a sheet metal stamping, capable of being manufactured at a relatively high rate

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while still possessing to a high degree the various requisite operating characteristics of such contacts.

A further object is to provide an improved socket contact of the character indicated which simplifies and expedites the operation of soldering a terminal portion of a conductor wire thereto.

Still another object is to provide an improved socket contact of the character indicated which is formed as a sheet metal stamping and constructed and arranged to provide substantial resilience and maintenance of uniform pressure when engaged with a cooperating male contact element.

A still further object is to provide an improved socket contact formed as a sheet metal stamping wherein the contact portion thereof is of generally triangular formation for insuring positive electrical contact, with a male contact element, at a multiplicity of spaced apart surface areas.

A still further object resides in the provision of an improved socket contact of the character indicated formed as a sheet metal stamping and incorporating unique constructional features adapted for use with cooperating features of an insulated plug in which it is mounted, by virtue of which the socket contact is held against rotative movement and axial movement in the direction of the terminal portion of the contact.

Other objects and advantages of this invention will be apparent from the following description, taken in connection with the accompanying drawings, in which:

Fig. 1 is an enlarged elevational view of the socket contact embodying the present invention;

Fig. 2 is a longitudinal section through the contact taken as indicated at line 2—2 of Fig. 1;

Figs. 3 and 4 are transverse sectional views through the contact, taken substantially as indicated at lines 3—3 and 4—4 respectively on Fig. 1;

Fig. 5 is a front end elevational view of the contact, taken as indicated at line 5—5 on Fig. 1;

Fig. 6 is an elevational view of a body of a connector element in which the socket contacts embodying the present inventions are assembled;

Fig. 7 is an end elevational view of the assembly, and taken as indicated at line 7—7 on Fig. 6;

Fig. 8 is an axial section through the assembly, taken as indicated at line 8—8 on Fig. 7;

Fig. 9 is a fragmentary sectional view through one of the sections of the insulating plug, showing the seat of special formation for cooperative engagement with my novel socket contact;

Fig. 10 is a transverse sectional view th ugh

the assembly, taken as indicated at line 10—10 on Fig. 8.

While it is to be understood that my novel and improved socket contact embodying the present invention is made up in a relatively wide range of sizes, the particular size represented in the drawings for the purpose of clarity is shown at a scale approximately ten times actual size.

The socket, A, as disclosed in Figs. 1 to 5 inclusive, is formed as a sheet metal stamping of copper or bronze or other material of high electrical conductivity. I prefer, however, to use a sheet metal formed as an alloy of copper containing tellurium, which has been found to be highly suitable for sockets of this type, in that the metal possesses the desirable characteristics of high electrical conductivity together with mechanical strength and ductility as well as adequate resilience.

The socket contact is produced on a punch press by the use of a progressive die, which performs in sequence the several cutting and forming operations.

The socket contact A, as illustrated in Figs. 1 to 5 of the drawings is of generally elongated tubular form including a contact portion 10 and a terminal portion 11. The contact portion 10, comprising approximately one-half the length of the socket, is formed to receive a cooperating male contact element. As may be seen in the drawings, the contact portion of the socket contact is of generally triangular cross section. The socket is blanked and formed in a progressive die from a ribbon of metal of appropriate width, the blank which constitutes the socket being of generally, slightly irregular, rectangular form. Hence, in the final form of the socket the longitudinal edges of the blank, and particularly of the contact portion, are disposed in relatively close, substantially parallel spaced apart relation, thus forming a relatively narrow slit as indicated at 14. The longitudinal edges of the blank of the formed socket, for the part thereof which connects the contact portion and the terminal portion and which for convenience is herein indicated at 15 as the connecting portion, are disposed in substantially abutting engagement.

The opposite or intermediate side wall of the triangular cross section of the contact portion is formed with a longitudinally extending slot 16, which terminates a short distance from the outer end of the contact portion of the socket. The marginal edges of the slot in the intermediate side wall of the triangular shaped terminal portion are depressed inwardly as seen in Fig. 4 of the drawings to provide two knife edge contact surfaces as indicated at 17. Thus by virtue of the slots 14 and 16 the contact portion of the socket is afforded a certain degree of resiliency, and with this thought in mind, I also provide a transverse slot 18, intersecting the slot 16, adjacent its outer end. This transverse slot extends across the entire intermediate wall or side of the triangular contact portion of the socket and terminates a short distance into the other two adjacent or continuous side walls of the contact portion 10. By virtue of this construction, adequate resiliency and flexibility is provided in the body of the contact portion of the socket for insuring and maintaining a uniformly firm grasp upon the male contact element when inserted therein so as to insure the existence of a minimum of electrical resistance incident to the engagement with a male contact. Further, such flexibility and resilience permits accommodating

and compensation for variations in diameter of the male contact element.

It will thus be seen that the male contact element, which is herein designated in dash and dot outline at 20, engages the internal wall of the contact portion of the socket at four circumferentially spaced apart areas. Furthermore, the knife edges 17, on opposite sides of the slot 16, tend to bite into the male contact element for insuring a more certain and positive electrical contact. These knife edges 17, as well as the edges surrounding the slot 18, serve the further function of scraping or cleansing of the male contact element for removing therefrom any accumulated oxidation thereof for insuring a more perfect electrical contact.

The outer end of the contact portion of the socket is flared outwardly by the formation of depressions 22 in the ends of each of the three longitudinally extending areas or sides of the contact portion, which is of triangular cross section. By flaring the outer end of the contact, in effect provides a mouth for guiding and facilitating the entry of the male contact element into the contact portion of the socket and enables the socket to more readily align itself to and accommodate said male contact element.

It is well known that the characteristics of pressure and surface area are the determining factors as to the amount of current to be properly handled through a contact without appreciable overheating. It will therefore be apparent that by virtue of the construction described there is obtained a substantial amount of pressure by reason of the resiliency of the areas intermediate the slots 14, 16 and 18, and that substantial contact area is obtained by reason of the four lines of contact of the interior of the contact portion of the socket with the male contact element 20.

The terminal portion 11 of the socket contact, as well as the interconnecting portion 15, is formed in cross section of substantially circular outline. The terminal portion is formed with a relatively wide elongated slot 24 opening to the rear end of the socket contact, and a transverse slot or notch 25 is formed adjacent the rear end of the socket contact, and opens into the slot 24, so as to form a deformable tab 26. By virtue of this construction the terminal portion of a conductor wire may be freely inserted through and seated in the slot 24, and secured thereto by the pouring of solder into the trough-like form of the terminal portion of the socket contact. To facilitate the soldering operation, the tab 26 may, by the use of a pair of pliers, be folded down upon and squeezed against the terminal portion of the conductor wire for holding it securely in position, preparatory to filling of the trough with solder. This construction is of considerable importance and advantage in high production because all of the terminal portions of the conductor wires, for a multi-contact connector, can be placed and anchored in position in their respective terminal portions of the socket contacts and the soldering operation can then be performed as a continuous operation, in sequence, upon all of the conductor wires and socket contacts.

To facilitate fast soldering of the conductor wires, the interior of the trough of the terminal portion of the contact is preferably silver plated. I prefer however to silver plate the entire socket contact because such plating provides greater conductivity, and moreover, the silver plating

possesses the desirable characteristic of being a good conductor even when oxidized.

The slot 24 in the terminal portion 11 of the socket contact also serves as a keying means for holding the socket against rotation in its mounting. The closed end of the slot forms abutment shoulders as indicated at 24a, which as will hereinafter be described, serves to limit longitudinal movement of the socket contact in its mounting, in a direction toward the terminal portion of the contact.

In the blanking and forming of the socket contact the intermediate or connecting portion 15 thereof is formed to produce a suitable opening 28, which as herein shown as of diamond shape, the function of which is to serve as a seat for a sheet metal ball 29. The ball 29 is automatically fed into place in the socket in the process of forming said socket, just prior to severing of the complete socket from the strip of material as it is passing through the machine. The ball 29 is of a dimension so as to substantially occupy the entire cross sectional area of the intermediate or connecting portion 15 of the socket. The primary function of the ball is to serve as a plug or stop to preclude the passage of molten solder, during the process of soldering the terminal portion of a conductor wire to the terminal portion 11 of the socket contact, from passing up into the contact portion proper of the socket contact. The ball further serves as a stiffening means to prevent collapsing of the contact due to exertion of external pressure, and also tends to maintain proper conformation of the socket contact, so as to obtain uniform gauge and further, to maintain adequate and uniform contact pressure upon the cooperating male contact element.

In the construction disclosed in Figs. 6 to 10 of the drawings I have shown a multiplicity of socket contacts, embodying the present invention, assembled in a part of an electrical connector of the character above indicated. The disclosure in the drawings however is limited to the assembly of the contacts in insulating plugs, encased in a body or container. It is to be understood that in connection with the assembly as illustrated there is also employed a suitable housing for enclosing the terminal portions of the contacts as well as the terminal portions of the conductor wires. There is also usually applied a suitable connector or coupler nut for maintaining the assembly containing the female contact elements in connected relation to an assembly containing the male contact elements.

In the assembly illustrated there is shown a cast metal body 30 of generally tubular cross section which as may be seen in Fig. 8 of the drawings includes two portions of different internal diameters to provide an annular shoulder 31. Disposed within the body 30 is a plug of insulating material composed of two sections as indicated at 33 and 34, the section 33 being dimensioned to fit the larger diameter at the outer end of the body while the section 34 fits into the portion of the body of smaller internal diameter, and is provided with an enlarged end portion as indicated at 34a for seating in the enlarged diameter of the body, and adapted to abut against the annular shoulder 31. To maintain proper registry of the two plug sections 33 and 34 with each other and in a fixed relation to the body 30, the outer marginal edge of the section 33 and the flange 34a of section 34 are formed with a longitudinally extending keyway 36 adapted to register with an

internal key 37 formed in the enlarged diameter portion of the body 30. The two plug sections are held in such assembled relation, within the body, as seen in Fig. 8 of the drawings, by means of a C-clamp or spring ring 39 which is initially compressed so as to be inserted into the outer end of the body 30, and is then permitted to expand for seating into an annular groove 40 formed in the interior of the large internal diameter portion of the body 30, in abutting relation to the outer end of the plug section 33, thus maintaining the two plug sections in a fixed assembled relation with the body 30.

The two plug sections 33 and 34 are formed with a multiplicity of circumferentially spaced apart aligned openings 33b and 34b for accommodating the female socket contacts A. Due to the triangular cross sectional formation of the contact portion 10 of the socket contacts there is substantial clearance provided between said portion of the contact and the wall of the openings 34b so as to permit flexibility and yielding of the walls of the contact portion, and thus in effect provide a floating mounting of the contact. The outer end of the contact portion 10 of the contact A abuts against a shoulder 34c formed in the openings 34b of the plug section 34, adjacent the outer end thereof, and thus serves to preclude forward movement of the contact.

The openings 33b, of plug section 33, terminate at their outer ends in reduced openings 33c, of a cross sectional dimension sufficient for snugly embracing the terminal portion 11 of the socket contact. The turning of the socket contacts in the insulating plugs is highly objectionable as it tends to cause twisting or breaking of the conductor wires, and primarily the soldered connections of such wires. Hence, the outer ends of the openings 33b are reduced to snugly fit the terminal portion of the contact and in the interior of each of the reduced portions of the openings there is formed an internally projecting lug or key 33d adapted to register with the slot 24 of the terminal portion 11 of a socket contact. This construction serves the dual function of precluding rotation of the socket contact in the plug assembly, and precludes rearward axial movement of the socket contact in the plug assembly, by the abutment shoulders 24a engaging the key or lug 33d.

The novel socket contact embodying my invention, is of relatively light weight, while still possessing the highly desirable characteristics of high efficiency, dependability and serviceability, and results in the advantage of affording great convenience and economy in the soldering of the terminal portions of conductor wires thereto when a multiplicity of such contacts are embodied in a multi-contact assembly. Furthermore, such contacts are extremely economical to produce, and relatively high production may be obtained per machine and man hour as compared to production of contacts from solid stock.

Although I have shown and described a preferred embodiment of my invention, manifestly it is capable of modification and rearrangement of constructional features without departing from the spirit and scope thereof. I do not, therefore, wish to be understood as limiting this invention to the precise form herein disclosed, except as I may be so limited in the appended claims.

I claim as my invention:

1. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal stamping formed to provide an

elongated generally tubular body having one end portion formed to receive a cooperating male contact element and the other end portion serving as a terminal for connection to a conductor wire, said socket being blanked and formed to provide a pair of longitudinally extending marginal edges disposed in close spaced apart relation at the contact end portion of the socket, the opposite wall of said contact portion being provided with a longitudinally extending slot, the portion of the body connecting the contact portion and the terminal portion being substantially cylindrical in cross section, and a ball secured in and substantially filling the entire cross sectional area of said connecting portion of the body.

2. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal stamping formed to provide an elongated generally tubular body having one end portion formed to receive a cooperating male contact element and the other end portion serving as a terminal for connection to a conductor wire, said socket being blanked and formed to provide a pair of longitudinally extending marginal edges disposed in close spaced apart relation at the contact end portion of the socket, the opposite wall of said contact portion being provided with a longitudinally extending slot, the portion of the body connecting the contact portion and the terminal portion being substantially cylindrical in cross section, and a ball disposed in and substantially filling the entire cross sectional area of said connecting portion of the body, said connecting portion being formed with a seat for firmly securing said ball in position in the body.

3. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal stamping formed to provide an elongated generally tubular body having one end portion formed to receive a cooperating male contact element and the other end portion serving as a terminal for connection to a conductor wire, the contact end portion of said socket being formed of generally triangular cross section and having a pair of longitudinally extending marginal edges disposed in close spaced apart relation, the wall opposite said edges being provided with a longitudinally extending slot terminating a short distance from the outer end of said contact portion, the portion of the body connecting the contact portion and the terminal portion being substantially cylindrical in cross section, and a ball secured in and substantially filling the entire cross sectional area of said connecting portion of the body.

4. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal stamping formed to provide an elongated generally tubular body having one end portion formed to receive a cooperating male contact element and the other end portion serving as a terminal for connection to a conductor wire, the contact end portion of said socket being formed of generally triangular cross section and having a pair of longitudinally extending marginal edges disposed in close spaced apart relation, the wall opposite said edges being provided with a longitudinally extending slot terminating a short distance from the outer end of said contact portion, and a transverse slot intercepting said longitudinal slot adjacent the outer end of the latter, the portion of the body connecing the contact portion and the terminal portion being substantially cylindrical in cross section, and a ball disposed in and substantially filling the entire cross sectional area of said connecting portion of the body, said connecting portion being formed with a seat for firmly securing said ball in position in the body.

5. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal stamping formed to provide an elongated generally tubular body having one end portion formed to receive a cooperating male contact element and the other end portion serving as a terminal for connection to a conductor wire, said socket being blanked and formed to provide a pair of longitudinally extending marginal edges disposed in close spaced apart relation at the contact end portion of the socket, the opposite wall of said contact portion being provided with a longitudinally extending slot, the terminal portion of the body being provided with a relatively wide longitudinally extending slot opening to the outer end of said portion, to permit disposition of the terminal end of a conductor wire in said terminal portion of the socket, said terminal portion being provided at its outer end with a tab adapted to be folded down into said wide slot to engage the said terminal end of a conductor wire, preparatory to soldering of said wire to the terminal portion of the socket, and means secured within the tubular socket body constituting a partition between the contact portion and the terminal portion of said body, and serving as a plug to preclude passage of solder or the like from the terminal portion into said contact portion of the socket body.

6. In an electrical connector, the combination of a plug of insulating material formed with a longitudinal opening, an electrical contact socket seated in said opening, said socket being a sheet metal stamping in the form of an elongated tubular body having one end portion formed to receive a cooperating male element and the other end portion serving as a terminal for connection to a conductor wire, the outer end of said terminal portion extending beyond the end of said plug, said terminal portion of the body being provided with a relatively wide longitudinally extending slot opening to the outer end of said portion, to constitute a trough to permit convenient disposition and anchorage of a terminal end of a conductor wire in said trough beyond the plug, the opposite end of said slot terminating in a transverse shoulder adapted to abut against a cooperating shoulder formed in said opening of the plug to limit axial movement of said socket in the direction of said terminal end portion.

7. In an electrical connector, the combination of a plug of insulating material formed with an axial opening, an electrical contact socket seated in said opening, said socket being a sheet metal stamping in the form of an elongated tubular body having one end portion formed to receive a cooperating male element and the other end portion serving as a terminal for connection to a conductor wire, the outer end of said terminal portion extending beyond the end of said plug, said terminal portion of the body being provided with a relatively wide longitudinally extending slot opening to the outer end of said portion, to permit convenient disposition and anchorage of a terminal end of a conductor wire in said portion extending beyond the plug, the opposite end of said slot terminating in a transverse shoulder, the opening in said plug having an inwardly extending lug adapted to be telescoped into said slot of the terminal portion of the socket and abut said shoulder for precluding rotative movement

of the socket relatively to said plug and limiting axial movement of said socket in the plug in the direction of said terminal portion.

8. In an electrical connector, the combination of a plug of insulating material, composed of two cooperating sections, and formed with longitudinally aligned openings and an electrical contact socket seated in said aligned openings, said socket comprising an elongated tubular body having one end portion formed to receive a cooperating male contact element and the other end portion serving as a terminal for connection to a conductor wire, the outer end of said terminal portion extending beyond the end of said plug, said terminal portion of the body being provided with a relatively wide longitudinally extending slot opening to the outer end of said portion to constitute a trough, to permit convenient disposition and anchorage of a terminal of a conductor wire in said trough beyond the plug, the opposite end of said slot terminating in a transverse shoulder adapted to abut against a cooperating shoulder formed in the opening in the adjacent plug section to limit axial movement of said socket in the direction of said terminal end portion.

9. In an electrical connector, the combination of a plug of insulating material, composed of two cooperating sections, and formed with longitudinally aligned openings and an electrical contact socket seated in said aligned openings, said socket comprising an elongated tubular body having one end portion formed to receive a cooperating male contact element and the other end portion serving as a terminal for connection to a conductor wire, the outer end of said terminal portion extending beyond the end of said plug, said terminal portion of the body being provided with a relatively wide longitudinally extending slot opening to the outer end of said portion to constitute a trough, to permit convenient disposition and anchorage of a terminal of a conductor wire in said trough beyond the plug, the opposite end of said slot terminating in a transverse shoulder, the opening formed in the adjacent plug section having an inwardly extending lug adapted to be telescoped into said slot of the terminal portion of the socket and abut against said shoulder to preclude rotative movement of the socket relatively to the plug and limiting axial movement of said socket in the plug in the direction of said terminal portion.

10. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal blank formed to provide an elongated generally tubular body having one end portion formed to receive a cooperating contact element and the other end portion formed to serve as a terminal for connection to a conductor wire, said socket being blanked and formed to provide a pair of longitudinally extending marginal edges disposed in close spaced apart relation at the contact end portion of the socket, the opposite wall of said contact portion being formed with a longitudinally extending slot terminating a distance from the outer end of said contact portion of the socket to provide a pair of spaced knife edges for line engagement with a cooperating element.

11. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal blank formed to provide an elongated generally tubular body having one end portion formed to receive a cooperating contact element and the other end portion formed to serve as a terminal for connection to a conductor

wire, the contact end portion of said socket being in the form of an equilateral triangle in cross section and having the longitudinally extending marginal edges of the blank disposed in closed spaced apart relation at one corner of the triangle, the center of the wall opposite said edges being provided with a longitudinally extending slot terminating a short distance from the outer end of said contact portion to provide a pair of inturned spaced knife edges for line engagement with a cooperating contact element.

12. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal blank formed to provide an elongated generally tubular body having one end portion formed to receive a cooperating contact element and the other end portion formed to serve as a terminal for connection to a conductor wire, the contact end portion of said socket being in the form of an equilateral triangle in cross section and having the longitudinally extending marginal edges of the blank disposed in closed spaced apart relation at one corner of the triangle, the center of the wall opposite said edges being provided with a longitudinally extending slot terminating a short distance from the outer end of said contact portion to provide a pair of inturned spaced knife edges for line engagement with a cooperating contact element, the wall opposite said edges also being formed with a transverse slot adjacent the outer end of said longitudinal slot.

13. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal blank formed to provide an elongated generally tubular body having one end portion formed to receive a cooperating contact element and the other end portion formed to serve as a terminal for connection to a conductor wire, the contact end portion of said socket being formed of generally triangular cross section, the terminal end portion being trough-shaped, and the intermediate portion being circular in cross section, and a pair of longitudinally extending marginal edges disposed at one corner of the triangular section of the contact end portion and in close relation throughout the contact end portion and the intermediate portion.

14. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal blank formed to provide an elongated generally tubular body having a contact end portion formed to receive a cooperating contact element and a terminal end portion for connection to a conductor wire, said socket being blanked and formed to provide a pair of longitudinally extending marginal edges disposed at one corner of the triangular section of the contact end portion and in close relation intermediate the contact end portion and the terminal end portion of the socket, and plug means provided within the tubular socket body at that portion thereof intermediate the contact end portion and the terminal end portion.

15. An electrical contact socket for electrical connectors of the character described, comprising a sheet metal blank formed to provide an elongated generally tubular body having one end portion formed to receive a cooperating contact element and the other end portion formed to serve as a terminal for connection to a conductor wire, the contact end portion of said socket being formed of generally triangular cross section, the terminal end portion being trough-shaped, and the intermediate portion being circular in cross

section, and a pair of longitudinally extending marginal edges disposed at one corner of the triangular section of the contact end portion and in close relation throughout the contact end portion and the intermediate portion, and plug means provided within the intermediate portion of the socket body.

JULES K. CHENIER.

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