

Oct. 19, 1948.

E. L. SCOTT

2,451,982

ELECTRICAL PLUG AND SOCKET

Filed Jan. 31, 1945

Fig. 1.

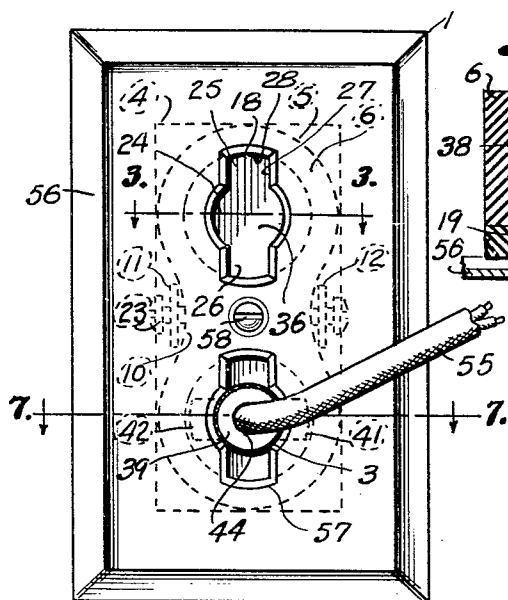


Fig. 2.

Fig. 3.

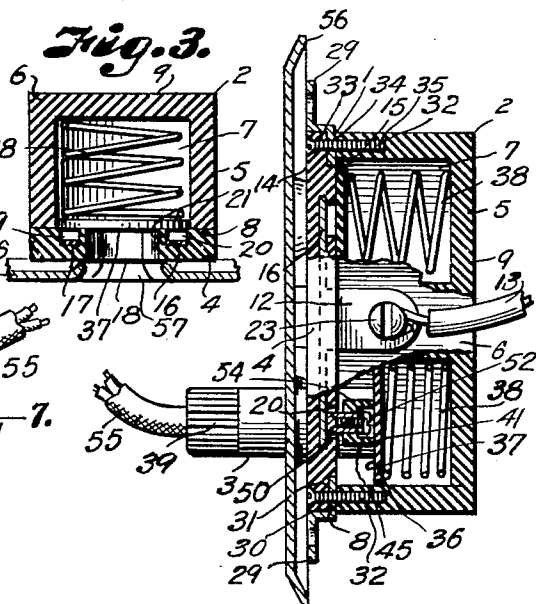


Fig. 4.

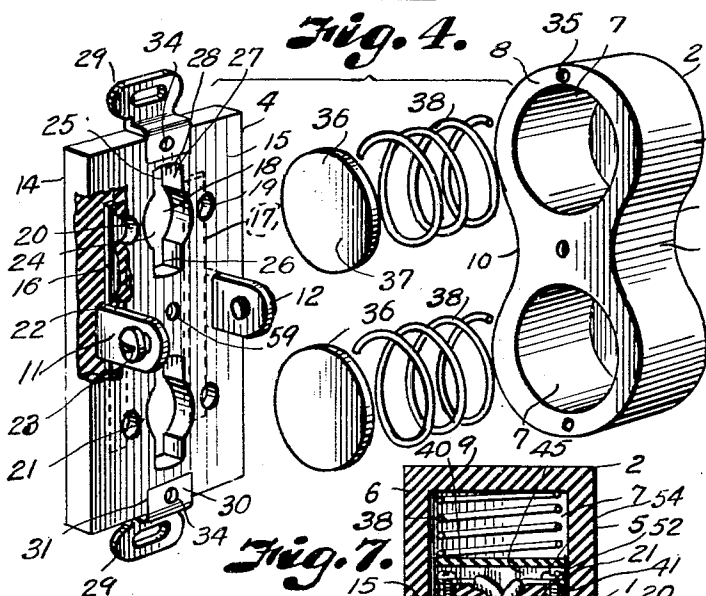


Fig. 5.

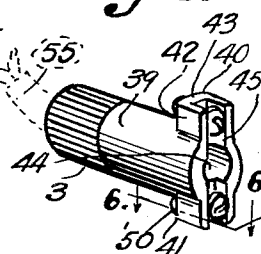


Fig. 6.

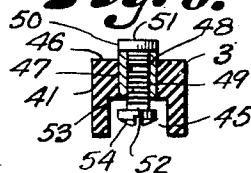
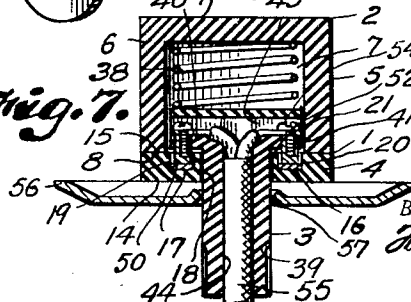


Fig. 7.



INVENTOR.

Eben L. Scott.

BY Fishburn & Mullendore

ATTORNEYS

UNITED STATES PATENT OFFICE

2,451,982

ELECTRICAL PLUG AND SOCKET

Eben L. Scott, Mission, Kans.

Application January 31, 1945, Serial No. 575,391

2 Claims. (Cl. 173—330)

1

This invention relates to electrical connectors, particularly plug and socket members for use in connecting various appliances or the like in an electric circuit and has for its principal object to provide a structure wherein the live contacts are substantially inaccessible through the plug inlet of the socket member, thereby eliminating possibility of short circuits caused by metal objects being thrust into the socket.

Further objects of the invention are to provide a connector constructed to prevent accidental displacement of the plug member by pulling or jerking on the electric cord connected thereto; to provide a plug and socket construction which maintains positive electrical contact when the plug is inserted in the socket for assuring full line current to an appliance served thereby and avoiding arcs and radio interference ordinarily caused by loose contacts; to provide a structure wherein the plug completely closes the socket opening when electrical contact is being established; and to provide a connector of relatively simple and inexpensive construction.

In accomplishing these and other objects of the invention as hereinafter pointed out, I have provided improved structure, the preferred form of which is illustrated in the accompanying drawing wherein:

Fig. 1 is a face view of an electrical connector constructed in accordance with the present invention.

Fig. 2 is a vertical section through the connector, a part being shown in elevation to illustrate connection of an electrical service wire thereto.

Fig. 3 is a fragmentary cross section on the line 3—3 of Fig. 1 particularly illustrating the manner of closing access to the live contacts when the plug member is removed from the socket member.

Fig. 4 is a perspective view of the parts of the socket member shown in disassembled spaced relation to better illustrate the construction thereof.

Fig. 5 is a perspective view of the plug member.

Fig. 6 is a section through one of the contacts of the plug member taken on the line 6—6 of Fig. 5.

Fig. 7 is a horizontal section through the connector on the line 7—7 of Fig. 1 showing the plug in position in the socket for establishing an electrical connection.

Referring more in detail to the drawings:

1 designates an electrical connector embodying the features of the present invention and

2

which includes a socket member 2 and a plug member 3. The socket member 2 is preferably formed in two sections 4 and 5 composed of insulating material such as a plastic that is readily formable to desired shape. The member 5 includes a body 6 having one or more preferably cylindrical recesses 7 opening from a face side 8 thereof but terminating short of the opposite face 9 to provide an insulating wall completely surrounding the recess.

The connector illustrated is of duplex type, and, therefore, the member 5 includes two recesses 7 located with their axes in parallel relation and spaced apart by a constricted portion 9 as best shown in Fig. 4. The outer contour of the member 5 is preferably shaped to conform to the recesses and the sides intermediate the recesses are curved inwardly as at 10 to form the portion 9 and to accommodate terminals 11 and 12 for connection with the leads 13 of an electric circuit as later described.

The section 4 constitutes a cover for the section 5 and is of a size to cover the face side 8 of the section and to carry the terminals 11 and 12 so that they lie adjacent the curved faces 10 and are contained within the limits of the section 5.

In the illustrated instance the cover 4 is substantially rectangular and has sufficient thickness between the front and rear faces 14 and 15 thereof to thoroughly insulate contact strips 16 and 17 and provide ample strength in resisting pulling forces on an electric cord connected therewith through a plug member 3. The contact strips 16 and 17 are disposed on opposite sides of plug inlet openings 18 which register with the recesses 7. The strips 16 and 17 are of a length to intersect recesses 19 and 20 formed inwardly from the rear faces 15 and which are spaced from the openings 18 to provide sufficient insulating material 21 therebetween for thoroughly insulating the contact strips and prevent any contact therewith except from the direction of the rear face 15 of the cover member 4. The terminals 11 and 12 are preferably integral with the contact strips and turned laterally therefrom as at 22 to project from the rear face 15 of the cover section a sufficient distance to accommodate screws 23 for connection of the service wires 13 of an electric circuit as indicated in Fig. 2. The openings 18 have central cylindrical portions 24 located coaxially with the recesses 7 and extending therefrom are notch portions 25 and 26 of less width than the diameter of the cylindrical portions.

The notches have relatively parallel side faces 27 joined with arcuate faces 28 formed on a radius corresponding to the radius of the recesses 7. The recesses 19 and 20, while being spaced from the inlet openings, are located within the limits of the recesses 7 as shown in Fig. 3.

It is thus obvious that the contact strips are exposed only through the recesses 19 and 20 and when the sections are connected together any access to the contacts must be attained from within the recesses 7 and from the rear face of the cover section 4. The cover section 4 carries ears 29 at the ends thereof for attachment of the socket member within a conventional box (not shown).

The ears 29 are preferably formed of metal and have anchoring portions 30 inset within recesses 31 provided on the rear face of the cover section 4 so that when the cover section is secured to the section 5 the anchoring portions are clamped therebetween as shown in Fig. 2. The sections of the socket member are secured together by fastening devices such as screws 32 that extend through openings 33 in the cover section, registering openings 34 in the anchoring portions of the ears, and into threaded openings 35 formed in the section 5.

Contained within the recesses 7 are closures 36 for the plug inlet openings. The closures 36 are of disc-like form and of a diameter to be freely movable axially of the recesses and to extend over the contact recesses 19 and 20 through which the contact strips 16 and 17 are exposed. The front faces 37 of the closures conform to the rear face 15 of the front section 4 so that when engaged therewith there is no space occurring about the margin of the plug inlet openings. The closures are yieldingly retained in closing position by coil springs 38 also contained within the socket recesses 7 and having one end bearing against the bottoms thereof and their opposite ends against the rear faces of the closure discs, as shown in Figs. 2 and 3, to urge the discs in closing position and to establish positive pressure on the plug 3 for assuring positive contact with the contact strips.

The plug 3 includes a substantially cylindrical body 39 of substantially the diameter of the cylindrical portion of the inlet openings and having laterally extending lugs 40 and 41 diametrically arranged with respect to each other as shown in Fig. 5. The lugs 40 and 41 have flat side faces 42 (Fig. 5) to pass between the faces 37 of the notch portions 25-26 and arcuate end faces 43 to pass between the arcuate faces 28 of the notches so that the plug is readily insertable through either one of the inlet openings of the cover section when the lugs on the plug are aligned with the notch portions of one of the openings. The cylindrical body portion of the plug has an axial bore 44 opening therethrough and which intersects a transverse groove 45 provided in the rear face of the lugs as shown in Fig. 5. Formed in each lug and extending from the bottom of the recesses to the outer faces 46 of the lugs are openings 47 (Fig. 6) mounting metal bushings 48 having internally threaded openings 49 therein to mount contacts 50 having face portions 51 adapted to engage the exposed portions of the contact strips through the recesses 19 and 20. The faces 51 of the contacts are, therefore, spaced a slightly greater distance from the front faces of the lugs than the depth of the recesses as shown in Fig. 7 so as to assure contact. The threaded openings also mount screws 52 that have

the shank portion 53 inserted from the opposite ends of the bushings with the heads 54 positioned within the transverse groove. The electrical cord 55 is passed through the boss of the plug and the conductors therein are extended laterally through the groove 45 to be anchored by the screws 52 to the contacts.

In assembling a socket member constructed as described, the springs 38 are inserted in the recesses 7 of the section 5 followed by the closure plates 36. The ears 29 are then applied to the ends of the cover section 4 so that the anchor portions 30 thereof lie within the recesses 31. The cover section 4 is then applied over the face 15 side of the section 5 with the terminals 11 and 12 passing over the sides of the section 5. The screws 32 are then inserted to complete the assembly of the socket element. The leads 13 form an electric circuit and are connected by the screws 23 with the terminals 11 and 12 and the socket element is pushed into the box for attachment therein as in conventional manner. The box is then preferably covered by an ornamental cover plate 56 of conventional design except that the plug openings 57 thereof conform in shape to the inlet openings of the cover section 4. The cover plate 56 is secured in position by a fastening device 58 extending through an opening thereof and engageable in a threaded opening 59 in the cover section.

In using the connection, the plug 3 is inserted into one of the openings 18 by holding it in position so that the lugs 41 and 42 thereon register with the notch portions 25 and 26 of the opening. When in registering position, the plug is pushed through the opening so that it bears upon the closure disc 36 and additional pressure on the plug moves the disc 36 away from seating contact with the rear face 15 of the cover section 4. When the contacts 50 have cleared the cover section the plug is rotated to bring the lugs thereon in registry with the recesses 19 and 20. Then, upon releasing pressure, the stored up tension in the coil spring 38 presses the disc 36 against the plug and effects sufficient outward movement thereof for the contacts to enter the recesses 19 and 20 and engage the contact strips 16 and 17 thereby making a positive electrical connection with the electric circuit to which the connector is attached. When thus engaged, it is impossible to remove the plug without exerting sufficient pressure in opposition to the spring 38 for moving the contacts out of the recesses 19 and 20. Even then, it is necessary to rotate the plug to bring the lugs thereon into registry with the notch portions 25 and 26 of the inlet openings before the plug can be removed. As the plug is removed, the spring urges the closure disc in following contact with the end of the plug so that by the time the plug completely closes the inlet opening and is being withdrawn therethrough, the closure plate seats against the inner face of the cover section and this is before the plug has been removed from closing relation with the opening.

From the foregoing it is obvious that I have provided an electrical connector of simple and relatively inexpensive construction that is safe and dependable and which cannot be short circuited by objects accidentally inserted into the socket.

It is also obvious that when the connection is made the plug member cannot be accidentally removed by pulling or jerking upon the cord connected therewith.

What I claim and desire to secure by Letters Patent is:

1. In a device of the character described, a socket element having a recess therein, insulating means covering said recess and provided with a plug inlet opening including a circular portion substantially coaxial with the socket and substantially oppositely arranged radial notch-like portions, said insulating means having seating faces at the sides of the circular portion and facing said recess and having contact exposing recesses within and completely surrounded by said seating faces, contact elements within said insulating means and exposed through said recesses in the seating faces, a closure member in said socket-like recess and having marginal portions contacting the face portions completely around the contact exposing recesses to completely cover the exposed portions of the contacts, and a coil spring in the socket recess and bearing substantially circumferentially of said marginal portions for urging the closure member into contact with said seating faces.

2. In a device of the character described, a socket element having a recess therein, insulating means covering said recess and provided with a plug inlet opening including a circular portion substantially coaxial with the socket and radial notch-like portions, said insulating means having seating faces at the sides of the circular portion and facing said recess and having contact exposing recesses within and surrounded by said seating faces, contact elements within said insulating means and exposed through said recesses in the seating faces, a closure member in said

socket-like recess and having marginal portions contacting the face portions completely around the contact exposing recesses to completely cover the exposed portions of the contacts, a coil spring in the socket recess and bearing substantially circumferentially of said marginal portions for urging the closure member into contact with said seating faces, and a plug member having a head conforming to said circular portion of the plug inlet opening and having radially directed lug portions adapted to pass through the notch-like portions when the closure member is depressed against action of the spring and having contact elements for substantially filling said contact exposing recesses, said lugs having marginal portions surrounding the contact elements to close said contact exposing recesses when the plug member is in position in the socket element.

EBEN L. SCOTT.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,509,839	Kuhn	Sept. 30, 1924
2,102,625	Hubbell	Dec. 21, 1937
2,230,658	Stull	Feb. 4, 1941
2,312,017	Ackerman	Feb. 23, 1943

FOREIGN PATENTS

Number	Country	Date
27,585	Great Britain (1903)	Feb. 25, 1904