Oct. 25, 1949. F. N. ERVIN 2,486,013

ELECTRICAL CONNECTOR

Filed Feb. 7, 1947

Fig. 1.

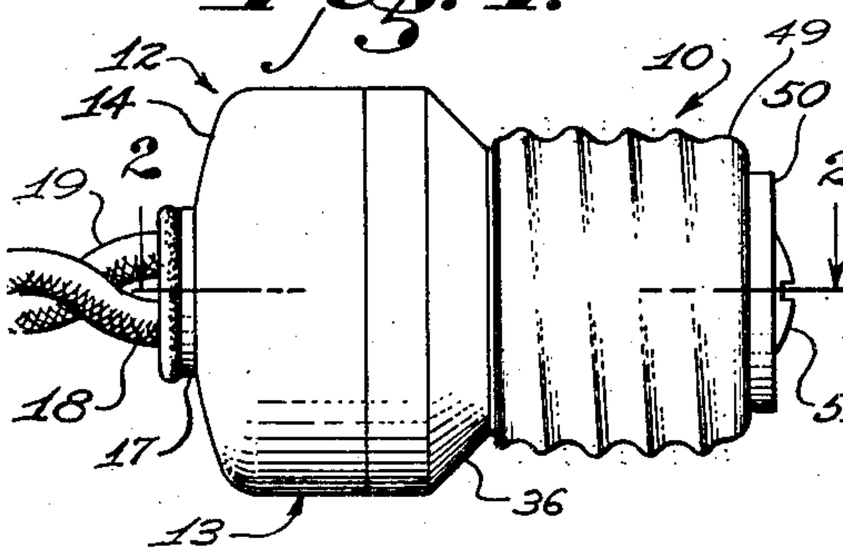


Fig. 2.

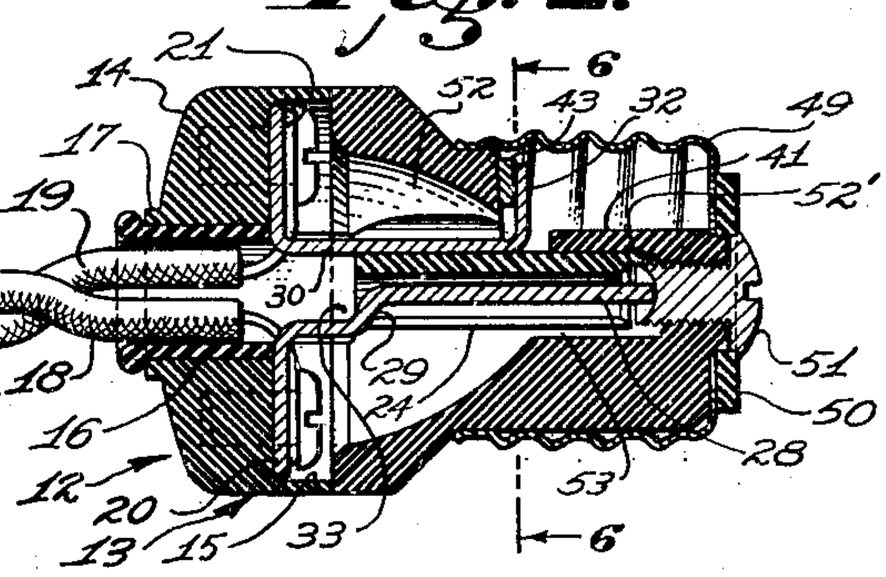


Fig. 3.

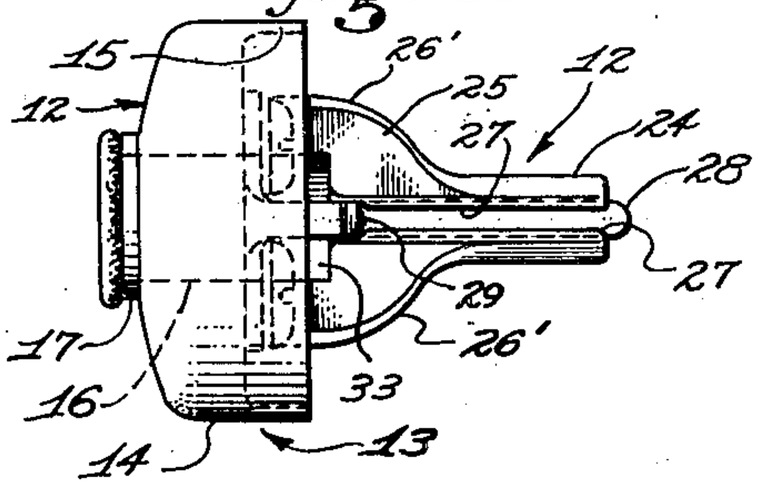


Fig. 4.

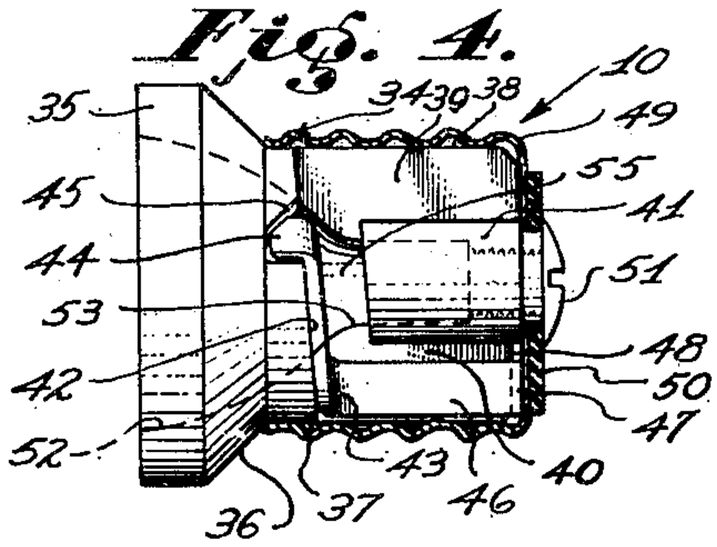


Fig. 5.

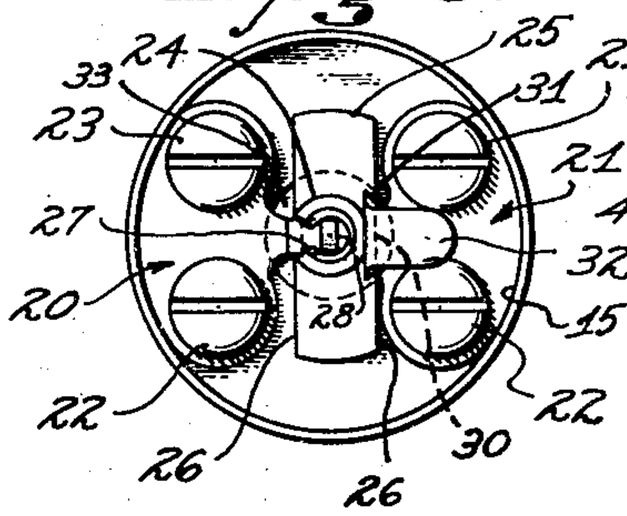


Fig. 6.

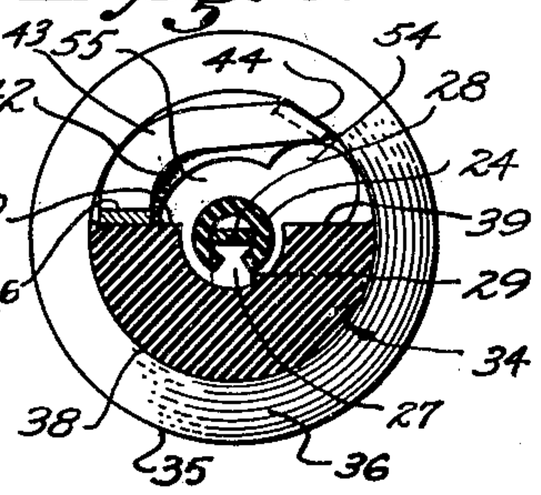


Fig. 7.

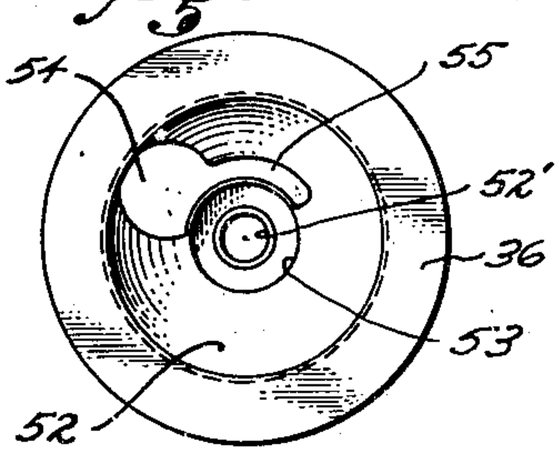


Fig. 9.

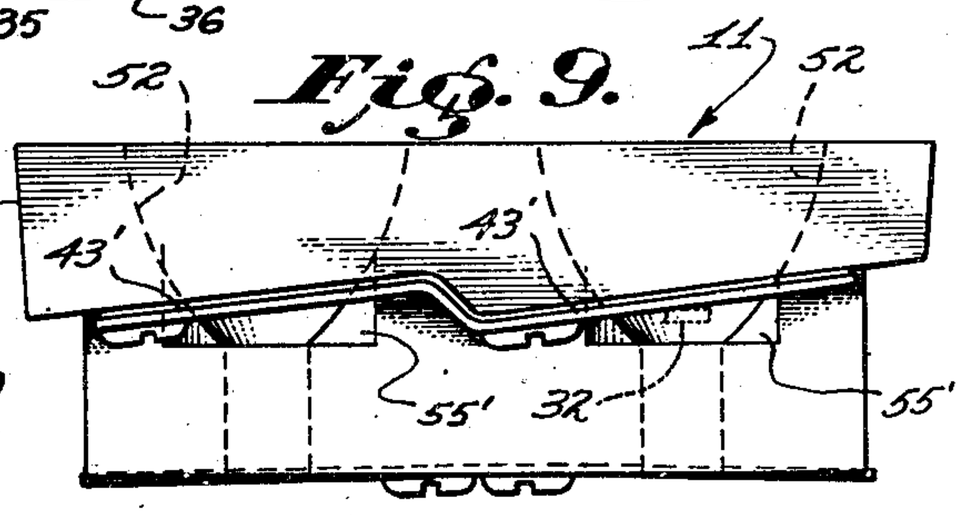
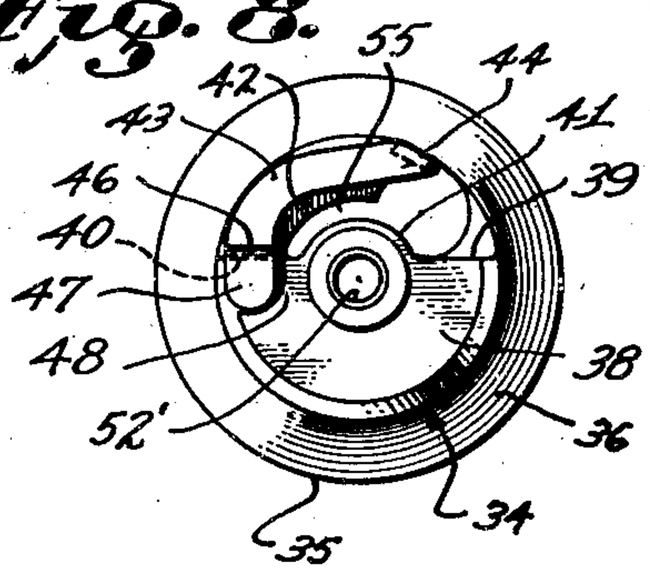


Fig. 8.



INVENTOR
FRANCIS N. ERVIN
BY James M. Abbett
ATTORNEY

Patented Oct. 25, 1949

2,486,013

UNITED STATES PATENT OFFICE

2,486,013

ELECTRICAL CONNECTOR

Francis N. Ervin, Wilmar, Calif.

Application February 7, 1947, Serial No. 727,183

3 Claims. (Cl. 173—343)

1

This invention relates to electrical equipment, and particularly pertains to an electrical connector.

At the present time it is common practice to connect electrical conduits by means of a plug and socket arrangement. Some forms of the invention are embodied in portable plugs and sockets, and other forms are embodied in structures in which the socket is fixed in the wall or the like and a plug may be removably attached thereto. In most commercial structures of this type the plug is formed with two separate contact terminals which are inserted into spaced openings in the socket and are engaged by yieldable socket terminals. In the use of such structures it is difficult to properly register the contact fingers of the plug with the socket openings. This is particularly true when the socket is mounted in the wall near the floor or is in some other position where it is difficult to view the plug and the socket while attempting to place them in operative relation to each other. It is desirable, therefore, to provide a plug and socket connection which may be easily connected or disconnected, and which does not require any close scrutiny of the parts in order to place them in their connected position or to separate them therefrom. It is the principal object of the present invention, therefore, to provide a socket structure which has a plug receiving opening into which the complementary end of an electrical plug may be inserted and after which the parts may be manipulated relative to each other to place the terminals of the two elements in electrical connection and to hold them temporarily in a locked position, the structure being so designed as to make the operation possible without looking at the parts.

The present invention contemplates the provision of an electrical socket structure within which two electric terminals are provided for connection with conductors, the said socket structure having a central opening to receive a complementary plug element which carries two electric terminals connected with other electric conductors, the plug and socket being designed so that when the members are in their properly assembled position relative rotation will temporarily lock the parts together and maintain electrical contact between the terminals of the plug and socket.

The invention is illustrated by way of example in the accompanying drawing in which:

Figure 1 is a view in elevation showing the invention as embodied in portable plug and socket structures.

2

Fig. 2 is a view in central longitudinal section as seen on the line 2—2 of Fig. 1 and shows the assembled relationship of the plug and socket.

Fig. 3 is a view in side elevation showing the plug structure.

Fig. 4 is a view in side elevation showing the socket structure with its threaded sleeve indicated in section.

Fig. 5 is a view in end elevation showing the plug structure as viewed from its inner end.

Fig. 6 is a view in transverse section through the assembled plug and socket as seen on the line 6—6 of Fig. 2 and shows the relationship of the electric terminals therein.

Fig. 7 is a view in end elevation showing the socket as viewed from its outer end.

Fig. 8 is a view in end elevation showing the socket as seen from its inner end and with its threaded sleeve, washer and screw removed for sake of clarity.

Fig. 9 is a view in side elevation showing a form of socket structure suitable for use in a wall in order to provide an electrical outlet.

Referring more particularly to the drawings, 10 indicates a socket structure of the portable type, and 11 indicates a socket structure adapted to be fixed in position. A plug which may be used with either type of socket is indicated at 12. The plug comprises an outer cylindrical portion 13 which is cup-shaped and has an outer relatively heavy end wall 14. The portion 13 is formed with an annular inwardly extending wall 15. Extending through the end wall 14 is an opening 16 which at its outer end is formed with a circumscribing lip 17. The opening is designed to receive electric conductors 18 and 19. One of these conductors is designed to be attached to a terminal member 20 within the cup-shaped portion 13 of the plug, and the other is designed to be attached to a terminal member 21 disposed within the same portion of the plug and spaced diametrically opposite therefrom. It is to be understood that the body structure of the plug is formed of dielectric material, and that the body structures of both of the sockets 10 and 11 are formed of similar material. In the plug, therefore, the terminals 20 and 21 and their screws 22 and 23 are the only metallic parts in the structure. Extending inwardly and axially of the plug is a stem structure 24. This structure has a widened base portion 25 which is formed integral with the plug and has opposite flat sides 26, as shown in Fig. 5 of the drawing.

The stem itself is tubular and has a longitudinal slot 27 extending down one side and continuing along one of the flat faces 26 of the portion 25. Extending lengthwise of the stem is a contact finger 28 which is formed integral with the terminal member 20 and is disposed at right angles thereto. As shown in Fig. 2 of the drawings, it will be seen that there is an offset length 29 in the contact finger 28. This provides slight flexibility of the finger and permits the main longitudinal length of the finger to yield axially of the plug. Positioned upon the diametrically opposite face 26 of the portion 25 is a terminal extension 30 which is disposed at right angles to the terminal 21 and is formed integral therewith. This extension lies within a groove 31 formed in the face 26, and at the end of the extension 30 an outturned contact finger 32 is formed. An opening 33 is formed across the base of the portion 25 and accommodates electric conductors which are led out from the central bore 16 in the end of the plug. It is to be understood that the screws 22 are provided to hold the terminal structures 20 and 21 in position, and that the screws 23 are provided to receive the ends of the conductors 18 and 19.

The unit as thus described provides a plug which may be inserted into either of the sockets 10 or 11. The fundamental features of these two types of sockets is the same, and the type indicated by the numeral 10 will therefore be described in detail, with the understanding that the parts embodied in the structure 11 are for the most part identical.

The sockets are made of dielectric material. The socket 10 has a body portion 34 formed by an outer cylindrical portion 35 having a frustoconical length 36 communicating with a cylindrical extension 37, parts of which are cut away as will be hereinafter explained. The cylindrical portion 35 is of a diameter agreeing with the outside diameter of the portion 13 of the plug 12, as particularly shown in Fig. 1 of the drawing. The cylindrical extension 37, which is of reduced diameter, comprises a semicircular portion 38 defined at its opposite ends by axially extending radial faces 39 and 40. The inner ends of the faces 39 and 40 join the outer faces of a cylindrical portion 41 which is of materially reduced diameter as compared with the portion 38. The cutaway side of the cylindrical portion 37 terminates with an inclined or helical face 42. This face receives an arcuate contact member 43 which is formed of metal. One end of this contact member has an outturned tang 44 which seats within a recess 45 in the face of the cylindrical portion 37. The other end is bent substantially at right angles to the member 43 and provides a terminal extension 46 which extends longitudinally of the portion 37 of the socket and rests against the radial face 40. Its outer end is provided with an inturned tang 47 which rests within a recess 48 in the end of the cylindrical portion 37 of the socket. Ftting over the cylindrical portion 37 of the socket is the usual threaded metal sleeve 49 by which this socket may be screwed into the conventional threaded socket. Over the end of the sleeve 49 is a washer 50 held in position by a screw 51 which engages a threaded bore 52 extending axially of the cylindrical portion 37 and at the outer end thereof. This screw holds the end of the sleeve 49 in electrical contact with the tang 47. The screw itself also provides electrical contact with the end of the terminal finger 28 carried by the plug when the plug

has been forced inwardly to its extreme position with relation to the socket.

The inclined terminal element 43 is provided to make electrical connection with the outturned contact finger 32 carried by the plug. It is obvious, however, that since the contact finger 32 extends radially with relation to the axis of the plug and socket an opening must be provided through the wall of the cylindrical portion 37 of the socket to permit the contact finger 32 to swing over and engage the inclined face of the contact extension portion 43 which lies along the inclined face 42. It should be pointed out that the interior of the body 34 of the socket is formed with an inwardly tapered bore 52 which is relatively large at its outer end. The wall of this tapered bore agrees substantially with the faces 26' of the base portion of the stem 24. At the reduced inner end of the tapered bore 52 is a cylindrical bore 53 which receives the tubular portion 24 of the stem. As shown in Fig. 7 of the drawing a radial opening 54 is cut through the tapered portion and terminates in an arcuate slot 55 which is concentric with the axis of the socket. The radial opening is of sufficient dimensions to permit the contact finger 32 to pass downwardly through the opening 54 into the arcuate slot 55, after which clockwise rotation of the plug 10 will move the contact finger 32 over the face of the contact member 43 to draw the plug and socket together and to hold them frictionally against separation.

In the form of the invention shown in Fig. 9 of the drawing the socket structure is indicated with two openings 52. The socket is constructed as previously described but in this case inclined slots 55' are formed in the block 56 to accommodate the contact fingers 32 which may move along contact elements 43'.

In operation of the present invention and with particular reference to the plug 12 and a socket structure 10, the stem 24 of the plug 12 is inserted into the tapered bore 52 of the socket. The plug is manipulated until the contact finger 32 registers with the slotted opening 54, after which the plug and socket may be forced together, as shown in Fig. 1. When the contiguous shoulders of the plug and socket are in a substantially abutting relation the plug may be rotated in a clockwise direction with relation to the socket. This will move the contact finger 32 along the slotted opening 55 and will force it to ride up on the inclined surface of the member 43. At the same time the end of the contact finger 28 carried by the plug will engage the end of the screw 51 to complete an electric circuit from conductors 18 and 19 to conductors within the socket into which the socket member 10 is screwed.

It will thus be seen that the structure here disclosed provides a simple electrical connector which comprises a few parts and which may be easily assembled and disassembled as required.

While I have shown the preferred form of my invention as now known to me, it will be understood that various changes may be made in combination, construction and arrangement of parts by those skilled in the art, without departing from the spirit of the invention as claimed.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. An electrical connector comprising; a pair of detachable members constituting a plug and a socket, the plug having a dielectric body portion formed with a relatively long, slender, hollow open sided stem projecting axially of the body and terminating in an open cylindrical end portion, a

pair of detachable contact members carried by said body, one mounted within said stem and projecting from the open cylindrical end portion thereof and the other extending axially along the outer face of the stem and terminating midway of the stem in a radially disposed contact end lying in a plane normal to the axis of the stem, the socket comprising a body having an inwardly tapering bore adapted to guide the stem towards axial alignment with the plug terminating in an inwardly spaced cylindrical portion of relatively small diameter adapted to receive the cylindrical end of the stem and having an intermedial helical surface radially disposed with respect to the stem axis adapted to receive thereover the radially disposed contact end, a detachable electrical contact member mounted within the cylindrical portion adapted to engage the contact mounted within the stem and a detachable electrical contact mounted on said shoulder.

2. The structure of claim 1 in which the intermediate shoulder is a segment of the body and constitutes the outer terminal end of the body at such segment.

3. The structure of claim 1 in which the tapering base of the body is interrupted by a radial slot having an arcuate extension to permit entry of the radial contact end and relative rotation of the plug in the socket after insertion.

FRANCIS N. ERVIN.

REFERENCES CITED

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

UNITED STATES PATENTS

Number	Name	Date
2,075,794	Allabach	Apr. 6, 1937
2,082,453	Kissell	June 1, 1937
2,129,044	Burns	Sept. 6, 1938
2,158,691	Carlino	May 16, 1939