Sept. 30, 1941. A. KEEFE 2,257,608

ELECTRICAL CONNECTION

Filed Oct. 29, 1937

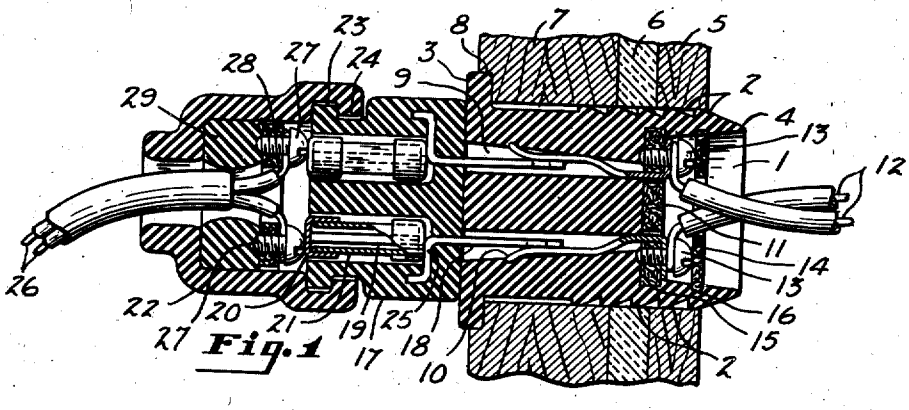


Fig. 1

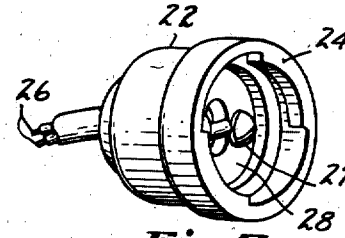


Fig. 2

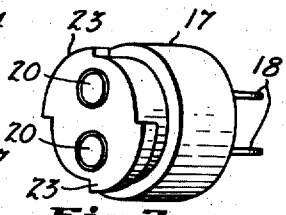


Fig. 3

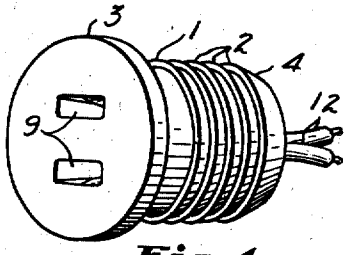


Fig. 4

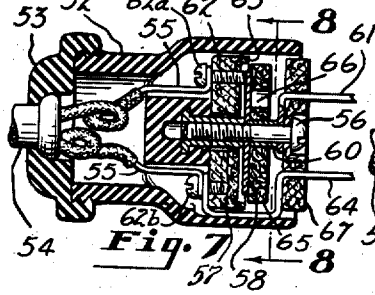


Fig. 7

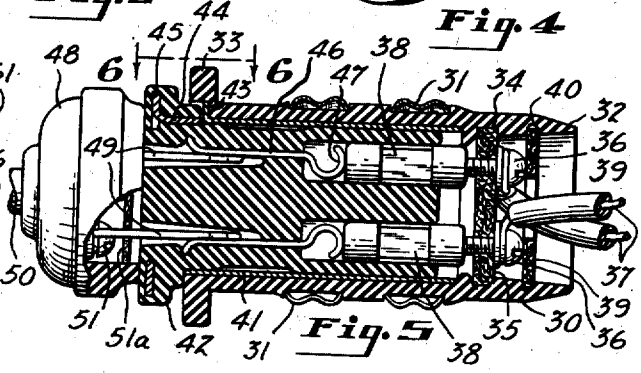


Fig. 5

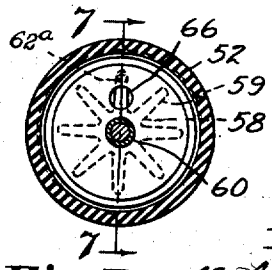


Fig. 8



Fig. 9

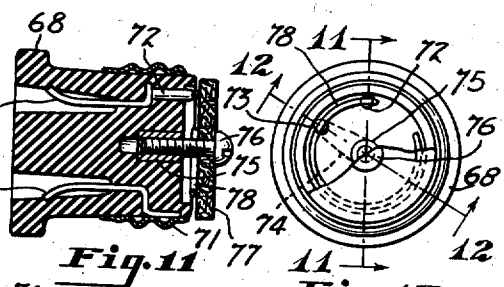


Fig. 11

Fig. 10

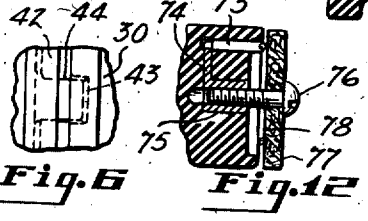


Fig. 6

Fig. 12

INVENTOR
Arthur Keefe
BY
O. J. McCoy
ATTORNEY

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ELECTRICAL CONNECTION

Arthur Keefe, Akron, Ohio

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10 Claims. (Cl. 200—115.5)

This invention relates to electrical connections and more particularly to plug receptacles, plugs and the like, with and without circuit interrupting means.

In the past wall sockets have been largely of porcelain and metal for which an aperture that accurately conformed to their varying contour and proportions had to be individually provided, often at the expenditure of considerable time and labor. It has been common practice to mount a plurality of outlet sockets on a single house or shop line that was provided with a single fuse. In the event of a short circuit from any of the sockets in such a system, the entire circuit was broken and the outlets were useless until the fuse was replaced, frequently by match or candle light. The wires of the house line are frequently disposed in inaccessible places, as back of or between walls and the like. These walls are sometimes inflammable, as when made of wood and similar materials and great losses have been caused by arcing or overheating of the wires of the line in such inaccessible places, before the line fuse melted, or where the line fuse failed to function properly.

The present invention is directed toward the avoidance of these limitations and toward the improvement of electrical connection constructions and the introduction of new and advantageous functions.

An object of the present invention is to provide improved forms of electrical connections that embody improved and simplified structures that have new functional advantages.

Another object is to provide electrical connections that comprise simple moldings and stampings that are inexpensively made and simply assembled.

Another object is to provide electrical connections comprising plug receptacles having deformable body portions that may be inserted in a wide variety of mountings, or even in irregular mountings, with equal ease and security.

Another object is to provide electrical connections that comprise plug receptacles that are readily installed and removed in a mounting with a minimum of tools and effort and without injury or disfigurement to the mounting in which they are installed or removed.

A further object is to provide electrical connections that protect and permit the continued services of the house line for light and for the use of other appliances, where a short circuit occurs in some individual appliance or fixture or in its connecting circuit.

Another object is to provide an electrical connection that reduces the fire hazard of the installation by containing a current interrupting device that prevents the dangerous heating of wires in inaccessible locations where inflammable material might be ignited, as back of a wall of wood construction, and the like.

Another object is to provide an electrical connection that may be used safely in or near highly combustible material, such as illuminating gas, highly combustible fluids, inflammable vapors and the like.

Another object is to provide electrical connections that contain a replaceable fuse that is readily and simply accessible and that may be easily and inexpensively replaced.

A further object is to provide fuse elements that comprise a plurality of individual fuses that may be successively placed in position to conduct the electrical current of the line before replacement of the element is necessary.

With the above and other objects in view that will be apparent to those familiar with the art to which the present invention pertains from the following description, illustrative embodiments of the invention are disclosed in the accompanying drawing, wherein:

Fig. 1 is a longitudinal section of an electrical connection assembly in a suitable mounting;

Fig. 2 is a perspective of the appliance attaching plug that forms a part of the connection assembly that is shown in Fig. 1;

Fig. 3 is a perspective of the intermediate member in the connection assembly that is shown in Fig. 1;

Fig. 4 is a perspective of the plug receptacle that is shown in Fig. 1;

Fig. 5 is a longitudinal section of a modified connection assembly;

Fig. 6 is a fragmentary plan view from the line 6—6 of Fig. 5 of the tongue and socket registration union of the assembly;

Fig. 7 is a longitudinal section taken along the line 7—7 of Fig. 8 of an intermediate member fuse plug;

Fig. 8 is a transverse section taken along the line 8—8 of Fig. 7;

Fig. 9 is a plan view of the multiple fuse unit of radially extending individual fuse arms that preferably forms a part of the socket that is shown in Figs. 7 and 8;

Fig. 10 is an end elevation of a fuse carrying intermediate member that is partly broken away to expose the circular multiple fuse wire that preferably forms a part thereof;

Fig. 11 is a longitudinal section taken along the line 11—11 of Fig. 10 and with parts broken away; and

Fig. 12 is a fragmentary section taken along the line 12—12 of Fig. 10.

In the accompanying drawing, the plug receptacle 1, that is shown in Figs. 1 and 4, is preferably of resilient and deformable material, such as rubber or the like, and may be of substantially any desired external form to fit a particular aperture. The example shown is substantially cylindrical. The plug receptacle 1 may, or may not, as desired, be provided on its exterior with retaining means, such as the plurality of external projections 2, that engage portions of the aperture wall in which the receptacle is mounted with zones of increased contact pressure to more securely fix the plug receptacle in its aperture. The flange 3 indicates the proper depth that the plug receptacle should be inserted in its aperture. The flange 3 may flare to a desired degree to overlie the aperture mouth and to conceal any roughness about the mouth of the aperture. The flange 3 and the projections 2 may be omitted, if desired, without material alteration in the function of the plug receptacle. The plug receptacle 1 may, if desired, have an inclined lead edge 4, that assists in its deflection past irregularities in the wall of its aperture during its installation.

An apertured wall is illustrated as a suitable mounting for the plug receptacle 1, and comprises the lath 5, the plaster 6, and the base board 7, in which base board the groove 8 is shown to partly countersink the flange 3. The plug receptacle may be mounted in a suitable aperture in any other desired mounting to which it is similarly adapted.

The axially extending slots 9 in the receptacle 1, house the separate concealed blade contacts 10, that are commonly of spring brass and are mounted therein in a suitable manner, as by being firmly secured to the insulating contact supporting washer 11. The wires 12, of the house line, engage the concealed blade contacts 10 electrically, as by the screws 13 that thread into the washer 11 and secure both the contacts 10 and the wires 12 thereto. A short circuit of the line back of the mounting is preferably guarded against, as by the insulating washer 14, that overlies the heads of the screws 13 and is apertured centrally for the accommodation of the wires 12. Suitable means is provided for mounting the contact supporting washer 11 and the insulating washer 14 in the plug receptacle 1, as by their being removably positioned in the circumferentially extending washer grooves 15 and 16, respectively, in the radially inner wall of the plug receptacle 1. It will be noted that the assembly and installation of the plug receptacle is simple and easy.

The intermediate member 17, in Figs. 1 and 3, is preferably of stiff material, such as stiff rubber, polymerized resins, or the like, in which the intermediate member exposed blade contacts 18, that releasably contact the receptacle blade contacts 10, are rigidly mounted, as by being molded therein.

Fuses, that preferably are of less amperage than the line fuse, are removably housed in suitable apertures in the intermediate member 17. The illustrative safety fuses shown, have the fuse wire 19 connected to the metal fuse tips 20, that are spaced from each other by the section of glass tube 21. The glass tube 21 insulates the flash of the fuse wire where a short circuit occurs in the fuse circuit.

The intermediate member 17, that is shown in Figs. 1 and 2, is removably secured to the appliance attaching plug 22, in suitable manner, as by the engagement of the intermediate member threads 23 with the appliance attaching plug threads 24, that are preferably segmental to form a bayonet joint for ease of engagement and separation. The intermediate blade contacts 18 are preferably exposed and shouldered at 25, or otherwise adapted to provide fuse contacts.

The appliance attaching plug 22 comprises a shell of stiff insulation material in which the wires 26 of the appliance cord are separately secured, as by the screws 27, that thread into the wire supporting insulating washer 28. The washer 28 is preferably, tho not necessarily, removably positioned within the shell of the appliance attaching plug 22. Suitable means, such as the cushion rubber washer 29, is provided for maintaining the fuse that is disposed between the screws 27 and the exposed shoulder 25 of the intermediate blade contacts 18, in compressed engagement with each other to provide permanent electrical contact therebetween. Either or both fuses may be replaced with any other suitable fuse or conducting means, where such construction is desired, as is common in the industry. The intermediate blade contacts 18 are preferably indented or apertured adjacent their free ends in conventional style as shown for the apertured exposed contact 49 in Fig. 5.

The form of electrical connection assembly that is shown in Fig. 5, comprises the plug receptacle 30, that is illustrated as being of cylindrical form altho it may be of other desired form to fit a particular mounting, if desired. It may be of any suitable insulating material and is channelled on its outer surface to provide retaining slots for the spring metal fluted strips 31. The spring strips 31 are preferably discontinuous and yieldingly engage the inner walls of the aperture in which the plug receptacle may be mounted. The plug receptacle is also preferably, tho not necessarily, provided with the inclined lead edge 32 and the insertion arresting flange 33.

The washer receiving groove 34 in the plug receptacle 30, provides a seat for the preferably removable connection supporting washer 35. The washer 35 carries suitable connection and contact means, such as the screws 36 that are threaded therethru, so that they secure the wires 37 of the house line to the washer 35. The wire connection means, or screws 36, also contact one end of the fuses 38, as by extending thru the washer 35, as shown. The insulating guard washer 39, that is removably seated in the washer groove 40, and is apertured centrally for the accommodation of the wires 37 of the house line, covers the heads of the screws 36 from any possible shorting contact back of the mounting.

The plug receptacle liner 41, that is shown as being cylindrical in form and as providing a lining for the plug receptacle 30, is of hard noninflammable material, such as metal, glass, hard rubber, or the like, and may be slipped into the plug receptacle 30 or may be vulcanized thereto, as desired. The liner 41 is preferred to provide a radially inner wall of the plug receptacle 30 of a constant diameter and to provide a favorable friction surface against which the intermediate member 42 may be inserted. The liner 41 may

be omitted, however, if desired, without alteration in the electrical functions of the device.

Suitable means is provided for placing the intermediate member **42** in proper registration with the plug receptacle **30**, such as the liner tongue **43**, that extends radially outwardly therefrom and provides a locating depression for the admission of the intermediate tongue **44**, that extends axially of the metal reenforcement **45** in the intermediate member **42**. The reenforcement **45** is preferably embedded within the intermediate member **42** that is adapted for being removably inserted in the plug receptacle **30** and serves to stiffen and maintain circular, the exposed end of the intermediate member **42**.

The intermediate member **42** is preferably apertured at its inner end for the reception of suitable fuses **38** and at its other end for the accommodation of the intermediate member concealed blade contacts **46**. The intermediate member blade contacts **46** preferably terminate at their fuse engaging end in the spring tips **47**, that yieldingly press the fuses **38** into engagement with the ends of the line contact or screws **36**. The spring tips **47** of the intermediate member blade contacts **46** may be supported in their engagement with the fuses **38** in any suitable manner, as by having a part, such as their ends opposite from the spring tips **47**, embedded in the rubber of the intermediate member **42**, or by the engagement of the curved portions of the spring tips **47** against a portion of the preferably resilient body portion of the intermediate member **42**, or in other suitable manner, as desired.

The appliance attaching plug **48** is of substantially conventional type and comprises a shell of stiff insulating material, to which the exposed plug blade contacts **49** and the wires of the appliance cord **50** are secured by the screws **51**. The washer **51***a* conceals the screws **51**. The plug blade contacts **49** are held stiffly in position and make close frictional engagement with the intermediate member blade contacts **46**, that are shown as being yieldingly backed by the resilience of the rubber body portion of the intermediate member **42**.

The intermediate member **17** and the appliance attaching plug **22**, that are shown in Fig. 1, may be replaced, if desired, by the conventional appliance plug **48**, that is shown in Fig. 5, where it is desired that the fuse be omitted, so that the plug receptacle **1** receives the conventional appliance plug **48** in substantially conventional manner.

The fuse carrying intermediate member fuse plug **52**, that is shown in Fig. 7 of the drawing, may be used with any of the plug receptacles that are shown herein or with a conventional wall socket or plug receptacle, or the like. It is of stiff material, such as rubber, polymerized resins, or the like and is threaded on one end for engagement with the removable cap **53**, that is apertured for the reception of the headed tube **54** thru which the wires **55** pass.

Suitable parts supporting means is anchored in the body of the plug **52**, such as the screw **56**, that threads into the tube **57** that is molded in the body of the plug **52**.

The screw **56** carries suitable current interrupting means, such as the fuse plate **58**, that preferably comprises a plurality of radially extending fusible arms **59** that are joined in a common center. The fuse plate **58** is clamped between the ends of the tube **57** and the sleeve **60** by the tightening of the screw **56**. The sleeve **60** carries the exposed blade contact **61**, as by their being welded together.

The innermost washer **62** is of hard insulating material thru which the long screw **62***a*, that secures one wire **55**, is threaded and into which the other screw **62***b*, that secures the other wire of the circuit threads. The inner washer **62** is preferably spaced from the fuse plate **58** to accommodate metal that may separate from the fuse plate in the event of a short circuit and preferably has an upturned peripheral edge **63** that insulates the tips of the fuse plate arms **59** from that part of the blade contact **64** that is bent around the fuse assembly and that is secured to the inner washer **62** by the short screw **62***b*.

The middle washer **65** is apertured for the sleeve **60** and is preferably apertured at **66** for providing an outlet for waste fuse metal and for visual access to the fuse plate arm **59** that contacts the end of the fuse contact screw **62***a*.

The outer washer **67** may or may not be used, as desired, and, where used, is preferably countersunk at its center for the accommodation of the head of the screw **56** and is slotted so that the exposed blade contacts **61** and **64** may extend therethru. The fuse contacting long screw **62***a* may, if desired, be not in line with the exposed contact **61**, so that the outer washer **67** may also be apertured, not shown, in line with the aperture **66** in the middle washer **65**, to provide visual access to the fuse plate arm **59** that is in circuit.

The circuit flow thru the long screw **62***a*, serving as a contact, is thru the fuse arm **59** to the center of the fuse plate **58** and thru the screw **56** and the sleeve **60** to the exposed blade contact **61**. In the event of a current overload, the particular arm **59** of the fuse plate **58** that is in engagement with the long screw **62***a*, melts and the flow of current is interrupted. The screw **56** is then removed along with the washers **67** and **65**, the fuse plate **58** is rotated to a point where another fuse arm **59** is in engagement with the end of the long screw **62***a*, and the washers **65** and **67** and the screw **56** are reassembled. The intermediate member fuse plug **52** is then again ready for use.

The fuse carrying intermediate member **68**, that is shown in Figs. 10–12, inclusive, of the drawing, comprises a body portion of stiff rubber, or other suitable insulating material, in which supporting parts of the concealed blade contacts **69** and **70** are preferably molded. The concealed blade contact **69** is in electrical contact with the threaded screw base **71**, as by being welded thereto, to form one electrical connection for the intermediate member **68**.

The concealed blade contact **70** terminates at its inner end in the fuse contact pin **72**. Another fuse contact pin **73** is circumferentially spaced from the contact pin **72** and is mounted in electrical contact with the end of the radially extending arm **74** that forms a part of or is secured to, the screw receiving tube **75**, and that are all disposed in the body of the intermediate member **68**, as by being molded therein.

The tube **75** is threaded internally for the reception of the screw **76**. The insulating washer **77** carries the circular section of fuse wire **78** permanently mounted on its under side, as by having it partly embedded in a suitable groove in the washer. The insulation washer **77** is apertured at its center so that it fits snugly on the screw **76**. The fuse wire **78** bridges the gap be-

tween the ends of the fuse contacting pins 72 and 73 to complete the circuit between the head of the screw 76 and the concealed blade contact 70. The tips of the pins 72 and 73 are preferably depressed to better engage the wire 78.

On the burning away of one section of the fuse wire 78 between the fuse contact pins 72 and 73, by the surge of excessive current therethru, the screw 76 may be released slightly, the washer 77 rotated a sufficient distance to introduce a fresh length of fuse wire bridging the fuse contact pins 72 and 73, and the screw 76 again tightened.

The various structures that are herein described and illustrated are intended to be characterized by simplicity of manufacture, assembly, installation and function. The structures and assemblies are directed toward increasing the safety and convenience of electrical systems and facilitating the replacement of fuses and parts in cases of breakdown with decrease in the difficulties that are encountered in modern installations where the blowing of a house or shop fuse may result in considerable loss as well as discomfort.

It is to be understood that the particular embodiments of the invention that are disclosed and described herein and the constructions of the various parts of the connection members that are shown and described herein and their interrelations, are presented for purposes of illustration and explanation and that various changes in the particular designing and construction of the parts described and illustrated herein and in their particular mode of assembly may be made without departing from the invention as defined in the appended claims.

What I claim is:

1. An electrical connection, comprising in combination, an intermediate member comprising a resilient body portion, a concealed spring blade contact disposed in said intermediate member and terminating at one end in a spring tip cushioned by the resilience of said body portion, and a fuse removably engaging said blade contact spring tip in resilient end-wise compression.

2. A connection for conducting electrical energy, comprising in combination, a substantially deformable plug receptacle that is adapted to yieldingly grip the wall of an aperture in which it is mounted, a plug, and means interposed between said plug and said plug receptacle and yieldingly supported by the resilience of its mounting for making electrical connection therebetween.

3. An electrical connection, comprising in combination, a plug receptacle having a body wall of substantially resilient material adapted to grip the wall of an aperture in which the receptacle may be mounted, a groove in said body wall, a contact in said plug receptacle resting substantially against a portion of said resilient body wall, contact supporting means removably disposed in said groove in said body wall.

4. An electrical connection, comprising in combination, a plug receptacle of resilient material adapted to grip the wall of an aperture in which the receptacle may be mounted, an intermediate member adapted for being removably connected with said plug receptacle, a fuse in said intermediate member, a plug, and receptacle contact means against which said receptacle material resiliently presses for removably connecting said plug and said intermediate member to said receptacle.

5. An electrical connection, comprising in combination, a plug receptacle having a resilient portion capable of gripping the wall of an aperture in which it is mounted.

6. An electrical connection, comprising in combination, a plug receptacle, an intermediate member, an appliance attaching plug, an electrical connecting contact means, and a resilient rubber insulating means applying yielding pressure to said electrical connecting contact means.

7. An electrical connection, comprising in combination, a fuse plug, a rotatable washer part of said fuse plug, a fuse wire mounted on said washer, and washer securing means whereby portions less than the whole length of said fuse wire may be successively used in the conducting of electrical current in said fuse plug.

8. An electrical connection, comprising in combination, a resilient rubber intermediate member adapted to be interposed between a plug and a plug receptacle, and a contact disposed in said intermediate member and yieldingly supported in its frictional contacting engagement with any other contact against which it may be disposed by the resilience of the cushioning rubber of which the intermediate member is made.

9. An electrical connection, comprising in combination, a resilient intermediate member disposed between a plug and a plug receptacle, a contact part of said plug, a blade contact in said intermediate member and resiliently supported laterally thereby for making positive lateral engagement with said plug contact, a fuse disposed in said intermediate member and having one terminal engaging said contact, and wire connecting means supported by said plug receptacle and engaging the other terminal of said fuse.

10. An electrical connection, comprising in combination, a substantially hollow shell of substantially electrically non-conducting material, a plurality of line wires leading into said shell, a line wire attaching means disposed inwardly of said shell and providing a fuse contact therein, a fuse plate removably disposed inwardly of said shell, a fusible arm forming a part of said fuse plate and adapted for making electrical contact with said line wire attaching means, a blade contact projecting from said shell and in electrical contact with said fuse plate, and blade contact securing means adapted for attaching said blade contact to said shell and capable of being removed from said connection whereby said fuse plate and said line wire attaching means may be drawn substantially out of said shell for the purpose of replacing said fuse plate.

ARTHUR KEEFE.

CERTIFICATE OF CORRECTION.

Patent No. 2,257,608. September 30, 1941.

ARTHUR KEEFE.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 4, second column, line 13, claim 5, after the word "mounted" and before the period insert --, a concealed contact disposed inwardly thereof, an intermediate member from which an exposed contact extends to engage said concealed contact, a fuse disposed in said intermediate member, a plug engaging said intermediate member, wire securing means disposed in said plug, and a cushion means in said plug for maintaining said fuse in electrical engagement with said wire securing means--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of December, A. D. 1941.

Henry Van Arsdale,
Acting Commissioner of Patents.

(Seal)