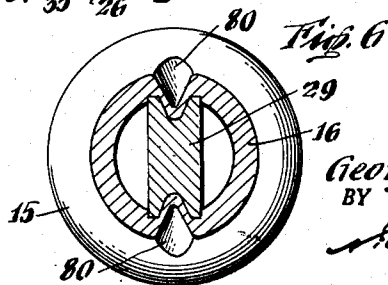
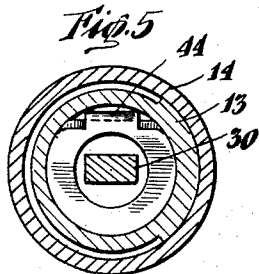
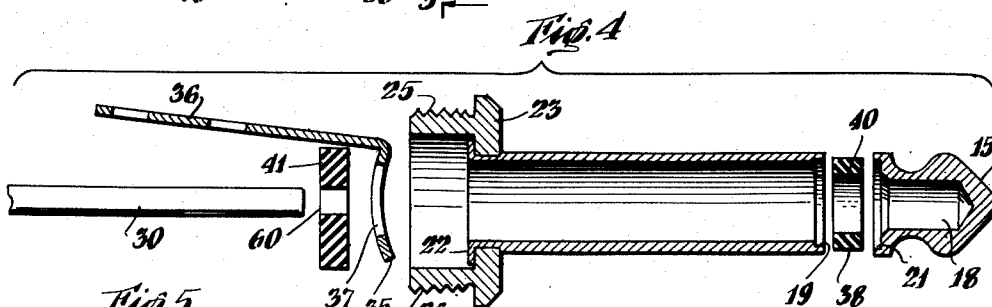
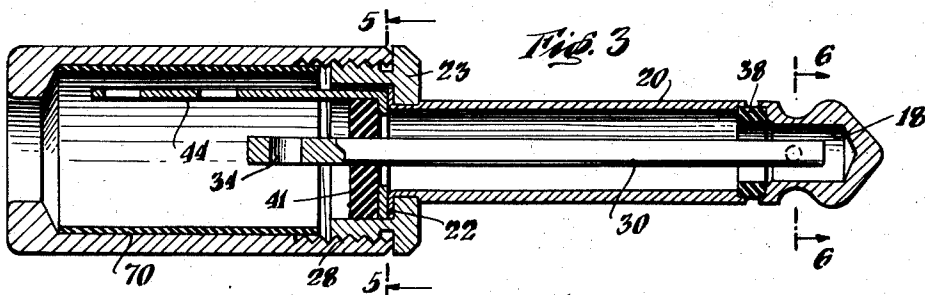
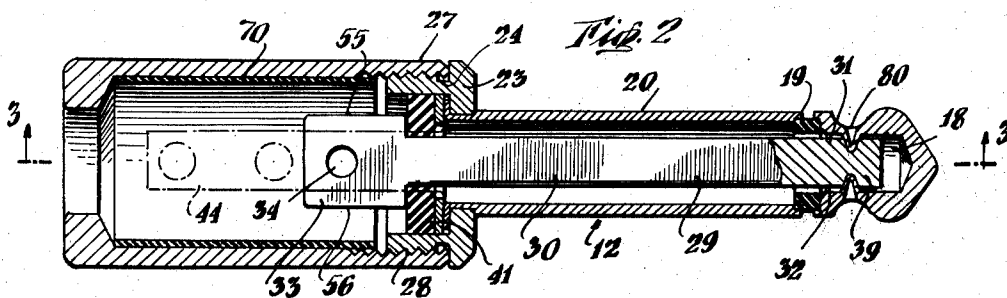
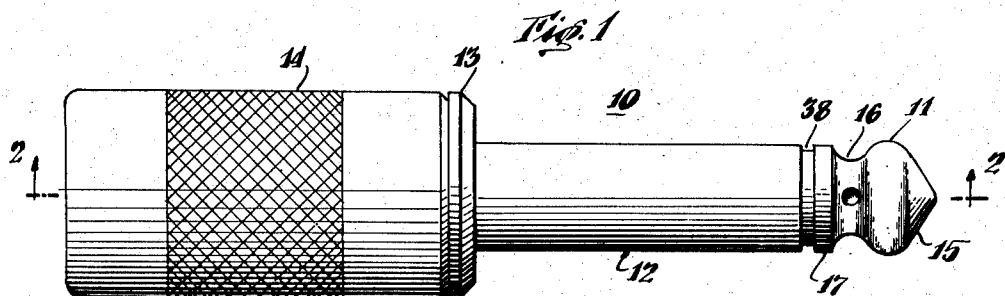


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MINIATURE PHONE PLUG  
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## MINIATURE PHONE PLUG

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This invention relates generally to electric connectors and has specific application to electric connector plugs adapted to be used as terminals cooperating with receiving or mating jacks for interconnecting electric circuits.

Frequently in the interconnection of electric circuits, a circuit is provided with a terminal consisting of an electrical plug attachment designed to engage an opposing jack contact terminal connected to another electric circuit. Because of the constant insertion of the plug terminal within its cooperating jack, the plug is subject to considerable strain and wear. Therefore, it is highly desirable that the required toughness and durability characteristics of the plug be obtained without sacrificing, at the same time, economy of cost.

In the usual type of connector plug, the tip and sleeve contacts are aligned so that they are spaced from each other in the lengthwise dimension of the plug by means of an insulator sleeve or dielectric core of considerable thickness in order to prevent the possibility of an electrical short between the contacts. The inside contact member of the plug is most often connected to the tip of the plug by retention means such as, for example, a screw type of joint.

By the present invention, amongst other things, the need for this type of retention means, necessitating costly attendant complexities of construction, is obviated by providing a contact member which may be force-fitted to the tip in a substantially inextricable manner. To do this the said tip contact member is passed through an insulating washer in the plug via a large clearance hole formed in an associated sleeve contact member. At one end of the said tip contact member there is formed a solder lug while at its opposite end, a tip engaging member is formed of predetermined dimensions so as to enable the retentive fitting of this member into the tip of the plug. The corners of the contact tip member are so constructed that they fit against the internal wall of the tip through a bore formed therein. A neck portion of the tip is then forcibly constricted to a determined depth so as to join and stake both the tip and tip contact together.

This novel construction further helps to insulatively space and hold the tip contact member and the sleeve contact member separate from each other without the necessity of providing a core of insulating or dielectric means so as to preclude electrical contact between the members. A plug has thus been provided which is extremely durable, simple to construct and assemble, and one which is inexpensive in cost.

It is, therefore, an object of the invention to provide a novel, practical as well as a simple and inexpensive plug connector.

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necting plug for electric circuits constructed of few and simple parts and which may be securely assembled in an efficient, rapid and economical manner.

5 Still another object of the invention is to provide a novel method for constructing an electrical terminal plug.

Yet another object of the invention is to provide a terminal plug for electrical circuits utilized with an associated jack for interconnecting electrical circuits as, for example, apparatus used in connection with radio, telephone or other like devices.

The invention accordingly consists in the features of the invention, combination of elements, arrangement of parts, and the several steps and order of each of the same to one or more of the others will be illustrated and described herein with the scope of the application to be indicated by the following claims.

Figure 1 is a side view of the embodiment of the plug connector of the invention;

Figure 2 is a sectionalized view of the invention as shown in Figure 1 as taken along line 2—2 thereof;

Figure 3 is a sectionalized view of the present invention as taken along line 3—3 of Figure 2;

Figure 4 is an expanded view of the invention useful in showing the assembly and/or arrangement of the individual parts thereof;

Figure 5 is a cross-sectional view of the subject plug invention as taken along the line 5—5 of Figure 3 and as adapted to show the arrangement of the contact members included within the handle of the subject plug; and

Figure 6 is a cross-sectional view of the tip of the plug invention as taken along line 6—6 of Figure 3 and is used to illustrate the simplicity in staking the tip contact to the tip of the plug.

Correspondingly like parts are referred to in the following description and indicated in all of the views of the drawing by the same reference characters.

The present invention provides a novel electrical connector plug which obviates the need for expensive components and means for assembling the separate components. The plug includes a tip and a tip contact member connected thereto by means of having the shoulders member adjacently fitted within a bore formed in the tip. At the other end of this contact member there is integrally formed a solder lug. Co-axially surrounding the tip contact member is a sleeve which is locked against a sleeve contact member by means of a threaded body member connected to the handle of the plug. This sleeve contact member also has an integrally formed solder lug. The tip contact member is adapted to penetrate the sleeve contact member via a hole therein so as to, as stated above, fit into the bore of the tip

of the plug. The contact member is then substantially inextricably connected to the tip by depressing an outer surface of the tip so that a portion of the surface is intruded therewithin to clamp the tip contact member fixedly.

Referring now to the drawing, there is shown a plug 10 which generally comprises a tip 11, a sleeve 12 separated from the said tip by means of an insulating washer 38, and a body section 13 joined to the sleeve by means of a threaded handle 14. Figures 1-5 are illustrative of the component arrangement and assembly of the plug 10.

Tip 11 comprises a head section 15, a neck 16, a collar 17 having a shoulder 21, and a bore 18 formed therein. Sleeve 12 of the plug comprises a shoulder ring 19, a barrel portion 20, and an annular extension 22. The body 13 of the plug comprises a knurled ring section 23, a body shoulder 24 and a threaded section 25 having a plurality of threads 26 formed therealong. The handle 14 of the plug comprises an end section 27 having a mating section 28 internally threaded and adapted to receive clamping threads 26 of threaded section 25. In order to prevent electrical shorting between the surface of the handle and frayed wiring to the tip connector or contact member, as hereinafter described, a cardboard liner 70 is placed internally of the handle.

One of the contacts for the subject plug comprises a tip contact member 29 having a shank or shaft 30 and to which is integrally formed a front end portion 39. The sides or shoulders 31, 32 of the tip contact member are adapted to fit within bore 18 of the tip of plug 10. An enlarged solder lug section 33 having a terminal perforation 34 is integrally formed to the shank of the tip contact member and is adapted to aid in the retention of the component parts of the plug, as hereinafter described. The other contact member, sleeve contact member 44, comprises an annular ring section 35 connected to a terminal solder lug 36 but which is bent substantially at 90° thereto. Annular ring 35 has a central hole portion 37 which, it is seen, allows shaft 30 to pass therethrough so as to further fit within bore 18 of tip 11. An insulating washer 38 is included between sleeve 12 and tip 11, said insulating washer having a central opening 40. The washer 38 is retained by the sleeve and tip of the plug by means of shoulders 19 and 21 integrally formed with said sleeve 12 and tip 11 respectively. A second insulating washer 41 having a slot 60 cut centrally therethrough separates enlarged solder lug section 33 from annular ring section 35. Washer 41 is tightly held against ring 35 by means of lug shoulders 55 and 56 of contact solder lug 33.

In the assembly of the present improved plug, body 13 fits over and retains the annular extension 22 of sleeve 12, as by means of its associated body ring section 23. The ring portion 35 of sleeve contact member 44 is placed against annular extension 22 and is in turn abutted by slit washer 41. Shaft 30 is passed through slit washer 41 and annular ring section 35 of sleeve contact member 44 and tightly holds the same together by means of enlarged solder lug section 33. It is to be noted, too, that ring section 35 is bowed so that it maintains a tension in the stack-up of the separate plug components. Thus, in the event of slight shrinkage of the insulating washers or members, compensatory tension is obtained through the bowed construction of annular ring 35. The shaft 30 of tip contact mem-

ber 29 passes through insulating washer 38 which, as has been stated, separates the tip from the sleeve of the plug. Shank 30 passes through said insulating washer 38 and, as stated, is adapted to slideably fit within the bore 18 of tip 11. As seen in Figure 6, a constriction 39 of a predetermined depth is next formed within the external surface of tip 10 in such fashion as to deform the same inwardly to develop a clamp or a substantially inextricable grip on the front end portion 39 of the shank fitted within bore 18 of the tip 11. By this means the tip and shank are substantially inextricably joined together. To complete the assembly, handle 14 is tightly screwed upon body 13 by means of the threaded construction thereof so as to rigidly lock all the components together. In this manner there is provided an electric connector plug which is assembled simply, ruggedly and compactly, yet, at an economy of cost.

The novel connector plug, as described above, is merely illustrative and not exhaustive in scope and since many widely different embodiments of the invention may be made without departing from the scope thereof, it is intended that all matter contained in the above description and shown in the accompanying drawing shall be interpreted as illustrative and not in a limiting sense.

What is claimed is:

1. An electrical connector plug comprising a tip having a smooth bore formed therein, a flat rectangular contact member having its outer end fitted within said bore, a solder lug being an enlarged portion integrally formed on the inner end of said contact member opposite the tip thereof, said enlarged portion having a cross-sectional diameter substantially greater than that of the rest of said contact member, a metal sleeve surrounding said flat member and spaced therefrom, said sleeve separated insulatively from said tip by means of an insulative washer, a second contact member having a bowed resilient ring section with a hole therethrough placed adjacent the inner end of said sleeve so as to be electrically connected therewith, said first contact member being spaced from the inner end of said sleeve member in an insulative manner by an insulation disc having a hole whose cross-sectional diameter is substantially less than that of said enlarged portion of said first rectangular contact member, whereby when said outer end of said first contact member is fitted through said sleeve contact member via said disc and said hole in said resilient ring section to enter said bore tip then said enlarged portion of said rectangular member is firmly stopped against said disc, and means for securing said sleeve to said second contact member comprising a body ring section within which said insulation disc is placed, said body ring section being connected to said inner end of said sleeve at a position oppositely adjacent said resilient ring section, said insulative disc being pushed against said bowed, resilient ring by means of the pressure of said enlarged portion of said first contact member shoving thereagainst, thus to compress the resilient, bowed ring against said sleeve to join the same firmly thereagainst, the tip being staked to said flat contact member to so retain the same securely whereby a compensatory tension is provided in the entire assembly of the separate components.

2. An electrical connector plug comprising a tip having a smooth bore formed therein, a flat

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rectangular contact member including a front portion fitted within said bore, the outer surface portion of said tip being depressed so that it is intruded to clamp the front portion of said tip within said bore fixedly, a solder lug being an enlarged portion integrally formed on the inner end of said contact member opposite the tip thereof, said enlarged portion having a cross-sectional diameter substantially greater than that of the rest of said contact member, a round metal sleeve surrounding said flat member and spaced therefrom, said sleeve separated insulatively from said tip by means of an insulative washer, a second contact member including a bowed resilient ring section with a hole therethrough placed adjacent the inner end of said sleeve so as to be electrically connected therewith, said first contact member being spaced from the inner end of said sleeve member in an insulative manner by an insulation disc having a center slit whose cross-sectional diameter is substantially less than that of said enlarged portion of said first rectangular contact member, whereby when said outer end of said first contact member is fitted through said sleeve contact member via said hole in said washer and said hole in said resilient ring section to enter said bore tip then said enlarged portion of said rectangular member is firmly stopped against said disc, and means for intimately se-

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curing said sleeve to said second contact member comprising a body ring section within which said insulation disc is placed, said body ring section being connected to said inner end of said sleeve at a position oppositely adjacent said resilient ring section, said insulative disc being pushed against said bowed, resilient ring by means of the pressure of said enlarged portion of said first contact member shoving thereagainst, thus to compress the resilient, bowed ring against said sleeve to join the same firmly thereagainst, the tip being staked to said flat contact member to so retain the same securely whereby a compensatory tension is provided in the entire assembly of the separate components.

GEORGE O. PUERNER.

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