Oct. 26, 1937. J. D. BROWN 2,097,057

ELECTRIC CONNECTION PLUG

Filed June 15, 1932

FIG. 1

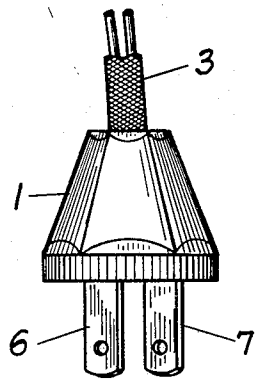


FIG. 2

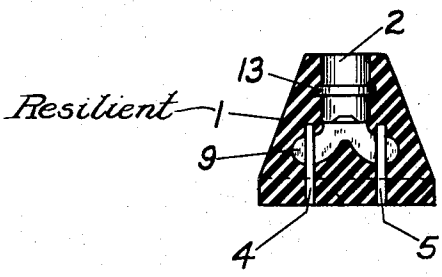


FIG. 3

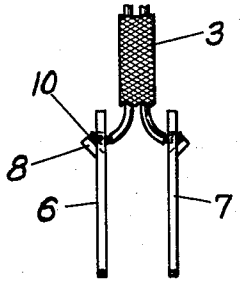


FIG. 4

FIG. 5

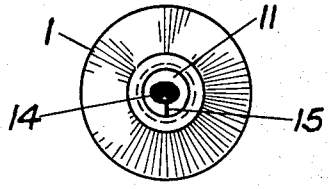
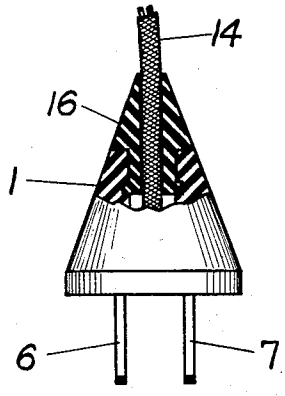


FIG. 6



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ELECTRIC CONNECTION PLUG

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7 Claims. (Cl. 173—361)

This invention relates to the design of an electric plug connecter such as is ordinarily used for connecting any electrical piece of apparatus to a source of current to which a cooperating socket is attached.

In the early days of electric lighting, these plugs were usually made of porcelain, and in later years of other insulating material not so easily breakable as porcelain.

More recently, non-breakable plugs have made their appearance on the market. Such plugs are made of soft rubber and various means have been proposed for mounting the terminals therein, substantially all of these devices comprising a plurality of parts such as a plug insertable at the terminal end to hold the terminals in position.

It is the object of my invention to provide a single or one-piece soft rubber plug; that is to say, the part which is adapted to receive and hold the terminals is composed of only a single piece.

My improvement will be readily understood by reference to the annexed drawing wherein:

Figure 1 shows a plan view of one form of my terminal plug showing a portion of the cable extending therefrom.

Figure 2 is a section through the plug proper without the terminals or cable in position.

Figure 3 shows the manner of connecting the cable to the terminals.

Figure 4 shows a split ring which is sometimes necessary where a very small cable is desired to be fitted to a plug having a cable opening of the size such as shown in Figures 1 and 2.

Figure 5 is an end view of the plug showing such small cable with the split ring of Figure 4.

Figure 6 shows a modified form of split ring or plug bushing from that illustrated in Figures 4 and 5.

In the drawing, the plug 1 is composed of a single piece of flexible insulating material such as soft rubber. The plug is provided with a main interior recess and has a central orifice 2 leading therefrom through one end of the plug to receive a twin conductor cable 3. The plug 1 also has a pair of channels 4 and 5 extending across the interior recess and opening through the opposite end of the plug to receive the terminal clips 6 and 7. Each of the terminal clips 6 and 7 is provided with an offset projection 8 which is adapted to engage, in gripping relation, the walls of extensions 9 of the main recess within the plug. The orifice in the members 6 and 7, formed by forcing the lug or projection 8 outwardly from each of the terminals 6 and 7, is used to receive the bared end 10 of each of the cable conductors, it being understood that the ends 10 are soldered or otherwise fastened to their respective terminals 6 and 7.

After the wires of the cable 3 have been attached to the terminals 6 and 7 as just described and as shown in Figure 3, they are adapted to be inserted in the plug 1. This is done by means of a suitable expanding tool which is adapted to be inserted into the hole 2 and operated to expand the upper end of the plug so that the cable 3 with the terminals 6 and 7 may be inserted therethrough. The terminals 6 and 7 are guided into their respective channels 4 and 5 by another cooperating tool, and the lugs 8 will be located in their seats 9. When the said tools are removed from the plug, the terminals will be securely gripped in the channels 4 and 5 and seats 9, so that the complete assembly is substantially as illustrated in Figure 1. The lugs 8 are forced into the side-walls of the main recess extensions 9 and prevent any strain on the cable 3 from dislodging the terminals within the body of the plug. They also help to hold the terminals in place against frictional pulling on the terminals when the plug is being used with its cooperating socket.

It often happens that a cable much smaller than that shown in Figure 1 is desired to be utilized with a standard plug having a regular opening 2 to receive a cable such as has been described. An adapter in the form of a split ring of resilient insulating material such as soft rubber can then be utilized. This adapter 11 is shown partly in section and partly in elevation in Figure 4, and is provided with a flange 12 adapted to enter an annular recess 13 that is made in the plug 1 at the time it is moulded, it being preferable to mould the recess 13 in the plug 1 so that the plug will be interchangeable for a large cable as well as a small, by use of the adapter shown in Figure 4. A small oval-shaped cable 14 is illustrated in Figure 5 and is closely gripped by the split ring adapter, the split being indicated at 15, which is closely compressed by the stem of the plug 1 when the assembly tool has been removed.

The bushing 11 may take another form such as illustrated in Figure 6, wherein the adapter or bushing has a neck 16 extending over and above the end of the plug and into gripping relation with the small cable 14, thereby giving a longer flexible support for the cable. Instead of using the bushing 11 in either of the forms illustrated, I may of course make the body 1 with a

small orifice 2 to receive the cable 14 with a tight fit around it, just the same as in the form shown in Figures 1 and 2 for the normal size cable, but as pointed out, the adapter bushing 11 can be used under the special circumstances described.

The size of the channels 4 and 5 in the plug 1, as well as the size of the split adapter or bushing 11 are such that when the various parts are assembled, they are gripped very tightly by the soft rubber walls of the plug and are thus securely held in position.

To further insure that the cable and its respective terminals 6 and 7 are held securely within the plug body 1, and also to seal the plug completely which may be desirable where the plug is to be used in damp places, I may treat the end of the cable 3 and the terminals 6 and 7 over the part that is engaged by the plug body 1, with a flexible cement such as can be made from a rubber compound, just previous to the assembly of the cable and terminals in the plug body 1. This flexible cement also keeps the insulation on the cable 3 from fraying, as well as sealing up the opening into the body of the plug.

It is to be understood that the outer shape or appearance of the plug 1 may be varied, but I prefer to use the design such as shown in my Design Patent No. 89,253, issued February 14, 1933, and illustrated in Figure 1.

Furthermore, it is to be understood that the stem of the plug 1, or that part which encompasses the cable 3, may be extended to a greater length than illustrated in the drawing, but such changes are considered to come within the scope of the appended claims.

Having thus described my invention, what I claim is:

1. An electric connection plug including a single-piece body of resilient insulating material, said body having a single interior main recess having oppositely positioned extensions and with terminal channels extending across said recess adjacent said extensions and leading therefrom through one end of the body, and a single central cable orifice leading outwardly therefrom through the opposite end of the body, and terminals having parts intermediate the ends thereof forced outwardly to form locking grips with the side walls of said recess extensions, said terminals having cable-conductors fastened thereto before being inserted into said channels through said cable orifice.

2. An electric connection plug as set forth in claim 1, characterized in that apertures are made in the terminals by the forming of said grips, and these apertures are utilized to fasten the cable conductors to said terminals.

3. An integral resilient plug body having a plurality of parallel openings extending into the body in one direction and adapted to receive contact prongs, a single opening extending into the body in opposition to said first direction and communicating with all said parallel openings, the walls of said single opening extending in said first direction but a short distance from the adjacent ends of said spaced openings and adapted to be stretched to permit direct insertion of contact prongs into said spaced openings.

4. A single-piece connecting plug body of resilient material having a plurality of spaced openings extending into the body from one end adapted to receive contact pins, and a second opening extending into the body from the other end and communicating with the first opening intermediate the ends thereof, the walls of said second opening being adapted to be stretched to a distance greater than that between the first named openings to facilitate assembly of contact pins in the plug body.

5. The method of assembly of a connecting plug having a body of resilient material with a plurality of spaced openings extending into the body from one end adapted to receive contact pins and another opening extending into the body from the other end and communicating with the first openings, which includes connecting conductors of a cord to contact pins, stretching the walls of said other opening laterally beyond the first openings, inserting the contact pins into their respective openings by an axial straight line movement and then releasing the stretched walls so that the body may return to its normal shape to hold said contact pins and conductors within said plug body.

6. The method of locating a pair of spaced contact pins in a plug body of resilient material having a central axial opening at its inner end and two spaced axially-extending openings at its outer end connected with the axial opening, which includes the steps of forcing the walls of said axial opening at the inner end of the plug apart a distance greater than the distance between the two spaced axially-extending openings, moving the spaced contact pins simultaneously in a straight line movement through the distended central axial opening into the plug body to proper axial positions relatively to the plug body and then permitting the forced-apart walls to approach each other to substantially normal position.

7. The method of assembling a connecting plug having a body of resilient material with a passageway therethrough of substantially inverted Y-shape, which includes the following steps, securing the two conductors of a twin conductor cord to contact pins, mounting the inner end of each contact pin in a movable support, the two supports being spaced apart, expanding the single, inverted Y-shaped passage, moving the contact pins, cord and supports in a straight line movement through the expanded single end until the contact pins are located in proper axial positions relatively to the plug body in the two arms of the inverted Y-shaped passageway, withdrawing the movable support and then permitting the single end to contract to cause the body to resiliently grip and hold the contact pins and the single end portion of the body to grip and hold the cord.

JOSEPH D. BROWN.