

Dec. 24, 1935.

L. A. SHARP

2,025,533

PLUG

Filed Aug. 25, 1933

FIG. 5.

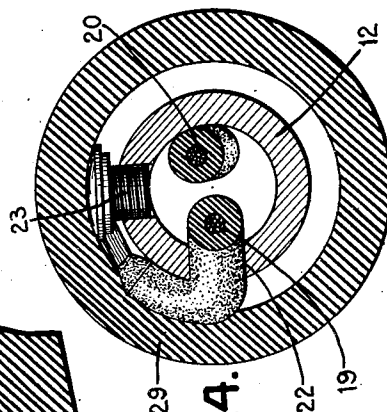
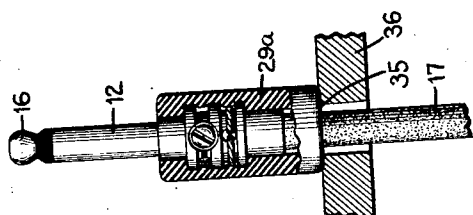


FIG. 4.

Resilient
FIG. 1.

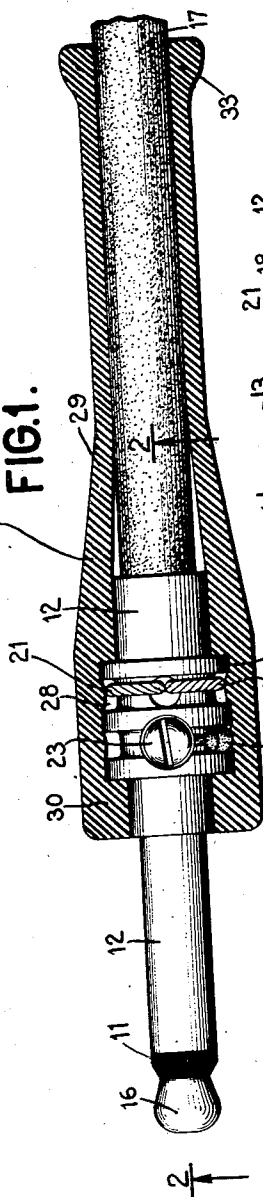


FIG. 2.

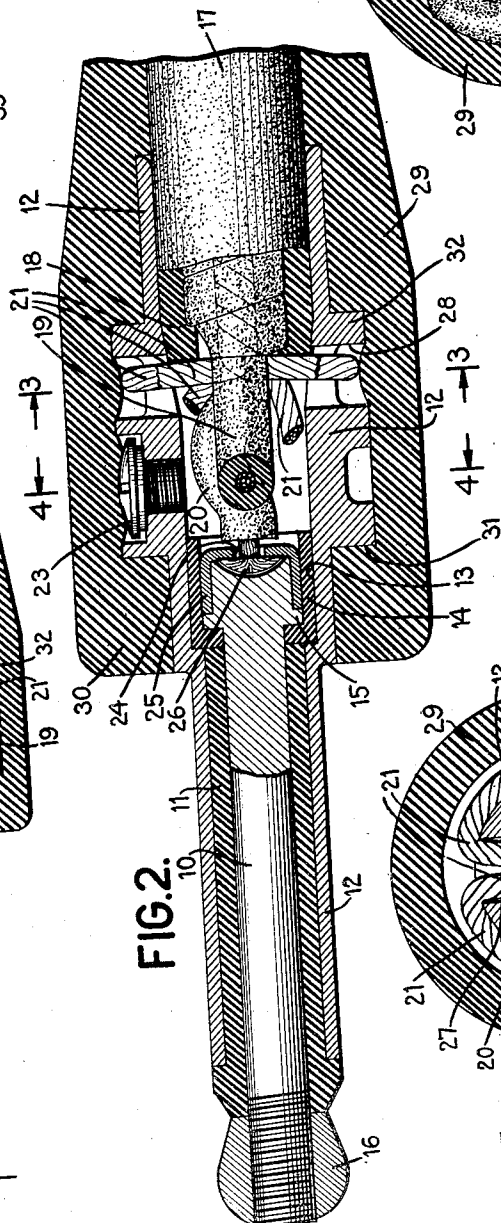
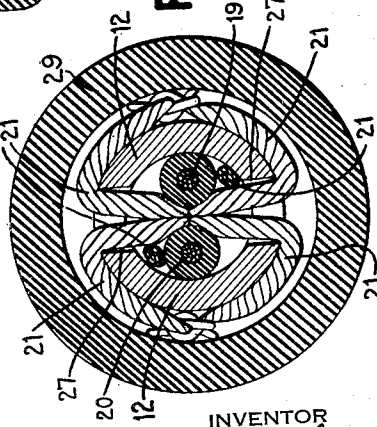


FIG. 3.



INVENTOR
L. Alan Sharp
BY
Cooper Kerr & Dunham
ATTORNEYS

UNITED STATES PATENT OFFICE

2,025,533

PLUG

L. Alan Sharp, Bellevue, Pa., assignor to National Electric Products Corporation, New York, N. Y., a corporation of Delaware

Application August 25, 1933, Serial No. 686,719

8 Claims. (Cl. 173—361)

This invention relates to improvements in telephone plugs of the type used in connection with telephone head sets and the like. In telephone practice the wires of the phones are connected through a cord to a plug and such plug is adapted to be plugged into a jack to connect the phones with a telephone circuit.

When telephones are used in certain places, for example in gun turrets or in other hazardous locations, occasion sometimes arises where the user of the phone has to make a hasty emergency exit. In such cases the telephone plug is jerked from the jack frequently by pulling upon the cord instead of by manually withdrawing the plug. In such cases the plugs are subject to injuries in various ways. The plugs may strike against the floor, deck or other hard object and may become broken or damaged. Furthermore, the conductors are liable to be torn from the plug terminals. The telephone plug itself must be of such character that it may withstand severe usage for such service.

One object of the present invention resides in the provision of an improved plug which is better adapted to withstand rough usage than the plugs which are now used.

A further object of the present invention resides in the provision of a plug with improved conductor securing means and improved strain relief means associated therewith.

Another object of the present invention resides in the provision of a plug and cord which may be readily assembled either in the shop or the field.

Another object of the present invention resides in the provision of a plug and cord with the plug provided with strain relief means to prevent damage to the terminal connections of the cord conductors.

A further object of the present invention resides in the provision of a plug with improved strain relief means and terminal securing means for the conductors of the cord which will provide a maintained definite amount of slack in the conductors adjacent their point of connection to the terminals.

A further object of the present invention resides in the provision of a plug with terminal means thereon which will permit the elimination of terminal elements upon the ends of the conductors.

A further object of the present invention resides in the provision of a plug with a resilient jacket of rubber or like material.

Further and other objects of the present invention will be hereinafter set forth in the accom-

panying specification and claims and shown in the drawing which shows by way of illustration a preferred embodiment and the principle thereof and what I now consider to be the best mode in which I have contemplated of applying that principle. Other embodiments of the invention employing the same or equivalent principle may be used and structural changes made as desired by those skilled in the art without departing from the present invention and within the spirit of the appended claims.

In the drawing:

Figure 1 shows an assembled view of plug and protecting sheath, the sheath alone being shown in section, and the plug parts and cooperating cable being shown in side elevation;

Fig. 2 is an enlarged sectional view taken substantially on line 2—2 of Fig. 1 and looking in the direction of the arrows. The cord is shown partly in section and partly in side elevation;

Fig. 3 is a sectional view taken substantially on line 3—3 of Fig. 2 and looking in the direction of the arrows and shows the tying of the filler cords to provide a strain relief connection to the cord; and

Fig. 4 is a sectional view taken substantially on line 4—4 of Fig. 2 and shows the manner in which one of the conductors is fastened to a binding screw terminal element on the plug.

Fig. 5 shows another embodiment of the invention.

In more detail and referring particularly to Fig. 2, the plug comprises a central rod 10 which is preferably of brass, which rod is surrounded by an insulating sleeve 11. Surrounding the sleeve 11 is a metallic sleeve 12. An extended portion of the sleeve 12 is provided with an annular aperture 13 adapted to receive a flanged collar of insulating material 14. The flange of this collar is received between a shouldered portion 15 of the rod 10 and the end of the insulating sleeve 11. A ball or contact tip 16 is screwed on the threaded end of the rod or conducting core 10 and holds all of the above mentioned parts in a tight assembly. The conductor cable or cord is generally designated 17, such cord comprising an outer jacketed portion 18 preferably of rubber within which are a pair of individually insulated conductors 19 and 20 and also including filler cords 21. Preferably in practice the conductors 19 and 20 are closely wound around the filler cords 21. This provides a conductor with maximum flexibility so that when the filler cords are used for strain relief the pulling strains will be

directly exerted upon the filler cords instead of upon the conductors 19 and 20.

In assembling the cord to the plug the end portion of the outer jacket 18 is cut away, leaving the conductors 19 and 20 and the filler cords 21 projecting. One of the conductors, viz. 19 is then passed laterally through an opening 22 in the sleeve 12 (see Fig. 4) and the wire of the conductor is then fastened under the head of the binding screw 23, which binding screw is threaded into a rear portion of the sleeve 12 on the outside thereof. The other conductor 20 is passed through a hole 24 in the bottom of the cup 25. The cup 25 is then pressed over the end of the rod 10 between the rod and the flanged insulating collar 14, thus securing the cup to the conducting core 10 and thus pressing the spread-end 26 of conductor 20 against the inner end of the rod or core 10 and securing it thereto. The filler cords 21 are then passed through other holes 27 in the rear portion of the sleeve 12 (see Fig. 3) and are wound around a groove 28 in such sleeve 12. They are finally tied as shown in Fig. 3.

As shown, it will be noted that slack is left in the conductors 19 and 20 when the filler cords 21 are tied. Such slack is shown adjacent the end of the lead line for reference numeral 20 on Fig. 2. A resilient sheath 29, preferably made of yielding rubber is stretched over the rear end of the assembled plug and cable 17. This sheath has an inwardly extending shouldered portion 30 which locks behind a shoulder 31 on the sleeve 12 and the sheath also cooperates with another shoulder 32 of the sleeve 12. Preferably the end of the sheath is provided with beaded ends 33 (see Fig. 1) which are initially slightly smaller than the external diameter of the cord 17 so as to stretch over the cord and tightly grip it when the sheath is in position over the cord. The sheath provides for a water-tight assembly and also protects the conductor connections, the filler cord connections and the rear end of the plug from mechanical injury.

The arrangement of the shoulders 31 and 32 cooperating with shouldered portions of the flexible sheath allows the plug to be withdrawn and inserted by means of pulling and pushing on the sheath and prevents the interior plug assembly from pulling out or pushing back into the sheath.

In a plug of this type it will be understood that the parts be relatively small in size, i. e. particularly such that the cord engaging or body portion be as small as conveniently possible. At the same time the arrangement for making the necessary electrical connections and for mechanically securing the cord in the plug should be readily accessible and should be such as to provide a firm and secure electrical and mechanical connection in the small space provided.

With the construction shown the binding screw terminal 23 is accessible on the outside of the rear portion of the sleeve and accessibility is provided for tying the filler cords before the resilient sheath is placed in position. The resilient sheath may be stretched over the rear end of the plug and when in position not only covers the conductor connection at terminal 23 and the tied filler cords, but yieldingly grips the binding screw and the filler cord knots.

In Fig. 5 I have shown my improved plug construction with a protective sheath 29a of slightly different configuration. The plug per se is substantially the same as that previously described but the protective rubber sheath 29a is substan-

tially cylindrical in outer configuration in place of being tapering as in the previously described embodiments and such sheath has a lower shoulder 35 adapted to act as an abutment and cushion the plug when the same is allowed to fall to its vertical position through the aperture in the shelf 36. In falling the shoulder 35 resiliently abuts the top of the key shelf of a telephone switchboard and thus cushion the arrest of the plug by the key shelf.

It will be appreciated that silencing material customarily applied to the key shelf may be eliminated, for the plug body or sheath is made of yielding or self-silent material as here shown. The improved plug construction is useful with wall switch boards of the usual type with plugs and cords pendant from the bottom which cords when in use are plugged into jacks at the bottom of the switch board. With such switch boards there is considerable abuse both to the plugs and to the wall switches between the plugs when the plugs are withdrawn from the jack and dropped to their natural pendant position. Under such conditions the resilient sheath prevents damage to the wall and strain is relieved from the connections in the manner previously explained.

What I claim is:

1. A plug for use with a jack and for connection with the conductors of an electrical cord, 30 comprising a conducting core member, a contact tip upon the forward end of said member, a cup pressed over the rear end of said core member and provided with a hole through which an electrical conductor may be passed, said cup 35 holding the conductor tightly against the rearward end of the aforesaid core, a metal sleeve surrounding the core and insulated therefrom and from the contact tip, means providing a conductor connection to said sleeve, and a sheath of 40 resilient material tightly fitted over the rear end of the plug and also over a portion of the entering electrical cord.

2. The invention set forth in claim 1 in which the means for securing a conductor to the sleeve 45 comprises a binding screw cooperating with the sleeve and in which the sleeve is provided with a hole through which a conductor may be passed to extend to the aforesaid binding screw.

3. A plug for use with a jack and for connection to the conductors of an electrical cord, 50 comprising a contact tip and sleeve insulated from each other with the tip carried upon a core which extends through the sleeve and which is also insulated therefrom, means providing conductor 55 connections to the core and to the sleeve, said sleeve having a grooved portion extending peripherally therearound and disposed beyond the point of conductor connection and into which the filler cords of an electrical cord may be laid 60 and secured and a sheath of resilient material fitted over the rear end of the plug and over the aforesaid groove and also embracing a portion of the entering electrical cord.

4. A plug for use with a jack and for connection with the conductors of an electrical cord, 65 comprising a contact tip carried upon a core, a sleeve around the core and insulated therefrom and from the tip, said sleeve having a hollow rear portion into which the conductors of an 70 electrical cord may be extended, and whereby one conductor may be connected to the rear of the core, said rear portion of said sleeve carrying a binding screw and having a pair of peripheral outer grooves, said sleeve having apertures there- 7

through to each of the said grooves, one groove providing space for a conductor which passes through one of the apertures and extends to the binding screw upon the sleeve, the other groove receiving tied filler cords which also pass through sleeve apertures.

10 5. The invention set forth in claim 4 in which the filler cord groove is disposed intermediate the point of conductor fastening and the rear end of the plug where the cord enters the plug whereby slack may be maintained in the conductors at the point of fastening to the plug elements.

6. The invention set forth in claim 4 in which a resilient sheath is provided which tightly grips the rear portion of the plug and also embraces a portion of the plug and also embraces a portion of the entering cord.

7. A plug for use with a jack and adapted for connection with the conductors of an electrical cord, said plug comprising a contact tip, a contact sleeve and a conducting core secured to the tip with an insulating sleeve between it and the contact sleeve, said contact sleeve having an integral rear hollowed out portion into which the rear of the core extends, a cup-shaped member upon the rear end of the core providing a

securing means for one conductor of the electrical cord, a binding screw on the outside of the integral rear portion with a groove in said integral rear portion extending to an aperture through said portion into the hollow interior and providing a passage for another conductor which emerges from the hollow interior, said portion also being provided with another groove for receiving and securing the filler cords of the core, which filler cords also pass through apertures in said rear portion, and a sheath of resilient material enclosing and gripping the rear portion of the plug and also enclosing a portion of the cord entering said plug.

8. A plug for use with a jack comprising the usual contact tip and sleeve elements insulated from each other with the sleeve at its rear end provided with an extension having a recess portion therein into which filler cords of an electrical cord may extend, said extension having apertures therethrough leading to a groove extending annularly on the outside of the extension to provide for passing the filler cords from within the sleeve into said groove, said groove providing for accessible tying of the filler cords.

L ALAN SHARP.