April 29, 1924. 1,492,335

S. McCLATCHIE

ATTACHMENT DEVICE

Filed March 21, 1919.

Fig. 3.

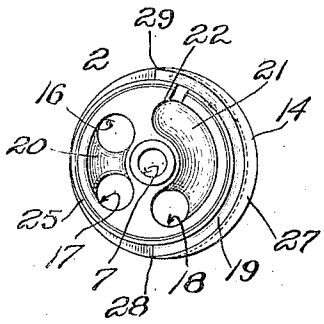


Fig. 4.

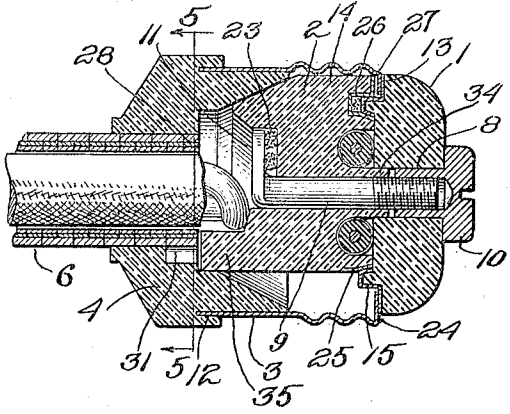


Fig. 1.

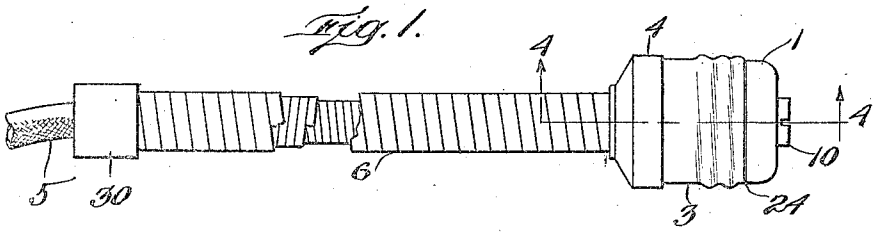


Fig. 2.

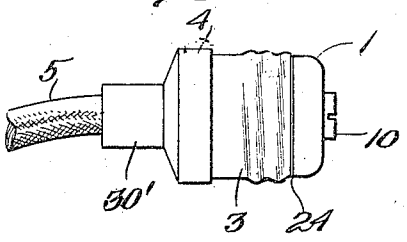
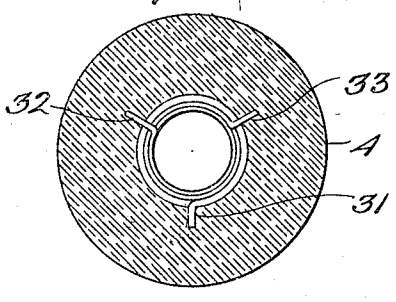


Fig. 5.



Inventor:
Stanley McClatchie,
by Roberts Roberts & Cushman
his attorneys.

Patented Apr. 29, 1924. 1,492,335

UNITED STATES PATENT OFFICE.

STANLEY McCLATCHIE, OF CAMBRIDGE, MASSACHUSETTS, ASSIGNOR TO BENJAMIN ELECTRIC MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS, A CORPORATION OF ILLINOIS.

ATTACHMENT DEVICE.

Application filed March 21, 1919. Serial No. 284,113.

To all whom it may concern:

Be it known that I, STANLEY McCLATCHIE, a citizen of the United States of America, and resident of Cambridge, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Attachment Devices, of which the following is a specification.

My invention relates to improvements in the construction of swivel attachment plugs.

Attachment plugs of the class to which the present invention relates usually comprise an inner body or core of insulation material, an outer metallic shell which is adapted to connect one side of the cord circuit to the threaded portion of the socket, a handle or finger-piece for rotating this shell, a cap of insulation material adapted to close the rearward end of the plug except for a central opening for the cord, a central contact adapted to connect the other side of the cord circuit to the central terminal of the socket, means for attaching the central contact to the latter side of the cord circuit, a sliding contact for connecting the former side of the cord circuit to said metallic shell, means to limit the movement of the swivel shell relatively to the core, and means for binding the two limiting means together. Attachment plugs are also commonly provided with means for preventing the cord from pulling out of the plug and with means usually comprising a coil of wire surrounding a short length of the cord at entrance to the plug for protecting the cord against excessive wear at this point. My invention includes a simplified structure and arrangement for these various parts.

While the invention in its various aspects is adapted to many applications and modifications. I shall describe it, for the purpose of setting forth the various features involved, with reference to the preferred embodiment shown in the accompanying drawings, in which,—

Figure 1 is a side elevation of the attachment plug, portions of the handle being broken away;

Figure 2 is a side elevation of the plug provided with a modified handle;

Figure 3 is a front elevation of the rearward part of the plug core hereinafter referred to;

Figure 4 is a central longitudinal section on line 4—4 of Fig. 1, on an enlarged scale; and

Figure 5 is a transverse section on line 5—5 of Fig. 4.

The particular embodiment of the invention chosen for the purpose of illustration comprises in general a body or core divided transversely into forward and rearward parts 1 and 2, a metallic shell 3 rotatable around the body or core, a cap 4 closing the rearward end of the metallic shell except for a central opening to receive the electric cord 5, and a handle which projects behind the plug and which may be flexibly extended as shown in Fig. 1, or which may extend only a short distance behind the plug and be rigid as shown at 30′ in Fig. 2.

The body or core 1—2 is formed of composition or other suitable insulation material, and the two parts thereof are provided with axial openings 7 and 8 to receive means for attaching the two parts together. The attachment means shown in the drawings comprises a screw 9 extending forwardly through the opening 7 in the part 2, and a nut 10 having a tubular portion extending rearwardly through the axial opening 8 in the forward part 1 threading over the forward end of the screw 9. The screw 9 is provided with a flange 11 on one side thereof adapted to prevent the screw from being drawn forwardly through the opening 7 and adapted to contact with one of the terminals of the cord 5 as will hereinafter be explained. The nut 10 is provided with a flanged portion overhanging the forward face of the part 1 which is adapted to form the central terminal of the plug.

3 is a threaded metallic shell swivelling about the core. The rear portion 4 is preferably made of composition moulded onto the shell 3. The forward end of the shell 3 is turned inwardly to form a flange 13 which is adapted to extend into the annular space between the forward and rearward parts 1 and 2 of the core of the plug. The opposing faces of the two parts of the core

are so shaped that when the two parts are connected together by the screw 9 and nut 10 a space will be provided just wide enough to permit the flange 13 to turn freely therein without permitting any considerable lateral movement.

The rearward part 2 of the core is made of a size such that it is adapted to be inserted through the flange 13 and it is provided with an eccentric portion 14 on one side which is adapted to extend behind the flange 13 when the part has been inserted into the shell and then moved laterally until the central opening 7 is concentric with the shell. The forward portion 1 of the core is provided with a cylindrical extension 15, which is adapted to fit into the opening surrounded by the flange 13. Inasmuch as the forward part 1 is centered by the projection 15, the rearward part 2 is also centered when attached to the forward part by means of the screw 9 and nut 10.

The two conductors of the cord 5 are preferably led into the plug and connected to the two terminals thereof in the following manner: Three longitudinal openings 16, 17 and 18 are provided in the rearward part 2 of the core, and in the forward face of the part 2 an annular groove 19 is provided concentrically with the opening 7 throughout substantially 180° on the eccentric side of the core. The recess 20 is provided in the forward face of the part 2 between the openings 16 and 17, and a similar recess 21 is provided between the opening 18 and the recess 22 connecting the recess 21 with the groove 19 near one end of the groove, all as shown in Fig. 3. One of the conductors of the electric cord is extended forwardly through the opening 17, thence laterally in the recess 20 and thence rearwardly through the opening 16 where the end of the conductor is clamped beneath the flange 11 as shown at 23 in Fig. 4. The other conductor of the electric cord is extended forwardly through the opening 18, thence laterally along the recess 21, thence radially through the recess 22, and thence around in the groove 19. The groove 19 is not only formed concentrically with the axis of the core as above described, but it is also made to correspond with the cylindrical projection 15 mounted on the forward part 1 of the core. The projection 15 is covered with a channel-shaped ring 24 of conducting material and is adapted to extend into the groove 19 and clamp the end of the last mentioned conductor against the bottom of the groove, as well as to hold the core central.

The ring 24 covering the cylindrical extension 15 is also provided with a flange adapted to engage the forward side of the flange 13 of the shell 3, whereby the last mentioned conductor is connected to the shell 3 through the medium of member 15 and flange 13. The extension 15 is preferably molded into the ring 24 when the part 1 is formed of composition material. As will be apparent from the above description the first mentioned conductor is connected to the nut 10, which forms the other terminal of the plug through the medium of the flange 11 and screw 9.

In order to provide a better contact between the end of the conductor disposed in groove 19 and the shell 3, I preferably line the groove 19 with a pressed metal member 26 which covers the base of the groove and both the inner and outer sides of the groove. The portion 25 covering the inner side of the groove is extended around the plug in the form of a continuous ring, the inner side of the groove and the aforesaid ring preferably being tapered as shown in Figs. 3 and 4 so that the end of the projection 15 will bear thereagainst. The lining 26 is preferably provided with an exterior flange 27 covering the eccentric portion of the rearward part 2 of the core and extending substantially from point 28 to point 29 in the shape of a crescent as shown in Fig. 3. This metallic flange forms the bearing surface against the rearward face of the flange 13.

While the features of my invention heretofore described are novel and useful per se, they are of particular importance in the present invention in that they mutually contribute to the most satisfactory application of the principal feature of my invention which will now be described.

The construction shown comprises an extension from the rear of the swivel member by means of which the plug may be easily and quickly attached or detached in inaccessible sockets. The essential characteristic of this extension is that it has a relatively small diameter to facilitate rotation of the swivel member. However, the extension may be relatively long as shown in Fig. 1 or it may be comparatively short as shown in Fig. 2. Moreover, it may be either flexible as shown in Fig. 1 or rigid as shown in Fig. 2. When made rigid it is preferably formed as an integral tubular extension on the swivel member as shown in Fig. 2.

When the aforesaid extension is made flexible it is preferably constructed as shown in Figs. 1 and 4. As shown in these figures the extension 6 comprises three layers of spirally wound wire. The wire in each layer is preferably closely wound and successive layers should lie in close juxtaposition in order to avoid giving under torsional stress, as will be hereinafter explained. The wire employed is preferably flat spring wire such as commonly used in clock springs. The inner layers are so wound that they tend to expand outwardly to a slight extent

so that when the coils are placed inside of each other the inner coils expand snugly against each other and against the outer coil. For purposes which will hereinafter be described the wire forming the outer coil is preferably both heavier and wider than the wire forming the inner coils. The ends of the wire of the respective layers or coils are secured together and this may be done by molding the ends of the wires into the cap 4 and the finger piece 30 respectively, the cap 4 and finger piece 30 preferably being formed of composition material such as ordinarily employed for electrical insulation. In order to securely anchor the ends of the wires to the cap 4 and finger piece 30 the ends of the wires are preferably bent outwardly so as to be firmly embedded in the composition material. Thus in Fig. 5 the ends 31, 32 and 33 of the outer, intermediate and inner coils, respectively, are bent outwardly and are thus firmly embedded in the cap 4. The opposite ends of the wires are similarly anchored in the finger piece 30. The essential feature of the extension 6 is that the successive layers are wound in opposite directions. Thus when employing three layers of wire the inner and outer layers would be wound in the same direction and the intermediate layer would be wound in the opposite direction as shown in Fig. 1.

By constructing the extension 6 as aforesaid, it is quite flexible and yet will resist torsional stress in either direction. Indeed, this construction affords a handle which, while readily flexible, cannot be appreciably twisted, so that rotary forces applied in either direction will produce substantially no give in the member.

The essential feature contributing to this result is the opposite winding of the successive layers. When so wound a force applied in the direction tending to unwind the outer layer will tend to wind the central layer still tighter and to unwind the inner layer. The tendency for the inner layer to unwind causes it to expand against the intermediate layer and the tendency of the intermediate layer to wind still tighter causes it to contract against the inner layer. Thus the inner and intermediate layers buck against each other. When a force is applied to the finger piece tending to wind the outer layer still tighter the intermediate layer tends to unwind and the inside layer tends to wind still tighter. In this case the outer layer tends to contract against the intermediate layer and the intermediate layer tends to expand against the outer layer so that the opposition of the outer and intermediate layers prevents rotation of the finger piece 30 relative to the cap 4.

It is desirable that the wire be flat in order to prevent the turns of the respective layers from wedging through the turns of the adjacent layers in manipulating the handle; and by making the inner layers narrower and lighter than the outer layers both flexibility and resiliency of the handle are attained in maximum degree.

The parts of the swivel member comprising the shell 3, cap 4, extension 6 and finger piece 30, are permanently connected together to form a single part. In assembling the device the cord 5 is passed through the hollow extension 6, one of the wires of the cord is passed through the openings 16 and 17 and then positioned under the flange 11 of the screw 9, the other wire is passed through the opening 18 and the end of the wire is placed in the groove 19, the part 2 of the core is then inserted into the shell 3 through the open forward end thereof, the part 1 of the core with the metallic ring 15 permanently secured thereto is placed in position over the forward face of the part 2, and the nut 10 is then threaded on to the end of the screw 9 to secure the parts in the position shown in Fig. 1.

In this connection it is noted that the recesses 20 and 21 in the forward face of the part 2 of the core are made sufficiently shallow so that the part 1 will bear against the conductors lying in the recesses when the part 1 is secured in position, thereby assisting in preventing the wires from being pulled out of the plug by forces applied to the cord. However, the principal agencies preventing the cords from pulling out comprise the tortuous channels through which the conductors are passed, the channel for one conductor involving a 180° turn in passing from the opening 17 to the opening 16, and the passage for the other cord involving a 90° turn in passing from the opening 18 to the recess 21 and involving a 180° turn in passing the recess 21 to the slot 19.

It will be noted that the means comprising screw 9 and nut 10 not only serve to secure the two parts of the core together, but also to form the central terminal of the plug inasmuch as they are adapted to connect with one conductor of the cord at the rear end and inasmuch as it projects from the forward end of the plug at its forward end. The interfitting groove 19 and ring 15 serve not only to center the core in the shell and thereby prevent the core from pulling out of the shell, but these parts also serve as attachment means for one of the conductors to the shell 3 through the sliding connection between the flanges 13 and 24. The provision of the two parallel openings 16 and 17 in the core 2 whereby one conductor may be looped through the two openings effectually serves to prevent the cord from being pulled out of the plug.

Owing to the fact that part 2 of the body or core bears against the flange 13 only on one side of the plug, rearward forces on the shell tend to swing the core transversely. This is prevented by having the portion 35 of the part 2 bear against the inner periphery of the swivel member on the side opposite to the projection engaging behind the flange or shoulder 13.

I claim:

1. In an attachment plug, a swivel member, two members adapted to position said swivel member, means for securing said two members together, and means including a groove in one side of said two members and a corresponding projection in the other of said two members for clamping a conductor therebetween in electrical contact with one terminal of the plug.

2. A swivel attachment plug comprising an insulation body and a metallic shell rotatable around the body, said body being divided transversely into forward and rearward parts, means for securing the parts together with an arcuate space therebetween, said shell having a flange adapted to extend into said arcuate space to restrain axial movement of the shell relatively to the body, the rearward part of the body having a diameter sufficiently small to permit it to be inserted into the shell through the forward open end thereof and having an eccentric portion adapted to extend behind said flange when the rearward part is centered in the shell, and the forward part of the body having a portion adapted to cooperate with said flange to center both parts of the body when connected together by said means.

3. A swivel attachment plug comprising an insulation body and a metallic shell rotatable around the body, said body being divided transversely into forward and rearward parts, means for securing the parts together with an arcuate space therebetween, said shell having a flange adapted to extend into said arcuate space to restrain axial movement of the shell relatively to the body, the rearward part of the body having a diameter sufficiently small to permit it to be inserted into the shell through the forward opening and having an eccentric portion adapted to extend behind said flange when the rearward part is centered in the shell, and the rearward part of the body having a circular groove in its forward face adapted to receive the end of an electrical conductor, the circular groove being concentric with the axis of the shell and lying just within the inner periphery of said flange when the rearward part of the body is centered, and the forward part of the body having a cylindrical metallic portion adapted to fit through said flange and extend into said groove against the end of the conductor therein, to center the body when the two parts thereof are connected together by said means and to connect said conductor with said shell through the medium of said flange.

4. An attachment plug comprising an insulation body and a metallic shell surrounding the body, the body having two longitudinal openings therein through one of which a conductor may extend forwardly and through the other of which the conductor may extend rearwardly, and an axial conductor member for connecting with the end of said conductor beyond the parts of said conductor which lie in said openings at the rear of the body, said member projecting from the forward face of the plug so as to contact with the central terminal of the socket into which the plug is inserted.

5. An attachment plug comprising an insulation body and a metallic shell surrounding the body, the body being transversely divided into a forward and a rearward part, the rearward part having a longitudinal opening therethrough and a concentric groove in its forward face so arranged that a conductor may be extending through said opening and have its end disposed in said groove, the forward part having a concentric metallic ring on its rearward face adapted to extend into said groove and bear tightly against the end of the conductor when the two parts of the body are connected together and to connect said conductor to said shell, and a metallic member extending through axial openings in said parts to secure said two parts together, said metallic member being adapted to connect with the other conductor at its rearward end and projecting from the forward end of the body to contact with the central terminal of the socket.

6. An attachment plug comprising a two-part insulating base, wiring terminals mounted thereon, a center contact mounted thereon, and a screw-shell swiveled thereon, said screw-shell having an inwardly extending annular flange, one of said base parts being provided with an abutment rigid with respect thereto, which is moved past said annular shoulder in assembly, and laterally to engage said shoulder to position said swivel shell.

7. An attachment plug comprising a two-part insulating base, wiring terminals mounted thereon, a center contact mounted thereon, and a screw-shell swiveled thereon, said screw-shell having an inwardly extending annular flange, one of said base parts being provided with an abutment rigid with respect thereto, which is moved past said annular shoulder in assembly, and laterally to engage said shoulder to position said

swivel shell, the other of said base parts being provided with means for centering it with respect to said swivel shell contact, and means for securing said base parts together to hold said first base part centered.

8. An attachment plug comprising a two-part insulating base, wiring terminals mounted thereon, a center contact mounted thereon, and a screw-shell swiveled thereon, said screw-shell having an inwardly extending annular flange, one of said base parts being provided with an abutment rigid with respect thereto, which is moved past said annular shoulder in assembly, and laterally to engage said shoulder to position said swivel shell, and means for holding said base parts centered to prevent disengagement from said shoulder.

9. An attachment plug comprising an insulating base, wiring terminals mounted thereon, and a screw-shell swiveled with respect thereto, said screw-shell having an inwardly extending annular flange, and said base being provided with an abutment rigid with respect thereto which is moved past said annular shoulder in assembly and laterally to engage said shoulder to position said swivel shell, and means for centering said insulating base to prevent its disengagement from said swivel shell.

10. An attachment plug comprising a two-part insulating base, wiring terminals mounted thereon, a center contact mounted thereon, and a screw-shell swiveled thereon, said screw-shell having an inwardly extending annular flange, one of said base parts being provided with an abutment rigid with respect thereto, which is moved past said annular shoulder in assembly and laterally to engage said shoulder to position said swivel shell, said flange being at the entering end of said screw-shell, and means for securing said base parts together to hold said first base parts centered.

11. A swivel shell attachment plug comprising a two part insulating base to which the wires are secured, a swivel shell contact swivelled on said base and having an inwardly extending flange at its entering end held in place between the two parts of said base and means forming a center contact and wiring terminal therefor comprising a screw extending through said base parts and having a clamping portion for clamping the bared end of the wire and a nut threaded on said screw and forming a center contact, said nut and screw serving to hold the two base parts together.

12. A swivel shell attachment plug comprising a two part insulating base to which the wires are secured, a swivel shell contact swivelled on said base and having an inwardly extending flange at its entering end held in place between the two parts of said base, and means for drawing said base parts together to clamp the bared ends of a wire therebetween, comprising a screw extending axially through said base parts.

Signed by me at Boston, Massachusetts, this 19th day of March, 1919.

STANLEY McCLATCHIE.