Oct. 1, 1929. A. C. GAYNOR 1,729,740

ATTACHMENT PLUG CAP

Filed Nov. 4, 1924

Fig. 1.

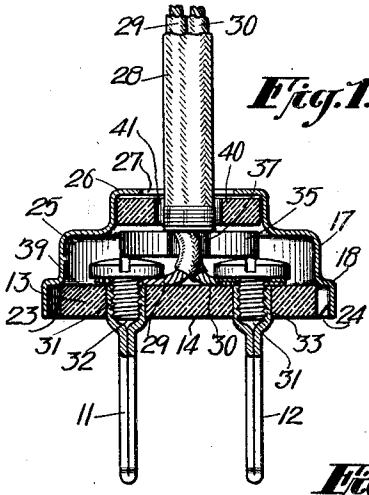


Fig. 4.

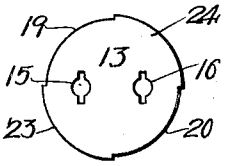


Fig. 7.

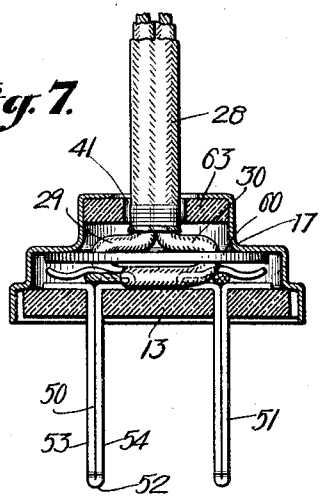


Fig. 9.

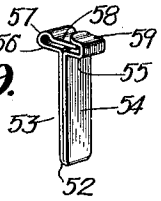


Fig. 2.

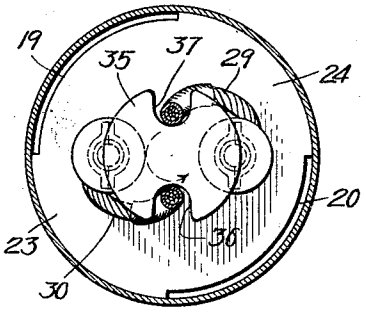


Fig. 8.

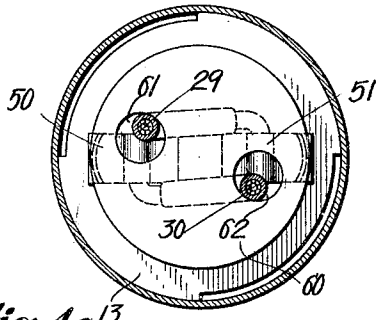


Fig. 5.



Fig. 4a

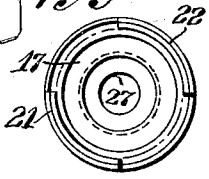


Fig. 10.

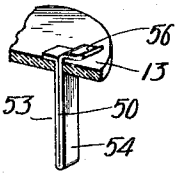


Fig. 3.

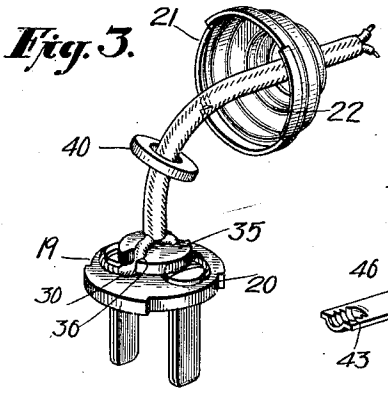
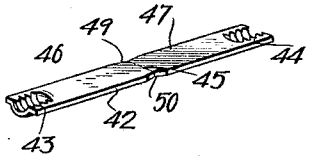


Fig. 6.



Inventor

ARTHUR C. GAYNOR.

By His Attorney

Cornelius C. Billings

Patented Oct. 1, 1929 1,729,740

UNITED STATES PATENT OFFICE

ARTHUR C. GAYNOR, OF STRATFORD, CONNECTICUT

ATTACHMENT-PLUG CAP

Application filed November 4, 1924. Serial No. 747,733.

My present invention relates to an attachment plug cap of the type used to tap an electric circuit through a pair of contact blades adapted to be inserted into suitable sockets in the circuit.

Attachment plug caps of this type have heretofore been constructed of blocks of insulating material, usually of porcelain, or of compositions of phenol-formaldehyde derivatives, pitch and asbestos, shellac or other similar materials, in which suitable anchorages for the contact terminals have been cast. As these materials are usually brittle and not capable of withstanding blows or rough usage, the caps must be made large and heavy in order to provide the requisite mechanical and electrical strength. Moreover, during the casting of the caps, they are liable to warp and thus throw the mounting of the terminal elements out of their proper relative positions making it difficult to mount or insert the cap in its socket when being connected for use.

As it is not safe to depend on the attachment of the wires to the contact terminals for securing the wires in the plug cap, these wires have heretofore been anchored in the cap by forming a holding knot in the wires between their attachment to the contact terminals and an outlet opening for the wires so that, when a pull is exerted on the wires, the knot is brought against the inner face of the cap surrounding the opening and the stress imparted through the wires is thus received on the cap rather than being imposed directly on the contact terminals. The formation of such anchoring knots, however, uses up considerable wire, which, in cases where a large number of caps are attached to wires, forms a considerable item of expense.

An object of my present invention is to provide a light, strong, compact and rigid attachment plug cap.

Another object of the invention is to provide an attachment plug cap which avoids the necessity of using cast insulating supports for the contact terminals and to support the terminals in plates or other forms of insulation in which they may be easily and accurately inserted and mounted.

A further object of the invention is to provide an attachment plug cap in which the terminal wires may be secured or anchored without the necessity of forming an anchoring knot and consequently with a considerable saving of wire.

A still further object of the invention is to provide a contact terminal blade of a single, unitary structure, which may be stamped from a single sheet or strip of metal.

Another object of the invention is to provide a method of making contact blades or other similar devices in a stamping operation from a single strip of metal.

Further objects and features of the invention are to provide an improved method and means for anchoring lead wires in a holding housing, to provide a method of forming threaded sockets for binding screws and similar devices by a stamping operation, and to provide a cap of the type indicated above in which the insulating elements are protected from breakage.

With these and other objects in view, which will appear from the following description, the invention comprises, the methods and devices described and set forth in the following specification and claims.

The various features of the invention are illustrated in the accompanying drawings, in which:

Fig. 1 is a longitudinal sectional view of an attachment plug cap embodying a preferred form of the invention,

Fig. 2 is a plan view of the cap shown in Fig. 1 with the metal housing removed to show the arrangement of the lead wires on the insulating elements and contact terminals.

Fig. 3 is a perspective view of the various elements of the plug partly disassembled to show the construction of the cap and the connection of the wires therein.

Fig. 4 is a plan view of a supporting insulating plate forming a part of the attachment plug cap.

Fig. 4a is a bottom plan view of a shell enclosing the insulating plate.

Fig. 5 is a perspective view of a contact terminal forming an element of the plug,

Fig. 6 is a blank from which the terminal of Fig. 4 may be stamped.

Fig. 7 is a longitudinal, sectional view of an attachment plug cap embodying a modified form of the invention,

Fig. 8 is a plan view of the cap of Fig. 7 with an outer metallic shell or casing removed to reveal the insulating elements and their relation to the lead wires and contact terminals,

Fig. 9 is a perspective view of a modified form of terminal, and,

Fig. 10 is a detail sectional view showing the manner of mounting this terminal in a plate of insulating material.

In my present invention, the contact blades are mounted on an insulating plate, which is enclosed on all sides, except that from which the blades project, by a protecting shell or housing of suitable material, such as spun metal. The supporting, insulating plate may be of any suitable composition stamped to the requisite size and shape and in which are also stamped suitably spaced holes into which the blades are driven and tightly held in their proper spaced positions. The blades project from the exposed face of the supporting plate and also extend in the opposite direction through the plate to its opposite, covered face, and are there connected to the ends of the lead wires, which enter the closing shell through an entrance opening. The lead wires are separated between this opening and their attachment to the blade terminals and a separator of insulating material is placed between the separated wires and given a quarter turn, thus imparting a bend to the wires. A washer of insulating material is then placed on the separator and, when the enclosing shell is mounted in position, the washer and separator are pressed tightly onto the supporting plate, holding the lead wires in their bent positions and preventing them from being pulled through the entering opening and from transmitting a pull to the blade terminals.

Referring to the accompanying drawings, and more particularly to Figs. 1 to 6 inclusive, a pair of contact blade terminals 11 and 12 are mounted in spaced relation on a plate 13 of insulating material such as treated or untreated paper and project from one face 14 of the plate for a sufficient distance to enter the openings of a receiving socket. The plate 13 is made of a sheet of insulating material in which are punched a pair of spaced openings 15 and 16 of a shape to fit that of the blade terminals and of a size to enable the blades to be driven thereinto and to be tightly held therein. As the holes are punched in a plate of seasoned material their position may be accurately fixed by the punch thus insuring an accurate positioning of the contact blades.

The plate 13 is enclosed, with the exception of the face 14 by a protecting shell 17 having an outwardly stepped, edge portion 18 which encircles and is secured to the edge of the plate 13. The plate 13 may be secured in the shell in any suitable manner, but, to enable the plate to be readily mounted and demounted in the shell, a pair of shallow notches 19 and 20, preferably extending through a quarter of the circumference of the plate, are formed in diametrically opposite positions on the plate to permit the passage therethrough of inwardly bent lips 21 and 22, respectively, on the edge portion 18 of the shell 17, and the portions 23 and 24 of the circumference of the plate between these notches is slightly rounded at the face 14 to permit the lips to be given a quarter turn and engage the edge of the plate. From the edge portion 18 the shell extends from the plate 13 to form an enclosing portion 25 and is continued to a top portion 26 having a central opening 27 through which enters a cord 28 having a pair of lead wires 29 and 30.

Within the shell 17 the lead wires 29 and 30 are separated and one wire 29 is attached to the terminal blade 11 by means of a binding screw 31 threaded in a socket 32 in the inner end of the blade and the wire 30 is similarly attached to the blade 30 by means of binding screw 33 threaded in a socket 34 in the end of the blade 30. A separator plate 35, preferably of circular shape, is then inserted between the separated portions of the wires 29 and 30, the wires being then received in diametrical notches 36 and 37, respectively. A short length of wire is left between the separator plate 35 and the terminals of the blades 11 and 12 and by rotating the plate 35 on its center, as indicated by the broken arrow in Fig. 2, and pressing it towards the supporting plate 13, these lengths of wire are pressed tightly against the inner face 39 of the plate 13 and are bent at a sharp angle as they enter the notches 36 and 37. The sharp bends in the wires at this point transmit any pulling forces to the separator plate 35 and prevent the loosening of the wires without the lifting and rotating of the plate 35 and thus serve to anchor the wires to the body of the cap. The wires are further anchored to the cap structure by means of a washer 40 having a small diameter opening 41 through which the cord 28 extends and the edge of which opening is sufficiently close to the inner portions of the notches 36 and 37 to tightly grip the wires 29 and 30 therebetween and provide a further anchorage for the wires. The washer 40 and plate 35 are pressed tightly against each other and against the plate 13 by the top

portion 26 of the shell which is shaped to fit the washer 40.

Any suitable type of contact blade terminal may be employed, but the form of terminal shown in Figs. 5 and 6 is preferred. This blade terminal is formed of a single strip of metal 42 having semi-cylindrical, threaded depressions 43 and 44 stamped in its opposite ends, the axial centers of the depressions preferably being in alignment. The strip of metal is then bent double on a line 45 midway between the depressions 43 and 44 bringing faces 46 and 47 on opposite sides of the line 45 against each other and bringing the edges of the depressions 43 and 44 into coincidence with each other. The depressions 43 and 44 are so stamped that, when their edges are thus brought into coincidence, a threaded, cylindrical screw socket 32 or 34 is formed, capable of receiving the stem of the screw 31 or 33. In the stamping of the blank, flanges are formed at opposite edges of the depressions 43 and 44, which, when the blank is doubled, form wings preventing the turning of the blade in the opening 15 or 16. The plate 42 is also preferably notched as at 49 and 50 at the ends of the bending line 45 to provide a beveled edge or corner for the blades to permit them to be easily inserted into their sockets.

In the modification of the invention shown in Figs. 7 to 10 a different form of contact blades and of separator plate is used than in the form of the invention described above. In the form of embodiment shown in Figs. 7 to 10, a mounting insulating plate 13 and a housing or enclosing shell 17 are used of substantially the same character as in the form of embodiment shown in Figs. 1 to 6, but the openings 15 and 16 are of a shape to conform to the cross sectional form of terminals 50 and 51 used in this form of embodiment. The terminals 50 and 51 are stamped of a single piece of metal bent at 52 to form a pair of contiguous or abutting plate portions 53 and 54 which extend through the plate 13 and project from the outer face 14 and at their other ends also extend a short distance past the inner face 39 of the plate. The end portion 55 of one of the plate portions 53 is bent sidewise to lie against the face 39 and the end portion 56 of the other plate portion 54 is bent sidewise in the opposite direction to also lie against the surface 39 and is then curved upwardly at 57 and reversely to provide a portion 58 at a slight distance above the portions 55 and 56. The end 59 of the portion 55 may then be bent to overlie the end of the portion 58 and press against it with a resilient pressure. In securing a wire to blade terminals of this type the end of the wire may be inserted beneath the portion 58 and this portion and the portion 59 then presses or is pressed or clamped down to tightly hold the wire. Or in some cases, the terminal may be finished spaced from the surface 39 so that the end of a lead wire may be inserted beneath it and held as the portion 54 is pressed downwardly onto the surface 39 of the plate 13.

A modified form of separator disc is employed in the form of embodiment shown in Figs. 7 to 10. This separator disc comprises a disc 60 having a pair of spaced openings 61 and 62 through which the lead wires 29 and 30 are threaded and which upon turning through a quarter turn, bend the wires 29 and 30 sharply in a manner similar to that shown in Figs. 1 to 6 and serves to hold or anchor the wires in the cap. The cap is also provided with a washer 62 similar in form to that of the embodiment shown in Figs. 1 to 6 and resting against the top portion 26 of the enclosing shell. The disc 60 however, is preferably extended outwardly for a sufficient distance to be engaged by a shoulder 64 of the shell 17 and pressed by this shoulder against the supporting plate 13 when the shell 17 is mounted on the plate.

The above described invention therefore provides an attachment plug cap which is of a light weight, inasmuch as the insulating material comprises only a few light plates, which are, however, protected against injury by the enclosing metal shell. As the openings in which the terminal blades are mounted may be accurately stamped in the material the blades are automatically and accurately positioned in the cap and all danger of their being displaced by a warping of the material is avoided. The anchoring of the wires in the cap by the use of the separator disc and washer construction, which may be applied to a variety of apparatus, enables a very strong anchorage to be effected with a minimum consumption of wire length.

As changes of construction could be made within the scope of my invention, it is intended that all the matter contained in the above description or shown in the accompanying drawings, shall be interpreted as illustrative and not in a limiting sense.

Having described my invention, what I claim and desire to secure by Letters Patent is:

1. A terminal blade of the type described in which comprises a strip of metal having a pair of complementary threaded depressions, and a radially extended wing at each end thereof and said strip being folded midway of said depressions to bring the edges of said depressions into coincidence and form a screw socket.

2. A terminal of the type described which comprises a strip of metal having a pair of complementary threaded depressions and radially extending wings at opposite ends thereof, the axes of said depressions and the sides of the wings being respectively in alignment, said strip being folded double on a line midway of said depressions and wings,

to bring the edges of said depressions and wings into alignment to form a threaded socket and a spline.

3. In a device of the type described, a contact carrying plate having a hole therein, a contact blade formed of a strip folded double at one end and having the other end held in said hole, and means held between said ends and in said hole for securing the end of a lead wire to said blade when the ends thereof are held together in said hole.

ARTHUR C. GAYNOR.