June 29, 1954 T. C. SMITH 2,682,647

ATTACHMENT PLUG CAP

Filed April 28, 1951

Fig. 1.

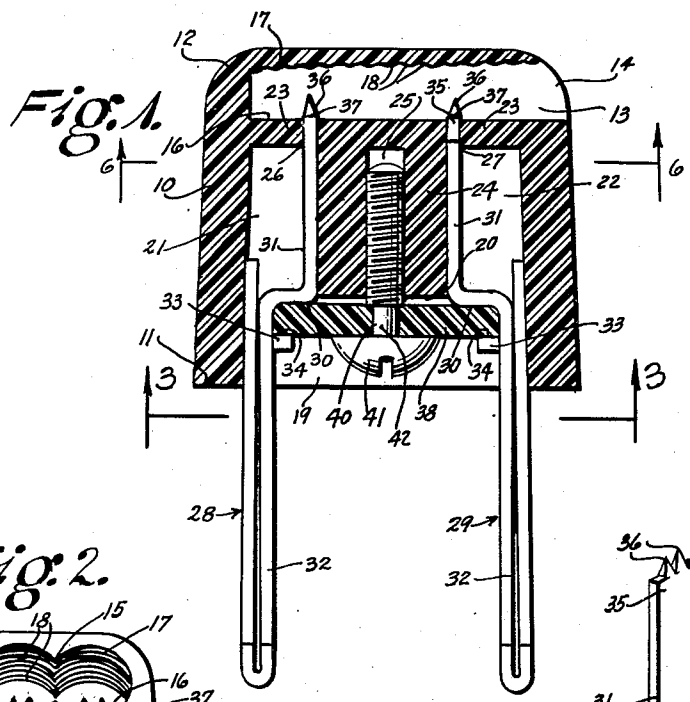
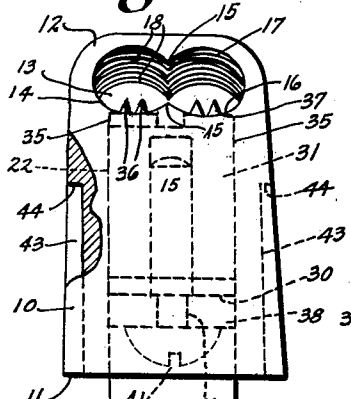


Fig. 2.



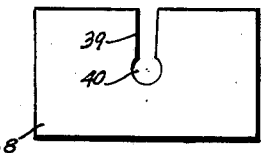


Fig. 4.

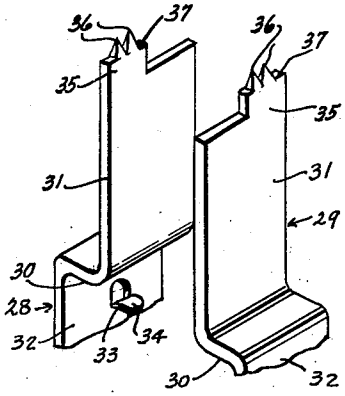


Fig. 5.

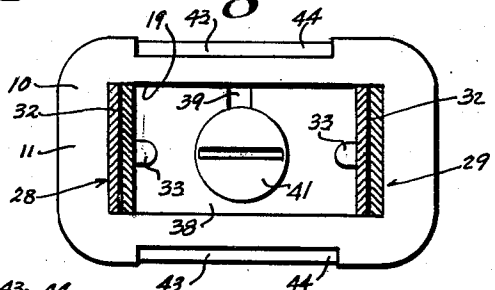


Fig. 3.

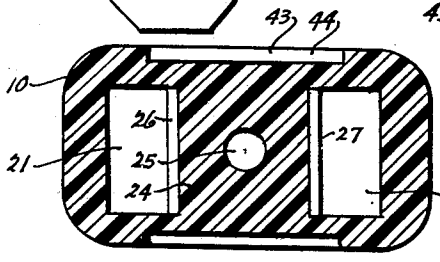


Fig. 6.

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ATTACHMENT PLUG CAP

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5 Claims. (Cl. 339—99)

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My invention relates to a new and useful attachment plug cap and has for one of its objects to produce an inexpensive, compact article of this character which may be of relatively small size thus requiring less material to make it and resulting in substantial savings in the cost of manufacture.

Another object of the invention is to provide an attachment plug cap having means of unique construction for securing together said cap and the end of a twin wire insulation covered conductor, said securing means including prongs to be forced through one side of the insulation covering and caused to penetrate the strands of the wires in a manner to obtain the highly efficient results without stripping the insulation covering from the wires.

Generally, the prongs of articles of this class have more or less sliding, rotary or a combination of both movements relative to the common plane of both wires or the conductor is pressed towards the prongs by such movements for the purpose of causing the prongs to penetrate the insulation covering and the wires. This is detrimental to the efficient operation of the article and often prevents repeated use thereof or actual retraction of the prongs from the insulation covering without damage to the prongs. Therefore, another object of this invention is to produce an attachment plug cap having piercing prongs which are moved in straight lines at right angles to the common plane of the twin wires for both projection and retraction whereby said prongs can be forced through the insulation covering and into the wires without damage thereto or undue marring of the insulation covering.

Another object of the present invention is to produce an attachment plug cap which will be neat in appearance and devoid of projections when in use and consisting of a body of insulating material having a base surface with a conductor receiving opening adjacent the outer end of said body and running laterally with relation to two sides thereof, being the narrower sides as illustrated, a pair of prong members spaced longitudinally of said conductor receiving opening and offset relative to each other, a bridge-piece connected with said prong members and means to move said bridge-piece and through the latter to simultaneously propel or retract said prong members in straight lines longitudinally of the body with relation to the base and the opposite or outer end of said body and at right angles to the conductor receiving opening.

Another object of the invention is to so form the

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conductor receiving opening as to provide oppositely disposed ribs to function as longitudinal center finders and guides for the twin wire conductor.

Another object of the invention is to form the top wall of the conductor receiving opening on a taper or incline relative to the bottom wall thereof.

Another object of the invention is to fashion the top wall of the conductor receiving opening with transverse ridges or snubber surfaces.

Another object of this invention is to produce an attachment plug cap including a body having an electric conductor receiving opening and with double-ended electric contact members slidably mounted therein for crosswise projection into and withdrawal from said conductor receiving opening, said contact members being positively propelled and retracted by a single screw through the medium of a bridge-piece of insulation material connected to said screw and positioned between a pair of shoulders on each double-ended contact member.

A further object of this invention is to position the operating screw at the inner or base end of the attachment plug cap body so that it enters said body from said inner end and is completely enclosed when the device is in use so that it cannot be manipulated except and until the attachment plug cap is removed from a companion socket.

A still further object of the present invention is to fashion each double-ended contact member in a novel manner whereby one portion constitutes a prong element and another portion comprises a leg with a bend between said prong element and leg to form one shoulder and another shoulder in spaced cooperative relation to the first one and produced by a projection punched from said leg.

With the above and other objects in view this invention consists of the details of construction and combination of elements hereinafter set forth and then designated by the claims.

In order that those skilled in the art to which this invention appertains may understand how to make and use the same I will describe its construction in detail referring by numerals to the accompanying drawing forming a part hereof, in which:

Fig. 1 is a vertical longitudinal sectional view, on a considerably enlarged scale, of the attachment plug cap constructed in accordance with my invention, the screw and double-ended contact members being shown in elevation.

Fig. 2 is an edge view thereof looking at the right hand side of Fig. 1, with a portion of the body broken away.

Fig. 3 is a section on the line 3—3 of Fig. 1 providing an inner or base end view of the body and certain component parts with the legs of the double end contact members in section.

Fig. 4 is a fragmentary perspective view of the duplicate companion double-ended contact members to illustrate the relation of the prong elements of the contact members to each other.

Fig. 5 is a face view of a bridge member of insulating material.

Fig. 6 is a cross section of the body on the line 6—6 of Fig. 1 without the contact members and screw.

In carrying out my invention as herein embodied, 10 represents the body of the attachment plug cap of any appropriate shape but for purposes of illustration is shown as oblong and tapering outwardly from the inner or base end 11 to the outer end 12.

A lateral conductor receiving opening 13 is formed in the body adjacent its outer end. The use of the term lateral being merely for descriptive purposes and, in this case, is to be considered with reference to the narrower sides of said body. The opening 13 runs from one side of the body to a location adjacent the opposite side thereof and therefore is open at one end, to provide an entrance 14 which will be considered the forward end of the opening, while the rear end is closed to provide a stop. This opening 13, preferably, has the configuration or shape, in cross section, of two endwise positioned ellipses intersecting each other on the longer diameters or has the form of the figure eight lying on its side, as plainly apparent in Fig. 2 thus providing opposed longitudinal guide ribs 15 with which the usual grooves in the insulation covering of a twin wire conductor register to locate the longitudinal center of said conductor and guide the wires into their respective channels of the opening 13. The wires are usually composed of a multiplicity of fine strands twisted together.

The conductor receiving opening 13 is, preferably, tapered with the larger end at the entrance 14 and, by preference, the curvilinear bottom wall 16 of said opening 13 is in a plane parallel with the base end surface 11 of the body while the similar curvilinear top wall 17 of the same opening 13 is inclined outwardly and upwardly from the closed end to the open end or entrance. Said top wall 17 of the conductor receiving opening 13 has transverse snubber ridges 18 formed thereon for a purpose to be fully set forth below.

In the base or inner end 11 of the body 10 is provided a cavity 19 of the same general outline extending a suitable distance into said body forming an abutment wall 20. At two opposite sides of the interior of said body, as at the ends of the cavity 19, if oblong in shape, are provided identical chambers 21, 22 in communication with the cavity 19 and extending towards the outer end of the body but terminating sufficiently short of the conductor receiving opening 13 to provide dividing walls 23 between said chambers and the opening 13. The provision of said chambers forms a central partition 24 between them in which is located the screw hole 25 extending perpendicularly relative to the abutment wall 20 and longitudinally of said partition a suitable distance and, preferably, ending short of the opening 13.

The chambers 21, 22 communicate with the conductor receiving opening 13 through respective slots 26, 27 located contiguous opposite sides of the central partition 24. These slots are relatively narrow and, preferably, are substantially equal in length to the transverse width of the chambers 21, 22, Fig. 6.

In the chambers 21, 22 are longitudinally slidably mounted the contact members 28, 29 which are duplicates of each other so that a detailed description of one will suffice for both. Each contact member is formed from a strip of suitable electrical conductive material of a width to slidingly snugly fit the cavity 19, transversely thereof, the chambers 21, 22 and the slots 26, 27. The strip of metal is bent at an appropriate location below or outwardly from its inner end at right angles to form a shoulder 30 and provide a prong element 31 and then again bent at right angles in a direction away from the prong element 31 to constitute a leg 32 which may be of double thickness by simply bending a portion thereof back upon itself, and by slightly separating the layers intermediate the ends a certain amount of resilient compressibility is imparted to the leg. An area of the leg adjacent to but spaced from the shoulder 30 is partially severed therefrom and punched or bent out to form a lug 33 providing a second shoulder 34 opposed to the first mentioned shoulder 30. The upper or inner end of each double ended contact member 28, 29 is fashioned to provide a narrow extension 35 projecting forwardly and on the terminal end of said extension are produced the conductor penetrating barbs 36 having a shoulder 37 at their bases, which shoulder is the terminal end of the extension and limits the amount of penetration of said barbs into the conductor.

In practice, two of the double ended contact members 28, 29 are used in connection with the other parts of the article and, being duplicates, they are turned so that the shoulders on each contact member faces the shoulders on the companion contact member and the prongs are in staggered relation. The bridge 38 or operating link of electric insulation material which, for purposes of illustration, is shown as a panel of oblong shape with a slot 39 running from one edge thereof to a center aperture 40, the diameter of said aperture being larger than the width of the slot 39. In effect said slot 39 and aperture 40 form a keyhole opening having an open end at the edge of the bridge panel.

A screw 41 has a restricted neck 42 contiguous the screw head and this neck is slightly larger than the width of the slot 39 in the bridge panel whereby the latter has to be forced over the screw neck to cause the aperture 40 to register with said screw neck after which the screw can turn freely but cannot be accidentally displaced. This screw 41 is screwed into the screw hole 25 with the bridge 38 in the cavity and the latter is movable towards and away from the abutment wall 20 as the screw is projected and retracted longitudinally within said screw hole.

To assemble the structure the bridge 38 is mounted on the neck of the screw by forcing the screw through the slot 39 into the aperture 40. After the screw enters the aperture 40 the walls of the slot return to their normal positions and bars the accidental return passage of the screw through said slot. Because of the restricted neck the bridge is held in a fixed location on the screw contiguous the head and will follow the movements of said screw. Next the double end-

ed contact members **28, 29** are placed on opposite ends of the bridge with the shoulders **30** and **34** on opposite faces of said bridge so that said double ended contact members are, at least in effect attached to the opposite ends of the bridge and the latter is connected to the screw so that the four elements provide a structural unit. Finally, the prong elements of the double ended contact members are inserted into the chambers **21, 22** and the screw is screwed into the hole **25**. As the screw is propelled forwardly it will carry the double ended contact members **28** and **29** forwardly and project them further and further into the chambers **21, 22** until the inner ends of the prong elements **31** enter the slots **26, 27** and approach or actually pass into the conductor receiving opening **13** with the barbs of the two contact members on opposite sides of said opening **13**, in the separated channels provided by the novel formation of said opening **13** or on opposite sides of the guide ribs **15** and in staggered relation to one another.

In operation, the screw **41** is backed out of the hole **25** sufficiently to withdraw the barbs **36** from the conductor receiving opening **13** and sheathe them within the walls of the slots **26, 27**. This is accomplished through the medium of the bridge **38** carried by the screw and acting simultaneously upon the shoulders **34**, formed by the lugs **33**, on both of the contact members **28, 29**. To attach a two-wire insulated conductor, not shown, to the attachment plug cap, the end of such conductor, with the insulation cover intact, is inserted in the conductor receiving opening **13** until the terminal of said conductor engages the stop wall comprising the closed end of said conductor receiving opening. Then the screw **41** is revolved in the proper direction to move it forwardly in the hole **25** which will carry the bridge **38** along with it and project the prongs into the conductor receiving opening **13**, through one side of the insulation covering on the conductor and cause the prongs of the two distinct contact members to cut into or penetrate the strands of the separated and individual wires for providing the electrical connections between each wire and one contact member. In forcing the prongs through the covering and into the wires the conductor will be pushed against the top wall of the opening **13** and caused to assume the general shape of the formation produced by the snubbing ridges **18** which will have a tendency to prevent withdrawal of the conductor which might result in bending or otherwise deforming the prongs. The penetration of the conductor by the prongs is limited by the shoulders **37**, at the bases of the prongs due to engagement of said shoulders with the conductor covering and the forward projection of the contact members **28, 29** is limited by contact of the bridge with the abutment wall **20**.

The double ended contact members **28, 29** are guided to positively reciprocate in directly straight lines by the engagement of the prong elements **31** with the side surfaces of the central partition **24** and the engagement of the legs **32** with the opposed surfaces, provided by the formation of the chambers **21, 22** and the base cavity **19**, as well as the slots **26, 27**.

It is to be particularly noted that, while the contact members are exact duplicates, by reversing one of them relative to the other the shoulders of said members will be positioned in facing relation and the prongs thereof will be staggered.

Whenever it is desirable or necessary to disconnect the attachment plug cap and conductor the screw **41** is backed out sufficiently to retract the prongs **36** into the slots and below the bottom wall **16** of the opening **13** which bottom wall will arrest any movement of the conductor and the prongs will be withdrawn from said conductor without any obstruction. This is possible because there is nothing to bend the prongs and they are completely freed from the conductor before the latter is to be pulled out of the opening **13**.

Recesses **43** may be formed in the exterior of the body on two opposite sides to form gripping ledges **44** to permit a person to obtain a good grip on the attachment plug cap when it is desirable to remove the same from a socket or outlet element to which said cap is connected by means of the legs **32**.

Some of the advantages, partially set forth in the objects, are; that the fastening together of the cap and conductor is accomplished without stripping off the cover of the conductor, that the brabs are driven forwardly and retracted in contradistinction to impaling the conductor on the barbs and stripping it therefrom, that said barbs are simultaneously actuated by a single screw through the medium of an insulated bridge which are completely enclosed when the device is in use because said screw is entered from the base end of the body, and that the flow of electric current is direct between a leg and its associated barbs which are parts of a substantially straight integral contact member.

Of course I do not wish to be limited to the exact details of construction herein shown and described as these may be varied within the scope of the appended claims without departing from the spirit of my invention.

Having described my invention what I claim as new and useful is:

1. An attachment plug cap comprising a body of insulation material having base and outer ends with a conductor receiving opening adjacent the outer end of said body, said body having a cavity in the base end open to the exterior thereof, said cavity communicating with a pair of spaced chambers running longitudinally of the body and terminating short of the conductor receiving opening which chambers communicate through slots with said conductor receiving opening crosswise thereof and in spaced relation longitudinally of said conductor receiving opening, a partition formed between said chambers and the end face thereof forming the bottom wall of the cavity, said partition having a screw hole therein communicating with the cavity, a pair of reversible similar contact members each produced from a strip of electric conductive material and consisting of a straight prong element having an extension to one side of the inner end with conductor piercing barbs on the terminal end of said extension, a shoulder at the base of the prong element, a leg projecting at right angles from the shoulder outwardly in a direction opposite to the prong element and a lug on said leg to provide a second shoulder in cooperative adjacent spaced relation to the first mentioned shoulder, said contact members each slidably mounted in a separate chamber with the legs extending through and projecting from the cavity and the prong elements located in their respective slots and projectable into the conductor receiving opening with the barbs of one contact member in staggered relation to the barbs of

the other contact member and the shoulders of one contact member facing the shoulders of the other contact member, a bridge of insulating material having its ends inserted between the shoulders of both contact members, and a screw threaded into the screw hole with the head thereof normally in the cavity and connected with the bridge whereby the two move in unison relative to the longitudinal travel of said screw to simultaneously project and retract the contact members.

2. An attachment plug cap comprising a body of insulating material with a conductor receiving opening having a closed end and an open end at a side of said body which is further provided with opposed recesses opening through the base of the body and communicating with the conductor receiving opening through slots crosswise of said opening, contact members slidably mounted in the recesses with barbs on the inner ends extending into the slots and projectable into the conductor receiving opening and legs on the opposite ends projecting beyond the base of the body, cooperating pairs of shoulders on said contact members, said barbs being on opposite sides of a plane in the longitudinal center of the conductor receiving opening and perpendicular to the base of the body when the shoulders of one contact member are facing the shoulders of the other contact member, a bridge of insulating material having opposite ends snugly positioned between the shoulders of opposed contact members to detachably connect the latter to the bridge, and a screw swiveled to the bridge and threaded into the body for producing a push and pull action on the contact members in accordance and simultaneously with the direction of longitudinal movement of said screw.

3. The structure according to claim 2 wherein the screw has a restricted neck and the bridge has a transverse slot open at one edge of said bridge and the inner end being enlarged at substantially the center thereof, the major portion of said slot being narrower than the screw neck whereby said bridge has to be forced over said neck and the enlarged portion of the slot being slightly larger than said neck whereby the screw is free to rotate independently of the bridge.

4. In an attachment plug cap for securement to a duplex wire conductor without the necessity of separating the wires, an insulated body including base and outer ends with a lateral conductor receiving opening adjacent the outer end, a pair of identical reversible contact members each produced from a strip of electric conductive material and consisting of a straight prong element having an extension to one side of the inner end of the individual contact member, barbs on the terminal of said extension, a shoulder at the

base of the prong element, a leg projecting at right angles from said shoulder outwardly in a direction opposite to the prong element and a lug on said leg to provide a second shoulder in adjacent spaced relation to the first mentioned shoulder, said contact members longitudinally slidably mounted in separated chambers in the body with the legs extending outside of the body and the barbed ends of the prong elements projectable through slots into the conductor receiving opening with the barbs of one contact member in staggered relation to the barbs of the other contact member and the shoulders of the contact members facing each other, means bridging the space between the contact members and engaged between the respective shoulders of each contact member to substantially tie said contact members together, and a screw swiveled to said means and having threaded connection with the body to reciprocate said means and the contact members.

5. An attachment plug cap for securement to a duplex wire conductor comprising a body of insulation material and including base and outer ends with a lateral conductor receiving opening adjacent the outer end thereof, said opening being closed except for an entrance at one end for the insertion of the wire conductor whereby said conductor is held against appreciable lateral movements, a pair of reversible identical contact members each having barbs on the inner end offset to one side and a leg at the outer end, said contact members being slidably mounted in the body with the barbs on one contact member to the side of the body opposite the barbs on the other of said contact members and projectable into the conductor receiving opening crosswise thereof whereby the barbs are in staggered relation longitudinally of said conductor receiving opening for penetration of the conductor to engage the individual wires thereof, means insulatively carrying the opposed contact members, and screw means carried by the body and in engagement with the first mentioned means and the plug cap body for simultaneously projecting or retracting said contact members to cause the barbs to penetrate the conductor or be withdrawn therefrom.

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