Jan. 12, 1937. F. J. BOLLER 2,067,433

SOFT RUBBER ATTACHMENT PLUG CAP

Filed Dec. 8, 1932

Fig. 1

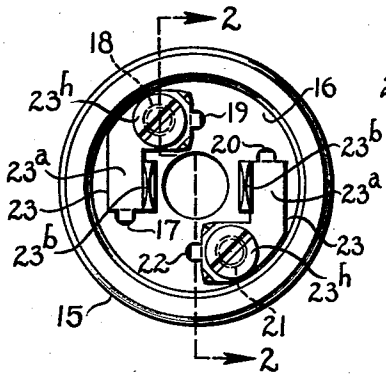


Fig. 4

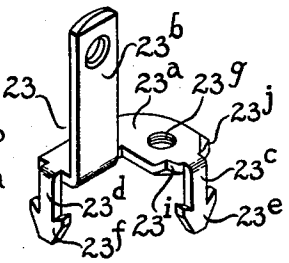


Fig. 8

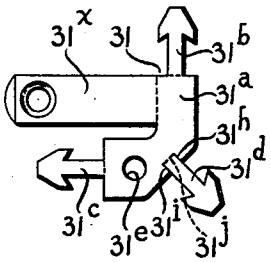


Fig. 5

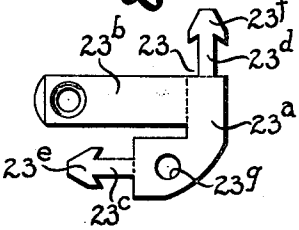


Fig. 9

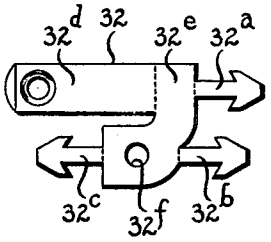


Fig. 2

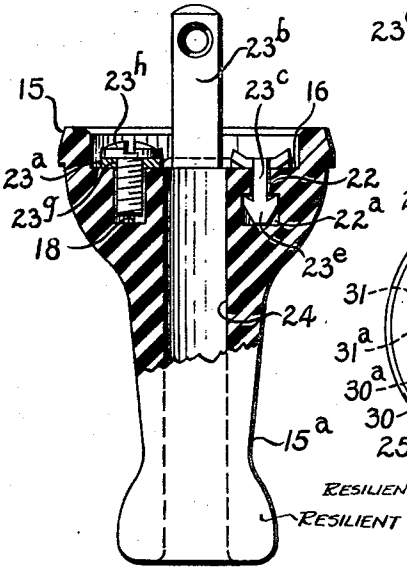


Fig. 6

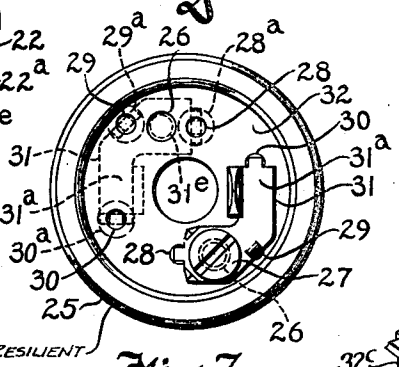


Fig. 10.

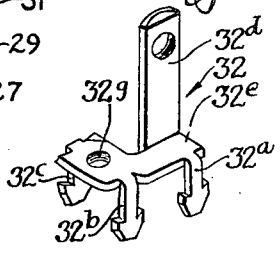


Fig. 3

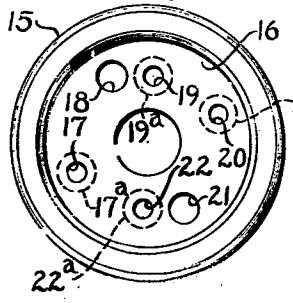
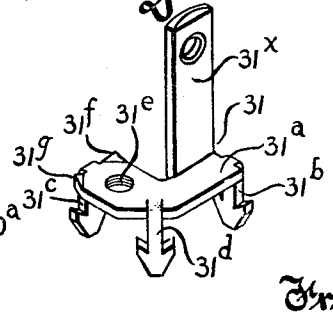


Fig. 7



Inventor
Frank J. Boller
By Frank H. Hubbard
Attorney

Patented Jan. 12, 1937 2,067,433

UNITED STATES PATENT OFFICE

2,067,433

SOFT RUBBER ATTACHMENT PLUG CAP

Frank J. Boller, Mount Vernon, N. Y., assignor, by mesne assignments, to Belden Manufacturing Company, Chicago, Ill., a corporation of Illinois

Application December 8, 1932, Serial No. 646,220

3 Claims. (Cl. 173—361)

This invention relates to improvements in soft rubber attachment plug caps.

An object of the invention is to improve and simplify the details of construction and assembly of the parts and wiring of rubber attachment plug caps.

Another object is to provide an attachment plug cap comprising a pre-molded body member of relatively soft rubber, and a plurality of combined contact jack and wiring terminal members which may be directly attached thereto after the molding operation,—the terminal portions of said members having exposed elements to provide for attachment of conductor wires after assembly of the cap parts.

Another object is to provide novel means affording a multi-point attachment of the combined contact and terminal member to the pre-molded rubber cap body.

Another object is to provide a simple form of one-piece combined contact and terminal member having a plurality of spaced anchorage elements formed integrally therewith.

Another object is to provide a plug cap consisting of a rubber body having a plurality of groups of recesses of socket form and a plurality of combined contact and terminal members each having a plurality of anchorage projections to be forcibly inserted into said recesses, said projections and the walls of said recesses being so formed as to provide a positive interlocking connection therebetween.

Another and more specific object is to provide a plug cap having a minimum number of separately formed parts while affording the usual or standard means for attachment of the conductor wires.

Other objects and advantages of the invention will hereinafter appear.

The accompanying drawing illustrates certain embodiments of the invention which will now be described, it being understood that the embodiments illustrated are susceptible of modification in certain details thereof without departing from the scope of the appended claims.

In the drawing, Figure 1 is a bottom plan view of a rubber attachment plug cap constructed in accordance with my invention,—the combined contact jack and wiring terminal members being shown in assembled position.

Fig. 2 is a view, partly in vertical section, on the broken line 2—2 of Fig. 1, and partly in side elevation, illustrating the manner in which the combined contact jack and wiring terminal members are attached to the rubber cap body, and also showing the form of the hand-grip or extension provided upon the rubber cap body.

Fig. 3 is a view similar to Fig. 1, but with the combined contact jack and wiring terminal members omitted, and illustrating the form and arrangement of the groups of recesses.

Fig. 4 is a perspective view of one of the two combined contact jack and wiring terminal members of identical form employed in the device of Figs. 1 to 3.

Fig. 5 is a plan view of the punched metal blank prior to bending thereof to the form illustrated in Fig. 4.

Fig. 6 is a view similar to Fig. 1, but showing a slightly modified form of combined contact jack and wiring terminal member and a slightly modified form of rubber cap body to which the same is attached.

Fig. 7 is a perspective view of one of the combined contact jack and wiring terminal members employed in the device of Fig. 6.

Fig. 8 is a plan view of the punched sheet metal blank prior to bending thereof to the form illustrated in Fig. 7.

Fig. 9 is a plan view of a blank from which a further modified form of combined contact jack and wiring terminal member may be produced, and

Fig. 10 is a perspective view of a combined contact jack and wiring terminal member formed from the blank shown in Fig. 9.

Referring first to Figs. 1 to 5, the numeral 15 designates the one-piece cap body which is formed of a relatively soft and resilient material, such as rubber. The body 15 is produced by a molding operation, and as shown the same is provided with a flat surface 16 offset inwardly from one end thereof. Formed within the body 15 and opening to said surface 16 are two groups of recesses 17, 18, 19 and 20, 21, 22. As best illustrated at 18 in Fig. 2 the recesses 18 and 21 of the respective groups are preferably of cylindrical form and of such dimensions as to provide clearance for the shanks of wiring terminal screws of usual or desired form. The recesses 17, 19 and 20, 22 are preferably of like form and dimensions, and each preferably comprises a cylindrical constriction or neck portion which opens to the surface 16 as shown and enlarged cylindrical inner end portions 17^a, 19^a and 20^a, 22^a, as shown in dotted lines in Fig. 3 and as best illustrated at 22^a in Fig. 2.

A pair of one-piece combined contact jack and wiring terminal members 23 are provided, said members each comprising a flat base portion 23^a

which is adapted to seat or rest upon the flat surface 16 of the cap body, a contact jack portion 23b which is bent upwardly at substantially right angles to said base portion, and a pair of anchoring portions 23c and 23d which are bent downwardly at substantially right angles to said base portion 23a. Said anchoring portions 23c, 23d are provided with enlarged ends 23e, 23f which are preferably of arrowhead-shape as shown, whereby forcible insertion of said anchoring portions into the respective groups of recesses 19, 17 and 22, 20 is facilitated.

As will be understood, and as best illustrated at the right-hand side of Fig. 2, upon forcible insertion of said anchoring portions into said recesses the enlarged and arrow-shaped heads (see 23e) after passage through the constrictions or neck portions will fit rather snugly within the enlarged ends (see 22a) of the recesses,—the resiliency of the inner end wall of each recess being adapted to permit a sufficient degree of inward movement of the enlarged end of the anchoring portion to insure engagement thereof with the shoulder formed between the constriction or neck portion and the enlarged inner end of the recess. In this manner a positive interlocking connection is provided between each anchoring portion and the walls of its cooperating recess, whereby the combined contact jack and wiring terminal members are retained in assembled relation to the rubber cap body.

Each terminal portion 23a is provided with a tapped opening 23g with which a wiring terminal screw 23h of usual or desired form is adapted to engage,—the recesses 18 and 21 being adapted to provide clearance for the shanks of the respective screws 23h, as best illustrated at the left-hand side of Fig. 2. The terminal portion 23a preferably has the corners thereof adjacent to opening 23g bent upwardly at the desired angle, as indicated at 23i, 23j to provide the usual wire guard.

Also it will be noted that the anchoring portions 23c, 23d are so arranged that the enlarged ends 23e, 23f thereof are located in planes extending at substantially right angles to each other. By this arrangement the base portion 23a of each member 23 is held rather tightly against the flat surface 16 of the cap body 15 and substantially equal resistance to tilting of base portion 23a (and consequently of the contact jack portion 23b) in any direction is insured; whereas the resilient mounting provided for the combined contact jack and wiring terminal members enables self-adjustment of the contact jack portions to slight differences or inequalities in the shape or spacing of the guide slots or contacts of the attachment plug receptacles (not shown).

As will be understood the combined contact jack and wiring terminal members may be factory-assembled with respect to the rubber cap body, and when it is desired to use the attachment plug cap the same may be wired in the usual manner,—a duplex conductor (not shown) being inserted through the cord passage and having the free ends of the individual wires thereof bared and looped around the shanks of screws 23h (which are partially withdrawn) whereupon the heads of the latter may be driven into clamping engagement with the respective wires.

While I have shown the rubber cap body 15 in Fig. 2 as being provided with an elongated and tapered end 15a, which forms a hand-grip and which also provides a flexible support for the duplex conductor to prevent a sharp bend or other strain upon the latter, it is to be understood that this extension of the rubber cap body may be omitted if desired.

In the device illustrated in Figs. 6, 7 and 8, the rubber cap body 25 is substantially like that aforedescribed, except that the same is provided with two groups of recesses each of which groups includes a recess 26, corresponding with the recesses 18 and 21 aforementioned, to provide clearance for the shank of a binding screw 27, and three anchorage recesses 28, 29 and 30. The anchorage recesses 28, 29 and 30 are of the form described in connection with the device of Figs. 1 to 5,—the same having enlargements at the inner ends thereof as indicated in dotted lines at 28a, 29a and 30a at the left-hand side of Fig. 6. Two combined contact jack and wiring terminal members 31 of identical form are employed, each having a flat base portion 31a which is adapted to rest upon the inwardly offset flat surface 32 of the molded rubber cap body 25.

Formed integrally with each base portion 31a and extending in one direction at substantially right angles thereto is the contact jack portion 31x, and also formed integrally with base portion 31a and extending in the opposite direction at substantially right angles thereto are three anchorage portions 31b, 31c and 31d, each having an enlarged free end of substantially arrow-head shape, as shown. The anchoring portions 31b, 31c and 31d are adapted to register with the recesses 30, 28 and 29 of the respective groups, whereby the enlarged ends of said anchoring portions may be forcibly inserted jointly into said recesses for positive interlocking engagement with the walls of the enlarged inner ends of the latter.

As in the device aforedescribed the anchoring portions 31b, 31c are arranged at opposite ends of the base portion 31a in such manner that the enlarged free ends thereof are located in planes at substantially right angles to each other, for the purpose set forth, and the anchoring portion 31d is preferably so arranged that the enlarged free end thereof is located in a plane extending at an angle to each of the planes aforementioned. The additional anchoring portion 31d thus not only increases the degree of resistance to separation of the combined contact and terminal member 31 from the rubber cap body, but likewise increases the resistance to distortion or tilting of the contact jack portion 31b with respect to the cap body.

The flat base portion 31a of each combined contact and wiring terminal member 31 is provided with a tapped opening 31e for cooperative engagement by the shank of a screw 27 which fits with clearance into once of the recesses 26 of the respective groups of recesses. The corners of base portion 31a may be bent upwardly as shown at 31f, 31g to act as a wire guard.

As best illustrated in Fig. 8 the anchoring portion 31d is preferably provided by shearing inwardly to a slight extent from the outer edge of base portion 31a, as shown at 31h, 31i, whereby said anchoring portion may be bent downwardly along the dotted line 31j to lie within the plane of said outer edge of base portion 31a (see Fig. 6). In this manner the recess 29 of each group may be positioned as illustrated in Fig. 6 to facilitate molding of the cap body, and to insure location of each recess a sufficient distance inwardly from the outer surface of the cap body.

The blank 32 illustrated in Fig. 9 is adapted to be formed into a combined contact jack and wir-

ing terminal member like that shown in Fig. 10,—the same having three anchoring portions 32^a, 32^b and 32^c with enlarged ends of substantially arrow-head shape. Said anchoring portions and the contact jack portion 32^d are formed integrally with the flat base portion 32^e,—said contact jack portion 32^d being bent upwardly along the dotted line with respect to the base portion and said anchoring portions being bent downwardly along the dotted lines.

As shown in Fig. 10 the anchoring portions 32^a, 32^b and 32^c after bending have the enlarged ends thereof located in planes parallel to each other. Where three anchoring portions are provided the parallel arrangement of the enlarged ends thereof is not objectionable, since the same provide a sufficiently rigid form of attachment of the combined contact jack and wiring terminal member to the cap body (which will of course have the recesses thereof suitable arranged to register with said anchoring portions). The principal advantage of the arrangement illustrated in Figs. 9 and 10 is that the blank may be punched from a relatively narrower strip of metal than is required for the blanks shown in Figs. 5 and 8, for instance.

On the other hand where the blanks of either of Figs. 5, 8 or 9 are to be punched from a relatively wide sheet of metal the blanking elements of the punch or die may be nested or correlated to minimize the wastage or scrap material left in the metal sheet after forming of the blanks. Blank 32 is preferably provided with an opening 32^f which may be tapped for cooperation with a binding screw, as indicated at 32^g in Fig. 10.

While I have illustrated certain preferred embodiments of my invention, slight modifications thereof will at once suggest themselves to those skilled in the art. For instance, if a more rigid connection between the combined contact jack and wiring terminal members and the cap body is desired, this result may be attained by assembling the parts in the manner illustrated in Figs. 1, 2 and 6, and then inserting into the respective recesses a suitable tool to effect bending of the enlarged free ends of the respective anchoring portions into clamping engagement with a wall of the enlarged inner end of its respective recess,—whereas if desired such tool might be formed to provide for simultaneously bending of two or more of the anchoring portions. Also, if desired the constrictions or neck portions of the respective recesses might be made of a different shape or size from that illustrated in order to facilitate insertion of such bending tool.

Referring again to the right-hand side of Fig. 2 it will be noted that the enlarged end 23^e of arrow-head shape engages the walls of the enlarged inner end 22^a of recess 22 in a manner similar to that in which the stud of a snap fastener engages its cooperating socket element. Moreover, the sharp corners formed at the rear end of the arrow-head enlargement will tend to "bite" into the material of the shoulder or surface formed between the neck or constriction of recess 22 and its enlargement 22^a whereby a positive resistance to removal of the anchoring portion from its recess is insured. Moreover by increasing or multiplying the number of anchoring connections between each combined contact jack and wiring terminal member and the rubber cap body, I am enabled to positively insure against separation of said members from the cap body during normal usage of the attachment plug cap.

The feature of providing exposed wiring terminal elements is of great importance from a practical viewpoint since it enables the user to wire the plug cap in the standard or usual manner long practiced in this art. I believe that I am the first to provide a rubber attachment plug cap of the particular type herein disclosed wherein such feature is provided. While I prefer to provide a tapped opening in the base portion of each combined contact jack and wiring terminal member for cooperation with the usual form of binding screw, it is to be understood that other means for attachment of the wire ends to said base portions may be employed. Thus the wire ends might be welded, brazed, soldered or otherwise attached permanently to said base portions; or the latter might be provided with lugs sheared or struck upwardly therefrom and bendable into clamping engagement with the wire ends, thus providing a rubber attachment plug cap consisting of only three separately formed parts which are adapted for complete assembly and subsequent wiring in a simple manner without requiring separation of any of said parts.

What I claim as new and desire to secure by Letters Patent is:

1. As an article of manufacture, a combined contact jack and wiring terminal member for attachment plug caps of the soft rubber type, said member having a flat base portion, a contact jack portion formed integrally with said base portion and extending therefrom at substantially right angles thereto, a plurality of anchoring portions also formed integrally with said base portion and extending in the opposite direction from the latter at substantially right angles thereto, each of said anchoring portions having an enlarged end of arrow-head shape, for the purpose set forth, certain of said enlarged ends being arranged in planes at substantially right angles to each other and another of said enlarged ends being arranged in a plane at an angle to each of the planes last mentioned, said base portion having a tapped opening formed therein, and a wiring terminal screw having threaded engagement with said opening.

2. As an article of manufacture, a combined contact jack and wiring terminal member adapted for use in attachment plug caps of the soft rubber type, said member having a flat base portion to which a conductor wire may be attached, a contact jack portion extending in one direction at right angles to said base portion, three spaced anchoring portions formed integrally with said base portion and extending in the opposite direction at right angles to the latter in planes parallel to each other, and each of said anchoring portions having an enlarged end of substantially arrow-head shape.

3. In an attachment plug cap, in combination, a plurality of one-piece combined contact jack and wiring terminal members; each of said members having a flat base portion and means for attaching a conductor wire thereto, a contact jack portion extending in one direction at substantially right angles to said base portion and three anchoring portions formed integrally with said base portion and extending in the opposite direction at substantially right angles thereto, each of said anchoring portions having an enlargement at the free end thereof, two of said anchoring portions being arranged in planes at substantially right angles to each other and the other of said anchoring portions being arranged in a plane at an angle to each of the planes last

mentioned; a molded cap body of relatively soft rubber, said body having a flat surface against which the base portions of the respective members are adapted to seat, said body having therein a plurality of groups of recesses, said recesses having enlargements at the inner ends thereof, the enlargements of said anchoring portions being adapted to register with the respective groups of recesses and being forcibly insertable therewithin, and the walls of said enlargements of the respective groups of recesses cooperating with said enlargements of the anchoring portions to positively retain said members in assembled relation to said body.

FRANK J. BOLLER.