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3,295,094

COAXIAL PLUG TERMINAL

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2 Sheets-Sheet 1

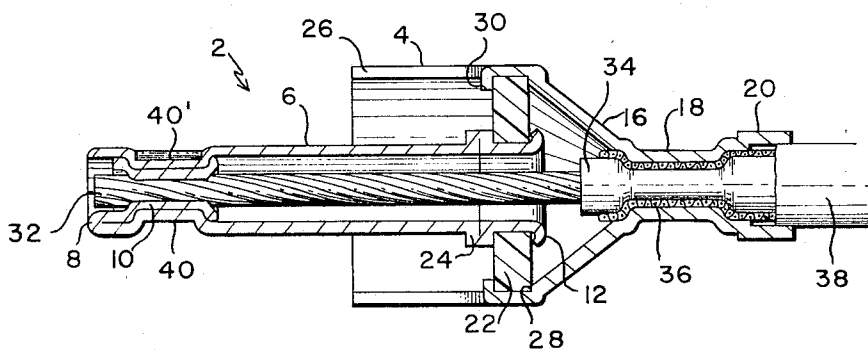
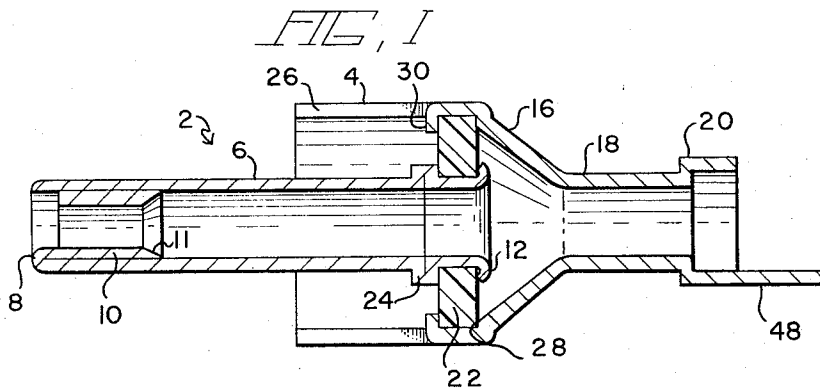


*FIG. 2*

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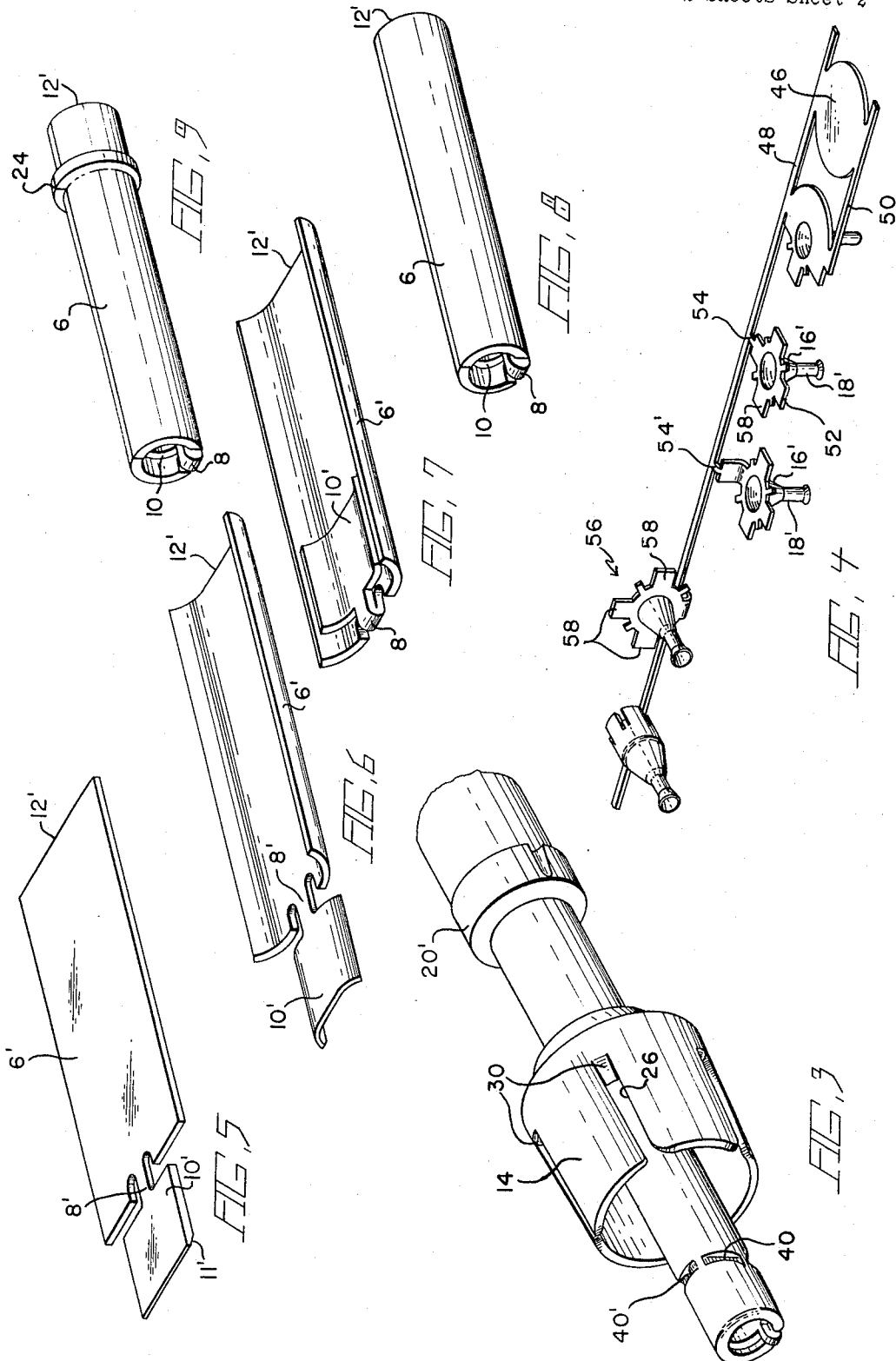
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## COAXIAL PLUG TERMINAL

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3 Claims. (Cl. 339-177)

This application is a continuation-in-part of application Serial No. 398,159, filed September 22, 1964, now abandoned.

This invention relates to plug-type terminals of the type commonly used for shielded wire.

An object of the invention is to provide an improved plug-type terminal for shielded wire which can be crimped onto both the center conductor and the braided shielding of the wire. A further object is to provide a plug-type shielded wire terminal in strip form. A further object is to provide a plug-type terminal which can be manufactured at a reduced cost and can be applied to the shielded wire at an extremely low cost. A further object is to provide a plug-type terminal having one drawn part and one stamped and formed part, the two parts being assembled to each other with the drawn part being in the form of a continuous strip.

These and other objects of the invention are achieved in a preferred embodiment comprising a plug terminal having a stamped and formed sheet metal pin and a drawn shell in surrounding coaxial relationship to the pin. The two parts are separated from each other by an insulating disc mounted on the pin and within the shell. The shell is drawn from a continuous strip and remains in strip form after manufacture. The stamped and formed pin and the insulating disc are mounted in the shell so that the finished product comprises a strip of completed connectors which can be applied to wire ends by a suitable automatic crimping machine. A significant feature of the stamped and formed pin is the provision of an integral tongue having a cylindrical stuffer on its ends which is contained in the pin and which has an internal diameter which is compatible with the relatively small diameter of the center conductor of the cable.

In the drawing:

FIGURE 1 is a longitudinal cross sectional view of a coaxial plug terminal in accordance with the invention prior to crimping;

FIGURE 2 is a view similar to FIGURE 1 but showing the shape of the parts after crimping;

FIGURE 3 is a perspective view of the crimped terminal of FIGURE 2;

FIGURE 4 is a perspective view illustrating the several steps in the combined stamping and drawing process by means of which the shell portion is made; and

FIGURES 5-9 are perspective views showing the successive stages in the manufacture of the pin portion of the terminal.

Referring first to FIGURES 1-3, a preferred form of plug terminal 2 in accordance with the invention comprises a shell member 4 and a pin member 6 concentrically mounted in the shell. The pin, which is also of cylindrical shape, has a reversely extending tongue at its forward end which extends into the interior of the pin which has an integral cylindrical stuffer member 10 on its end. The rightwardly facing side of this stuffer member, as viewed in FIGURE 1, has a beveled edge 11 to facilitate insertion of the center conductor member at the time of crimping. The right-hand end of the pin is upset to provide a lip or flange 12 which bears against an insulating disc 22 disposed between the pin and the shell member.

The shell 4 has a forward cylindrical section 14 pro-

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vided with four axially extending slots 26 which extend inwardly from the forward end of the shell. The cylindrical section 14 merges with a conical section 16 which slopes rearwardly and towards the axis of the terminal to a cylindrical section 18 of a relatively smaller diameter which is compatible with the diameter of the cable 38 after the outer insulation has been removed therefrom. A relatively short and slightly enlarged cylindrical section 20 is provided on the right-hand end of the shell member to receive an unstripped portion of the cable as will be described below. In FIGURE 1, a terminal 2 is shown as being integral with a carrier strip 48 from which it is removed at the time of crimping.

The insulating disc 22 may be of any suitable material such as a filled resin or the like. This disc or spacer is lodged against a forwardly facing internal shoulder 28 of the shell portion 16 and is retained against this shoulder by downwardly extending ears 30 at the ends of the slots 26. The pin portion 6 is maintained in assembled relationship to the disc 22 by previously identified lip 12 and by a radially extending collar on pin portion 24, the disc being held between the lip and the collar as being shown.

A conventional coaxial cable comprises a center or signal conductor 32, an insulating sheet 34 surrounding the signal conductor, a continuous metallic shielding sheath 36 of braided material or the like surrounding the insulation 34 and finally an outer insulating sheath 38. When the terminal is crimped onto the end of a cable, the end of the cable is stripped in the manner indicated in FIGURE 2, that is, a substantial portion of the inner conductor 32 is exposed and a relatively shorter portion of the shielding 36 is also exposed. The inner insulation 34 advantageously extends forwardly beyond the end of the braided material 36 in order to prevent contact between the shielding and the center conductor. At the time of application, the inner conductor is inserted into the stuffer 10 and the end portion of the insulation 38 is inserted into the cylindrical section 20 of the shell. The shielding material 36 will then extend along the cylindrical portion 18 of the shell. The portions 18 and 20 can be crimped in any suitable manner, for example, by circular crimps of the general type shown in U.S. Patent 3,010,183. The forward end of the pin 6 is crimped onto the center conductor 32 by a slightly modified form of the crimping die shown in U.S. Patent 2,600,012. This type of die will produce three flat indentations 40 and an additional indentation 40' having arcuate surfaces as shown. It will be understood that other crimping methods might be used so long as the diameter of the pin portion 6 is not materially changed since this portion must fit relatively snugly within the receptacle.

FIGURE 4 illustrates the manner in which the shell portion 4 is formed by a series of stamping and drawing operations from a continuous strip of metal. In the first stage, a circular blank 46 is formed between two carrier strips 48, 50. The center of this blank is deep-drawn as shown at 16' and 18' to produce the corresponding part 16, 18 of the finished terminal. The peripheral portions of the blank are stamped out to produce a blank 52 having four wings or flanges 58 which eventually become the cylindrical portion 14. The flange which is immediately adjacent to the carrier strip 48 is connected thereto by a slug 54. In the succeeding stage, this flange and the slug 54 are bent as shown at 54' so that the entire blank is lowered below the plane of the strip. The blank is then bent through a 90° angle so that its axis extends parallel to the plane of the strip. The flanges 58 are then formed into the cylindrical portion 14.

The pin portion 6 is formed from the blank of FIGURE

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5 by imparting curvatures in opposite directions to the stuffer section 10' and the body section 6'. The tongue 8' is then bent through a 180° angle as shown in FIGURE 7 and the body portion 6' is subsequently formed into a cylindrical shape. The collar 24 can be formed by a compressing or upsetting operation as illustrated in FIGURE 9.

Since the shell portions are in strip form, the individual pin portions and the spacers can then be assembled to the shells automatically and the ears 30 clinched downwardly to retain the parts in assembled relationship.

The fact that terminals in accordance with the invention can be produced in strip form is a distinct advantage, particularly where they are applied to wires by automatic or semi-automatic machines. The strip can be fed to the crimping press to reduce the application time.

A significant advantage of the invention is that it provides a low cost crimpable coaxial terminal of the type commonly used for the shielded conductors used with domestic phonograph, radio, and television equipment. Heretofore, terminals of this type have ordinarily been soldered rather than crimped. A significant feature of the invention, which permits the achievement of a low cost plug-type terminal, is the provision of the rearwardly bent and formed tongue 10' by means of which the pin terminal or contact 6 can be crimped onto the relatively small inner conductor of a cable while maintaining the relatively large outside diameter which is necessary in terminals of this type.

Changes in construction will occur to those skilled in the art and various apparently different modifications and embodiments may be made without departing from the scope of the invention. The matter set forth in the foregoing description and accompanying drawings is offered by way of illustration only. The actual scope of the invention is intended to be defined in the following claims when viewed in their proper perspective against the prior art.

We claim:

1. A plug terminal for shielded wire comprising a stamped and formed sheet metal pin and a metal shell, said shell being in surrounding coaxial relationship to said pin with said pin extending forwardly beyond said shell, an insulating disc in surrounding relationship to

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said pin at the rearward end thereof, said rearward end being upset to form a circumferential lip bearing against the rearward side of said insulating disc, radially extending shoulder means on said pin forwardly of said disc and bearing against the forward side of said disc whereby, said disc is gripped between said shoulder means and said lip, said shell having inwardly directed ears at spaced locations around its periphery, said ears bearing against said disc, a tongue integral with a hollow cylindrical stuffer member coaxially contained within said pin thereby to adapt said pin for crimping onto a relatively small diameter center conductor of said shielded wire.

2. A plug terminal as set forth in claim 1 wherein said shell member is drawn from strip metal.

3. A strip of plug terminals for shielded wire, each of said terminals comprising a shell portion and a stamped and formed pin portion, said shell portion being in coaxial surrounding relationship to said pin portion with said pin extending forwardly beyond said shell, an insulating disc in surrounding relationship to said pin at the rearward end thereof, said rearward end being upset to form a circumferential lip bearing against the rearward side of said insulating disc, radially extending shoulder means on said pin forwardly of said disc and bearing against the forward side of said disc whereby, said disc is gripped between said shoulder means and said lip, said shell having inwardly directed ears at spaced locations around its periphery, said ears bearing against said disc, a tongue integral with a hollow cylindrical stuffer member coaxially contained within said pin thereby to adapt said pin for crimping onto a relatively small diameter center conductor of said shielded wire.

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