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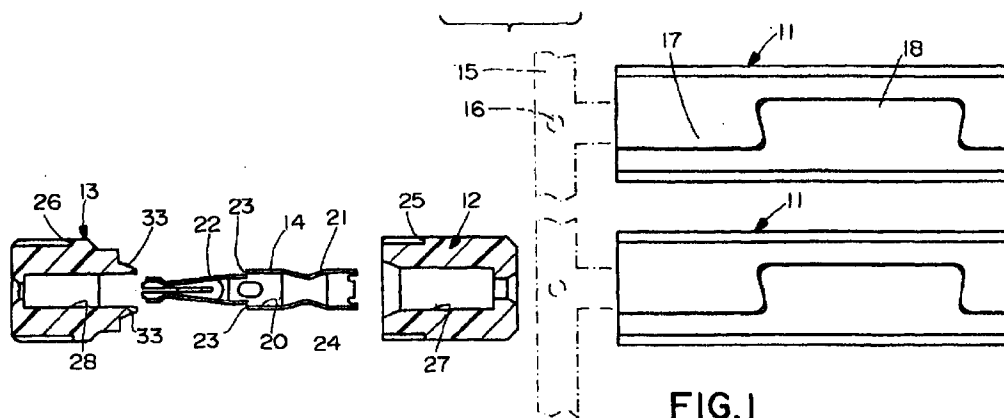
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(54) Single-pole coaxial crimp connector

(57) A single-pole plug connector (10) for a coaxial cable (1) having a signal conductor (2), a shield (3) and an insulating jacket (4). The plug connector includes a hollow shielding sleeve (11), an insert housing comprising a terminal housing part (12) and an actuating housing part (13), and a signal terminal (14). The hollow shielding sleeve (11) includes a collapsible piercing por-

tion (30, 31) adapted to be connected to the shield (3) of the cable. The shielding sleeve (11) further includes a cavity (32) for receiving the insert housing (12, 13) which is acted upon to clamp and connect the signal conductor (2) to the signal terminal (14).



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Description

Field of the Invention

[0001] This invention relates to the art of electrical connectors and, particularly, to a single-pole plug connector for a shielded cable including a signal wire or conductor, an insulating jacket and an outer shielding. The invention is particularly applicable to coaxial cables.

Background of the Invention

[0002] A coaxial cable connector is known (US Patent 5,116,230) which has dielectric means for mounting a signal terminal that terminates to a signal wire and conductive grounding terminal means arranged outside the dielectric means having piercing means to engage an outer shielding of the coaxial cable. The coaxial cable connector discloses an outer insulating housing for mounting a plurality of terminals for a plurality of coaxial cables.

[0003] Single-pole plug connectors are a mass-produced item that are manufactured in many different configurations. There is therefore an ongoing need to cost-effectively produce such single-pole plug connectors with existing assembly machines, while maintaining a properly designed quality product.

Summary of the Invention

[0004] An object of the invention is to provide a new and improved single-pole plug connector for terminating a shielded insulated wire or coaxial cable which can be produced inexpensively with existing assembly machines.

[0005] The single-pole plug connector of the invention includes a hollow shielding sleeve of metal which constitutes the outer housing of the single-pole plug connector, and a hollow insulating insert housing which mounts a hollow signal terminal. The outer housing or sleeve includes a free cavity and collapsible insulation piercing means for cooperation with the shielding and insulating jacket of the coaxial cable. The signal terminal is of the insulation displacing or piercing type and is activated when the insert housing is fully inserted into the outer housing or shielding sleeve. Simultaneously, when terminating the signal wire, the piercing means of the outer housing or shielding sleeve bites into the jacket of the coaxial cable to make a connection therebetween.

[0006] In the preferred embodiment, hollow shielding sleeves are produced from a single metal sheet in such a way that they remain attached to the sheet metal strip from which they were produced in order to be fed in to an assembly machine in rolled reels where the sleeves can be separated or cut from the reels. The collapsible insulation piercing means is located in the interior of the shielding sleeve along with the hollow, insulating insert housing. The insert housing is preferably a two-part

structure including a terminal housing member and an actuating housing member. A signal terminal is inserted between the terminal housing member and the actuating housing member and, together with the insert housing, is pre-assembled in the shielding sleeve. In this form, the shielding sleeves, together with the pre-assembled insert housings and signal terminals, remain on the residual portion of the sheet metal strip and can be rolled up. Final assembly of the plug connector is effected by introducing the shielded cable into the shielding sleeve with the signal wire or conductor passing into the hollow signal terminal and the cable shielding passing into the collapsible piercing means. Final assembly is effected by axially pressing the parts together, thereby crimping the signal terminal which clamps and engages the signal wire. The outside of the insulating insert housing is provided with grooves having abutment surfaces and the wall of the shielding sleeve may be provided with ridges or tabs, which engage each other and hold the parts firmly in position.

Brief Description of the Drawings

[0007] Further details of the invention are described with reference to the drawing in which:

Figure 1 is an exploded view of the plug connector of the invention illustrating the components thereof; Figure 2 is a view in longitudinal section of a pre-assembled plug connector; Figure 3 is a view similar to Figure 2 showing the pre-assembled plug connector with an inserted cable; Figure 4 is a view in longitudinal section of the plug connector in its fully assembled condition; and Figure 5 is a perspective view of the plug connector prior to being assembled to a shielded cable.

Detailed Description of the Preferred Embodiment

[0008] Figure 1 shows the components of a plug connector 10 for a shielded cable 1 which includes a signal wire or conductor 2, a cable shield 3, an inner jacket 4 and an outer jacket 5. The plug connector itself includes a hollow shielding sleeve 11, a terminal housing member 12 and an actuator housing member 13 which together form an insert housing, and a signal terminal 14. The signal terminal can have a female socket configuration (as shown) or a male pin configuration.

[0009] The walls of the shielding sleeve 11 are stamped out of a metal sheet and formed into shape. The shielding sleeves remain connected to a residual sheet metal strip or carrier 15 so that the sleeves can be easily handled during assembly of the plug connector. For that purpose, the carrier 15 includes transport and indexing holes 16.

[0010] Opposing edges of the sheet metal from which the shielding sleeve is folded are configured as shown

at 17 and 18. These interleaved portions 17 and 18 engage one another with an undercut configuration, so that some tensile loading in the peripheral direction of the shielding sleeve 11 is carried by the sleeve.

[0011] The insert housing, made up of terminal housing member 12 and actuator housing member 13, is generally hollow and is fabricated of insulating material such as plastic. The terminal housing member and the actuating housing member have external grooves with abutment surfaces 25, 26 and internal cavities or spaces 27, 28 which form through passages. Signal terminal 14 also has a hollow configuration with a through passage and includes a collapsible plug portion 21 having termination engagement means 24, and a signal contact portion 22 which connects with the plug portion at a step or shoulder 23. The collapsible plug portion fits into cavity 27 in terminal housing member 12 and signal contact portion 22 fits into cavity 28 of actuating housing member 13. When fitted together in that way, the insert housing 12,13 can be pre-assembled into shielding sleeve 11, as shown in Figure 2.

[0012] Shielding sleeve 11 comprises a first section including two clamp portions 30 having insulation piercing means 31, and a second section including a free cavity 32 for receiving insert housing 12,13 and signal terminal 14. Ridges or tabs 35, 36 are formed in the wall of the shielding sleeve 11 and form abutment surfaces to latchingly interengage with abutment surfaces 25, 26 of the insert housing. As seen in Figure 2, in this pre-assembled condition the rear end of the insert housing projects out of the shielding sleeve.

[0013] For final assembly of the plug connector, shielded cable 1 is inserted into the opening formed between the insulation piercing means 31, and the pre-assembled structure of Figure 2 is compressed by applying pressure, with a tool for example, to the rear end 29 of the insert housing to push it further into the sleeve. Signal terminal 14 is thereby terminated. This causes each limb of clamp portion 30 to be shortened and insulation piercing means 31 thereby penetrates outer shielding 3 of cable 1 and makes contact with the shielding. Ribs or actuating projection portions 33 disposed on actuating housing member 13 cooperate with the abutment surfaces 23 of signal terminal 14. In comparing Figure 3 with Figure 4, it can be seen that actuating projection portions 33 penetrate into cavity 27 of terminal housing member 12 which is enlarged at an opening thereof in a funnel-shape configuration. Collapsible portion 21 of signal terminal 14 includes termination engagement means 24 which penetrate the insulating jacket of cable 1 and makes contact with signal wire 2. The position of the insert housing may be secured by ridges or tabs 37, 38 on the wall of shielding sleeve 11, which engage the abutment surfaces of terminal housing member 12 and actuating housing member 13, respectively.

[0014] Figure 5 shows a perspective view of plug connector 10 prior to assembly to the cable 1. As can be

seen therefrom, shielding sleeve 11 is generally rectangular or square shaped, either of which is desirable in terms of manufacture of insulation piercing means 31.

[0015] The force applied to rear end 29 of the insert housing can be measured by a suitable force-measuring device on the assembly tool, and it is possible to determine whether the thrust force is in the correct range. If the dimensions are not correct and/or the cable is not correctly inserted, the measured force will be outside the permissible range, and faults can therefore be detected and corrected.

[0016] The step of separating the shielding sleeve from the carrier strip may be effected prior to or after completion of the assembly procedure.

[0017] It will be understood that the invention may be embodied in other specific forms without departing from the spirit or central characteristics thereof. The present examples and embodiments, therefore, are to be considered in all respects as illustrative and not restrictive, and the invention is not to be limited to the details given herein.

Claims

1. A single-pole plug connector (10) for a shielded cable (1) having a signal conductor (2), a shield (3) and an insulating jacket (4), the connector comprising:

a hollow shielding sleeve (11) including a first section having collapsible piercing means (30, 31) and a second section defining a cavity (32); an insert housing (12, 13) adapted to fit into said cavity (32) of the shielding sleeve (11) and including a through passage (27, 28) therein; interengaging means on said shielding sleeve (11) and on said insert housing (12, 13) for fixing said insert housing in said shielding sleeve when said insert housing is fully inserted in said shielding sleeve;

a signal terminal (14) mounted in said passage (27, 28) of said insert housing (12, 13) including termination engagement means (24); wherein, when said cable is inserted into said passage (27, 28) of said insert housing (12, 13) such that the shield and jacket are located in the first section of said shielding sleeve (11) and said insert housing (12, 13) is positioned in the second section of said sleeve, said piercing means (30, 31) of said sleeve engage the shield of the cable and the termination engagement means (24) makes contact with the signal conductor.

2. The plug connector according to claim 1 wherein said insert housing comprises a terminal housing member (12) and an actuating housing member (13) which, when said signal conductor is inserted

into said passage of said insert housing, are spaced by said signal terminal, and when said insert housing is fully inserted into said cavity of said sleeve, the terminal housing member and actuating housing member are minimally spaced from one another.

3. The plug connector according to claim 2 wherein said signal terminal (14) comprises a collapsible portion (21) and a contact portion (22) and wherein a shoulder (23) is provided between said collapsible portion and said signal contact portion, wherein the shoulder is adapted to be engaged by said actuating housing member.
4. The plug connector according to claim 1 wherein said shielding sleeve (11) is formed of sheet metal.
5. The plug connector according to claim 4 wherein said shielding sleeve (11) has wall portions formed with interleaving edge portions (17, 18).
6. The plug connector according to claim 4 wherein said shielding sleeve (11) is of a generally rectangular shape.
7. The plug connector according to claim 4 wherein said shielding sleeve (11) includes ridges (35, 36, 37, 38) which provide surfaces for securing the insert housing (12, 13) within said sleeve (11).
8. The plug connector according to claim 7 wherein some of said abutment surfaces (35, 36) are arranged for pre-assembly and the other of the abutment surfaces (37, 38) are arranged for final assembly of said insert housing.
9. The plug connector according to claim 3 wherein said actuating housing member of said insert housing comprises projection means (33) adapted to cooperate with said shoulder (23) of the signal terminal (14).
10. The plug connector according to claim 9 wherein said actuating housing member (13) and the terminal housing member (12) are adapted to be pushed together to terminate the signal terminal (14).

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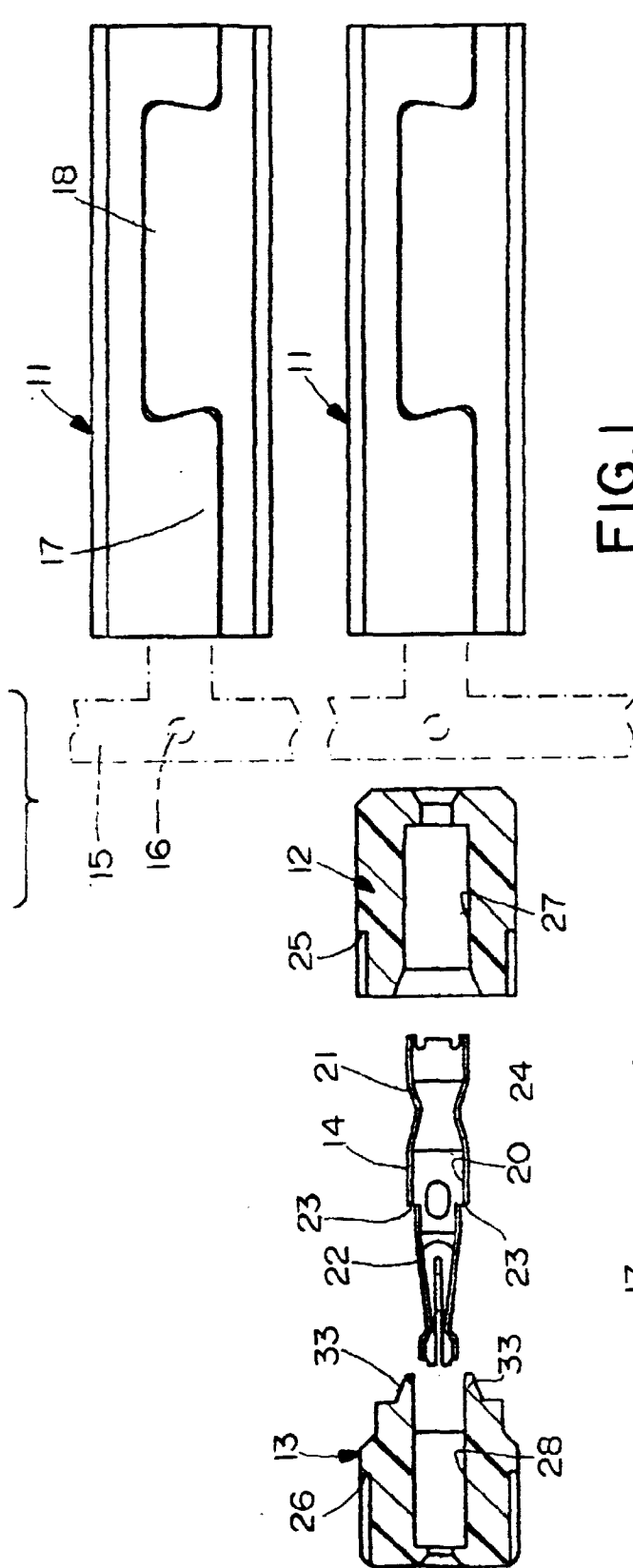


FIG. 1

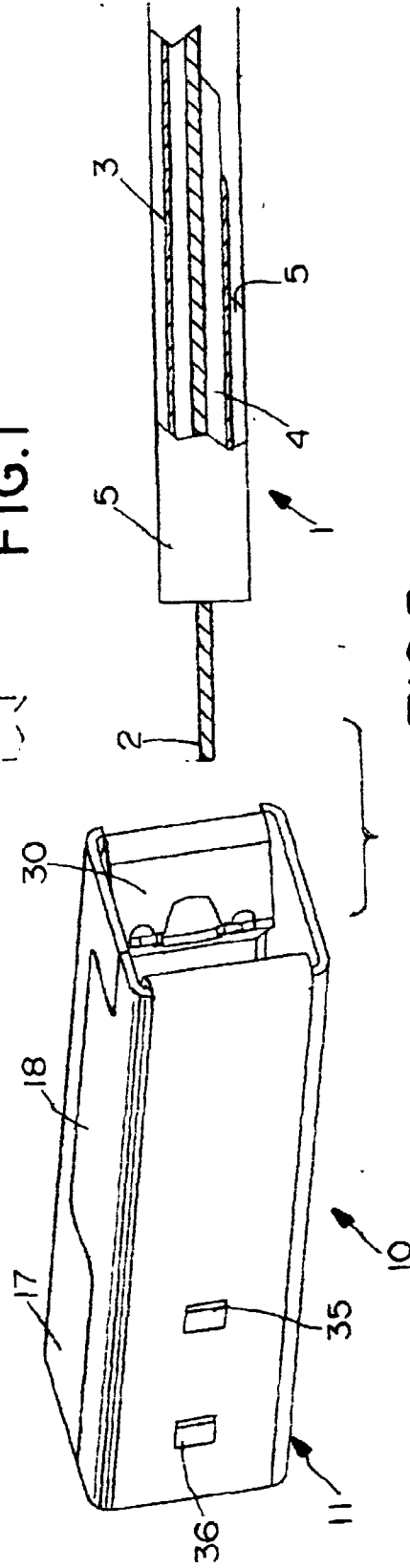


FIG. 5

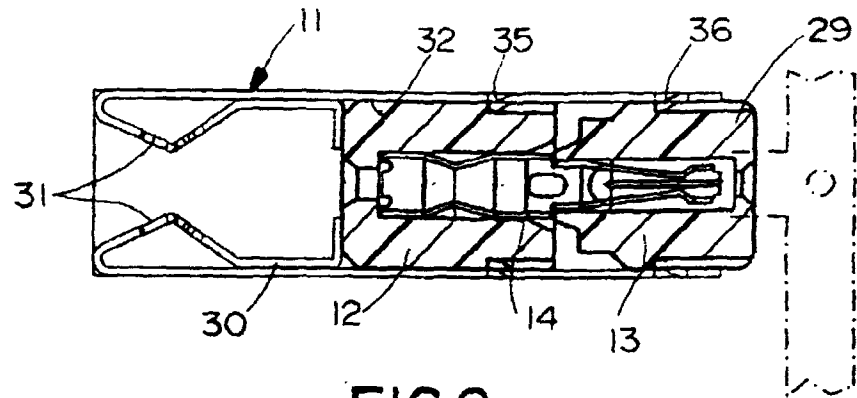


FIG. 2

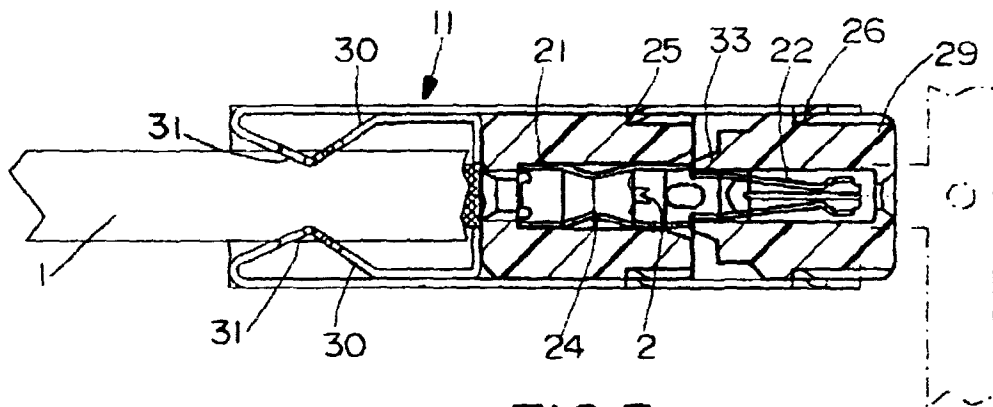


FIG. 3

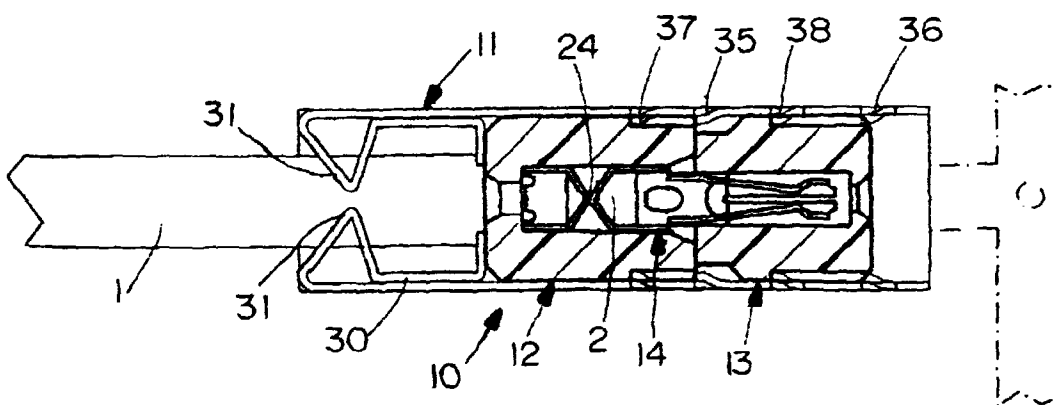


FIG. 4



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EUROPEAN SEARCH REPORT

Application Number
EP 98 12 2203

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	EP 0 607 485 A (MOLEX) 27 July 1994 * column 4, line 11 - column 6, line 15 *	1,4,6,7	H01R9/05
A	* column 7, line 11 - column 8, line 24; figures 1-4,7,8 *	3	
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The present search report has been drawn up for all claims			TECHNICAL FIELDS SEARCHED (Int.Cl.6) H01R
Place of search BERLIN		Date of completion of the search 25 February 1999	Examiner ALEXATOS G.
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 98 12 2203

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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