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entitlement to designation.**

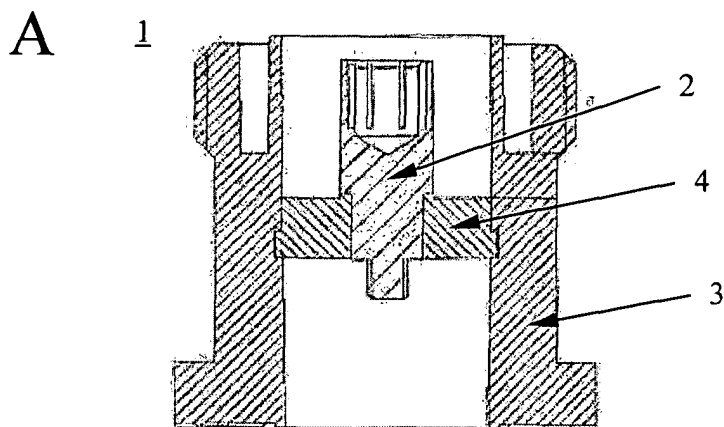
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(54) **RF Coaxial connector and manufacturing method**

(57) The invention relates to a method for manufacturing a coaxial connector 1 comprising the steps of moulding a connector housing 3 in thermoplastic material, coating said housing 3 with an electrical conductive material, and fitting a center conductor 2 with an insu-

lating spacer 4 into the housing. It is also related to a coaxial connector 1 for RF products comprising a connector housing 3 made of thermoplastic material and coated with an electrical conductive material, a center conductor 2 and an insulating spacer 4 between the center conductor and the outer coated housing.

Figure 1



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Description

[0001] The present invention relates, in general, to connectors for coaxial cables of the type used for radio frequencies (RF), and more particularly, to electrical connectors acting as a termination, such as a socket or part of a union, for a coaxial cable, whereby such cable may be connected to a piece of equipment where the socket is attached to.

[0002] A coaxial cable, which is used to transmit RF signals, is a cylindrical transmission line made up of an inner conductor and a tube-shaped outer conductor separated by a dielectric spacer. Coaxial cables are connected or terminated using an RF connector. The RF connector has an inner conductor and tube-shaped outer conductor, which connect to the respective conductors of the cable.

[0003] Coaxial cables and connections are typically used in cellular telephone base stations for carrying signals with high frequency. Various arrangements are known for connecting a coaxial cable to a piece of equipment in the mobile network industry. For example, many types of filtering and antenna equipment used today in the mobile telephony industry have connector terminations for RF coaxial cables attached to them which are well known for the person skilled in the art, such as 7/16 type connectors or N-type connectors. Said connectors are made of brass which is surface treated with white bronze (optalloy, sucoplate or silverplated) and are mounted on the filter equipment by using screws or press-fit.

[0004] One problem with prior connectors is that their manufacture involves a relatively costly process. Furthermore, they do not perform well with respect to passive intermodulation characteristics if assembly between connector and the equipment is not performed correctly. Another problem is that, they need an extra gasket for making them waterproof.

[0005] Accordingly, it is the object of the present invention to solve the aforesaid problems and provide an improved RF coaxial connector and method of manufacture.

[0006] The object is achieved, according to the invention, by a method for manufacturing a coaxial connector comprising the steps of moulding a connector housing in thermoplastic material, coating said housing with an electrical conductive material, and fitting a center conductor with an insulating spacer into the housing.

[0007] The object is also achieved by a coaxial connector for RF products comprising a connector housing made of thermoplastic material and coated with an electrical conductive material, a center conductor and an insulating spacer between the center conductor and the coated housing.

[0008] The present inventors have found a method of making a connector which is more cost-effective. Due to the method according to the invention, the number of processes to manufacture the connector is reduced and

it eliminates the need for individually machine and assemble different parts of the connector in different materials as was the case with prior art.

[0009] Advantageous configurations of the invention emerge from the dependent claims, the following description and the drawings. For example, it is seen advantageous that by reducing the mechanical assembly of different parts of the connector in different materials, its performance with respect to passive intermodulation is improved. Also advantageous is that the invention provides an easy way to achieve an extreme weight reduction for the connector and to improve its waterproof characteristics.

[0010] An embodiment example of the invention is now explained with the aid of Figures 1 and 2.

[0011] Fig. 1 A,B shows a sectional view of a connector according to the invention.

[0012] Fig. 2 A,B shows a perspective partial view of a filter equipment with connectors according to invention mounted onto the body housing.

[0013] Figure 1 A shows a sectional view of a connector 1 comprising a center conductor 2, an outer conductor 3, which constitutes the connector housing, and an insulating spacer 4 between the center conductor and the outer conductor.

[0014] According to the invention, the connector 1 is manufactured by moulding the outer conductor 3 body or connector housing in thermoplastic material, coating said outer conductor body with an electrical conductive material such as for example copper or silver-plating, and fitting the center conductor 2, of e.g. spring bronze, with an insulating spacer 4, of e.g. PTFE, into the body by press-in or by outsert moulding in a moulding tool.

[0015] The plating process is usually made by electro-deposited silver on top of a thin layer of chemical copper and electrolytic copper.

Outsert moulding is similar to insert moulding, but here though, a larger metal part surrounds one or more plastic elements like distance pins, flexible snap-locks, turnable buttons etc. A prepared sheet of metal with holes and gripping areas is placed in a mould, hereafter plastic is injected as in conventional injection moulding.

[0016] Figure 1B is a perspective sectional view of the inventive connector 1.

[0017] Figure 2A shows a perspective partial view of a filter equipment 5 with connectors 1 according to invention mounted onto the housing.

[0018] In a typical arrangement of a mobile network base station, the filters 5 are coupled to an antenna by means of a coaxial cable and connector 1 mounted on the housing of the filter 5.

[0019] In figure 2A, the coaxial connectors 1 are mounted, as a separate product, on the filter equipment 5 housing by means of screws or by press-fit.

[0020] Alternatively, also according to the invention, the connector housing 3 can be moulded directly together with the filter 5, as shown in figure 2B, or with any product to which the connector 1 is mounted on, so that

the connector 1 constitutes an integrated part of the product. The center conductor 2 with insulating spacer 4 is hereafter fitted in place.

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Claims

1. A method for manufacturing a coaxial connector (1) comprising the following steps:

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moulding a connector housing (3) in thermoplastic material,
coating said housing (3) with an electrical conductive material, and
fitting a center conductor (2) with an insulating spacer (4) into the housing (3).

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2. The method of claim 1 **characterized in that** the center conductor (2) is fitted into the connector housing (3) by press-in or outsert moulding.

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3. The method of claim 1 **characterized in that** the connector housing (3) is moulded directly together with the product (5).

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4. A coaxial connector for RF products comprising a connector housing (3) made of thermoplastic material and coated with an electrical conductive material, a center conductor (2) and an insulating spacer (4) between the center conductor and the coated housing (3).

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Figure 1

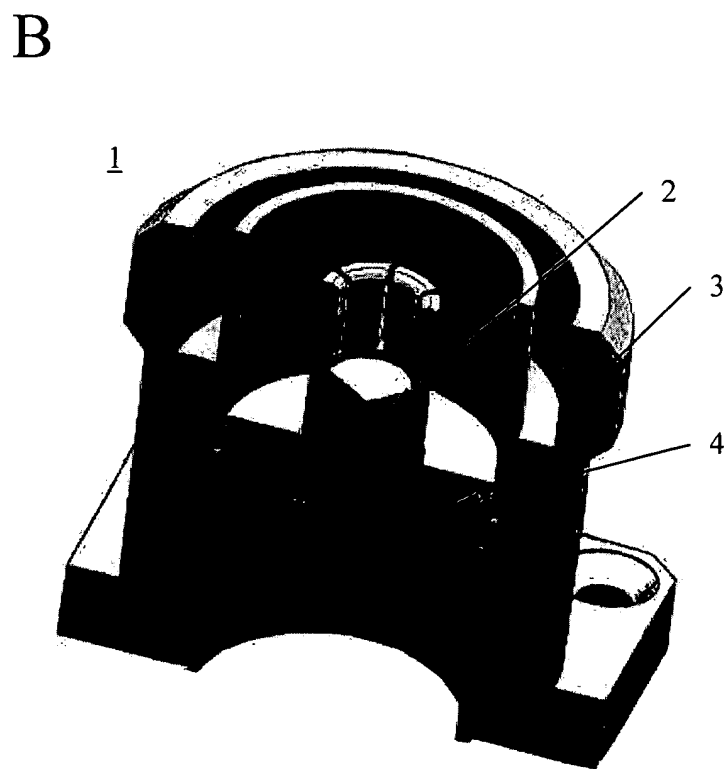
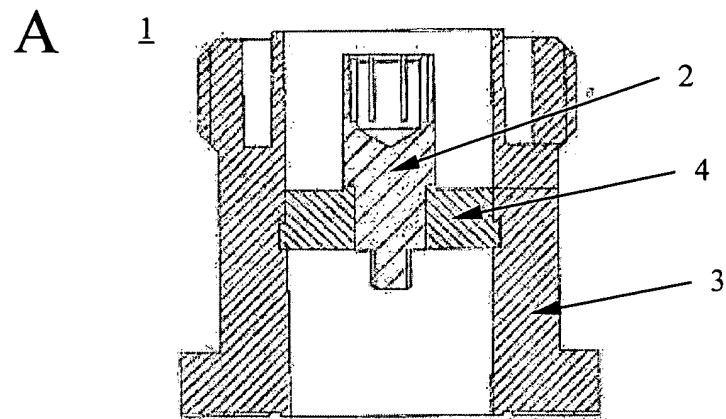
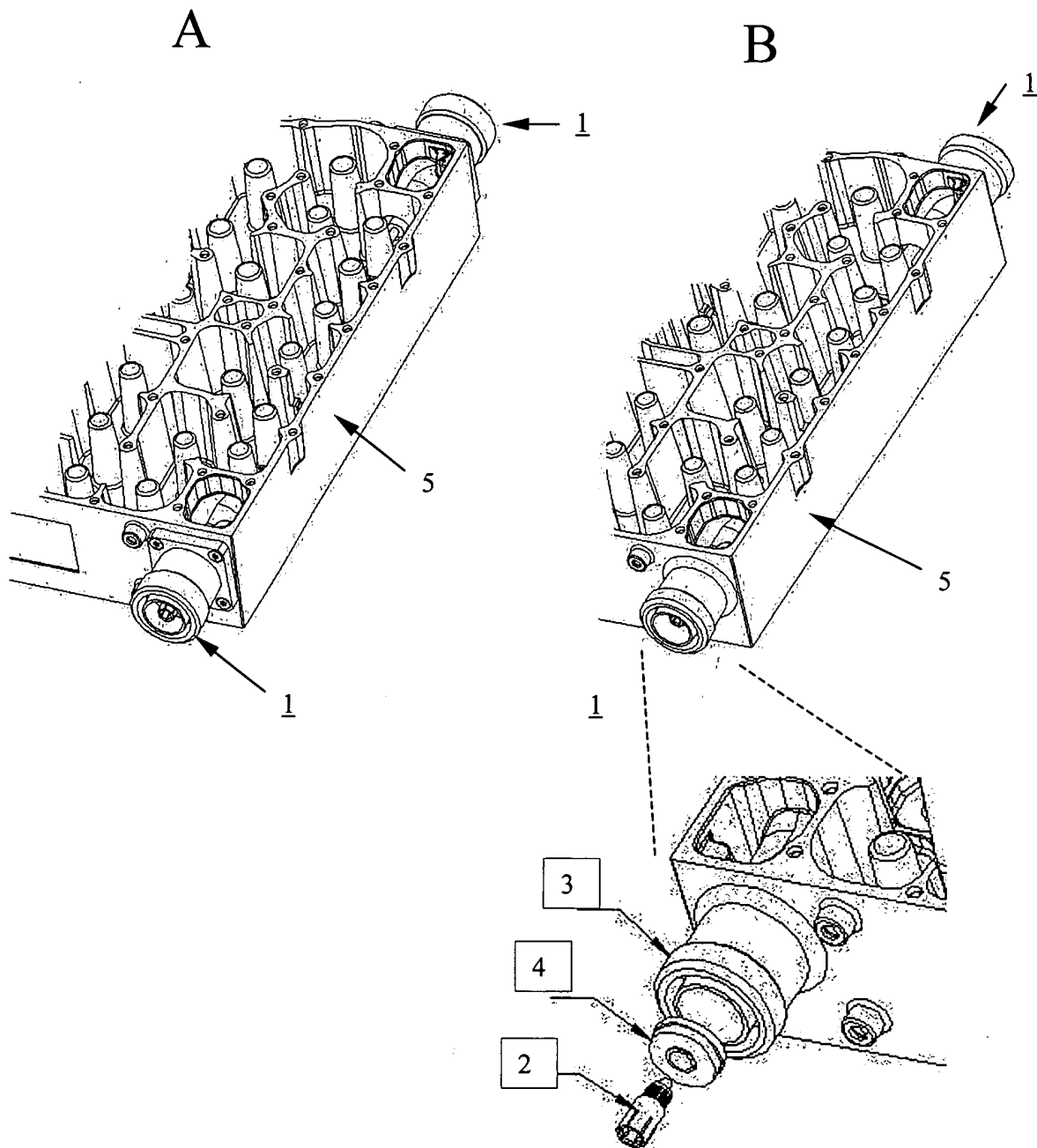


Figure 2





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 03 02 9336

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The present search report has been drawn up for all claims			
Place of search BERLIN		Date of completion of the search 10 May 2004	Examiner Ledoux, S
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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EPO FORM 1503 03/82 (P04C01)

**ANNEX TO THE EUROPEAN SEARCH REPORT
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EP 03 02 9336

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
The members are as contained in the European Patent Office EDP file on
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