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54 Co-axial plug with a right angle junction for a co-axial cable.

57 A co-axial plug (10; 50) with a right -angle connection for cable, particularly suited for co-axial cables for antennas, presents a central cylindrical metallic contact (20; 60) and another annular contact (30; 70) co-axial with the first, consisting of at least two partially cylindrical and symmetrical surfaces fastened together and sunk in a base support (40; 80) made of plastic material.

The central metallic contact (20; 60) and the annular metallic contact (30; 60) present each a band (22, 33; 62, 73) being part of the corresponding contacts, which fastens each of the wires of the co-axial cable.

In this fashion it is possible to manufacture the plug separately from the cable and to assemble the cable with the plug according to specific requirements.

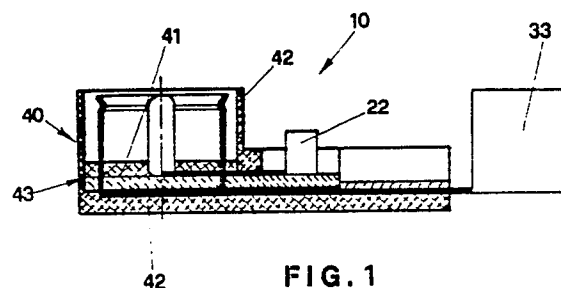


FIG. 1

## CO-AXIAL PLUG WITH A RIGHT-ANGLE JUNCTION FOR A CO-AXIAL CABLE

The invention concerns a co-axial plug with a right-angle cable junction, which is used as a terminal for co-axial antenna-cables and which can be applied to car radios or similar installations.

It is a known fact that car radios are connected to their antennas by means of co-axial cables which carry the radio signal and which are connected with the car radio by means of gudgeon pins, which are also co-axial, and which consist essentially of a central cylindrical bar carrying the signal and of an external, co-axial cylindrical body, which is electrically insulated from the central body and connected with the earth of the circuit.

The standardization norms of said plugs have recently been changed and the international standardization has suggested a new type of plug wherein the two co-axial contacts, i.e. the gudgeon pin and the external cylindrical part concerning the earth are not only co-axial but also inserted into the same annular space.

One of the reasons which has induced the manufacturer to develop this type of plug is that the plug is substantially shortened, so that the overall dimensions and the dimensions of the connection between the plug and the corresponding socket in the car radio are reduced. The plugs which have just been described are already circulating on the market, and they are mostly made by moulding the plastic plug around the already pre-arranged cable.

This manufacturing technology, which undoubtedly presents some advantages, does not, however, allow the assembly between the plug and the already peeled-off cable with automatic machines.

In fact, in the mentioned case, the peeled-off cable must be placed under the mould of the injection press, in order for the moulding process of the plastic part of the plug to take place.

The purpose of the present invention is that of overcoming the just-mentioned drawbacks.

Specifically the purpose is that of realizing a co-axial plug with a right-angle cable junction which can be applied to co-axial cables by means of automatic machines, while avoiding to perform the moulding process under the press with the co-axial cable inserted in the mould.

The purpose is reached with the manufacture of a co-axial plug, particularly suited for car radios, which, in accordance with the claims, presents a central cylindrical contact and another annular contact, co-axial with the former, and inserted in the same annular space consisting of at least two partially cylindrical and symmetrical surfaces catching each other and submerged in a plastic support, where said plug is characterized in that the central

metal contact and the annular contact present each a thin band which is part of each contact and is suited to connect and to hold fast each of the wires of the co-axial cable when closing around them.

Other characteristics and details of the invention will be better understood from the description of a preferred form of execution, given by way of explanation only, but which is not meant to limit the scope of the invention, such as it is illustrated in the enclosed tables of drawing, where:

- Fig. 1 represents a cross-section of the plug of the invention;

- Fig. 2 is a top view of the plug of the invention;

- Fig. 3 is a perspective view of the metallic part of the plug according to the invention;

- Fig. 4 represents a cross-section of an execution variation of the plug according to the invention;

- Fig. 5 is a perspective view of the metallic part of the solution variation of Fig. 4.

With reference to the mentioned drawings, it can be observed that the co-axial plug, indicated as a whole with 10, consists of two metallic parts 20 and 30, part 20 being the central metallic contact which is connected with the co-axial cable carrying the signal, while the part indicated with 30 is the metallic part which is connected with the part of the co-axial cable being connected with the earth. In particular it will be pointed out that both the sheet 20 and the sheet 30, although complex, are made starting from a flat sheet, which is cut and bent so as to obtain a contact having a cylindrical body 21 and a thin band 22 joined together by the thin, flat plate 23.

In the same way sheet 30 is also made from a flat sheet, cut and bent and it presents two partially cylindrical surfaces 31, equal and symmetrical, facing each other and joined together at their base by the flat plate 32, ending with a thin band 33.

The elements 20 and 30 are obtained separately and they are inserted into the plastic unit 40 in two subsequent phases. In fact, said unit 40 consists of two parts 41 and 42, as can be observed in Fig. 1. The first moulding process concerns part 41, which is moulded in two open halves, joined together in the area 43, so as to allow the subsequent insertion of contact 20. After contact 20 has been inserted into the plastic part 41, contact 30 is also inserted and the assembly is positioned in the injection press, in order to obtain the moulding of part 42 which definitely holds together the assembled parts. The result is that of having both contacts 20 and 30 inserted in a single

plastic element, which form the co-axial plug 10, as can be observed in the cross-section of Fig. 1.

It is obvious that with such a pre-assembled plug, it will be easy to assemble the plug with the co-axial cable of the antenna, peeled off and ready for the junction with the plug of the invention.

This junction can easily be performed with automatic machines, since the peeled-off co-axial cable can be inserted and correctly positioned within the two thin bands 22 and 33 and can definitely be blocked in a subsequent step which causes the final sealing of the above-mentioned thin bands 22 and 33. The advantage arising from the possibility of performing the mechanical automatic assembly of the plug and the co-axial cable is also obvious: in fact with this process the plugs can be manufactured, assembled and stocked, separately from the cables and the cables, in turn, can be separately pre-packed, according to different lengths and according to different requirements, so that when it becomes necessary to prepare a cable complete with plug, this can be done by drawing the already assembled plugs from the stock and connect it with the chosen cable.

It will be pointed out that on the other hand, in the case of the present technique, the plug is made with the cable already attached through moulding to the cable with all the drawbacks connected therewith.

One instance will be mentioned: some types of cars require antenna cables, differing in length from other cars, so that it will be necessary to put together stocks of plugs and cables according to the requirements. On the contrary, in the case of the invention the plug can be manufactured and kept in stock in considerable quantities, and can subsequently be connected with the required cables. It will also be pointed out that the moulding of the plastic part 40 can be obtained with processes differing from the one mentioned above; for instance it can be obtained by moulding in a single step, by pre-arranging the two elements 20 and 30 suitable placed, so as to obtain the plastic unit 40 in a single piece, without the need for two subsequent moulding steps. In any case, the result will be the plug represented in cross-section in Fig. 1 and from a top view in Fig. 2.

An execution variation using the same idea of solution is represented in Fig. 4, where the co-axial plug, indicated as a whole with 50, is made without the external plastic protection.

In this variation, too, sheet 60 is obtained by cutting a sheet and bending it, so as to obtain a central contact, having a cylindrical body 61 and a band 62, joined together by the flat plate 63.

In an analogous way, sheet 70 is also obtained by cutting a sheet and bending it, so as to obtain the two partially cylindrical surfaces 71, equal,

symmetrical and facing each other, which are joined together at their base by the plate 72 and presenting the terminal band 73 and the intermediate one 74.

The elements 60 and 72 are assembled together in an element 80 of plastic material, also obtained with two subsequent injection moulding steps.

In this case, too, part 82 is made with the first moulding step, in that the plastic material is injected on element 70 and afterwards part 81 is injected, after element 60 has been superimposed on the previously injected part 82.

The two parts 82 and 81 are, therefore, united along surface 83. The absence of the external plastic protection around part 70 offers the advantage of obtaining a co-axial plug 50 which is cheaper than the one previously described, since, apart from the saving in plastic material, the manufacture will be more expedite and there will be a reduced cost of the required moulds. All this will not in the least make less efficient the electric performance of the co-axial plug, since the non-protected external element 70 will be connected with the earth, when in use.

Execution variations may be applied during the manufacturing process with the purpose of improving the construction. Said variations will, however, not exceed the scope of the invention, such as it is described in the following claims.

## Claims

1) A co-axial plug (10-50) with a right-angle connection for cable, particularly suited for co-axial cables for antennas or similar, presenting a central cylindrical metallic contact (20; 60) and another annular contact (30; 70) co-axial with the first, both inserted in the same annular space, characterized in that the external annular contact (30; 70) consists of at least two partially cylindrical surfaces kept together by a support (40; 80) made of plastic material, further characterized in that the central metallic contact (20; 60) and the annular metallic contact (30; 70) present each a band (22, 33; 62, 73) being part of the contact and suited to fasten each of the wires of the co-axial cable which is connected with the plug.

2) A plug (10, 50) for co-axial cables according to claim 1, characterized in that it presents the plastic material support (40; 80) consisting of two parts (41, 42; 81, 82) moulded in two subsequent steps, wherein each of these two parts carries, inserted within it, the central cylindrical metallic contact (20; 60) and the metallic annular contact (30; 70).

3) A plug (40; 80) for co-axial cables according to claim 1, characterized in that the support of plastic material (40; 80) is made in a single piece including the two metallic contacts (20, 30; 60, 70).

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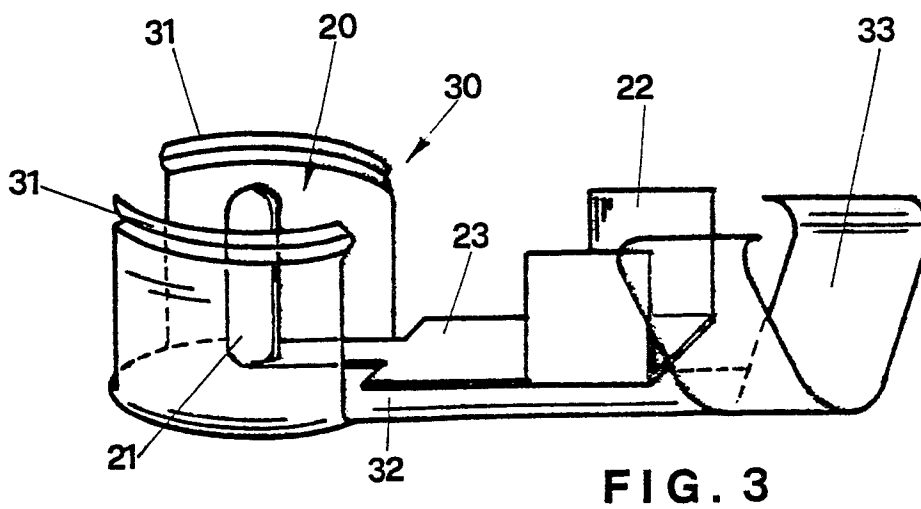
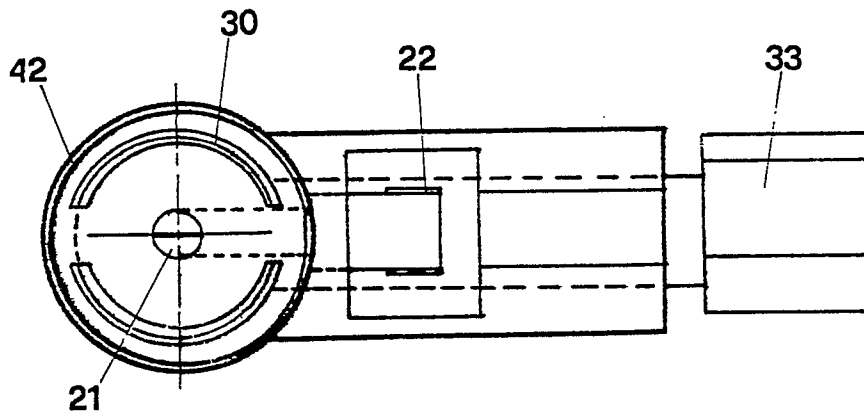
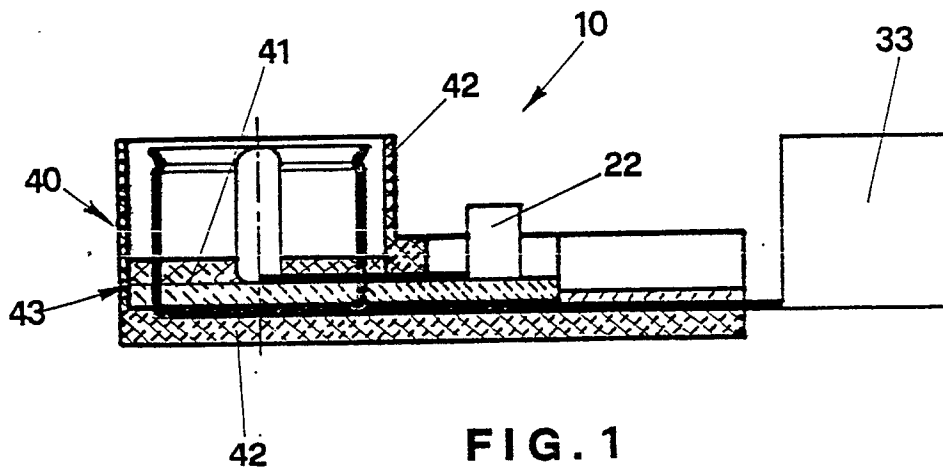
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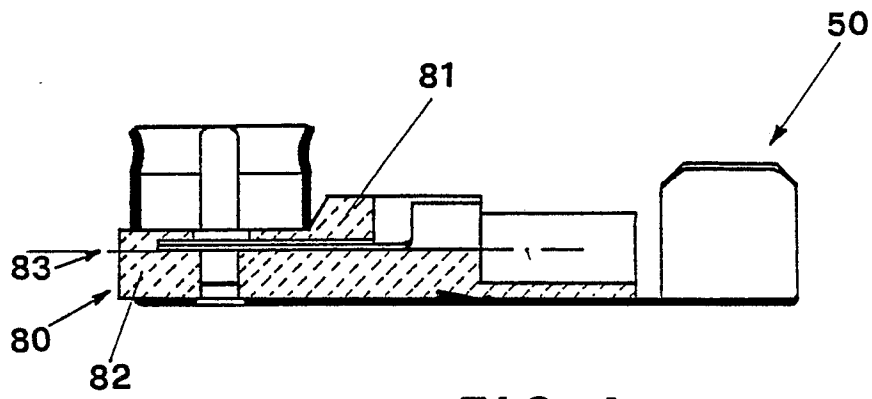


FIG. 4

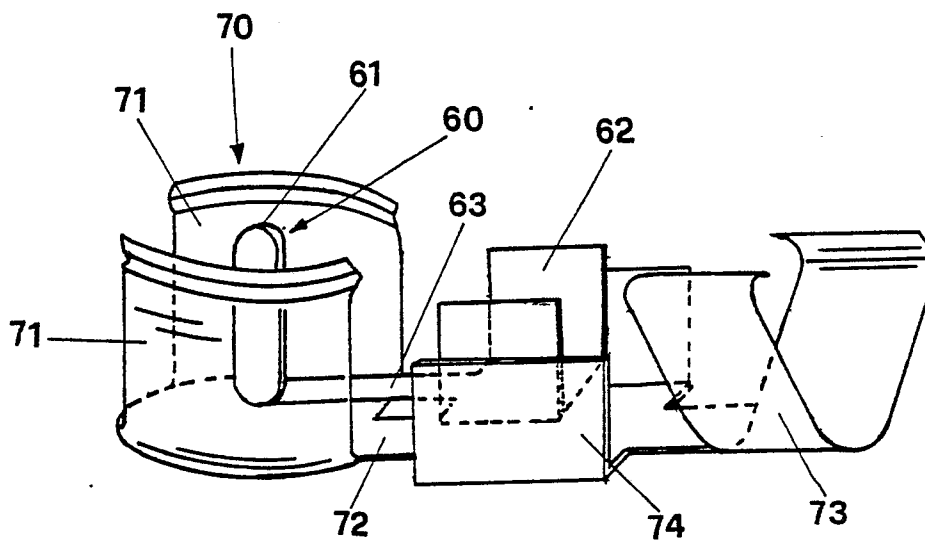


FIG. 5