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(54) Device for contacting waveguide tube outer conductors of coaxial cables.

(57) A device is provided for contacting waveguide tube outer conductors of a coaxial cables on the one hand and the inner surface of an eletrically conductive outer socket on the other hand.

The device comprises a contact member that can be screwed onto the waveguide tube outer conductor and in so doing alters its original outer contour to another contour.

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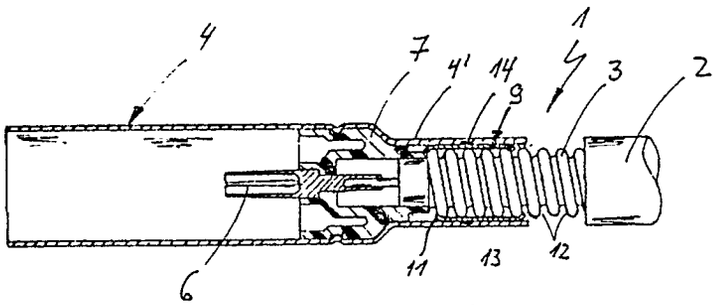

Fig. 1

DEVICE FOR CONTACTING WAVEGUIDE TUBE OUTER CONDUCTORS OF COAXIAL CABLES

This invention relates to a device for contacting waveguide tube outer conductors of coaxial cables on the one hand and the inner surfaces of an electrically conductive outer socket on the other hand.

A number of possible methods of connecting coaxial cables with metallic housings has already been proposed. One particular problem is the contacting of so-called waveguide tube outer onductors of such cables with other metallic plug-in sockets, e.g. with cable entry pipes of housings or with wire cable couplings or the like. In particular, screw elements having crimp parts or the like have been proposed hitherto, e.g. DE-OS 27 24 862, DE-PS 34 22 549 or DE-GM 78 20 303 or EP-A 0 045 038. A sleeve connection with crimp parts is disclosed in DE-PS 34 03 805.

The known solutions are as a rule comparitively complicated and do not in every case ensure impermeability to high frequencies.

The object of the invention is to provide a solution that simplifies the contacting of such waveguide tube outer conductors with corresponding outer sockets, which solution is, in particular, economical and at the same time offers high impermeability to high frequencies.

This object is achieved according to the invention with a device comprising a contact member that can be screwed onto the the waveguide tube outer conductor and in so doing alters its original outer contour to another contour.

This contact member which can be screwed onto the thread of the waveguide tube outer conductors renders possible by virtue of the desired deformation upon being screwed on, especially good contacting of the inner surface of the outer socket and of the waveguide tube outer conductor since, with this deformation, a slight expansion of the outer diameter of the contact element can be achieved in a controlled manner. The dimensions can be so selected that, upon pushing into the outer contact which is to be contacted, compression in the opposite direction is effected without additional aids being required.

This deformation both when arranging on the waveguide tube outer conductor and when inserting into the outer socket which is to be contacted additionally ensures a corresponding impermeability to high frequencies, even with different arrangements of the device according to the invention.

One of the possible arrangements of the invention comprises constructing the contact member as an electrically conductive socket which is slit over its entire length and engages with edge regions into the screw threads of the waveguide tube outer conductor. With this slit socket, a diagonal tightening of the socket is achieved by means of the engagement regions when screwing on, i.e. it is tensioned out of its straight cylindrical shape into a slightly helical shape, which at the same time results in a slight increase in its outer diameter.

To facilitate screwing on, the invention provides for the edge of regions of the socket to be flanged inwardly as least in the regions by an amount that is less than the depth of the screw threads of the waveguide tube outer conductor.

The invention also provides for the slit in the contact socket to deviate from a straight generator and, especially, for it to be zigzag-shaped.

It should be mentioned that the slit may also be provided in helical shape or can alternatively be meander-shaped with the proviso that the particular slit gap so produced in each case allows the deformation conditioned by the helix.

Another arrangement of the device according to the invention comprises forming the contact from a helix of electrically conductive material, the screw pitch of which differs slightly from the screw pitch of the waveguide tube outer conductor.

During screwing-on, these differences in pitch allow a slight deformation of the contact member resulting in an expansion of the outer diamater and, on being pushed into the element to be contacted, the helix is again deformed, this time in the opposite direction, as a result of which a firm contact both wth inner surface of the element to be contacted and with outer regions of the waveguide tube and outer conductor is ensured.

If at least part of the contact helix is provided in the form of a screw element, it is expedient for it to be secured against self-turning, which the invention makes possible by providing the contact helix at least at one end with an end projection which points in the axial direction. This projection can be used for fixing it, for example in the threaded socket or to cable elements.

The invention is explained in detail below, by way of example, with reference to the accompanying drawings, wherein:

Fig.1 shows a section through a cable end with coaxial cable coupling,

Fig.2 is a plan view of a contact socket,

Fig.2a is a plan view of a modified contact socket in the mounting position,

Fig.2b shows this contact socket in the maunfacturing position,

Fig.3 shows a view according to Fig.1 of a modified exemplary embodiment of a coupling element,

Fig.4 shows a contact helix in the relaxed

position and

Fig.5 shows the same contact in the tensioned position.

Referring to the drawings a coupling socket, generally designated 4, is plugged onto the end, generally designated 1, of a coaxial cable 2 having a waveguide tube outer conductor 3, the coaxail cable not being shown in detail. The coaxial cable end is stepped in customary manner, the inner conductor designated 5 projects into an inner conductor contact socket 6 which is in turn held by plastics support member 7 to which the contact socket 4 also is fastened.

In order to achieve optimum contacting between the waveguide tube outer conductor 3 and the outer contact case 4, which may also be a cable entry pipe of metallic housing, a contacting device, generally designated 8, is provided which in the Example shown in Figures 1 and 2 is formed by a socket 9 consisting of eletrically conductive material.

This socket 9 has in this case a zigzag-shaped slit 10 and edge regions 11 which are folded inwardly at least in regions, which edge regions, for engagement purposes, are able to engage the screw threads 12 of the waveguide tube outer conductor 3.

As will be apparent from Fig.1 in conjunction with Fig.2, the electircally conductive socket 9 is offset by half pitch of the screw threads 12, which is associated with a deformation such that the socket expands outwardly slightly, resulting in pressing against the inner surface of the contact socket. In order to ensure permanent engagement, the socket 9 additionally has engagement cramps 13 which may engage grooves 14 in the inner surface of the contact socket 4.

Fig.2a and 2b show contact socket 9a, in the premounting position in Fig.2b and in the mounting position in Fig.2a, i.e. in the inclined position resulting from being screwed on.

Fig.3 to 5 show another exemplary embodiedment. Here, all elements that are otherwise the same carry the same reference numerals as in Fig.1 and 2 but with the suffix "a".

In contrast to the contact socket 9 shown in Fig.1 and 2, here a contact member 8a is provided in the form of a contact helix 15 in which the distance between the turns is slightly greater before being screwed onto the waveguide tube outer ccnductor 3a in the example shown. As a result of being screwed on, the contact spring 15 is forced out of the position shown in Fig.4 into the configuration shown in Fig.5, which results in a slight expansion of the outer diameter thus ensuring optimum contacting of the inner surface of the contact socket 4a. In order to prevent turning of the contact spring 15, for example when screwing on the coaxial cable end 2a, the insulating body 7a has a slot or bore 16 which can be engaged by an end projection 17 of the contact helix 15.

Mounting may be performed in various ways. For example, the contact socket 9 may be arranged on an appropriately stepped end ofa coaxial cable and secured thereon beforehand the factory; then, it has merely to be pushed into the corresponding pipe 4′ of the contact socket 4 and the cramps 13 can then engage the undercuts 14.

Mounting can be slightly different with the examples shown in Fig.3 to 5: in this case, the helix 15 can first be inserted into the contact pipe 4a′ of the contact socket 4a, and the free end 18 of the contact socket 4a can then be flanged inwardly in order to secure the spring 15. The contact socket 4a can then be screwed onto the waveguide tube conductor resulting in the described deformation. If desired or necessary, the free end 18 of the contact socket 4a can be further flanged subsequently in order, if necessary, to engage the screw threads 12a of the waveguide tube outer conductor at least in regions.

The described exemplary embodiedments of the invention can, of course, still be modified in many respects without departing from the basic idea. For example, as already mentioned, the slit 10 can be in the form of a more open helix, a straight slit, and so on.

Claims

1. A device for contacting waveguide tube outer conductors (3,3a) of a coaxial cables (2) on the one hand and the inner surface of an electrically conductive outer socket (4) on the other hand, characterised in that the device comprises as a contact member (8,8a) that can be screwed onto the waveguide tube outer conductors (3,3a) and in so doing alters its original outer contour to another contour.

2. A device according according to claim 1, characterised in that the contact member (8) is constructed as an electrically conductive socket (9) that is slit over its entire length and engages by edge regions into the screw threads of the waveguide tube outer conductor.

3. A device according to any of the preceding claims, characterised in that the edge regions (11) of the socket (9) are inwardly flanged at least in regions by an amount less than the depth of the screw threads (12) of the waveguide tube outer conductor(3).

4. A device according to any of the preceding claims, characterised in that the slit (10) in the contact socket (13) deviates from a straight generator and, preferably is zigzag-shaped.

5. A device according to claim 1, characterised in that the contact member (8a) is formed by helix (15) of the electrically conductive material the screw pitch of which differs slightly from the screw pitch of the waveguide tube outer conductor (3a).

6. A device according to claim 5, characterised in that the contact helix (15) has at least one end projection (17) pointing in the axial direction.

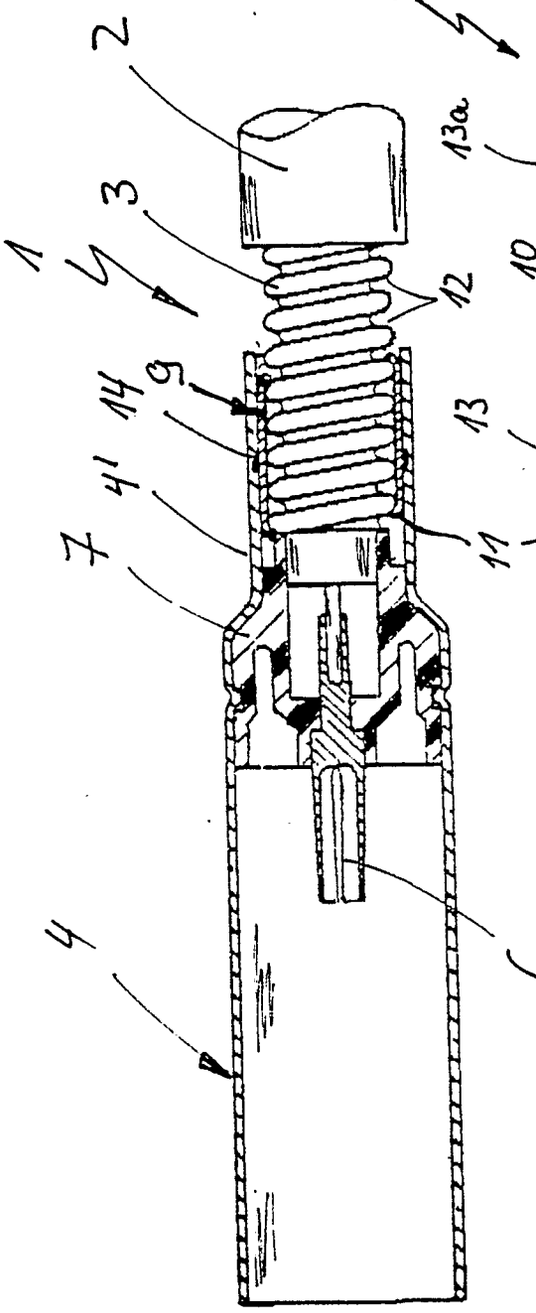

Fig. 1

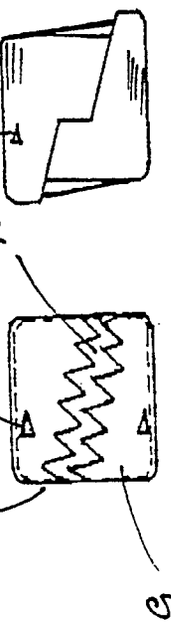

Fig. 2

Fig. 2a

Fig. 2b

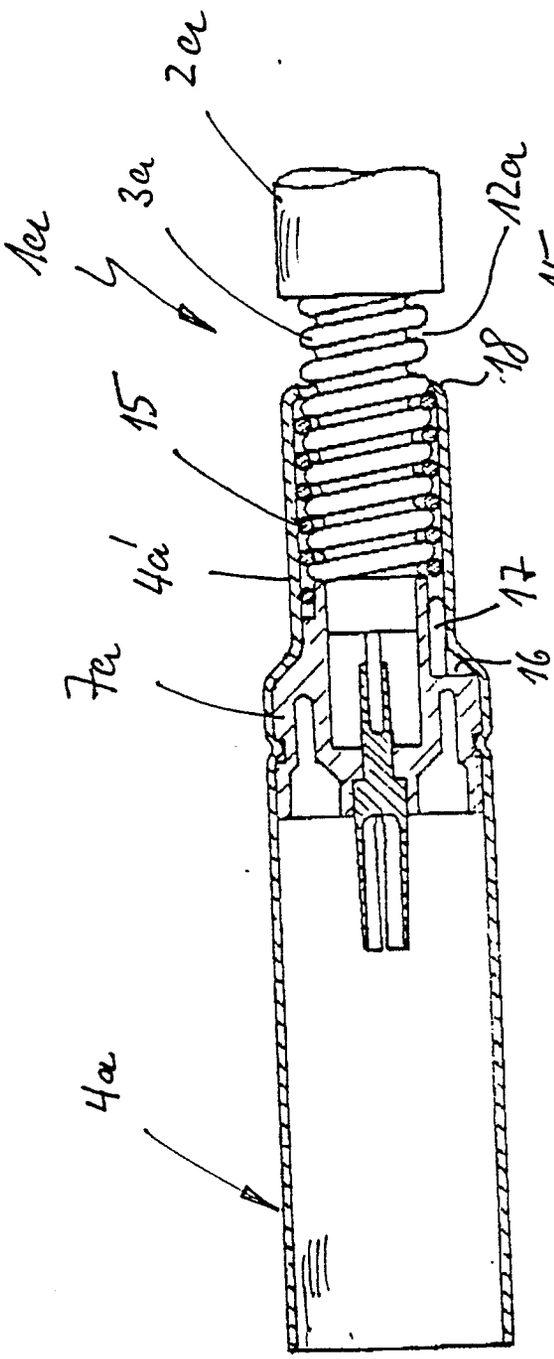

Fig. 3

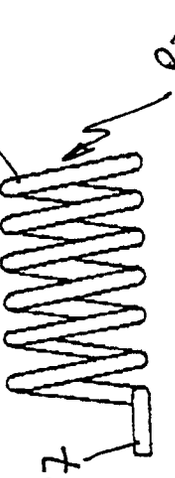

Fig. 4

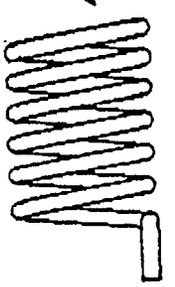

Fig. 5