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(54) **Cable joint box or cable shoe for medium-voltage cables**

(57) The invention relates to a cable joint box or cable shoe for medium-voltage cables. A space (10) defined by a housing (1) contains in axial sequence a multi-segment spline (2) and a clamping nut (3) therefor. The

spline (2) is provided with a space (8) defined by the spline segments for receiving and securing the end of a cable. The clamping nut (3) is provided with a central hole (9) as an axial extension to said space (8) defined by the spline segments.

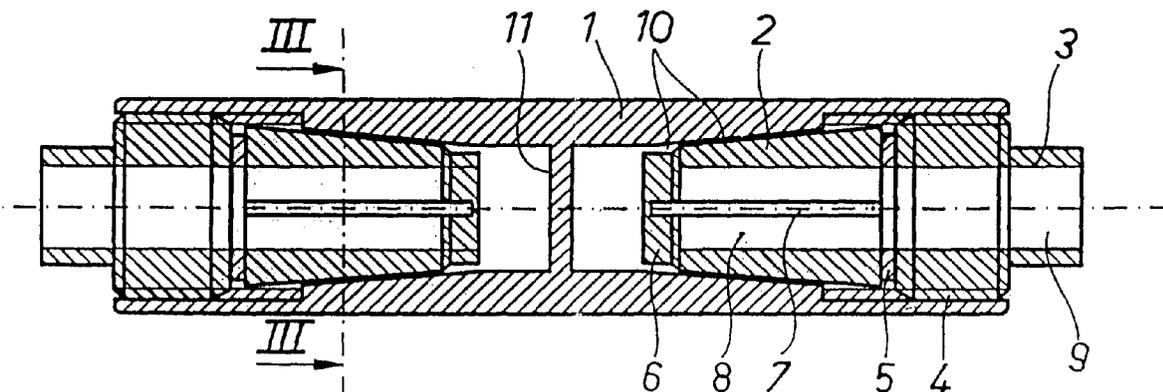


Fig.1

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Description

At present, the cable joints and cable shoes for medium-voltage cables (3,6 kV - 52 kV) are based on compressible boxes and shoes. Therefore, each lateral surface requires a separate box and, in addition, individual clamping jaws are required for individual boxes. During the course of clamping or compression, the box also develops burrs, which may cause partial discharges and destroy the joint unless such burrs are ground off. Thus, the burrs must be ground off. However, the grinding produces conductive metal particles, which are problematic if trapped between the insulation and contraction box of a cable where the particles may produce partial discharges.

An object of the invention is to provide a cable joint box or a cable shoe for coupling a medium-voltage cable therewith without the above-mentioned drawbacks.

This object is achieved by means of the invention on the basis of the characterizing features set forth in the annexed claim 1. The non-independent claims set forth preferred embodiments for the invention.

One exemplary embodiment of the invention will now be described in more detail with reference made to the accompanying drawing, in which

- fig. 1 shows a cable joint box of the invention in an axial section;
- fig. 2 shows the same box in an end view and
- fig. 3 shows the same box in a section taken along a line III-III in fig. 1.

The illustrated cable joint box comprises a tubular housing 1 provided with cavity spaces 10, which are separated by a central partition 11 and rotationally symmetrical and disposed concentrically relative to the box housing 1. Each space 10 receives a multi-segment spline 2, whose outer surface has an angle of convergence which is substantially equal to the angle of convergence found in the axial central area of the cavity space 10. The space 10 has its outer end provided with an internal thread 4 engaged by the thread of a clamping nut 3. Between the spline 2 and the nut 3 is a washer 5, which reduces friction between the spline and the nut as the spline 2 is forced deeper into the space 10 by turning the nut 3.

The clamping nut 3 is provided with a central hole 9, disposed as an axial extension to a space 8 defined by the spline segments. The spline segments separated by gaps 7 only join each other at the narrower end of the spline 2, the spline segments being more readily able or having more space to approach each other at the wider end of the spline than at the narrower end thereof. Hence, an end piece 6 included in the spline is only provided with small webs, whereby the spline segments connect to each other and whose deformation or

rupture enable movement of the spline segments towards each other also at the narrower end of said spline as the spline 2 is pushed deeper into the space 10. The angles of convergence and traveling distance of the spline 2 may vary to some extent.

In order to provide a cable joint, the ends of appropriate cables are pushed through the hole 9 in the nut 3 into the space 8, defined by the spline segments 2 and located concentrically with the box housing 1. Turning of the clamping nuts 3 forces said spline 2 deeper with the result that the spline segments clamp tightly around the cable conductor.

The cable shoe only differs from the above-discussed joint box in the sense that, instead of a spline joint included in one end, the housing 1 is provided with a screw-joint lug for connecting the cable shoe to a rail or to an immobile instrument terminal.

If a dismountable spline joint is required, it is necessary to provide a gripping collar between outer end of the spline 2 and inner end of the nut 3.

A joint box or a cable shoe operating on spline principle in accordance with the invention offers e.g. the following benefits:

- the same box or shoe is functional on a variety of cross-surfaces, the operating range depending on the angle of convergence and traveling distance of the spline
- no separate clamping tools are required
- no grinding of the box, thus no harmful metal particles
- provides a homogeneous electric field, thus no partial discharge problem
- no more faults resulting from incorrect or damaged clamping tool jaws or a wrong size of box
- stockpiles are reduced as the same box is functional over a plurality of cross-surfaces.

Although a spline engagement functioning on a corresponding principle has been used as a mechanical terminal for open wiring, it has not been applied earlier for providing an electrical joint, especially on medium-voltage cables.

The invention is not limited to the above-discussed embodiment, but its structural configuration may vary in several ways. For example, the movement of a spline can be effected, not by a thrust screw but instead by a spline-pulling clamping means. The spline can be designed to be reducible at both ends thereof by alternately cutting open the gaps between the spline segments at both ends of the spline.

Claims

1. A cable joint box or cable shoe for medium-voltage cables, **characterized** in that a space (10) defined

by a housing (1) contains in axial sequence a multi-segment spline (2) and a clamping element (3) therefor, and that the spline (2) is provided with a space (8) defined by the spline segments for receiving and securing the end of a cable.

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2. A cable joint box or cable shoe as set forth in claim 1, **characterized** in that the clamping element comprises a nut (3), provided with a central hole (9) as an axial extension to said space (8) defined by the spline segments.

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3. A cable joint box or cable shoe as set forth in claim 1 or 2, **characterized** in that the space (8) defined by the spline segments is located concentrically relative to the tubular housing (1).

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4. A cable joint box or cable shoe as set forth in any of claims 1-3, **characterized** in that the spline segments separated by gaps (7) connect to each other at one end of the spline (2) or alternately at both ends of the spline.

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5. A cable joint box or cable shoe as set forth in any of claims 1-4, **characterized** in that the space (10) defined by the housing is cuneately converging, the angle of convergence being substantially equal to that on the outer surface of the spline (2).

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6. A cable joint box or cable shoe as set forth in any of claims 1-5, **characterized** in that between the spline (2) and the clamping element (3) is a washer (5) for reducing friction between the spline and the clamping element.

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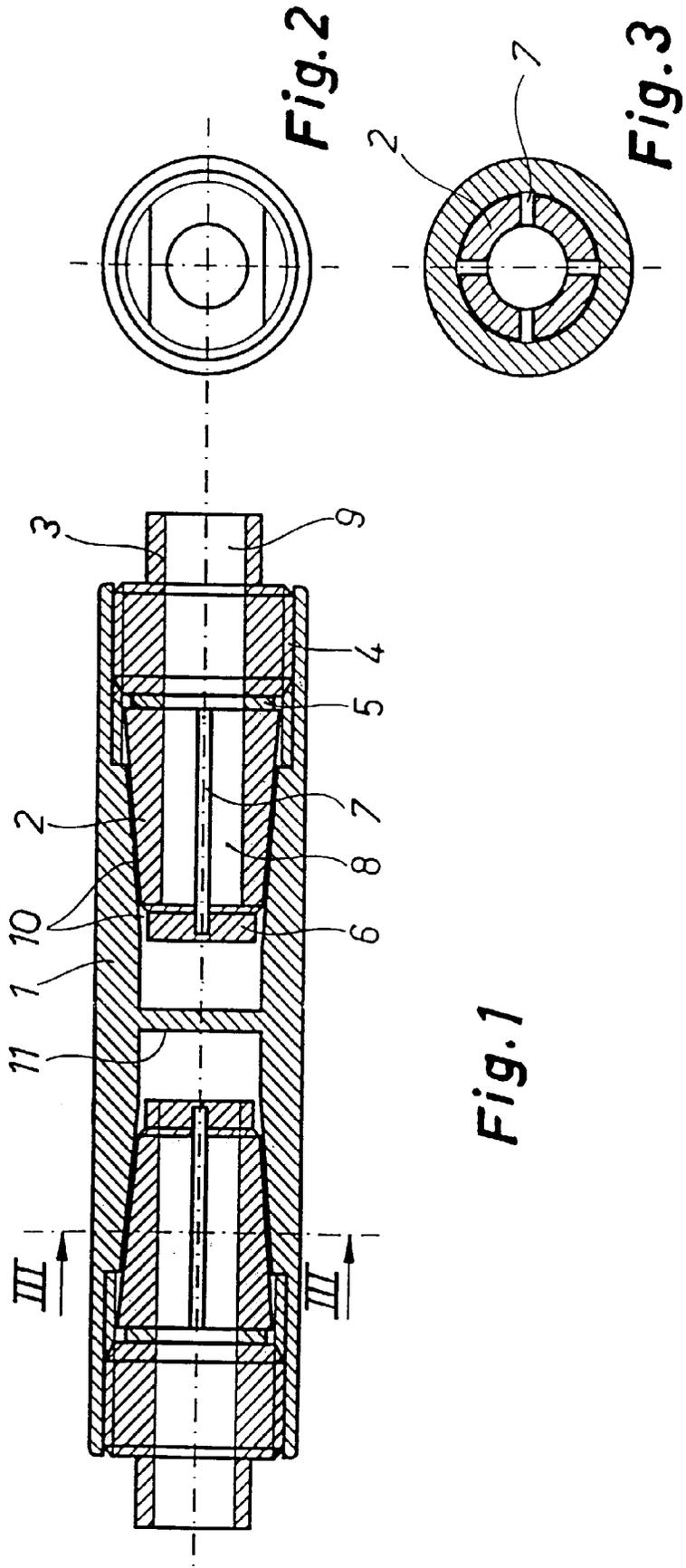
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EUROPEAN SEARCH REPORT

Application Number
EP 97 66 0085

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	US 2 475 741 A (GOELLER) * column 1, line 41 - column 3, line 65; figures 1-5 *	1-6	H02G15/00 H01R4/50
X	US 5 440 073 A (LIN ET AL.) * column 1, line 58 - column 2, line 23; figures 1-4 *	1-5	
X	US 5 362 253 A (LIN ET AL.) * column 1, line 57 - column 2, line 32; figures 1,2 *	1-5	
X	CH 112 294 A (ZWICKY) * the whole document *	1-5	
A	CH 178 656 A (FLURY) * the whole document *	1-5	
A	CH 165 955 A (GARDY) * the whole document *	1-5	
A	GB Q14436 A (BAJMA-RIVA) & GB-A-14436 A.D. 1915 * figures 1-6 *	1-5	TECHNICAL FIELDS SEARCHED (Int.Cl.6) H01R
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 19 February 1998	Examiner Lommel, A
<p>CATEGORY OF CITED DOCUMENTS</p> <p>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</p> <p>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</p> <p>& : member of the same patent family, corresponding document</p>			

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