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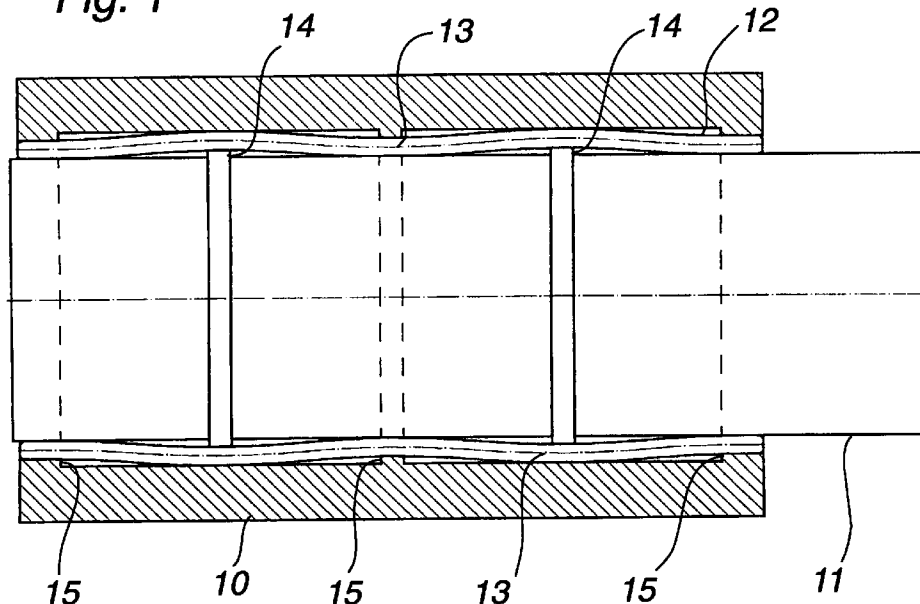
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### (54) Rotable electrical contact connection

(57) Rotatable electrical contact connection between two conductors which are rotatable relative to each other, one of said conductors consisting of a contact pin (11) and the other of a contact sleeve (10) arranged concentrically around the contact pin. The internal diameter of the contact sleeve is larger than the external diameter of the contact pin, such that between the pin and the sleeve an annular gap (12) is formed, in which a number of elongated, relatively narrow contact

rollers (13), oriented parallel to the longitudinal axis of the pin, are evenly distributed around the periphery of the pin. According to the invention, the contact pin and the contact sleeve are formed with radially outwardly projecting annular elevations (14) and radially inwardly projecting annular elevations (15), respectively, in such a way that the contact rollers (13) are strained in wave form between the pin and the sleeve, thus providing the necessary contact force at the contact points.

**Fig. 1**



**EP 0 692 844 A1**

**Description****TECHNICAL FIELD**

5 The invention relates to a rotatable electric contact connection according to the precharacterising part of claim 1. The invention is intended for use in joints where there is a need both to journal radially in bearings and to transmit both high and low currents.

**BACKGROUND ART**

10 From DE-A-2 519 413, a roller contact device is previously known, in which between a rotatable contact pin and a surrounding stationary contact sleeve there are arranged a plurality of contact rollers in the form of helical springs, which are distributed around the circumference of the contact pin supported by rods fixed to the contact sleeve, the rods extending axially through the respective springs. In such a design a relatively large space is required between the contact  
15 pin and the sleeve to accommodate the helical spring rollers. This requires a relatively large quantity of lubricant. The design is also relatively expensive because of the special attachment of the spring rollers.

**SUMMARY OF THE INVENTION**

20 The invention aims to provide a rotatable electric contact connection of the above-mentioned kind, which is less expensive and less space-demanding than the above-mentioned prior art design.

To achieve this aim the invention suggests a rotatable electric contact connection according to the introductory part of claim 1, which is characterized by the features of the characterizing part of claim 1.

Further developments of the invention are characterized by the features of the additional claims.

25 According to the invention, the current transmission between the two conductors is ensured by constructing the contact rollers in the form of hardened, solid pins, so-called needles, of a resilient contact material, and by designing the contact pin and the contact sleeve with radially outwardly projecting annular elevations and radially inwardly projecting annular elevations, respectively, of one or a few tenths of a millimetre in such a way that the needles are strained in wave form to provide the necessary contact force at the points of contact.

**BRIEF DESCRIPTION OF THE DRAWINGS**

By way of an example, the invention will now be described in greater detail with reference to the accompanying drawings showing in

- 35 Figure 1 a schematic sketch illustrating the principle of a rotatable electric contact connection according to the invention,  
Figure 2 in axial section a rotatable electric contact connection device, designed according to the invention, of a high-voltage disconnecter,  
40 Figure 3 an axial section of the sleeve-formed outer part of the contact device according to Figure 2,  
Figure 4 in axial section a roller holder which is part of the contact device according to Figure 2,  
Figures 5 and 6 the roller holder of Figure 4 in cross section along the line V-V in Figure 4 and in a view from below, respectively.

**DESCRIPTION OF THE PREFERRED EMBODIMENTS**

Figure 1 shows the principle of a rotatable electric contact connection, designed according to the invention, between two concentric conductors 10 and 11, which are rotatable in relation to each other. The conductor 10 consists of a tubular contact sleeve, which surrounds the end portion of the conductor 11, which consists of a contact pin of circular cross  
50 section. The internal diameter of the contact sleeve 10 is larger than the external diameter of the contact pin, an annular gap 12 thus being formed between the pin and the sleeve, in which gap a number of elongated, thin, solid rollers 13 of resilient contact material are arranged. The contact pin 11 and the contact sleeve 10 are provided with radially outwardly projecting annular elevations 14 and radially inwardly projecting annular elevations 15, respectively, manufactures preferably by turning, in such a way that the rollers 13 are strained in wave form with a prestress force of, for example, about  
55 5 N per point of contact. The radial extent of these outwardly and inwardly projecting annular elevations is, in practice, only one or a few tenths of a millimetre but has been enlarged in Figure 1 to illustrate the invention more clearly.

The mounting of the rollers 13 is suitably performed such that they are pressed in between the pin 11 and the sleeve 10 after the pin has been placed in position in the sleeve. The radially outwardly and inwardly projecting annular elevations 14 and 15, respectively, are made with bevelled edges, as is clear from Figures 2 and 3, to make possible such mounting.

Figure 2 shows a rotatable electric contact device for a high-voltage disconnecter. The contact device comprises a bracket 16 of, for example, aluminium, which is fixed to the upper end of a vertical support insulator (not shown), which is rotatable, for example, 90° about its longitudinal axis. A connecting arm 17 is fixed to the bracket 16. The bracket 16 has a circular-cylindrical hole 18 (Figure 3), coaxial with the rotary axis of the support insulator, in which hole a contact sleeve 10 of copper or copper alloy is fixed. External cable connection to the connecting arm 17 of the disconnecter is performed via a connection member 19, to which a contact pin 11 is fixed. The contact pin 11 is rotatably journaled in the bracket 16, partly through a contact needle bearing of the embodiment described with reference to Figure 1, partly through a sliding bearing in the form of a sleeve 20 of, for example, polytetrafluoro ethylene. The pin 11 is fixed axially in the bracket 16 by means of a washer 21 and a locking ring 22.

The manufacture of the bracket 16 may, for example, be performed by chill casting of aluminium. The fixing of the contact sleeve 10 to the bracket 16 may then be achieved by embedment in the same work operation as that in which the bracket is manufactured.

The current transfer between the pin 11 and the sleeve 10 is achieved with the aid of thirty-six relatively long, thin rollers 13, so-called needles, of resilient contact material, for example beryllium copper or chromium-zirconium copper. Because the pin 11 and the sleeve 10 are formed with radially outwardly and inwardly projecting annular elevations 14 and 15, respectively, the contact needles 13 will be strained in wave form, thus providing the necessary contact pressure at the contact points.

Figures 4-6 show a roller holder 23 made of insulating material, the task of which is to distribute the contact needles 13 evenly spaced from each other around the periphery of the contact pin 11 and to prevent them from contacting each other. The holder 23 has the shape of a cylindrical cage with thirty-six slots adapted to the contact needles 13, the slots extending between an upper and a lower end ring 25 and 26, respectively.

The invention is not limited to the embodiment shown, but may be applied in a plurality of ways within the scope of the claims. For example, the sliding bearing 20 shown is not absolutely necessary, but the contact needles 13 may in many cases serve alone as both bearing and current-transfer members. In addition, the field of use of the invention is not limited to disconnectors, but the invention is also advantageous in many other applications, where there is a need of rotatable contact connections.

## Claims

1. Rotatable electrical contact connection between two conductors which are rotatable relative to each other, one of said conductors consisting of a contact pin (11) and the other of a contact sleeve (10) arranged concentrically around the contact pin, the internal diameter of the contact sleeve being larger than the external diameter of the contact pin (11), such that between the pin and the sleeve an annular gap (12) is formed, in which a number of elongated contact rollers (13), oriented substantially parallel to the longitudinal axis of the pin, are distributed around the periphery of the pin, **characterized** in that the contact rollers (13) consist of solid pins, so-called needles, of resilient contact material, and that the contact pin (11) and the contact sleeve (10) are formed with radially outwardly projecting annular elevations (14) and radially inwardly projecting annular elevations (15), respectively, in such a way that the rollers (13) are strained in wave form between the contact pin (11) and the sleeve (10).
2. Rotatable electrical contact connection according to claim 1, **characterized** in that the radial extent of said outwardly and inwardly projecting annular elevations (14, 15) is smaller than 1 mm.
3. Rotatable electrical contact connection according to claim 1 or 2, **characterized** in that the rollers (13) are made of copper or a copper alloy.
4. Rotatable electrical contact connection according to any of the preceding claims, **characterized** in that the rollers (13) are fixed relative to each other in the tangential direction in the annular gap (12) with the aid of a roller holder (23) of insulating material.
5. Rotatable electrical contact connection according to any of the preceding claims, **characterized** in that the contact sleeve (10) is made of copper or a copper alloy and is fixed in an aluminium bracket (16) by embedment.

Fig. 1

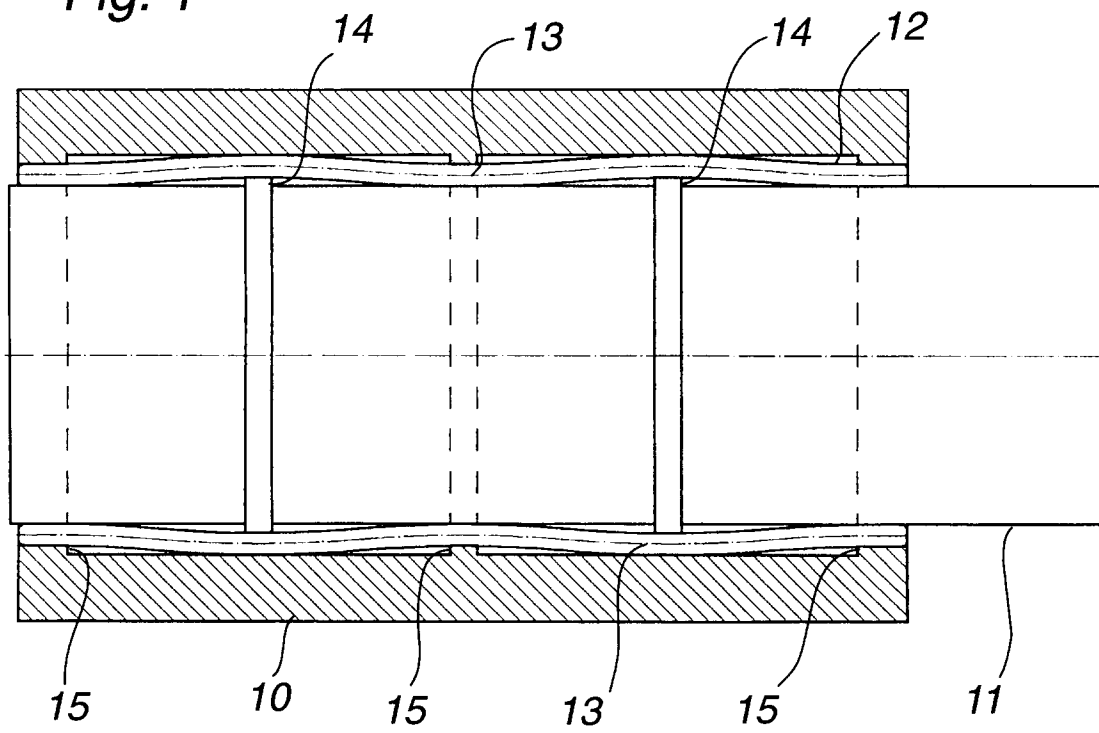


Fig. 3

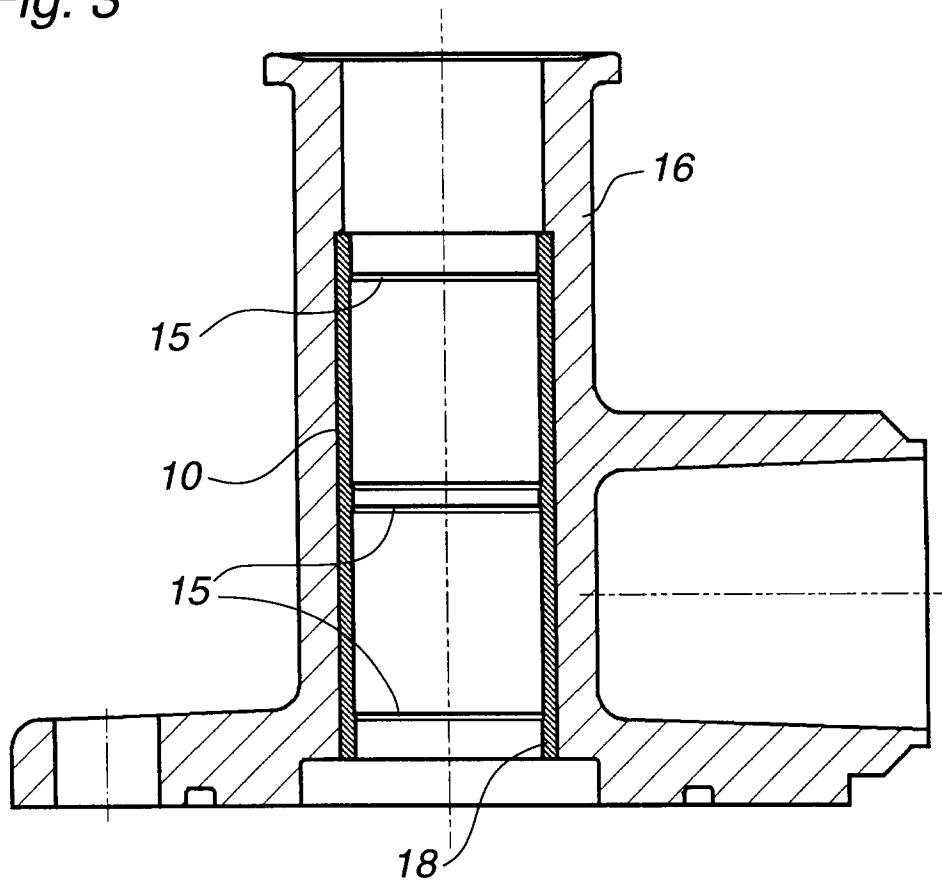


Fig. 2

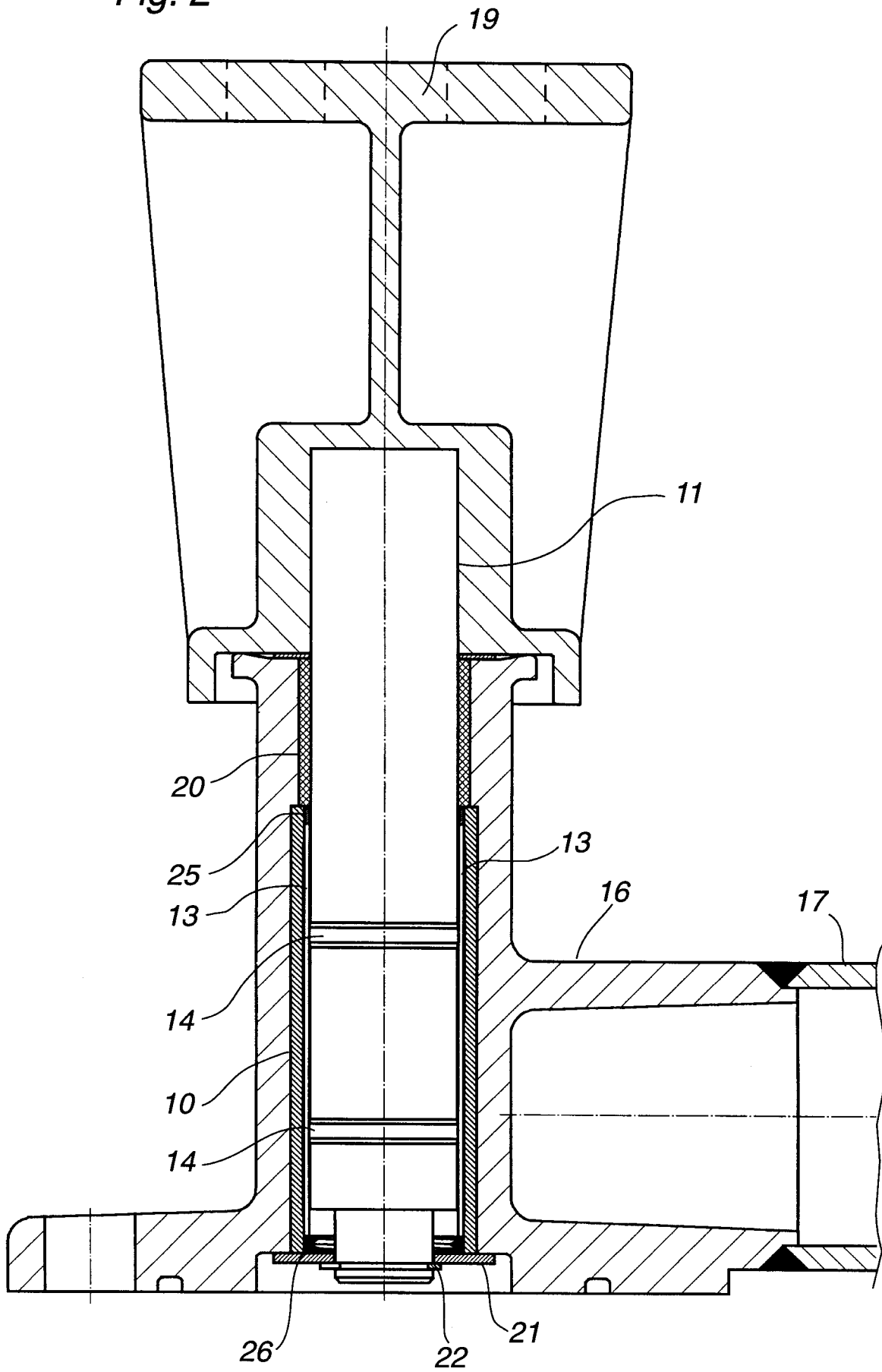


Fig. 5

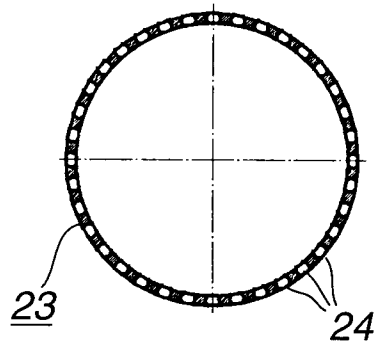


Fig. 6

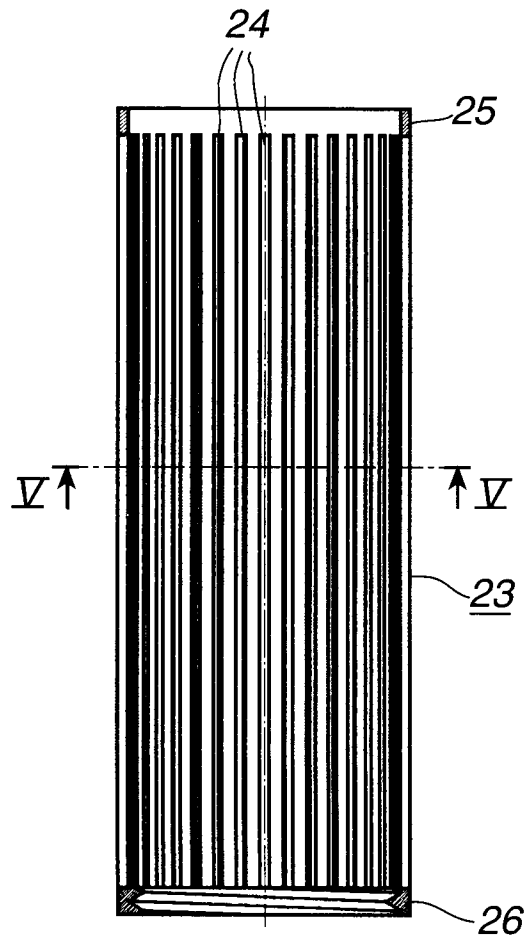
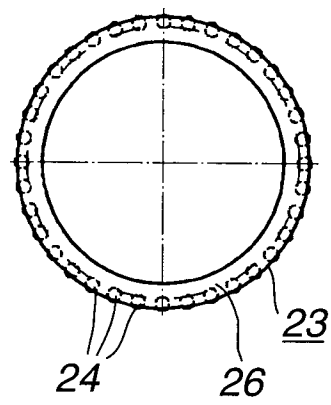


Fig. 4



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## EUROPEAN SEARCH REPORT

Application Number  
EP 95 11 0789.5  
Page 1

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)
A	US, A, 4786262 (P.-R. MOLITOR ET AL), 22 November 1988 (22.11.88) * column 3, line 21 - line 35, abstract *	1-5	H01R 13/187 H01R 39/64 H01R 15/00 H01H 1/16
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A	US, A, 5036583 (W. PROCHASKA ET AL), 6 August 1991 (06.08.91) * column 4, line 22 - line 29, abstract *	1-5	
	--		
A	SE, B, 406132 (SPRECHER & SCHUH AG), 22 January 1979 (22.01.79) * page 5, line 3 - line 23 *	1-5	
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			TECHNICAL FIELDS SEARCHED (Int. Cl.6)
			H01R H01H
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
STOCKHOLM		20 October 1995	BLOMBERG TOMMY
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