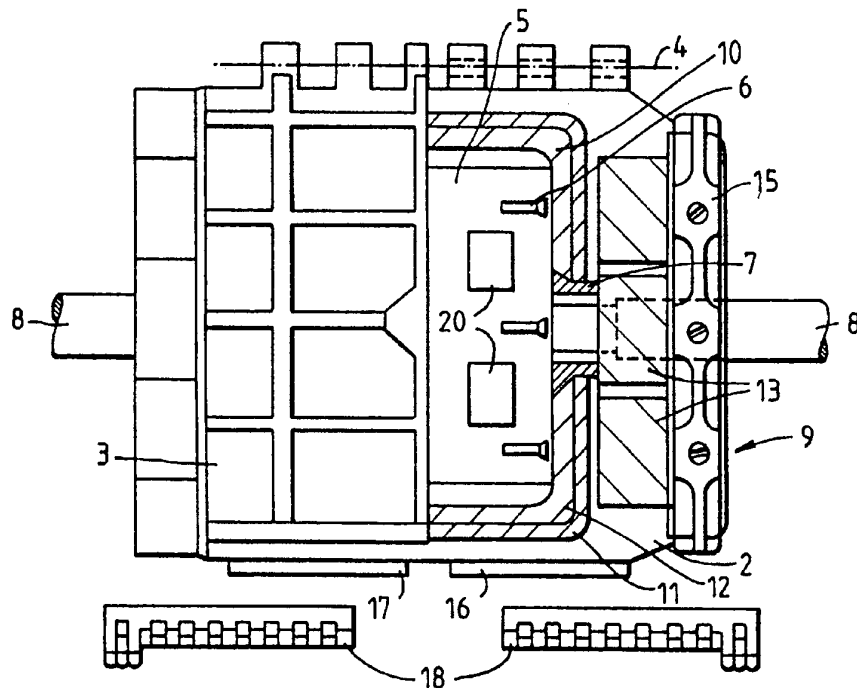


INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: CONNECTION AND TAP SLEEVE FOR COAXIAL CABLES OR THE LIKE



(57) Abstract

In a connection and tap sleeve for coaxial cables or the like in wideband networks, with a sleeve body closing tightly in the operational position with cable inlets and cable outlets, and with a printed circuit board mounted inside the sleeve body with branch circuit connections for splicing and/or distribution, and where the damping values of the branch circuit connections can be altered, it should be possible to wire up all outlets simply at any damping value required. This is achieved in that the sleeve body (1) is formed so that it can be opened and tightly closed again and the printed circuit board (5) has an individual line disconnection for each tap, discharging into plug connections (19), a modular structured transfer element (20) with a pre-set, selectable damping value, provided with corresponding plug connections (21), being plugged interchangeably into the plug connections (19).

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CONNECTION AND TAP SLEEVE FOR COAXIAL CABLES OR THE LIKE

The discovery relates to a connection and tap sleeve for coaxial cables or the like in wide-band communications networks, with a sleeve body closing tightly in the operational position with cable inlets and cable outlets, with a printed circuit board mounted inside the sleeve body with branch circuit connections for splicing and/or distributing. The damping (hereinafter referred to as damping or attenuation) values of the branch circuit connections can be changed.

In wide-band communications network of this kind, the signal strength made available to the individual end subscriber is determined through the damping dimension of the splicer/distributor through which the signal is de-coupled from the main circuit. Splicer/distributors with varying damping dimensions are required due to varying network structures. Thus, for example, the telecommunications authority of the Federal German Post Office uses splicer/distributors in their wideband communications networks with three different damping levels, namely 10, 15 and 20 dB.

A sleeve of this type is known from DE-40 04 811-A1, which is designed in such a way that the damping levels can be adjusted for any application, in such a way that a suitable path can be selected, depending on the damping desired. A heat-shrinkable sheath is provided as an external covering for this element.

A disadvantage of this known solution is that the electronic componentry must be available for any damping. It has also been shown that the technical effort required to wire up every individual outlet of the tap for every damping value required is very great and not justifiable from the economic point of view.

The invention is therefore intended to create a solution with which all outlets of a sleeve of this kind can be simply wired up

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for any damping value required. The operation should be simple and the sleeve should be satisfactorily tight, even after a switching process.

This problem is solved, using a connection and tap sleeve of the type initially described, in that the sleeve body is formed so that it can be opened and tightly closed again, and the printed circuit board has a line disconnection for every tap, each discharging into plug connections, a replaceable modular transfer element being inserted into the plug connections, provided with corresponding plug connections and having a pre-set selectable damping value.

With the invention it is possible to wire up each tap simply on site at the required damping level, in that initially the sleeve is opened and then subsequently the required damping value is determined, for example by measuring the main circuit, and then, if necessary, the modular transfer element is replaced by another transfer element with a suitable damping value. The sleeve body is then closed tightly again. Obviously, standard sleeves can thus be used, which are simply converted after being installed, in that the sleeve is opened and the transfer elements are exchanged in an appropriate manner. In an advantageous refinement of the invention, it is intended that an individual modular transfer element be provided for each tap. Such a modular transfer element can have varying damping values and also other variations in form. For Example, should a tap not be required, it can be bridged by a module with a simple wire bridge.

It is particularly advantageous, especially for standard applications, if the components required for several taps are integrated in a modular transfer element, the transfer element having a corresponding multiplicity of plug connections. If, for example, all components for all existing taps are integrated into a modular transfer element, only one module has to be changed in a replacement operation, which correspondingly simplifies operation.

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In this form, it is preferable if the modular transfer element is provided with integrated internal conductor contacts and plug contacts for the external conductor. In this case, the entire circuit is structured as an IC-type module and is inserted into a sleeve housing on site.

According to invention, it is also planned for the sleeve body to have connections for the external conductor contacts of the modular transfer element. The electrical connection to the external conductor contacts of the incoming and outgoing cables is then brought about in known fashion by metallising the sleeve housing.

To guarantee that the sleeve can be opened and tightly closed again, it is particularly advantageous for the sleeve body to have a sleeve foundation and a closable sleeve cover, with means of sealing being provided between the sleeve foundation and the sleeve cover, as well as in the area of the cable inlets and cable outlets.

To guarantee, on the one hand, the sealing of the sleeve against environmental influences and, on the other hand, the high-frequency insulation of the sleeve housing, it is particularly preferable for the means of sealing between the sleeve foundation and the sleeve cover to be a ring-form combi-seal which consists of a sealing element and a screen element.

In this connection, it is advantageous for the sleeve cover to be formed in such a way that the compression forces for the sealing element do not exceed the resiliency of the screen element.

For effective sealing of the cable inlets and cable outlets, it is preferable for the means of sealing in the area of the cable inlets and cable outlets to take the form of a sealing chamber fully enclosing the individual cable in the operational position. In this connection, guide units should preferably be provided on the

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sleeve cover for the axial and/or radial compression of the means of sealing in the cable inlets and cable outlets during closure. When the sleeve cover is closed, the guide units bring about axial and/or radial compression of the sealing elements in the cable inlets and outlets, so that this area is automatically reliably sealed. Preferably the means of sealing are mounted in such a way that the screen material is protected against corrosive influences.

In a further significant development of the invention, the cable inlets and cable outlets are each equipped with tensile interception formed to accept varying cable diameters, which is preferably provided with cable centring. Here the activating elements of the tensile interception are preferably covered when the sleeve cover is in the closed condition, in such a way that the activating elements are safeguarded against unauthorised access when the sleeve is in the closed condition.

To guarantee a secure contact, it is preferable if the external conductor contacts take the form of spring cages which can be adjusted to the varying cable diameters.

To guarantee satisfactory closure of the sleeve, which ensures satisfactory tightness of the sleeve, it is advantageous for closure wedges to be provided on the sleeve foundation for the closure of the sleeve cover, which can be locked in the final position. This locking process automatically indicates to the fitter that the sleeves have closed properly, and at the same time this locking connection provides protection against any unintentional opening of the sleeve.

The invention also advantageously provides for mast fastening elements to be located on the sleeve foundation and/or on the sleeve cover.

The invention is clarified in greater detail below with reference to the diagrams. These show:

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- Fig. 1 Side view of a sleeve according to invention with open sleeve cover
- Fig. 2 Longitudinal side view of a closed sleeve
- Fig. 3 Section along line III-III in Fig. 2
- Fig. 4 Printed circuit board of sleeve with modular transfer elements
- Figs. 5 to 7 Block diagrams of various modular transfer elements and
- Fig. 8 Block diagram of a printed circuit board with a maximum of three taps, two taps being connected to transfer elements and one tap with a transfer element engaging over it.

A connection and tap sleeve according to invention for coaxial cables or the like in wide-band communications network is indicated by 1 throughout the diagrams. Here the sleeve body of the sleeve, 1, has a sleeve foundation, 2, and a sleeve cover, 3, which preferably are both made of plastic. The sleeve cover, 3, is flexibly articulated around a swivel pin, 4, on the sleeve foundation, 2, and can thus be opened and shut. The internal surfaces of the sleeve components, 2 and 3, are metallised in a known manner, and a printed circuit board, 5, is mounted inside the sleeve foundation, 2. This printed circuit board, 5, is provided with internal conductor contacts, 6 and external conductor contacts, 7, on both sides, for the attachment of coaxial cables, 8. In addition, cable inlets or cable outlets, 9, which are formed in the sleeve foundation, 2, are provided for the coaxial cables, 8.

For the complete sealing of the sleeve, 1, means of sealing are provided which initially serve to bring about sealing between the sleeve foundation, 2, and the sleeve cover, 3, namely a ring-form

combi-seal, 10, which is mounted on the top side of the sleeve foundation, 2, and embraces the entire area of the printed circuit board, 5, but not the area of the cable inlets or cable outlets, 9. This combi-seal, 10, consists of a sealing element, 11, and a screen element, 12, which guarantees high-frequency insulation.

For the sealing of the cable inlets and cable outlets, 9, a sealing chamber, 13, is provided in each cable inlet or cable outlet, filled, for example, with sealing gel, and completely enclosing the individual cable in the operational position. To guarantee a satisfactory sealing of the cable inlets, 9, when the sleeve cover, 3, is closed, guide units are provided on the sleeve cover, 3, for the radial and/or axial compression of the jointing compounds in the sealing chambers, 13. These guide units are marked 14 and take the form, for example, of clamping jaws.

Each cable inlet or cable outlet is equipped with tensile interception, 15, which, as best shown in Fig. 1, takes the form of two wedge-shaped bottom sections, 15a, which centre the cable, and an arc-shaped top section, 15b. Here the two bottom sections, 15a, are connected to a spring (not shown) in such a way that they are pressed apart, in such a way that a cable, 8, can be fed in without any problem. To centre the cable, 8, and for adjustment to varying diameters, the arc-shaped upper section, 15b, can be pushed down to the bottom sections, 15a, the sections 15a and 15b being fitted with interacting wedge surfaces in such a way that when the top section, 15b, is pushed down to the bottom sections, 15a, the bottom sections, 15a, are compressed against the spring tension and vice versa. To displace the top section, 15b, activating elements are provided which are mounted in a fixed cross-piece, 25, of the sleeve body, 2, in such a way that they can be rotated and thus displaced. The top section, 15b, can thus be adjusted by turning an individual setting screw, 24. The setting screws, 24, are thus not accessible when the sleeve, 1, is closed, so that the tensile interception, 15, is ensured when the sleeve, 1, is closed.

So that the sleeve, 1, can be closed properly and tightly after being opened, cross-pieces, 16 and 17, are provided on the side of the sleeve foundation, 2, and the sleeve cover, 2, opposite the swivel pin, 4, onto which closure wedges, 18, can be pushed, which can be locked in the final position on the cross-pieces, 16, 17. This guarantees that, on the one hand, when closure takes place it can be ensured that the sleeve, 1, is properly closed, and, on the other hand, it is guaranteed that the sleeve, 1, can not be opened inadvertently. A sleeve, 1, which can be opened and reliably tightly closed again, is thus available.

Because the sleeve, 1, can be opened and closed again, the printed circuit board, 5, the form of which is essential for the invention, is freely accessible at any time.

As can best be seen in Fig.4, the printed circuit board, 5, is provided with disconnections for each tap, each of which discharges in plug connections, 19, an interchangeable transfer element, 20, which is provided with corresponding plug connections, 21, being plugged into these plug connections, 19. Thus each transfer element can have a different damping value, e.g. 10, 15 and 20 dB.

An individual modular transfer element, 20, can also be provided for each tap, or, as an alternative, the components required for several taps can be integrated in a modular transfer element, 20 (not shown in diagram). Such a transfer element has a corresponding large number of plug connections, 21.

The modular transfer element, 20, is preferably equipped with integrated internal conductor contacts and plug contacts for the external conductor (not shown in detail).

Fig. 5 is a block diagram which shows an example of a transfer element, 20, according to invention. Other developments are shown in Figs. 6 and 7, the transfer elements, 20, shown there each being equipped with wire bridges for taps not required.

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Fig. 8 shows a block diagram of a board, 5, for a maximum of three taps, two taps being connected by transfer elements. These taps are numbered as 22, whilst the tap numbered as 23 is bridged over by a transfer element, 20, with a wire bridge.

The sleeve according to invention can obviously be used to put varying circuits and taps into effect without changing the printed circuit board, 5, through suitable exchange of transfer elements, 20. This is possible, on the one hand, when the sleeve, 1, is first installed, but it is also possible, on the other hand, if the sleeve has been installed earlier. In fact, this merely requires the sleeve cover, 2, to be opened and the transfer elements, 20, can then be suitably replaced. The sleeve can then be tightly closed again.

Naturally, the invention is not restricted to the specific exemplified embodiments illustrated. Further developments of the invention are possible without departing from the basic concept. Thus, the transfer elements, 20, can have a different shape, and suchlike.

CLAIMS

1. Connection and tap sleeve for coaxial cables or the like in wideband networks, with a sleeve body closing tightly in the operational position with cable inlets and cable outlets, with a printed circuit board mounted inside the sleeve body with branch circuit connections for splicing and/or distribution, and for which the damping values of the branch circuit connections can be altered, distinguished by the fact that the sleeve body (1) is formed so that it can be opened and tightly closed again and the printed circuit board (5) has a line disconnection for each tap, individually discharging into plug connections (19), a modular transfer element (20) with corresponding plug connections (21) and with a pre-set, selectable damping value, being inserted interchangeably into the plug connections (19).
2. Sleeve as Paragraph 1, distinguished by the fact that an individual modular transfer element (20) is provided for each tap.
3. Sleeve as Paragraph 1, distinguished by the fact that the necessary components for several taps are integrated in a modular transfer element (20), the transfer element (20) having a corresponding multiplicity of plug connections (21).
4. Sleeve as Paragraph 1 or one of the subsequent paragraphs, distinguished by the fact that the modular transfer element (20) is provided with integrated internal conductor contacts and plug contacts for the external conductor.
5. Sleeve as Paragraph 4, distinguished by the fact that the sleeve body (1) has connections for the external conductor contacts of the modular transfer element (20).

6. Sleeve as Paragraph 1 or one of the subsequent paragraphs, distinguished by the fact that the sleeve body (1) has a sleeve foundation (2) and a closable sleeve cover (3), and that means of sealing (10, 13) are provided between the sleeve foundation (2) and the sleeve cover (3), as well as in the area of the cable inlets and cable outlets (9)
7. Sleeve as Paragraph 6, distinguished by the fact that the means of sealing between the sleeve foundation (2) and the sleeve cover (3) is a ring-form combi-seal (10) which consists of a sealing element (11) and a screen element (12).
8. Sleeve as Paragraph 7, distinguished by the fact that the sleeve cover (3) is formed in such a way that the compression forces for the sealing element (11) do not exceed the resiliency of the screen element (12).
9. Sleeve as Paragraph 6 or one of the subsequent paragraphs, distinguished by the fact that the means of sealing in the area of the cable inlets and cable outlets (9) takes the form of the sealing chamber (13) which completely encloses the individual cable (8) in the operational position.
10. Sleeve as Paragraph 6 or one of the subsequent paragraphs, distinguished by the fact that guide units (14) are provided on the sleeve cover (3) for the axial and/or radial compression of the means of sealing (13) in the cable inlets and cable outlets (9) when closure takes place.
11. Sleeve as Paragraph 6 or one of the subsequent paragraphs, distinguished by the fact that the means of sealing are mounted in such a way that the screen material is protected against corrosive influences.

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12. Sleeve as Paragraph 6 or one of the subsequent paragraphs, distinguished by the fact that the cable inlets and cable outlets (9) are each equipped with tensile interception (15) formed to receive varying cable diameters.
13. Sleeve as Paragraph 12, distinguished by the fact that the tensile interception (15) is provided with cable centring (15a, 15b).
14. Sleeve as Paragraph 12 or 13, distinguished by the fact that activating elements (24) of the tensile interception (15) are covered by the sleeve cover (3) in the closed condition.
15. Sleeve as Paragraph 1 or one of the subsequent paragraphs, distinguished by the fact that the external conductor contacts (7) consist of spring cages.
16. Sleeve as Paragraph 1 or one of the subsequent paragraphs, distinguished by the fact that closure wedges (18), which can be locked in the final position, are provided on the sleeve foundation (2) for the closing of the sleeve cover (3).
17. Sleeve as Paragraph 1 or one of the subsequent paragraphs, distinguished by the fact that mast fastening elements are provided on the sleeve foundation (2) and/or on the sleeve cover (3).

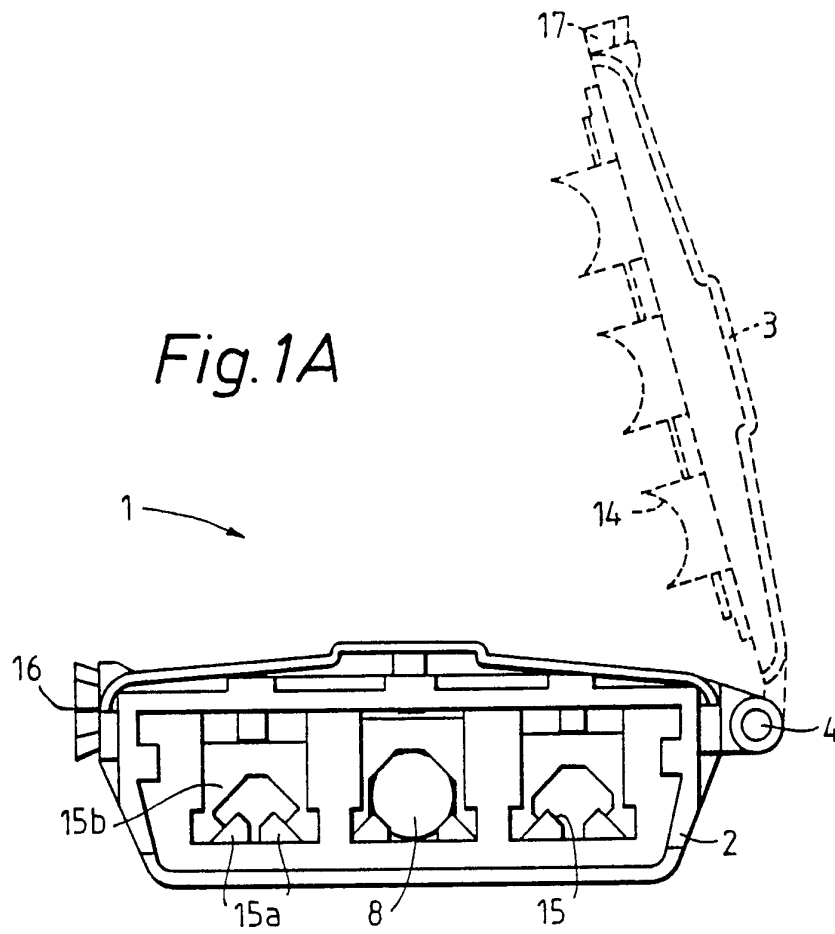


Fig. 2

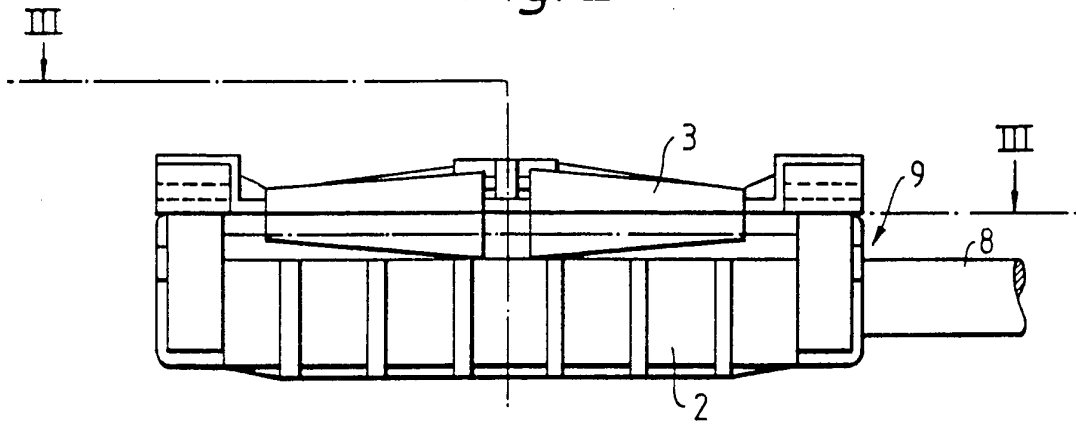
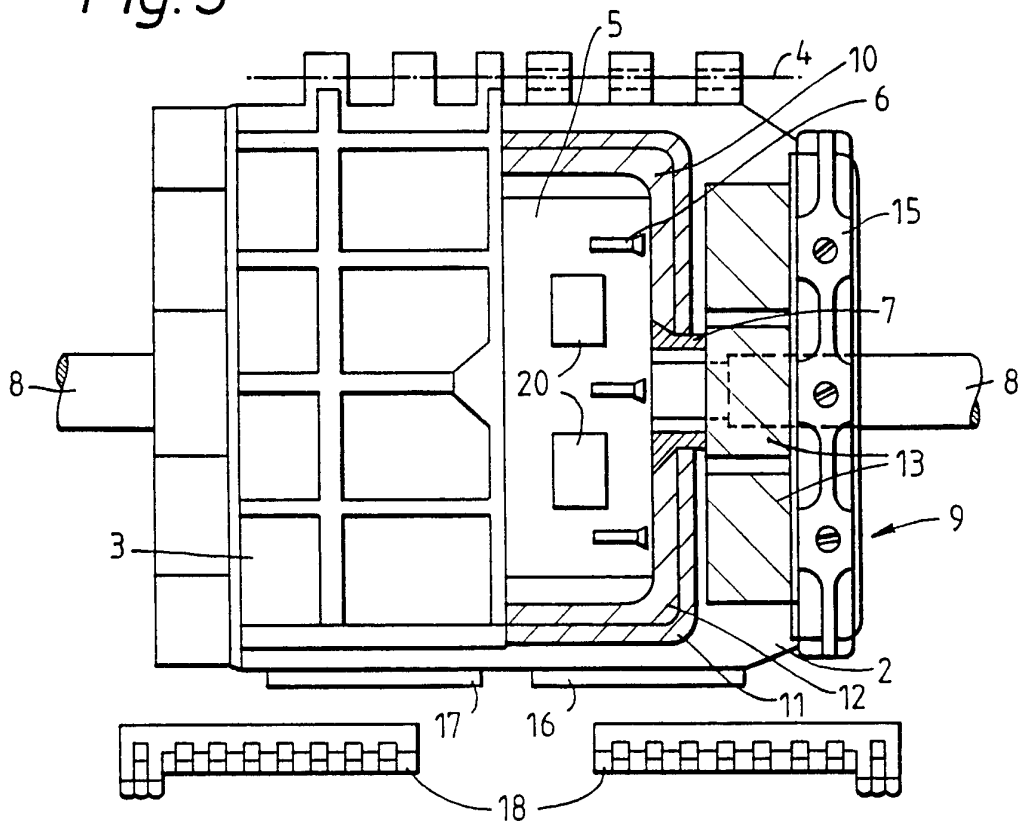
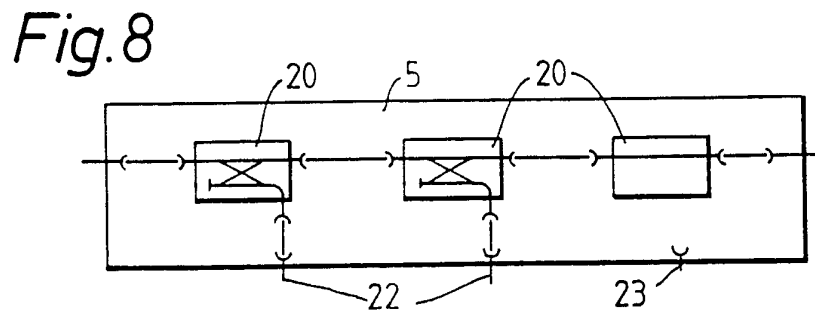
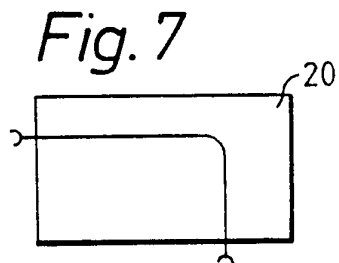
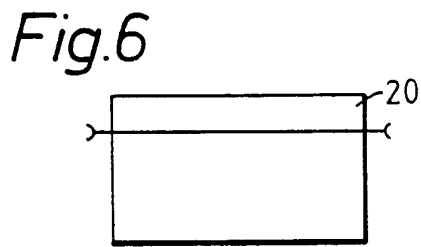
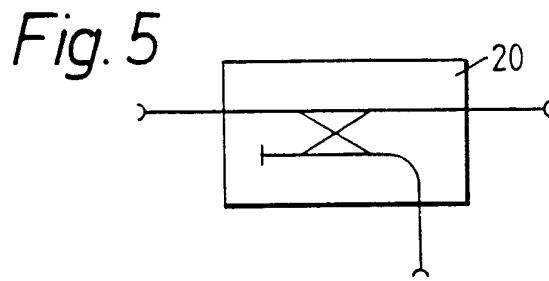
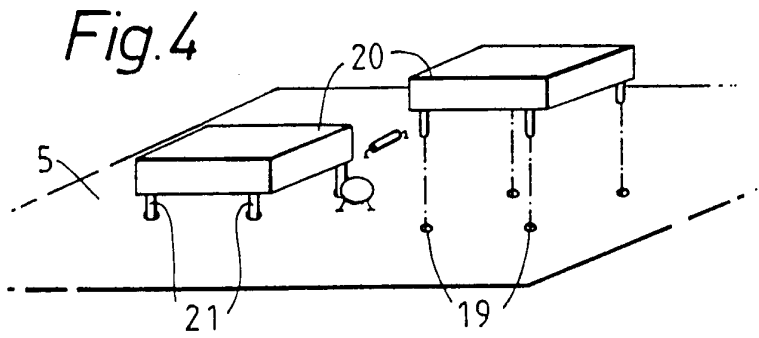


Fig. 3





INTERNATIONAL SEARCH REPORT

International application No.
PCT/GB 94/00023

A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 H01R9/05 H02G15/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED
Minimum documentation searched (classification system followed by classification symbols)
IPC 5 H01R H02G

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US,A,4 990 109 (ROMEREIN ET AL.) 5 February 1991 see column 1, line 63 - column 2, line 3 see column 3, line 3 - line 40; figure 1 ---	1
A	EP,A,0 187 203 (ANT NACHRICHTENTECHNIK GMBH) 16 July 1986 see page 3, line 12 - page 5, line 11; figure 1 -----	1,6

Further documents are listed in the continuation of box C. Patent family members are listed in annex.

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Date of the actual completion of the international search 11 April 1994	Date of mailing of the international search report 22 AVR. 1994
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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/GB 94/00023

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US-A-4990109	05-02-91	CA-A, C 2030643	19-01-92
EP-A-0187203	16-07-86	DE-A- 3446728	26-06-86