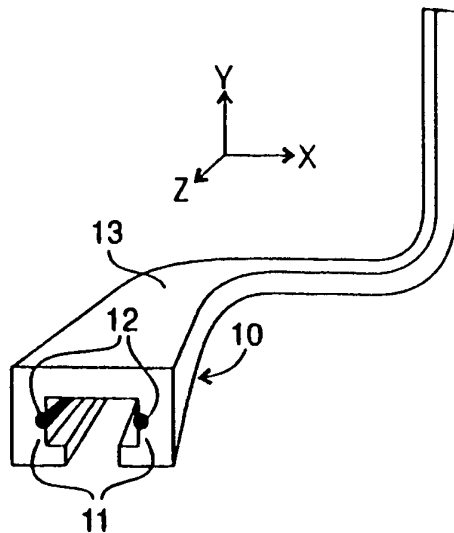


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(54) Title: CONNECTOR RAIL AND A METHOD FOR PRODUCING THE SAME		
(57) Abstract		
The invention concerns a conductor rail comprising a bearing structure (13), an insulator (11) and a conductor or conductors (12). The bearing structure (13) and insulating structure (11) of the conductor rail (10) are produced as the same uniform structure by the extrusion method and the conductors (12) are inserted in the rail after extrusion, which allows the bending of the rail under heating or without heating, in any direction, before the insertion of the conductors (12) or after insertion. 		

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Connector rail and a method for producing the same.

The invention concerns a conductor rail, comprising a bearing structure, an insulator and a conductor or
5 conductors. The invention also concerns the method of producing the conductor rail.

As is well-known, electricity or conductor rails are already used in show windows, restaurant dining rooms and
10 other public places, as well as in private homes, to provide a means by which electric appliances, such as lamps, may easily be connected, at any point whatsoever, to the electricity supply. These rails are made by enclosing copper conductors in PVC, which in turn is enclosed in
15 aluminium. In this kind of well-known rail, the aluminium acts as the bearing structure, to which an adaptor may easily be connected, and the PVC acts as the insulator.

One already-known electricity rail or electrical current
20 rail, described in the FI lay-open publication 69730, comprises a metal rail, U-shaped in cross-section, to which two electrical current conductors are attached by means of plastic holding strips in the longitudinal direction.

25 Another already-known conductor rail or contact rail, described in the FI patent publication 49658, consists of a supporting rail, made from extruded aluminium for example, and longitudinal insulation strips attached to each side wall of the rail, containing grooves into which e.g. copper
30 conductors are sunk.

Another already-known solution for an electrical current
rail is described in the FI patent publication 66706. In this well-known solution, the current-collecting rail has
35 two comb-shaped insulation parts facing each other in which the electrical conductor rails are held in the correct form. In addition, an earth conductor is placed in the current rail.

Another already-known rail solution is described in the FI patent publication 65874 in which the rail is formed from a duct channel made e.g. from anodized aluminium by press casting. Extending through this rail is an insulation
5 container, inside of which the conductors are placed.

Another already-known conductor rail is described in the FI lay-open publication 84002. In this case, the conductor rail consists of an insulator, which acts as the bearing
10 structure and is made by the pultrusion method, and a conductor or conductors set in place in connection with the pultrusion.

The above-mentioned, already-known conductor rails cannot
15 be bent, either because their bearing structure is made from non-bending material (e.g. metal), or because the entire conductor rail is made by the pultrusion method in one uniform structure so that the conductors or fibres prevent the bending of the conductor rail. Due to the
20 unbendability of the conductor rail, it is necessary to make special pieces for e.g. curves and bends and, as is well-known, these pieces are expensive and restrict the potential uses of the conductor rail. Consequently, it is extremely difficult to create e.g. lighting arrangements
25 that are aesthetically beautiful.

The purpose of the present invention is to achieve a conductor rail solution which allows the bending of the rail. The extrusion method is applied in the conductor rail
30 solution used in this invention.

The extrusion method means such a method by which continuous plastic products are produced in a longitudinal direction, for example by heating a thermoplastic material
35 until it becomes soft, pressing it into a dense mass and forcing it through a nozzle which gives it a desired form.

The purpose of the invention is to achieve a conductor rail, produced by the extrusion method, in which the

conductor or conductors are inserted after extrusion, thus allowing the bending of the rail in any direction whatsoever (creating the possibility of making three-dimensional forms without additional pieces) prior to
5 inserting the conductors, or also after it, as will later be explained.

The conductor rail and its production method according to the invention, meeting the goals stated both above and in
10 what comes later, are characterized mainly by what is presented in the attached patent claims.

In addition to bendability, another advantage achieved by a conductor rail according to the invention is that linking
15 pieces are not needed, as the conductors may be inserted afterwards (e.g. in order to join two conductor rails together it is necessary only to attach the rails end-to-end on a base, and to insert the conductors, e.g. directly from a reel, into the grooves in the insulator). However,
20 the use of linking or additional pieces is possible with a conductor rail according to the invention, if required.

Another advantage of the solution according to the invention is that a switch or switches may easily be
25 installed in the conductor rail at any point whatsoever, because the conductors may also be easily inserted as many separate pieces.

Additional reinforcements may also be easily installed on a
30 conductor rail according to the invention, if required.

The conductor rail according to the invention may be shaped into any desired form for various purposes, such as for attachment mechanisms, channel for cables or for attachment
35 to another rail.

A conductor rail according to the invention is easily dismantled and the conductors may be easily removed, whence the rail may be reformed, if required. In addition, due to

the ease with which it may be dismantled, the rail is completely recyclable.

5 A conductor rail according to the invention may also be made directly, in that the conductors are placed in their grooves automatically after extrusion.

10 It must further be noted that a conductor rail according to the invention can be made in such a way that the grooves formed in the rail for the conductors are very slightly too large for the conductors to be used. In this case, a conductor rail made according to the invention may easily be bent even when the conductors are already set in place. The conductors will then be able to adapt to the bending of
15 the rail by sliding a little in their grooves in a longitudinal direction, and will thus not essentially prevent bending.

20 In what follows the invention is described by referring to certain examples of advantageous embodiments of the invention, as presented in the attached drawings, without in any way limiting the invention narrowly to precise features of these embodiments. The description of the general method of producing the conductor rail and its
25 structure is at the same time a description of the method according to the invention.

30 Figure 1 shows schematically a conductor rail according to the invention which is rectangular in its cross-section.

Figure 2 shows schematically a conductor rail according to the invention which is oval in its cross-section.

35 Figure 3 shows schematically a conductor rail according to the invention which is round in its cross-section.

Figure 4 shows schematically a conductor rail according to the invention which is triangular in its cross-section.

Figure 5 shows schematically a conductor rail according to the invention which is equipped with a protective cover.

Figure 6 shows an example of one bending possibility with a conductor rail solution according to the invention.

Figure 7 shows schematically the linking of two conductor rails.

Figure 8 shows schematically the positioning of separate conductor lengths.

Figure 9 shows schematically a conductor rail according to the invention which is equipped with additional reinforcement.

The conductor rail 10 shown in Figure 1 consists of a bearing structure 13 and an insulating structure 11. The conductors 12 are inserted after the insulating structure 11 is made. The conductors 12 are located in grooves in the insulation structure 11, as shown in Figure 1.

Figure 2 shows a conductor rail 10 whose bearing structure 13 is oval in its cross-section. Grooves for the conductors 12 are formed in the insulating structure 11.

Figure 3 shows a conductor rail 10 which is round in cross-section and contains conductors 12 in grooves in the insulating part 11 of the bearing structure 13.

Figure 4 shows a conductor rail 10 which is triangular in cross-section and contains conductors 12 in grooves in the insulating part 11 of the bearing structure 13.

The conductor rail 10 shown in Figure 5 has the same structure as the conductor rail shown in Figure 1, but is equipped with a protective cover 14.

Figure 6 shows a conductor rail 10 corresponding in

structure to the conductor rail 10 shown in Figure 1, but bent by way of example in all three dimensions, at 90 degree angles from each other.

5 The conductor rail arrangement shown in Figure 7 consists of two conductor rails 10 linked to each other without a linking piece. The conductors 12, located in the insulating structure 11 which acts as the bearing structure 13, cross the linking point with no break.

10

In the conductor rail 10 shown in Figure 8, the conductors 12 are inserted as separate pieces in the grooves of the insulating structure 11 which acts as the bearing structure 13.

15

The perception of the invention is to join the conductor or conductors to a bearing and insulating structure made by the extrusion method especially after the structure has first been made in the desired form.

20

In the production of extruded products it is possible to use thermosetting plastics or thermoplasts as the raw material. The most suitable raw materials to use for a conductor rail according to the invention are softened thermoplastics such as PVC, ABS, polypropylene or
25 polyethylene, all of which are economically priced. In addition, polycarbonate and acrylic resins are suitable for the raw material of the conductor rail. The most suitable thermosetting plastic to use as the raw material of a
30 conductor rail according to the invention is polyester. A conductor rail according to the invention may, if required, use fibres (in separate slivers) such as glass fibre or aramid fibre, i.e. kevlar, as a reinforcement.

35 In terms of its production method, a conductor rail according to the invention may be economically produced and bent into the desired form as shown in Figures 1-8. Although the conductor rail cross-sections shown in the drawings are mainly symmetrical, a conductor rail may also

be produced with an asymmetrical cross-section, for example in that one part of the rail (the gripping part) is considerably thicker than the other part. A conductor rail according to the invention can thus be made advantageously and easily in accordance with safety regulations.

In addition, all possibly necessary devices for protecting form or access, or any protective covers, may be easily shaped if made from plastic, and the plastic is also automatically an insulator, thus giving extra security.

The invention is described above with reference to only certain of its most advantageous embodiments. This does not imply any desire to limit the invention as concerning only these examples, but many modifications and adaptations are possible within the scope of the inventive thinking specified in the following patent claims.

Claims

1. A conductor rail (10), consisting of a bearing structure (13), an insulator (11) and a conductor or conductors (12),
5 **characterized** in that the bearing structure (13) and the insulator (11) are made in the same uniform structure by the extrusion method and that the conductor or conductors (12) are set in their place after extrusion in grooves formed in the insulator.
- 10 2. A conductor rail according to claim 1, **characterized** in that the said structure is made of plastic, reinforced plastic or thermosetting plastic or thermoplast.
- 15 3. A conductor rail according to claim 2, **characterized** in that the resin component of the reinforced plastic is thermoplast or thermosetting plastic.
- 20 4. A conductor rail according to claim 1, **characterized** in that the conductor rail (10) is essentially rectangular, round, oval or triangular in its cross-section.
- 25 5. A conductor rail according to claim 1, **characterized** in that the conductors (12) are placed in grooves in the insulator (11).
- 30 6. A conductor rail according to claim 5, **characterized** in that the cross-section dimensions of the conductors (12) are a little smaller than the cross-section dimensions of the grooves of the insulator (11), thus allowing restricted longitudinal movement of the conductors (12) within the grooves.
- 35 7. A conductor rail according to claim 1, **characterized** in that the conductor rail (10) is equipped with a protective cover (14).
8. A conductor rail according to claim 1, **characterized** in that the conductor rail (10) is equipped with a

reinforcement (15).

9. A conductor rail according to any of the claims 1-8,
characterized in that the conductors (12) are placed in the
5 insulating structure (11) either as a uniform length
extending from end to end of the structure or as an
integrated unit made up of several different lengths.

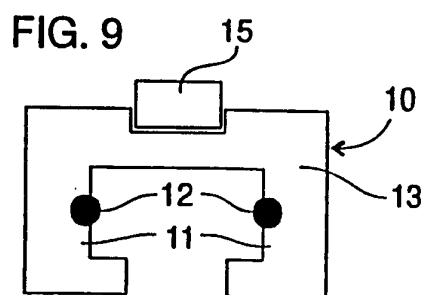
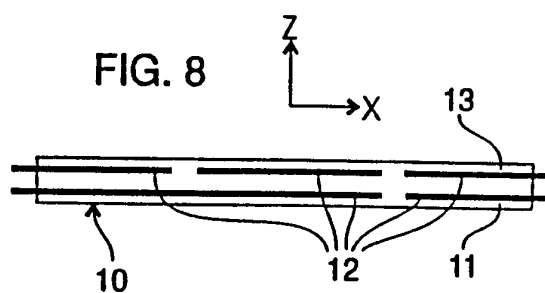
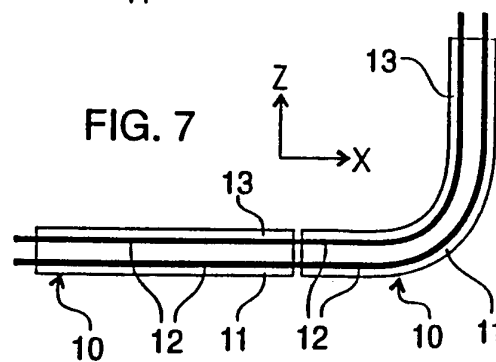
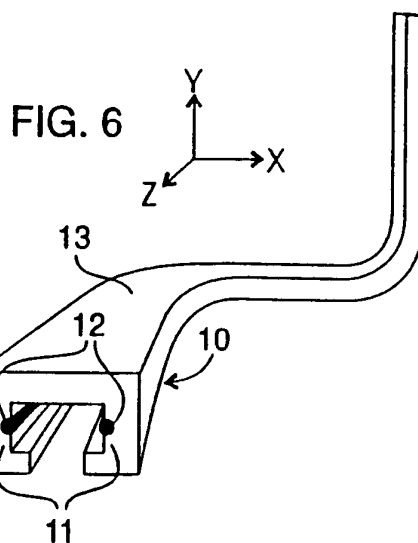
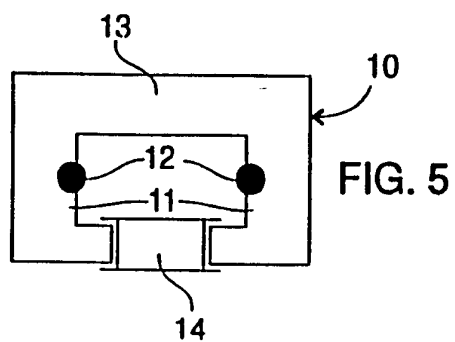
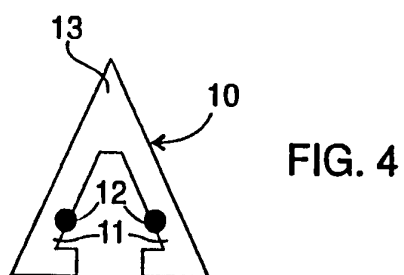
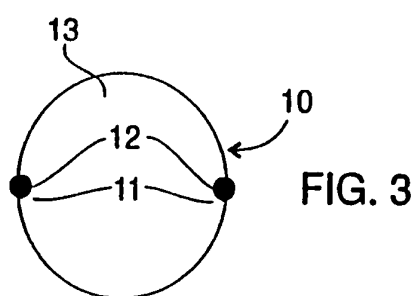
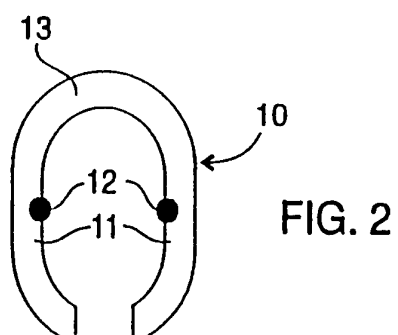
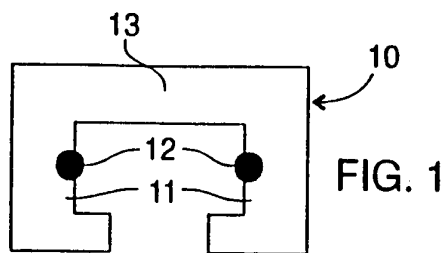
10. A method of producing a conductor rail (10) which
10 consists of a bearing structure (13), an insulator (11) and
a conductor or conductors (12), **characterized** in that the
bearing structure (13) and insulator (11) are extruded so
as to form the same, uniform structure and that the
conductor or conductors (12) are set in their places
15 afterwards, in grooves formed during the extrusion.

11. A method according to claim 10, **characterized** in that
the conductor rail (10) is bent into the desired form
before the insertion of the conductors (12).

20

12. A method according to claim 10, **characterized** in that
the grooves in the insulating structure (11) are made a
little larger than the thickness of the conductor to be
used, so that the essentially free rail (10) may also be
25 bent after the placement of the conductors (12).

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/FI 94/00556

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: H01R 25/14, H02G 5/04

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)

IPC6: H01R, H02G

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

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, 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.
Y	EP, A2, 0428055 (NESTE OY), 22 May 1991 (22.05.91), column 3, line 12 - line 42, figures 1-6 --	1-12
Y	US, A, 3081442 (E.T. PLATZ), 12 March 1963 (12.03.63), column 2, line 57 - line 72, figure 1 --	1-12
A	US, A, 2234745 (A. VON RARREL), 11 March 1941 (11.03.41), page 1, column 2, line 41 - line 52; page 2, column 2, line 62 - line 67, figures 1-3	1,11
Y	page 2, column 2, line 42 - line 49, figure 6 --	8

☒ Further documents are listed in the continuation of Box C.
 ☒ See patent family annex.

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Date of the actual completion of the international search

Date of mailing of the international search report

10 March 1995

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INTERNATIONAL SEARCH REPORT

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C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US, A, 4861273 (JAMES A. WENMAN ET AL), 29 August 1989 (29.08.89), column 4, line 25 - line 35, figures 1-8	1,6,9,12
Y	-- -----	11

INTERNATIONAL SEARCH REPORT
Information on patent family members

09/02/95

International application No.

PCT/FI 94/00556

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A2- 0428055	22/05/91	AT-T- 110891 DE-D,T- 69012054	15/09/94 12/01/95
US-A- 3081442	12/03/63	NONE	
US-A- 2234745	11/03/41	NONE	
US-A- 4861273	29/08/89	NONE	