

# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)

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|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Applicant's or agent's file reference<br>333138                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   | <b>FOR FURTHER ACTION</b>                                |                                                                                                                                                                         | See Form PCT/IPEA/416 |
| International application No.<br>PCT/ES2024/070770                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | International filing date (day/month/year)<br>11.12.2024 | Priority date (day/month/year)<br>12.12.2023                                                                                                                            |                       |
| International Patent Classification (IPC) or national classification and IPC<br>INV. H02G3/04                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |                                                          |                                                                                                                                                                         |                       |
| Applicant<br>Unex Aparellaje Electrico S.L.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                          |                                                                                                                                                                         |                       |
| <p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of <u>7</u> sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p>a. <input checked="" type="checkbox"/> a total of <u>27</u> sheets, as follows:</p> <p><input checked="" type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and/or sheets containing rectifications authorized by this Authority, unless those sheets were superseded or cancelled, and any accompanying letters (see Rules 46.5, 66.8, 70.16, 91.2, and Section 607 of the Administrative Instructions).</p> <p><input type="checkbox"/> sheets containing rectifications, where the decision was made by this Authority not to take them into account because they were not authorized by or notified to this Authority at the time when this Authority began to draw up this report, and any accompanying letters (Rules 66.4bis, 70.2(e), 70.16 and 91.2).</p> <p><input type="checkbox"/> superseded sheets and any accompanying letters, where this Authority either considers that the superseding sheets contain an amendment that goes beyond the disclosure in the international application as filed, or the superseding sheets were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in item 4 of Box No. I and the Supplemental Box (see Rule 70.16(b)).</p> <p>b. <input type="checkbox"/> a separate electronic file containing a sequence listing (<i>sent to the International Bureau only</i>)</p> |                                                          |                                                                                                                                                                         |                       |
| <p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the report</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input checked="" type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                          |                                                                                                                                                                         |                       |
| Date of submission of the demand<br><br>11.10.2025                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |                                                          | Date of completion of this report<br><br>24.11.2025                                                                                                                     |                       |
| Name and mailing address of the international preliminary examining authority:<br> European Patent Office P.B. 5818 Patentlaan 2<br>NL-2280 HV Rijswijk - Pays Bas<br>Tel. +31 70 340 - 2040                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |                                                          | Authorized officer<br><br>Hermann, Robert<br><br>Telephone No. +31 70 340-2754<br> |                       |

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/ES2024/070770

## Box No. I Basis of the report

1. With regard to the **language**, this report is based on
  - ☒ the international application in the language in which it was filed
  - ☐ a translation of the international application into , which is the language of a translation furnished for the purposes of:
    - ☐ international search (under Rules 12.3(a) and 23.1(b))
    - ☐ publication of the international application (under Rule 12.4(a))
    - ☐ international preliminary examination (under Rules 55.2(a) and/or 55.3(a) and (b))
2. With regard to the **elements\*** of the international application, this report is based on (*replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report*):

### Description, Pages

|      |                          |            |
|------|--------------------------|------------|
| 1-13 | filed with the letter of | 11-10-2025 |
|------|--------------------------|------------|

### Claims, Numbers

|     |                          |            |
|-----|--------------------------|------------|
| 1-9 | filed with the letter of | 11-10-2025 |
|-----|--------------------------|------------|

### Drawings, Sheets

|            |                     |
|------------|---------------------|
| 1/15-15/15 | as originally filed |
|------------|---------------------|

- ☐ a sequence listing - see Supplemental Box Relating to Sequence Listing.
3. ☐ The amendments have resulted in the cancellation of:
    - ☐ the description, pages
    - ☐ the claims, Nos.
    - ☐ the drawings, sheets/figs
    - ☐ the sequence listing (*specify*):
  4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since either they are considered to go beyond the disclosure as filed, or they were not accompanied by a letter indicating the basis for the amendments in the application as filed, as indicated in the Supplemental Box (Rules 70.2(c) and (c-bis)):
    - ☐ the description, pages
    - ☐ the claims, Nos.
    - ☐ the drawings, sheets/figs
    - ☐ the sequence listing (*specify*):
  5. ☐ This report has been established:
    - ☐ taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91 (Rules 66.1(d-bis) and 70.2(e)).
    - ☐ without taking into account the **rectification of an obvious mistake** authorized by or notified to this Authority under Rule 91(Rules 66.4bis and 70.2(e)).

# INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

International application No.  
PCT/ES2024/070770

6. ☒ With regard to top-up searches (Rules 66.1 *ter* and 70.2(f)):
- ☒ A top-up search was carried out by this Authority on 11.11.2025 (all discovered documents are listed in the Supplemental Box Relating to Top-up Search).
  - ☐ Additional relevant documents have been discovered during the top-up search.
  - ☐ No top-up search was carried out by this Authority because it would serve no useful purpose.
7. ☐ Supplementary international search report(s) from Authority(ies) has/have been received and taken into account in establishing this report (Rule 45bis.8(b) and (c)).

\* If item 4 applies, some or all of those sheets may be marked "superseded".

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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1. Statement

|                               |             |            |
|-------------------------------|-------------|------------|
| Novelty (N)                   | Yes: Claims | <u>1-9</u> |
|                               | No: Claims  |            |
| Inventive step (IS)           | Yes: Claims | <u>1-9</u> |
|                               | No: Claims  |            |
| Industrial applicability (IA) | Yes: Claims | <u>1-9</u> |
|                               | No: Claims  |            |

2. Citations and explanations (Rule 70.7):

**see separate sheet**

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**Box No. VII Certain defects in the international application**

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The following defects in the form or contents of the international application have been noted:

**see separate sheet**

1 **Re Item V**

**Reasoned statement with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

1.1 Reference is made to the following documents:

- D1 US 5 067 678 A (HENNEBERGER ROY L [US] ET AL) 26 November 1991 (1991-11-26)
- D2 US 2014/263868 A1 (HILBERT GREG [US] ET AL) 18 September 2014 (2014-09-18)
- D3 KR 2014 0027718 A (HYUNDAI ROTEM CO [KR]) 7 March 2014 (2014-03-07)
- D4 US 2006/261240 A1 (NAULT GARY F [US] ET AL) 23 November 2006 (2006-11-23)
- D5 EP 0 750 377 A1 (TELECOMNET AG [CH]) 27 December 1996 (1996-12-27)
- D6 DE 70 36 854 U (KLEINHUIS FA H [DE]) 7 January 1971 (1971-01-07)

- 1.2 **D1** is regarded as being the prior art closest to the subject-matter of claim 1, and shows (references in parentheses referring to this document):  
A cable channel assembly (**fig. 1, 5 - 7, and 20-24, see in particular col. 6 lines 30 - 35 'Using troughs 10 and the plurality of fixtures, a system designer and installer can produce a cable routing system having a plurality of bends, dips and intersections to accommodate a wide variety of installation designs. The extruded troughs 10 can be as long as desired and spliced together directly or with fixtures.**'), comprising:  
- at least one cable channel (**10, col. 4 - 5 'B. Trough Design' and 'C. Trough Attachment Members'**) made of a polymer material (**col. 4 line 7**), comprising a straight segment (**10, col. 4 'B. Trough Design' and 'C. Trough Attachment Members', fig. 1**) with a U-shaped section (**col. 4 'B. Trough Design' 'U-shaped cross-section'**), with a bottom wall (**12**), two opposing side walls (**14**), an open upper face (**see e.g. the cross-section in fig. 6**) and an open end (**22**); with there being formed on an outer face of each of said side walls (**14**), at least in said straight segment, an outer guide (**26**) protruding from said outer

face (14) of the side wall (14) and extending in the longitudinal direction of said straight segment, said outer guide (26) being in the form of a profile with a hollow inner space (fig. 24 38 - 46), an open wall (at 36) opposite said outer face (outer face of 14 in fig. 24) of the side wall (14) and an open end (at the end at 22), said open wall (36) comprising a continuous opening (36, see fig. 21 and 23) along said outer guide (26); and

- a cable-holder component (a further trough 10, see the splicing of troughs as in col. 6 lines 30-35 as cited above) that can be coupled to said cable channel (10), said cable-holder component (a further trough 10) comprising at least one channel (fig. 1, 5 - 7, 20-24, see also the feature identification above) having a U-shaped section (fig. 6 or 7 col. 9 lines 9 - 19) corresponding to that of said straight segment of the cable channel (see fig. 5 - 7), with a bottom wall (see fig. 7), two opposing side walls (see fig. 7), an open upper face (see fig. 7), and an open end (see fig. 5); such that said channel (the passage visible in fig. 7) of the cable-holder component (the further trough 10) and said straight segment of the cable channel (10) are coupled to one another through their respective open ends (see the coupling in fig. 5), forming a continuous channel;

characterized in that said channel (fig. 1, 5-7, and 20-24 10) of the cable-holder component (the further channel 10) and said straight segment of the cable channel (see above the first channel 10) are coupled to one another through their respective open ends (see the coupling in fig. 5 - 7) directly, without the interposition of a third element; and in that said cable-holder component (10) comprises in said channel (see above), on the outer face of each of its side walls (see fig. 5 - 7), a lug (the plate 50 fixed to one of the two channel elements- 'troughs'- 10) extending in cantilever fashion towards its open end (see the top view in fig. 5, during assembly this lug 50 will extend as defined, see col. 4 line 58 - col. 5 line 21), arranged facing said side wall (14, see fig. 5 - 7) and at a distance therefrom (see fig. 6 and 7), and said lug (50) is integral (see e.g. <https://www.thefreedictionary.com/integral> '2. composed of parts that together constitute a whole.') with a rod (55) extending from said lug (50) in a manner perpendicular thereto (fig. 6 and 7) and in the direction opposite said side wall (14); said lug (50) and said rod (55) being sized such that, when said channel (see above) of the cable-holder component (the further, second channel 10) and said straight segment of the cable channel (10) are coupled to one another, said lug (50) is inserted into said hollow inner space (see the space in 26 in fig. 24) of the outer guide (26, see fig. 24) through the open end (at 22, see fig. 23) of said outer guide (26), and said rod (55) goes through said continuous opening (36); said cable channel

assembly comprising a tightening part (**nut 52**) which is assembled at one end of said rod (**55**) protruding from said open wall (**see at 36**), said tightening part (**52**) cooperating with said rod (**55**) such that it can be manually actuated to be moved to a position closer to said side wall (**14**), which is maintained by the cooperation of said tightening part (**52**) with said rod (**55**, **see e.g. col. 4 line 58 - col. 5 line 21**), said tightening part (**52**) being supported with pressure on said open wall (**see 36 at 32**), thereby locking said lug (**50**) in said outer guide (**26**); ~~wherein said channel of the cable-holder component comprises an outer edge, formed on an outer face of at least one of the side walls and the bottom wall of said channel, and a continuous perimeter lip which is formed by said bottom wall and said side walls of the channel and extends between said open end of the channel and said outer edge, said outer edge and said perimeter lip being sized such that, when said channel is coupled to said straight segment of the cable channel, said open end of the straight segment of the cable channel is supported such that it abuts with said outer edge and said perimeter lip is inserted into said straight segment of the cable channel and tightly supported on the bottom wall and the side walls of said straight segment; and wherein said lug is connected in a widening of said outer edge.~~

The subject-matter of claim 1 therefore differs from this known cable channel assembly in that

**A)** said channel and the cable holder are coupled to one another directly, without the interposition of a third element;

**B)** wherein said channel of the cable-holder component comprises an outer edge, formed on an outer face of at least one of the side walls and the bottom wall of said channel, and a continuous perimeter lip which is formed by said bottom wall and said side walls of the channel and extends between said open end of the channel and said outer edge,

**C)** said outer edge and said perimeter lip being sized such that, when said channel is coupled to said straight segment of the cable channel, said open end of the straight segment of the cable channel is supported such that it abuts with said outer edge and said perimeter lip is inserted into said straight segment of the cable channel and tightly supported on the bottom wall and the side walls of said straight segment; and

**D)** wherein said lug is connected in a widening of said outer edge.

Also none of the other cited documents D2 - D6 discloses these features A- D

The subject-matter of claim 1 is therefore novel (Article 33(2) PCT).

The effect of these differences together is that it is easier to provide a robust coupling of the cable channel assembly (see page 3 lines 8 - 10, page 4 lines 24 - 25, page 5 lines 13 - 15).

The problem to be solved by the present invention may therefore be regarded as how to provide a more robust coupling which is easy to assemble.

The solution to this problem proposed in claim 1 of the present application is considered as involving an inventive step (Article 33(3) PCT) for the following reasons:

When trying to solve the objective technical problem above the person skilled in the art would know the teachings of the further documents D2 - D6 cited. Of these only D2, D3 and D4 address the subject of coupling channel elements and only D3 discloses a direct coupling (see fig. 1 and 2 for the coupling of 110 and 120 in D3). However, if the person skilled in the art would have applied this teaching of D3 to the teaching of D1, no indication would be available from either of D3 or D1 to solve the objective technical problem by further including the features B) - D). Features B and C might be derived from D2 (see fig. 3) or D4 (see fig. 4) and also the structure of the interconnecting part 250 in D1. The direct coupling disclosed in D3 is however based on an overlap between the two cable channel parts 110 and 120, see fig. 2 and 3, which is in direct contradiction to these teachings of D1, D2, and D4. Therefore, there is no hint or indication in any of these documents to combine these multiple separate teachings for the solution of the objective technical problem and thus to arrive at the subject-matter of claim 1 in an obvious manner.

Hence, the subject-matter of claim 1 is considered to be based on an inventive step.

- 1.3 Claims 2 - 9 is dependent on claim 1 and as such also meet the requirements of the PCT with respect to novelty and inventive step.

**2 Re Item VII**

**Certain defects in the international application**

- 2.1 Independent claim 1 is not formulated correctly in the two-part form in accordance with Rule 6.3(b) PCT, which in the present case would be appropriate, with those features known in combination from the prior art D1 (see above) being placed in the preamble (Rule 6.3(b)(i) PCT) and the remaining features being included in the characterising part (Rule 6.3(b)(ii) PCT).

Online filing

EUROPEAN PATENT OFFICE  
80298 MUNICH  
GERMANY

Our Ref.: 333138

Barcelona, October 11, 2025

**Re:** PCT International Application No. PCT/ES2024/070770

**Applicant:** UNEX APARELLAJE ELECTRICO S.L.

**International Preliminary Examination demand (PCT Chapter II).**

**Accompanying letter (including identification of amendments and arguments as a formal response to the written opinion).**

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Dear Sir, dear Madam,

This letter is submitted as an accompanying letter for the International Preliminary Examination demand (Art. 31 PCT) filed for the above-captioned PCT International Application.

The demand is filed before the European Patent Office (EPO) in its capacity of competent International Preliminary Examining Authority (IPEA).

The written opinion (WO) previously established by the EPO as the International Searching Authority (ISA) is considered to be a written opinion of the IPEA (Rule 6.1bis PCT).

Amended description and claims are filed under Art. 34 PCT.

This letter contains an identification of the amendments with an indication of its basis (Rules 66.8 and 46.5 PCT), as well as arguments as a formal response to the written opinion (Rules 6.1bis and 66.3 PCT).

## **1 - REFERENCED DOCUMENTS**

Reference is made to the following documents cited in the International Search Report and the written opinion of the ISA:

D1: US5067678A

D2: US2014263868A1

D3: KR20140027718A

Documents D4-D6 are not discussed here since they do not affect novelty and inventive step of original claims 1, 3, and 6 which are the basis of amended claim 1.

## **2 - AMENDMENTS**

Amended description and claims are submitted.

In order to clearly identify the amendments, the amended description and claims are also attached in an annotated format, in which deleted text is barred and added text is underlined. Please note that the annotations are made with respect to the English translation of the application as originally filed.

The identification of the amendments indicated below (page and line) refer to said annotated format.

### **Description**

Page 2 lines 9-27: documents D1 and D3 have been cited as prior art and briefly discussed. This is in response to the objection in item VII - point 2.1 of the WO.

## **Claims**

- Claim 1:
  - It has been specified that the cable channel assembly comprises the tightening part (20). This is in response to the objection in item VIII - point 3.1 of the WO. The basis for this amendment is obvious: the tightening part (20) is described as part of the cable channel assembly in the whole description and drawings of the original application. According to claim 1, the tightening part (20) is assembled at one end of the rod (19) of the cable-holder component (12).
  - All the features of original claims 3 and 6 have been incorporated into claim 1. Claim 1 is thus a combination of original claims 1+3+6.
- Original claims 3 and 6 have been suppressed, since all their features have been incorporated into claim 1.
- The rest of the claims have been renumbered accordingly.
- Original claims 12-22 have been suppressed. This is in response to the objection in item VIII - point 3.2 of the WO.

The amended set of claims contains 9 claims.

Any suppression in the description and claims is made without prejudice to the later filing of amendments or divisional applications supported on any aspect contained in the suppressed parts.

## **3.- NOVELTY AND INVENTIVE STEP**

### **Novelty**

None of the documents cited as relevant prior art in the International Search Report and in the written opinion discloses an assembly comprising all the technical features of claim 1.

In particular, none of these documents disclose all the distinctive features defined in the characterising part of claim 1:

- said channel (13) of the cable-holder component (12) and said straight segment of the cable channel (1) are coupled to one another through their respective open

ends (17, 5) directly, without the interposition of a third element; and in that said cable-holder component (12) comprises in said channel (13), on the outer face of each of its side walls (15), a lug (18) extending in cantilever fashion towards its open end (17), arranged facing said side wall (15) and at a distance therefrom, and said lug (18) is integral with a rod (19) extending from said lug (18) in a manner perpendicular thereto and in the direction opposite said side wall (15); said lug (18) and said rod (19) being sized such that, when said channel (13) of the cable-holder component (12) and said straight segment of the cable channel (1) are coupled to one another, said lug (18) is inserted into said hollow inner space (8) of the outer guide (7) through the open end (10) of said outer guide (7), and said rod (19) goes through said continuous opening (11); said cable channel assembly comprising comprising a tightening part (20) which is assembled at one end of said rod (19) protruding from said open wall (9), said tightening part (20) cooperating with said rod (19) such that it can be manually actuated to be moved to a position closer to said side wall (15), which is maintained by the cooperation of said tightening part (20) with said rod (19), said tightening part (20) being supported with pressure on said open wall (9), thereby locking said lug (18) in said outer guide (7);

- wherein said channel (13) of the cable-holder component (12) comprises an outer edge (23), formed on an outer face of at least one of the side walls (15) and the bottom wall (14) of said channel (13), and a continuous perimeter lip (24) which is formed by said bottom wall (14) and said side walls (15) of the channel (13) and extends between said open end (17) of the channel (13) and said outer edge (23), said outer edge (23) and said perimeter lip (24) being sized such that, when said channel (13) is coupled to said straight segment of the cable channel (1), said open end (5) of the straight segment of the cable channel (1) is supported such that it abuts with said outer edge (23) and said perimeter lip (24) is inserted into said straight segment of the cable channel (1) and tightly supported on the bottom wall (2) and the side walls (3) of said straight segment;
- and wherein said lug (18) is connected in a widening (25) of said outer edge (23).

## D1

In the WO (point 1.2), the component 250 of D1 is assimilated to the cable-holder component (12) of claim 1, and the metal plate 50 of D1 is assimilated to the lug (18) of claim 1.

We respectfully disagree with this analysis, for the reasons explained here below.

- In D1 the cable channel ("trough") and the cable-holder component ("fixture" or "fitting") are not coupled directly, but via a coupling collar 250 which is provided for aligning the ends of

a trough 10 with the ends of a fixture (column 9 lines 9-10). In D1 the cable-holder component of claim 1 is any one of the fixtures or fittings 70, 74, 76, 84, 90, 100, 112, 80; the cable channel is the trough 10; and the trough 10 is coupled to any of the fixtures or fittings by means of the coupling collar 250.

- In D1 a metal plate 50 is used to secure the cable channel (the trough 10) to the cable-holder component (the fixtures or fittings 70, 74, 76, 84, 90, 100, 112, 80) via the coupling collar 250. This metal plate 50 has a plurality of holes 56 and is slidably inserted into the attachment members (guide) 26 of the cable channel and into tracks 230 of the cable-holder component. Each end of the metal plate 50 is secured to the cable channel and to the cable-holder component by a bolt 48 and a nut 52 (see Figs. 5-7 and 20-24; column 4 line 59 - column 5 line 21; column 9 lines 9-41), which are independent parts. The shaft 55 of the bolt 48 passes through one of the holes 56 of the metal plate 50 and its head 54 fits into a slot 42 in the bottom wall of the guide 26, so that it cannot rotate. The nut 52 is screwed onto the shaft 55, which protrudes from guide 26, to secure the end of the metal plate 50 to it. On the cable-holder component side, a bolt and nut are similarly used to secure the metal plate 50 to track 230.
- Therefore, even if a similarity were made between the coupling collar 250 of D1 and the cable-holder component (12) of claim 1, the coupling collar 250 of D1 does not have the lug (18) with the rod (19) which is inserted into the outer guide (7) as defined in claim 1. In D1, the coupling collar 250 is interposed between the trough 10 and a fixture or fitting, and the metal plate 50, the bolts and the nuts, which are not part of the coupling collar 250, are used to fix the trough 10 and the fixture or fitting. The metal plate 50 is fixed to the trough 10 and the fixture or fitting, not to the coupling collar 50.

In addition, the assembly of D1 does not have all the features of original claims 3 and 6, now incorporated into claim 1. In particular, even if the component 250 of D1 were assimilated to the cable-holder component (12) of claim 1, and the metal plate 50 of D1 were assimilated to the lug (18) of claim 1, the metal plate 50 is not connected in a widening of an outer edge of the cable-holder component on which the open end of the cable channel abuts. As discussed above, in D1 the two ends of the metal plate 50 are secured to the trough 10 and to the fixture or fitting by a bolt 48 and a nut 52 (see Figs. 5-7 and 20-24; column 4 line 59 - column 5 line 21; column 9 lines 9-41). The shaft 55 of the bolt 48 passes through one of

the holes 56 of the metal plate 50 and its head 54 fits into a slot 42 in the bottom wall of the guide 26.

## D2

D2 discloses a system to make a bridge connexion over two parallel troughs, which is completely different from the system of claim 1 in which a cable-holder component (12) and a cable channel (1) are coupled to one another through the respective open ends of a U-shaped section to form a continuous channel.

In any case, the part shown in Fig. 3 of D2 is not a cable-holder component within the meaning of claim 1, but rather a coupling element for connecting two parallel troughs in an intermediate section thereof. And it does not have the lug (18) with the rod (19) which is inserted into the outer guide (7) as defined in claim 1.

The post member 326 cannot be assimilated with the rod (19) of claim 1. Indeed, the post member of D2 does not pass through a continuous opening of an outer guide in the cable duct. Furthermore, the flange into which the post member 326 of D2 is connected cannot be the lug (18) of claim 1, because it is not inserted into the hollow inner space of an outer guide, through the open end of said outer guide.

## D3

D3 discloses an extensible cable tray for a railway comprising two profiles: a first profile 110 which is a main cable tray and a second profile 120 which is an auxiliary cable 120 tray. The two profiles 110, 120 are slidably coupled together to adjust the length of the extensible cable tray. The profile 120 is coupled to the outside of the profile 110 (see Figs. 2 and 3). The profile 110 has a rail 116 on its side walls, with which a rail 125 formed on the side walls of the profile 120 slidably engages. The rail 116 of the profile 110 has a plurality of threaded rods 116d distributed along this rail 116 and emerging from its lower flange 116b (see Fig. 1). The rail 125 of the profile 120 has a complementary shape to the rail 116 of the profile 110, such that the lower flange 116b of the rail 116 is inserted into the rail 125 and the rod

116d protrudes through the open face of the rail 125. To fix the relative position between the two profiles 110, 120, a plate 126 is placed through the rod 116d, which is tightened by means of a nut 127.

The lower flange 116b on the rail 116 of D3 is not a lug extending in cantilever fashion towards an open end of the profile 110, but a continuous flange of the rail.

In any case, the assembly of D3 does not have all the features of original claims 3 and 6, now incorporated into claim 1. In particular, even if the profile 110 of D1 were assimilated to the cable-holder component (12) of claim 1, and the flange 116b of D3 were assimilated to the lug (18) of claim 1, the flange 116b is not connected in a widening of an outer edge of the cable-holder component on which the open end of the cable channel abuts. In addition, in D3 the end of the profile 120 does not abut on the end of the profile 110. On the contrary, the two profiles freely slide one over the other are they are fixed by the nut 127, with no abutment of one profile on the other profile.

Therefore, claim 1 is novel over each of D1-D3.

### **Inventive step**

D1 can be considered the closest prior art to the subject-matter of claim 1 since it discloses an assembly of the type defined in the preamble of claim 1, in which a cable-holder component and a cable channel are coupled to one another through the respective open ends of a U-shaped section to form a continuous channel.

The subject-matter of claim 1 differs from the assembly disclosed in D1 at least in the distinctive technical features defined in the characterizing part of the claim:

- said channel (13) of the cable-holder component (12) and said straight segment of the cable channel (1) are coupled to one another through their respective open ends (17, 5) directly, without the interposition of a third element; and in that said cable-holder component (12) comprises in said channel (13), on the outer face of each of its side walls (15), a lug (18) extending in cantilever fashion towards its open end (17), arranged facing said side wall (15) and at a distance therefrom, and said lug (18) is

integral with a rod (19) extending from said lug (18) in a manner perpendicular thereto and in the direction opposite said side wall (15); said lug (18) and said rod (19) being sized such that, when said channel (13) of the cable-holder component (12) and said straight segment of the cable channel (1) are coupled to one another, said lug (18) is inserted into said hollow inner space (8) of the outer guide (7) through the open end (10) of said outer guide (7), and said rod (19) goes through said continuous opening (11); said cable channel assembly comprising comprising a tightening part (20) which is assembled at one end of said rod (19) protruding from said open wall (9), said tightening part (20) cooperating with said rod (19) such that it can be manually actuated to be moved to a position closer to said side wall (15), which is maintained by the cooperation of said tightening part (20) with said rod (19), said tightening part (20) being supported with pressure on said open wall (9), thereby locking said lug (18) in said outer guide (7);

- wherein said channel (13) of the cable-holder component (12) comprises an outer edge (23), formed on an outer face of at least one of the side walls (15) and the bottom wall (14) of said channel (13), and a continuous perimeter lip (24) which is formed by said bottom wall (14) and said side walls (15) of the channel (13) and extends between said open end (17) of the channel (13) and said outer edge (23), said outer edge (23) and said perimeter lip (24) being sized such that, when said channel (13) is coupled to said straight segment of the cable channel (1), said open end (5) of the straight segment of the cable channel (1) is supported such that it abuts with said outer edge (23) and said perimeter lip (24) is inserted into said straight segment of the cable channel (1) and tightly supported on the bottom wall (2) and the side walls (3) of said straight segment;
- and wherein said lug (18) is connected in a widening (25) of said outer edge (23).

These distinctive technical features have the following technical effects (page 3 line 28 - page 4 line 3; page 5 lines 20-24; page 5 lines 33-35): because of the coupling being performed without the interposition of a third part, the assembly is simpler and easier to manage both for the end user and for the manufacture and distributors. The incorporation of the lug and the rod on the outer face of the side walls of the channel of the cable-holder component requires modifying the latter, but this modification is performed only at one end and in the outer part, such that it does not alter the functionality of cable-holder system, and is furthermore easy to perform and inexpensive. This solution allows the coupling to be performed easily, with a single manoeuvre and by only handling the cable-holder component and the cable channel, by manually actuating the tightening part after having performed the coupling, and obtaining a robust locking. In addition, the outer edge and said perimeter lip is inserted into said straight segment of the cable channel and tightly supported on the bottom wall and the side walls of said straight segment. The solution of the edge and the perimeter lip provides a coupling that is resistant to bending stresses on the side walls and

the bottom wall. Since the perimeter lip extends outwardly in the length direction of the channel, it only interferes with the inside of the straight segment of the cable channel, but not with the inside of the cable-holder component. In addition, the widening of the outer edge in which the lug is connected is a simple, discontinuity-free geometric solution for the placement of the lug, and provides a good support for the end of the outer guide, which increases the robustness of the coupling.

The objective technical problem solved by the invention according to claim 1 consists in how to provide an assembly of the type defined in the preamble of claim 1, which has a simpler structure with a lower manufacturing cost and a lower material consumption, without reducing the ease of coupling and locking, and without reducing the effectiveness and robustness of said locking.

None of the documents cited in the International Search Report and the written opinion contain any indication or suggestion which would (not could, but would) induce the skilled person to modify the assembly described in D1 by incorporating the distinctive technical features of claim 1 with the aim to obtain the technical effect described above.

As discussed above in the novelty analysis, in D1 a trough and a fixture are coupled via a coupling collar. A metal plate with a plurality of holes is used to secure the trough to the fixture. The metal plate is slidably inserted into a guide of the trough and into tracks of the fixture. Each end of the metal plate is respectively secured to the trough and to the fixture by a bolt which passes through one of the holes of the metal plate, and a nut which is screwed onto the rod. D1 does not contain any suggestion for the skilled person to depart from this particular configuration, with a coupling collar, a metal plate with holes, bolts and nuts.

D3 discloses an extensible cable tray for a railway comprising a first profile and a second profile slidably coupled together to adjust the length of the extensible cable tray. The end of the second profile does not abut on the end of the first profile. On the contrary, the two profiles freely slide one over the other and they are fixed by a nut, with no abutment of one profile on the other profile. The structural configuration disclosed in D3, with a first rail of the first profile with a plurality of threaded rods extending from a flange on said first rail, and a

second rail of the second profile in which said flange engages, is specific for allowing the two profiles freely slide one over the other. The skilled person would find no motivation to attempt to use this structural configuration disclosed in D3 in the assembly of D1, in which the trough and the fixture must be fixed together in fixed manner, without sliding and with their ends abutting through the coupling collar. In any case, as discussed above, neither D1 nor D2 disclose the features of original claims 3 and 6, now incorporated into claim 1.

Therefore, starting from D1 and faced to the objective technical problem, even if a skilled person were to consider any of the documents belonging to the prior art, he/she would not arrive at the claimed invention without performing an inventive step.

Claim 1 is thus inventive over D1-D3.

Claims 2 to 9 are depended on claim 1. Therefore, they share its novelty and inventive step.

#### **4.- CONCLUSION AND REQUEST**

The amended application is believed to meet all the requirements of Art. 33 (2) (3) (4) PCT.

Therefore, the applicant looks forward for a favourable opinion from the International Preliminary Examination Authority (IPEA).

Should the IPEA has further objections, the applicant respectfully requests an additional opportunity to submit amendments and arguments pursuant to Rule 66.4(b) PCT.

Yours faithfully,



Roberto Roser Galard  
European Patent Attorney  
CURELL SUÑOL S.L.P.

Encl.:

- amended description and claims, clean version;
- amended description and claims, annotated version.

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## CABLE CHANNEL ASSEMBLY, AND CORRESPONDING CABLE-HOLDER COMPONENT

DESCRIPTION5 Field of the Invention

The invention is comprised in the field of cable channels that are typically used for guiding cables in a space. The invention is applicable particularly, although not exclusively, for guiding bundles of fiber optic cables and other cables in data centers

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More specifically, the invention relates to a cable channel assembly, comprising:

- at least one cable channel made of a polymer material, comprising a straight segment with a U-shaped section, with a bottom wall, two opposing side walls, an open upper face and an open end; with there being formed on an outer face of each of said side walls, at least in said
- 15 straight segment, an outer guide protruding from said outer face of the side wall and extending in the longitudinal direction of said straight segment, said outer guide being in the form of a profile with a hollow inner space, an open wall opposite said outer face of the side wall and an open end, said open wall comprising a continuous opening along said outer guide; and
- a cable-holder component that can be coupled to said cable channel, said cable-holder
- 20 component comprising at least one channel having a U-shaped section corresponding to that of said straight segment of the cable channel, with a bottom wall, two opposing side walls, an open upper face, and an open end; such that said channel of the cable-holder component and said straight segment of the cable channel are coupled to one another through their respective open ends, forming a continuous channel.

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The invention also relates to the cable-holder component that is part of this assembly.

State of the Art

- 30 Cable channels of the type indicated above are provided at least on their side walls with an outer guide that is typically used for fixing various elements to the cable channel. To that end, for example, a system consisting of a nut and a screw, in which the nut is inserted into the outer guide, is used.

- 35 Cable channel assemblies of the type indicated above, in which coupling between the channel

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of the cable-holder component and the straight segment of the cable channel is performed by means of a connector which is a third part interposed between them, are known. The connector is formed by a main body in the form of a channel and composite parts that fit into the outer guide of the straight segment of the cable channel and have a mechanism to lock the coupling.

5 Document WO03084018A1 describes this type of cable channel assembly. This solution has the advantage of allowing coupling and locking to be performed in a simple manner and without the need for tools, but it requires the use of a coupler having a complex composition.

US5067678A discloses a cable channel assembly in which a cable channel and a cable-holder  
10 component are coupled to one another through a coupling collar. A metal plate is used to secure the cable channel and the cable-holder component between them through the coupling collar. The metal plate has a plurality of holes and is slidably inserted into outer guides of the cable channel and the cable-holder component. Each end of the metal plate is secured to each  
15 of the cable channel and the cable-holder component by means of a bolt and a nut. The shaft of the bolt traverses one of the holes of the metal plate, and its head is fitted into a groove in a bottom wall of the outer guide, so that it cannot rotate. A nut is screwed to the shaft of the rod, that projects through the outer guide, to secure the end of the metal plate to the outer guide.

20 KR20140027718A discloses an extensible cable tray for a railway comprising a main cable tray and an auxiliary cable tray slidably coupled together to adjust the length of the extensible cable tray. The lateral walls of the main cable tray and the auxiliary cable tray comprise longitudinal rails that slidably engage one another. The rail of the main cable tray has a plurality of threaded rods distributed along its length, which extend through an open face of the rail of  
25 the auxiliary cable tray. The two trays are secured together by a clamp with a hole through which the rod passes and a nut that screws onto the rod to press the clamp against the auxiliary cable tray.

#### Description of the Invention

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The purpose of the invention is to provide a cable channel assembly of the type indicated above, which has a simpler structure with a lower manufacturing cost and a lower material consumption, without reducing the ease of coupling and locking, and without reducing the effectiveness of said locking.

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This purpose is achieved by means of a cable channel assembly of the type indicated above, characterized in that the channel of the cable-holder component and the straight segment of the cable channel are coupled to one another through their respective open ends directly without the interposition of a third element; and in that said cable-holder component comprises

5 in said channel, on the outer face of each of its side walls, a lug extending in cantilever fashion towards its open end, arranged facing said side wall and at a distance therefrom, and said lug is integral with a rod extending from said lug in a manner perpendicular thereto and in the direction opposite said side wall; said lug and said rod being sized such that, when said channel of the cable-holder component and said straight segment of the cable channel are

10 coupled to one another, said lug is inserted into the hollow inner space of the outer guide through the open end of said outer guide, and said rod goes through the continuous opening of the outer guide. The cable-holder component is associated with a tightening part which is assembled at one end of the rod protruding from the open wall of the outer guide, said tightening part cooperating with said rod such that it can be manually actuated to be moved to

15 a position closer to the side wall, which is maintained by the cooperation of said tightening part with said rod, said tightening part being supported with pressure on the open wall of the outer guide, thereby locking the lug in said outer guide. Preferably, the cable-holder component is made of a polymer material. Preferably, the tightening part is also made of a polymer material.

20 The cable-holder component can be, for example, an elbow, a T-shaped branch, a cable guide for changing height, a widening or narrowing segment, a receiver for the entry of cables into a device, etc. Generally, the cable-holder component can be any component of a cable channel system having a channel with a U-shaped section corresponding to that of the straight segment of a cable channel for coupling with same at its end so as to form a continuous channel. The

25 tightening part can be previously assembled on the rod or can be a part that is supplied separately. Preferably, the tightening part is previously assembled on the rod.

As a result of the coupling being performed without the interposition of a third part, the assembly is simpler and easier to manage both for the end user and for the manufacture and

30 distributors. The incorporation of the lug and the rod on the outer face of the side walls of the channel of the cable-holder component requires modifying the latter, but this modification is performed only at one end and in the outer part, such that it does not alter the functionality of cable-holder system, and is furthermore easy to perform and inexpensive. As will be seen below in the detailed description of several embodiments, this solution allows the coupling to

35 be performed easily, with a single maneuver and by only handling the cable-holder component

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and the cable channel. Furthermore, it allows the coupling to be locked easily by manually actuating the tightening part after having performed the coupling, and obtaining a robust locking. Advantageously, providing an assembly of an outer guide and a lug and rod on each of the side walls is sufficient to obtain this robust locking, and there is no need to provide any locking system on the bottom wall.

The rod and the tightening part can have various configurations. For example, solutions in which the rod and the tightening part form a bayonet-type assembly, such that the user has to rotate the tightening part, for example, one quarter of a turn in order to bring it to the correct tightening position, are possible. Other solutions in which the tightening part is a composite part are also possible. For example, it can be envisaged that the tightening part comprises a cam and lever mechanism, such that the user has to actuate the lever to obtain the correct tightening position. In some embodiments, the rod is a threaded rod and the tightening part is a nut that is screwed onto said rod and comprises a grip, so that the user can grab the tightening part with his/her hand and rotate it, and a support base to be supported on the open wall of the outer guide. This solution is simple and allows robust locking to be performed. In an advantageous solution, the nut has a through hole having at least one threaded band provided with an inner thread, and at least one non-threaded band, extending along the entire length of said through hole in the axial direction thereof; and the rod has at least one threaded band provided with an outer thread constituting the threading, and at least one non-threaded band. The threaded and non-threaded bands of the through hole of the nut and of the threaded rod are complementary to one another such that, in a first angular position of said nut with respect to said threaded rod, said threaded band of the threaded rod and said threaded band of the through hole of the nut are completely facing said non-threaded band of the through hole of the nut and said non-threaded band of the threaded rod, respectively, and coupling of the outer thread of the threaded rod with the inner thread of the through hole of the nut does not take place and said nut can be freely moved in the axial direction of said threaded rod; and in a second angular position of said nut with respect to said threaded rod, said threaded band of the threaded rod is at least partially facing said threaded band of the through hole of the nut and coupling of the outer thread of the threaded rod with the inner thread of the through hole of the nut takes place to prevent the free movement of said nut in the axial direction of said threaded rod. This configuration with a threaded rod and a through hole is as described in document ES1299216U, with the difference that, in this case, the through hole with threaded bands and non-threaded bands is located in a nut constituting the tightening part. To lock the coupling, the user places the nut in the first angular position, manually moves said nut freely

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in the axial direction until its support base is supported on the open wall of the outer guide, pushes said nut a little more so that it exerts the desired pressure on said open wall, and then rotates said nut slightly, in any case less than one turn, in order to transition to the second angular position and thereby couple the inner thread thereof with the thread of the threaded  
5 rod. This coupling of the two threads fixes the position of the nut with respect to the threaded rod in the axial direction. This method allows the coupling to be locked very quickly and with few movements of only one hand.

Various solutions to obtain a robust coupling between the channel of the cable-holder  
10 component and the straight segment of the cable channel are possible. In particular, it can be envisaged that the channel of the cable-holder component has its own added elements that fit with the straight segment of the cable channel. In the preferred embodiments, the channel of the cable-holder component comprises an outer edge, formed on an outer face of at least one of the side walls and the bottom wall of said channel, and a continuous perimeter lip which is  
15 formed by the bottom wall and the side walls of said channel and extends between the open end of said channel and said outer edge, said outer edge and said perimeter lip being sized such that, when said channel is coupled to the straight segment of the cable channel, said open end of the straight segment of the cable channel is supported such that it abuts with said outer edge and said perimeter lip is inserted into said straight segment of the cable channel  
20 and tightly supported on the bottom wall and the side walls of said straight segment. This solution provides a coupling that is resistant to bending stresses on the side walls and the bottom wall. Furthermore, since the perimeter lip extends outwardly in the length direction of the channel, it only interferes with the inside of the straight segment of the cable channel, but not with the inside of the cable-holder component.

25 Preferably, the outer edge is formed continuously on an outer face of the two side walls and of the bottom wall of the channel. A more robust coupling is thus obtained.

Preferably, the thickness of the perimeter lip gradually decreases towards the open end of the  
30 channel, thereby providing a smooth transition on the inner face of the side walls and the bottom wall so as not to damage the cables.

Preferably, the lug is connected in a widening of the outer edge. This widening is a simple, discontinuity-free geometric solution for the placement of the lug, and provides a good support  
35 for the end of the outer guide, which increases the robustness of the coupling.

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In some preferred embodiments, the free upper end of each side wall of the straight segment of the cable channel forms a tubular edge projecting outwardly from this side wall; and the free upper end of each side wall of the channel forms a support surface projecting outwardly from this side wall, such that the end of said tubular edge is supported on said support surface when said channel is coupled to said straight segment of the cable channel. This solution also increases the robustness of the coupling through the support of the tubular edge on the support surface. The tubular edge which is usually arranged at the upper end of the cable channels and serves other functions is advantageously used, particularly for fixing covers or other elements to the cable channel.

Preferably, the support surface for the tubular edge is a prolongation of the widening of the edge in which the lug is connected. This prolongation is a simple, discontinuity-free geometric solution.

Preferably, the support surface comprises a recess extending from the perimeter of said support surface such that, when the channel is coupled to the straight segment of the cable channel, said recess forms between said support surface and the end of the tubular edge a gap to receive the head of a flat screwdriver, for the purpose of making uncoupling easier, particularly in the embodiments provided with the perimeter lip, in which the coupling is strong due to the friction force between the perimeter lip and the walls of the straight segment of the channel.

In some preferred embodiments, the free upper end of each side wall of the channel forms an edge projecting outwardly from this side wall and having the same outer shape as the tubular edge, prolonging said tubular edge when said channel is coupled to the straight segment of the cable channel. This prolongation of the tubular edge provides a continuity of the free upper ends of the side walls which facilitates the integration of the assembly with other elements, particularly for fixing covers or other elements to the assembly. Preferably, the edge has a recessed segment in the channel and the cable-holder component comprises a bridge having at its ends claws with a shape complementary to the shape of said recessed segment of the edge, such that said claws removably snap-fit with said recessed segment of the edge, and said bridge closes a segment of the open upper face of the channel. This solution allows optionally placing the bridge to confine the cables laid in the channel, without altering the geometry of the cable-holder component. It also allows placing a cover over the bridge.

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Preferably, the bridge is formed such that, when it is snap-fitted to the recessed segment of the edge through the claws, closing a segment of the open upper face of the channel, said bridge does not protrude from said open upper face of the channel. This solution has the advantage of the bridge not altering the height of the channel of the cable-holder accessory.

The invention also comprises the cable-holder component which is part of the assembly described above, considered individually. Therefore, the invention comprises a cable-holder component that can be coupled to a cable channel, said cable-holder component comprising at least one channel having a U-shaped section, with a bottom wall, two opposing side walls, an open upper face, and an open end; characterized in that it comprises in said channel, on the outer face of each of its side walls, a lug extending in cantilever fashion towards the open end of said channel, arranged facing said side wall and at a distance therefrom, and said lug is integral with a rod extending from said lug in a manner perpendicular thereto and in the direction opposite said side wall; said cable-holder component being associated with a tightening part which is assembled at one end of said rod, said tightening part cooperating with said rod such that it can be manually actuated to be moved to a position closer to said side wall, which is maintained by the cooperation of said tightening part with said rod. Preferably, the cable-holder component is made of a polymer material.

Preferably, the rod is a threaded rod and the tightening part is a nut that is screwed onto said rod and comprises a grip and a support base.

Preferably, the channel of the cable-holder component comprises an outer edge, formed on an outer face of at least the side walls of said channel, and a continuous perimeter lip which is formed by the bottom wall and the side walls of said channel and extends between the open end of said channel and said outer edge.

Preferably, the outer edge is formed continuously on an outer face of the two side walls and of the bottom wall of the channel.

Preferably, the thickness of the perimeter lip gradually decreases towards the open end of the channel.

Preferably, the lug is connected in a widening of the outer edge.

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Preferably, the free upper end of each side wall of the channel forms a support surface projecting outwardly from this side wall.

5 Preferably, the support surface is a prolongation of the widening.

Preferably, the support surface comprises a recess extending from the perimeter of the support surface and is suitable to receive the head of a flat screwdriver.

10 Preferably, the free upper end of each side wall of the channel forms an edge projecting outwardly from this side wall and having in the channel a recessed segment; and the cable-holder component comprises a bridge having at its ends claws with a shape complementary to the shape of said recessed segment of the edge, such that said claws removably snap-fit with said recessed segment of the edge, and said bridge closes a segment of the open upper  
15 face of said channel.

Preferably, the bridge is formed such that, when it is snap-fitted to said recessed segment of the edge through said claws, closing a segment of the open upper face of the channel, said bridge does not protrude from the open upper face of said channel.

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The invention also comprises other detailed features shown in the following detailed description of an embodiment of the invention and in the attached figures.

#### Brief Description of the Drawings

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The advantages and features of the invention are apparent from the following description in which preferred embodiments of the invention are described in a non-limiting manner with respect to the scope of the main claim in reference to the figures.

30 Figure 1 is a perspective view of a cable-holder assembly formed by two cable channels and a cable-holder component, in an uncoupled position.

Figures 2 and 3 are, respectively, a front view and a perspective view of the cable channel.

35 Figures 4, 5, 6 and 7 are, respectively, a front perspective view, a top view, a rear perspective

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view, and a bottom perspective view of the cable-holder component.

Figure 8 is an enlarged partial top view of the channel at one of the ends of the cable-holder component, with the tightening parts assembled on the rods.

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Figure 9 is a view similar to Figure 8, without the tightening parts.

Figure 10 is an enlarged partial perspective view of one side of the open end of the channel, with the tightening parts assembled on the rods.

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Figure 11 is a view similar to Figure 10, without the tightening parts.

Figure 12 is a front perspective view of the cable-holder component coupled to one of the cable channels.

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Figure 13 is a front perspective view of the cable-holder component coupled to two cable channels.

Figure 14 is a rear perspective view of the cable-holder component coupled to two cable channels.

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Figure 15 is an enlarged partial perspective view of the cable-holder component coupled to two cable channels, showing the area of the coupling areas on one of the sides, with the tightening parts assembled on the rods.

25

Figure 16 is a view similar to Figure 15, without the tightening parts.

Figures 17 and 18 are, respectively, a front perspective view and a rear perspective view of the tightening part.

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Figure 19 is a partial front perspective view, showing the cable-holder component and the two cable channels coupled thereto, with the bridges before being placed and snap-fitted.

Figure 20 is a view similar to Figure 19, with the bridges snap-fitted.

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Detailed Description of Embodiments of the Invention

The cable channel assembly which is described below by way of example is applied mainly for guiding bundles of fiber optic cables in data centers. It is formed by two cable channels 1 and a cable-holder component 12. The cable channels 1 are made of a polymer material such as, for example, PVC (polyvinyl chloride) or ABS (acrylonitrile butadiene styrene). In the example depicted in the figures, the two cable channels 1 have identical section and can have different lengths. As can be seen in Figures 1 to 3, each cable channel 1 is a straight profile segment having a U-shaped section, with a bottom wall 2, two opposing side walls 3, an open upper face 4 and two open ends 5. The free upper end of each side wall 3 forms an outwardly projecting tubular edge 26. There is formed on an outer face 6 of each of the side walls 3, along the entire cable channel 1, an outer guide 7 protruding from the outer face 6 of the side wall 3 and extending in the longitudinal direction of the cable channel 1. This outer guide 7 is in the form of a profile with a hollow inner space 8 and an open wall 9 opposite the outer face 6 comprising a continuous opening 11 along the length of the outer guide 7. The two ends of the outer guide 7 in the longitudinal direction are open ends 10.

Other embodiments of the invention in which the cable channels are not a straight U-shaped profile segment are possible. For example, at least one of the cable channels can be an elbow or a T-shaped branch, with a final segment with a U-shaped section described above. Moreover, the number of cable channels in the assembly can be other than two, depending on the nature of the cable-holder component.

The cable-holder accessory 12 described in this example is a 90° elbow for joining the two cable channels 1. This cable-holder accessory 12 in the form of an elbow is intercalated between two cable channels 1 in order to couple them through their open ends 5. As can be seen in Figures 4 to 11, each of the two ends of the cable-holder component 12 forms a channel 13 having a U-shaped section corresponding to the U-shaped section of the cable channel 1, with a bottom wall 14, two opposing side walls 15, an open upper face 16, and an open end 17. There is formed on the outer face of each of the two side walls 15 of each channel 13 a lug 18 extending in cantilever fashion towards the open end 17, arranged facing the side wall 15 and at a distance therefrom. A threaded rod 19, formed from a single part with the lug 18, extends from said lug 18 in a manner perpendicular thereto and in a direction opposite the side wall 15. The rod 19 has a diameter that is smaller than the width of the continuous opening 11 of the outer guide 7, such that it can go through same. There is also formed on the outer

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face of each of the two side walls 15 and of the bottom wall 14 of each channel 13 a continuous outer edge 23 comprising, in the side wall 15, a widening 25 in which the lug 18 is connected. Each channel 13 comprises a continuous perimeter lip 24 which is formed by the bottom wall 14 and the side walls 15 of the channel 13 and extends between the open end 17 and the

5 outer edge 23. The thickness of the perimeter lip 24 gradually decreases towards the open end 17. In each channel 13, the free upper end of each side wall 15 forms a support surface 27 for the end of the tubular edge 26 of the cable channel 1. The support surface 27 is a prolongation of the widening 25 projecting outwardly from the side wall 15 and comprising a recess 28 extending from the perimeter of said support surface 27. The recess 28 is formed

10 such that it is suitable to receive the head of a flat screwdriver. In each channel, each side wall 15 forms an edge 29 projecting outwardly from this side wall 15 and having the same outer shape as the tubular edge 26 of the cable channel. In each channel 13, the edge 29 has a recessed segment 30.

15 As can also be seen in Figures 4 to 11, the cable-holder component 12 is associated with a tightening part 20 which is assembled at one end of the rod 19 and cooperates with said rod 19 such that it can be manually actuated to be moved to a position closer to the side wall 15, which is maintained by the cooperation of said tightening part 20 with said rod 19. More specifically, as shown in greater detail in Figures 17 and 18, in the depicted example the

20 tightening part 20 is a nut that is screwed onto the threaded rod 19 and comprises a grip 21 and a support base 22. The grip 21, which is a cylindrical body with three radial flanges in this example, allows the user to grab the tightening part 20 with two fingers to rotate it and screw or unscrew it with respect to the rod 19. The support base 22 is a circular radial projection with a diameter that is greater than the width of the continuous opening 11 of the outer guide 7.

25 As shown in Figures 19 and 20, the cable-holder component 12 further comprises a bridge 31 for each channel 13. The bridge 31 has at its ends claws 32 with a shape complementary to the shape of the recessed segment 30 of the edge 29. The claws 32 removably snap-fit with the recessed segments 30. When it is snap-fitted to the recessed segments 30 through the

30 claws 32, the bridge 31 closes a segment of the open upper face 16 of the channel 13, without protruding from said open upper face 16. More specifically, the bridge 31 has a flat upper surface that is level with the edge 29 and the tubular edge 26.

The cable-holder component 12 is a one-piece component made of a polymer material such

35 as, for example, PVC or ABS. The tightening part 20 is also made of a polymer material such

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as, for example, PVC or ABS.

Other embodiments of the cable-holder accessory such as, for example, a T-shaped branch, a cable guide to cause a change in height, a widening or narrowing segment, a receiver for  
5 the entry of cables into a device, etc., are possible.

As can be seen in Figures 12 to 16, when each channel 13 of the cable-holder component 12 and each cable channel 1 are coupled to one another, the open end 17 of the channel 13 is coupled to the open end 5 of the cable channel 1 directly without the interposition of a third  
10 element, such that the channel 13 and the cable channel 1 forms a continuous channel. The open end 5 of the cable channel 1 is supported such that it abuts with the outer edge 23 and the perimeter lip 24 is inserted into the cable channel 1 and tightly supported on the bottom wall 2 and the side walls 3. The lug 18 is inserted into the hollow inner space 8 of the outer guide 7 through its open end 10, and the rod 19 goes through the continuous opening 11 such  
15 that the end of said rod 19 projects from the open wall 9. The end of the tubular edge 26 is supported on the support surface 27, and the recess 28 forms, between said support surface 27 and the end of said tubular edge 26, a gap to receive the head of a flat screwdriver. The edge 29 prolongs the tubular edge 26.

20 The coupling of each cable channel 1 to the cable-holder accessory 12 is preferably performed with the tightening part 20 previously assembled on the rod 19, being unscrewed sufficiently so that the open wall 9 of the outer guide 7 passes between the lug 18 and the support base 22 of said tightening part 20. The coupling can be performed by means of a translation of the cable channel 1, previously aligned with the channel 13, in the longitudinal direction.  
25 Advantageously, the invention allows using a more user-friendly alternative coupling method which consists of first inserting the end of the perimeter lip 24 into the cable channel 1, keeping the cable channel 1 slightly inclined with respect to the channel 13, and then rotating the cable-holder component 12 to reach the final coupling position. During this rotation, the perimeter lip 24 remains fitted advantageously between the bottom wall 2 and the side walls 3 of the cable  
30 channel 1, whereby the lug 18 is aligned with the open end 10 of the outer guide 7, and the lug 18 and the rod 19 are gradually inserted into the inner space 8 and through the opening 11, respectively.

To lock the coupling, the user manually actuates the tightening part 20 to rotate it, screwing it  
35 onto the rod 19, whereby the tightening part 20 is moved towards the side wall 15 and is

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supported by pressure, through its support base 22, on the open wall 9 of the outer guide 7, thereby locking the lug 18 in said outer guide 7. To unlock the coupling, the user rotates the tightening part 20 in the opposite direction to unscrew it. To perform uncoupling, the user can advantageously perform the rotational movement described above in the opposite direction.

- 5 To start the uncoupling, the tip of a flat screwdriver can be inserted into the gap formed by the recess 28 and a levering movement can be performed with the screwdriver.

In an alternative embodiment not shown in the figures, the rod 19 has two threaded bands, one opposite the other, and two non-threaded bands, one opposite the other. The two threaded  
10 bands are provided with an outer thread, constituting the threading of the rod 19. The two non-threaded bands are flat faces in planes parallel to one another and parallel to the axis of the rod. The tightening part 20 is a nut with a through hole having two threaded bands, one opposite the other, and two non-threaded bands, one opposite the other. Each of these threaded bands of the through hole of the nut is provided with the inner thread. The non-  
15 threaded bands of the through hole of the nut extend along the entire length of the through hole in its axial direction. The threaded and non-threaded bands of the through hole and of the rod are complementary to one another in two angular positions of the nut with respect to the rod. In a first angular position of the nut, the threaded bands of the rod and the threaded bands of the through hole of the nut are all facing the non-threaded bands of the through hole of the  
20 nut and the non-threaded bands of the rod, respectively. In this first angular position, coupling of the outer thread of the rod with the inner thread of the through hole of the nut does not take place, whereby the nut can be moved freely towards the open wall 9 of the outer guide 7 in the axial direction. In a second angular position of the nut with respect to the rod, the threaded bands of the rod are at least partially facing the threaded bands of the through hole of the nut.  
25 In this second angular position, coupling of the outer thread of the rod with the inner thread of the through hole of the nut takes place. This coupling between the two threads prevents the free movement of the rod in the axial direction. This configuration with a threaded rod and a through hole is as described in document ES1299216U, with the difference that, in this case, the through hole with threaded bands and non-threaded bands is located in a nut constituting  
30 the tightening part.

CLAIMS

1. A cable channel assembly, comprising:

- 5 - at least one cable channel (1) made of a polymer material, comprising a straight segment with a U-shaped section, with a bottom wall (2), two opposing side walls (3), an open upper face (4) and an open end (5); with there being formed on an outer face (6) of each of said side walls (3), at least in said straight segment, an outer guide (7) protruding from said outer face (6) of the side wall (3) and extending in the longitudinal direction of said straight segment, said  
10 outer guide (7) being in the form of a profile with a hollow inner space (8), an open wall (9) opposite said outer face (6) of the side wall (3) and an open end (10), said open wall (9) comprising a continuous opening (11) along said outer guide (7); and
- a cable-holder component (12) that can be coupled to said cable channel (1), said cable-holder component (12) comprising at least one channel (13) having a U-shaped section  
15 corresponding to that of said straight segment of the cable channel (1), with a bottom wall (14), two opposing side walls (15), an open upper face (16), and an open end (17); such that said channel (13) of the cable-holder component (12) and said straight segment of the cable channel (1) are coupled to one another through their respective open ends (17, 5), forming a continuous channel;
- 20 characterized in that said channel (13) of the cable-holder component (12) and said straight segment of the cable channel (1) are coupled to one another through their respective open ends (17, 5) directly, without the interposition of a third element; and in that said cable-holder component (12) comprises in said channel (13), on the outer face of each of its side walls (15), a lug (18) extending in cantilever fashion towards its open end (17), arranged facing said side  
25 wall (15) and at a distance therefrom, and said lug (18) is integral with a rod (19) extending from said lug (18) in a manner perpendicular thereto and in the direction opposite said side wall (15); said lug (18) and said rod (19) being sized such that, when said channel (13) of the cable-holder component (12) and said straight segment of the cable channel (1) are coupled to one another, said lug (18) is inserted into said hollow inner space (8) of the outer guide (7)  
30 through the open end (10) of said outer guide (7), and said rod (19) goes through said continuous opening (11); said cable channel assembly comprising a tightening part (20) which is assembled at one end of said rod (19) protruding from said open wall (9), said tightening part (20) cooperating with said rod (19) such that it can be manually actuated to be moved to a position closer to said side wall (15), which is maintained by the cooperation of said tightening  
35 part (20) with said rod (19), said tightening part (20) being supported with pressure on said

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open wall (9), thereby locking said lug (18) in said outer guide (7);

wherein said channel (13) of the cable-holder component (12) comprises an outer edge (23), formed on an outer face of at least one of the side walls (15) and the bottom wall (14) of said channel (13), and a continuous perimeter lip (24) which is formed by said bottom wall (14) and  
5 said side walls (15) of the channel (13) and extends between said open end (17) of the channel (13) and said outer edge (23), said outer edge (23) and said perimeter lip (24) being sized such that, when said channel (13) is coupled to said straight segment of the cable channel (1), said open end (5) of the straight segment of the cable channel (1) is supported such that it abuts with said outer edge (23) and said perimeter lip (24) is inserted into said  
10 straight segment of the cable channel (1) and tightly supported on the bottom wall (2) and the side walls (3) of said straight segment; and wherein said lug (18) is connected in a widening (25) of said outer edge (23).

2. The cable channel assembly according to claim 1, characterized in that said rod (19) is a  
15 threaded rod and said tightening part (20) is a nut that is screwed onto said rod (19) and comprises a grip (21) and a support base (22) to be supported on said open wall (9) of the outer guide (7).

3. The cable channel assembly according to claim 1, characterized in that said outer edge (23)  
20 is formed continuously on an outer face of the two side walls (15) and of the bottom wall (14) of said channel (13).

4. The cable channel assembly according to any one of claims 1 to 3, characterized in that the  
25 thickness of said perimeter lip (24) gradually decreases towards said open end (17) of the channel (13).

5. The cable channel assembly according to any one of claims 1 to 4, characterized in that the  
free upper end of each side wall (3) of said straight segment of the cable channel (1) forms a  
tubular edge (26) projecting outwardly from this side wall (3); and the free upper end of each  
30 side wall (15) of said channel (13) forms a support surface (27) projecting outwardly from this side wall (15), such that the end of said tubular edge (26) is supported on said support surface (27) when said channel (13) is coupled to said straight segment of the cable channel (1).

35 6. The cable channel assembly according to claim 5, characterized in that said support

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surface (27) is a prolongation of said widening (25).

7. The cable channel assembly according to any one of claims 5 or 6, characterized in that said support surface (27) comprises a recess (28) extending from the perimeter of said support surface (27) such that, when said channel (13) is coupled to said straight segment of the cable channel (1), said recess (28) forms between said support surface (27) and the end of said tubular edge (26) a gap to receive the head of a flat screwdriver.

8. The cable channel assembly according to any one of claims 5 to 7, characterized in that the free upper end of each side wall (15) of said channel (13) forms an edge (29) projecting outwardly from this side wall (15) and having the same outer shape as said tubular edge (26), prolonging said tubular edge (26) when said channel (13) is coupled to said straight segment of the cable channel (1), and said edge (29) has in said channel (13) a recessed segment (30); and in that said cable-holder component (12) comprises a bridge (31) having at its ends claws (32) with a shape complementary to the shape of said recessed segment (30) of the edge (29), such that said claws (32) removably snap-fit with said recessed segment (30) of the edge (29), and said bridge (31) closes a segment of the open upper face (16) of the channel (13).

9. The cable channel assembly according to claim 8, characterized in that said bridge (31) is formed such that, when it is snap-fitted to said recessed segment (30) of the edge (29) through said claws (32), closing a segment of the open upper face (16) of the channel (13), said bridge (31) does not protrude from said open upper face (16) of the channel (13).

25