



(51) International Patent Classification:
G02B 6/44 (2006.01)

(21) International Application Number:
PCT/IB2011/051484

(22) International Filing Date:
6 April 2011 (06.04.2011)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:
201010153048.8 16 April 2010 (16.04.2010) CN

(71) Applicant (for all designated States except US): **TYCO ELECTRONICS (SHANGHAI) CO. LTD.** [CN/CN];
Level 1, No. 142 He Dan Road Waigaoqiao, Free Trade Zone, Shanghai 200233 (CN).

(71) Applicant (for MG only): **TYCO ELECTRONICS UK LTD** [GB/GB]; Faraday Road Dorcan, Swindon Wiltshire SN3 5HH (GB).

(72) Inventor; and

(75) Inventor/Applicant (for US only): **ZHANG, Lujun** [CN/CN]; c/o Tyco Electronics (Shanghai) Co. Ltd., Level 1, No. 142 He Dan Road Waigaoqiao, Free Trade Zone, Shanghai, 200233 (CN).

(74) Agents: **HEINZ-SCHAEFER, Marion** et al.; c/o Tyco Electronics UK Ltd, European Patent Department, Faraday Road Dorcan, Swindon Wiltshire SN3 5HH (GB).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM, AO, AT, AU, AZ, BA, BB, BG, BH, BR, BW, BY, BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM, DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT, HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP, KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD, ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI, NO, NZ, OM, PE, PG, PH, PL, PT, RO, RS, RU, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LR, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV, MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Declarations under Rule 4.17:

— as to applicant's entitlement to apply for and be granted a patent (Rule 4.17(ii))

[Continued on next page]

(54) Title: OPTICAL FIBER CABLE JUNCTION BOX

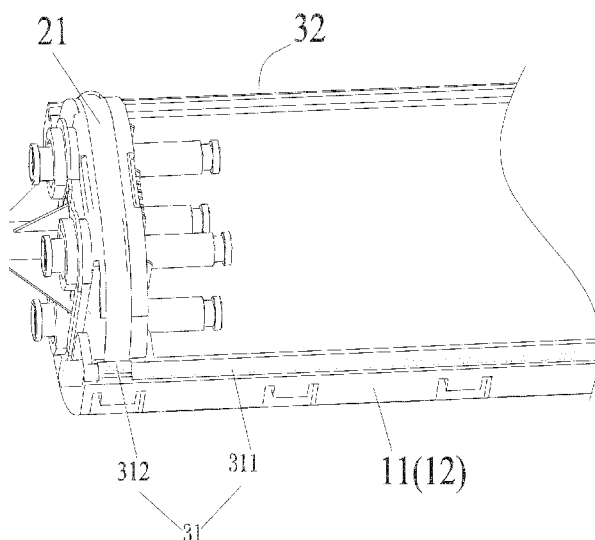


Fig. 2

(57) Abstract: The present invention discloses an optical fiber cable junction box, comprising: a housing consisting of a first housing and a second housing mated with each other; a pair of end seal blocks for sealing two end ports of the housing; and a pair of edge seal bars for sealing two edges extending in the length direction of the optical fiber cable junction box as the first housing is mated with the second housing. A first gel layer is formed on a circumference of each of the pair of end seal blocks by injection molding. The pair of edge seal bars each comprises a rubber bar and a second gel layer. The second gel layer is formed on at least a portion of the rubber bar by injection molding to be tightly mated with the first gel layer of the end seal block. In the present invention, since the first and second gel layers both are very soft and have good elasticity, the sealing performance between the end seal block and the edge seal bar is greatly improved as the first and second housings are closed together.



Published:

— with international search report (Art. 21(3))

— before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))

OPTICAL FIBER CABLE JUNCTION BOX

CROSS-REFERENCE TO RELATED APPLICATION

This application claims the benefit of Chinese Patent Application No. 201010153048.8 filed on April 16, 2010 in the State Intellectual Property Office of China, the whole disclosure of which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

Field of the Invention

The present invention relates to an optical fiber cable junction box, more particularly, relates to an optical fiber cable junction box with high water-tightness or air-tightness.

Description of the Related Art

A conventional optical fiber cable junction box generally consists of an upper cover and a lower cover that can be closed together to constitute a whole box. In the conventional optical fiber cable junction box, two rubber blocks are disposed at two end ports of the housing to seal the two end ports, respectively; and two rubber bars are respectively disposed at two edges extending in the length direction of the optical fiber cable junction box to seal the box as the upper and lower covers are mated with each other. When the upper and lower half covers are closed together, the two rubber blocks at two end ports and the two rubber bars at two engaging edges are compressed by the upper and lower covers, and ends of the two rubber bars are pressed against the circumferences of the two rubber blocks. In this way, the conventional optical fiber cable junction box may be of water-tightness or air-tightness.

However, because the rubber block and the rubber bar both are relative hard and have poor elasticity, the sealing performance between the rubber block and the rubber bar of the

- 2 -

conventional optical fiber cable junction box is not desirable. Moreover, the rubber block and the rubber bar of the conventional optical fiber cable junction box can not be reused.

Considering above disadvantages of the conventional optical fiber cable junction box, it needs to develop a new optical fiber cable junction box capable of overcoming or alleviating at least one aspect of the above mentioned disadvantages.

SUMMARY OF THE INVENTION

The present invention has been made to overcome or alleviate at least one aspect of the above mentioned disadvantages.

Accordingly, it is an object of the present invention to provide an optical fiber cable junction box which can effectively improve the water-tightness and the air-tightness.

Accordingly, it is another object of the present invention to provide an optical fiber cable junction box with reusable end seal blocks and reusable edge seal bars.

According to an aspect of the present invention, there is provided an optical fiber cable junction box, comprising: a housing consisting of a first housing and a second housing mated with each other; a pair of end seal blocks for sealing two end ports of the housing; and a pair of edge seal bars for sealing two edges extending in the length direction of the optical fiber cable junction box as the first housing is mated with the second housing. A first gel layer is formed on at least part of the circumference of each of the pair of end seal blocks by injection molding. The pair of edge seal bars each comprises a rubber bar and a second gel layer. The second gel layer is formed on at least a portion of the rubber bar by injection molding to be tightly mated with the first gel layer of the end seal block.

In an exemplary embodiment according to the present invention, the second gel layer is formed only on the bond portion of each end of the rubber bar mating with the end seal block.

- 3 -

In another exemplary embodiment according to the present invention, at least one protrusion rib is formed on the bond portion of the rubber bar to be coated with the second gel layer

In another exemplary embodiment according to the present invention, the protrusion rib surrounds the bond portion of the rubber bar in a ring shape.

In another exemplary embodiment according to the present invention, at least one through hole is formed in the bond portion of the rubber bar to be bonded with the second gel layer coated on the bond portion.

In another exemplary embodiment according to the present invention, the bond portion of the rubber bar is a depressed part that is lower than other parts of the rubber bar.

In another exemplary embodiment according to the present invention, a longitudinal groove is formed in each mating edge of the first and second housings, when the first housing and the second housing are closed together, the pair of edge seal bars are embedded in longitudinal grooves of the first and second housings, respectively.

In another exemplary embodiment according to the present invention, a ring socket is formed in each end portion of the first and second housings, when the first housing and the second housing are closed together, the pair of end seal blocks are embedded in ring sockets of the first and second housings, respectively.

In another exemplary embodiment according to the present invention, the first and second housings are substantially symmetrical with each other, and a latch is formed on the first and second housings to lock them together.

In another exemplary embodiment according to the present invention, the first and second gel layers both are made of a reusable gel material.

In various exemplary embodiments of the present invention, the circumference of each of the pair of end seal blocks is formed with the first gel layer, and the edge seal bars each is formed with the second gel layer to be bonded with the first gel layer of the end seal block.

- 4 -

Since the first and second gel layers both are very soft and have good elasticity, the sealing performance between the end seal block and the edge seal bar of the present invention is greatly improved as the first and second housings are closed together.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig.1 is an illustrative view of an optical fiber cable junction box according to an exemplary embodiment of the present invention;

Fig.2 is a local enlarged view of the optical fiber cable junction box shown in Fig.1;

Fig.3 shows an edge seal bar according to an exemplary embodiment of the present invention; and

Fig.4 is a local enlarged view of the edge seal bar shown in Fig.3.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

Exemplary embodiments of the present disclosure will be described hereinafter in detail with reference to the attached drawings, wherein the like reference numerals refer to the like elements. The present disclosure may, however, be embodied in many different forms and should not be construed as being limited to the embodiment set forth herein; rather, these embodiments are provided so that the present disclosure will be thorough and complete, and will fully convey the concept of the disclosure to those skilled in the art.

Fig.1 is an illustrative view of an optical fiber cable junction box according to an exemplary embodiment of the present invention; and Fig.2 is a local enlarged view of the optical fiber cable junction box shown in Fig.1.

As shown in Fig.1 and Fig.2, in one exemplary embodiment of the present invention, the optical fiber cable junction box mainly comprises a first and a second housings 11, 12, a pair

- 5 -

of end seal blocks 21, 22, and a pair of edge seal bars 31, 32.

Referring to Figs.1-2, the first housing 11 and the second housing 12 can be closed together to form a whole housing. In one exemplary embodiment of the present invention, the first housing 11 and the second housing 12 are substantially symmetrical with each other, and a latch is formed on the first and second housings 11, 12 to lock them together. But the present invention is not limited to this, the first housing and the second housing may be not symmetrical with each other as soon as they can be mated together to form a whole housing defining a chamber therein.

As shown in Figs.1-2, in one exemplary embodiment of the present invention, the pair of end seal blocks 21, 22 are respectively disposed in two end ports of the housing, for sealing the two end ports of the housing.

Referring to Figs.1-2 again, in one exemplary embodiment of the present invention, the pair of edge seal bars 31, 32 are disposed in two edges extending in the length direction of the optical fiber cable junction box as the first housing 11 is mated with the second housing 12, for sealing the two edges between the first and second housings 11, 12. With this configuration, when the first housing 11 is tightly mated with the second housing 12, the end seal blocks 21, 22 and the edge seal bars 31, 32 are pressed by the housing, and become in contact with each other to further reliably seal the whole housing of the optical fiber cable junction box.

Although it is not shown, in one exemplary embodiment of the present invention, each of the end seal blocks 21, 22 may mainly comprises a rubber block and a first gel layer formed on a circumference of the rubber block, for example, by injection molding.

Fig.3 shows a edge seal bar according to an exemplary embodiment of the present invention; and Fig.4 is a local enlarged view of the edge seal bar shown in Fig.3.

As shown in Fig.3 and Fig.4, in one exemplary embodiment of the present invention, each of

- 6 -

the edge seal bars 31, 32 mainly comprises a rubber bar 311, 321 and a second gel layer 312, 322 formed on at least a portion of the rubber bar 311, 321 to be tightly mated with the first gel layer of the end seal block 21, 22. For example, the second gel layer 312, 322 is formed on the rubber bar 311, 321 by injection molding.

Referring to Figs.3-4, in one exemplary embodiment of the present invention, the second gel layer 312, 322 is formed on only a bond portion at each end of the rubber bar 311, 321 corresponding to the end seal block 21, 22. But please be noted that the present invention is not limited to this, the second gel layer 312, 322 may be formed on the whole rubber bar 311, 321.

As shown in Figs.1-4, in the present invention, when the first and second housings 11, 12 are closed together, the pair of end seal blocks 21, 22 in the two end ports and the pair of edge seal bars 31, 32 in the two edges are compressed by the first and second housings 11, 12, and the pair of edge seal bars 31, 32 are compressed on circumferences of the pair of end seal blocks 21, 22. In this way, it achieves water-tightness or air-tightness of the optical fiber cable junction box.

Furthermore, in the present invention, the circumference of each of the pair of end seal blocks 21, 22 is formed with the first gel layer and the edge seal bars 31, 32 each is formed with the second gel layer to be bonded with the first gel layer of the end seal block 21, 22. In the present invention, because the first and second gel layers both are very soft and have good elasticity, as the first and second housings are closed together, the first gel layer of the end seal block 21, 22 can be tightly bonded with the second gel layer of the edge seal bar 31, 32. Accordingly, in the present invention, the sealing performance between the end seal block 21, 31 and the edge seal bar 31, 32 can be greatly improved.

In one exemplary embodiment of the present invention, the first and second gel layers both are made of a reusable gel material. In this way, it can protect environment, save cost and

- 7 -

material.

As shown in Fig.4, in one exemplary embodiment of the present invention, at least one protrusion rib 311a, 321a is formed on the bond portion of the rubber bar 311, 321 to be bonded with the second gel layer 312, 322 formed on the bond portion. In this way, the bonding strength between the second gel layer 312, 322 and the rubber bar 311, 321 can be increased to prevent a relative movement of the second gel layer 312, 322 and the rubber bar 311, 321.

In the exemplary embodiment shown in Fig.4, three protrusion ribs 311a, 321a are formed on the bond portion of the rubber bar 311, 321. However, please be noted that the present invention is not limited to this, there may be one, two, four or more protrusion ribs 311a, 321a formed on the bond portion of the rubber bar 311, 321.

Referring to Fig.4, in one exemplary embodiment of the present invention, the protrusion rib 311a, 321a surrounds the bond portion of the rubber bar 311, 321 in a ring shape. However, please be noted that the present invention is not limited to this, the protrusion rib 311a, 321a may be a web-shaped protrusion rib protruded outward from at least one part of the circumference of the rubber bar 311, 321.

As shown in Fig.4, in one exemplary embodiment of the present invention, at least one through hole 311b, 321b is formed in the bond portion of the rubber bar 311, 321 to be bonded with the second gel layer 312, 322 formed on the bond portion. In this way, the bonding strength between the second gel layer 312, 322 and the rubber bar 311, 321 can be further increased to prevent a relative movement of the second gel layer 312, 322 and the rubber bar 311, 321.

In the exemplary embodiment shown in Fig.4, two through holes 311b, 321b are formed in the bond portion of the rubber bar 311, 321. However, please be noted that the present invention is not limited to this, there may be one, three, four or more through holes 311b,

- 8 -

321b formed in the bond portion of the rubber bar 311, 321.

As shown in Fig.4, in one exemplary embodiment of the present invention, the bond portion of the rubber bar 311, 321 where the second gel layer 312, 322 is formed is a depressed part that is lower than other parts of the rubber bar 311, 321. In this way, the bonding strength between the second gel layer 312, 322 and the rubber bar 311, 321 can be further increased to prevent a relative movement of the second gel layer 312, 322 and the rubber bar 311, 321.

Although it is not shown, in one exemplary embodiment of the present invention, a longitudinal groove is formed in each lip of the first and second housings 11, 12. When the first housing 11 and the second housing 12 are closed together, the pair of edge seal bars 31, 32 are embedded in longitudinal grooves of the first and second housings 11, 12, respectively. In this way, it can further improve the air or water tightness between the first and second housings 11, 12.

Although it is not shown, in one exemplary embodiment of the present invention, a ring groove is formed in each end portion of the first and second housings 11, 12. When the first housing 11 and the second housing 12 are closed together, the pair of end seal blocks 21, 22 are embedded in ring grooves of the first and second housings 11, 12, respectively. In this way, it can further improve the air or water tightness between the first and second housings 11, 12.

Although several exemplary embodiments have been shown and described, it would be appreciated by those skilled in the art that various changes or modifications may be made in these embodiments without departing from the principles and spirit of the disclosure, the scope of which is defined in the claims and their equivalents.

- 9 -

What is claimed is,

1. An optical fiber cable junction box, comprising:

a housing consisting of a first housing (11) and a second housing (12) that can be mated with each other;

a pair of end seal blocks (21, 22) for sealing two end ports of the housing; and

a pair of edge seal bars (31, 32) for sealing two edges extending in the length direction of the optical fiber cable junction box as the first housing (11) is mated with the second housing (12),

wherein a first gel layer is formed on the circumference of each of the pair of end seal blocks (21, 22) by injection molding,

wherein the pair of edge seal bars (31, 32) each comprises:

a rubber bar (311, 321); and

a second gel layer (312, 322) formed on at least a portion of the rubber bar (311, 321) by injection molding to be tightly mated with the first gel layer of the end seal block (21, 22).

2. The optical fiber cable junction box according to claim 1, wherein

the second gel layer (312, 322) is formed on only a bond portion at each end of the rubber bar (311, 321) corresponding to the end seal block (21, 22).

3. The optical fiber cable junction box according to claim 2, wherein

at least one protrusion rib (311a, 321a) is formed on the bond portion of the rubber bar (311, 321) to be bonded with the second gel layer (312, 322) formed on the bond portion.

4. The optical fiber cable junction box according to claim 3, wherein

the protrusion rib (311a, 321a) surrounds the bond portion of the rubber bar (311, 321) in a

- 10 -

ring shape.

5. The optical fiber cable junction box according to claim 2 or 3, wherein at least one through hole (311b, 321b) is formed in the bond portion of the rubber bar (311, 321) to be bonded with the second gel layer (312, 322) formed on the bond portion.
6. The optical fiber cable junction box according to claim 2 or 3, wherein the bond portion of the rubber bar (311, 321) is a depressed part that is lower than other parts of the rubber bar (311, 321).
7. The optical fiber cable junction box according to claim 1, wherein a longitudinal groove is formed in each lip of the first and second housings (11, 12), when the first housing (11) and the second housing (12) are closed together, the pair of edge seal bars (31, 32) are embedded in longitudinal grooves of the first and second housings (11, 12), respectively.
8. The optical fiber cable junction box according to claim 1, wherein a ring groove is formed in each end portion of the first and second housings (11, 12), when the first housing (11) and the second housing (12) are closed together, the pair of end seal blocks (21, 22) are embedded in ring grooves of the first and second housings (11, 12), respectively.
9. The optical fiber cable junction box according to claim 1, wherein the first and second housings (11, 12) are substantially symmetrical with each other, and a latch is formed on the first and second housings (11, 12) to lock them together.

10. The optical fiber cable junction box according to claim 1, wherein the first and second gel layers both are made of a reusable gel material.

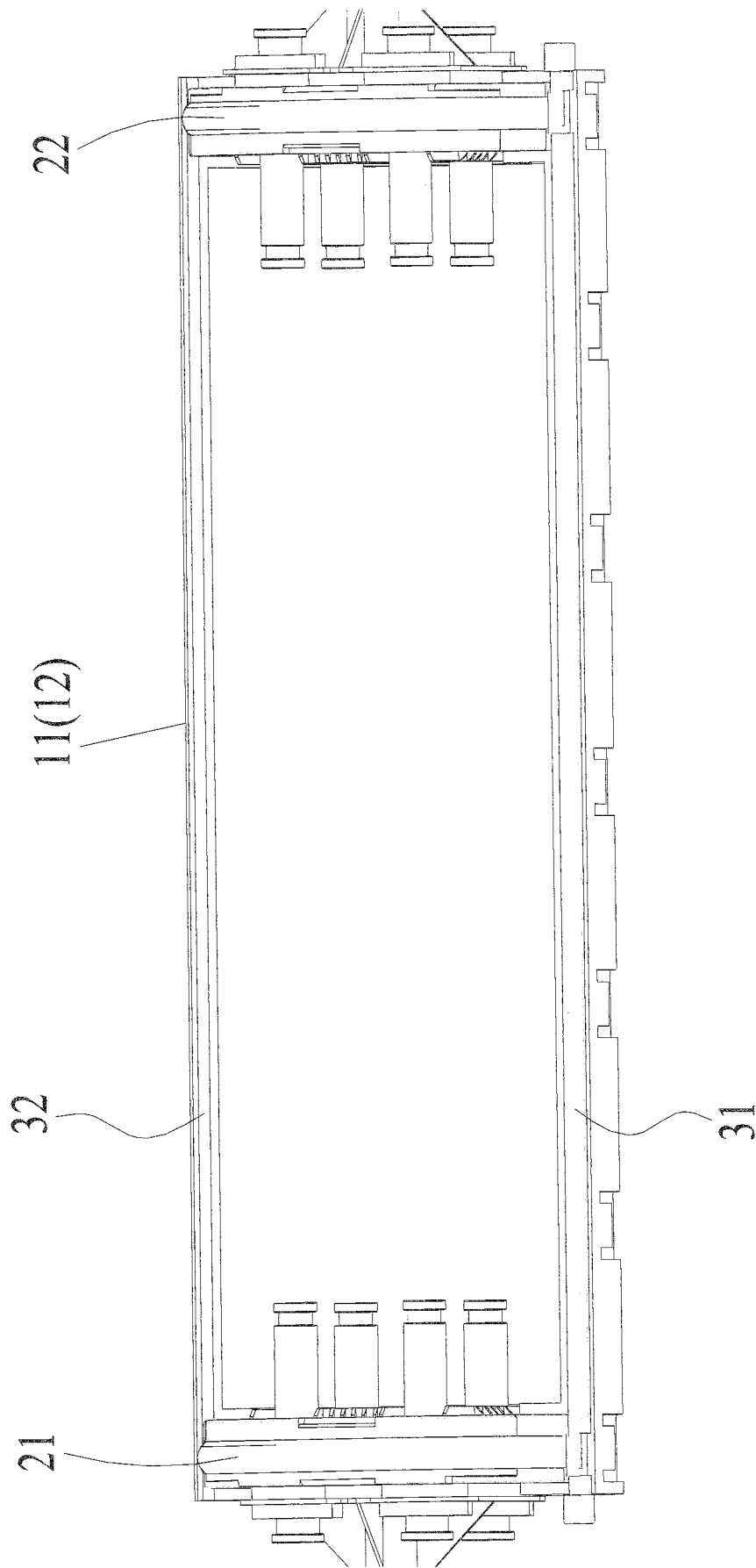


Fig. 1

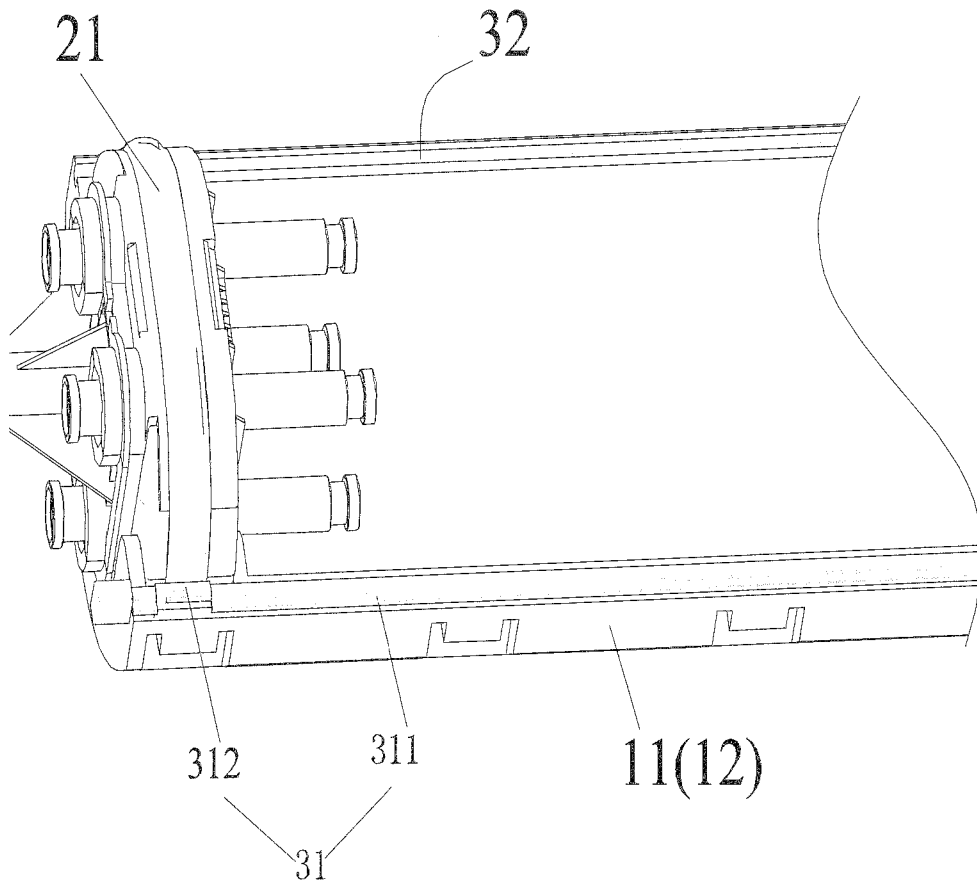


Fig. 2

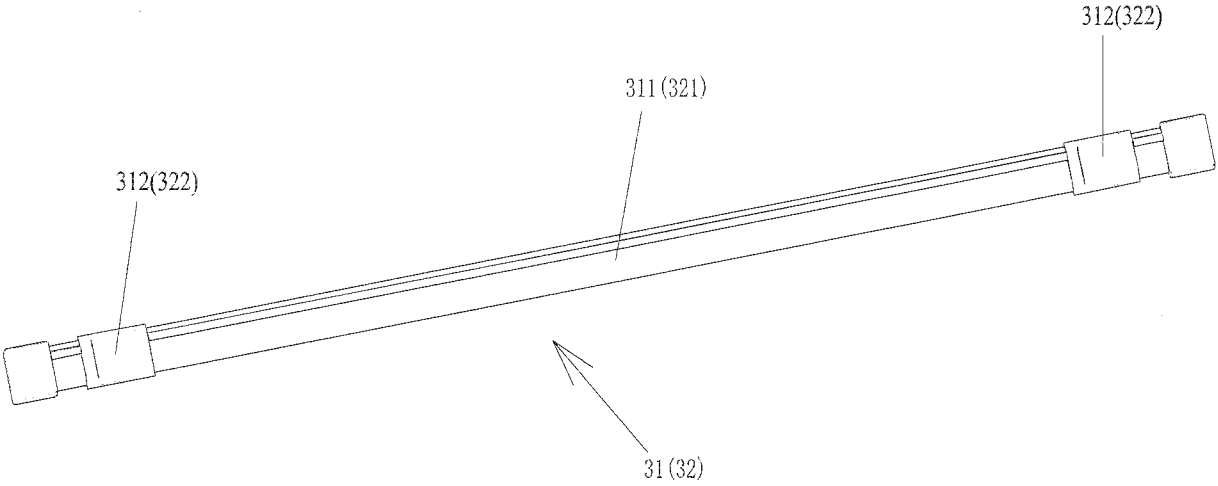


Fig. 3

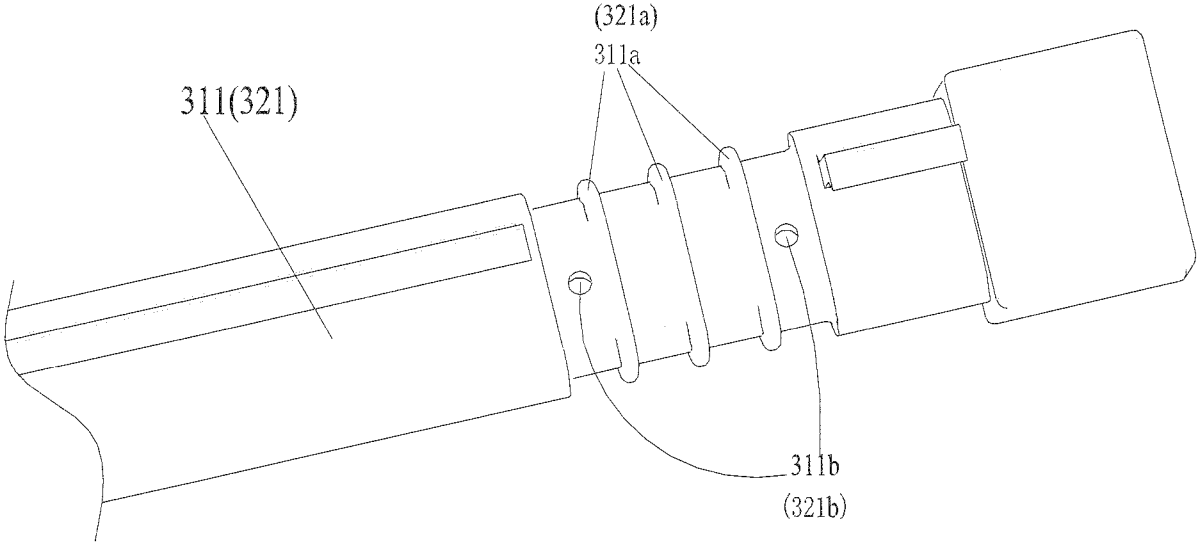


Fig. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/051484

A. CLASSIFICATION OF SUBJECT MATTER
INV. G02B6/44
ADD.

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

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
G02B

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

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

EPO-Internal, WPI Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 2008/112681 A1 (BATTEY JENNIFER A [US] ET AL) 15 May 2008 (2008-05-15) paragraphs [0030] - [0033]; figures 1-3 -----	1,7-10
A	WO 95/06347 A1 (ROSE WALTER GMBH & CO KG [DE]; RAYCHEM LTD [GB]; FREMGEN DIETER [DE];) 2 March 1995 (1995-03-02) page 8, line 1 - page 9, line 3; figures 1,9-14 -----	1
A	US 5 835 658 A (SMITH DONALD J [US]) 10 November 1998 (1998-11-10) column 5, line 5 - column 8, line 60; figures 1,2,7,8 ----- -/--	1-10



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

Date of the actual completion of the international search

9 September 2011

Date of mailing of the international search report

16/09/2011

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Wolf, Steffen

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2011/051484

C(Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 4 558 174 A (MASSEY JOHN R [US]) 10 December 1985 (1985-12-10) column 8, line 38 - column 9, line 38; figures 1,2,5-10 -----	1-10
A	US 5 884 002 A (CLOUD RANDY G [US] ET AL) 16 March 1999 (1999-03-16) the whole document -----	1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2011/051484

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 2008112681	A1	15-05-2008	NONE	

WO 9506347	A1	02-03-1995	AU 7502294 A	21-03-1995
			BR 9407520 A	07-01-1997
			CA 2169926 A1	02-03-1995
			CN 1132005 A	25-09-1996
			CZ 9600480 A3	17-07-1996
			EP 0715775 A1	12-06-1996
			FI 960872 A	26-02-1996
			JP 9502077 T	25-02-1997
			NO 960765 A	26-02-1996
			PL 313163 A1	10-06-1996

US 5835658	A	10-11-1998	US 5568584 A	22-10-1996

US 4558174	A	10-12-1985	CA 1226046 A1	25-08-1987
			DE 3512165 A1	17-10-1985
			GB 2158659 A	13-11-1985
			MX 157837 A	15-12-1988

US 5884002	A	16-03-1999	US 5883999 A	16-03-1999
			US 5884000 A	16-03-1999
			US 5884001 A	16-03-1999
			US 5884003 A	16-03-1999
