

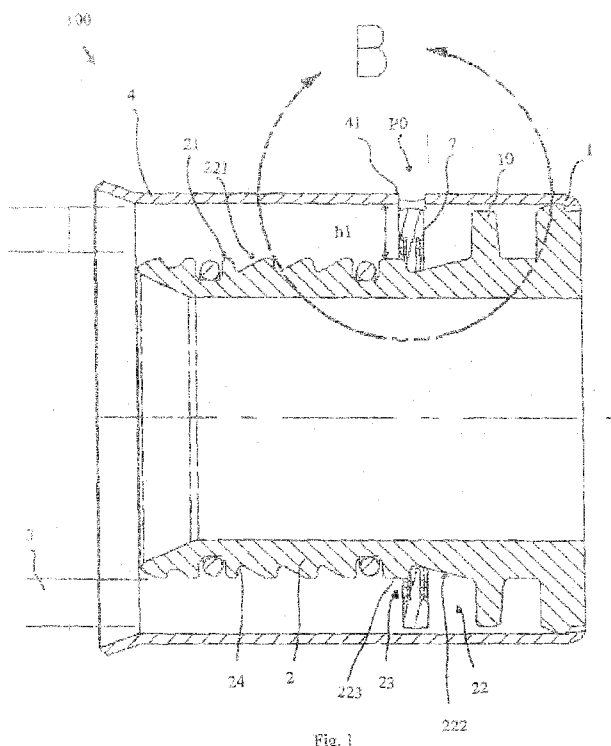


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(54) Title: FITTING WITH BUILT-IN INDICATOR RING



(57) Abstract: Fitting, including: a fitting body (1) with an end wall (10) and an inner support (2) on which a tube end (3) can be inserted/fitted, a sleeve (4), which surrounds the inner support, for attaching the tube end to the inner support, the sleeve including at least one window, an inner ring (7), placed over the inner support, configured to be placed between the end wall (10) and the tube end, with the inner ring being movable between a rest position (PO) and an abutment position in which the inner ring substantially bears against the end wall of the fitting body, and biasing means (72) for biasing the inner ring to the rest position where the inner ring is visible through at least one window (41), with the biasing means formed, at least in part, by a part other than the inner ring.



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## FITTING WITH BUILT-IN INDICATOR RING

The present invention relates to compression fittings, crimp fittings, or socket fittings, and more particularly, a ring for visually indicating insertion of the pipe to be connected.

5

Compression fittings, crimp fittings, and socket fittings, by which pipes can be connected by compression and deformation using one or two sleeves, are well known in the field of tubing, piping, and conduit system installation, for example, for water, gas, or heating.

10 The tube, pipe or conduit systems are assembled in several steps: first, the tubes are inserted into a fitting; then, in the case of a crimp fitting, the fitting is crimped to guarantee good mechanical strength and a leak-tight installation. The crimping is essentially done by pressure on the fitting, which causes deformation or forming of the fitting to the pipe to which it is being connected. The pressure is usually applied to the fitting using a press jaw.

15

Installation or maintenance of a tubing, piping or conduit system requires the assembly of a plurality of tubes and fittings. It is critical that each connection in the installation be properly crimped to ensure the strength and leak-tightness of the entire system or installation. Otherwise, there can be serious safety problems, particularly in the case of gas piping  
20 systems.

25

It is sometimes difficult to ensure that all connections have been properly assembled and crimped. This may be due to working conditions (poor light, for example) or due to the repetition of steps during installation, which can adversely affect careful verification of each connection.

30

Specifically, it is necessary to ensure that the tube is sufficiently inserted into the fitting, for example prior to crimping a crimp fitting. One goal of the present invention is to propose an indicator allowing the installer to check that the tube was properly inserted into the fitting.

To this end, the invention proposes a fitting including: a fitting body with an end wall and an inner support on which a tube end can be inserted/fitted, a sleeve, which surrounds the inner support, to attach the tube end over the inner support, the sleeve including at least one

window, an inner ring, pushed over the inner support, configured to be placed between the end wall and the tube end, the inner ring being able to move between a rest position and a abutment position in which the inner ring substantially bears against the end wall of the fitting body, and biasing means for biasing the inner ring to the rest position where the inner ring is  
5 visible through at least one window, with the means of restoration formed, at least in part, by a part other than the inner ring.

In one embodiment, the inner support has a portion on the tube insertion end side with an outer circumferential envelope with a substantially constant diameter, and a portion on the  
10 end wall side with an outer circumferential envelope diameter that substantially increases in the direction of the end wall.

Advantageously, a junction area between the portion on the tube insertion end side and the portion on the end wall side substantially corresponds to the rest position P0.  
15

According to one embodiment, the inner ring includes at least one substantially flexible tabs bearing against the inner support. Preferably, the at least one said tab has a radial length that is substantially equal to the radial distance defined between the outer circumferential envelope of the portion on the tube insertion end side and the sleeve.  
20

According to one embodiment, the sleeve has at least one axial window, in an axial position substantially corresponding to the rest position P0.

Advantageously, the inner ring, in the rest position, is in an axial position that is substantially  
25 aligned with an axial position of at least one window in the crimp sleeve.

According to one embodiment, the inner ring is substantially made of dielectric material.

Other characteristics and advantages of the invention will be clearer after reading the  
30 descriptions of several currently preferred embodiments, provided as examples only and referring to the attached drawings:

- Figure 1 schematically represents a fitting according to a first aspect of the present invention,
- Figure 2 shows a fitting sleeve according to a first aspect of the present invention,
- Figure 3 illustrates an inner ring for use on a fitting according to an aspect of the present invention.

In the figures, identical parts are identified with the same reference numbers.

Figure 1 shows a fitting 100 allowing connection of a tube 3 according to one aspect of the present invention. The fitting 100 is a crimp fitting in the embodiment illustrated, as a non-limiting example. A person skilled in the art will understand that other types of fittings are possible, such as compression or socket fittings.

The crimp fitting 100 includes a fitting body 1 including an end wall 10, an inner support 2 and a crimp sleeve 4 defining an insertion space 5 into which the tube end 3 can be inserted.

The crimp sleeve 4 extends substantially around the inner support 2 and can be irreversibly deformed, using pressure, to attach the inner support 2 and the tube end 3 to which it is connected. The pressure can be applied by a press jaw or a crimping tool (not shown).

The fitting body 1 has an elongated shape along a longitudinal axis, and can have a substantially symmetric shape with respect to its longitudinal axis.

The inner support 2 also has recesses 24, provided to accept a seal (not shown).

The inner support 2 has a portion 21 on the tube insertion end side with an outer circumferential envelope 221 with a substantially constant diameter from the tube insertion end to the junction area 23. The inner support 2 also has a portion 22 on the end wall side, with an outer circumferential envelope 222 with a substantially increasing diameter, from the junction area 23 to the end wall 10 of the fitting body 1.

An inner ring 7 is pushed or inserted over the inner support 2 on the side of the fitting. The inner ring 7 can be designed to create dielectric insulation between the tube 3 and the fitting.

The inner ring 7 is preferably made of a thermoplastic or equivalent material. The inner ring could also be made of metal.

5 The inner ring 7 is designed to visually indicate that the tube 3 was properly inserted into the insertion space. The inner ring 7 is also preferably of a contrasting colour, red for example, compared to the rest of the fitting and the sleeve, allowing the user to easily find and see it.

10 More specifically, the inner ring 7 is able to move between a rest position and an abutment position in which the inner ring 7 is substantially in abutment against the end wall 10 of the fitting body. The rest position P0 is one that is substantially axially aligned with an axial position of the junction area 23 between the portion 21 on the tube insertion end side and the portion 22 at the end wall.

15 The inner ring 7, in the rest position, is in an axial position with respect to at least one window 41 on the outer circumference of the sleeve 4. The window 41 is designed to allow visualization of the inner ring 7 when the tube 3 is not inserted or is only partly inserted into the crimp fitting 100. Alternatively, the window 41 could allow visualization of the inner ring 7 in the abutment position when the tube is inserted into the fitting, thus holding the ring in abutment against the end wall of the fitting.

20

In the rest position P0, the inner ring 7 bears against a circumferential wall 223 of the junction area 23 of the inner support 2, defining the portion 21 on the tube insertion end side with an outer circumferential envelope 221 with a substantially constant diameter.

25 When the tube 3 is pushed over the inner support 2 of the crimp fitting, the tube 3 pushes the inner ring 7, which then bears against the end wall 10 of the fitting body.

30 The inner ring 7 as shown in Figure 3 has an annular body 71 with four tabs 72. The annular body 71 has a diameter that substantially matches the inner diameter of the sleeve 4, for both good dielectric insulation and good visualization through the at least one window 41 in the sleeve 4. The tabs 72 have a radial length R that is substantially equal to the radial distance h1 defined between the outer circumferential envelope 221 of the inner support 2 and the sleeve 4 in the junction area 23.

The tabs 72 are configured to bear against the outer circumferential surface of the inner support 2. In the rest position P0, the tabs 72 bear against the junction area 23. The tabs 72 are substantially elastic.

5

Thus during crimping the tube 3 is pushed over the inner support 2 until it makes contact with the inner ring 7. When insertion of the tube continues and the tube 3 is inserted further along the longitudinal axis, the inner ring 7 is pushed along until it is in abutment against the end wall 10 of the fitting body.

10

A person skilled in the art will understand that the inner ring 7 is designed to be held against the end wall 10 by the tube 3. If the tube is inserted improperly or incompletely, or if it slips out, the tube 3 no longer holds the inner ring 7 against the end wall 10. As a result, the inner ring 7 is restored to the rest position P0 by the cooperation of the tabs bearing against the flared surface of the inner support.

15

The portion 22 on the end wall side has an outer circumferential envelope 222 with a diameter that substantially decreases from the end wall 10 of the fitting body towards the junction area 23 of the inner support 2. In other words, the height of the insertion space defined between the sleeve 4 and the inner support 2 in the portion 22 on the end wall side is greater than the length of the tabs 72; this causes the ring to return to a position P0, where the radial distance between the sleeve 4 and the inner support 2 substantially corresponds to the length of the tabs R.

20

Thus the cooperation between the tabs 72 of the inner ring and the flared external circumferential surface of the inner support 2 constitutes biasing means whereby the inner ring 7 returns to its rest position P0. The term 'biasing' in the present application should be understood as retracting, soliciting, spring, or the like. In the rest position, the inner ring is visible through at least one window 41 of the crimp sleeve, thus indicating whether or not the tube 3 is inserted properly and completely into the fitting.

25

30

A person skilled in the art will understand that the inner ring is shown with four tabs. The number of tabs is only provided as an example and is not limiting.

In the embodiment shown, the window 41 in the sleeve is designed to allow visualization of the inner ring 7 when the tube 3 is not inserted or is partially inserted into the crimp fitting 100, i.e., when the inner ring 7 is restored in the rest position. The window 41 in the sleeve  
5 could also be designed to allow visualization of the inner ring 7 when the inner ring is in abutment against the end wall, held by the tube 3 that is properly inserted into the fitting.

In summary, the fact remains to that the invention provides a crimped-, compression- or socket-type fitting with a sleeve equipped with an inner ring. The ring is configured to  
10 visually indicate that the tube is properly inserted. The inner ring is configured to return to the rest position, where it is visible when the tube is not inserted or is partially inserted into the crimp fitting. This advantageously ensures proper mating of the tube into the fitting for correct installation and good fitting strength.

## CLAIMS

1. Fitting, including:

5 a fitting body (1) with an end wall (10) and an inner support (2) over which a tube end (3) can be inserted/fitted,

a sleeve (4) which surrounds the inner support (2), for attaching the tube end to the inner support, the sleeve (4) including at least one window (41),

10 an inner ring (7), pushed over the inner support, configured to be positioned between the end wall (10) and the tube end (3), with the inner ring (7) being able to move between a rest position (P0) and an abutment position where the inner ring is substantially in abutment against the end wall of the fitting body, and

15 biasing means (72; 2) for biasing the inner ring to the rest position where the inner ring (5) is visible through at least one window (41), the biasing means being formed, at least in part, by a part other than the inner ring.

2. Fitting according to claim 1, wherein the inner support (2) has a portion (21) on the tube insertion end side with an outer circumferential envelope (221) with a substantially constant diameter, and a portion (22) on the end wall side with an outer circumferential envelope (222) with a substantially increasing diameter in the direction of the end wall.

3. Fitting according to claim 2, wherein a junction area (23) between the portion (21) on the tube insertion end side and the portion (22) on the end wall side substantially corresponds to the rest position P0.

4. Fitting according to any one of claims 1 to 3, wherein the inner ring (7) includes at least one substantially elastic tab (72) bearing against the inner support (2).

5. Fitting according to claim 4 when dependent on one of claims 2 or 3, wherein said at least one tab (72) has a radial length substantially equal to the radial distance defined between the outer circumferential envelope (221) of the portion (22) on the tube insertion end side and the sleeve (4).

6. Fitting according to any one of the preceding claims, wherein the sleeve (4) has at least one axial window (41), at an axial position substantially corresponding to the rest position P0.
- 5 7. Fitting according to claim 6, wherein the inner ring (7), in the rest position, is in an axial position substantially aligned with an axial position of at least one window (41) in the crimp sleeve.
- 10 8. Fitting according to any of the preceding claims, wherein the inner ring (7) is substantially made of dielectric material.

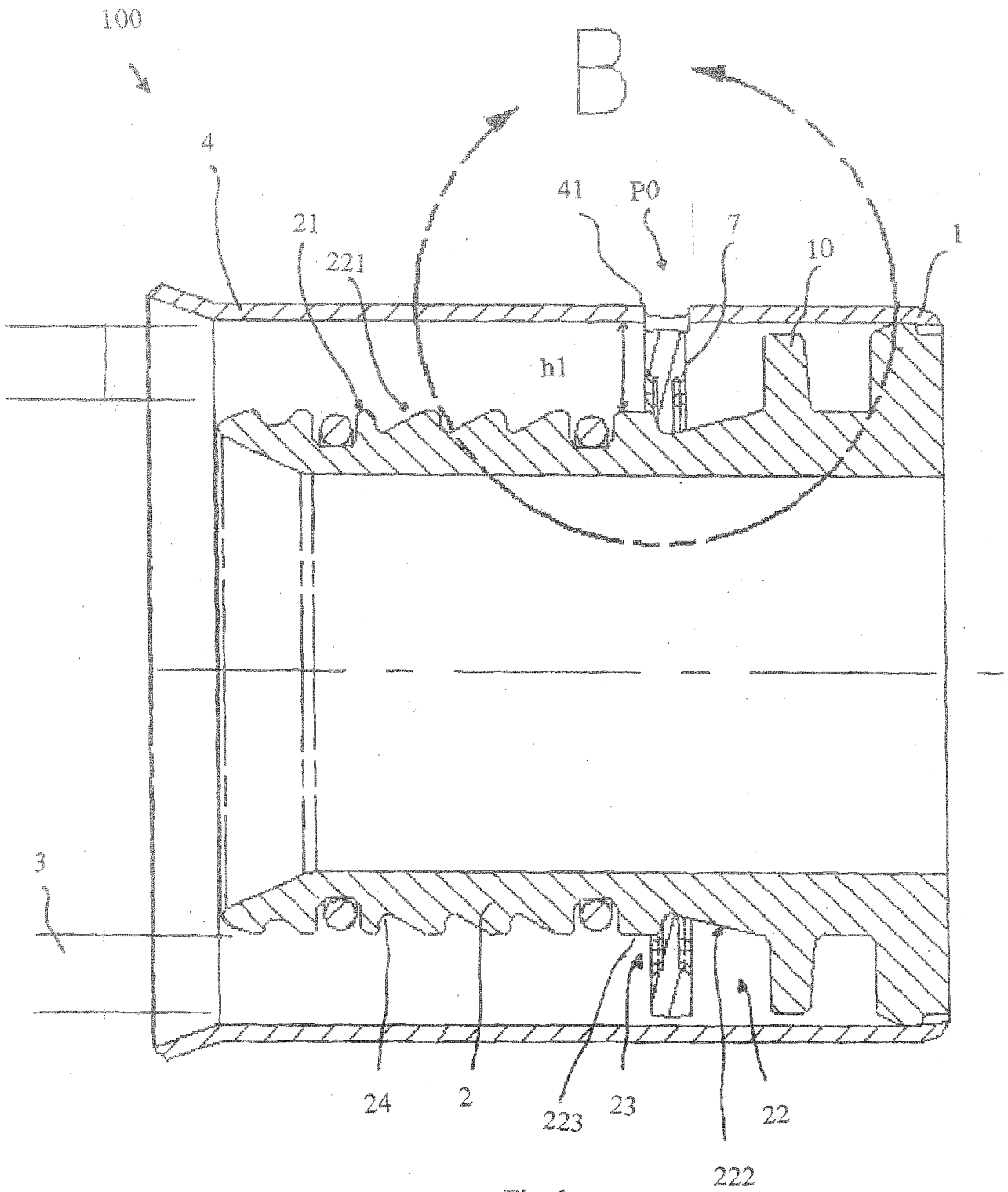


Fig. 1

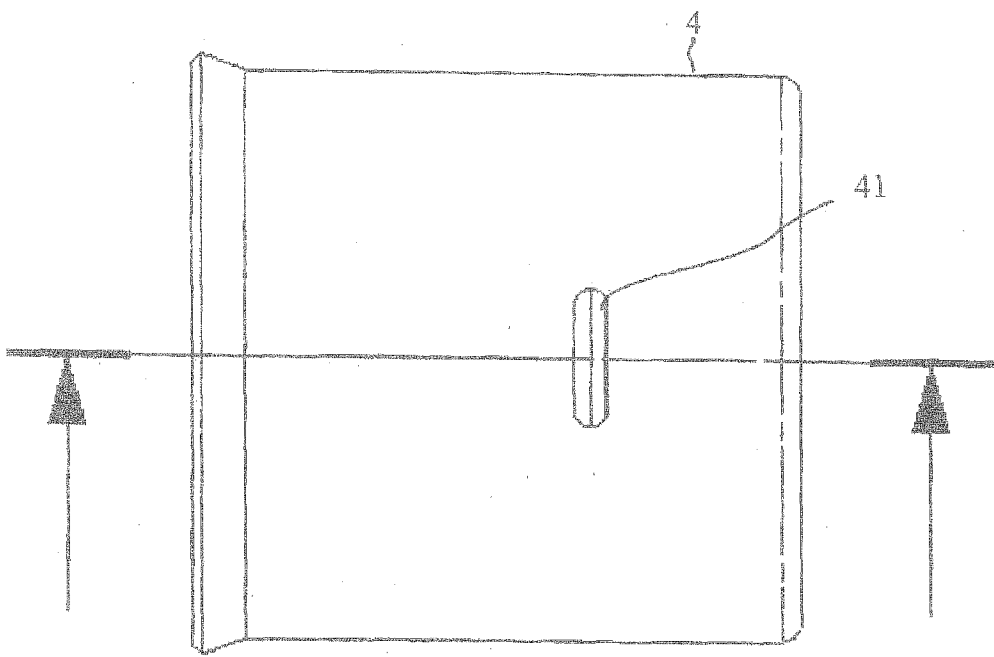


Fig. 2

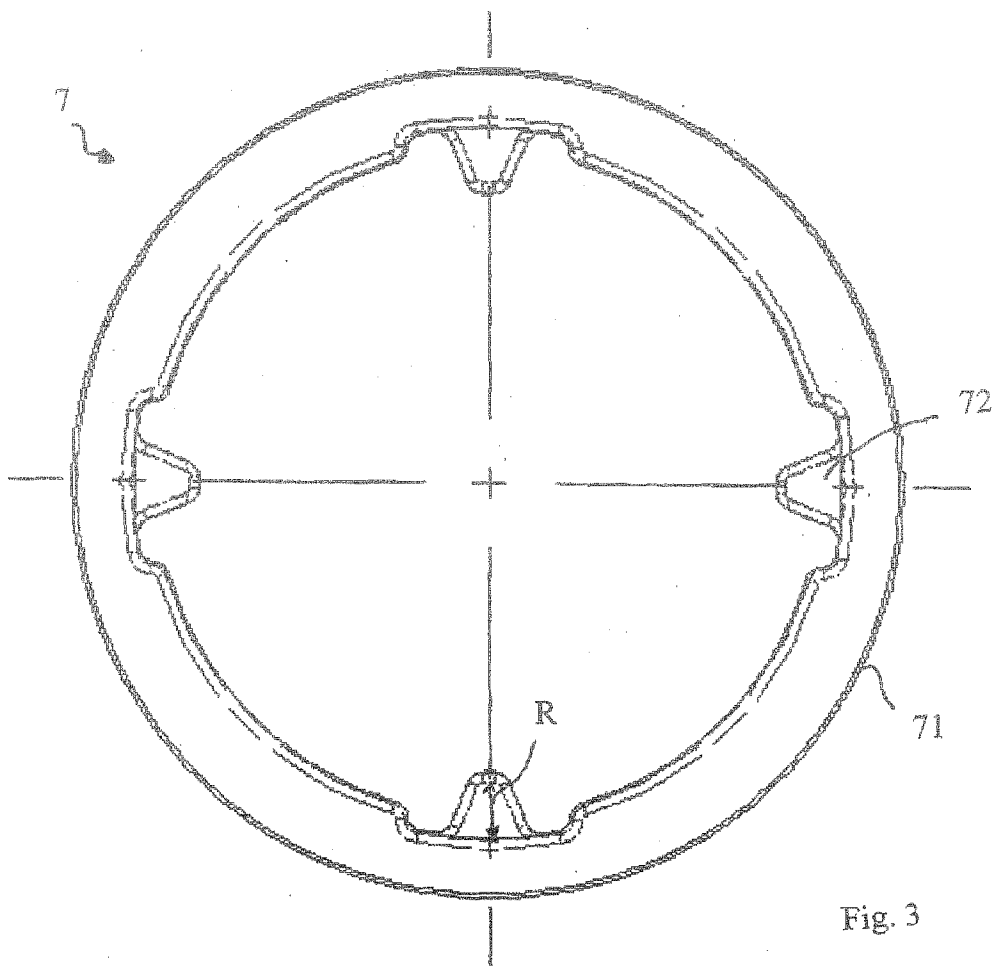


Fig. 3

# INTERNATIONAL SEARCH REPORT

International application No  
PCT/EP2012/054472

A. CLASSIFICATION OF SUBJECT MATTER  
INV. F16L13/14  
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)  
F16L

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

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

| Category* | Citation of document, with indication, where appropriate, of the relevant passages                                             | Relevant to claim No. |
|-----------|--------------------------------------------------------------------------------------------------------------------------------|-----------------------|
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|           | -----                                                                                                                          |                       |



Further documents are listed in the continuation of Box C.



See patent family annex.

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"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

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# INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/EP2012/054472

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