

(19)



(11)

EP 4 475 353 A1

(12)

EUROPEAN PATENT APPLICATION

(43) Date of publication:
11.12.2024 Bulletin 2024/50

(51) International Patent Classification (IPC):
H01R 13/627 ^(2006.01) **H01R 43/26** ^(2006.01)

(21) Application number: **23177245.0**

(52) Cooperative Patent Classification (CPC):
H01R 13/6278; H01R 43/26

(22) Date of filing: **05.06.2023**

(84) Designated Contracting States:
AL AT BE BG CH CY CZ DE DK EE ES FI FR GB GR HR HU IE IS IT LI LT LU LV MC ME MK MT NL NO PL PT RO RS SE SI SK SM TR
Designated Extension States:
BA
Designated Validation States:
KH MA MD TN

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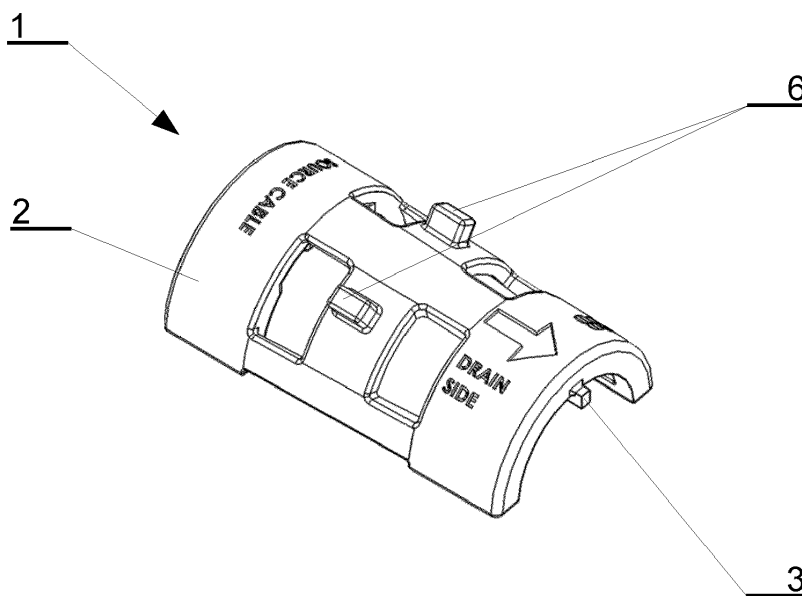
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(54) A REMOVABLE TOOL FOR DISCONNECTING A CABLE CONNECTOR

(57) A removable tool (1) for disconnecting a cable connector (7), the cable connector (7) comprising a drain terminal (8) and a source terminal (9), wherein the drain terminal (8) comprises a retractable safety pin (10) and the source terminal (9) comprises projections (11) and a seat (12) for the retractable safety pin (10), wherein the removable tool (1) is adapted to be based on the source terminal (9), and the removable tool (1) comprises a body (2), a projecting element (3) that projects from the inner

surface of the body (2) in the radial direction of the tool (1), wherein the projecting element (3) is adapted to be inserted into the seat (12) of the source terminal (9) and to move the retractable safety pin (10) inward the drain terminal (8). The tool (1) further comprises at least one recess (4) arranged on the inner surface of the body (2), wherein the at least one recess (4) is to be engaged with one of the projections (11) of the source terminal (9) of the cable connector (7).

**Fig. 1**

Description

Technical field

[0001] The present invention relates to a removable tool for disconnecting a cable connector. The removable tool is used in cable connectors for charging electric vehicles, especially cable connectors for charging formula E vehicles as well as cable connectors for power generators.

Background of the invention

[0002] From European patent EP3633800B1 there is known an electric connection device comprising a first electric connection element, a second electric connection element connectable to the first electric connection element by means of respective electric contacts, a removable unlocking tool, removable connecting means configured to be removably fastened to the electric connection device and a bayonet-type locking and unlocking mechanism configured for coupling and uncoupling the first connection element and the second connection element following a rotation of one with respect to another. Further, the electric connection device comprises a secondary safety locking mechanism configured for preventing a rotation of the first connection element and of the second connection element one with respect to another and a consequent separation of said two elements. In turn, the first electric connection element and the second electric connection element comprise retractable locking means configured to be unlocked by the removable unlocking tool and the removable unlocking tool is connectable to the electric connection device through the removable connecting means which are configured to be removably fastened to the electric connection device. Furthermore, one of the retractable locking means has a form of a seat and the other has a form of a pin, and the removable unlocking tool comprises a projection configured to be inserted in the seat in order to retract the pin and unlock the secondary safety locking mechanism.

[0003] Although removable tools for disconnecting cable connectors known from the prior art allow for disconnecting cable connectors, their user, to disconnect a cable connector without damage, must firmly hold such removable tool when it is coupled to the cable connector and rotate its drain terminal relative to its source terminal. Otherwise, a seat of a secondary safety locking mechanism of a cable connector can be damaged, rendering said cable connector unfit for further use. Therefore, the object of the invention is to provide a removable tool for disconnecting a cable connector that makes simplifies a process of disconnecting a cable connector as well as reduces the risk of damage to the cable connector during said disconnecting process.

The Essence of the Invention

[0004] The object of the invention is a removable tool for disconnecting a cable connector, the cable connector comprising a drain terminal and a source terminal, wherein the drain terminal comprises a retractable safety pin and the source terminal comprises projections and a seat for the retractable safety pin, wherein the removable tool is adapted to be based on the source terminal, and the removable tool comprises a body, a projecting element that projects from the inner surface of the body in the radial direction of the tool, wherein the projecting element is adapted to be inserted into the seat of the source terminal and to move the retractable safety pin inward the drain terminal. The essence of the invention is that the tool further comprises at least one recess arranged on the inner surface of the body, wherein the at least one recess is to be engaged with one of the projections of the source terminal of the cable connector.

[0005] The application of the at least one recess arranged on the inner surface of the body, wherein the at least one recess is to be engaged with one of the projections of the source terminal of the cable connector reduces the risk of damage to the cable connector during said disconnecting process as well as simplifies a process of disconnecting the cable connector. This is due to the fact that the application of the at least one recess as disclosed ensures a reduction in the impact of the projecting element of the removable tool on the seat for the retractable safety pin of the source terminal of the cable connector during a process of disconnection of the cable connector. Thus it leads to a transfer of torque from the seat for the retractable safety pin to the body of the source terminal of the cable connector. Further it simplifies the process of disconnecting the cable connector as there is no need for a user applying the disclosed tool to use the other hand during said disconnection to reduce the impact of the projecting element on the seat of the for the retractable safety pin.

[0006] Preferably, the at least one recess is longitudinal.

[0007] The application of the at least one longitudinal recess, and in particular longitudinal recesses, provides a larger contact surface between the removable tool and the projections of the source terminal of the cable connector, allowing greater force to be applied to said tool without risking damage to its projecting element.

[0008] Preferably, the at least one recess further comprises a cavity.

[0009] The application of the at least one recess further comprising the cavity ensures savings in material needed to produce the removable tool.

[0010] Preferably, the at least one recess is arranged in one end of the body and the projecting element in the opposite end of the body.

[0011] Preferably, the tool comprises recesses arranged circumferentially along the inner surface of the body.

[0012] Preferably, the recesses are arranged evenly with respect to each other.

[0013] Preferably, the projecting element extends in the longitudinal direction of the tool beyond the body.

[0014] Preferably, the projecting element is located in the axis of symmetry of the tool.

[0015] Preferably, the tool comprises at least two additional projecting elements that project from the outer surface of the body.

[0016] The application of the at least two additional projecting elements that project from the outer surface of the body prevents a user's hand from slipping from the body of the removable tool.

[0017] Preferably, the at least two additional projecting elements are arranged evenly with respect to each other.

[0018] Preferably, the at least two additional projecting elements are arranged at an equal distance from both ends of the body.

[0019] Preferably, the tool is made of plastic.

[0020] Preferably, plastic comprises additives of glass fibers.

[0021] Preferably, plastic comprises additives of metals.

[0022] The application of plastic comprising additives of glass fibers or additives of metals as material for production of the removable tool ensures increased durability of said tool, which in turn allows even greater force to be applied to said tool without risking damage to its projecting element.

Advantages of the invention

[0023] The removable tool according to the invention ensures simplification of a process of disconnecting of a cable connector.

[0024] The removable tool according to the invention ensures safe disconnecting of a cable connector, including safety of members of a cable connector as well as safety of its user.

[0025] The removable tool according to the invention provides acceleration of a disconnection process of a cable connector, as it reduces the number of steps performed by the user.

Description of the drawings

[0026] The subject of the invention is shown in the embodiments in a drawing, in which:

Fig. 1 presents a removable tool for disconnecting a cable connector according to the invention in a top perspective view,

Fig. 2 presents a removable tool for disconnecting a cable connector according to the invention in a bottom perspective view,

Fig. 3 presents a cable connector without a remova-

ble tool for disconnecting a cable connector according to the invention in a perspective view,

5 Fig. 4 presents uncoupled removable tool for disconnecting a cable connector according to the invention and a cable connector in a perspective view,

10 Fig. 5 presents a removable tool for disconnecting a cable connector according to the invention coupled with a cable connector in a perspective view,

15 Fig. 6 presents a removable tool for disconnecting a cable connector according to the invention coupled with a cable connector in a side view,

Fig. 7 presents a cable connector without a removable tool for disconnecting a cable connector according to the invention in a longitudinal section,

25 Fig. 8 presents a removable tool for disconnecting a cable connector according to the invention coupled with a cable connector in a longitudinal section,

30 Fig. 9 presents a removable tool for disconnecting a cable connector according to the invention coupled with a cable connector in a cross-section in the direction of looking towards projections of a source terminal of the cable connector;

35 Fig. 10 presents a removable tool for disconnecting a cable connector according to the invention coupled with a cable connector in a cross-section in the direction of looking towards a drain terminal of the cable connector.

Detailed description of the invention

45 [0027] A removable tool 1 for disconnecting a cable connector 7, wherein the cable connector 7 comprises a drain terminal 8 and a source terminal 9, wherein the drain terminal 8 comprises a retractable safety pin 10 and the source terminal 9 comprises projections 11 and a seat 12 for the retractable safety pin 10. The removable tool 1 comprises a body 2 and a projecting element 3 that projects from the inner surface of the body 2 in the radial direction of the tool 1. The projecting element 3 is adapted to be inserted into the seat 12 of the source terminal 9 and to move the retractable safety pin 10 inward the drain terminal 8. The projecting element 3 is located in the axis of symmetry of the tool 1 and the projecting element 3 extends in the longitudinal direction of the tool 1 beyond the body 2.

[0028] The removable tool 1 is adapted to be based on the source terminal 9. The tool 1 comprises longitudinal recesses 4 arranged circumferentially along the inner surface of the body 2, wherein the recesses 4 are to be engaged with projections 11 of the source terminal 9 of the cable connector 7.

[0029] The application of the recesses 4 arranged on the inner surface of the body 2 of the removable tool 1, wherein the recesses 4 are to be engaged with projections 11 of the source terminal 9 of the cable connector 7 reduces the risk of damage to the cable connector 7 during said disconnecting process as well as simplifies a process of disconnecting the cable connector 7. This is due to the fact that the application of the recesses 4 as disclosed ensures a reduction in the impact of the projecting element 3 of the removable tool 1 on the seat 12 for the retractable safety pin 10 of the source terminal 9 of the cable connector 7 during a process of disconnection of the cable connector 7. Thus it leads to a transfer of torque from the seat 12 for the retractable safety pin 10 to a body of the source terminal 9 of the cable connector 7. Further it simplifies the process of disconnecting the cable connector 7 as there is no need for a user applying the disclosed tool 1 to use the other hand during said disconnection to reduce the impact of the projecting element 3 on the seat 12 for the retractable safety pin 10.

[0030] Further, the application of the recesses 4 which are longitudinal provides a larger contact surface between the removable tool 1 and the projections 11 of the source terminal 9 of the cable connector 7, allowing greater force to be applied to said tool 1 without risking damage to its projecting element 3.

[0031] The recesses 4 further comprises cavities 5.

[0032] The application of the recesses 4 further comprising the cavities 5 ensures savings in material needed to produce the removable tool 1.

[0033] The recesses 4 are arranged in one end of the body 2 and the projecting element 3 in the opposite end of the body 2. Furthermore, the recesses 4 are arranged evenly with respect to each other.

[0034] Moreover, the removable tool 1 comprises additional projecting elements 6 that project from the outer surface of the body 2.

[0035] The application of the additional projecting elements 6 that project from the outer surface of the body 2 prevents a user's hand from slipping from the body 2 of the removable tool 1.

[0036] The additional projecting elements 6 are arranged evenly with respect to each other and the additional projecting elements 6 are arranged at an equal distance from both ends of the body 2.

[0037] The removable tool 1 is made of plastic comprising additives of glass fibers. In the other embodiments of the invention the removable tool 1 is made of plastic comprising additives of metals.

[0038] The application of plastic comprising additives of glass fibers or additives of metals as material for production of the removable tool 1 ensures increased

durability of said tool 1, which in turn allows even greater force to be applied to said tool 1 without risking damage to its projecting element 3.

Explanation of how the removable tool according to the invention works

[0039] The removable tool 1 is put on the source terminal 9 of the cable connector 7 so that its projecting element 3 is inserted into the seat 12 of the source terminal 9, and the projections 11 of said terminal 9 are engaged with the recesses 4 of the tool 1. The insertion of the projecting element 3 moves the retractable safety pin 10 of the drain terminal 8 of the cable connector 7 inward the drain terminal 8. At this, it is possible to turn the source terminal 9 relative to the drain terminal 8 with the movement of one hand.

List of references

Removable tool

[0040]

- 1 - removable tool
- 2 - body
- 3 - projecting element
- 4 - recesses
- 5- cavities
- 6 - additional projecting elements

Cable connector

[0041]

- 7 - cable connector
- 8 - drain terminal
- 9 -source terminal
- 10 - retractable safety pin
- 11 - projections
- 12 - seat

Claims

1. A removable tool (1) for disconnecting a cable connector (7),

the cable connector (7) comprising a drain terminal (8) and a source terminal (9), wherein the drain terminal (8) comprises a retractable safety pin (10) and the source terminal (9) comprises projections (11) and a seat (12) for

the retractable safety pin (10),
wherein
the removable tool (1) is adapted to be based on
the source terminal (9), and
the removable tool (1) comprises

- a body (2),
- a projecting element (3) that projects from
the inner surface of the body (2) in the radial
direction of the tool (1),
wherein the projecting element (3) is
adapted to be inserted into the seat (12)
of the source terminal (9) and to move the
retractable safety pin (10) inward the drain
terminal (8),

characterized in that

- the tool (1) further comprises at least one
recess (4) arranged on the inner surface of
the body (2),
wherein the at least one recess (4) is to be
engaged with one of the projections (11) of
the source terminal (9) of the cable connec-
tor (7).

additional projecting elements (6) that project from
the outer surface of the body (2).

- 5 **10.** The removable tool according to claim 9, wherein the
at least two additional projecting elements (6) are
arranged evenly with respect to each other.
- 10 **11.** The removable tool according to claim 9 or 10,
wherein the at least two additional projecting ele-
ments (6) are arranged at an equal distance from
both ends of the body (2).
- 15 **12.** The removable tool according to any of the preced-
ing claims, wherein the tool (1) is made of plastic.
- 13.** The removable tool according to claim 12, wherein
plastic comprises additives of glass fibers.
- 20 **14.** The removable tool according to claim 12, wherein
plastic comprises additives of metals.
- 25
- 2.** The removable tool according to claim 1, wherein the
at least one recess (4) is longitudinal.
- 30 **3.** The removable tool according to claim 1 or 2, where-
in the at least one recess (4) further comprises a
cavity (5).
- 35 **4.** The removable tool according to any of the preced-
ing claims, wherein the at least one recess (4) is
arranged in one end of the body (2) and the project-
ing element (3) in the opposite end of the body (2).
- 40 **5.** The removable tool according to any of the preced-
ing claims, wherein the tool (1) comprises recesses
(4) arranged circumferentially along the inner sur-
face of the body (2).
- 45 **6.** The removable tool according to claim 5, wherein the
recesses (4) are arranged evenly with respect to
each other.
- 50 **7.** The removable tool according to any of the preced-
ing claims, wherein the projecting element (3) ex-
tends in the longitudinal direction of the tool (1)
beyond the body (2).
- 55 **8.** The removable tool according to any of the preced-
ing claims, wherein the projecting element (3) is
located in the axis of symmetry of the tool (1).
- 9.** The removable tool according to any of the preced-
ing claims, wherein the tool (1) comprises at least two

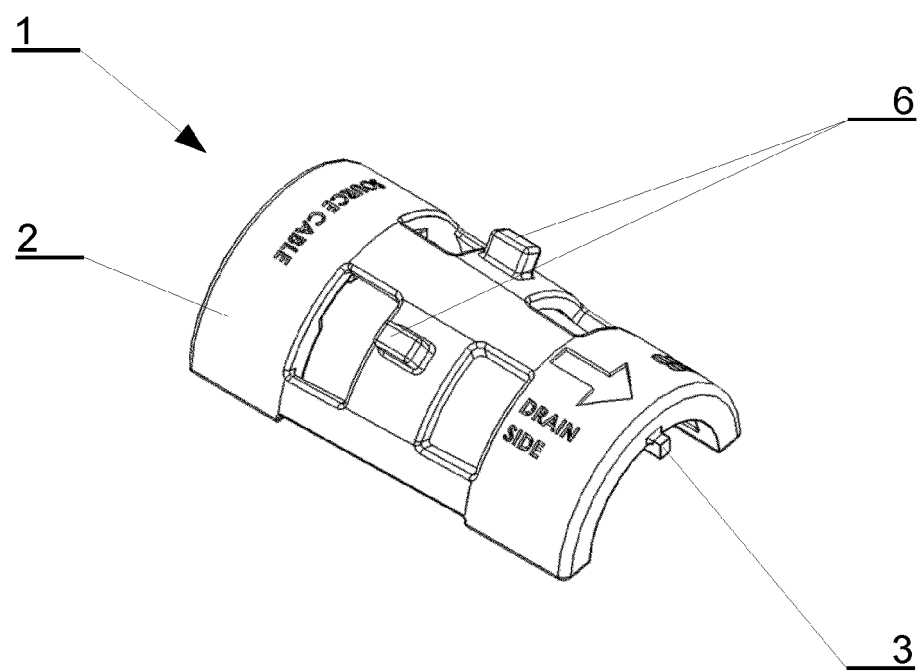


Fig. 1

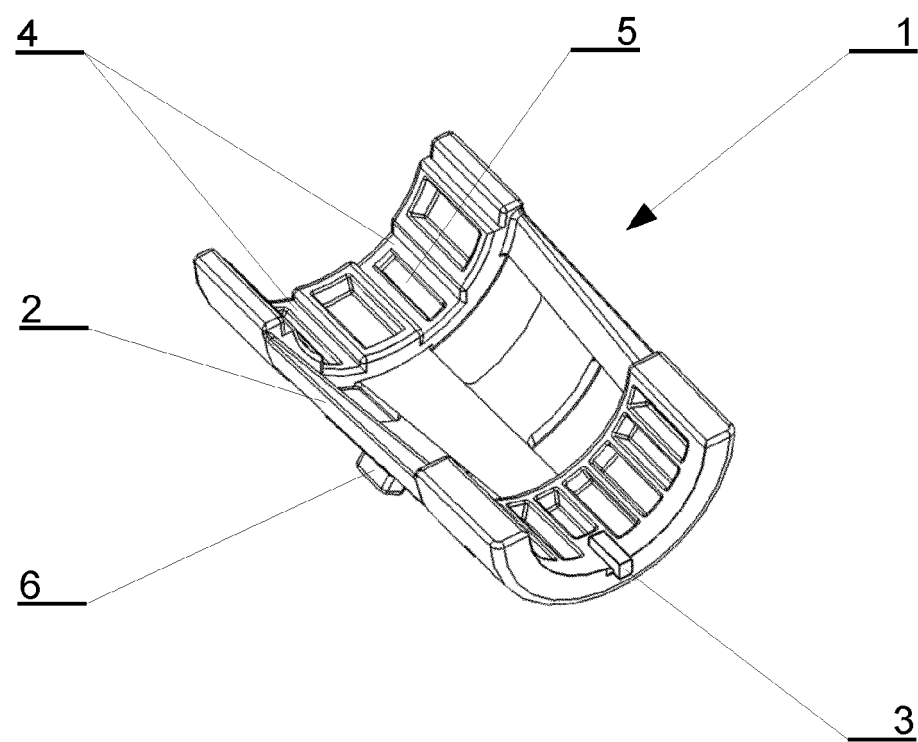


Fig. 2

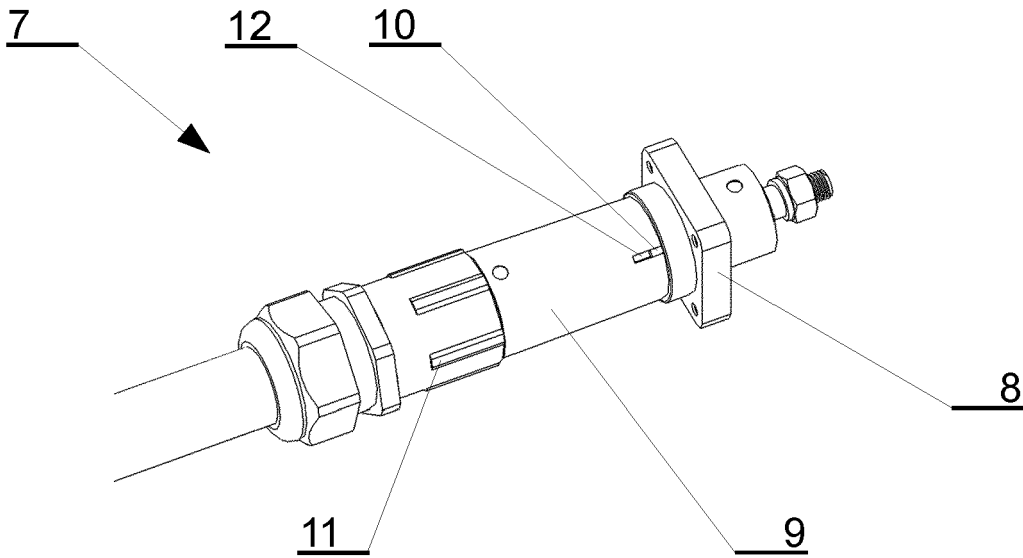


Fig. 3

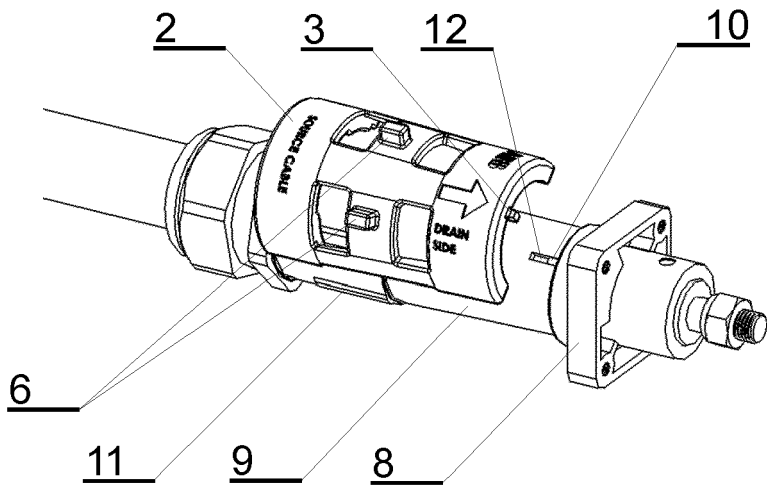


Fig. 4

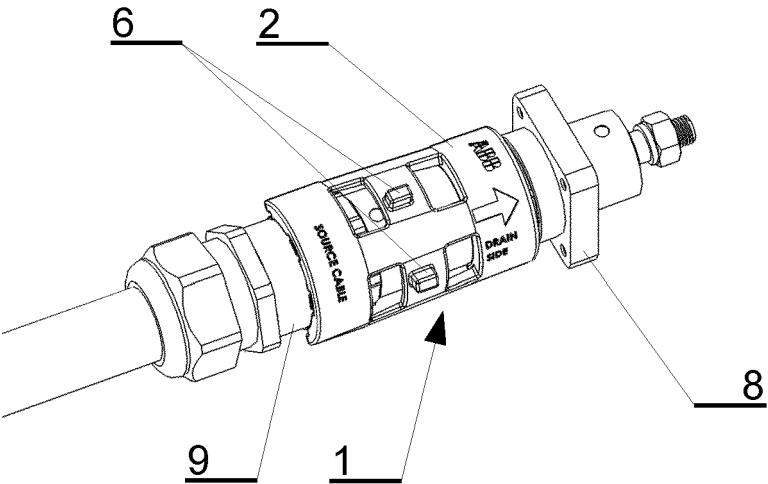


Fig. 5

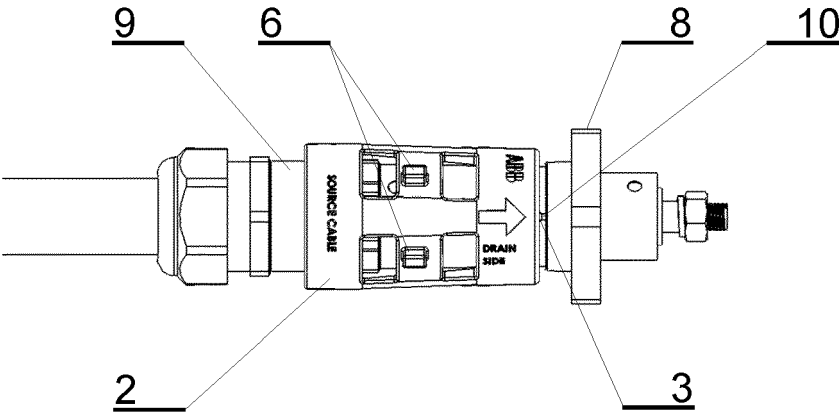


Fig. 6

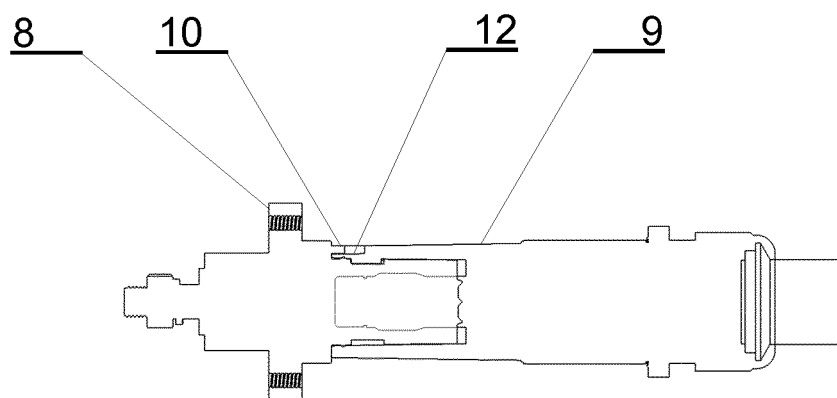


Fig. 7

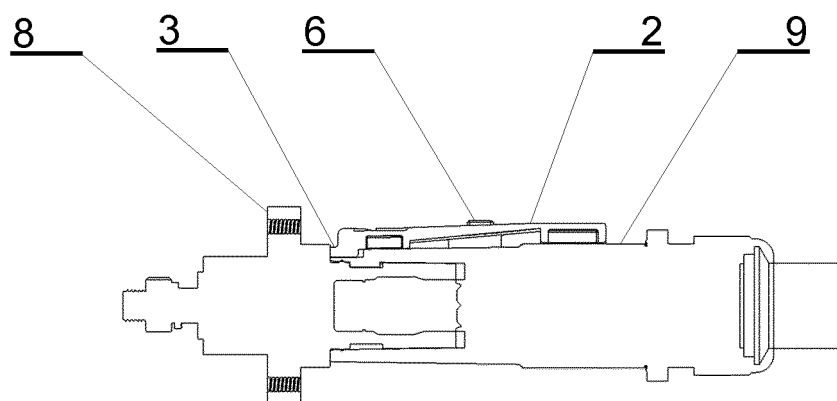


Fig. 8

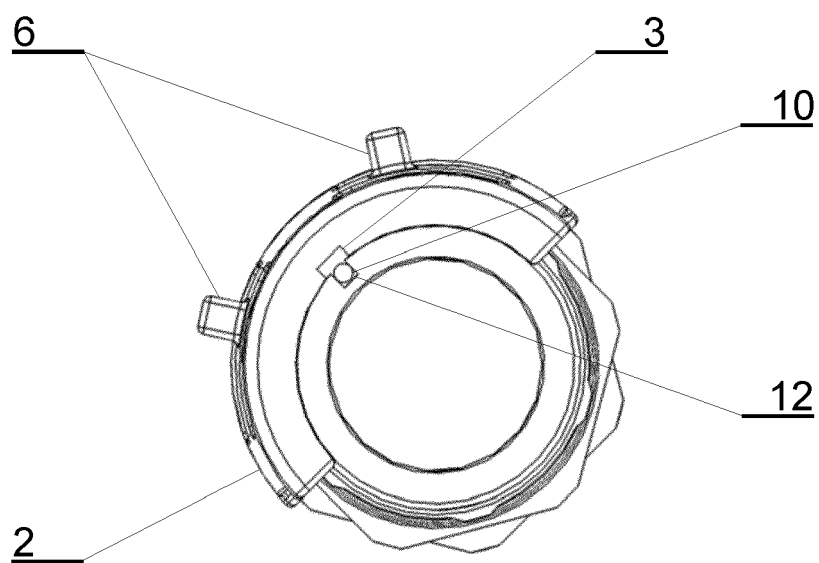


Fig. 9

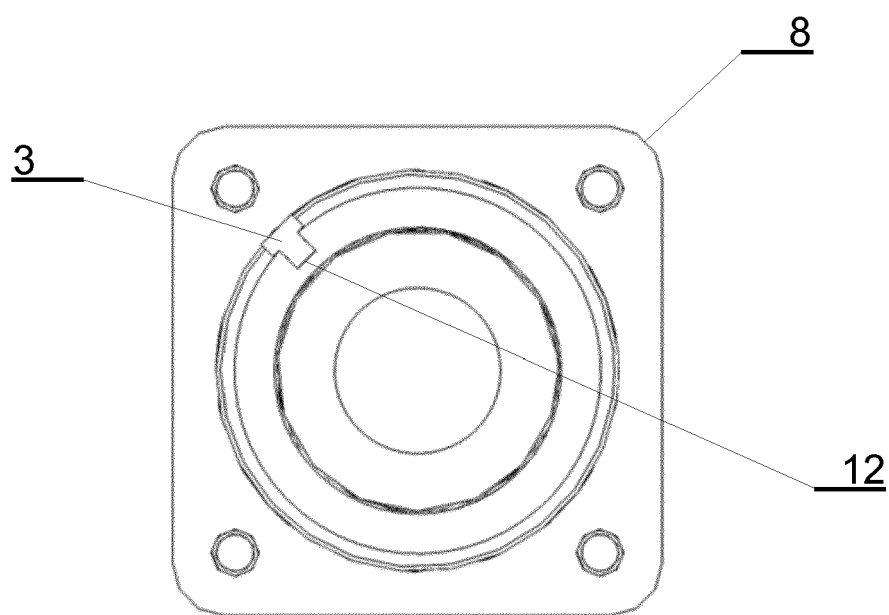


Fig. 10



EUROPEAN SEARCH REPORT

Application Number

EP 23 17 7245

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
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			H01R
The present search report has been drawn up for all claims			
Place of search		Date of completion of the search	Examiner
The Hague		27 October 2023	Gomes Sirenkov E M.
CATEGORY OF CITED DOCUMENTS			
X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

REFERENCES CITED IN THE DESCRIPTION

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