(19) Europäisches Patentamt
European Patent Office
Office européen des brevets

(11) **EP 4 300 716 A1**

(12) **EUROPEAN PATENT APPLICATION**

(43) Date of publication:
03.01.2024 Bulletin 2024/01

(21) Application number: **23180696.9**

(22) Date of filing: **21.06.2023**

(51) International Patent Classification (IPC):
H01R 13/504 *(2006.01)* ***H01R 13/56*** *(2006.01)*
H01R 13/58 *(2006.01)*

(52) Cooperative Patent Classification (CPC):
H01R 13/504; H01R 13/562; H01R 13/582

(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

(30) Priority: **29.06.2022 CN 202210764961**

(71) Applicants:
- **Self Electronics Co., Ltd.**
  Ningbo City, Zhejiang 315103 (CN)
- **SELF ELECTRONICS Germany GmbH**
  51149 Köln (DE)

(72) Inventors:
- **CHEN, Dong**
  Ningbo, 315103 (CN)
- **XU, Kai**
  Ningbo, 315103 (CN)
- **LIN, Wanjiong**
  Ningbo, 315103 (CN)
- **Lin, Wanjiong**
  Ningbo City, Zhejiang 315103 (CN)

(74) Representative: **2K Patentanwälte Blasberg Kewitz & Reichel Partnerschaft mbB**
Schumannstrasse 27
60325 Frankfurt am Main (DE)

(54) **PLUGS AND LAMPS**

(57) The invention discloses a plug and a lamp. The plug includes an insulating housing, a connector and a connecting wire; the insulating housing is formed by ultrasonic welding of a first housing and a second housing; An installation cavity and a wire passing hole communicating with the installation cavity are formed; the connector is inserted in the installation cavity and protrudes outward, and the connector is provided with a terminal; the connecting wire is connected to the terminal and is drawn out through the wire passing hole, and the hole wall of the wire passing hole is provided with a limiting part, and the limiting part is against the outer wall of the connecting wire, so as to restrict the moving of the connecting wire along the first direction. The invention improves the structure of the plug, effectively reduces the risk of terminal damage in the plug connector, improves the safety of the plug, and prolongs the service life of the plug .

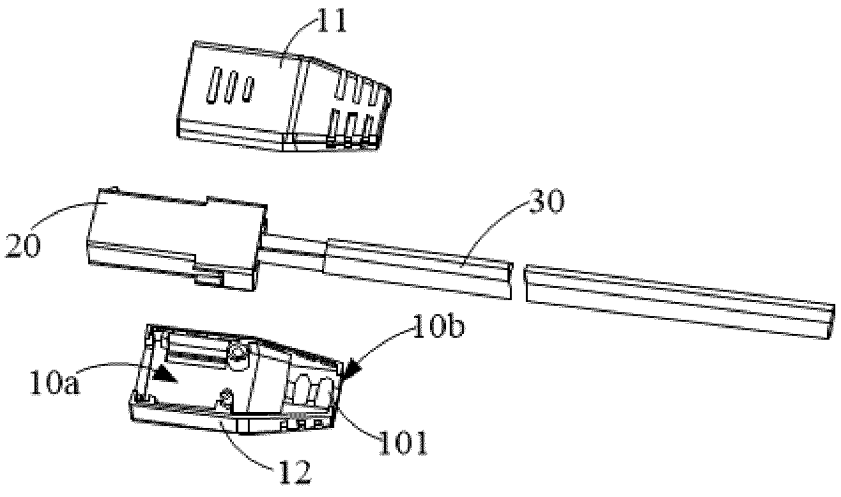

figure 2

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Description

technical field

[0001] The invention relates to the technical field of connectors, in particular to a plug and a lamp.

Background technique

[0002] The plug of the lamp includes a housing, a connector and connecting wires, and the connector is provided with one or more terminals inside. Among them, the connector part has relevant safety requirements, and the connector and terminals need to meet the tension requirements.

[0003] For small-sized plugs, due to their few components and simple structure, in order to meet the tensile requirements, the commonly used method is to encapsulate the outer housing of the product. although this can improve the tensile capacity the use verification found that there is a certain risk in this rubberized structure. The rubberized housing will make the terminals inside the connector fixed. However After a long time of use, the terminals in the connector will be stretched and damaged. As a result, the contact resistance of the terminal increases, and in severe cases , the terminal may catch fire.

Contents of the invention

[0004] the present invention is to provide a plug and a lamp, aiming at reducing the risk of terminal damage in the plug connector, so as to improve the safety of the plug and prolong the service life of the plug.

[0005] In order to achieve the above object, the present invention proposes a plug, which includes:

The insulating housing is formed by ultrasonic welding of the first housing and the second housing, and the first housing and the second housing are surrounded to form an installation cavity and a wire passing hole communicating with the installation cavity;
a plug-in piece / plug connector inserted into the installation cavity and protruding outward, the plug-in piece is provided with terminals; and
the connecting wire is electrically connected to the terminal and drawn out through the wire passing hole, and the hole wall of the wire passing hole is provided with a limiting part, and the limiting part is abutting against the outer wall of the connecting wire to limit the connecting wire from moving along a first direction.

[0006] Optionally , at least two protrusions arranged at intervals protrude from the two hole walls opposite to each other in the first direction of the wire passing hole to form the limiting part.

[0007] Optionally, the end surface of the limiting part abutting against the connecting wire is arranged in an arc/circular/rounded shape.

[0008] Optionally, both the terminal and the connecting wire can move along a second direction, and the first direction is perpendicular to the second direction.

[0009] Optionally, the wire passing hole has a gap between two hole walls in the second direction and an outer wall of the connecting wire, so that the connecting wire can move in the second direction.

[0010] Optionally, the connector has a first surface and a second surface opposite to each other in the first direction, and the first surface of the connector is ultrasonically welded and fixed to the insulating housing, so as to limit the that the plug connector moves along the first direction, and the second surface of the plug connector abuts against the insulating housing part.

[0011] Optionally, welding ribs are distributed along the connection surface on the first housing and/or the second housing.

[0012] Optionally, the first housing is provided with a positioning post, the second housing is provided with a positioning hole at a position corresponding to the positioning post of the first housing, and the positioning post is inserted into the positioning hole.

[0013] Optionally, both the first housing and the second housing are injection molded parts.

[0014] In order to achieve the above object, the present invention also proposes a lamp, including the above-mentioned plug, and the plug includes:

The insulating housing is formed by ultrasonic welding of the first housing and the second housing, and the first housing and the second housing are surrounded to form an installation cavity and a wire passing hole communicating with the installation cavity;
a plug-in piece inserted into the installation cavity and protruding outward, the plug-in piece is provided with terminals; and
the connecting wire is electrically connected to the terminal and drawn out through the wire passing hole, and the hole wall of the wire passing hole is provided with a limiting part, and the limiting part is abutting against the outer wall of the connecting wire to limit the connecting wire moving along a first direction.

[0015] In the technical solution of the present invention, the plug includes an insulating housing, a connector and a connecting wire; the insulating housing is formed by ultrasonic welding of the first housing and the second housing, and the first housing and the second housing are surrounded to form an installation cavity and a wire passing hole connected to the installation cavity; the connector is inserted in the installation cavity and protrudes outward, and the connector is provided with a terminal; the connecting wire is electrically connected to the ter-

minal and is drawn out through the wire passing hole, and the wire hole wall of the hole is provided with a limiting part, and the limiting part is pressing against the outer wall of the connecting wire to restrict the moving of the connecting wire along the first direction. Since the terminals in the connector are restricted to move in the first direction, they can move in the second direction, which releases the limit fixation of the terminals in the second direction, avoids the terminals being stretched, and effectively reduces the risk of terminal damage Risk, to improve the safety of the plug, and extend the life of the plug.

Description of drawings

[0016] In order to more clearly illustrate the technical solutions in the embodiments of the present invention or the prior art, the following will briefly introduce the drawings that need to be used in the description of the embodiments or the prior art. Obviously, the accompanying drawings in the following description are only some embodiments of the present invention. For those skilled in the art, other drawings can also be obtained according to the structures shown in these drawings without creative effort.

Fig. 1 is the structural representation of an embodiment of the plug of the present invention;

Fig. 2 is an exploded view of an embodiment of the plug of the present invention;

Fig. 3 is another exploded view of an embodiment of the plug of the present invention;

Fig. 4 is a side view of an embodiment of the plug of the present invention.

[0017] Explanation of reference numbers:

10. Insulating housing;
20. Connector;
30. Connecting wire;
10 a . Installation cavity;
10b . Wire passing hole;
101a . Gap;
101. Protrusion;
11. First housing;
12. Second housing.

the present invention , functional characteristics and advantages will be further described in conjunction with the embodiments and with reference to the accompanying drawings.

Detailed Description

[0018] The following will clearly and completely describe the technical solutions in the embodiments of the present invention with reference to the accompanying drawings of the embodiments of the present invention. Obviously, the described embodiments are only part of the embodiments of the present invention , not all of them. Based on the embodiments of the present invention, all other embodiments obtained by persons of ordinary skill in the art without creative efforts fall within the protection scope of the present invention.

[0019] It should be noted that if there are directional indications (such as up, down, left, right, front, back...) in the embodiment of the present invention, the directional indications are only used to explain how to move in a certain posture (as shown in the accompanying drawings). If the specific posture changes, the directional indication will also change accordingly.

[0020] In addition, if there are descriptions involving "first", "second" and so on in the embodiments of the present invention, the descriptions of "first", "second" and so on are only for descriptive purposes, and should not be interpreted as indicating or implying its relative importance or implicitly indicates the number of technical features indicated. Thus, the features defined as "first" and "second" may explicitly or implicitly include at least one of these features. In addition, if the meaning of "and/or" appearing in the whole text includes three parallel schemes, taking "A and/or B" as an example, it includes scheme A, scheme B, or schemes in which both A and B are satisfied. In addition, the technical solutions of the various embodiments can be combined with each other, but it must be based on the realization of those skilled in the art. When the combination of technical solutions is contradictory or cannot be realized, it should be considered that the combination of technical solutions does not exist, nor within the scope of protection required by the present invention.

[0021] The present invention proposes a plug, which can be applied to devices such as lamps, but is not limited thereto.

[0022] Referring to Figures 1 to 4, in one embodiment of the present invention, the plug includes an insulating housing 10, a connector 20 and a connecting wire 30; the insulating housing 10 is formed by ultrasonic welding of the first housing 11 and the second housing 12. In this way, the first housing 11 and the second housing 12 surround and form the installation cavity 10a and the wire passing hole 10b communicating with the installation cavity 10a; terminals are provided; the connecting wire 30 is electrically connected to the terminal of the plug connector 20 and is drawn out through the wire passing hole 10b, and the hole wall of the wire passing hole 10b is provided with a limiting part, and the limiting part is abutting /pressing against the outer wall of the connecting wire 30, so as to the connecting wire 30 is restricted from moving along the first direction.

[0023] Mainly referring to FIG. 2 , in this embodiment, both the first housing 11 and the second housing 12 can be made of insulating materials such as hard plastic, and

both the first housing 11 and the second housing 12 can be injection molded parts made by injection molding process. The first housing 11 and the second housing 12 can be fixed by ultrasonic welding, and the first housing 11 and/or the second housing 12 are distributed with welding ribs along the connection surface, so as to facilitate ultrasonic welding. If there is no waterproof requirement, multiple welding ribs can be provided, and multiple welding ribs can be arranged at intervals on the connecting surface of the housing.

[0024] In this embodiment, the first housing 11 can be provided with a positioning post, and the second housing 12 can be provided with a matching positioning hole corresponding to the position of the first housing 11, and the positioning post is inserted in the positioning hole to achieve the first welding position during welding. The pre-positioning of the first housing 11 and the second housing 12 facilitates ultrasonic welding, thereby improving the reliability of the housing 10 assembly.

[0025] It should be noted that ultrasonic welding uses high-frequency vibration waves to transmit to the surfaces of two objects to be welded. In this area, the vibration energy causes the surfaces of the two objects to rub against each other to form fusion between molecular layers. The use of ultrasonic welding instead of lagging allows room for movement within the enclosure.

[0026] Of course, in some other embodiments, the insulating housing 10 may also be assembled using more components, which is not limited here.

[0027] In this embodiment, both the terminals of the plug connector 20 and the connecting wires 30 can move along the second direction, and the first direction is perpendicular to the second direction.

[0028] It should be noted that, as shown in FIG. 4, the first direction may be the height direction of the connector 20, that is, the Z-axis direction in the figure; the second direction may be the width direction of the connector 20, that is, the Y-axis in direction in the figure.

[0029] In this embodiment, the connector 20 may be a TYCO connector or other connector 20 with terminals inside, which is not limited here.

[0030] In this embodiment, the connecting wire 30 is used to transmit electrical signals, which may include a conductor and an insulating layer covering the outside of the conductor, the conductor is electrically connected to the terminal of the connector 20, and the insulating layer is connected to the limiting part of the wall of the wire passing hole 10b to restricted from moving the connecting wire 30 in the first direction, so that the connecting wire 30 can be prevented from moving and driving the plug 20 and its terminals in the first direction.

[0031] Wherein, the limiting part of the wire passing hole 10b can be a strip-shaped protrusion or a circular bump, and the end surface of the limiting part abutting against the connecting wire 30 can be arranged in an arc shape to avoid indentation of the connecting wire 30 and ensure that it can pass the stress test. Preferably, the radius R of the arc may be 1.5mm.

[0032] In the technical solution of the present invention, the plug includes an insulating housing 10, a plug connector 20 and a connecting wire 30; the insulating housing 10 is formed by ultrasonic welding of the first housing 11 and the second housing 12, and the first housing 11 and the second housing 12 are welded together. The second housing 12 surrounds and forms the installation cavity 10a and the wire passing hole 10b communicating with the installation cavity 10a; the plug connector 20 is inserted in the installation cavity 10a and protrudes outward, and the plug connector 20 is provided with a terminal; the connecting wire 30 is electrically connected with the terminal of the plug connector 20 and is drawn out through the wire passing hole 10b, and the hole wall of the wire passing hole 10b is provided with a limiting part, and the limiting part presses against the outer wall of the connecting wire 30 to limit the connecting wire 30 along the first direction. The terminal of the connector 20 and the connecting wire 30 can both move along the second direction, and the first direction is perpendicular to the second direction. Since the terminals in the connector 20 can move along the second direction, the limit fixation of the terminals in the second direction is released, the terminals are prevented from being stretched, and the risk of damage to the terminals is effectively reduced to improve the safety of the plug and extend the service life of the plug.

[0033] In addition, in one embodiment, the plug connector 20 has a first surface and a second surface opposite in the first direction, and the first surface of the plug connector 20 and the insulating housing 10 can be fixed by ultrasonic welding to limit the insertion. The connector 20 moves along the first direction, and the second surface of the connector 20 is arranged in close contact with the insulating housing 10.

[0034] Since the housing of the connector 20 and the insulating housing 10 are fixed by ultrasonic welding, and the connector 20 is fixed in the installation cavity 10a of the insulating housing 10, the connector 20 and the terminals therein cannot move along the third direction and can meet the tension requirement of the plug connector 20, and at the same time, the terminals of the plug connector 20 can move along the second direction, which improves the adaptability of the plug connector 20 when mating. Wherein, the third direction may be the length direction of the plug connector 20.

[0035] In addition, during the production process of the product, it was found that the housing exerts energy on the wires during ultrasonic welding. Excessive energy will damage the outer skin of the connecting wire 30 and cause deep indentations, which will affect the tensile capacity of the connecting wire 30.

[0036] In this regard, the present application also improves the installation structure of the connecting wire 30. Referring to FIG. 2, in one embodiment, at least two spaced apart protrusions 101 protrude from two opposite hole walls of the wire passing hole 10b in the first direction to form a limiting part. In this way, the stability in the height

direction of the connecting wire 30 and the plug connector 20 connected thereto can be further improved.

[0037] Further, in order to enable the terminal to move in the second direction, with reference to FIGS 2 to 4, the body 10 is clearance fit at the wire passing hole 10, so that the connecting wire 30 can move in the second direction, so as to further prevent the terminal from being stretched, hereby reducing the risk of terminal damage, improving the safety of the plug, and extending the length of the plug service life.

[0038] In one embodiment, the plug connector 20 and the insulating housing 10 are fixed by ultrasonic welding to form three welding points. In this way, single-point connection failure between the plug connector 20 and the insulating housing 10 can be avoided, and the stability of welding between the plug connector 20 and the insulating housing 10 is further improved.

[0039] In this embodiment, the connecting lines of the three soldering points can be arranged in a triangular shape, so that the connection between the connector 20 and the insulating housing 10 is more reliable, avoiding single-point, single-direction connection failure, and greatly improving the plug-in connection. The stability of the connection of the piece 20 in the height direction is greatly enhanced.

[0040] The present invention also proposes a lamp, which includes a plug. For the specific structure of the plug, refer to the above-mentioned embodiments. Since the lamp proposed by the present invention includes all the solutions of all the embodiments of the above-mentioned plug, it has at least the same features as the plug. The technical effects are not elaborated here.

[0041] The above descriptions are only optional embodiments of the present invention, and do not limit the patent scope of the present invention . Under the inventive concept of the present invention, the equivalent structural transformation made by using the description of the present invention and the contents of the accompanying drawings, or direct/indirect Application in other related technical fields is included in the patent protection scope of the present invention.

Claims

1. A plug, **characterized in that** the plug comprising:

an insulating housing (10) formed by ultrasonic welding of a first housing (11) and a second housing (12), and the first housing (11) and the second housing (12) enclosing an installation cavity (10a) and a wire passing hole (10b) communicating with the installation cavity (10a);
a plug connector (20), which is inserted into the installation cavity (10a) and protruded outward, and the plug connector (20) is provided with terminals; and
a connecting wire (30) is electrically connected to the terminal and drawn out through the wire passing hole (10b), and the hole wall of the wire passing hole (10b) is provided with a limiting part, and the limiting part is abutting against the outer walls of the connecting wires (30) to limit the connecting wires (30) from moving along a first direction.

2. The plug according to claim 1, **characterized in that** the wire passing hole (10b) is provided with at least two protrusions (101) spaced apart on the two hole walls opposite each other in said first direction to form said limiting part.

3. The plug according to claim 2, **characterized in that**, the end surface of the limiting part abutting against the connecting wire (30) is arranged in an arc shape.

4. The plug according to claim 1, **characterized in that** both the terminal and the connection wire (30) can move along a second direction, and the first direction is perpendicular to the second direction.

5. The plug according to claim 4, **characterized in that** there is a gap (101a) between the two hole walls of the wire passing hole (10b) in the second direction and the outer wall of the connecting wire (30), so that the connecting wire (30) is movable in the second direction.

6. The plug according to claim 1, **characterized in that**, the connector (20) has a first surface and a second surface opposite to each other in the first direction, and the first surface of the connector (20) is ultrasonically welded to the insulating housing (10) to limit the movement of the plug (20) along the first direction , and the second surface of the plug (20) being connected to the insulating housing (10) is only partially abutting each other.

7. The plug according to claim 1, **characterized in that** welding ribs are distributed along the connection surface on the first housing (11) and/or the second housing (12).

8. The plug according to claim 7, **characterized in that**, the first housing (11) is provided with a positioning post, and the second housing (12) is provided with a positioning hole corresponding to the position post of the first housing (11), and the positioning post being inserted in the positioning hole.

9. The plug according to claim 7, **characterized in that**, both the first housing (11) and the second housing (12) are injection molded parts.

10. A lamp, **characterized by** comprising the plug according to any one of the claims 1-9.

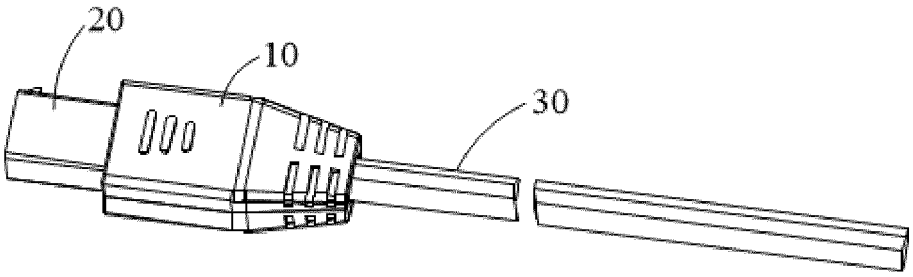

figure 1

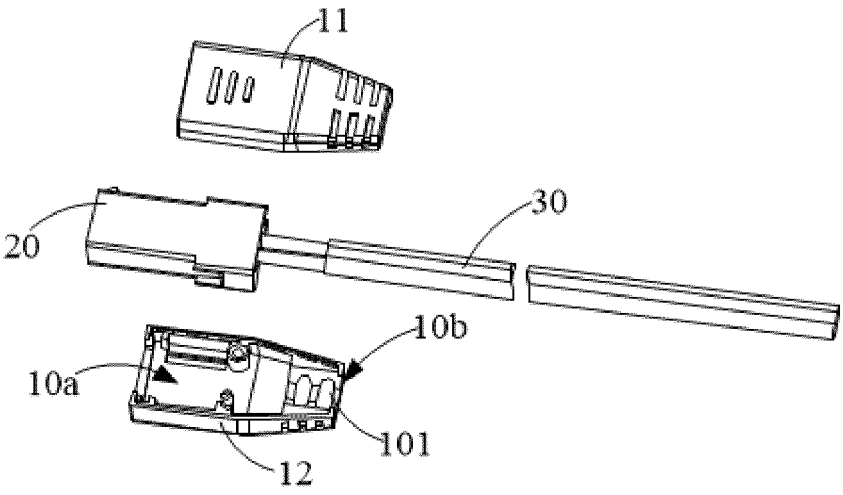

figure 2

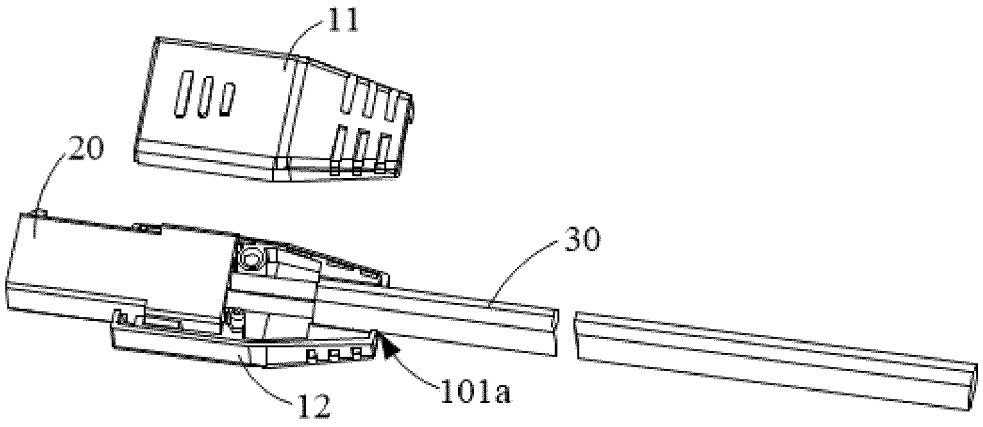

Figure 3

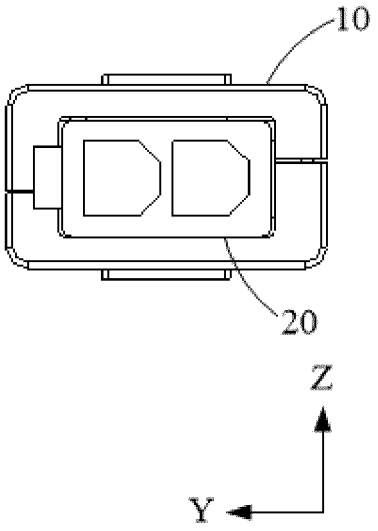

Figure 4

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EUROPEAN SEARCH REPORT

Application Number
EP 23 18 0696

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (IPC)
X	CN 114 243 364 A (SEERRICH ELECTRON LTD COMPANY) 25 March 2022 (2022-03-25) * paragraph [0046] - paragraph [0053]; figures 1,2,3,4,5 *	1-10	INV. H01R13/504 H01R13/56 H01R13/58
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TECHNICAL FIELDS SEARCHED (IPC)

H01R

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	20 October 2023	Mateo Segura, C

CATEGORY OF CITED DOCUMENTS

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
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US 2017207580 A1	20-07-2017	CN 106981763 A	25-07-2017
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