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(54) **CROWN SPRING MODULE AND CONNECTOR**

(57) This patent application relates to the connector technology field, and discloses a crown spring module and a connector. The crown spring module includes a sleeve and an anti-detachment means. The sleeve is provided with a cylindrical accommodative chamber inside, wherein the accommodative chamber is used for accommodating a crown spring. The anti-detachment means is disposed within the sleeve and comprises a first anti-detachment member and a second anti-detachment member. The first anti-detachment member is disposed at an opening of the accommodative chamber, and the second anti-detachment member is disposed at one end of the

accommodative chamber away from the opening. The first anti-detachment member and the second anti-detachment member can respectively reduce inner diameter at the opening of the accommodative chamber and inner diameter at the one end of the accommodative chamber away from the opening, such that the crown spring is clamped between the first anti-detachment member and the second anti-detachment member. The first and second anti-detachment members of this invention achieve fixation of the crown spring by changing inner diameter of the accommodative chamber.

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Description

TECHNICAL FIELD

[0001] This patent application relates to the technology field of connector, in particular to a crown spring module and a connector.

BACKGROUND

[0002] The crown spring in an electrical connector is used to achieve a conductive connection with female pins in the electrical connector, and is widely used in electronic and electrical equipment. With the inevitable trend of high current transmission in the future, the requirements for transmission reliability and stability of contacts are also becoming increasingly stringent.

[0003] In existing technology, the securing structures of a crown spring and a metal sleeve are connected together through laser welding, riveting, and so on, which is complicated and costly.

[0004] The fixation of the crown spring is achieved through a step disposed on the metal sleeve. However, such step is to be formed by stamping and has rounded on the inside of the step, which make the crown spring prone to slide out of the metal sleeve along the rounded after installation. Alternatively, the step can be formed by machining, which makes the step having no rounded on the inside of the step and being relatively reliable in fixing. However, the cost of this machining approach is relatively high.

[0005] So, there is an urgent need for a crown spring module and connector to solve the above problems.

SUMMARY

[0006] Based on the above, the purpose of this invention is to provide a crown spring module and connector, with simple process, convenience for connection, and lower cost.

[0007] To achieve the above purposes, this invention adopts the following technical solutions:
a crown spring module comprising:

a sleeve provided with a cylindrical accommodative chamber inside, wherein the accommodative chamber is to accommodate the crown spring;
an anti-detachment means disposed within the sleeve, the anti-detachment means comprising a first anti-detachment member and a second anti-detachment member, wherein the first anti-detachment member is disposed at an opening of the accommodative chamber, and the second anti-detachment member is disposed at one end of the accommodative chamber away from the opening, and wherein the first and second anti-detachment members can respectively reduce inner diameter at the opening of the accommodative chamber and inner diameter at

the one end of the accommodative chamber away from the opening, such that the crown spring is clamped between the first and second anti-detachment members.

[0008] As a preferred solution for the crown spring module, inner sides of the first anti-detachment member and the second anti-detachment member that abut against the crown spring are both configured as non-rounded.

[0009] As a preferred solution for the crown spring module, the anti-detachment means is further provided with a latching ring, the first anti-detachment member is configured as an installation groove, and the latching ring can be placed in the installation groove and at least partially convexly disposed on an inner wall of the sleeve to abut against the crown spring.

[0010] As a preferred solution for the crown spring module, the first anti-detachment member is configured as stamped depressions, wherein the stamped depressions are in communication with the opening of the sleeve and at least partially convexly disposed on the inner wall of the sleeve to abut against the crown spring.

[0011] As a preferred solution for the crown spring module, the second anti-detachment member is configured as installation steps, wherein the installation steps are arranged circumferentially along the inner wall of the sleeve;

alternatively, the second anti-detachment member is configured as an installation groove, and the anti-detachment means is further provided with a latching ring, wherein the latching ring can be placed in the installation groove and at least partially convexly disposed on an inner wall of the sleeve to abut against the crown spring;

alternatively, the second anti-detachment member is configured as stamped depressions, wherein the stamped depressions are in communication with the opening of the sleeve and at least partially convexly disposed on the inner wall of the sleeve to abut against the crown spring.

[0012] As a preferred solution for the crown spring module, the first anti-detachment member and/or the second anti-detachment member are configured as first stamped convex blocks, wherein the first stamped convex blocks comprise first protrusions protruding from an inner wall of the sleeve and first depressions concaving on an outer wall of the sleeve, wherein the first depressions are provided in one-to-one correspondence with the first protrusions, and the first protrusions can abut against the crown spring.

[0013] As a preferred solution for the crown spring module, there are a plurality of first stamped convex blocks, and the plurality of first stamped convex blocks are disposed along the inner wall of the sleeve in even spacings.

[0014] As a preferred solution for the crown spring module, the sleeve is configured to form the accommodative chamber by winding a plate material.

[0015] As a preferred solution for the crown spring module, the first anti-detachment member and/or the second anti-detachment member are configured as second stamped convex blocks, wherein the second stamped convex blocks are disposed on the plate material, and after the plate material is wound, the second stamped convex blocks are at least partially protruding from an inner wall of the sleeve to abut against the crown spring.

[0016] A connector including a plugging end, wherein the plugging end is provided with the crown spring module as described in any of the above solutions.

[0017] The beneficial effects of this invention comprises as follows.

[0018] This invention provides a sleeve with an accommodative chamber for accommodating a crown spring, and provides an anti-detachment means, which can ensure that the crown spring is stably placed in the accommodative chamber without falling off, improving the stability and reliability of the connection between the crown spring and the sleeve. Specifically, the anti-detachment means is provided with a first anti-detachment member and a second anti-detachment member. The first and second anti-detachment members achieve the fixation of the crown spring by changing inner diameter at the opening of the accommodative chamber and inner diameter at the one end of the accommodative chamber away from the opening. The second anti-detachment member is disposed at the one end of the accommodative chamber away from the opening, which can be used for positioning the crown spring. The first anti-detachment member is disposed at the opening of the accommodative chamber, and by disposing the first anti-detachment member, it is used to cooperate with the second anti-detachment member for the installation and fixation of the crown spring. Through a structural improvement, the anti-detachment means brings the advantages of simple process, convenient connection, and lower cost as compared to the installation of the crown spring through laser welding, riveting, and so on in existing technologies.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] In order to explain the technical solutions in the embodiments of the present patent application more clearly, the accompanying drawings required to be used in the description of the embodiments of the present patent application will be briefly introduced below. Obviously, the accompanying drawings in the following description are only some of the embodiments of the present patent application, and for those of ordinary skill in the art, other accompanying drawings would also have been obtained from the contents of the embodiments of the present patent application and these accompanying drawings without involving any inventive effort.

FIG. 1 is a schematic diagram of a crown spring module provided in a specific implementation of the present patent application;

FIG. 2 is a sectional view of a crown spring module provided in a specific implementation of the present patent application;

FIG. 3 is a schematic diagram of another crown spring module provided in a specific implementation of the present patent application;

FIG. 4 is a sectional view of another crown spring module provided in a specific implementation of the present patent application;

FIG. 5 is a schematic diagram of yet another crown spring module provided in a specific implementation of the present patent application;

FIG. 6 is a sectional view of yet another crown spring module provided in a specific implementation of the present patent application;

FIG. 7 is a schematic diagram of further yet another crown spring module provided in a specific implementation of the present patent application;

FIG. 8 is a sectional view of further yet another crown spring module provided in a specific implementation of the present patent application.

[0020] In the drawings:

100 sleeve; 200 crown spring;
310 first anti-detachment member; 311 latching ring;
320 second anti-detachment member.

DETAILED DESCRIPTION

[0021] Embodiments of the present patent application are described below in detail, and examples of the embodiments are shown in the accompanying drawings, where the same or similar labels throughout represent the same or similar components or components with the same or similar functions. The embodiments described below with reference to the accompanying drawings are exemplary and intended to explain the present patent application, but cannot be understood as limitations to the present patent application.

[0022] In the description of the present patent application, it should be noted that, orientational or positional relationships indicated by the terms "center", "upper", "lower", "left", "right", "vertical", "horizontal", "inner", "outer" and the like are the orientational or positional relationships shown based on the accompanying drawings, and are only for ease of describing the present patent application and simplifying the description, rather than indicating or implying that the apparatus or element referred to must have a specific orientation or be constructed and operated in a specific orientation, and therefore cannot be construed as limiting the present patent application. In addition, the terms "first" and "second" are used for descriptive purposes only, and cannot be understood as indicating or implying relative importance. The terms

"first position" and "second position" refer to two different positions.

[0023] Unless otherwise specified and defined, the term "mount", "connected", and "connect", or "fix" should be comprehended in a broad sense. For example, the term may be a fixed connection or a detachable connection; or may be a mechanical connection or an electrical connection; may be a direct connection or an indirect connection via an intermediate medium, or may be internal communication between two elements or interaction relationship between two elements. For those of ordinary skill in the art, specific meanings of the foregoing terms in the present patent application may be understood based on specific situations.

[0024] In this patent application, unless otherwise specified and defined, the situation of a first feature being located "above" or "below" a second feature may include a direct contact between the first and second features, or include contact between the first and second features that is not direct, but through other features between them. In addition, the situation of a first feature being located "above", "over" and "upon" a second feature includes that the first feature is directly above and diagonally above the second feature, or simply indicates that the first feature is horizontally higher than the second feature. The situation of a first feature being located "below", "beneath" and "under" a second feature includes that the first feature is directly below and diagonally below the second feature, or simply indicates that the first feature is horizontally lower than the second feature.

[0025] The technical solutions of the present patent application will be further illustrated with reference to the accompanying drawings and through detailed description.

[0026] As shown in FIGS. 1 to 8, this implementation provides a crown spring module, which includes a sleeve 100 and an anti-detachment means. The sleeve 100 is provided with a cylindrical accommodative chamber inside, wherein the accommodative chamber is to accommodate a crown spring 200. The anti-detachment means is disposed within the sleeve 100 and comprises a first anti-detachment member 310 and a second anti-detachment member 320. The first anti-detachment member 310 is disposed at an opening of the accommodative chamber, and the second anti-detachment member 320 is disposed at one end of the accommodative chamber away from the opening. The first anti-detachment member 310 and the second anti-detachment member 320 can respectively reduce inner diameter at the opening of the accommodative chamber and inner diameter at the one end of the accommodative chamber away from the opening, such that the crown spring 200 is clamped between the first anti-detachment member 310 and the second anti-detachment member 320.

[0027] By providing the sleeve 100 with the accommodative chamber, it can be used for accommodating the crown spring 200. By providing the anti-detachment means, it can ensure that the crown spring 200 is stably

placed in the accommodative chamber without falling off, improving the stability and reliability of the connection between the crown spring 200 and the sleeve 100. Specifically, the anti-detachment means is provided with the first anti-detachment member 310 and the second anti-detachment member 320. The first anti-detachment member 310 and the second anti-detachment member 320 achieve the fixation of the crown spring 200 by changing inner diameter at the opening of the accommodative chamber and inner diameter at the one end of the accommodative chamber away from the opening. The second anti-detachment member 320 is disposed at the one end of the accommodative chamber away from the opening, which can be used for positioning the crown spring 200. The first anti-detachment member 310 is disposed at the opening of the accommodative chamber, and by disposing the first anti-detachment member 310, it is to cooperate with the second anti-detachment member 320 to achieve the installation and fixation of the crown spring 200. Through this structural improvement, the anti-detachment means brings the advantages of simple process, convenience for connection, and lower cost as compared to the installation of the crown spring 200 through laser welding, riveting, and so on in existing technologies.

[0028] It should be noted that inner sides of the first anti-detachment member 310 and the second anti-detachment member 320 that abut against the crown spring 200 are both configured as non-rounded. This configuration is to ensure a stable abut when the first anti-detachment member 310 and the second anti-detachment member 320 abut two ends of the crown spring 200, respectively, such that the crown spring 200 will not be prone to slide out of the sleeve 100, improving the reliability of the connection between the sleeve 100 and the crown spring 200.

[0029] As an optional solution for the crown spring module, the sleeve 100 is configured in one piece to form the accommodative chamber. For example, the one-piece sleeve 100 can be machined by drawing, casting, or other integral forming processes, and the one-piece sleeve 100 is structurally stronger.

[0030] In one embodiment, as shown in FIGS. 1 and 2, the anti-detachment means is further provided with a latching ring 311. To achieve the installation of the latching ring 311, the first anti-detachment member 310 is configured as an installation groove, which is arranged along the circumference of an inner wall of the accommodative chamber, such that the latching ring 311 can be placed in the installation groove and at least partially convexly disposed on the inner wall of the sleeve 100. The part protruding from the inner wall of the sleeve 100 can be used to abut against the crown spring 200, effectively avoiding the detachment of the crown spring 200 and ensuring the reliability of the installation of the crown spring 200.

[0031] In another embodiment, as shown in FIGS. 3 and 4, the first anti-detachment member 310 is config-

ured as stamped depressions, which are in communication with the opening of the sleeve 100. That is, the stamped depressions are formed by stamping along the axis direction of the sleeve 100 on the opening side of the sleeve 100, and the stamped depressions are at least partially convexly disposed on the inner wall of the sleeve 100, for abutting against the crown spring 200 to achieve the installation of the crown spring 200.

[0032] Preferably, there are a plurality of stamped depressions arranged along the circumference of the sleeve 100, and the plurality of stamped depressions are evenly spaced to ensure effective fixation of the crown spring 200 in all circumferential directions. For example, there are four stamped depressions in this embodiment. In addition, the size of the stamped depressions convexly disposed on the inner wall of the sleeve 100 can be set according to the thickness of the crown spring 200 to ensure reliable anti-detachment effect. The specific setting is not limited here.

[0033] Optionally, in the above two embodiments, the second anti-detachment member 320 is configured as an installation step, and an end face of the crown spring 200 away from the opening side of the accommodative chamber can be in contact with the installation step. The installation step is arranged circumferentially along the inner wall of the sleeve 100 to ensure that the crown spring 200 can be in contact with the installation step at all circumferential positions, ensuring the stable and reliable positioning of the crown spring 200 by the second anti-detachment member 320.

[0034] It should be noted that in the above two embodiments, the second anti-detachment member 320 may also be configured in the anti-detachment form of the installation groove and the latching ring 311, or the anti-detachment form of the stamped depressions. Those skilled in the art can choose according to actual needs, and specific limitations are not made here.

[0035] In other embodiments, as shown in FIGS. 5 and 6, the first anti-detachment member 310 and/or the second anti-detachment member 320 are configured as first stamped convex blocks. That is, the first stamped convex blocks are formed by directly stamping the one-piece hollow cylindrical sleeve 100. Specifically, the first stamped convex blocks comprise first protrusions protruding from the inner wall of the sleeve 100 and first depressions concaving on the outer wall of the sleeve 100. It can be understood that both the first depressions and the first protrusions are formed by stamping, so the first depressions and the first protrusions are disposed with one-to-one correspondence. Since the first protrusions are convexly disposed on the inner wall of the sleeve 100, they can be used to abut against the crown spring 200 to achieve anti-detachment of the crown spring 200.

[0036] Optionally, there are a plurality of first stamped convex blocks, which are evenly spaced along the inner wall of the sleeve 100. By disposing the plurality of first stamped protrusions, it is ensured that an effective fixation of the crown spring 200 at all circumferential positions

is achieved. For example, there are six first stamped convex blocks in this embodiment. And both the first anti-detachment member 310 and the second anti-detachment member 320 are configured as the first stamped convex blocks.

[0037] Preferably, the first stamped convex blocks are configured as a rectangular shape, such that the end of the crown spring 200 can abut against one side of the rectangle first protrusion, with a larger abutting area, thereby making the positioning more reliable.

[0038] As an optional solution for the crown spring module, as shown in FIGS. 7 and 8, the sleeve 100 is configured to form the accommodative chamber by winding a plate material. The sleeve 100, which is formed by winding the plate material, can be adaptively wound according to the crown spring 200 that needs to be installed, with better adaptability.

[0039] In one embodiment, the first anti-detachment member 310 and/or the second anti-detachment member 320 are configured as second stamped convex blocks. That is, the second stamped convex blocks are disposed on the plate material, and then the plate material disposed with the second stamped convex blocks is wound to form the accommodative chamber. After winding, the second stamped convex blocks are at least partially protruding from an inner wall of the sleeve 100 to abut against the crown spring 200, achieving fixation of the crown spring 200.

[0040] This implementation also discloses a connector including a plugging end. The plugging end is provided with the crown spring module as described in any previous solution. With the plugging end equipped with the crown spring module mentioned above, the connection between the crown spring 200 and the sleeve 100 becomes more reliable, thereby making the plugging more reliable. Meanwhile the cost of a connector provided with the aforementioned crown spring module is lower.

[0041] The above contents are only preferred embodiments of this patent application. For those skilled in the art, there may be changes in specific implementations and patent application scopes based on the ideas of this patent application. The contents of this specification should not be understood as a limitation on this patent application.

Claims

1. A crown spring module comprising:

a sleeve (100) provided with a cylindrical accommodative chamber inside, wherein the accommodative chamber is to accommodate the crown spring (200);

an anti-detachment means disposed within the sleeve (100), the anti-detachment means comprising a first anti-detachment member (310) and a second anti-detachment member (320),

- wherein the first anti-detachment member (310) is disposed at an opening of the accommodative chamber, and the second anti-detachment member (320) is disposed at one end of the accommodative chamber away from the opening, and wherein the first anti-detachment member (310) and the second anti-detachment member (320) are capable of respectively reducing inner diameter at the opening of the accommodative chamber and inner diameter at the one end of the accommodative chamber away from the opening, such that the crown spring (200) is clamped between the first anti-detachment member (310) and the second anti-detachment member (320).
2. The crown spring module according to claim 1, wherein inner sides of the first anti-detachment member (310) and the second anti-detachment member (320) that abut against the crown spring (200) are both configured as non-rounded.
 3. The crown spring module according to claim 1, wherein the anti-detachment means is further provided with a latching ring (311), the first anti-detachment member (310) is configured as an installation groove, and the latching ring (311) is capable of being placed in the installation groove and at least partially convexly disposed on an inner wall of the sleeve (100) to abut against the crown spring (200).
 4. The crown spring module according to claim 1, wherein the first anti-detachment member (310) is configured as stamped depressions, wherein the stamped depressions are in communication with an opening of the sleeve (100) and at least partially convexly disposed on an inner wall of the sleeve (100) to abut against the crown spring (200).
 5. The crown spring module according to claim 3 or 4, wherein the second anti-detachment member (320) is configured as installation steps, wherein the installation steps are arranged circumferentially along the inner wall of the sleeve (100);
 or, the second anti-detachment member (320) is configured as an installation groove, and the anti-detachment means is further provided with a latching ring (311), wherein the latching ring (311) is capable of being placed in the installation groove and at least partially convexly disposed on an inner wall of the sleeve (100) to abut against the crown spring (200);
 or, the second anti-detachment member (320) is configured as stamped depressions, wherein the stamped depressions are in communication with an opening of the sleeve (100) and at least partially convexly disposed on an inner wall of the sleeve (100) to abut against the crown spring (200).
 6. The crown spring module according to claim 2, wherein the first anti-detachment member (310) and/or the second anti-detachment member (320) are configured as first stamped convex blocks, wherein the first stamped convex blocks comprise first protrusions protruding from an inner wall of the sleeve (100) and first depressions concaving on an outer wall of the sleeve (100), wherein the first depressions are provided in one-to-one correspondence with the first protrusions, and the first protrusions are capable of abutting against the crown spring (200).
 7. The crown spring module according to claim 6, wherein there are a plurality of first stamped convex blocks, and the plurality of first stamped convex blocks are disposed along an inner wall of the sleeve (100) in even spacings.
 8. The crown spring module according to claim 1, wherein the sleeve (100) is configured to form the accommodative chamber by winding a plate material.
 9. The crown spring module according to claim 8, wherein the first anti-detachment member (310) and/or the second anti-detachment member (320) are configured as second stamped convex blocks, wherein the second stamped convex blocks are disposed on the plate material, and after the plate material is wound, the second stamped convex blocks are at least partially protruding from an inner wall of the sleeve (100) to abut against the crown spring (200).
 10. A connector including a plugging end, wherein the plugging end is provided with the crown spring module of any one of claims 1-9.

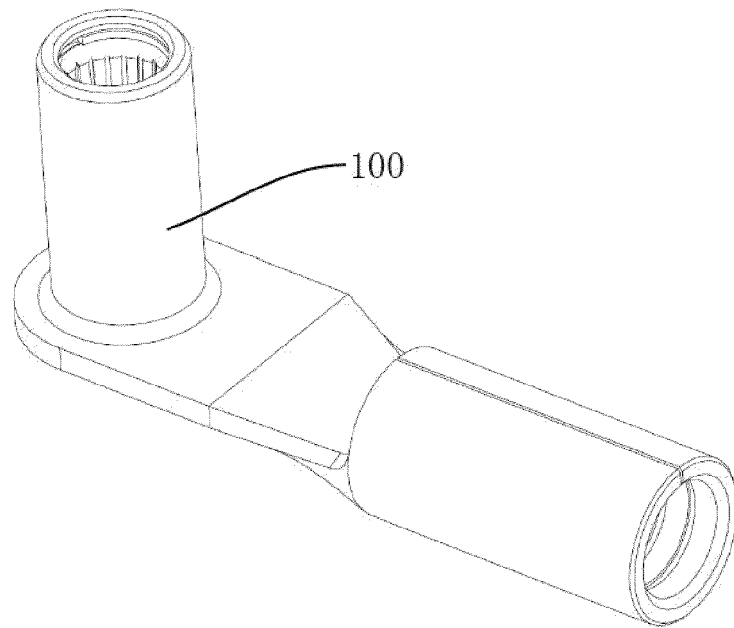


FIG. 1

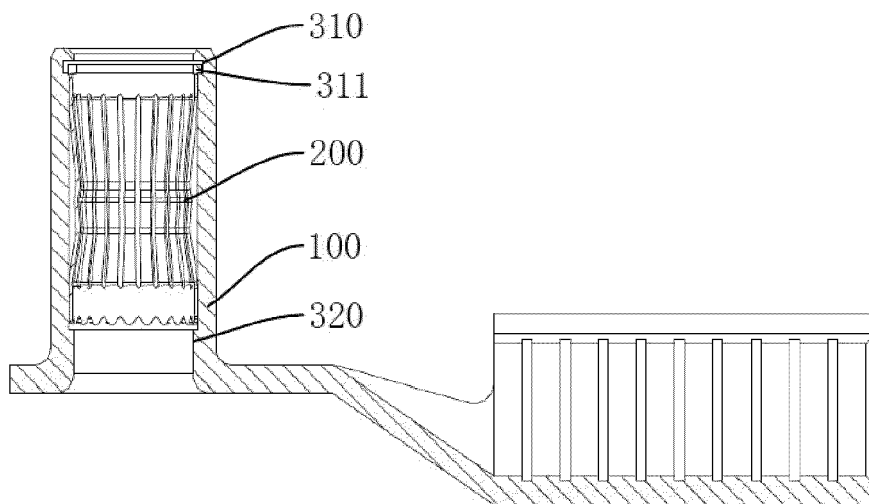


FIG. 2

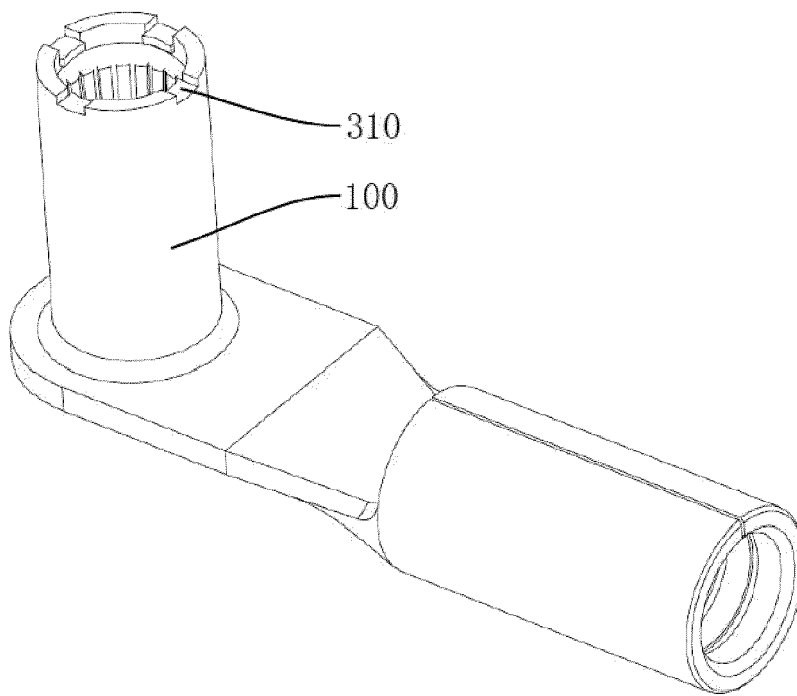


FIG. 3

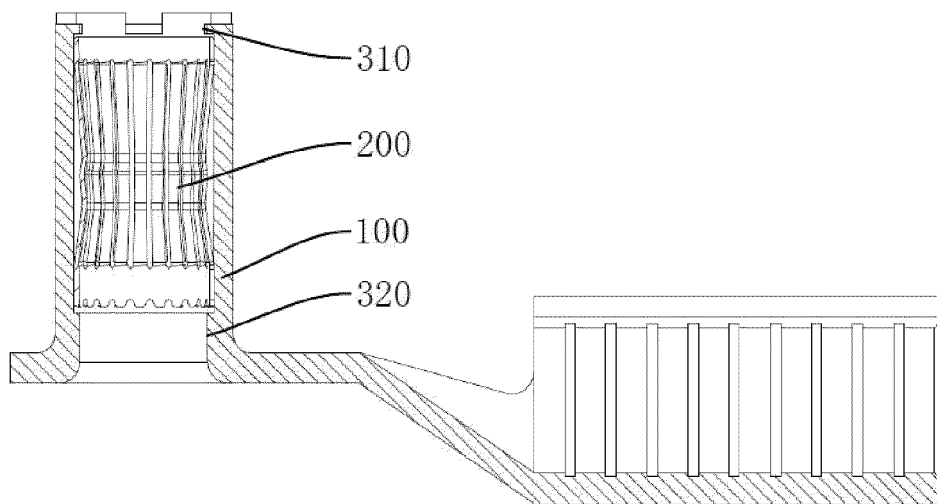


FIG. 4

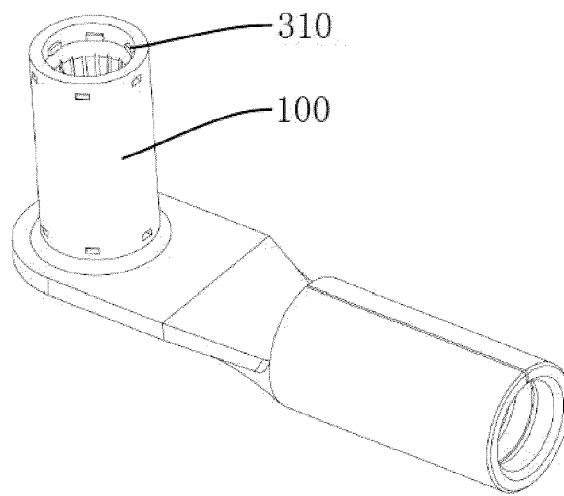


FIG. 5

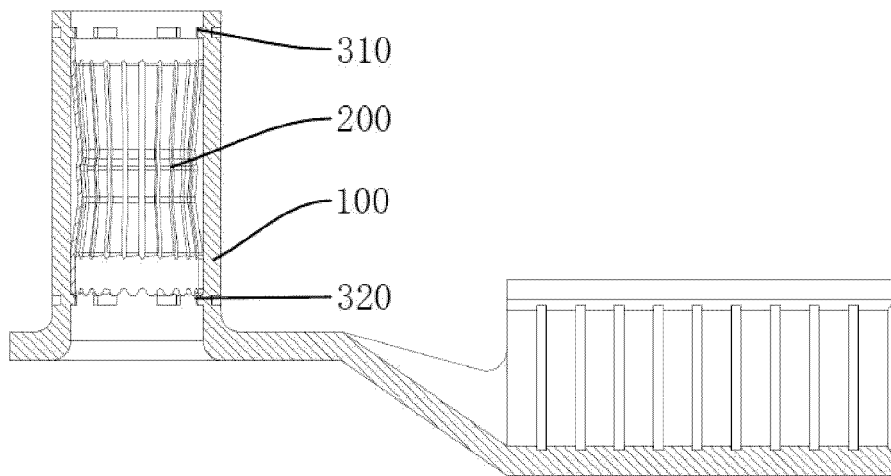


FIG. 6

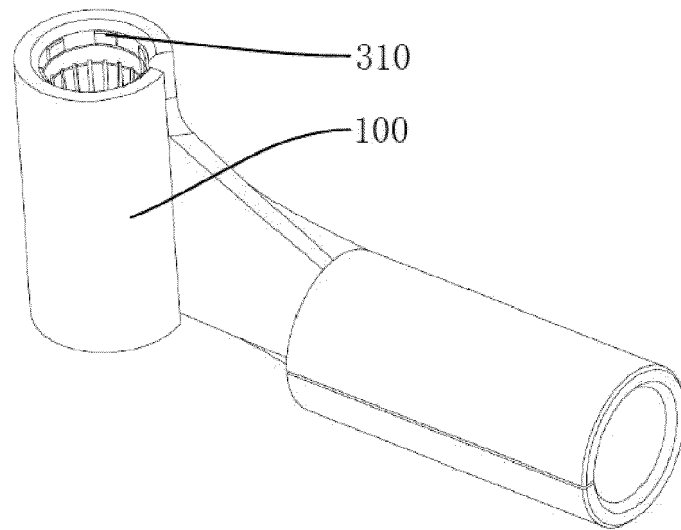


FIG. 7

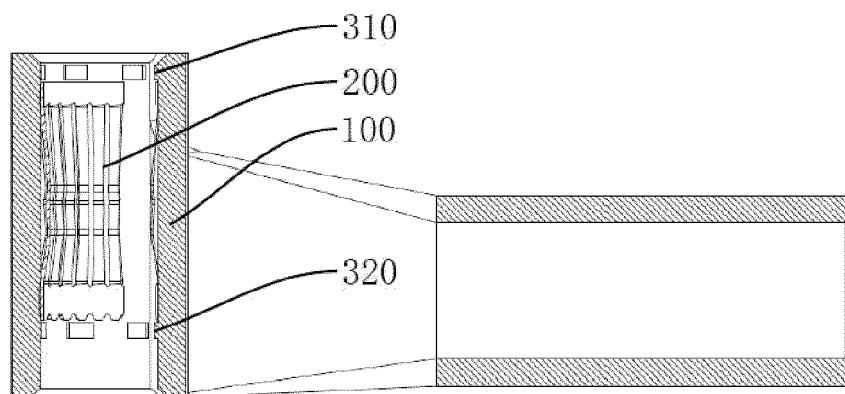


FIG. 8



EUROPEAN SEARCH REPORT

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EPO FORM 1503 03.82 (P04C01)

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The present search report has been drawn up for all claims			
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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	

ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO.

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5 This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report.
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