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(71) Applicant: **Therm-O-Disc, Incorporated**
Mansfield, Ohio 44907 (US)

(72) Inventors:
- **DING, Shouzheng**
  Tongling, Anhui, 244000 (CN)
- **MA, Qinglu**
  Zhuhai, Guangdong, 519085 (CN)
- **SCHUCKMANN, Scott**
  Cincinnati, Ohio, 45212 (US)
- **HUANG, Chenchen**
  Tongling, Anhui, 244000 (CN)
- **YANG, Sihai**
  Tongling, Anhui, 244000 (CN)

(74) Representative: **Bryn-Jacobsen, Caelia et al**
Kilburn & Strode LLP
Lacon London
84 Theobalds Road
London WC1X 8NL (GB)

(54) SEALED TERMINAL ASSEMBLY

(57) A sealed terminal assembly is disclosed asi including a body having at least one conductive needle mounting hole penetrating the body, at least one conductive needle mounted in the conductive needle mounting hole, and at least one insulating member located between the corresponding conductive needle and the body. The insulator connects the conductive needle to the body in an insulating manner. The conductive needle includes a copper core and a steel sleeve cladding the outer periphery of the copper core. The sealed terminal assembly has improved electrical conductivity and reduced heat generation and is especially suitable for low voltage situations.

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Description

FIELD

[0001] The present application relates to the technical field of electrical terminal, and in particular to a sealed terminal assembly.

BACKGROUND

[0002] Nowadays, the use of air conditioners in vehicles has become widespread, which can provide occupants with a comfortable temperature in an enclosed space. Generally, in automotive air conditioners, electrical power is transmitted from the frequency converter to the motor in the compressor by means of sealed terminals. Currently, the widely used sealed terminals of compressors are suitable for high voltages, which use stainless steel as conductors. Generally speaking, air conditioner compressors require more than two kilowatts of electrical power. If the stainless steel terminal is applied to a low-voltage (for example, 48V) system, a current of 100-150A is required, which leads to a relatively large cross section of the stainless steel terminal. In addition, the resistance of the stainless steel terminal is large, so it generates large amount of heat. Therefore, there is a need for a sealed terminal assembly suitable for low voltage situations.

SUMMARY

[0003] In order to solve the above-mentioned problems, an object of the present application is to provide a sealed terminal assembly, which can be applied to the situation of low voltage, and the volume may not increase significantly.

[0004] The sealed terminal assembly according to the present application includes: a body having at least one conductive needle mounting hole penetrating the body; at least one conductive needle, each of the at least one conductive needle is mounted in the conductive needle mounting hole, and at least one insulating member, each of the at least one insulating member is located between the corresponding conductive needle and the body, and is used for connecting the conductive needle to the body in an insulating manner; the conductive needle includes a copper core and a steel sleeve cladding the outer periphery of the copper core.

[0005] The sealed terminal assembly as described above, where the copper core includes an extension portion extending along an axial direction of the conductive needle mounting hole and an expansion portion located at one end of the conductive needle, an outer dimension of the expansion portion is larger than an outer dimension of the extension portion.

[0006] The sealed terminal assembly as described above, where the insulating member includes a ceramic ring sleeved on the outside of the conductive needle.

[0007] The sealed terminal assembly as described above, where the insulating member further includes a glass sintered piece, which is located between the body, the conductive needle and the ceramic ring and connects the body, the conductive needle and the ceramic ring in an insulating manner.

[0008] The sealed terminal assembly as described above, where an opening on one end of the ceramic ring close to the body is formed as a bell mouth.

[0009] The sealed terminal assembly as described above, where the numbers of the conductive needles, the conductive needle mounting holes, and the insulating members are three, respectively.

[0010] The sealed terminal assembly as described above, where an outer diameter of the expansion portion of the conductive needle is equal to an outer diameter of the steel sleeve, so that the expansion portion is flush with the steel sleeve in a radial direction.

[0011] The sealed terminal assembly as described above, where the body is made of metal and has at least one mounting hole.

[0012] The sealed terminal assembly as described above, where a free end of the steel sleeve has a chamfer.

[0013] Since the conductive needle of the terminal assembly of the present application is composed of both the copper core and the steel sleeve, the copper core has a much lower electrical resistance than the steel sleeve, has good electrical conductivity when large currents pass, and therefore reduces heat generation. Meanwhile, the steel sleeve cladding the copper core retains good bonding ability with the glass sintered piece, and is suitable for the application of low voltage and high current without significantly increasing the volume.

[0014] The sealed terminal assembly of the present application has improved electrical conductivity and reduced heat generation, and is especially suitable for low voltage situations.

BRIEF DESCRIPTION OF THE DRAWINGS

[0015]

FIG. 1 is a perspective view of a sealed terminal assembly according to the present application;

FIG. 2 is a cross-sectional view of the sealed terminal assembly according to the present application;

FIG. 3 is a schematic diagram of a conductive needle of the sealed terminal assembly according to the present application;

FIG. 4 is a schematic diagram of a body of the sealed terminal assembly according to the present application;

FIG. 5 is a schematic diagram of a ceramic ring of a sealed terminal assembly according to the present application.

DETAILED DESCRIPTION OF THE EMBODIMENTS

[0016] Hereinafter, the sealed terminal assembly of the present application is described with reference to the accompanying drawings.

[0017] FIG. 1 is a perspective view of a sealed terminal assembly according to the present application; FIG. 2 is a cross-sectional view of the sealed terminal assembly according to the present application. Referring to FIG. 1 and FIG. 2, the sealed terminal assembly of the present application includes a body 1, at least one conductive needle 2 and at least one insulating member 3. The body 1 is made of metal and has at least one conductive needle mounting hole 11 (see FIG. 4) passing through the body 1. The number of conductive needles 2 corresponds to the number of conductive needle mounting holes 11. That is, each conductive needle 2 is mounted in the corresponding conductive needle mounting hole 11. Each insulating member 3 is sleeved on the outside of the corresponding conductive needle and serves to insulate the conductive needle from the body 1. Further, the number of the conductive needles 2 also corresponds to the number of the insulating members 3.

[0018] Referring to FIG. 2, the conductive needle in the present application includes a copper core 21 and a steel sleeve 22 cladding the outer periphery of the copper core 21. The copper core 21 has a much smaller resistance than the steel sleeve, has good electrical conductivity when a large current passes under low voltage conditions, and thus reduces heat generation. Meanwhile, the steel sleeve 22 cladding the copper core 21 retains a good bonding ability with the insulating member 3.

[0019] Referring to FIG. 3, the copper core 21 includes an extension portion 211 and an expansion portion 212. The extension portion 211 extends along the axial direction of the conductive needle mounting hole 11, and the expansion portion 212 is located at one end of the extension portion. An external dimension of the expansion portion is larger than an external dimension of the extension portion 211 to facilitate welding, so that the cross section of the copper core 21 is T-shaped. The steel sleeve 22 clads the outer periphery of the extension portion 211 of the copper core 21. Preferably, the outer diameter of the expansion portion 212 of the copper core 21 is equal to the outer diameter of the steel sleeve 22 , so that the expansion portion 212 of the copper core 21 is flush with the steel sleeve 22 in the radial direction.

[0020] Referring back to FIG. 2 , the conductive needles 2 are mounted in the conductive needle mounting holes 11 of the body 1 through the insulating member 3. The insulating member 3 includes a ceramic ring 32 and a glass sintered piece 31. The conductive needle 2 passes through the ceramic ring 32, and the ceramic ring 32 is placed in the conductive needle mounting hole 11. Then, a glass sintered piece 31 is formed and cured between the steel sleeve 22 of the conductive needle, the ceramic ring 32 and the body, thereby connecting them together in an insulating manner.

[0021] Preferably, referring to FIG. 5, the opening 321 on one end of the ceramic ring 32 close to the body 1 is formed as a bell mouth for holding the glass sintered piece.

[0022] In addition, preferably, as shown in FIG. 3, one end of the steel sleeve 22 far away from the body 1 is provided with a chamfer to facilitate installation.

[0023] In the terminal assembly of this embodiment, the numbers of the conductive needles 2, the conductive needle mounting holes 11 and the insulating members 3 are respectively three. However, it is contemplated that there may be any number of conductive needles.

[0024] Finally, as shown in FIG. 4, the body 1 may also have a mounting hole 12 for mounting the sealed terminal assembly.

[0025] Since the conductive needle of the terminal assembly of the present application is composed of both the copper core and the steel sleeve, the copper core has a much lower electrical resistance than the steel sleeve, has good electrical conductivity when large currents pass, and therefore reduces heat generation. Meanwhile, the steel sleeve cladding the copper core retains good bonding ability with the glass sintered piece, and is suitable for the application of low voltage and high current without significantly increasing the volume.

[0026] The preferred embodiments of the present application are exemplarily introduced above, but the protection scope of the present application is not limited thereto. Variations and modifications made within the spirit and principles of the present application fall within the scope of the present application.

Claims

1. A sealed terminal assembly, comprising:

a body having at least one conductive needle mounting hole penetrating the body;
at least one conductive needle, wherein each of the at least one conductive needle is mounted in the conductive needle mounting hole, and
at least one insulating member, wherein each of the at least one insulating member is located between the corresponding conductive needle and the body, and is used for connecting the conductive needle to the body in an insulating manner;
wherein the conductive needle comprises a copper core and a steel sleeve cladding the outer periphery of the copper core.

2. The sealed terminal assembly according to claim 1, wherein the copper core comprises an extension portion extending along an axial direction of the conductive needle mounting hole and an expansion portion located at one end of the conductive needle, an outer dimension of the expansion portion is larger

than an outer dimension of the extension portion.

3. The sealed terminal assembly according to claim 1, wherein the insulating member comprises a ceramic ring sleeved on the outside of the conductive needle.

4. The sealed terminal assembly according to claim 3, wherein the insulating member further comprises a glass sintered piece, which is located between the body, the conductive needle and the ceramic ring and connects the body, the conductive needle and the ceramic ring in an insulating manner.

5. The sealed terminal assembly according to claim 3 or claim 4, wherein an opening on one end of the ceramic ring close to the body is formed as a bell mouth.

6. The sealed terminal assembly according to any one of claims 1 to 4, wherein the numbers of the conductive needles, the conductive needle mounting holes, and the insulating members are three, respectively.

7. The sealed terminal assembly according to claim 2, wherein an outer diameter of the expansion portion of the conductive needle is equal to an outer diameter of the steel sleeve, so that the expansion portion is flush with the steel sleeve in a radial direction.

8. The sealed terminal assembly according to any one of claims 1 to 4, wherein the body is made of metal and has at least one mounting hole.

9. The sealed terminal assembly according to any one of claims 1 to 4, wherein a free end of the steel sleeve has a chamfer.

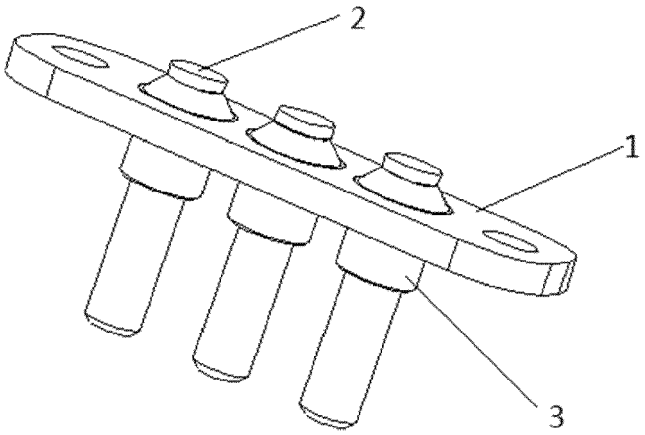

Fig. 1

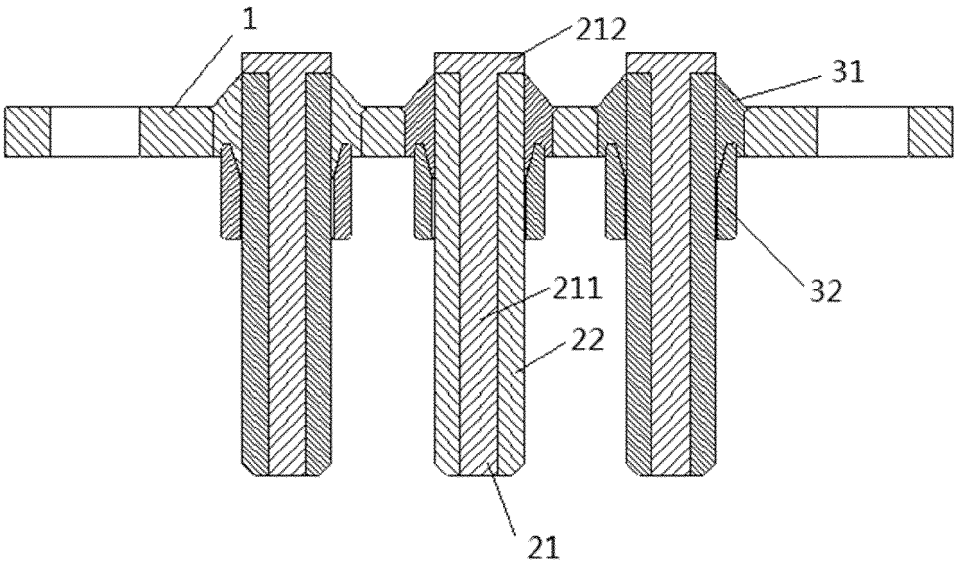

Fig. 2

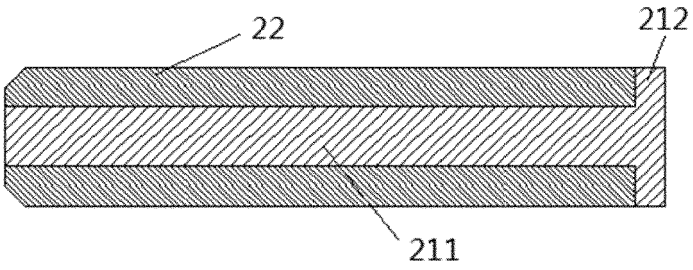

Fig. 3

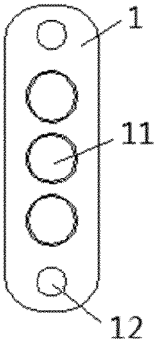

Fig. 4

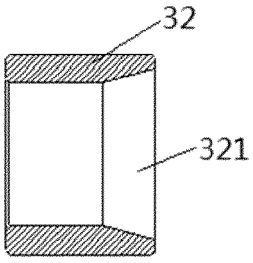

Fig. 5

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EUROPEAN SEARCH REPORT

Application Number
EP 23 18 3740

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 Y	US 2011/083897 A1 (PATEREK DIETER [NL] ET AL) 14 April 2011 (2011-04-14) * paragraph [0024] - paragraph [0029]; figures 2,3 *	1,3-6,8,9 2,7	INV. H01R9/24 F04B39/00 H01R13/03 H01R43/00
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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	6 November 2023	Bouhana, Emmanuel

CATEGORY OF CITED DOCUMENTS

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ANNEX TO THE EUROPEAN SEARCH REPORT ON EUROPEAN PATENT APPLICATION NO. EP 23 18 3740

This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82