

FORM 2

THE PATENTS ACT, 1970
(39 of 1970)

&

THE PATENTS RULES, 2003

COMPLETE SPECIFICATION
[See section 10, Rule 13]

ELECTRICAL CONNECTOR;

RAYCHEM RPG PRIVATE LIMITED, A
COMPANY INCORPORATED UNDER THE
COMPANIES ACT, 1956, WHOSE ADDRESS IS
RPG HOUSE, 463, DR. ANNIE BESANT ROAD,
WORLI, MUMBAI, 400 030, MAHARASTRA,
INDIA

THE FOLLOWING SPECIFICATION
PARTICULARLY DESCRIBES THE
INVENTION AND THE MANNER IN WHICH IT
IS TO BE PERFORMED.

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of Indian Provisional Application No. 3117/MUM/2013, filed on Sep. 30, 2013. The entire disclosure of the above application is incorporated herein by reference.

FIELD OF INVENTION

[0002] The present invention generally relates to electrical connectors and more particularly to electrical connectors employed in transformer bushings to connect multiple outgoing cables.

BACKGROUND OF THE INVENTION

[0003] Electrical connectors are very well known in the art. An electrical connector is typically an electromechanical device for joining electrical circuits.

[0004] The electrical connectors in the prior art, typically employ crimped or bolted connectors. These connectors generally connect multiple wires or devices either temporarily or permanently. In general, the electrical connectors are open to atmosphere and are subjected to variations in environmental parameters such as temperature and moisture. Limitations associated with these connectors include frequent over heating of connectors that leads to failures and interruptions resulting in power loss and revenue losses.

[0005] Prior art connectors generally employ multiple lugs to connect multiple cables with a brass connector. The weight of the connector results in exerting cantilever force on the transformer bushing that results in oil leakage. The oil

leakage that is observed from transformer bushings and subsequent oxidation of the outer surface of the transformer bushing are highly undesirable.

[0006] Further, the prior art connectors have limitations on the number of outgoing cables. The electrical connectors are typically configured to accommodate two outgoing cables, each having a cross sectional area of about 630 sq.mm. However, there is a need for connectors with three or more outgoing connections having varied cable sizes.

[0007] Further disadvantages associated with the prior art connectors include, the installation of the prior art electrical connectors is not standardized and the method is complex. Installation of such electrical connectors is further affected by application of force for tightening joints. Insulation of the connectors is still an unresolved problem which is directly related to human safety as well as electrical faults. These problems associated with the electrical connectors are mainly due to a plurality of causes that are associated with the material, design, installation of these electrical connectors. The root cause of such range of problems include number of factors such as poor quality of raw materials, faulty connection designs resulting in less contact area, employing crimped and bolted connectors, cantilever force on bushing (due to weight), improper crimping (tools/dies/skill), use of bi-metallic surfaces (Cu to brass, brass to Al), no control over installation, inferior quality workmanship and the like.

[0008] Thus, there is a need for a connector that has increased contact area so as to enhance heat dissipation, Further, there is a need for a connector that is light weight, easy to install with decreased human intervention and that can accommodate varied number of outputs. Further, a connector is needed that doesn't involve any crimping sequence.

[0009] These and other disadvantages of the prior art connectors are addressed by the electrical connector described in the foregoing invention.

BRIEF DESCRIPTION OF THE INVENTION

[0010] In one embodiment, an electrical connector for connecting multiple conductors with a transformer stud is provided. The electrical connector comprises a first portion having a plurality of conduits for receiving the conductors, and a second portion coupled to the first portion and configured to be positioned over the transformer stud so as to connect the conductors with the transformer stud. Further, the first portion is shaped to include multiple grooves at the distal end and the second portion comprises a plurality of projections in accordance with the configuration of the grooves in the first portion such that the second portion is slidably coupled to the first portion.

[0011] Various other features and advantages of the invention will be made apparent from the following detailed description and the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] Embodiments are illustrated by way of example, and not by way of limitation, in the figures of the accompanying drawings and in which:

[0013] FIG. 1 is a perspective view of an electrical connector for a transformer having two outgoing conductors, constructed in accordance with an embodiment of the invention;

[0014] FIG. 2 is a perspective view of an electrical connector having three outgoing conductors, constructed in accordance with another embodiment of the invention; and

[0015] FIG. 3 is a perspective view of an electrical connector having four outgoing conductors, constructed in accordance with yet another embodiment of the invention.

[0016] For simplicity in description, identical components are labeled by the same numerals in these figures.

DETAILED DESCRIPTION OF THE INVENTION

[0017] It shall be observed that system components described in accordance with exemplary embodiments have been represented by known symbols in the figures, showing only specific details that are relevant for an understanding of the present disclosure. Further, details that are readily apparent to those skilled in the art may not have been disclosed.

[0018] Electrical distribution transformers are typically used for stepping down the voltage of the electrical power from a main utility line for secondary distribution. The transformer accepts the main utility line on the primary side of the transformer and distributes the power from a secondary side of the transformer towards an end user.

[0019] The transformer is generally housed in a steel cabinet. A transformer stud extends from the secondary side of the transformer from which secondary distribution is provided. Plural electrical conductors, connected to the threaded transformer stud via an electrical connector, provide for distribution of the electrical power towards the end user for residential and commercial purpose.

[0020] The electrical connector configured for connecting the conductors to the transformer stud, is an elongated, electrically conductive member which is inserted over the transformer stud extending from the primary or secondary side of the transformer.

[0021] The electrical connector may be attached to the transformer stud through the threading provided on both the electrical connector and the transformer stud. Further, an orthogonally mounted clamping component is typically used to secure the electrical connector to the transformer stud.

[0022] Accordingly, in one embodiment, as shown in FIG. 1, an electrical connector 100 for connecting multiple conductors 105 and 106 with a transformer stud 110 is provided. The electrical connector 100 comprises a first portion 112 having a plurality of conduits 113 and 114 for receiving the conductors 105 and 106, and a second portion 116 coupled to the first portion 112 and configured to be positioned over the transformer stud 110 so as to connect the conductors 105 and 106 with the transformer stud 110.

[0023] The first portion 112 and second portion 116 respectively include predefined male-female features that guide the assembly of the first portion 112 and the second portion 116. Accordingly, the first portion 112 is shaped to include multiple grooves 118 at the distal end 119.

[0024] The second portion 116 includes a plurality of predefined projections 120 that are defined along the proximal end 122. The projections 120 of the second portion 116 are formed in accordance with the size and shape of the grooves 118 of the first portion 112 such that the first portion 112 is slidably assembled with the second portion 116. Upon reaching a desired position, clamping of the first portion 112 and the second portion 116 can be done using a set of fasteners 125a, 125b and 125c. Examples for each of the fasteners 125a, 125b and 125c include screw, nut, bolt, pin and rivet.

[0025] On the other hand, clamping of the second portion 116 to the transformer stud 110 is established using a clamping component 130. The clamping component 130 exerts a clamping force on the transformer stud 110 in order to mechanically

secure the transformer stud 110 in place within the second portion 116 of the electrical connector 100 as well as to ensure optimum conductivity.

[0026] In one embodiment, the clamping component 130 comprises multiple fasteners 130a, 130b and 130c. Each fastener 130a, 130b and 130c in the clamping component 130 is a hex bolt in one preferred embodiment. A hex bolt is a tool of hexagonal cross section used to drive bolts and screws that have a hexagonal socket in the head. The hex bolt provides rigidity and unity to the electrical connector 100, when the electrical connector 100 is clamped to the transformer stud 110.

[0027] Further, the second portion 116 may be structured to include a type of textured surface which may enhance suitability of the second portion 116 for gripping the transformer stud 110. Following the insertion of the transformer stud 110, the clamping component 130 is tightened bringing the transformer stud 110 into intimate contact with the second portion 116.

[0028] The second portion 116 further comprises a slit 134 for generating clamping force through spring action for enhanced thread engagement so as to facilitate clamping of the second portion 116 to the transformer stud 110.

[0029] In one embodiment, the transformer stud 110 is made of copper material. However, it is understood that the transformer stud 110 can be made of a metal selected from a group comprising aluminum, tungsten, brass and the like.

[0030] Further, the first portion 112 comprises a set of shearing featured fastening devices oriented perpendicular to the conduits 113 and 114. Each conduit 113 and 114 is internally threaded to receive the set of shearing featured fastening devices for clamping down on a respective conductor. In one exemplary embodiment, the set of shearing featured fastening devices comprise three shearing featured bolts. However, skilled artisans shall appreciate that that the number of shearing featured bolts can vary based on the user requirement.

[0031] In the embodiment shown in FIG. 1, conductor 105 in the conduit 113 is secured within the conduit 113 by a set of shearing featured bolts 135a and 135b. Another shearing featured bolt though not shown in FIG. 1, is shown as 135c, as can be seen with respect to the subsequent figures FIG. 2 and FIG. 3.

[0032] Further, as shown in FIG. 1, conductor 106 in the conduit 114 is secured within the conduit 114 by a set of shear bolts 137a and 137b.

[0033] The shearing featured bolts 135a, 135b and 135c are replaceable and include a hex slot at the center. Each shearing featured bolt 135a, 135b and 135c is characterized by at least one breaking point corresponding to a predetermined torque range so as to ensure appropriate amount of torque application and thereby prevent excessive application of torque. This helps in appropriately securing the conductor 105 within the conduit 113 and to maintain required physical contact and pressure in order to achieve optimal electrical conductivity path between the conductor 105 and the respective conduit 113.

[0034] In one embodiment, each shearing featured bolt 135a, 135b and 135c is designed to include two breaking points to accommodate variations in diameter of the corresponding conductor 105. Further, fine threading may preferably be used in each of the shearing featured bolts 135a, 135b and 135c and relative female threading in the first portion 112 that provides high torque strength. Further, the threading provided in the first portion 112 is designed to scale out oxidation that may have formed on the conductors 105 and 106.

[0035] Through the first portion 112 is described as having a set of shearing featured bolts 135a, 135b and 135c, skilled artisans shall however appreciate that a plain fastening device though not having the advantages of the shearing featured fastening device can as well be used to replace one or more of the shearing featured bolts 135a, 135b and 135c described herein.

[0036] FIG. 1 illustrates the electrical connector 100 as having two outgoing conductors 105 and 106. In another embodiment shown in FIG. 2, electrical connector 200 having three outgoing conductors 105, 106 and 107 is described. Skilled artisans shall appreciate that for simplicity in description, identical components in FIG. 1, FIG. 2 and FIG. 3 are labeled by the same numerals.

[0037] Further, as shown in FIG. 2 conductor 105 is secured within the conduit 113 by a set of shear bolts 135a, 135b and 135c. Similarly, conductor 106 is secured within the conduit 114 by a set of shear bolts 137a, 137b and 137c and conductor 107 is secured within the conduit 115 by a set of shear bolts 138a, 138b and 138c. This can further be understood when viewed in conjunction with FIG. 3 that illustrates electrical connector 300 having four outgoing conductors 105, 106, 107 and 108.

[0038] Similarly, varied number of conduits may be provided for drawing varied number of conductors, based on the user requirement, by modifying the features of the electrical connector 100 and thereby enabling the electrical connector 100 for providing electrical connection between a selected number of conductors and the transformer stud 110. In one embodiment, the cross sectional area of each of the conductors 105 and 106 may vary from 150 square millimeter to 800 square millimeter.

[0039] Though, in various embodiments of the invention, the electrical connector 100 is described as being configured to connect multiple conductors 105 and 106 with the transformer stud 110, skilled artisans shall however appreciate that the electrical connector 100 with suitable modifications if need be can even be used to connect multiple conductors with another conductor or an electrical and/or electronic device.

[0040] Further, though the electrical connector 100 described herein is employed for connecting multiple conductors 105 and 106 with the transformer stud 110 that is located on the secondary side of a transformer, the application of the electrical

connector 100 can further be extended to enable employing the electrical connector 100 for connecting multiple conductors to the transformer stud located on the primary side of the transformer. Thus, the electrical connector 100 described herein can be used in one of the primary side and the secondary side of a transformer.

[0041] The electrical connector 100 in the above mentioned embodiments is made of aluminum. Further, each of the first portion 112 and the second portion 116 include a surface that is provided with a surface treatment wherein the surfaces of each of the first portion 112 and the second portion 116 are treated with copper plating and tin plating successively to generate a bi-metallic surface. This ensures compatibility of the electrical connector 100 with metals such as copper and aluminum as well as alloys. Further, the provision of bi-metallic surfaces minimizes the occurrence of oxidation and eliminates the risk associated therewith.

[0042] Further, usage of aluminum reduces weight of the electrical connector 100 when compared to the brass connectors used in the prior art. Further, eliminating usage of lugs in the electrical connector 100 contributes to the weight reduction. The weight thus reduced minimizes application of cantilever force on the transformer stud 110 thereby avoiding the risk associated with oil leakage observed from the transformer and subsequent oxidation of the transformer stud 110 thereby.

[0043] Further, an inhibitor (not shown) may be used at various connecting areas of the electrical connector 100. The inhibitor thus used seals various areas of contact between two surfaces and acts as a sealant to prevent ingress of water, air and/or dust as well as oxidation of various parts of the electrical connector 100.

[0044] The electrical connector 100 may further comprise a sheath (not shown) of electrically insulating material encapsulating the electrical connector 100, so as to reduce the amount of electrically conductive material that is exposed to the

environment. In one embodiment, the sheath (not shown) comprises cross-linked polyethylene insulation (XLPE) insulation that isolates the electrical connector 100 from accidental contact.

[0045] Various advantages of the electrical connector 100 described in various embodiments of the invention are as listed below.

[0046] The electrical connector 100 described in various embodiments herein enables drawing variable number of conductors from the transformer stud 110 based on the user requirement.

[0047] Use of shearing featured fastening devices 135a, 135b and 135c and clamping component 130 mitigates risk associated with thread slippage and wear and tear of the electrical connector 100 that may occur during installation and subsequent usage.

[0048] The provision of grooves 118 in the first portion 112 and projection in the second portion 116 helps in assembling the first portion 112 with the second portion 116. Further, since the grooves 118 and projections 120 provided herein increase the contact area.

[0049] Further, the provision of inserting the conductors 105 and 106 within the conduits 113 and 114 provided in the first portion 112 and the threading that is provided within the conduits 113 and 114 increase the contact area between the conductors 105 and 106, and the conduits 113 and 114 that facilitates heat dissipation and thereby enhances efficiency.

[0050] Surface treatment on the surfaces of the electrical connector 100 ensures compatibility with components such as copper and aluminum as well as alloys. This further minimizes oxidation of various components.

[0051] The inhibitor (not shown) used to seal various contact areas poses resistance to ingress of dust, air and water and thus prevents probable oxidation of various parts of the electrical connector 100.

[0052] In one exemplary embodiment, the electrical connector 100 may be employed in low voltage and high current application wherein the low voltage refers to voltage in the range of about 1000 Volts and high current refers to current in the range of about 2000 Amperes.

[0053] Further, the electrical connector 100 described herein can be used in indoor and outdoor applications.

[0054] Thus, it will be appreciated by those skilled in the art that the present invention can be embodied in other specific forms without departing from the spirit or essential characteristics thereof. The presently disclosed embodiments are therefore considered in all respects to be illustrative and not restricted. The scope of the invention is indicated by the appended claims rather than the foregoing description and all changes that come within the meaning and range and equivalence thereof are intended to be embraced therein.

We Claim :

1. An electrical connector (100) for connecting multiple conductors (105 and 106) with a transformer stud (110), the electrical connector (100) comprising:
a first portion (112) having a plurality of conduits (113 and 114) for receiving the conductors (105 and 106); and
a second portion (116) coupled to the first portion (112) and configured to be positioned over the transformer stud (110) so as to connect the conductors (105 and 106) with the transformer stud (110);
wherein the first portion (112) is shaped to include multiple grooves (118) at the distal end (119) and the second portion (116) comprises a plurality of projections (120) in accordance with the configuration of the grooves (118) in the first portion (112) such that the second portion (116) is slidably coupled to the first portion (112).
2. The electrical connector (100) of Claim 1, wherein the first portion (112) and the second portion (116) are clamped together using a set of fasteners (125a, 125b and 125c).
3. The electrical connector (100) of Claim 1, wherein the second portion (116) further comprises a slit (134) for generating clamping force through spring action, so as to facilitate clamping of the second portion (116) to the transformer stud (110).
4. The electrical connector (100) of Claim 1, wherein each of the first portion (112) and second portion (116) comprise at least one bi-metallic surface.
5. The electrical connector (100) of Claim 1, wherein the first portion (112) includes a set of shearing featured fastening devices (135a, 135b and 135c)

for each of the conduits (113 and 114) so as to secure the conductor (105) with the respective conduit (113).

6. The electrical connector (100) of Claim 5, wherein each shearing featured fastening device (135a, 135b and 135c) is characterized by at least one breaking point corresponding to a predetermined torque range so as to facilitate appropriate connection of the conductor (105) within the respective conduit (113).
7. The electrical connector (100) of Claim 1, further comprising an inhibitor applied on at least one contact surface in order to protect the electrical connector (100) from external interference.

Dated this 30th day of September, 2013

FOR RAYCHEM RPG PRIVATE LIMITED

By their Agent

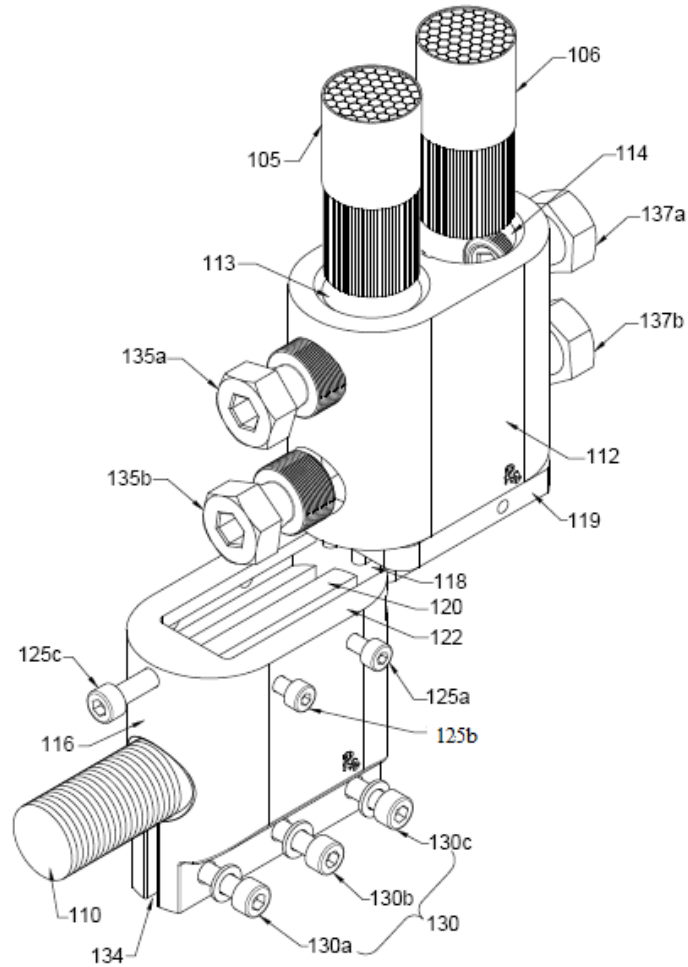


(Girish Vijayanand Sheth) (IN/PA 1022)
KRISHNA & SAURASTRI ASSOCIATES

ABSTRACT

TITLE.: ELECTRICAL CONNECTOR

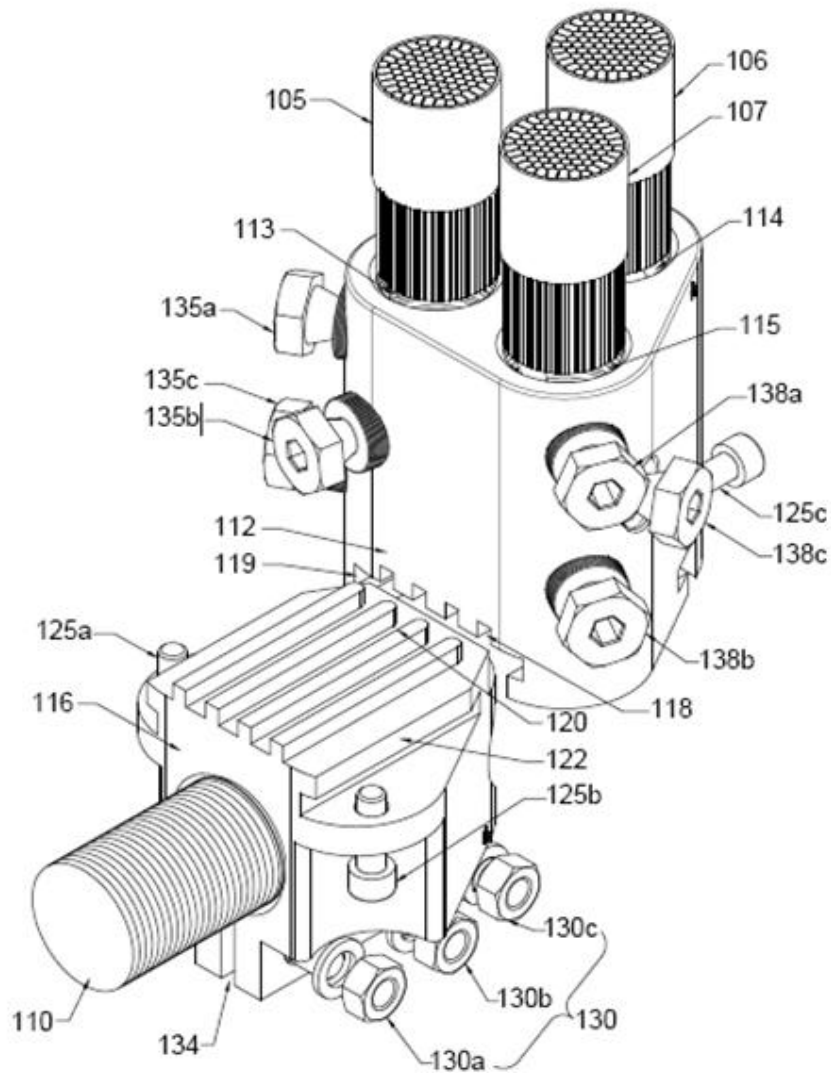
In one embodiment, an electrical connector (100) for connecting multiple conductors (105 and 106) with a transformer stud (110) is provided. The electrical connector (100) comprises a first portion (112) having a plurality of conduits (113 and 114) for receiving the conductors (105 and 106), and a second portion (116) coupled to the first portion (112) and configured to be positioned over the transformer stud (110) so as to connect the conductors (105 and 106) with the transformer stud (110). Further, the first portion (112) is shaped to include multiple grooves (118) at the distal end (119) and the second portion (116) comprises a plurality of projections (120) in accordance with the configuration of the grooves (118) in the first portion (112) such that the second portion (116) is slidably coupled to the first portion (112).



100

FIG. 1

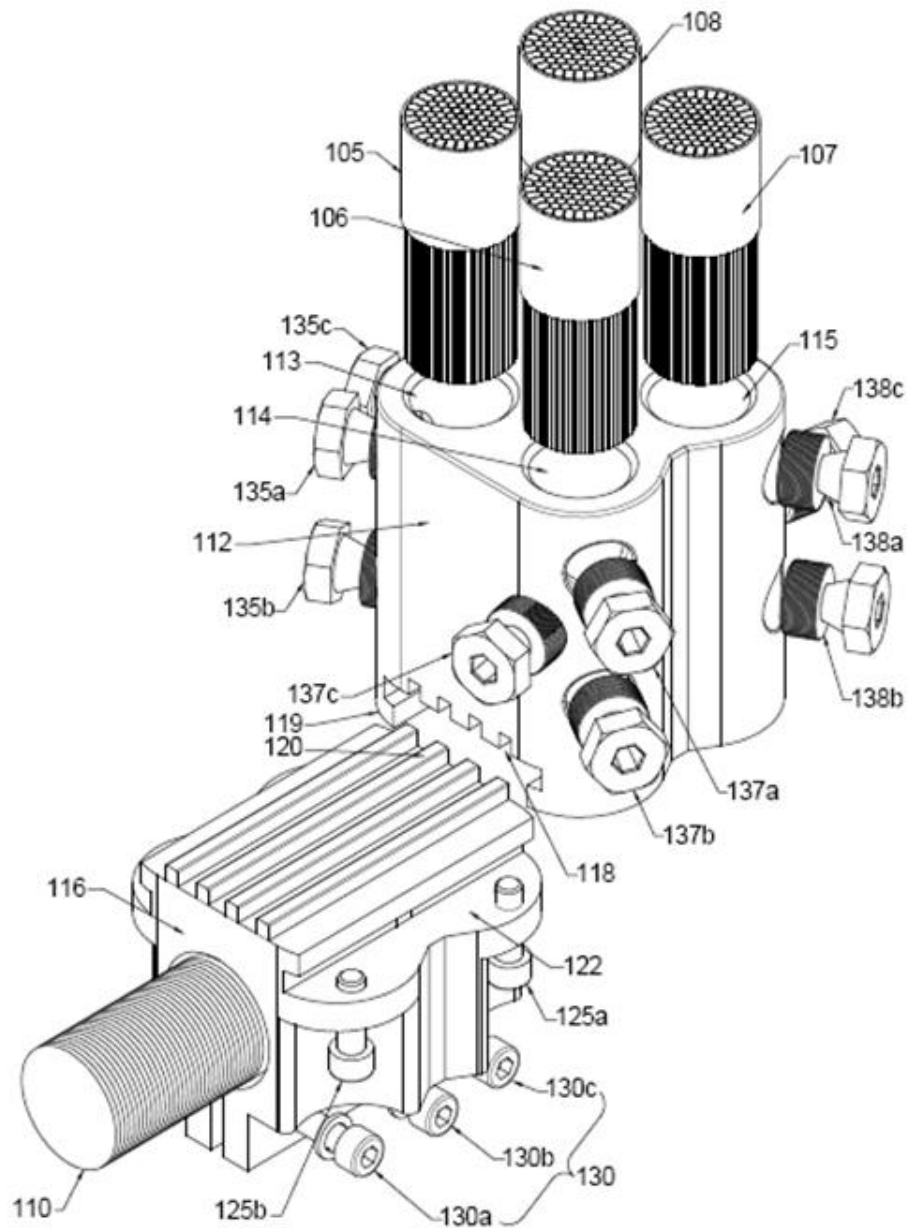
(GIRISH VIJAYANAND SHETH) - IN/PA 1022
KRISHNA & SAURASTRI ASSOCIATES



200

FIG. 2

(GIRISH VIJAYANAND SHETH) - IN/PA 1022
KRISHNA & SAURASTRI ASSOCIATES



300

FIG. 3

(GIRISH VIJAYANAND SHETH) - IN/PA 1022
KRISHNA & SAURASTRI ASSOCIATES

FIELD OF THE INVENTION:

The present invention relates to connectors for low voltage-high current transformer bushings, and more particularly to an efficient connector for low voltage-high current transformer bushing to connect multiple outgoing cables
5 thereon.

BACKGROUND OF THE INVENTION:

Electrical connectors are very well known in the prior art. An electrical connector is typically an electromechanical device for joining electrical circuits.
10 The electrical connector is an interface that uses a mechanical assembly. The connectors in the prior art generally employ crimped connectors. These connectors generally connect two wires or devices either temporarily or permanently. In general, the electrical connectors are open to atmosphere and are associated with high temperatures.

15 Electrical utilities have severe issues with existing connecting systems. The frequent over-heating of connections leads to failures and interruptions which in turn increases power/revenue losses. Particularly, Oil leakage observed from T/F bushings is an undesirable phenomenon. The oxidation of the outer surface is also observed which is highly undesirable. It is also noted that heavy hydraulic tools
20 require installation of existing connectors that are known in art which in turn require routine maintenance. These prior art connectors have only two outgoing connections that are generally of 630 mm. However, there is a dire need of

connectors with three outgoing connections directly from transformer stud or bushing.

The instillation of the prior art connectors is not standardized and the method is very difficult. Installation of such connectors is further affected by application of force for tightening the joints. Insulation of the connections is still an unresolved problem which is directly related to human safety as well as electrical faults. These problems associated with the connectors are mainly due to a plurality of causes that associated with the material, design, installation of these connectors. It has been found that root cause of such range of problems is due to number of factors such as poor quality of raw materials, faulty connection designs (less contact area), conventional connectors (Crimped + Bolted), cantilever force on bushing (due to weight), improper crimping (Tools/Dies/Skill), use of bi-metallic surfaces (Cu to Brass, Brass to Al), no control over installations (no assurance) and the like

There is a need of a connector that has increased real contact area, and single connection. Also, there is a need of a connector that is light weight, easy to install and has at least three outputs. Further a connector is needed that doesn't involve any crimping sequence.

BRIEF DESCRIPTION OF DRAWINGS:

FIG. 1 is a perspective view of an electrical connector for low voltage high current transformers constructed in accordance with a preferred embodiment of the present invention; and

- 5 FIG. 2 is a perspective of a first piece and a second piece of the connector of FIG. 1 showing configuration of grooves and projections thereon.

DESCRIPTION OF THE DRAWINGS:

Referring to FIG. 1, an electrical connector 100 for low voltage- high current transformers in accordance with a preferred embodiment of the present invention is disclosed. The electrical connector 100 is defined by a first piece 102 and a second piece 104 that are slidingly connectable with each other. The first piece 102 and second piece 104 respectively include predefined male-female features that guide the assembly of the first piece 102 and second piece 104.

The first piece 102 is preferably positioned with at least three cables 106 in this one preferred embodiment. The second piece 104 is preferably connected with a threaded stud 108 of a transformer such that the second piece 104 is positioned over the threaded stud 108. The stud 108 in this preferred embodiment is made of Copper material. However, it is understood here that the stud 108 can be of any materials such as Aluminium, Tungsten Brass and the like. The connector 100 in this preferred embodiment is preferably made of special Aluminium alloy. The shape of the first piece 102 and 104 is approximately

triangular cross section that is essentially defined to provide maximum contact area.

Referring now to FIGS. 1 and 2, the first piece 102 includes a plurality of holes 110 and a plurality of bolts 112 that are defined in a body of the first piece 114. The first piece 102 also includes a plurality of predefined grooves 116 on a bottom end of the first piece 102. The bolts 112 define shearing featured bolt connections with Aluminium conductors in this one embodiment. The second piece 104 includes a plurality of predefined projections 118 that are defined along a top end of the second piece 104. The projections 118 of the second piece 104 are formed in accordance with the shape and size of the grooves 116 of the first piece 102 such that the first piece 102 is slidably assembled with the second piece 104. The second piece 104 also includes a slit 120 and a plurality of bolts 122, and 124. The slit 120 advantageously ensures spring action force for better thread engagement and proper clamping force.

It is understood, however, that the assembly with three cables 106 needs to be done through a specially designed shear bolts 112 such that the bolts 112 break within designed torque range, to establish excellent quality connections. The bolts 112 are removable and replaceable. In this one preferred embodiment, the bolts 112 of the first part 102 include hex slot at centre. The bolts 112 include two breaking points to accommodate conductor diameter variations, if any. It is to be noted that fine threading is preferably used in the shear bolts 112 and relative female threading of the first piece 102 that provides high torque strength.

While assembling the first piece 102 and second piece 104, the first piece 102 is slidably assembled with the second piece 104 along the predefined grooves and projections 116, 118. After reaching to a desired position, clamping of the connector 100 can be done by using a bolt 124. The bolt 124 is an Allen bolt in this one preferred embodiment. The connection action of bolts 124 provides rigidity and unity to the connector 100 during the operation. Each of the first piece 102 and the second piece 104 has a surface that is provided with a special surface treatment to ensure compatibility of the connector 100 with Copper, Al etc.

It is to be noted that a special inhibitor is advantageously used at various connecting areas of the connector 100. The use of special inhibitor avoids water/dust ingress as well as Oxidation (when come in contact with atmospheric Oxygen) at connections. (Please justify) Justification: This inhibitor is like a gel/grease in nature which seals contact surfaces in between and act like sealant to prevent ingress of water/air/dust.

ADVANTAGES OF THE PRESENT INVENTION:

- Use of bolts 112, 122 and 124 eliminates risk of thread slippage / worn-out of the connector 100 during installation.
- Unique contour is given for sliding as well as to increase contact area of the connector 100. This will help for rapid heat dissipation at connection portions of the connector 100.
- Special inhibitor is used at connection areas of the connector 100. This avoids water / dust ingress as well as Oxidation.

- The electrical connector 100 provides option for multi-outgoings from transformer.
- Application Area of connector 100 is "Low Voltage & High Current"
- Special surface treatment on surface of the connector 100 is done to ensure its compatibility with components such as Copper as well as Aluminium and their alloys
- The electrical connector 100 of the present invention can be installed indoor or outdoor situations.

Dated this 30th day of September 2013

10

FOR RAYCHEM RPG PVT. LTD.

By their Agent

15



(Girish Vijayanand Sheth)

Patent Agent No.: IN/PA 1022

KRISHNA & SAURASTRI ASSOCIATES

20