CONNECTOR ASSEMBLY AND RECEPTACLE TERMINAL THEREFOR

Inventors: Thomas E. Hall; Wallace A. Hansen, both of Fort Wayne, Ind.


Filed: May 15, 1974

Appl. No.: 470,011

U.S. Cl. 339/192 RL; 339/217 S
Int. Cl. H01R 33/72

References Cited
UNITED STATES PATENTS
3,206,715 9/1965 Skony 339/192 RL
3,566,341 2/1971 Skony 339/217 S
3,777,302 12/1973 Travis 339/236 R

Primary Examiner—Joseph H. McGlynn
Assistant Examiner—James W. Davie
Attorney, Agent, or Firm—Robert D. Sommer; Lawrence E. Freiburger

ABSTRACT

A connector assembly including a block having a plurality of passageways therein and a receptacle terminal occupying each passageway. Each receptacle terminal has a first end portion adapted to be crimped onto an electrical conductor, an intermediate portion, and a second end portion which is bent back upon the intermediate portion to form an opening for receiving a pin terminal. A tab, struck out from the intermediate portion and bent over the end of the second end portion, rigidly attaches the second end portion to the intermediate portion. Each receptacle terminal also has a retention lance struck out from the second end portion which cooperates with a shoulder located in each passageway in the block to prevent withdrawal of the terminal.

4 Claims, 4 Drawing Figures
CONNECTION ASSEMBLY AND RECEPTACLE TERMINAL THEREFOR

BACKGROUND OF THE INVENTION

The present invention relates to a connector assembly including an insulating block for holding a plurality of receptacle terminals in spaced relation to one another and which are adapted to receive a corresponding number of cylindrical pin terminals.

Assemblies of this type are primarily used with a hermetically sealed compressor. Hermetically sealed compressors generally have an electrical connector comprising of three pins which extend into the interior of the compressor casing. Electrical power is then supplied to the compressor motor through these pins and a connector assembly connected thereto. The connector assembly is applied to the pins before the compressor unit is sealed and must maintain an adequate electrical connection throughout the lifetime of the compressor unit.

These connector assemblies, however, are subject to a number of repeated connections and disconnections in the course of testing the compressor motor prior to final assembly. After assembly as was mentioned previously the connector assembly must function perfectly throughout the entire lifetime of the compressor. If there is a high ambient temperature in excess of 100°C, the connector assembly must meet exacting requirements as far as lifetime, ease of assembly, reliability and must be able to maintain an adequate electrical connection even while undergoing vibration created by the compressor motor.

In many of the prior art connector assemblies it is necessary that the pin-terminal be precisely aligned with the proper portion of the receptacle terminal. One attempt at overcoming this somewhat undesirable necessity is the device disclosed in U.S. Pat. No. 3,566,341 which provides a receptacle terminal having an elongated receptacle portion which permits slight misalignment of the pin with the receptacle portion during insertion.

Also in the prior art there is known a closed entry receptacle terminal of generally triangular shaped cross section having a tongue extending from the crimp portion which is reversely bent and a locking section extending from the reversely bent portion into the crimp area such that the receptacle portion is rigidly fixed in place. In addition, the block has a second abutment shoulder at the end of each locking portion which prevents removal or insertion of a receptacle terminal from that end.

The present invention also provides a receptacle terminal adapted to be held in place by the previously mentioned block and adapted to mate with an assembly of pin terminals. The receptacle terminal of the present invention includes a first end portion adapted to be crimped onto a wire, a flat intermediate portion, and a second end portion, bent back upon and rigidly attached to the intermediate portion to form a closed elongated loop. In addition, the receptacle terminal has a locking tang or retention lance adapted to deform inwardly when the terminal is inserted into the narrowed entrance portion and to return toward its normal position when the terminal passes the locking shoulder and into the locking portion of the block. The retention lance is struck out from the second end portion of the terminal and extends generally outwardly and toward the first end portion from the juncture of the intermediate and second end portions.

It is an object of the present invention to provide a receptacle terminal and corresponding block for receiving and holding the terminal which is relatively inexpensive but yet reliable. Another object of the present invention is to provide a receptacle terminal which allows for misalignment or float of the pin terminal. Still another object of the present invention is to provide a receptacle terminal having a close tolerance on insertion and withdrawal forces over an entire lot of terminals. Still another object of the present invention is to provide a receptacle terminal with the ability to maintain fairly consistent insertion and withdrawal forces, even after multiple insertions.

These and other objects of the present invention will become apparent from the detailed description of the invention taken in conjunction with the drawing FIGURES, in which:

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a partially broken away isometric view showing a receptacle terminal inserted in a block in accordance with the present invention;

FIG. 2 is a cross sectional view taken along lines 2-2 of FIG. 1 showing the receptacle terminal inserted in the block;

FIG. 3 is a side elevational view of a receptacle terminal in accordance with the present invention; and

FIG. 4 is a top elevational view of the terminal shown in FIG. 3.

DESCRIPTION OF THE PREFERRED EMBODIMENT

FIG. 1 shows a receptacle terminal inserted in a connecting block in accordance with the present invention. The connecting block includes three parallel passageways which extend from one end of the block to the other. Each passageway includes a narrowed entrance portion 10 adapted to receive a receptacle terminal. Each passageway then abruptly widens into a locking portion 12 in which the receptacle terminal is adapted to be seated in alignment with apertures 13. The transition between the entrance portion 10 and the locking portion 12 defines a locking shoulder 14 or abutment which cooperates with a portion of the receptacle terminal to lock the terminal in place. In addition, near the end of each passageway there is an abutment or
stop shoulder 15 which essentially decreases the vertical dimension of the passageway, so that the terminal will be prevented from being inserted too far, or from being inserted from the wrong end. It can be seen, from FIG. 2, that each passageway has identical locking shoulders 14 on both sides thereof so that the receptacle terminal need not be preferentially oriented during insertion.

The receptacle terminal in accordance with the present invention is shown in more detail in FIGS. 3 and 4. The receptacle terminal, stamped from any suitable conductive metal, includes a first end portion adapted to be crimped onto a wire, a flat intermediate portion 18, and finally a second end portion 20. The first end portion is generally well known to those skilled in the art, and therefore it should suffice to say that it includes a first ferrule forming portion 22 of generally U-shaped cross section and having two opposing tabs 24 and 26 adapted to be crimped about a wire and a second ferrule forming portion 28 including two opposing tabs 30 and 32 adapted to be crimped about the insulation around the wire. In addition, a number of grooves or serrations 34 are formed in the upwardly facing surface between tabs 24 and 26 improve the reliability of the crimped connection.

The second end portion 20 is bent back upon the intermediate portion at 36 to form an elongated loop for receiving a pin terminal. The elongated loop consists of leg 38 formed from intermediate portion 18, reverse bend 36, and two legs 40 and 42 parallel to leg 38 which bend downwardly and are joined together by locking portion 44. A locking tab 48, struck out from leg 38, is bent over and extends through a portion 46, stamped out and removed from second end portion 20, and is finally bent down tightly against locking portion 44 to positively close the elongated loop.

The receptacle terminal of the present invention also includes a retention lance 50 which cooperates with locking shoulder 14 in the block to lock the receptacle terminal in place. The retention lance 50 is formed from the second end portion 20 and extends from the bend 36 generally toward the first end portion 16 and away from the intermediate portion 18 at an angle to legs 40 and 42. It can be seen that as the receptacle terminal is inserted into the entrance portion 10 of the connector block, the retention lance 50 will deflect allowing the terminal to be inserted. With further insertion, the terminal will pass into the widened portion 12, and as soon as the end of lance 50 passes the locking shoulder 14, the lance will snap outwardly, preventing extraction of the terminal. It can be seen that further insertion of the receptacle terminal will be prevented by the stop shoulder 15 and once the terminal is locked in place, proper alignment will be maintained between the terminal and aperture 13 in the block. In addition, because the connector block has a locking shoulder on both sides of each passageway, the receptacle may be inserted if it is rotated 180° from the position shown in FIG. 2.

It can thus be seen that the present invention provides a receptacle terminal that due to its elongated shape allows for misalignment of the pin with the terminal. This is illustrated in FIG. 3 where three possible pin positions are shown. In addition, since the closed entry receptacle terminal of the present invention is positively closed by bending tab 48 over locking portion 44 it is possible to maintain a close tolerance over insertion and withdrawal forces. In the prior art, this degree of control was not possible due to the fact that the receptacle portion of the terminal was closed in the crimp area.

Modifications may be made without departing from the true spirit of the present invention. It is intended that the above detailed description of the invention was made for illustrative purposes only and that the scope of the invention be defined in the following claims.

What is claimed is:

1. A receptacle terminal for gripping and making electrical contact to a cylindrical pin terminal, which comprises:

   a unitary, electrically conductive body having a first end portion adapted to be crimped about an electrical conductor to make electrical contact thereto, a flat intermediate portion extending from said first end portion, and a second end portion bent back upon said intermediate portion to form a loop; said intermediate portion and said second end portion comprising a unitary strip of substantially the same width throughout;

   said second end portion being bent down at the end thereof to meet said intermediate portion; and

   a tab struck out from said intermediate portion, said tab being bent down over said second end portion to rigidly fix said second end portion to said intermediate portion independently of said first end portion so that two electrical current paths are formed from said loop to said intermediate portion.

2. The terminal as claimed in claim 1, wherein:

   said second end portion comprises two legs extending generally parallel to one another from the juncture of said second end portion with said intermediate portion, said legs being separated by a cutout and being joined together at the end thereof by a bridging portion; and

   said tab extends from said intermediate portion, between said legs and is bent down over said bridging portion.

3. The terminal as claimed in claim 1, further comprising:

   a retention lance struck out from said second end portion and extending from the juncture of said intermediate and second end portions, said retention lance extending generally toward said first end portion and outwardly from said loop.

4. In combination, the terminal as claimed in claim 3 and a connector block for receiving and holding said terminal, said connector block comprising:

   an elongated passageway in said block, said passageway being rectangular in cross section and having a first pair of opposed sidewalls and a second pair of opposed sidewalls, said elongated passageway having a narrowed entrance portion for receiving said receptacle terminal, said passageway abruptly widening into a locking portion for retaining said receptacle terminal, a stop shoulder in one of said second pair of opposed sidewalls at the end of said locking portion, an aperture in one of said second pair of opposed sidewalls extending into said locking portion for receiving said cylindrical pin terminal.

* * * * *