United States Patent

[11] **3,622,948**

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[54] **ELECTRICAL CONNECTOR CLUSTER ASSEMBLY WITH MOTOR PROTECTION**
7 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** ..... **339/147 R,** 337/197, 339/192 RL
[51] **Int. Cl.** **H01r 3/00,** H01r 33/72
[50] **Field of Search** ..... 339/30, 147, 191 A, 191 L, 191 M, 192 R, 192 RL; 337/92, 197, 198, 268, 269

[56] **References Cited**

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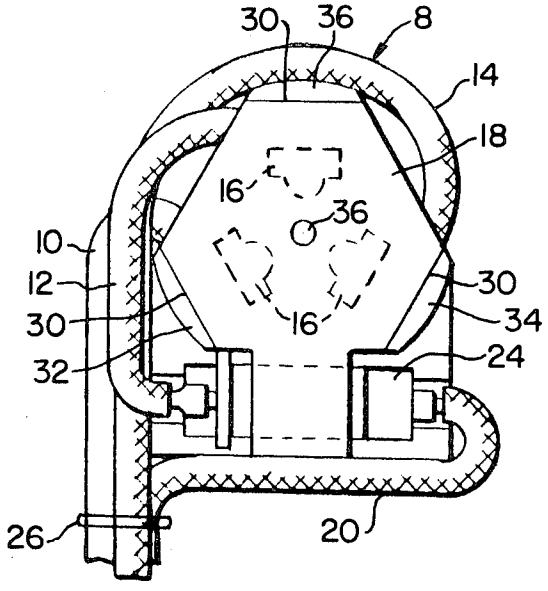
1,857,899	5/1932	Walder	339/30 UX
3,345,605	10/1967	Looke	339/192 RL

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ABSTRACT: The invention comprises an apparatus especially adapted for connecting hermetic compressor motor leads disposed in a cluster to a hermetic shell-mounted terminal of the type having three closely spaced pins with flat tabs thereon. The cluster assembly includes a block with cavities therein in an orientation in which the contact sockets are relatively flat and disposed at equilateral angles to each other so as to align with the tabs on the pins and so that the contact wires extend in a pinwheel arrangement at the edge of the block. An additional socket is provided in the block for reception of a thermal sensitive device that provides overload protection for the compressor motor, with the thermal sensitive device wired in series with one of the wires of the pinwheel arrangement.



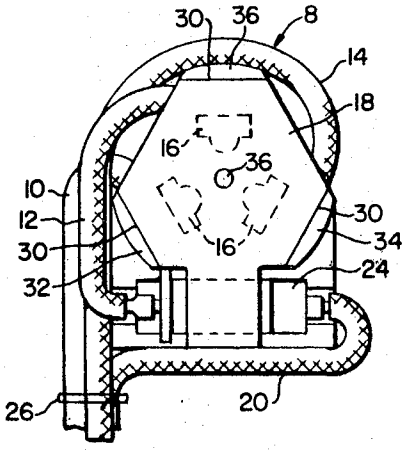


FIG. 1.

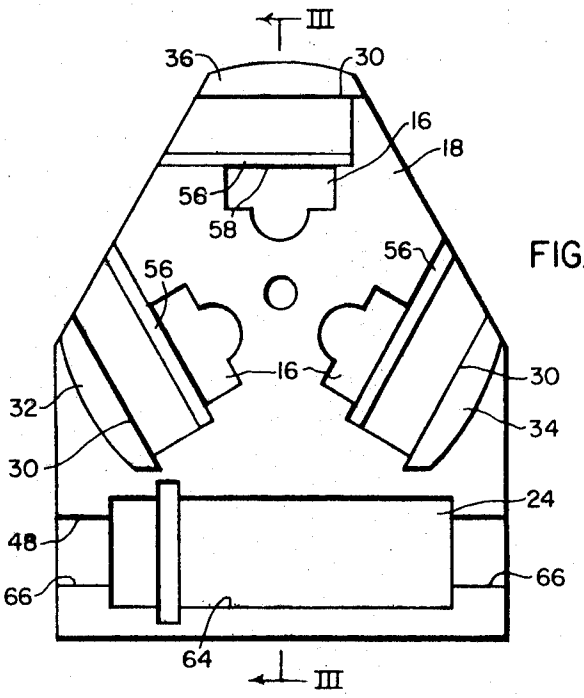


FIG. 2.

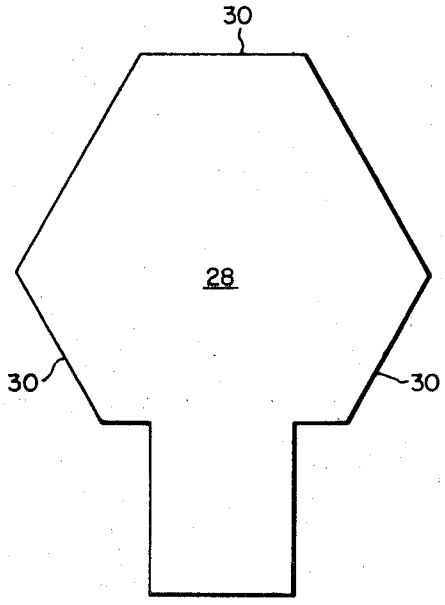


FIG. 4.

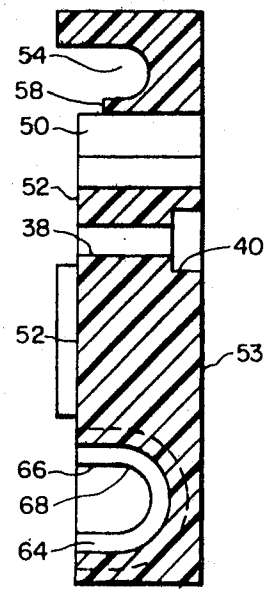
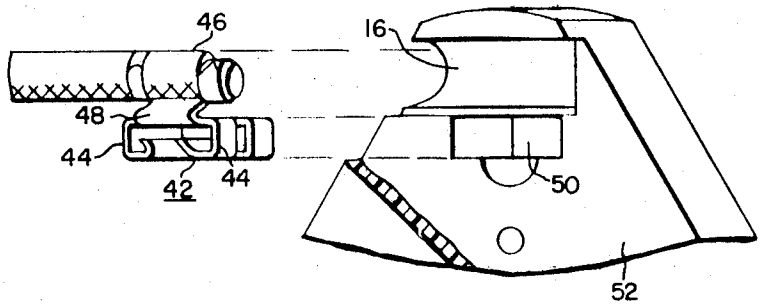


FIG. 3.

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FIG.5.



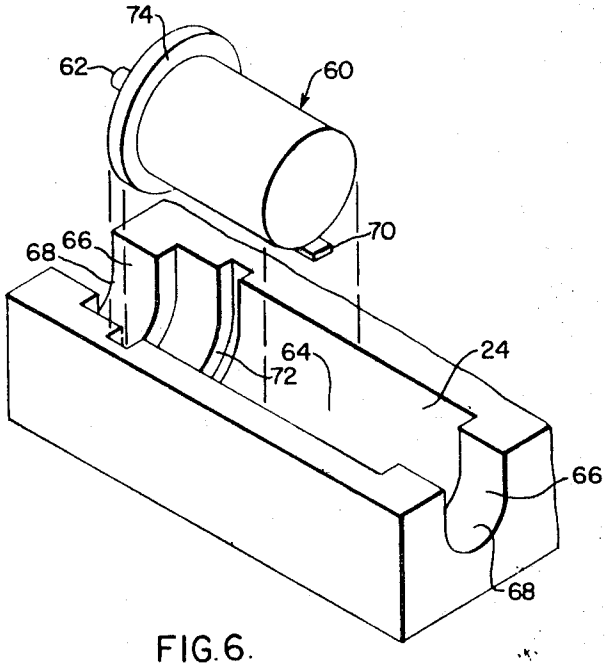


FIG.6.

ELECTRICAL CONNECTOR CLUSTER ASSEMBLY WITH MOTOR PROTECTION

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to an electrical connector cluster assembly with an overload means and, more specifically, relates to an electrical connector cluster assembly and an overload protection means that are adapted for connecting a hermetic compressor motor to the hermetic shell-mounted terminal of the type having three closely spaced pins with flat tabs thereon.

2. Description of the Prior Art

Although the use of an electrical connector cluster assembly of the general type herein disclosed is known and has been described, for example, U.S. Pat. No. 3,345,605, such connector cluster assemblies have not included any means for protecting the hermetic motor from overloading and thereby overheating so that such means had to be provided somewhere else within the hermetic shell and this required a consequent additional assembly operation and the added cost required by this assembly operation. The present invention obviates such a requirement.

The nature of the instant invention may be more readily appreciated if the environment in which the collector cluster assembly with overload protection is detailed. Small hermetic compressors of the type utilized in refrigerators, freezers and air conditioners are mass produced for incorporation in millions of such appliances each year. Most manufacturers of small hermetic compressors utilize a standard hermetic terminal which carries three pin conductors sealed in an insulating relationship through the shell of the hermetic compressor. Although collector cluster assemblies have been utilized to provide a convenient connection for the leads of the compressor motor to the pins provided in the side of the hermetic shell (e.g., U.S. Pat. No. 3,345,605), none of these cluster assemblies have heretofore utilized an overload protection as a portion of their assembly. Thus, this overload protection had to be provided alternately in the wiring leading to the hermetic shell or provided within the hermetic enclosure, itself. In both of these cases, the assembly of the hermetic compressor and its electrical connecting wires was somewhat complicated and thereby required more time and additional costs. If an overload protection was provided within the electrical connector cluster assembly, then a large amount of assembly time could be eliminated and the overload protector means prewired into the collector cluster assembly to provide the overload requirements of the compressor motor.

SUMMARY OF THE INVENTION

In accordance with the principles of this invention, a mounting block is provided with a number of connector cavities for holding a series of connectors in a proper array to fit the pins extending from a hermetic enclosure. Connectors including their ferrules are formed to accommodate the cavities provided in the mounting block, with these cavities being arranged so that each conductor emerges from the edge of the mounting block at a location closely adjacent to the connector cavity. Disposed outwardly of the connector cavities and substantially aligned with a base of the block, is an additional cavity which is shaped so as to rigidly hold therein an overload protector element. This cavity includes a trough portion for the overload protector and a part of the terminals which extend from the overload protector, with a lead attached to one of these terminals extending to the other two wires extending from the connector block and the other two wires extending from the opposite terminal of the overload protector around the mounting block to one of the three connectors disposed in one of the connector cavities. The cavity provided for the overload protector includes means for aligning the terminals which extend therefrom and also means formed by a substantially semiannular groove for holding the overload protector in the proper location within the cavity.

DRAWING DESCRIPTION

FIG. 1 is a plan view of the rear or cover side of a cluster assembly and overload protector according to the instant invention;

FIG. 2 is a plan view of the rear side of the mounting block with the cover removed and the connectors omitted;

FIG. 3 is a sectional side view corresponding to one taken along line III—III of FIG. 2;

FIG. 4 is a plan view of the cover for the mounting block;

FIG. 5 is a fragmentary perspective view of one corner of the mounting block with a connector for the corner cavity shown in exploded relation to the block; and

FIG. 6 is a view similar to FIG. 5, but showing the overload protector in exploded relation to its cavity.

DETAILED DESCRIPTION OF THE DRAWINGS

The invention will now be described in more detail in connection with the accompanying drawings which illustrate one embodiment thereof by way of example and wherein a connector cluster assembly **8** is shown in FIG. **1** in its assembled form with three electrical conductors **10**, **12**, and **14** emerging from three underlying cavities **16**, **16** and **16**. These cavities are situated at peripherally spaced locations about the edge of a generally truncated, peak-shaped insulating block **18**, and are at equilateral angles to one another in the truncated triangular portion on the insulating block. The lead wires **10** and **12** are wrapped around the peripheral edge of the insulating block **18** from their point of emergence to form a three wire group with another wire conductor **20** that extends outwardly from a cavity **24** in the rectangular part of the insulating block **18**. These three electrical conductors are fastened together outwardly of the truncated, peak-shaped insulating block **18** by and suitable means such as a cord **26** wrapped around them, this cord being disposed at the point where they may be forced into a closely adjacent position to form a grouping that extends to and is connected to an electrical supply (not shown).

A cover **28** that protects the rear face of insulating block **18** is generally hexagonally shaped with an extending tail that projects from one side of the hexagon shape. This cover is placed over the rear of the insulating block **18** and abuttingly fits with three of its side edges **30**, **30** and **30** against tabs **32**, **34**, and **36** provided integral with the peak-shaped insulating block **18**. These tabs take the form of raised abutments at three corners of the block **18** and therefrom conveniently locate the cover **28** relative to the block **18** when these two elements are in assembled relationship. The cover **28** is conventionally fastened to the block **18** by a rivet or screw **36** that my extend through a bore **38** in the peak-shaped insulating block **18** (FIG. **3**) with a nut or a peened over rivet head (not shown) being disposed in a blind bore **40** that communicates and is coaxially aligned with the bore **38**.

Referring now to FIGS. **2**, **3** and **5**, the three cavities generally denoted **16** are provided adjacent each corner of the block **18** to receive a connector **42** secured to the end of a motor lead wire. Each connector includes conventionally shaped clip portions **44**, **44** adapted for a slip-on connection to a hermetic terminal pin, a ferrule portion **46** which is crimped onto its respective bare lead wire and generally encompasses the lead wire conductor so as to be attached to it, both physically and electrically, and an intermediate web portion **48** disposed so as to extend between ferrule portion **46** and the clip portions **44**, **44**. It should be noted that the web portion **48** is disposed at an acute angle to the plane of the ends of the clip portion **44**, **44** so that each connector **42** can seat on a substantially similar shaped portion of the underlying cavity **16**.

Each cavity **16** which receives a connector **42** includes a clip receiving opening **50** that extends between a rear face **52** and a front face **53** of the truncated peak-shaped mounting block **18**. Each clip receiving openings merges with a receiving trough-shaped recess **54** in the block **18** disposed outwardly of it, relative to the sides of the mounting block. Each trough-shaped recess is open at one end to the edge of the

block and open adjacent its other end to a wall **56** having its edge **58** recessed from the rear face of the block **18**. The trough-shaped recess **54** that receives the ferrule portion **46** and the edge **58** are generally cut across a corner of the triangular portion of the peak-shaped block **18** with only one end of the trough-shaped recess **54** to open the edge of the block.

Each of the connectors **42** seats in a cavity **16** with its clip portions **44, 44** fitting in the clip receiving opening **50** and extends between the rear face **52** and the front face **53** of the block **18**. The ferrule portion **46** lies in the trough **54** and recessed edge **58** of the block receives the web portion **48** of the connector **42**. The opening, trough and recessed edge are designed to allow freedom of movement of the connector in the cavity so that the connector is essentially self-aligning with the pins on which it is pushed to make an electrical connection.

The orientation of each of the cavities **16** is such that the lead wires emerge from the edges of the blocks in what may be aptly termed pinwheel fashion. As such, the lead wires emerge at an obtuse angle relative to the adjacent edges of the mounting block so that the flexible leads may be easily wrapped around the edges of the mounting block without departing from it.

The lead wire **12** extends from what may be considered the uppermost cavity **16** in this manner, and is then attached to an overload device **60** such as a conventional thermal sensitive device disposed within the cavity **24**. A terminal **62**, rigidly attached to the overload device **60**, may provide an easy connection between this electrical conductor and the overload device **60**. The cavity **24** is formed with a substantially semicircular shape **64** (FIGS. **3** and **6**) for nearly its full linear extend. Adjacent the ends of the cavity **24**, the semicircular recess **64** is terminated by means of walls **66, 66**. Each of the walls **66, 66** includes extending through it, a U-shaped channel **68** which opens outwardly to the edge of the mounting block to thereby provide a guiding and alignment means for the electrical terminal which extends outwardly therethrough from the overload device **60**. Of course, the opposite end of the overload device **60** includes a terminal **70** similar to the aforementioned terminal **62**. This terminal (terminal **70**) has attached to it the electrical connector **20**, with this electrical connector taking a very sharp turn around what may be considered the bottom edge of the insulating block **18** to form one of the wires of the three wire assemblage which are tied together by the cord **26**.

In order to properly transversely space the overload device **60** within the cavity **24**, a semicircular groove means **72** is provided immediately between the walls **66, 66**. The overload device includes, adjacent one of its ends, an integral circular flange **74** which fittingly is inserted into the semicircular groove **72** to thereby positively position the overload device **60** within the cavity **24**.

With the completion of the binding of the connecting wires **10, 14** and **20**, the truncated, peak-shaped insulating block **18** and the three electrical connectors extending therefrom form essentially a single assemblage which may be easily handled and engaged, for example, with a three-prong plug which may be disposed on the wall of the hermetic shell for the compressor (not shown). Such a plug is shown in FIG. **5** of U.S. Pat. No. 3,345,605 and reference may be had thereto for a more complete understanding of the manner of the connection of the electrical connector cluster assembly with overload protection of the instant invention to such a plug member.

It will be appreciated from the foregoing description that a cluster assembly with overload protection has been provided which may be easily utilized as a single assembly and plugged to a three-prong plug provided for it. Because of its construction, overload protection for a compressor is provided which is in a series relationship with one of the electrical connectors that forms the three-connector assembly. At the same time, the thickness of the cluster assembly is held to a minimal value since the electrical connectors, their terminals and the overload protection means are disposed in cavities formed in the mounting block.

Although a single embodiment of the invention has been disclosed, it will be apparent to those skilled in the art that many modifications can be made therein without exercising the inventive faculty.

What is claimed is:

1. a cluster assembly for making a gang connection to a plural post terminal including;

a. a mounting block having a peripheral edge and a pair of oppositely disposed faces, and mounting block having a plurality of cavities disposed in one of said faces, and cavities opening to said peripheral edge,

b. electrical connector means disposed in at least some of said cavities,

c. an overload protector means disposed in one of said cavities, and

d. electrical conducting means disposed between the connecting said overload protector means and one of said electrical connector means and extending outwardly from one of said openings to said peripheral edge and also extending at least partially around said block outwardly of said peripheral edge of said block between the overload protector means and said one of said electrical connector means.

2. A cluster assembly for making a gang connection to a plural post terminal having:

a. a series of cavities formed in the face of a mounting block,

b. said cavities opening outwardly to the edge of said mounting block,

c. electrical terminals disposed in some of said cavities and connected to electrical leads disposed in and extending from some of said cavities,

d. an overload protection means disposed in another of said cavities, and

e. one of said electrical leads extending from one of said cavities and in electrical connection with said overload protection means disposed in said another of said cavities, and,

f. electrical conducting means extending from said overload protection means outwardly of its cavity and joined to one of said extending leads to thereby from an assemblage.

3. The combination set out in claim **2** wherein:

a. said overload protection means cavity includes groove means and,

b. said overload protection means includes means fitting in said groove means for maintaining its position in said overload protection means cavity.

4. The combination set out in claim **3**, wherein;

a. said groove means is partially annular and,

b. said means fitting in said groove means comprises a circular flange.

5. The combination set out in claim **3** wherein;

a. said overload protection means includes oppositely extending terminals, and

b. said overload protection means cavity includes channel means for receiving said oppositely disposed terminals in a holding relationship.

6. The combination set out in claim **3** wherein;

a. a cover means is provided for said mounting block,

b. said mounting block includes a plurality of upstanding tabs, and

c. said cover means abuts said upstanding tabs in assembled positions on said mounting block.

7. The combination set out in claim **6** wherein;

a. said mounting block takes the form of a truncated, peaked member.

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