LOCK COLLAR FOR MULTIPLE ELECTRICAL TERMINAL CONNECTIONS

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A lock collar is provided to maintain electrically conductive engagement between electrical terminals of a first group and electrical terminals of a second group wherein each of the terminals of the first group is supported relative to each other as contrasted to the terminals of the second group wherein each of the terminals relies for its support upon its connection to one of the terminals of the first group. The lock collar is adapted to be positioned about and supported by the terminals of the second group. The lock collar comprises a unitary plastic structure having first and second opposing portions adapted to extend respectively above and below the electrical terminals, an integral hinge means formed at one end thereof, and an integral locking means formed at the other end thereof.

3 Claims, 3 Drawing Figures
This invention relates generally to a lock collar adapted to maintain electrically conductive engagement between electrical terminals of a first group and electrical terminals of a second group wherein each of the terminals of the first group is supported relative to each other so as to prevent relative movement therebetween, and wherein each of the terminals of the second group, however, relies for its support on its connection to one of the terminals of the first group.

It has become commonplace in the design of a wide variety of electrical appliances for mass production to provide snap-together electrical terminal connections throughout the appliance whereby components thereof may be electrically interconnected during assembly with a minimum of time and effort. However, as this approach to assembly simplification has been increasingly employed in the production of such major home appliances as automatic clothes washers and dryers, a corresponding increase in service calls has been occasioned to correct faulty electrical connections between such snap-together terminals as have become sufficiently loose to disconnect under the stresses of shipment and normal operation. The occurrence of loose-fitting electrical connections appears to be particularly prevalent in crowded areas of terminal interconnection where assembly-line personnel find difficulty in making the necessary connective engagement between the closely spaced terminals. It is to be recognized that in such crowded areas of interconnection, the vast majority of electrical connections are made in such fashion as to assure lasting engagement therebetween, while the problem of loose-fitting connections extends to only one or two terminal connections which may be made sufficiently loosely as to permit later disengagement therebetween under the stresses of shipment or normal operation.

It is therefore an object of my invention to provide an improved means to maintain electrically conductive engagement between closely spaced electrical terminals of a first group and electrical terminals of a second group.

It is a further object of my invention to provide a lock collar adapted to maintain electrically conductive engagement between electrical terminals of a first group and electrical terminals of a second group wherein each of the terminals of the first group is supported relative to each other so as to prevent relative movement therebetween, and wherein each of the terminals of the second group relies for its support on its connection to one of the terminals of the first group.

It is still a further object of my invention to provide such a lock collar which is adapted to be positioned about and supported by the terminals of the second group to restrict the relative axial movement thereof, thereby utilizing the sustained in-place engagement between a plurality of the terminals of the first and second groups to maintain the electrically conductive engagement between the remainder of the terminals of the first and second groups.

SUMMARY OF THE INVENTION

Briefly stated, in accordance with one aspect of the present invention there is provided a lock collar adapted to maintain electrically conductive engagement between electrical terminals of a first group and electrical terminals of a second group wherein each of the terminals of the first group is supported relative to each other terminal of the first group so as to prevent movement therebetween, and wherein each of the terminals of the second group relies for its support on its connection to one of the terminals of the first group.

Each of the terminals of the second group comprises, in a substantially axially arrangement, a portion of reduced cross section intermediate a first enlarged portion adapted for connection to one of the terminals of the first group. The lock collar comprises a collar structure adapted to be positioned about and supported by the terminals of the second group. Receiving means are associated with a collar structure and adapted to simultaneously receive each of the portions of reduced cross section to thereby restrict relative axial movement of each of the terminals of the second group. By this arrangement, the sustained in-place engagement between a plurality of the terminals of the first and second group will serve to maintain the electrically conductive engagement between the remainder of the terminals of the first and second groups.

BRIEF DESCRIPTION OF THE DRAWING

While the specification concludes with claims, particularly pointing out and distinctly claiming the novel feature which is regarded as the invention, it is believed the invention will be better understood from the following description of the preferred embodiment taken in connection with the accompanying drawing, in which:

FIG. 1 is a perspective view of a plurality of male electrical terminals supported relative to each other so as to prevent relative movement therebetween, the terminals being shown connected to a plurality of female electrical terminals which rely for their support upon their connection to the male electrical terminals;

FIG. 2 is a perspective view of the lock collar of my invention shown in an open position; and

FIG. 3 is a perspective view showing the lock collar of my invention in a closed position positioned about and supported by the female electrical terminals of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawing, and initially to FIG. 1 thereof, there are illustrated a plurality of male electrical terminals 10 each being individually and rigidly supported from a terminal block 11 of the type which may extend from an electrical component such as the timer mechanism of an automatic washer or dryer. The male electrical terminals 10 comprise a first group of electrical terminals each of which is supported relative to each other terminal of the first group so as to prevent relative movement therebetween. A second group of electrical terminals comprising female terminals 12 are shown in-place upon the male electrical terminals so as to provide electrically conductive engagement between the first group of male terminals and the second group of female terminals.

It is to be noted that each of the female terminals 12 relies for its support on its connection to one of the male electrical terminals 10.

Referring, in FIG. 1, to the extreme right most female terminal 12 shown, it may be seen that each of the female terminals 12 comprises, in a substantially axial arrangement, a portion of reduced cross section 13 intermediate a first enlarged portion 14 adapted for connection to one of the male terminals 10, and a second enlarged portion 15 adapted for connection to at least one of the flexible electrical conductors 16. First enlarged portion 14 may be seen to comprise opposed resilient gripping members 17 adapted to engage one of the male terminals 10 and to frictionally maintain electrically conductive engagement therebetween once installed thereon. Second enlarged portion 15 may be provided with opposed tabs 18 adapted for connection by means of crimping to flexible conductor 16.

As was previously mentioned, the occurrence of loose-fitting electrical connections is particularly prevalent in crowded areas of terminal interconnection such as that shown in FIG. 1, wherein, although the vast majority of electrical connections will be made in such fashion as to assure lasting engagement therebetween, it is not uncommon for one or two of the electrical connections to be of such a loose-fitting nature as to permit later disengagement therebetween under the stress conditions of a season of normal operation. In order to alleviate the problem of such disengagement between one or two of the electrical terminal connections, I provide a lock characterizing the invention as the lock collar.
collar 19, as shown in FIG. 2, which is adapted to be positioned about and supported from the female electrical terminals 12 so as to restrain relative axial movement thereof and thereby maintaining electrically conductive engagement between the male and female terminals. In accordance with the preferred embodiment of my invention, lock collar 19 comprises a unitary collar structure of nonelectrically conductive material such as plastic having first and second opposing portions or arms 20 and 21 adapted to extend respectively above and below the terminals of FIG. 1.

An integral hinge means shown generally by the numeral 22 connects opposing portions or arms 20 and 21 to permit relative movement therebetween from an open position as shown in FIG. 2 wherein the collar structure 19 may be positioned over the female terminals 12, to a closed position as shown in FIG. 3. In the preferred embodiment, hinge means 22 comprises a connecting member 23 which extends between one end of each of the arms 20 and 21. A first integral plastic hinge 24 serves to join one end of arm 20 to one end of connecting member 23 while a second integral plastic hinge 24a serves to join one end of arm 21 to the other end of connecting member 23. By the term "integral plastic hinge" I mean an integral formation of plastic which is of such cross section as to be flexible, permitting a pivotal movement between the elements integral with each of the sides thereof.

In order to releasably maintain the collar structure 19 in the closed position, an integrally formed locking means, shown generally by the numeral 25, is disposed adjacent the other ends of arms 20 and 21. Locking means 25, in the preferred embodiment, comprises a tab 26 extending outwardly from arm 21 and having a slot 27 formed therein. A cooperating barbed projection 28 extends from arm 20 in a direction substantially perpendicular to the plane of tab 26 whereby, when barbed projection 28 is forced through slot 27 during the closing of the collar structure 19, barbed projection 28 will engage the underside of tab 26 thereby preventing the subsequent opening of collar structure 19. Of course, the application of strong force to separate arms 20 and 21 may be used to withdraw tab 26 from slot 27 if it later becomes necessary to open collar structure 19. Normal stresses of operation or shipment, however, will not be sufficient to open the collar.

In order to prevent relative axial movement of each of the female terminals 12, collar structure 19 is provided with receiving means adapted to simultaneously receive each of the portions of reduced cross section 13 of the female terminals 12. Such receiving means, in the preferred embodiment, comprises a plurality of recesses 29 formed in arms 20 and 21, and may additionally comprise one or more recesses 30 formed in connecting member 23. Recesses 29 and 30 are of such size and configuration as to provide a somewhat loose fit about the portions of reduced cross section 13 of the female terminals 12 while being too small to permit movement of either the first enlarged portion 14 or second enlarged portion 15 therethrough. By this arrangement, the lock collar of my invention relies on the continued in-place connection of the majority of the terminals of FIG. 1 to support the collar structure 19 which, in turn, prevents the disengagement of such few female terminals 12 as may become loose due to improper assembly or to the stresses of shipment and normal operation.

Where desired, the recesses 29 and 30 may be made sufficiently small so as to frictionally engage the portions of reduced cross section 13, although such frictional engagement is not essential to operation. Furthermore, one or more terminal engaging portions 31 may be formed integrally with either of the arms 20 and 21 to assure engagement of the portions of reduced cross section 13 with recesses 29.

As was previously mentioned, my system is particularly adapted for use in conjunction with such major appliances as automatic clothes washers and dryers wherein it is desirable to provide an improved means to maintain electrically conductive engagement between closely spaced electrical terminals. From the foregoing description it should now be apparent that the present invention, by providing a lock collar adapted to rely on the sustained in-place connection of the majority of such terminals to maintain electrically conductive engagement between the remainder of such terminals provides such a means which is simple and inexpensive to manufacture and easy to install during production.

As will be evident from the foregoing description, certain aspects of the invention are not limited to the particular details of construction of the example illustrated, and it is contemplated that various modifications or applications will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. A lock collar adapted to maintain electrically conductive engagement between electrical terminals of a first group and electrical terminals of a second group wherein each of the terminals of the first group is rigidly supported relative to each other terminal of the first group so as to prevent relative movement therebetween, and wherein each of the terminals of the second group is separate from other terminals thereof and relies for its support on its connection to one of the terminals of the first group and comprises, in a substantially axial arrangement, a portion of reduced cross section intermediate a first enlarged portion adapted for connection to one of the terminals of the first group and a second enlarged portion adapted for connection to at least one flexible electrical conductor, the lock collar comprising:

a collar structure adapted to be positioned about and supported by the terminals of the second group and comprising a unitary plastic member having first and second opposing portions or arms;

hinged means formed integrally with said collar structure and disposed adjacent one end of each of said opposing portions and adapted to permit movement therebetween from an open position in which said collar structure may be positioned over the terminals of the second group to a closed position;

locking means formed integrally with said collar structure and disposed adjacent the other ends of each of said opposing portions to releasably maintain said collar structure in said closed position;

said collar structure including recesses adapted to simultaneously receive each of the portions of reduced cross section but being smaller than both said first and second enlarged portions of said second terminals to thereby restrict relative axial movement of each of the terminals of the second group.

2. The invention of claim 1 wherein said hinge means comprises:

a connecting member extending between said one end of each of said opposing portions;

a first integral plastic hinge joining one end of said connecting member to one of said opposing members; and

a second integral plastic hinge joining the other end of said connecting member to the other of said opposing members.

3. The invention of claim 2 wherein said collar includes means on one of said collar portions extending into a recess on the other collar portion adapted to firmly engage at least one of the portions of reduced cross section.

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