Aug. 27, 1963 S. J. SKONY 3,101,985

ELECTRICAL CONNECTOR

Filed Feb. 23, 1961

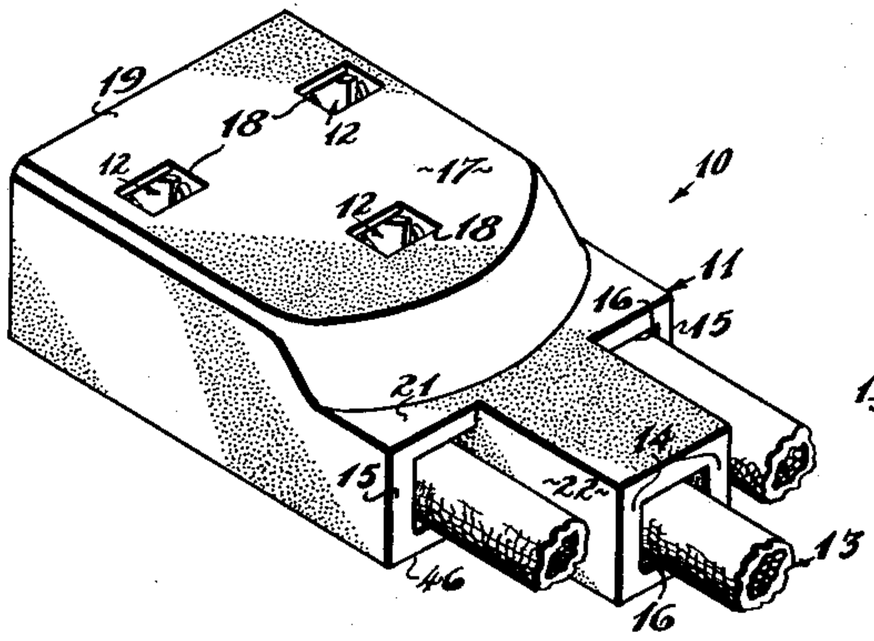

Fig. 1

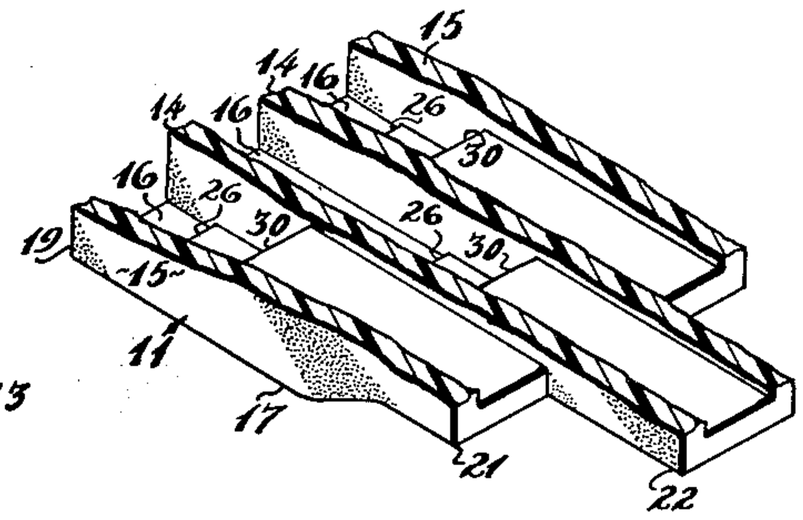

Fig. 2

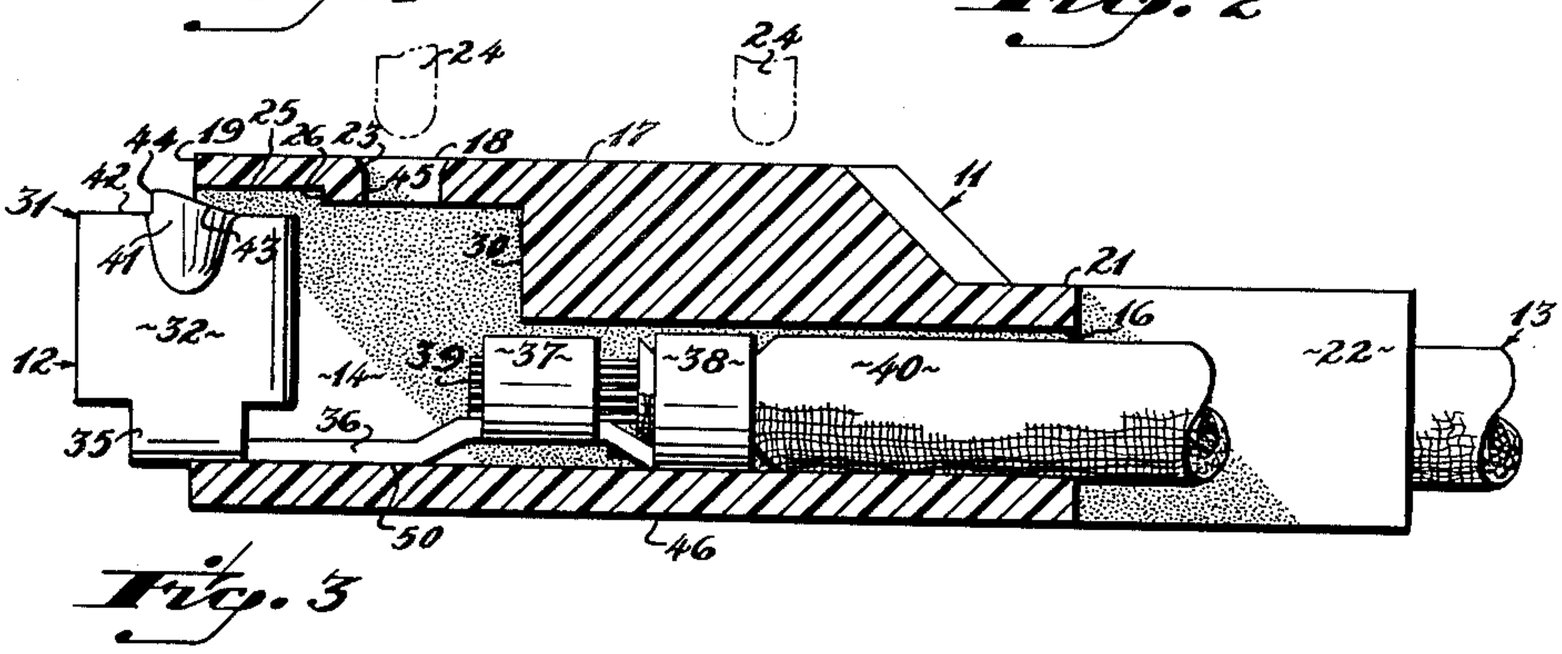

Fig. 3

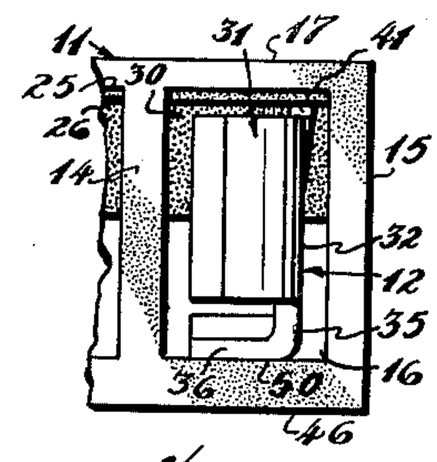

Fig. 5

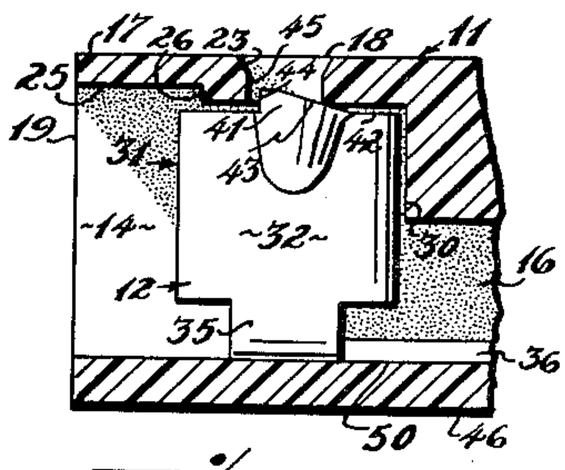

Fig. 4

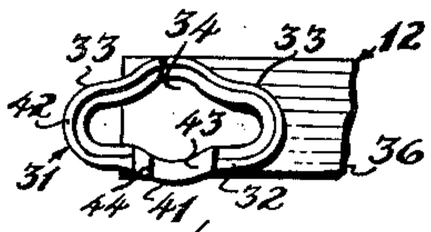

Fig. 6

INVENTOR.
Sigmund J. Skony
BY
Wood, Herron & Evans
ATTORNEYS

United States Patent Office

3,101,985

Patented Aug. 27, 1963

3,101,985
ELECTRICAL CONNECTOR

Sigmund J. Skony, Cincinnati, Ohio, assignor to Van Products, Inc., Cincinnati, Ohio, a corporation of Ohio

Filed Feb. 23, 1961, Ser. No. 91,182
6 Claims. (Cl. 339—192)

This invention relates to an electrical connector and more particularly the invention is directed to the combination of one or more connector clips mounted in an insulative connector block.

The connector of the present invention is particularly adapted to make electrical connection with terminals in the shell of a hermetically sealed refrigeration unit although it will be obvious from the following description that the invention is by no means limited to that application. In such an environment, three terminal posts or pins are exposed and each is adapted to receive a connector clip. The connector clips have conductive sockets whose axes are normal to the plane of a connector block in which the clips are mounted, the clips being adapted to be forced onto the terminal posts and frictionally retained there.

Space requirements dictate that the assembly of connector block and clips require as small amount of space as possible. Reducing the over-all size of the cluster assembly requires the positioning of the clips close together. When several clips are positioned quite closely adjacent to one another, it is, of course, of the utmost importance that the clips be as completely electrically isolated from each other as possible in order to avoid arcing over between adjacent clips with consequent short circuits and damage to the units.

Another important requisite of a cluster assembly is that the component parts remain in assembled condition. In apparatus such as a refrigerator, the motor and compressor develops vibrations during operation. These vibrations will tend to disassemble insecurely held component parts of a cluster assembly.

In my Patent No. 2,875,426 I have disclosed a cluster assembly comprising a connector block having three connector clips secured in the connector block by means of a snap lock cover plate. The connector of that patent is compact and the component parts are securely held together by the snap fitting of the cover plate to the connector block.

In my present invention I am able to reduce the overall dimensions of the cluster assembly, as compared to my patented connector, while providing an even more complete isolation of the connector clips with respect to each other. Additionally, I have eliminated the requirement of a separate cover plate to secure the connector clips within the block.

In accordance with the present invention I provide an integral connector block having three longitudinal passageways extending through the block to receive connector clips. The passageways are dimensioned so as to receive the connector clips snugly, each connector clip being provided with a projection which is normally lodged in a hole communicating with a passageway to secure the clip in the block. The longitudinal passageways are defined by divider walls integral with the top and bottom walls. The integral construction provides substantially complete electrical isolation and insures the prevention of arcing between adjacent clips.

In the present invention, the connector clips may be assembled with respect to the connector blocks in a very rapid and convenient manner. The free ends of the leads connected to the connector clips are merely threaded into the longitudinal passageways and pulled through the rearward end of the passageways until the projection on each

clip snaps into the respective hole in the connector block into which the projection is to be received. Thus the application of the connector clips to the connector block is simplified in the elimination of the requirement of snapping on the cover.

The bottom wall which would normally be the cover plate in my prior invention is molded integrally with the remaining block structure. As a consequence the dimensions of the connector block can be reduced for it is not necessary to have the additional side wall thickness required to support flanges by which the snap in cover plate is secured.

In my patented invention, the connector clips are securely positioned in a block by disposing them in transverse holes extending through the block. By using projections on the connector clips to secure the clips in the block of the present invention, the connector clips can be substantially identical to those used with my prior invention. Not only does this aspect of the invention eliminate the requirement of a complete redesign of connector clips, but also the invention permits the use of the connector block of my prior invention to be used interchangeably with the connector block of the present invention. This is important to the repair and replacement of connectors of the present invention.

It will be appreciated that when an installation has been made with the lead wires connected to their respective terminals and it is necessary to destroy the connector block, replacement can best be effected by employing the connector block of my earlier patent for this does not require the lead wires to be disconnected for threading into the block. Thus the importance of the interchangeability of the connector clips with the connector block.

The several features of the invention will become more readily apparent from the following detailed description taken in conjunction with the accompanying drawings in which:

FIG. 1 is a perspective view of the invention;

FIG. 2 is a perspective view with the bottom wall broken away;

FIG. 3 is a cross sectional view through one longitudinal passageway of the connector block;

FIG. 4 is a fragmentary cross sectional view showing a connector clip in final position;

FIG. 5 is a fragmentary front elevational view of the block and clip shown in FIG. 4, and

FIG. 6 is a top plan view of the clip.

Shown in the drawings is a cluster assembly **10** comprising a connector block **11**, three connector clips **12** and associated leads **13**. The connector block **11** is an integrally molded unit having divider walls **14** and side walls **15** defining three parallel longitudinal passageways **16** to receive the respective connector clips and leads. The connector has a top wall **17** in which three triangularly spaced holes **18** are formed, two of which are located at the forward end **19** of the connector block. The leads **13** project from the rearward end **21** of the block, the rearward end being offset as at **22**. The outer edges of each hole are chamfered as indicated at **23** in FIG. 3 so as to facilitate the introduction of terminal posts such as is shown at **24** in FIG. 3.

The forward portion of each longitudinal passageway **16** is recessed as at **25**, leaving a detent **26** adjacent hole **18**. The recess **25** facilitates the introduction of the connector clips and the detent **26** prevents their removal as will be explained below.

Spaced rearwardly of each hole **18** is a shoulder **30** which is integral with the top wall **17** of the connector block, and which presents a transverse wall portion engageable by a clip. The shoulders **30** are spaced rearwardly of their respective holes **18** a distance sufficient

to align each connector clip 12 with its respective hole when the connector clip is positioned in the connector block in substantial abutment with the shoulder as shown in FIG. 4.

Each connector clip has a socket portion 31 which is preferably of the type disclosed in my Patent No. 2,875,426. It comprises a central metallic member 32 (FIG. 6) having wings or ears 33 bent from opposite sides thereof toward each other to provide a socket receptacle 34 for a pin 24. The central member 32 is an extension of a flange 35 on a flat shank portion 36. The shank 36 has integral ferrules 37 and 38 which are crimped about the core 39 and insulation 40 respectively of the lead wire to secure the clip to the lead wire and to form an electrical connection therewith.

The central metal member has a projection 41 which protrudes above the upper edge or end 42 thereof and which is integral therewith. The projection 41 has a rearwardly facing inclined surface 43 and a forwardly facing transverse surface 44. As illustrated in FIG. 4, the projection 41 extends into the hole 18 through which the pin 24 passes and blocks removal of the clip in a forward direction from the connector block by the engagement of surface 44 with the edge 45 of the hole 18 (FIG. 4).

As best illustrated in FIG. 3, the distance between the extremity of the projection 41 and the outer surface 50 of the shank 36 is slightly greater than the internal dimension of the passageway from the detent 26 to the bottom wall 46 of the longitudinal passageway into which the clip is to be introduced. The combination of the inclined surface 43 of the projection and the resilience of the shank 36 and flange 35 permits the clip to be compressed as it is pulled over the detent 26 and into its properly aligned position in hole 18. The forward edge of the detent 26 cams the inclined surface and clip downwardly as viewed in FIG. 3 to compress the clip when it engages the detent 26. When the projection 41 reaches the hole 18, the projection is freed from the confines of the longitudinal passageway and pops into the hole 18 with a perceptible click.

In assembling the clips with respect to the connector block, the lead wires are threaded into the longitudinal passageway from the forward end and are forced out of the rearward end 21. The assembler pulls on the rearwardly projecting lead wires to pull the clip into its respective longitudinally passageway until it engages detent 26. Thereafter somewhat greater force must be applied for projection 41 to ride over detent 26 until the distinctive click is heard. Further, longitudinal movement of the clip is blocked by the abutment of the clip socket with the shoulder or wall portion 30 in the passageway.

It should be understood that it is not absolutely necessary that the block be recessed as at 25. Rather the upper wall could be uniformly of the thickness of the detent. Such configuration, however, would increase the distance over which the clip would have to be pulled in compressed condition.

The holes 18 are triangularly positioned with respect to each other, the positioning conforming to the positioning of three terminal posts 24 to which the connector is to be applied. In assembling the refrigerator unit the connector block is positioned over the ends of the terminal posts, the chamfered surfaces 33 facilitating the proper alignment of the connector block with respect to the posts. Thereafter the connector block is simply forced down over the posts and electrical connection is made.

It should be understood that while the description of the invention has been directed particularly to a three connector cluster assembly, the principal features of the invention are equally applicable to a combination of clip and connector block in which fewer or greater clips are employed.

I claim:

1. An electrical connector device comprising, an integral connector block having opposed top and bottom walls and forward and rearward ends, said block having three parallel longitudinal passageways extending therethrough from said forward end to said rearward end and three transverse holes in said top wall each communicating with one of said passageways, a shoulder in each passageway formed on the inner surface of the top wall and located rearwardly of said hole, a connector clip disposed in each said passageway, each connector clip comprising a conductor socket abutting said shoulder and having an axis aligned with the center of each said transverse hole, said socket being adapted to receive a terminal pin projecting through said hole, a conductive lead electrically and mechanically connected to said socket and extending rearwardly out of said passageway, a projection on one edge of said socket projecting into said hole, said projection having a forwardly facing transverse surface forming a detent in engagement with the edge of said hole and an inclined rearwardly facing surface to facilitate introduction of said socket into its aligned position in said passageway from the forward end thereof.

2. An electrical connector device comprising, an integral connector block having opposed top and bottom walls and forward and rearward ends, said block having at least one longitudinal passageway extending therethrough from said forward end to said rearward end and a transverse hole in said top wall communicating with said passageway, a shoulder formed on one inner surface of said passageway and located rearwardly of said hole, a connector clip disposed in said passageway, said connector clip comprising a conductive socket forming portion abutting said shoulder and having an axis aligned with the center of each said transverse hole, said socket being adapted to receive a terminal pin projecting through said hole, a projection on the upper edge of said socket projecting into said hole, said projection having a forwardly facing transverse surface forming a detent in engagement with the edge of said hole and an inclined rearwardly facing surface to facilitate introduction of said socket into its aligned position in said passageway from the forward end thereof.

3. An electrical connector device comprising, an integral connector block having opposed top and bottom walls and forward and rearward ends, said block having at least one longitudinal passageway extending therethrough from said forward end to said rearward end and a transverse hole in said top wall communicating with said passageway, a shoulder in said passageway located rearwardly of said transverse hole, an inwardly directed detent forward of, and immediately adjacent each said hole, a connector clip disposed in said passageway, said connector clip comprising a conductive socket forming portion abutting said shoulder and having an axis aligned with the center of each said transverse hole, said socket being adapted to receive a terminal pin projecting through said hole, and a projection on the upper edge of said socket projecting into said hole to secure said clip in said passageway, the height of said passageway at said detent being slightly smaller than the height of said clip from its bottom portion to the end of said projection.

4. An electrical connector device comprising, an integral connector block having opposed top and bottom walls and forward and rearward ends, said block having at least one longitudinal passageway extending therethrough from said forward end to said rearward end and a transverse hole in said top wall communicating with said passageway, a shoulder in said passageway located rearwardly of said transverse hole, a connector clip disposed in said passageway, said connector clip comprising a conductive socket abutting said shoulder and having an axis aligned with the center of each said transverse hole, said socket being adapted to receive a terminal pin projecting through said hole, and a projection on one edge of said socket projecting into said hole to secure said clip in said passageway.

5. An electrical connector device comprising, an integral connector block having opposed top and bottom walls, said block having at least one cavity therein and a transverse hole in said top wall communicating with said cavity, a transverse wall portion in said cavity located on one side of said hole, a connector clip disposed in said cavity, said connector clip comprising a preformed conductive socket forming portion having a side surface abutting said wall portion and having an axis aligned with the center of said transverse hole, said socket being adapted to receive a terminal pin projecting through said hole, the end of said clip having an abutment which snaps into said transverse hole to block movement of said clip from its pin receiving position in a direction away from said transverse wall.

6. An electrical connector device comprising,

an integral connector block having opposed top and bottom walls,

said block having at least one cavity therein and a transverse hole in said top wall communicating with said cavity,

a transverse wall portion in said cavity located on one side of said hole,

a connector clip disposed in said cavity,

said connector clip comprising a preformed conductive socket forming portion having a side surface abutting said wall portion and having an axis aligned with the center of said transverse hole,

said socket being adapted to receive a terminal pin projecting through said hole, the end of said clip having an abutment which snaps into said transverse hole to block movement of said clip from its pin receiving position in a direction away from said transverse wall, and

said abutment having an inclined surface facing in the direction of said wall portion to facilitate introduction of said clip into said block.

References Cited in the file of this patent

UNITED STATES PATENTS

2,728,060 Doeg ---------- Dec. 20, 1955