Feb. 22, 1966 J. A. TOEDTMAN 3,236,938

COMPRESSIBLE ELECTRICAL CONNECTOR

Original Filed March 26, 1962

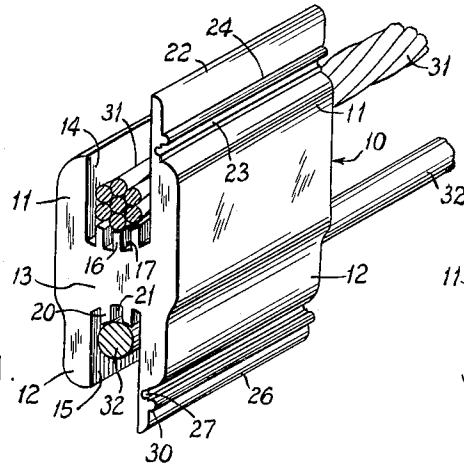

FIG. 1.

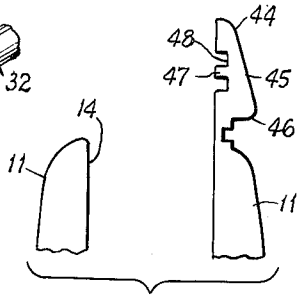

FIG. 7.

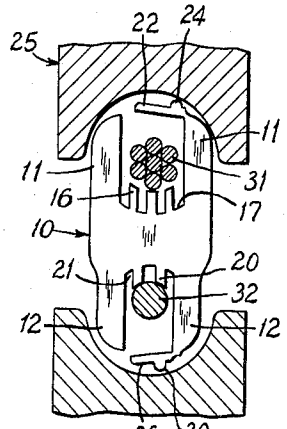

FIG. 2.

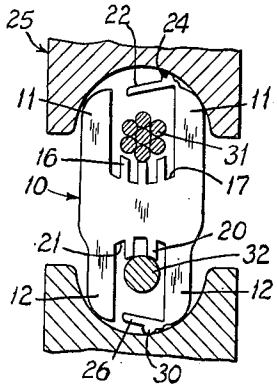

FIG. 3.

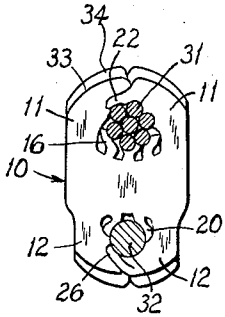

FIG. 4.

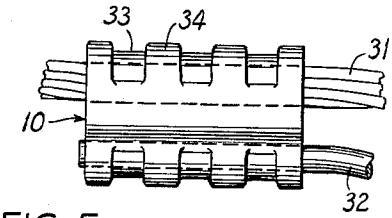

FIG. 5.

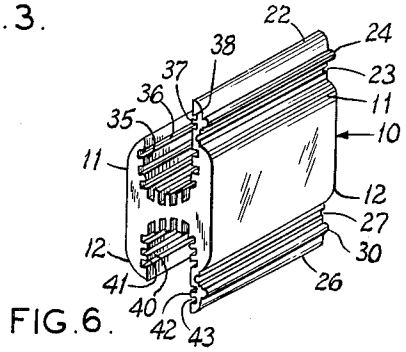

FIG. 6.

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COMPRESSIBLE ELECTRICAL CONNECTOR

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Original application Mar. 26, 1962, Ser. No. 182,237, now Patent No. 3,156,764, dated Nov. 10, 1964. Divided and this application Oct. 28, 1963, Ser. No. 319,260
3 Claims. (Cl. 174—94)

This application is a division of co-pending application Serial No. 182,237, filed March 26, 1962, now Patent No. 3,156,764.

This invention relates generally to improvements in a compressible electrical connector, and more particular to improvements in assembling the connector with a conductor or with a pair of conductors to be interconnected by the connector.

An important objective is achieved by the provision of an integral tab on the body which is easily bendable over a recess formed in the body to hold a conductor temporarily in the recess and in assembly with the connector, the tab including a shoulder adapted to engage a compression tool upon applying the tool to the connector body so that the tab is bent into the recess as the body is deformed to close the recess and permanently grip the conductor.

Another important object is realized by constructing the tab of a length less than the width of the recess to assure that the tab will enter the recess when the tab is bent and the connector compressed to provide an overlapping connection that enfolds and grips the conductor portion disposed in the body recess.

Still another important object is provided by making the tab thin at its connection to the body which enables the tab to be bent easily by digital pressure over the recess to retain the conductor temporarily incident to installation and final compression of the connector body.

An important objective is afforded by forming the recess between a pair of spaced arms, and by providing the bendable tab integrally on one of the arms, the tab having an outwardly projecting shoulder that cooperates with the tool to make sure that the tab is bent into the recess, over the conductor and inside of the opposite overlapping arm as the connector body is compressed.

Another important object is achieved by the structural arrangement of the tab in extending beyond the arm opposite to the arm to which it is integrally attached, and by making the tab of a length that is less than the width of the recess between the arms to assure entry of the tab into the recess.

Yet another important objective is realized by constructing the tab shoulder as an elongate ridge on the outer surface of the tab which extends longitudinally along the tab between its ends.

An important object is provided by forming the connector body of a substantially H-shaped cross section having two pairs of arms, the arms of each pair being spaced to provide a recess adapted to receive a conductor, and the recesses being open along their lengths at opposed portions of the body. With this structure, one of the arms of each pair includes an integral relatively thin tab bendable over the associated recess to hold the conductor disposed in the recess temporarily in assembly with the connector.

Another important objective is to provide a compressible electrical connector that is simple and durable in construction, economical to manufacture, highly efficient in operation, and which can be readily installed by anyone with little or no instruction.

The foregoing and numerous other objects and advantages of the invention will more clearly appear from

the following detailed description of a preferred embodiment and a modification thereof, particularly when considered in connection with the accompanying drawing, in which:

FIG. 1 is a perspective view of the connector before compression;

FIG. 2 is an end elevational view of the connector with the tabs bent over their associated recesses just prior to compressive action of the compression tool;

FIG. 3 is an end elevational view of the connector illustrating the first action of the compression tool in bending the tabs inwardly of the recesses and the oppositely disposed arms;

FIG. 4 is an end elevational view of the connector body fully compressed;

FIG. 5 is a side elevational view of the connector after compression;

FIG. 6 is a perspective view of a slightly modified construction of the connector, and

FIG. 7 is a fragmentary, end elevational view illustrating a modified construction of the tab utilized on the connector.

Referring now by characters of reference to the drawing, and first to FIGS. 1–5 inclusive, it is seen that the compressible electrical connector consists of a substantially H-shaped body generally indicated as **10** made of a malleable metal. The body **10** includes two pair of arms **11** and **12** extending outwardly from an intervening partition **13**. The arms **11** are spaced to provide a recess **14**. Similarly, the arms **12** are spaced to provide a corresponding recess **15** usually of a slightly smaller dimension.

The body **10** is provided with a plurality of longitudinal, alternately arranged series of deformable ribs **16** and grooves **17**. Specifically, the ribs **16** extend along the recess bottom and project into the recess **14**. It has been found advantageous to construct these ribs **16** so that their heighth is greater than their width to assure appropriate deformation and conformation in the manner which will become apparent upon later description of parts and assembly.

The inside surface of arms **11** are flat. However at each side of the bottom of recess **14** immediately adjacent the inner surface of each arm **11** there is provided one of the grooves **17** constituting a side groove. The location of the side grooves **17** assures bending of the arms **11** in a desired manner subsequently described.

The body **10** is provided with a plurality of alternating deformable ribs **20** and grooves **21** extending along the bottom of the other recess **15**. The ribs **20** extend into the interior of recess **15**. Again, it has been found advantageous to construct these ribs **20** so that their heighth is greater than their width.

Correspondingly, the inside surfaces of arms **12** are flat, and one of the grooves **21** constituting a side groove is provided along each side of the bottom of recess **15** immediately adjacent each arm **12**. It will be noted that because the recess **15** is slightly smaller to accommodate a smaller conductor, there are two ribs **20** extending along the recess bottom, while there are three ribs **16** extending along the bottom of the slightly larger recess **14**.

The ribs **16** in recess **14** and the ribs **20** in recess **15** constitute a deformable means providing a yieldable floor for the conductor received in each recess.

Attached integrally with one of the arms **11** is a bendable tab **22** extending beyond the end of the other opposite arm **11**. The tab **22** is provided with a thin portion **23** at its connection with its associated arm **11** which assures that the tab can be bent inwardly toward the opposite arm **11** very easily, as, for example, under pressure of the fingers.

A ridge 24 constituting a shoulder is formed on the outside surface of tab 22 and extends longitudinally the length of such tab between its ends. As will become apparent, the ridge 24 is engaged by the compression tool 25 shown in FIG. 3 to make sure that the tab 22 is bent inwardly of its associated recess 14 and inwardly of the opposed arm 11 before the arms 11 are compressively overlapped to enfold and grip the conductor within the recess 14. The length of tab 22, or in other words the distance of the tab 22 extending outwardly from its associated arm 11, is less than the width of the recess 14 between the arms 11. This structural arrangement assures that the tab 22 will enter the recess 14 when the tab 22 is bent over and when the connector is compressed.

A similar tab 26 is attached integrally to one of the arms 12 at the same side of the connector as the other corresponding tab 22. Tab 26 extends outwardly beyond the end of the other arm 12. Tab 26 is provided with a thin portion 27 at its connection to its associated arm 12 so that the tab can be easily bent inwardly toward the other arm 12. A ridge 30 constituting a shoulder is formed on the outside surface of tab 26 and extends the length of the tab between its ends, the ridge 30 being adapted to engage the compression tool 25 to assure that the tab 26 will be bent inwardly of its associated recess 15 and inwardly of the opposite arm 12 before the arms 12 are overlapped to enfold and grip the conductor in the recess 15 under the compressive action of tool 25. This tab 26 is also of a lesser length than the width of the recess 15 between the arms 12 to assure that the bendable tab 26 will enter the recess 15.

To install the connector, a conductor 31 is inserted into recess 14 and the tab 22 is bent by digital pressure over the conductor 27 to hold it temporarily in place, as is shown clearly in FIG. 2. As suggested above, the tab 22 enters the recess 14 inside of the opposite arm 11.

A smaller tap conductor 32 is disposed in the recess 15 and the tab 26 is bent over under digital pressure to hold such conductor 32 in place temporarily, as is shown in FIG. 2. Similarly, the tab 26 enters and closes the recess 15 inside of the opposite arm 12.

The compression tool 25 may be of any suitable type. The tool 25 is fitted over the connector body 10 and manipulated to exert a compressive pressure, thereby squeezing the body 10 to the condition illustrated in FIGS. 4 and 5. It will be noted that the tool 25 leaves a series of peripheral depressions 33 and intervening rises 34 in the connector body 10. Specifically, the first action of tool 25 is to engage the tab ridges 24 and 30, which results in bending the tabs 22 and 26 respectively inwardlly of the associated recesses 14 and 15 and inwardly of the oppositely disposed arms 11 and 12. This initial action of tool 25 and the bending of tabs 22 and 26 is best shown from a comparison of FIGS. 2 and 3.

Upon continued compressive action of tool 25, the arms 11 and 12 are bent toward each other to provide an overlapping connection that enfolds and grips the conductors 31 and 32 as is shown in FIG. 4. The tabs 22 and 26 are disposed over their associated conductors 31 and 32 in close contiguous relation, while the opposite arms 11 and 12 respectively overlap such tabs.

Upon compression of the connector, the ribs 16 are deformed and yield under pressure by the conductor 31 to accommodate the particular size of the conductor 31. As the ribs 16 are deformed, the ribs 16 wipe the contact surfaces with a cleaning action and yieldably conform precisely to the conductor configuration to provide an optimum contact.

As a result of the provision of side grooves 17 immediately adjacent each of the arms 11, the arms 11 bend toward each other at the bottom of the recess 14 and thereby preclude any bulging in this area of the recess bottom.

If a compound or paste (not shown) is utilized in the connector, the compound will be retained by the ribs 16 in the grooves 17. Moreover, such compound will be forced into the stranding of the conductor 31 for more effective action.

It will be importantly realized that as the ribs 16 yieldably deform under pressure by the conductor 31 upon compression, the ribs 16 accommodate the conductor 31 and thereby prevent excessive pressure from developing on the conductor. Of course, it will be readily apparent that this deformation feature of the ribs 16 enables the insertion and effective connection of any conductor 31 within a wide range of sizes.

In a similar manner, the conductor 32 deforms the ribs 20 under pressure so that the ribs 20 accommodate the particular size of such conductor 32. Again, the ribs 20 conform to the particular shape and contour of the conductor 32, and particularly the ribs 20 wipe the surface of the conductor 32 with a cleaning action and conform precisely with the conductor to provide an effective contact. The yielding or deformation of the ribs 20 precludes any excessive pressure developing on the conductor 32.

The same advantageous result is obtained in that the deformation of the ribs 20 at the bottom of the recess 15 enables the effective connection of any conductor 32 within a wide range of sizes.

Because a side groove is placed immediately adjacent each of the arms 12, the arms 12 bend toward each other at the bottom of the recess 15 and thereby preclude any bulging in this area.

If a compound or paste (not shown) is utilized in this portion of the connector body 10, such compound would be retained in the grooves 21 by the ribs 20 even upon endwise insertion of the conductor 32. Upon compressive action, the compound would be forced against the conductor 32 for more effective usage.

With the particular construction of tabs 22 and 26 and their structural relationship with the width of recesses 14 and 15 respectively, and the coacting engagement of the tab ridges 24 and 30 with the compression tool, the tabs 22 and 26 will enter the recesses 14 and 15 within the oppositely related arms 11 and 12 so that such tabs 22 and 26 will be overlapped by one of the associated pair of arms upon compression of the connector.

A modified embodiment of the compressible electrical connector is illustrated in FIG. 6. In this embodiment, the connector includes a plurality of deformable ribs 35 and alternately arranged grooves 36 along the inside surface of each arm 11. In addition, a deformable rib 37 with corresponding grooves 38 at each side thereof is provided along the inside surface of tab 22. The ribs 35 and 37 yieldably deform under pressure to accommodate a particular conductor and to conform to the conductor contour and surface.

Similiarly, in FIG. 6, a plurality of deformable ribs 40 and alternately arranged grooves 41 are provided along the inside surface of each arm 12. These side grooves 41 enable the arms 12 to bend easily in these areas so that the arms 12 wrap or enfold the conductor very closely. In addition, the tab 26 is provided with a deformable rib 42 and laterally related grooves 43. The ribs 40 and 42 yieldably deform under pressure to accommodate the conductor size and to conform to the configuration of such conductor.

In FIG. 7 there is illustrated a modified construction of a tab 44 that can be utilized in any one of the embodiments of FIGS. 1 and 6. The tab 44 includes an inclined outer surface 45 leading directly to an outwardly projecting shoulder 46 that corresponds to the tab ridges 24 and 30. This shoulder 46 cooperates with the compression tool 25 to assure that the tab 44 will enter its associated recess and be overlapped by the opposite arm of the body upon continued and further compression of such body, all in the manner previously described with respect to the embodiments of FIGS. 1 and 6.

In FIG. 7 there is shown a deformable rib **47** and laterally related grooves **48** on the inside surface of tab **44**, such rib **47** deforming under pressure against the conductor to conform to the conductor configuration. Of course, the type of shoulder **46** may be utilized in this tab **44** without the deformable rib **47** and grooves **48** if desired.

Although the invention has been described by making detailed reference to a preferred embodiment and modifications thereof, such detail is to be understood in an instructive, rather than in any restrictive sense, many variants being possible within the scope of the claims hereunto appended.

I claim as my invention:

1. A compressible electrical connector comprising:

(a) a connector body made of malleable metal and being provided with a recess,

(b) the body being provided with an integral tab, the tab being bendable over the recess, the length of the tab being less than the width of the recess to assure entry of the tab into the recess and overlapping of the body portion defining the recess opposite the tab, and

(c) the tab including a ridge projecting outwardly from the outer surface of the tab, the ridge being adapted to engage a compression tool upon applying the tool to the connector body so that the tab is bent into the recess as the body is deformed to close the recess.

2. A compressible electrical connector comprising:

(a) a connector body made of malleable metal having a pair of arms, the arms being spaced apart to provide a recess therebetween adapted to receive a conductor,

(b) one of the arms including an integral tab bendable over the recess to hold the connector temporarily in assembly with the conductor, the length of the tab being less than the width of the recess between the arms to assure entry of the tab into the recess,

(c) the tab including an outwardly projecting ridge on the outer surface of the tab, the ridge being adapted to engage a compression tool upon applying the tool to the body so that the tab is bent into the recess as the body is deformed to provide an overlapping connection of the arms which enfold and grip the conductor in the recess upon compression of the connector.

3. A compressible electrical connector comprising:

(a) a connector body made of malleable metal and being of substantially H-shape in cross section having two pairs of arms, the arms of each pair being spaced apart to provide a recess adapted to receive a conductor, the recesses being open along their lengths at opposed portions of the body,

(b) one of the arms of each pair including an integral tab bendable over the associated recess to hold the conductor disposed in the recess temporarily in assembly with the connector, the length of each tab being less than the width of the associated recess between the pair of arms to assure entry of the tab into the recess,

(c) the tab including an outwardly projecting ridge on the outer surface of the tab, the ridge being adapted to engage a compression tool upon applying the tool to the body so that the tab is bent into the recess as the body is deformed to provide an overlapping connection of the arms which enfold and grip the conductor in the recess upon compression of the connector.

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