March 17, 1964 T. J. McGRATH 3,125,397

CONNECTOR

Filed March 11, 1960

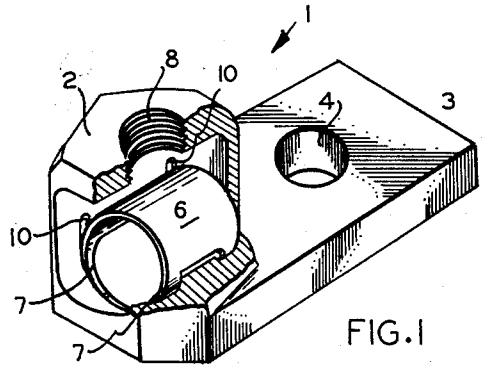


FIG.1

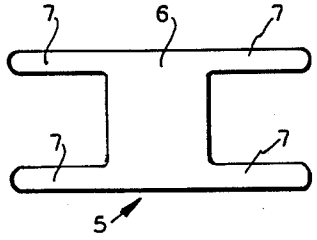


FIG.2

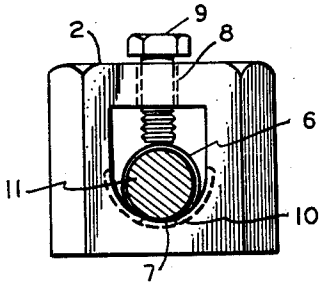


FIG.3

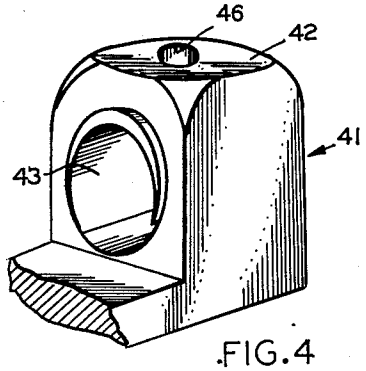


FIG.4

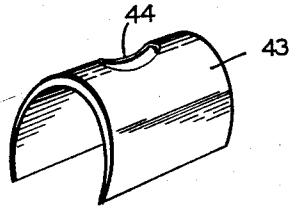


FIG.5

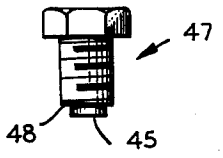


FIG.6

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CONNECTOR

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This invention relates to electrical connectors, and more particularly, to a mechanical conductor retention assembly for a connector.

It is common in terminal connectors to retain the conductor within the terminal by means of a pressure screw. This pressure screw is customarily of special design to minimize conductor deformation, prevent conductor damage, and facilitate removal of the conductor. Generally such a scheme is practical only for the smaller conductor sizes. The larger conductor sizes require a specially designed pressure bar which should be captured to the pressure screw to prevent the loss of the bar from the connector. Finally, if the connector is intended to accept a range of conductor sizes, the design must be a compromise, and no conductor will actually be perfectly accommodated, i.e. be under substantially full circumferential pressure, and undeformed in cross-section.

It is, therefore, an object of this invention to provide a mechanical pressure assembly for a connector which will apply pressure substantially circumferentially to a wide range of size of inserted conductors.

Another object is to provide a pressure assembly which can be captured by the connector.

Yet another object is to provide a pressure assembly which makes maximum use of standard parts, and for which nonstandard parts can be inexpensively manufactured.

A feature of this invention is a flat spring of substantially C shape which is adapted to be compressed around an inserted conductor by a pressure applying means.

These and other objects and features of this invention will become more apparent by reference to the following description taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a perspective view in partial section illustrating a preferred embodiment of the invention;

FIG. 2 is a plan view of the pressure spring utilized in the embodiment of FIG. 1, the spring being shown uncoiled;

FIG. 3 is an end view of the embodiment shown in FIG. 1;

FIG. 4 is a perspective view illustrating another embodiment of this invention;

FIG. 5 is a perspective view of the pressure spring utilized in the embodiment of FIG. 4; and

FIG. 6 is an elevation of the pressure screw utilized in the embodiment of FIG. 4.

FIG. 1 illustrates a terminal lug 1 having a socket portion 2 adapted to receive an inserted conductor (not shown) and a flat portion 3 including a hole 4 to receive a mounting bolt (not shown). Disposed within socket portion 2 is a flat stock pressure spring 5 rolled to substantially a C shape. As shown in FIG. 2, pressure spring 5 has a central portion 6 and four arms 7. Socket portion 2 includes a threaded hole 8 adapted to receive a pressure screw 9. Also included are a pair of grooves 10 adapted to receive pressure spring arms 7. It will be appreciated that the number of grooves 10 and interlocking therewith arms 7 may be varied.

In assembly, pressure spring 5 is rolled up and inserted into the socket 2, arms 7 snapping into grooves 10. The spring 5 is thus orientated and captured in the socket. Pressure screw 9 is inserted into hole 8. A conductor may be inserted into the pressure spring 5. As screw 9 is inserted into the socket 2, it abuts spring central portion 6. This resultant pressure tends to deform the spring and causes it to roll up into a smaller diameter, the opposite arms 7 approaching each other. Thus spring 5 maintains its circular cross-section. When the screw is fully tightened, the spring 5 may tightly encircle at least the upper surface (i.e., the surface not in direct contact with the socket) of the conductor 11, and transmit the pressure of screw 9 over the upper surface of the conductor. The lower surface of the conductor may be in direct contact with the socket. Spring 5 may be designed so that at maximum contraction arms 7 may abut each other, overlap, or lie alongside each other, within the grooves 10. On disassembly, the pressure screw 9 is backed out of the socket 2, pressure on spring 5 is released and the spring expands. Arms 7 remain in grooves 10, retaining the spring in the socket. When the spring extends the conductor may be removed therefrom.

Another embodiment is shown in FIG. 4 wherein a terminal lug 41 has a socket portion 42 adapted to receive an inserted conductor (not shown). Disposed within socket portion 42 is a C-shaped pressure spring 43. Spring 43 has a central surface discontinuity 44 adapted to engage the end 45 of a pressure screw 46. End 45 preferably does not pass through the spring 43. Socket 42 includes a hole 47 into which screw 47 may be threaded. When screw 47 is threaded through hole 46, end 45 engages discontinuity 44, orientating and capturing the spring 43. A conductor may be inserted into the spring. As screw 47 is threaded further into socket 42, shoulder 48 presses against the central portion 44 of the spring, forcing the ends of the spring to wrap around the conductor. When screw 47 is fully tightened, spring 43 may tightly encircle at least the upper surface of the conductor, and transmit the pressure of the screw over the upper free surface of the conductor. The lower surface of the conductor may be in direct contact with the socket. On disassembly as the screw is backed out of the socket 42, pressure on the spring is released and the spring expands. Screw end 45 remains in discontinuity 44, retaining the spring in the socket.

The invention has thus been described but it is desired to be understood that it is not confined to the particular forms or usages shown and described. The same being merely illustrative, and that the invention may be carried out in other ways without departing from the spirit of the invention, and therefore, the right is broadly claimed to employ all equivalent instrumentalities coming within the scope of the appendant claims, and by means of which objects of this invention are attained and new results accomplished, as it is obvious that the particular embodiments herein shown and described are only some of the many that can be employed to obtain these objects and accomplish these results.

I claim:

1. A connector for an electrical conductor comprising: a conductor receiving portion including a cavity therein; an arcuate spring element disposed in said cavity and adapted to receive a conductor within the arc thereof; a pressure applying means assembled to said conductor receiving portion for applying pressure to the medial part of said spring element to force the ends of the spring into camming engagement with the cavity inner wall; said spring element further being adapted to encircle more than one half the circumference of the inserted conductor; wherein the cavity inner wall is shaped to cam said resilient member around an inserted conductor into circumferential contact therewith for applying circumferential radially compressive pressure thereto in response to pressure applied by said pressure applying means.

2. A connector for an electrical conductor in accordance with claim 1, further including a surface discontinuity on said arcuate spring element and means on said

pressure applying means for engaging said discontinuity to retain said spring element within said cavity.

3. A connection comprising a connector and an elongate member secured thereto; said connector including an elongate member receiving portion having a receiving cavity therein, an arcuate resilient member disposed in said cavity with the ends thereof engaging the cavity inner wall, pressure applying means assembled to said elongate member receiving portion for applying pressure to the medial portion of said resilient member to force the ends thereof into camming engagement with said cavity inner wall, and means on said resilient member for capturing said elongate member receiving portion thereto; wherein said elongate member is axially disposed in said cavity within the arc of said resilient member, said resilient member is of sufficient length to encircle more than one half the circumference of said elongate member, and said cavity wall is shaped to cam said resilient member around said elongate member and into the cross-sectional shape thereof for applying circumferential, radially compressive pressure to said elongate member in response to pressure applied by said pressure applying means.

4. A connector for an electrical conductor in accordance with claim 3, wherein said means for capturing said resilient member to said receiving portion includes a discontinuity on the medial portion of said resilient member, and said pressure applying means engages said discontinuity to retain said resilient member within said receiving cavity.

5. A connector for an electrical conductor comprising: a conductor receiving portion having a cavity therein including an arcuately curved inner wall surface portion; an arcuate spring element disposed in said cavity and adapted to receive a conductor within the arc thereof; said spring element having a flat outline of substantially H shape including a medial part and two pairs of opposed arms and being formed in an arc about an axis normal to the said arms; a threaded hole through said conductor receiving portion radial to said cavity and opposite said curved inner wall surface portion; a pressure applying screw threaded into said hole and bearing on the medial part of said spring element to force the ends thereof into camming engagement with said curved inner wall surface portion; a pair of grooves in the wall of said cavity opposite said threaded hole, each receiving a pair of said opposed arms of said arcuate spring element to retain said spring element in said cavity; said spring element further being adapted to encircle, with its medial part and opposed arms, more than one half the circumference of an inserted conductor; wherein the said curved inner wall surface portion and said grooves are shaped to cam said arcuate spring element around an inserted conductor into circumferential contact therewith for applying continuous circumferential, radially compressive pressure thereto in response to pressure applied by said pressure applying means.

6. A connection comprising a connector and an elongate, substantially circularly cross-sectioned, member secured thereto; said connector including an elongate member receiving portion having an at least partially cylindrical cavity therein; an arcuate resilient member disposed in said cavity, said arcuate resilient member having a flat outline of substantially H shape including a medial part and two pair of opposed arms, a threaded hole in said elongate member receiving portion, radial to, and giving access to said cavity, a pressure screw threaded into said

hole and bearing on said medial arcuate resilient member part; a pair of grooves in the cylindrical surface of said cavity disposed diametrically opposite said threaded hole, each of said grooves receiving one of said pair of opposed arms; said elongate member disposed within the arc of said arcuate resilient member; said arcuate resilient member encircling with its medial part and opposed arms, more than one half of the circumference of said elongate member and adapted to be resiliently wrapped thereabout into continuous intimate contact therewith by said pressure screw, said pressure screw forcing said arms into camming engagement with said grooves, said grooves being so shaped that said resilient member applies continuous circumferential, radially compressive, pressure to said elongate member over more than one half the circumference thereof while pressing said elongate member against the wall of said cavity opposed to said screw.

7. A connector for an electrical conductor comprising: a conductor receiving portion including a cavity therein having recesses in the wall thereof; an arcuate spring element disposed in said cavity and adapted to encircle more than one half the circumference of a conductor inserted therein, said spring element having projections engaging said recesses in the wall of said cavity to retain said spring element in said cavity; a pressure applying means for applying compressive pressure to said arcuate spring element to force the ends of said spring element into camming engagement with the wall of said cavity; wherein the cavity wall is shaped to cam said resilient spring around an inserted conductor into circumferential contact therewith for applying circumferential, radially compressive pressure thereto in response to pressure applied by said pressure applying means.

8. A connection comprising a connector and an elongate member secured thereto; said connector including an elongate member receiving portion having a receiving cavity therein containing recesses in the cavity inner wall, an arcuate resilient member disposed within said cavity having projections engaging said recesses to retain the resilient member within said cavity, and pressure applying means coupled to said receiving portion for applying pressure to said resilient member to force the ends thereof into camming engagement with the cavity inner wall; wherein said elongate member is axially disposed in said cavity within the arc of said resilient member, said resilient member is of sufficient length to encircle more than one half the circumference of said elongate member, and the cavity inner wall and said recesses are shaped to cam said resilient member around said elongate member and into the cross-sectional shape thereof for applying circumferential, radially compressive pressure to said elongate member in response to pressure applied by said pressure applying means.

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CERTIFICATE OF CORRECTION

Patent No. 3,125,397 March 17, 1964

Thomas J. McGrath

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 2, line 17, for "extends" read -- expands --; line 23, for "46" read -- 47 --; line 25, for "47", first occurrence, read -- 46 --.

Signed and sealed this 14th day of July 1964.

(SEAL)

Attest:

ESTON G. JOHNSON
Attesting Officer

EDWARD J. BRENNER
Commissioner of Patents