June 9, 1942. H. JENSEN 2,285,928

ELECTRICAL CONNECTOR

Filed May 1, 1939 2 Sheets-Sheet 1

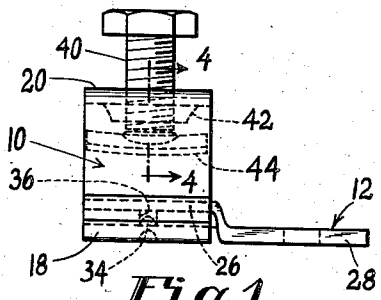


Fig. 1

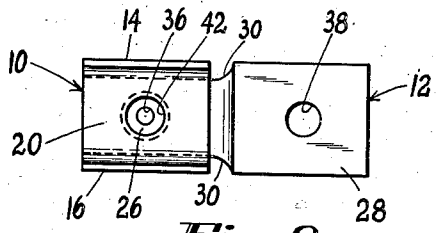


Fig. 2

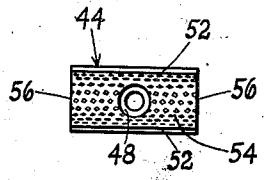


Fig. 5

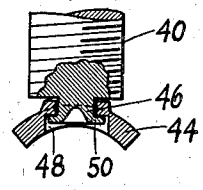


Fig. 4

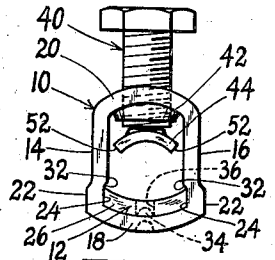


Fig. 3

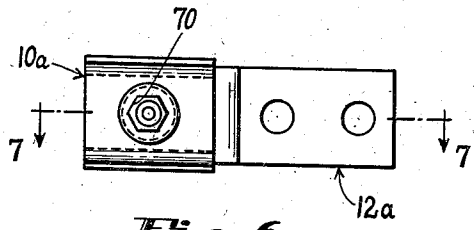


Fig. 6

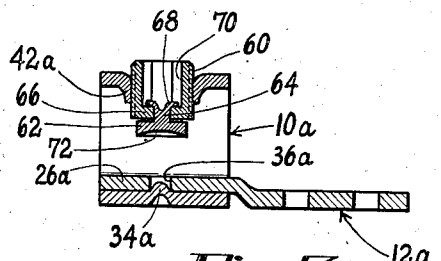


Fig. 7

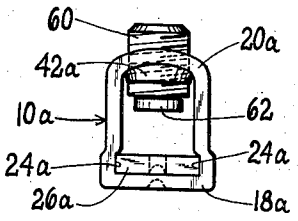


Fig. 8

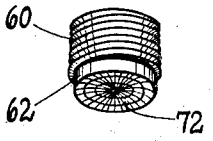


Fig. 9

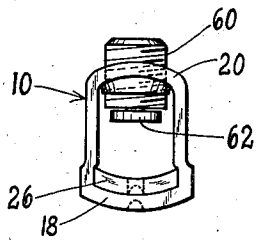


Fig. 10

Inventor

HELGE JENSEN

By Edwin Reinhardt

Attorney

June 9, 1942. H. JENSEN 2,285,928

ELECTRICAL CONNECTOR

Filed May 1, 1939 2 Sheets-Sheet 2

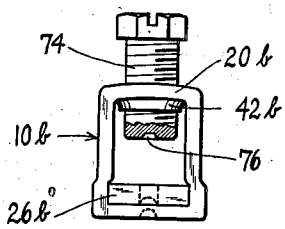


Fig. 11

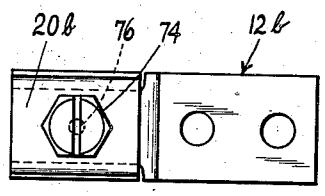


Fig. 12

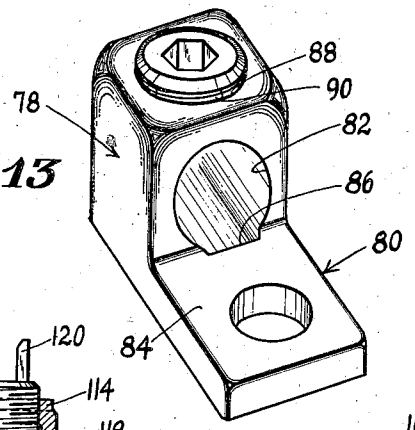


Fig. 13

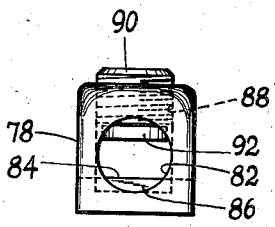


Fig. 14

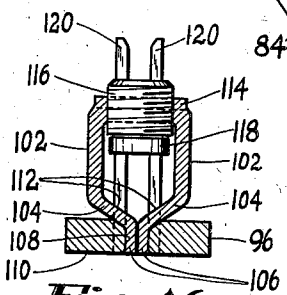


Fig. 16

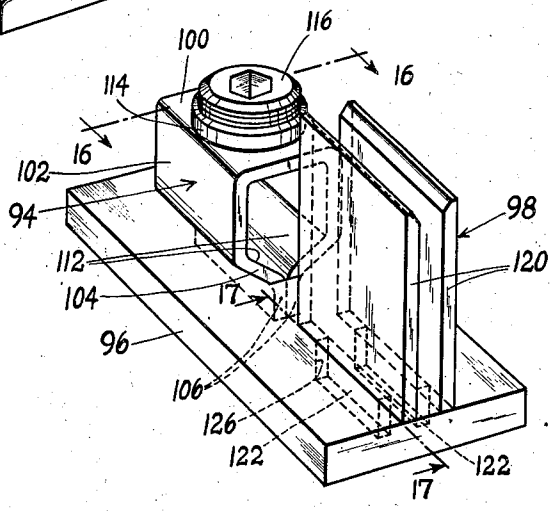


Fig. 15

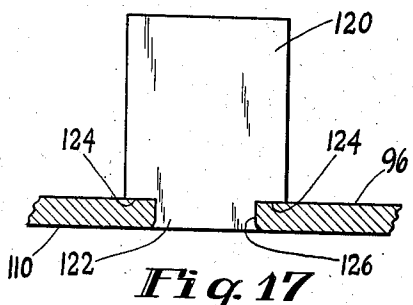


Fig. 17

Inventor

HELGE JENSEN

Edwin Leister

Attorney

Patented June 9, 1942 2,285,928

UNITED STATES PATENT OFFICE

2,285,928

ELECTRICAL CONNECTOR

Helge Jensen, Flushing, N. Y., assignor to Cole Electric Products Co. Inc., Long Island City, N. Y., a corporation of New York

Application May 1, 1939, Serial No. 271,083

1 Claim. (Cl. 173—269)

This invention relates to electrical connectors and, more particularly, to electrical connectors constructed and arranged to afford terminals for the securement therein of electric wires, cables, or similar conductors. In their more specific aspects, the terminal connectors embodying the present invention are of the solderless type.

One object of the invention is the provision of a terminal connector provided with improved means for securely clamping the end of a wire or cable in an opening in the body portion of the terminal connector.

Another object of the invention is the provision of a terminal connector having parts constructed and arranged to conform substantially to the cylindrical curvature of the wire or cable secured in the connector whereby to provide an improved mechanical and electrical connection between the cable or wire and the terminal connector.

Another object of the invention is to provide a terminal connector which may be made of sheet metal stock and composed of parts which may be readily manufactured by simple and inexpensive manufacturing operations and which can be readily assembled and secured together. A feature of the invention in this connection resides in the provision of a body portion and of a terminal blade portion constituted by initially separate parts, respectively, but constructed and arranged so that the blade portion can be readily assembled with the body portion and securely held therein.

A further object of the invention is to provide a terminal connector which can be readily assembled with other electrical connecting devices, such as for example, a conductor plate carrying a fuse clip terminal or a similar terminal of the type which is engaged by the knife-blade of a switch.

The above objects of the invention and other objects, advantages and features of the embodiments thereof will be apparent from the following description considered with reference to the accompanying drawings.

In the drawings:

Fig. 1 is a side view in elevation of a terminal connector made in accordance with one form of the present invention;

Fig. 2 is a plan view of the connector shown in Fig. 1, the clamping members being omitted;

Fig. 3 is an end view of the connector shown in Fig. 1;

Fig. 4 is a detail sectional view on the line 4—4 of Fig. 1;

Fig. 5 is a plan view of a clamping member detached from the clamping screw shown in Fig. 1;

Fig. 6 is a plan view of a terminal connector made in accordance with another form of the invention;

Fig. 7 is a sectional view on the line 7—7 of Fig. 6;

Fig. 8 is an end view of the connector shown in Fig. 6;

Fig. 9 is a perspective view of the clamping device, removed from the body portion of the connector;

Figs. 10 and 11 are views similar to Fig. 8, showing modifications;

Fig. 12 is a plan view of the connector illustrated in Fig. 11;

Fig. 13 is a perspective view of a connector embodying yet another form of the invention;

Fig. 14 is an end view of the connector illustrated in Fig. 13;

Fig. 15 is a perspective view of a connector mounted on a conductor plate together with a fuse clip or switch knife-blade clip;

Fig. 16 is a sectional view on the line 16—16 of Fig. 15;

Fig. 17 is a sectional view on the line 17—17 of Fig. 15.

Referring now to the drawings in detail, and first to the form of the invention illustrated in Figs. 1 to 5, the terminal connector made in accordance with this form of the invention comprises a sheet metal body portion 10, formed preferably from seamless tubular sheet metal stock, and a sheet metal blade or bar 12 connected together preferably in the manner which will now be described. Body portion 10 has opposite side walls 14 and 16 and opposite end walls 18 and 20 defining an opening for the reception of the end of a wire or cable (not shown). Side walls 14 and 16 have outwardly bent portions 22 formed therein adjacent end wall 18 to provide internal grooves 24 preferably for the full length of said side walls. Also, as here shown, end wall 18 has an approximately arcuate curvature, and bar 12 has a portion 26 of corresponding arcuate curvature. Said arcuate portion 26 of bar 12 is somewhat narrower than the outer flat portion 28 of said bar providing shoulders 30 adapted to lie near adjacent edges of side walls 14 and 16. Portion 26 of bar 12 interfits with body portion 10 of the connector and more particularly engages the side walls 14 and 16 of said body por-

tion in grooves 24 thereof. It will be noted that edge portions 32 of the side walls interiorly thereof at grooves 24 provide shoulders which hold bar portion 26 in abutting relation with end wall 18. Movement of bar portion 26 longitudinally of the side walls of body portion 10 is prevented by the engagement of a small struck-up projection 34 of end wall 18 in a small hole or perforation 36 in bar portion 26. The outer or lug portion 28 of bar 12 is preferably flat and is provided with one or more openings 38, which may be threaded or unthreaded, as may be necessary, for securing the terminal connector in position. It will be noted that bar portion 26 has an approximately cylindrical concave surface for engagement with a cylindrical wire or cable.

For securing the cable in position within the opening of body portion 10, more particularly for clamping the cable in good electrical and mechanical connection with portion 26 of bar 12 in engagement with said concave surface thereof, there is provided a clamping device which will now be described. Said clamping device comprises a clamping screw 40 which is in threaded engagement with an internally threaded sleeve 42 integral with and dependent from end wall 20. Threaded sleeve 42 is formed by extruding the same from said end wall. Said sleeve is preferably of such diameter that the outer portion thereof lies close to or abuts the inner adjacent surfaces of side walls 14 and 16, respectively, as clearly shown in Fig. 3. A clamping plate 44 is carried by clamping screw 40 and is connected to the latter and is so designed in relation to body portion 10 that it does not rotate with said screw but moves longitudinally therewith as a unit toward and away from the confronting surface of bar portion 26. For this purpose screw 42 has a reduced portion 46 which projects into the central recess portion 48 of plate 44 and is upset at its outer end 50 thereof as shown in detail in Fig. 4 whereby plate 44 has a swivel connection with said screw. It will be observed that plate 48 is substantially co-extensive in length with said walls 14 and 16 and is wide enough so that its side edges 52 lie close, with a slight clearance, to the inner adjacent surfaces of said side walls. Plate 42 has an arcuate or concave surface 54 which confronts the concave surface of bar portion 26 and like the latter conforms substantially to the curvature of the wire or cable. The ends of plate 44 are curved somewhat toward end wall 20 whereby to prevent the edges 56 of said plate from injuring the cable, particularly when the latter is of the multi-wire or stranded type, although it will be understood that the connector made in accordance with this form of the invention as well as in accordance with the other forms of the invention are well adapted for use with single or non-stranded conductors. For improving the grip of plate 44 on the cable or wire, surface 54 thereof is preferably provided with a multiplicity of minute indentations or pits indicated by the dots in Fig. 5 of the drawings. It will be apparent that when the end of the cable is inserted in the opening in body portion 10 between the confronting surfaces of plate 44 and bar portion 26, said cable is securely connected both mechanically and electrically to the connector by turning screw 40 to cause plate 44 to securely engage the cable and force the same firmly against the confronting surface of bar portion 26. It will be noted that the electrical connection is made directly between the cable and bar 12, and that very little if any current need pass through the connector body portion itself.

In the form of the inbention illustrated in Figs. 6 to 9 the terminal connector is substantially of the same construction as that described above in reference to Figs. 1 to 5, with the exception of the clamping device and of the form of the end wall of the body portion and of the inner bar portion connected thereto. Thus, as here shown, body portion 10a is of the same construction as body portion 10 with the exception that end wall 18a which corresponds to end wall 18 of body portion 10 is flat and not curved, and inner bar portion 26a of bar 12a is similarly flat instead of being curved. It will be understood that bar portion 26a is received within the grooves 24a formed in the side walls of the body portion of the connector and is secured against longitudinal movement by the central struck-up projection 34a which engages bar portion 26a in the perforation 36a. The clamping device comprises a screw 60 which is in adjustable engagement with the threaded sleeve 42a which is extruded from the end wall 20a of the body portion of the connector, said sleeve 42a being in all respects similar to sleeve 42. Clamping screw 60 carries a clamping plate 62, the latter having a swivel or rotary connection with the former by the engagement of the cylindrical stem 64 of said plate in a circular opening formed in the lower end 66 of the screw. Said screw and plate are held in assembled relation by upsetting the end 68 of stem 64 over end wall 66 of the screw at the bottom of the hexagonally shaped recess 70 of the latter. The outer surface 72 of plate 62 is pitted or roughened as illustrated in Fig. 9 to provide a frictional surface for engagement with the cable or wire. It will be understood that plate 62 is movable as a unit with screw 60 toward and away from bar portion 26a and that when said plate engages the cable or wire the frictional engagement of surface 72 with the latter prevents rotation of said plate during the rotation of the screw for tightening the connection of the cable to the connector between the confronting surfaces of bar portion 26a and plate 62. As illustrated in Fig. 10, the clamping device constituted by the screw 60 and plate 62 is applied to the housing 10 in lieu of the clamping device constituted by screw 40 and plate 44. In other respects the connector illustrated in Fig. 10 is the same as the connector shown in Figs. 1 to 3. It will be understood that the clamping device shown attached to housing 10 in Fig. 1 may be attached to housing 10a in place of screw 60 and plate 72 in the form of the invention illustrated in Figs. 6 to 8.

In Figs. 11 and 12, the connector is seen to comprise a housing 10b which is of the same construction as the housing 10a illustrated in Figs. 6 to 8 with the exception that the end wall 20b which is provided with the extruded sleeve 42b is comparatively flat instead of curved as is the case with end wall 20a of housing 10a. Bar 12b is of the same construction as bar 12a and is connected to the housing 10b in the same way as bar 12a is connected to housing 10a. In this form of the invention the clamping device is constituted by a screw 74 which is in threaded engagement with sleeve 42b. The swivel clamping plate utilized in the forms of the invention hereinbefore described is however omitted in this form of the invention and the screw directly engages the wire or cable for clamping the latter against the confronting surface of the inner bar portion

26b. The end of the screw is provided with a small circular dent or recess 76 into which a part of the wire or cable is squeezed when the screw is clamped thereon.

In the form of the invention illustrated in Figs. 13 and 14 the connector comprises a body portion 78 having integral therewith a connecting lug 80. Body portion 78 has an opening 82 for the engagement therein of the cable or wire. As shown in Fig. 14 said opening extends below the surface 84 of lug 80 whereby the adjacent end portion 86 of the latter constitutes a stop for the end of the cable when the latter is inserted through the opposite end of opening 82. Body portion 78 is also provided with an opening 88 in which a screw 90, such as the screw 60 illustrated in Fig. 9, is engaged, said screw constituting part of a clamping device like that shown in Fig. 9 and provided with a relatively rotary or swivelled clamping plate 92, like clamping device 62 shown in Fig. 9.

In the form of the invention illustrated in Figs. 15 to 17, a terminal connector 49 is mounted on a conductor bar 96 in association with a clip 98 for a fuse or for the knife-blade of a switch. Connector 94 comprises a housing having an end wall 100 and opposed side walls 102 having inwardly converging portions 104 terminating in edge portions 106 disposed in abutting relation. Said edge portions 106 project through an opening 108 in bar 96 and are upset or riveted over the opposite surface 110 of said bar whereby connector 94 is rigidly secured to said bar. The inner surface 112 of converging end portions 104 are engaged by the cable or wire inserted through the open end of the connector remote from the clip 98. End wall 100 is provided with an outwardly extruded threaded collar or sleeve 114 in which the screw 116 of a clamping device is adjustably engaged for releasably securing the cable or wire in engagement with surfaces 112. Said clamping device also includes a rotary plate 118 which is mounted on screw 116. The clamping device constituted by screw 116 and plate 118 is preferably of the same construction as the clamping device illustrated in Fig. 9, which includes the screw 60 and the plate 62. The clip 98 includes members 120 arranged in spaced confronting relation to receive therebetween and engage in electrical contact therewith the blade of a fuse or the knife blade of a switch. Said clip members 120 are rigidly fixed to bar 96 in upstanding relation thereto and for this purpose each of said members is provided with a reduced end portion 122 forming shoulders 124 for engagement with one surface of said bar 96, when said reduced edge portion 122 is projected through an opening 126 in said bar, there being one such opening 126 for each clip member 120. The outer ends of reduced end portions 122 of clip member 120 are upset or riveted over the surface 110 on bar 96 for rigidly fastening said clip members to said bar.

While I have shown and described several forms of the invention, it will be understood that the latter may be embodied in other forms and that in the illustrated embodiments certain changes in the details of construction and arrangement of parts may be made. It will be understood also that inasmuch as the invention comprises several features of construction, certain forms of the invention may have omitted therefrom certain parts which are included in other forms of the invention and other changes than those indicated herein will occur to skilled artisans. Therefore, I do not wish to be limited to the forms of the invention herein shown or described, or precisely to the construction of any of the illustrated embodiments, except as may be required by the scope of the appended claim.

Having thus described my invention, what I claim and desire to secured by Letters Patent is:

A connector comprising spaced side walls and spaced end walls defining an opening for the reception of an electrical conductor, said spaced side walls having outwardly bent portions adjacent one of said end walls and defining with the latter a pair of grooves extending longitudinally of said side walls and said one of the end walls, a conductor bar engaging said side walls in said grooves and thereby held in face to face contact relation with said last mentioned end wall, said conductor bar having a hole therein and said last mentioned end wall having a portion projecting into said hole for preventing movement of said bar longitudinally of said side walls, and means adjustably mounted on the other of said end walls and engageable with said electrical conductor for releasably securing said electrical conductor in said opening of the connector in engagement with said bar.

HELGE JENSEN.