March 16, 1965 E. C. CROWTHER 3,173,741

ELECTRICAL CONNECTORS

Original Filed Sept. 21, 1959

Fig. 1

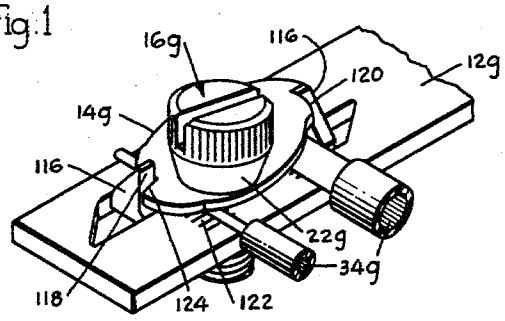



Fig. 2

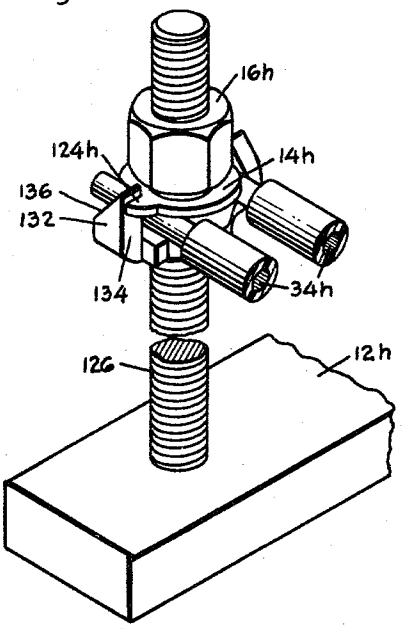
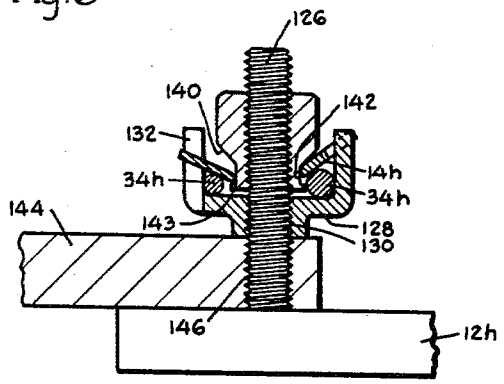



Fig. 3




INVENTOR.
Edmond C. Crowther
BY Robert W. Beart
atty.

United States Patent Office 3,173,741 Patented Mar. 16, 1965



3,173,741

# ELECTRICAL CONNECTORS

Edmond C. Crowther, Alden Park Manor, Philadelphia 44, Pa.

Original application Sept. 21, 1959, Ser. No. 841,212, now Patent No. 3,068,445, dated Dec. 11, 1962. Divided and this application Apr. 17, 1962, Ser. No. 188,021
5 Claims. (Cl. 339—246)

This application is a division of my co-pending application, Serial No. 841,212, filed on the 21st day of September 1959, now patent No. 3,068,445, patented December 11, 1962.

This invention relates to an electrical connector. More specifically, it relates to an electrical connector wherein a device of the type commonly known in the art as a "bus bar" is mechanically formed so that, when used in combination with other elements, it will accept lead wires or secondary conductors and removably retain same in direct contact with the material of the bus bar.

Heretofore, metallic connectors employed for electrically connecting primary conductors of current, such as bus bars, with the secondary wire conducting means have been complex in nature. Undue resistance to the passage of electrical current between the source and the end conductor is often present in such connectors. In addition, their complexity has provided inherent problems to the persons making the initial assembly, as well as those who were called upon to utilize the connector in repair work.

It is a primary object of this invention to provide an improved electrical connector which may be partially formed from the basic conductor or bus bar. It is a further object of this invention to provide a connector which has improved electrical conductivity properties. Still another object of this invention is to provide an electrical connector which is simple in operation and economical to manufacture.

Further objects of this invention will become apparent to those skilled in the art when the specification is read in conjunction with the accompanying drawings wherein:

FIG. 1 is a perspective view of a further embodiment of the present invention;

FIG. 2 is a perspective view of still another modification to this invention which can be adapted to be used with a plurality of bus bars, as well as serving as a connector for secondary wire conductors; and

FIG. 3 is a partial sectional view of the device shown in FIG. 2 when said device is utilized with a pair of wires having differing diameters.

An embodiment of this invention which can be utilized at any point along the length of a bus bar is disclosed in FIG. 1 wherein similar numerals are utilized to designate similar parts with the addition of the suffix "*g*." The bus bar 12*g* has struck from within its margins a pair of upstanding ears or shoulder elements 116. The ears 116 are spaced apart along the longitudinal axis of bus bar 12*g* and a threaded aperture is provided intermediate the spaced ears for the telescopic acceptance of the screw threaded fastener 16*g*. The ears 116 provide an abrupt shoulder 118 on each ear which face in opposite directions towards opposite edges of the plate or bus bar 12*g*. The side 120 of each ear 116 opposite to shoulder 118 is tapered downwardly towards the outside longitudinal edges of bus bar 12*g*.

Immediately adjacent each ear 116 on the side facing the other ear are a plurality of toothed serrations or sharp edges 122 arranged transversely to bus bar 12*g*. These serrations or sharp edges may be coined in the surface of bus bar 12*g* or consist of separate elements brazed, welded or attached in any other suitable manner to the surface of bus bar 12*g*.



Clamp means 14*g* is rotatably assembled to screw 16*g* by means known in the art and described hereinafter and is comprised of a flat plate-like member which in the present instance for purposes of economy in manufacture is generally elliptical in configuration, the shape of the plate, however, can be of any other shape since this is not of specific importance to the invention. At opposite ends of the major axis of clamp 14*g* are a pair of notches which open outwardly in opposite directions providing a pair of shoulders or abutments 124 which are spaced apart in such a fashion that they will engage the abrupt shoulder 118 on the ears 116 when clamp 14*g* is brought into juxtaposed relation to bus bar 12*g* by actuation of screw 16*g*. In the present instance the wires 34*g* are shown to have dissimilar diameters which will be readily accepted and positively clamped by this device. This is accomplished by the canting of clamp 14*g* relative to the conical clamping surface 22*g* on the undersurface of the screw head. Sufficient clamping force applied by actuation of screw 16*g* will force the toothed serrations 122 into the undersurface of the wires 34*g* providing positive mechanical and electrical engagement and preventing their withdrawal.

To rotatably assemble the screw 16*g* with clamp 14*g* suitable means known in the art such as an annular rib or shoulder is provided at the junction of an unthreaded shank portion adjacent the head of the screw and the threaded shank portion. The shoulder is greater in diameter than the aperture in the clamp 14*g* whereby upon retrograde movement of the screw 16*g* relative to the base 12*g*, the shoulder on the screw shank comes into contact with the under side of the central portion of the clamp 14*g* and moves the clamp 14*g* upwardly away from the base 12*g*. Additionally, in the operation of this device, one or more wires 34*g* can be inserted in the passageways formed between the base 12*g*, the ears 116, the central portion of the clamp 14*g* and the screw 16*g*.

Another embodiment of this invention is shown in FIGS. 2 and 3 wherein similar numerals will be utilized to designate similar parts with the addition of the suffix "*h*." This device was developed for use in situations where either the bus bar was not immediately accessible for direct contact with the secondary conductor elements 34*h* or where a plurality of conductor members consisting of both wires and bus bars should be desired to be connected together. The bus bar 12*h* has mounted on one of its flat surfaces a threaded stud 126. This stud can be inserted in a threaded aperture or can be attached to the bus bar 12*h* by any other suitable means, i.e., welding. Located on stud 126 in spaced relation to bus bar 12*h* is base member 128. Base member 128 has a central screw threaded aperture 130 adapted to be telescopically associated with stud 126. On opposite side edges of base member 128 there is provided a pair of upstanding ear members 132 similar in configuration to ear members 116. Each ear 132 has an abrupt shoulder 134 substantially parallel to stud 126 and a tapering shoulder 136. The upper surface of base member 128 can be transversely serrated or toothed as has been described in the previous embodiment for the purpose of mechanically engaging and deforming the undersurface of the wire.

Clamp 14*h* is a substantially flat plate-like member having a configuration very similar to the member 14*g* disclosed in the previous embodiment. It is notched at opposite edges to form laterally projecting shoulder or abutment means 124*h* for engagement with the abrupt shoulder 134 of ears 132. The clamp 14*h* in this embodiment is preferably manufactured from a relatively thick spring material that is semi-rigid but which will permit some flexing.

Clamp 14*h* is centrally apertured and rotatably assembled by suitable means with a rotary screw threaded

fastener 16*h*, which fastener in the present instance is an internally threaded nut member adapted to be telescopically associated with stud 126. Nut member 16*h* has at its lower extremity a downwardly extending conical clamping surface 140 which blends into a downwardly extending cylindrical portion 142 which can be deformed radially outwardly at its free extremity as indicated at 143 to rotatably retain the clamp 14*h*. This rotatable assembly permits jacking of the clamp member relative to the base means 128 in a simple manner by merely actuating the nut.

In the operation of this device the base member 128 is rotatably assembled with the stud 126 and positioned in a convenient location in spaced relation to bus bar 12*h* so that the wire members 34*h* can be readily inserted in the clamping device. As can be seen in FIG. 13, in the event other bus bars, such as secondary bus bar 144, are to be utilized they can be slipped over the stud 126 by suitable aperture means 146 and brought into contact with bus bar 12*h*. The base means 128 in this instance then serves a double function as nut means to secure the plurality of bus bars in firm engagement. The nut 16*h* is then actuated downwardly carrying clamp 14*h* in telescopic relation to the stud 126 until the ears 124*h* are brought into contact with the abrupt shoulder 134 of ears 132. Wire means 34*h* is then inserted in the passageway formed by the base 128 with its upstanding ears 132 and on the opposite hand a clamp means 14*h* and stud 126. In the event that the wires 24*h* should be of dissimilar diameters, as shown in FIG. 13, the conical undersurface 140 and neck 142 of the nut 16*h* permits limited canting of the clamp 14*h* which when taken with the flexibility of clamp 14*h* will compensate for this dissimilarity in the wire diameters and positively clamp wires 34*h*. To permit the use of this device a great number of times it is desirable that the clamping member 14*h* be manufactured of a spring material which can be treated to produce the spring fatigue and electrical characteristics desirable in a connector of this design. The electrical conductivity characteristics of this device, while not as high as the previous embodiments disclosed, is satisfactory from a commercial standpoint since the stud is of sufficiently substantial cross-section to carry the required current load from the primary bus bar 12*h* to the secondary conductors 34*h* and 144.

The embodiments of this invention have disclosed devices which retain simplicity of operation since the clamp means can be jacked away from the bus bar by mere rotation of the operator or screw whereby the personnel installing the wires do not have to physically manipulate these connectors in any fashion other than by rotation of the screw. The devices are economical to manufacture since they can be made from stamped parts and are ideally suited for use in close, tight quarters.

While modifications or embodiments of this invention will be apparent to those skilled in the art, it is not intended that it should be limited in any fashion except by the appended claims.

I claim:

1. An electrical connector adapted to accept one or more wires in releasably clamped relation, said connector including a base, at least one ear bent upwardly from said base and said at least one ear presenting an abrupt shoulder surface perpendicular to said base, said at least one ear being received on the side opposite said shoulder surface so as to present a limited surface area at its extremity opposite said base, screw threaded means positioned centrally of said base in spaced relation to said at least one ear, a clamping means rotatably assembled to a screw threaded fastener including a body generally elongated in shape having notch means opening outwardly from an edge of said clamping means to form laterally extending abutment means, said clamping means and its associated abutment means adapted to extend laterally and cooperatively engage the shoulder surface on said at least



one ear when said screw threaded fastener with which it is assembled is telescopically assembled with the screw threaded means positioned centrally of said base whereby actuation of said screw threaded fastener will bring said clamping means into nonrotatable juxtaposed relation relative to said base.

2. A device of the type claimed in claim 1 wherein said base is elongated and provided with a pair of ears struck from material within its margins and presenting a pair of perpendicular shoulder surfaces in spaced relation along the longitudinal axis of said base with each shoulder means facing an opposite edge of the base from the other shoulder, said screw threaded means in the base being a threaded aperture positioned centrally intermediate said ears, said clamping means being rotatably assembled to a male screw threaded fastener and including a body generally elliptical in shape having a pair of open notches providing said abutment means facing in opposite directions opening outwardly from opposite edges of said clamping means, said clamping means and its associated abutment means adapted to extend between and engage the shoulder surfaces on said ears when said male screw threaded fastener is telescopically assembled with said threaded aperture, whereby actuation of said screw will bring said clamping means into nonrotatable juxtaposed relation relative to said base.

3. A device of the type claimed in claim 2 wherein a clamping surface on said screw threaded fastener is conically configured and adapted to permit canting of said clamping means relative thereto a plurality of toothlike serrations displaced transversely of said base adjacent the side of each ear facing the other ear for the purpose of engaging said wires captured between said clamping means and said base means.

4. A device of the type claimed in claim 1 wherein said screw threaded means in said base includes a centrally located threaded aperture in said base and a threaded stud adapted to be telescopically accepted within said threaded aperture, said base having a pair of ears extending upwardly from opposite edges of said base and presenting a pair of shoulder surfaces facing in opposite directions relative to a vertical plane passing through the axis of said aperture, said screw threaded fastener being a threaded nut with said clamping means being rotatably assembled to said screw threaded nut and telescopically associated with said threaded stud on the side of said base means from which said pair of ears extend, said clamping means including a body adapted to extend between said upstanding ears and having notch means opening outwardly from opposite sides of said body forming abutments adapted to engage said shoulder surfaces, whereby said clamping means, stud, and base means with its associated ears form passageways adapted to releaseably accept said wires upon the actuation of said nut and clamping assembly relative to said base.

5. A device of the type claimed in claim 4 wherein said nut is provided with a conical clamping surface and said clamping means is a semi-flexible member adapted to be canted and flexed relative to said nut whereby wires of dissimilar diameters can be accepted in said connector.


**References Cited by the Examiner**

UNITED STATES PATENTS

| | | | |
|---|---|---|---|
| 812,287 | 2/06 | Nagel | 339—246 X |
| 1,867,918 | 7/32 | Lofgren | 339—269 |
| 1,871,094 | 8/32 | Sumpter et al. | 339—269 X |
| 1,979,091 | 10/34 | Alsaker et al. | 339—246 |
| 2,151,674 | 3/39 | Adam et al. | 339—269 |
| 2,246,356 | 6/41 | Graham | 339—263 X |
| 2,762,027 | 9/56 | Strobel | 339—246 |

FOREIGN PATENTS

| | | |
|---|---|---|
| 822,124 | 11/51 | Germany. |


JOSEPH D. SEERS, *Primary Examiner.*