United States Patent [19]

Ebinger

[11] **3,761,872**

[45] **Sept. 25, 1973**

[54] **BRAZED SEAM FERRULE**

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[73] Assignee: **Thomas & Betts Corporation,** Elizabeth, N.J.

[22] Filed: **Jan. 20, 1972**

[21] Appl. No.: **219,272**

[52] **U.S. Cl.** ..... **339/276 T,** 174/84 C, 174/90

[51] **Int. Cl.** **H01r 11/08**

[58] **Field of Search** ..... 339/95, 97, 275, 339/276; 174/84 C, 90, 94 R

[56] **References Cited**

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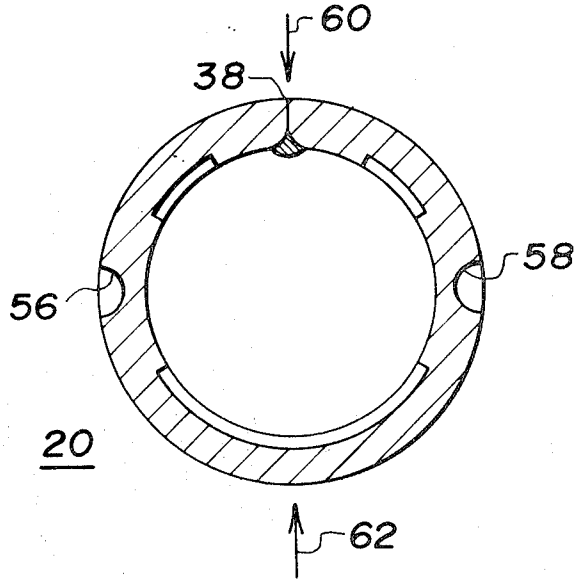
Primary Examiner—Joseph H. McGlynn
Attorney—David Teschner et al.

[57] **ABSTRACT**

A brazed seam generally elongate tubular sleeve for use preferably as an improved crimpable ferrule. Selectively formed, spaced recesses are provided within the interior surface of the ferrule, and selectively positioned exterior recesses are provided for establishing weakened areas to enhance the crimping characteristics of the ferrule. Web portions disposed adjacent the rows of interior recesses serve to restrict the flow of excess brazing material from the seam into the interior recesses. Coupling means which may include an apertured tongue or the like may be attached to, or formed integrally with, the ferrule to permit its attachment to a further member.

2 Claims, 14 Drawing Figures



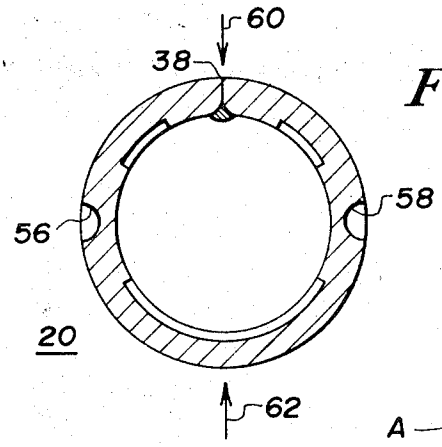


FIG. 1

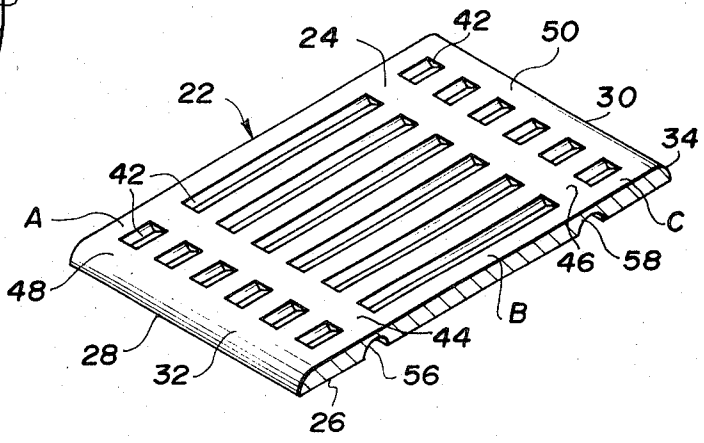


FIG. 2

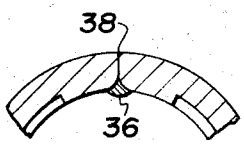


FIG. 3

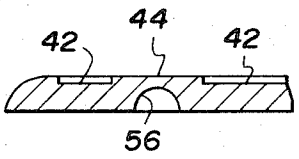


FIG. 4

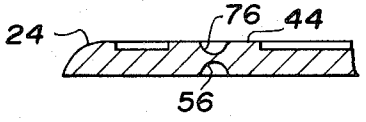


FIG. 5

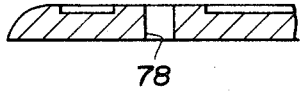


FIG. 6

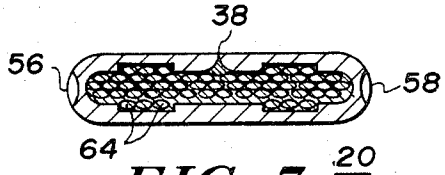


FIG. 7 20

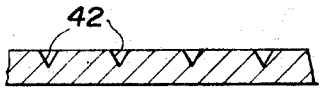


FIG. 8

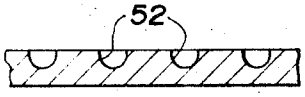


FIG. 9

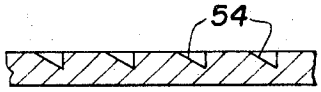


FIG. 10

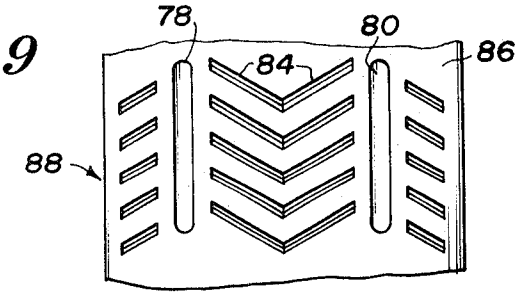


FIG. 11

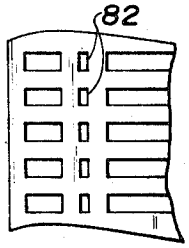


FIG. 12

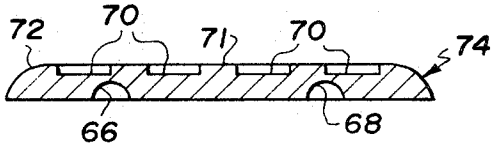


FIG. 13

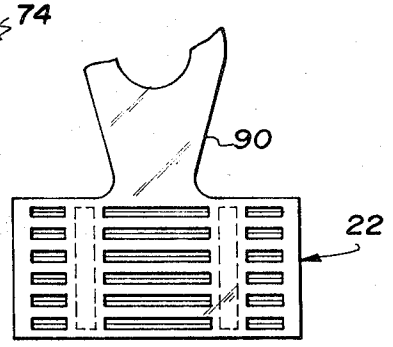


FIG. 14

BRAZED SEAM FERRULE

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention is directed to the field of connecting means and principally to a crimpable ferrule.

2. Description of the Prior Art.

The use of brazed seam ferrules to provide a crimpable barrel in electrical applications is fairly well known in the art. Such devices were generally formed from relatively flat stock, suitably blanked and configured to provide a sleeve-like structure arranged to receive one or more electrical conductors therewithin. To increase the integrity of such connections the seam resulting from the formation of the flat stock into a generally tubularly shaped article was generally subjected to a brazing operation to effect the closure thereof, thereby providing a generally continuous band of crimpable material about the article inserted therewithin. Although such devices were generally satisfactory for limited applications, the relatively rigid structure resulting from such fabrication, and from the stiffening effect caused by the flow and hardening of excess brazing material about the interior of the ferrule, was generally found to be somewhat resistant to deformation where it was desired to crimp the ferrule sufficiently to define a substantially flat configuration generally recognized as highly desirable where, for example, stranded conductors were being crimped therewithin. Because of the inherent resiliency in the material from which the ferrule was formed, there was a tendency for the sides of the ferrule to at least partially resist the crimping force, thereby providing voids within the ferrule within which a portion of the conductors could be insecurely entrapped, and which additionally exposed the interior of the ferrule to undesirable environmental attack. Where such prior art ferrules were provided with generally circumferentially disposed serrations or interruptions within the interior surface thereof to increase the engagement between the contained conductors and the ferrule, and the seam was subjected to a brazing operation, the brazing material tended to flow from the seam throughout the interior of the ferrule, thereby filling the cavities or recesses formed by the interruptions and rendering them relatively ineffective for the use intended.

SUMMARY OF THE INVENTION

The invention overcomes the problems and limitations noted above with respect to prior art devices by providing a brazed seam ferrule which is more efficient, reliable, and versatile than such prior art devices. The essentially tubular ferrule is formed from a base member blanked from preferably flat metallic stock. The interior surface of the tubular member or ferrule is provided with longitudinally extending rows of selectively formed, generally transverse recessed portions, each of said rows of recessed portions being separated from one another and from the ends of said base member by discrete lands or web portions. Further recessed portions are provided on the exterior surface of the tubular ferrule and extend generally longitudinally intermediate the open ends thereof, thereby providing one or more generally weakened zones thereabout, resulting in a decrease of the crimping force required to effect the desired deformation and an increase in the proclivity of the crimped ferrule to assume the highly desirably

flattened configuration. The ends of the base member are positioned in generally abutting relationship as said member is formed into the instant ferrule, thereby providing a longitudinally extending contiguous seam which is thereafter subjected to a brazing operation to provide a closure thereat. The ends of the base member forming said seam may be suitably contoured and the contoured portions interiorly disposed to at least partially provide a well for the receipt of the brazing material applied to the seam. The web portions of the base member adjacent the seam act as at least a partial barrier to the flow of the brazing material from the seam towards the recessed portions on the interior of the ferrule. The further web portions extending between the interior rows of recessed portions provide additional barriers to the flow of any excess brazing material, thereby preventing the closure of said recesses and the aforementioned stiffening effect caused by the filling thereof, thus maintaining the effectiveness of the recesses and the flexibility of the ferrule. The interior recessed portions may be configured to define a generally V-shaped, U-shaped, or saw-tooth shaped cross-section. The web portions disposed intermediate adjacent rows of recessed portions on the interior of the ferrule, may be formed either level with the interior surface or raised slightly thereabove, by for example, coining the opposite face of the base member to at least partially project the web portions above the interior surface of the ferrule. Longitudinally extending recessed portions may be additionally provided within the interior surface of the ferrule to serve as additional wells for the receipt of any excess brazing material applied to the seam. Such additional longitudinally extending recessed portions may be positioned in substantially overlapping relationship with respect to the recessed portions provided on the exterior surfaces of the ferrule to further enhance the deformability of the ferrule thereat. The exteriorly disposed longitudinally extending recessed portions may be formed to define either a groove, an open slot, or a series of aligned apertures. Coupling means may be affixed to the ferrule or stamped as an integral part thereof to permit the ferrule to be coupled to a further article such as a support member or a mating terminal. It is therefore an object of this invention to provide an improved brazed seam ferrule.

It is a further object of this invention to provide means for reducing the force required to crimp a brazed seam ferrule.

It is another object of this invention to provide means for maximizing the efficiency of an interiorly recessed brazed seam ferrule.

It is yet another object of this invention to provide a brazed seam ferrule having selectively weakened zones to enhance the crimpability thereof.

It is yet a further object of this invention to provide an improved brazed seam ferrule having a selectively recessed interior surface.

It is still another object of this invention to provide a means for restricting the flow of unwanted brazing material around the interior surface of a brazed seam ferrule.

Other objects and features of the invention will be pointed out in the following description and claims and illustrated in the accompanying drawings which disclose, by way of example, the principle of the invention and the best mode contemplated for carrying it out.

BRIEF DESCRIPTION OF THE DRAWINGS:

In the drawings:

FIG. 1 is a front elevational view, in section, of an improved brazed seam ferrule constructed in accordance with the concepts of the invention.

FIG. 2 is a fragmentary perspective view, partly in section, showing an embodiment of a base member employed to form the device of FIG. 1.

FIG. 3 is a fragmentary cross-sectional view of the seam portion of the device of FIG. 1.

FIGS. 4, 5 and 6 are fragmentary elevational views, in section, showing various embodiments of a base member constructed in accordance with the concepts of the invention.

FIG. 7 is an elevational view, in section, of the device of FIG. 1 crimped about a plurality of metallic strands.

FIGS. 8, 9 and 10 are fragmentary elevational views, in section, showing various embodiments of recessed portions disposed upon the interior surface of the device of FIG. 1.

FIG. 11 is a fragmentary top plan view of a further embodiment of a portion of the interior surface of a brazed seam ferrule constructed in accordance with the concepts of the invention.

FIG. 12 is a fragmentary top plan view of still another embodiment of a portion of the interior surface of a brazed seam ferrule constructed in accordance with the concepts of the invention.

FIG. 13 is a front elevational view, in section, of still another embodiment of a base member employed to form a brazed seam ferrule constructed in accordance with the concepts of the invention.

FIG. 14 is a fragmentary top plan view of a further embodiment of a portion of a base member employed to form a brazed seam ferrule constructed in accordance with the concepts of the invention.

Similar elements are given similar reference characters in each of the respective drawings.

DESCRIPTION OF THE PREFERRED EMBODIMENTS:

Turning now to FIGS. 1, 2, 3, 4, 7 and 8 there is shown a brazed seam ferrule 20 constructed in accordance with the concepts of the invention. Ferrule 20 comprises a base member 22 shown in more detail in the flat state in FIG. 2. The base member 22 may be formed by, for example, blanking said member from substantially flat metallic material, and comprises a first surface 24 defining the interior surface of ferrule 20 and a second surface 26 defining the exterior surface of ferrule 20. The lateral dimension of base member 22 is defined generally by a first end 28 and a second end 30 each of which is tapered substantially as shown at 32 and 34, respectively, to provide a generally longitudinally extending channel or well for the receipt of the brazing material 36 (FIG. 3) applied to the seam 38 created by joining the ends 28 and 30 of base member 22 in substantially abutting relationship as base member 22 is formed into the generally tubular shape shown in FIG. 1. Disposed within the first surface 24 of base member 22 are a plurality of recessed portions 42 arranged in three generally longitudinally extending rows substantially as shown. For purposes of illustration the rows are indicated as A, B, and C reading from the lower left hand side of FIG. 2 to the upper right hand side thereof. Intermediate rows A and B, and rows B and C, are web portions 44 and 46, respectively. Separating row A from the adjacent end 28 of base member 22 is a further web portion 48. A similar web portion 50 separates row C from the adjacent end 30 of base member 22. The recessed portions 42, although formed to define a substantially V-shaped cross section as is shown in more detail in FIG. 8, may alternatively be configured to define an essentially U-shaped cross section 52 as shown in FIG. 9, or an essentially sawtooth configuration 54 as shown in FIG. 10. It will, of course, be readily apparent to those skilled in the art that other suitable configurations may be readily provided without departing from the spirit of the invention and within the concepts herein disclosed. The recessed portions 42 serve to provide a valley or well for the receipt of a portion of a conductor or conductors disposed within the ferrule 20 as the ferrule is crimped thereabout thus increasing the interengagement therebetween. The width of the web portions 48 and 50, although not critical, should be choosen to provide at least a partial barrier to the flow of any excess brazing material 36 applied to the seam 38. A pair of recessed portions 56, 58 extend generally longitudinally within the second surface 28 of base member 22, as may be more clearly seen in FIG. 1, and are positionally arranged thereon in such manner as to be disposed in essentially opposing relationship and axially generally perpendicular to a radial line extending between the longitudinal axis of ferrule 20 and seam 38 as the base member 22 is formed into the generally tubular structure 20. Thus upon the app'ication of forces as directionally indicated by arrows 60, 62 to ferrule 20 during the crimping operation, the recessed portions 56, 58 permit the collapse of ferrule 20 into a relatively flat configuration essentially as shown in FIG. 7. The recessed portions 56, 58 thus provide a weakened zone generally adjacent thereto and about which the ferrule 20 tends to collapse into a relatively flat structure without the consequent bowing of the ends of the ferrule as is generally the case in prior art devices. Consequently, the interior surface 24 of the ferrule 20 is permitted to effect a more complete closure about articles such as 64 disposed therewithin. In the embodiment illustrated in FIG. 2 the second surface recessed portions 56, 58 are disposed generally intermediate each of the pairs of rows A and B, and B and C, respectively, of the recessed portions 42 disposed on the base member first surface 24 and essentially underlie the respective web portions 44 and 46, as may be at least partially seen in more detail in FIG. 4. Although such arrangment may be desirable from the standpoint of manufacture or construction for many applications, the positional relationship between the recessed portions 56, 58 and the overlying rows of recessed portions 42 may be suitably varied or modified, as shown, for example, in FIG. 13, wherein recessed portions 66, 68, which are essentially duplicative of recessed portions 56, 58, are longitudinally offset with respect to recessed portions 70 disposed within a first surface 72 of a base member 74. It should, of course, be readily apparent to those skilled in the art that it may be desirable, in the embodiment shown inFIG. 13, to provide sufficient material between the recessed portions 66, 68 and recessed portions 70 to avoid unduly weakening the base member 74 beyond that required to effect the desired collapse of the ferrule. Further recessed portions such as 76 (FIG. 5) may be provided within a web portion such as

44, and may be disposed in essentially overlying relationship with respect to an adjacent second surface recessed portion such as **56**, and may be effectively utilized to enhance the selective deformation of ferrule **20** while providing a well or chamber for the receipt of excess brazing material. Alternatively, and within the concepts of the invention, a weakened zone may be suitably established by the provision of a through-slot such as **78, 80** shown in FIGS. **6** and **11**, or by the provision of a series of selectively sized perforations **82** as shown in FIG. **12**. The generally transverse linear disposition of the first recesses **42** (FIG. **2**) may be modified, as shown in the embodiment illustrated in FIG. **11**, to define, for example, a herringbone pattern as exemplified by recesses **84** shown disposed on a first surface **86** of a base member **88**. Although the central row of recesses **84** are shown in generally interconnected fashion, they may, of course, be separated by a suitably dimensioned web portion such as **71** (FIG. **13**) where necessary or desirable. It will, of course, be readily apparent to those skilled in the art that the recesses **42** illustrated in FIG. **2**, although shown in essentially colinear alignment, may be varied in such manner as to effect an essentially staggered arrangement, (FIG. **14**) where necessary or desirable. Although the ferrule **20** illustrated in FIG. **1** may be employed essentially as shown to either encapsulate the ends of wires disposed therewithin as a termination therefore, or as a wire splice, further coupling means **90** such as is partially shown in FIG. **14** may be attached to, or formed contiguously with, the base member **22** to provide a terminal-like structure, where necessary or desirable to permit the attachment of ferrule **20** to a further member (now shown). Coupling means **90** may be formed to define any one of a number of commonly employed configurations such as an apertured or bifurcated tongue, or suitably configured tab arranged for mating interrelationship with a complementarily formed terminal member. It will, of course, be readily apparent to those skilled in the art that ferrule **20** may be formed of any suitable metallic material which may be readily deformed by crimping. However, where the ferrule **20** is to be employed as a terminating or coupling means for electrical conductors or the like, the base material **22** from which a said ferrule **20** is formed may be stamped from electrically conducting material such as, for example, copper, brass, aluminum, or other suitable metals.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

I claim:

1. A brazed seam generally elongate hollow tubular structure formed from a base member blanked from substantially flat metallic material, said base member having opposing first and second ends, a first surface extending between said first and second ends and defining the interior surface of said tubular structure, and a second surface extending between said first and second ends and defining the exterior surface of said tubular structure, said first surface and first end communicating at a first selectively tapered edge, said first surface and said second end communicating at a second selectively tapered edge, said base member first and second ends being aligned in generally abutting relationship upon the formation of said tubular structure to define a generally longitudinally extending contiguous seam thereat, said base member first surface further having disposed thereon longitudinally aligned rows of generally laterally extending first recessed portions, said rows being selectively spaced from one another and from said base member first and second ends by intervening web portions, said base member second surface having at least two spaced longitudinally extending second recessed portions disposed generally intermediate said base member first and second ends for providing a weakened zone generally adjacent each of said second surface recessed portions, said base member first and second ends having been joined together by brazing to effect a closure thereat, the axis defined by a line joining at least two of said base member second recessed portions in said tubular structure being aligned substantially perpendicular to the axis defined by a generally radially directed line extending between the longitudinal axis of said tubular member and said seam, at least one of said second recessed portions being defined by an open slot extending between said base member first and second surfaces.

2. A tubular structure as defined in claim **1** wherein the shape thereof is substantially cylindrical.

* * * * *