



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/NL96/00476</p> <p>(22) International Filing Date: 4 December 1996 (04.12.96)</p> <p>(30) Priority Data: 1001809 4 December 1995 (04.12.95) NL</p> <p>(71) Applicant (for all designated States except US): WITMETAAL B.V. [NL/NL]; Energiestraat 21, NL-1411 AR Naarden (NL).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): OUD, Martinus, Adrianus [NL/NL]; Oesterzwam 6, NL-2925 DK Krimpen aan de IJssel (NL). GODIJN, Paul, Willem [NL/NL]; Spaarne 8, NL-1273 WB Huizen (NL). WELLING, Antonius, Johannes [NL/NL]; Schepenen 56, NL-1412 DG Naarden (NL). VELTHUIZEN, Willem [NL/NL]; Rijksstraatweg 225, NL-3956 CN Leersum (NL).</p> <p>(74) Agent: LAND, Addick, Adrianus, Gosling; Arnold &amp; Siedsma, Sweelinckplein 1, NL-2517 GK The Hague (NL).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, EE, ES, FI, GB, GE, HU, IL, IS, JP, KE, KG, KP, KR, KZ, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (KE, LS, MW, SD, SZ, UG), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report. In English translation (filed in Dutch).</i></p>
<p>(54) Title: SOLDER SLEEVE AND A METHOD FOR THE FORMING THEREOF</p>		
<p>(57) Abstract</p> <p>The invention relates to a solder sleeve comprising a split sleeve of solder material, end surfaces of which take the form of form-fitting coupling elements, and to a method for forming such a solder sleeve, comprising of: i) providing a strip of solder material, end surfaces of which take the form of form-fitting coupling elements; and ii) bending the strip to form a sleeve, wherein the coupling elements mutually engage for coupling.</p>		

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**SOLDER SLEEVE AND A METHOD FOR THE FORMING THEREOF**

The present invention relates to a solder sleeve and to a method for forming such a solder sleeve.

In the soldering of objects, particularly wires and cables, so-called solder sleeves can be used. Such solder sleeves are pushed over the objects to the place requiring soldering, whereafter the solder sleeve is softened by supplying heat and the soldered connection is realized.

Solder sleeves have been manufactured heretofore by deep-drawing from a length of solder material a cup-shaped bulge from which a cylinder is subsequently cut and the remaining material is melted down to once again form a length of solder material. Such a method is expensive, while the manufactured solder sleeves may have burrs on the sleeve edges as a result of the cutting whereby sliding of such a solder sleeve along and over the object is made difficult or impossible.

The present invention has for its object to provide a solder sleeve of the type referred to in the preamble which substantially does not have the above stated drawbacks. This is achieved according to the invention in that the solder sleeve comprises a split sleeve of solder material, end surfaces of which take the form of form-fitting coupling elements. By making use of form-fitting coupling elements of solder material at the position of the end surfaces, strips can be punched from a length of solder material which can subsequently be bent round so that there remains substantially no solder material which must be fed back for re-use after melting down. It has been found that such a solder sleeve can be manufactured unexpectedly well within narrow tolerances and retains its form, this as a result of the residual stresses which are present.

Many kinds of known form-fitting shapes can be used as coupling elements, such as coupling elements comprising a female element and a male element complementary thereto. Such coupling elements preferably  
5 lock against a mutual displacement in axial as well as peripheral direction.

In order to easily perform the subsequent soldering it is further recommended that the internal surface of the sleeve is provided with at least one  
10 opening for delivering flux material. It is thus possible to release flux material locally and at the right position during the soldering process. It is however apparent that the solder sleeve can likewise be provided with flux material on its internal and optionally its  
15 external surface.

Because the solder sleeve is manufactured from a strip which is punched from a length of solder material, it is possible to form the length such that its longitudinal edges are rounded, whereby the sleeve also  
20 has rounded edges. This provides the advantage that no stagnation occurs during sliding of the sleeve over and along the objects.

The present invention also relates to a method for forming a solder sleeve, comprising of:

- 25 i) providing a strip of solder material, end surfaces of which take the form of form-fitting coupling elements; and  
ii) bending the strip to form a sleeve, wherein the coupling elements mutually engage for coupling.

30 In further preference the sleeve is deformed close to a transition of the coupling elements. Thus is avoided that the coupling elements move apart since deformation of material occurs at the position of the transition between the coupling elements. Use is hereby  
35 made of the deformability of known solder material.

Mentioned and other features will be further elucidated hereinbelow on the basis of two embodiments which are given by way of example without the invention

being deemed limited hereto, wherein reference is made to the annexed drawing.

In the drawing:

5 fig. 1 and 3 each show a perspective view of a strip of solder material; and

fig. 2 and 4 each show a perspective view of the solder sleeves according to the invention formed from the solder material strips shown in fig. 1 and 3.

10 Fig. 2 shows a solder sleeve 1 according to the invention formed from a solder strip 3 which is shown in fig. 1.

Solder strip 3 is punched from a length of solder material (not shown), this such that the end surfaces 5 and 6 are provided with co-acting, form-  
15 fitting coupling elements 7 and 8.

Coupling element 7 takes the form of a disc part 9 and coupling element 8 has a recess 10 complementary to disc part 9.

20 Fig. 1 further shows clearly that the edges 11 and 12 of solder strip 3 are rounded off.

In order to form the solder sleeve 1 the solder strip 3 is bent round to form the sleeve shown in fig. 2, wherein coupling elements 9 and 10 mutually engage in form-fitting manner so that solder sleeve 1 has equal  
25 quantities of solder material in axial and peripheral direction.

The internal surface 13 of sleeve 1 is provided with a plurality of apertures 14 from which flux material present in the solder material can flow outward at the  
30 beginning of the soldering process.

In order to ensure that the solder sleeve retains the formed sleeve shape, it is possible using the tool 15 shown in fig. 2 to apply a deformation locally at the position of the interface between the end surfaces 5  
35 and 6, whereby coupling elements 7 and 8 can no longer move apart.

Fig. 4 shows another solder sleeve 2 according to the invention which is manufactured from the solder strip 4 shown in fig. 3.

The end surfaces 5 and 6 are likewise provided with coupling elements 7 and 8 which in this case take the form of a dovetail-shaped part 16 and a recess 17 complementary thereto. The solder strip 4 is further covered on one side with a coating 18 of flux material whereby the internal surface 13 of sleeve 2 is likewise provided with flux material 18.

It is further possible using a centre point at the position of the points 19 to arrange deformations once again at the position of the transition between coupling elements 16 and 17, whereby undesirable moving apart is avoided.

It will be apparent that the solder sleeves are manufactured from any typical solder material such as Sn 60 Pb. Any known type of flux material can moreover be used such as the flux material.

It will be apparent to any skilled person that any type of solder material and flux material can be used as long as they do not interfere with the forming of solder material strips and the formation therefrom of solder sleeves according to the invention.

## CLAIMS

1. Solder sleeve comprising a split sleeve of solder material, end surfaces of which take the form of form-fitting coupling elements.

2. Solder sleeve, the coupling elements of  
5 which comprise a female element and a male element.

3. Solder sleeve as claimed in claim 1 or 2, wherein the coupling elements lock against a mutual displacement in axial and peripheral direction.

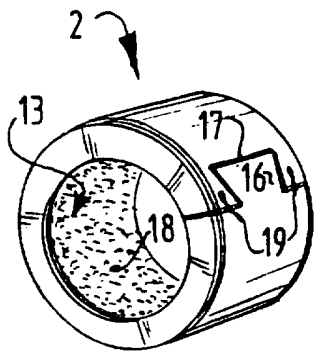
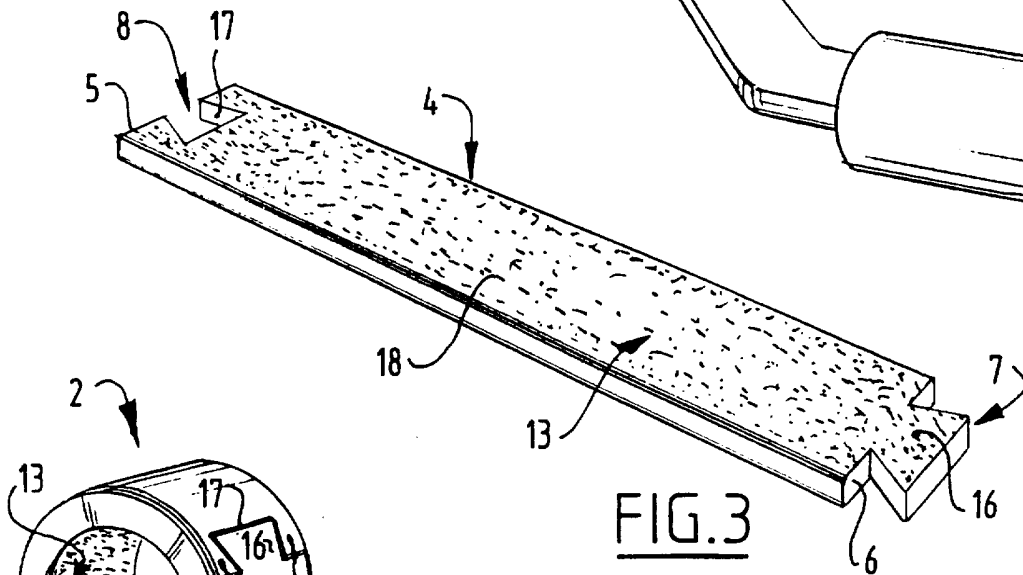
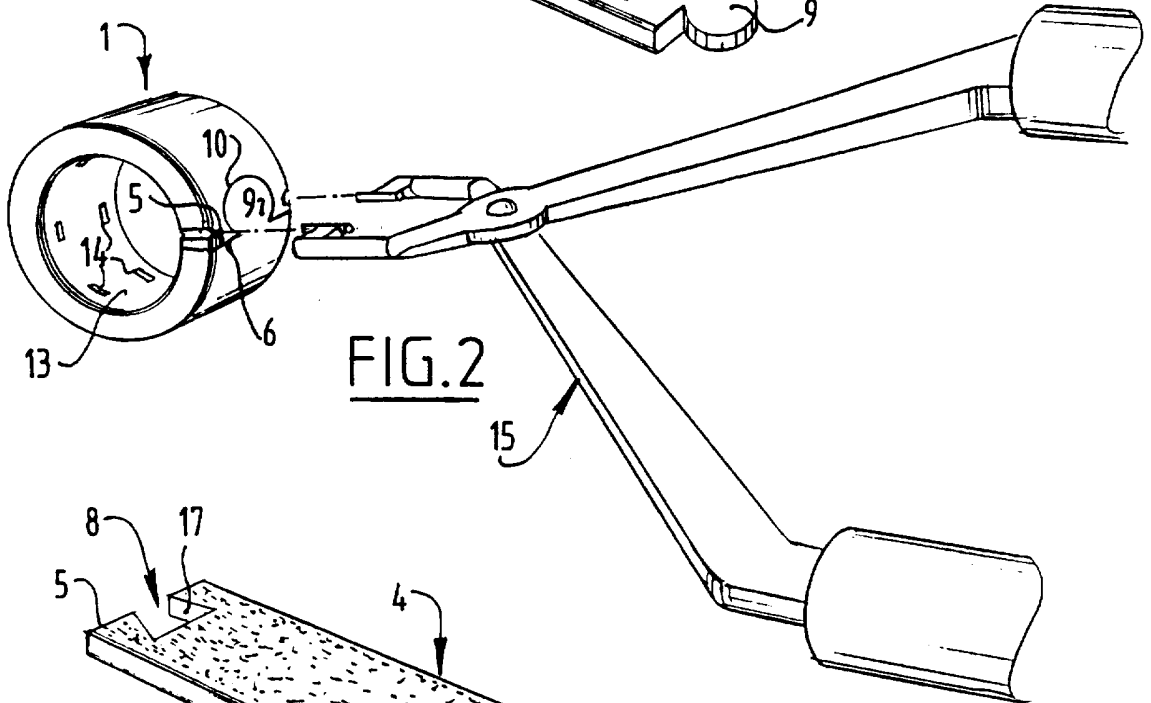
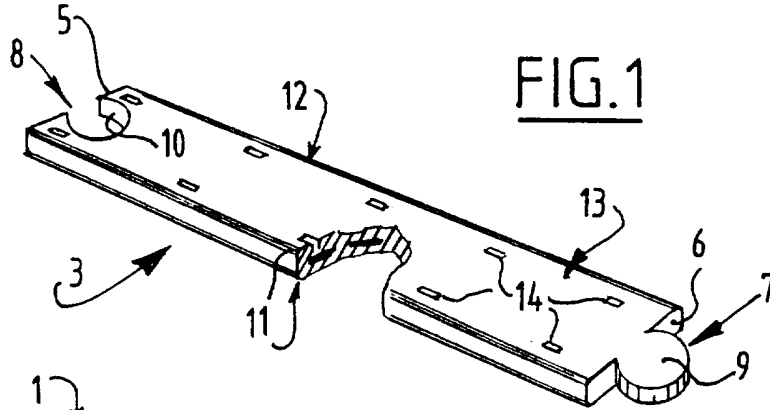
4. Solder sleeve as claimed in claims 1-3,  
10 wherein the internal surface of the sleeve is provided with at least one opening for delivering flux material.

5. Solder sleeve as claimed in claims 1-4, wherein the edges of the sleeve are rounded.

6. Method for forming a solder sleeve as  
15 claimed in claims 1-5, comprising of:

- i) providing a strip of solder material, end surfaces of which take the form of form-fitting coupling elements; and
- 20 ii) bending the strip to form a sleeve, wherein the coupling elements mutually engage for coupling.

7. Method as claimed in claim 6, wherein the sleeve is deformed close to a transition of the coupling elements.





# INTERNATIONAL SEARCH REPORT

Internat. Application No  
PCT/NL 96/00476

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 6 B23K35/14

According to International Patent Classification (IPC) or to both national classification and IPC

**B. FIELDS SEARCHED**

Minimum documentation searched (classification system followed by classification symbols)  
IPC 6 B23K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

**C. DOCUMENTS CONSIDERED TO BE RELEVANT**

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FR 48 577 E (MERCIER) 5 April 1938 see the whole document ---	1,6
Y	GB Q03310 A (A.E. COLLETT) 28 October 1915 see the whole document ---	1,6
A	US 3 427 707 A (R.F. NOWOSADKO) 18 February 1969 ---	
A	US 3 239 125 A (H.P. SHERLOCK) 8 March 1966 ---	
A	US 2 503 564 A (H.T. REEVE) 11 April 1950 ---	
A	GB 659 355 A (H.J. ENTHOVEN & SONS) 24 October 1951 ---	
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Further documents are listed in the continuation of box C.

Patent family members are listed in annex.

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Date of the actual completion of the international search

4 March 1997

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Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	PATENT ABSTRACTS OF JAPAN vol. 9, no. 282 (M-428) [2005] , 9 November 1985 & JP 60 124491 A (TOSHIBA), 3 July 1985, see abstract  ---	
A	WELDING ENGINEER, September 1960, pages 36-39, XP000614227 H. OLSON: "How to design for preform brazing"  -----	

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Information on patent family members

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US 3427707 A	18-02-69	NONE	
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