

EUROPEAN QUALIFYING EXAMINATION 1990**PAPER C****This paper comprises:**

- Instructions to Candidates 90/C/e/1-2
- Letter from client to professional representative 90/C/e/3
- Annex 1 (EP-B1-0 248 000) 90/C/e/4-12
- Annex 2 (WO 85/02 583) 90/C/d,e,f/13-17
- Annex 3 (DE-A-28 77 382) 90/C/d,e,f/18-21
- Annex 4 (CH-A-478 892) 90/C/d,e,f/22-24
- Annex 5 (FR-A-2 779 566) 90/C/d,e,f/25-30
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- Glossary for annexes 1 to 6 90/C/d,e,f/33-34

INSTRUCTIONS TO CANDIDATES

1. Attached you will find a letter from a client to a professional representative with annexed documents.
2. Your task is to put yourself in the position of the representative and, using only the information provided by the client, to prepare a notice of opposition, which when typed would be ready for filing.
3. If in the notice of opposition
 - you have not taken account of a particular piece of prior art,
 - there is a claim which you have not attacked,
 - you have made no use of a possible line of attack on a claim, or
 - you have attacked a given claim in circumstances where there is real doubt as to whether the attack would be successful,you should justify this briefly on a separate sheet of paper, referring where pertinent to the nearest state of the art.
4. The documents should be referred to by their annex number.
5. If not needed for the sake of argumentation, avoid word for word reproduction of the claims in your work. In particular, a mere listing of the features of the claims of Annex 1 should not be given by way of an introduction to the arguments presented.
6. You are not called upon to prepare documents which might be necessary for supporting the opposition, e.g. evidence from experts, authorisations, receipts or statements by witnesses.
7. The date of the client's letter has been chosen only to indicate to the candidate that there is not time to confer with the client. Explanations regarding the manner of filing the opposition to meet the deadline are therefore not required.
8. You should be aware that Annex 1 is fictitious and is not necessarily in a form that would have lead to a patent granted by the European Patent Office.
9. In addition the following points from "Instructions to candidates for preparing their answers" (Official Journal EPO 3/1984 and 4/1989) should be taken into account:

I. APPLICABLE TO PAPERS A, B, C AND D

1. Candidates are to accept the facts given in the paper and to base their answers upon such facts. Whether and to what extent these facts are used is the responsibility of the candidate.
2. Candidates are not to use any special knowledge they may have of the subject-matter of the invention, but are to assume that the prior art given is in fact exhaustive.

IV. APPLICABLE TO PAPER C

- **DURATION: 5 HOURS; THIRD DAY, MORNING**

8. The paper will be presented in the form of a letter from a client to a professional representative. The candidate is expected to draw up a notice of opposition which satisfies the requirements regarding filing, other than those relating to typing and the keeping of certain margins.

The notice of opposition prepared by the candidate should comply with Article 100 and Rule 55, bearing in mind the relevant recommendations in the Guidelines for examination in the EPO, Part D. However, in order to maintain the candidate's anonymity he is not to use his real name in the papers but, instead, the candidate should use the name of the representative to whom the client's letter is addressed. The grounds of Article 100(b) and (c) will not be used.

The candidate must also briefly set out on a separate sheet reasons why he adopted or did not adopt the suggestions of the client. In addition any questions the client may have posed should be answered.

9. The notice of opposition should contain all (and only those) grounds - as far as possible against all the claims - which the candidate in that particular case considers prejudicial to the maintenance of the patent.

Omission of a good ground for opposition will lead to a loss of marks, commensurate with the importance of the ground in the particular case.

11. The European patent to be opposed will be furnished in all three official languages. The candidate must indicate which of the three versions he chose to oppose.

PAPER C/1990

Jeremiah J. Johnson
(Rodmakers) Ltd. Estab. 1862
Turnpike Lane
Newcastle-upon-Tyne, England

Mrs. Ann Lloyd,
Professional Representative
before the EPO,
Lloyd, Ann et al.
2 Church Road,
Ludlow,
Shropshire,
England.

3 April 1990

Dear Madam,

We wish you to lodge an opposition against European Patent EP 0 248 000 (Annex 1) granted to Pipedreams Inc. USA. Relevant prior art is enclosed as Annexes 2 to 6. Despite the different technique used in Annex 2 we nevertheless believe this document to be useful.

Although for our European market we produce muffs according to a method which falls within the scope of claim 3 of Annex 1 we are not interested in attacking this claim as our factory is in Portugal.

With regard to the PCT application (Annex 2) we would point out that the contents of the priority document and the PCT application are identical, but that no fee at all has been paid to the EPO.

Yours sincerely,



Jeremy Johnson
(Managing Director,
Jeremiah J. Johnson (Rodmakers) Ltd.)

encls. Annexes 1-6



Europäisches Patentamt
 European Patent Office
 Office européen des brevets

⑱

⑪ Publication number:

EX 1
 0
 B1

⑫

EUROPEAN PATENT SPECIFICATION

④⑤ Date of publication of patent specification: 12.07.89

⑤① Int. Cl.⁴: F16L 47/02

②① Application number: 86 104 740.9

②② Date of filing: 12.05.86

⑤④ Welding muff

③⑩ Priority: 07.06.85 US 400 245

④③ Date of publication of application:
 07.01.87 Bulletin 87/1

④⑤ Publication of the grant of the patent:
 12.07.89 Bulletin 89/28

⑧④ Designated Contracting States:
 AT BE DE FR GB IT NL SE

⑤⑥ References cited:
 None

⑦③ Proprietor: Pipedreams Inc.
 1 Yellow Brick Road
 Kansas City
 Kansas, USA

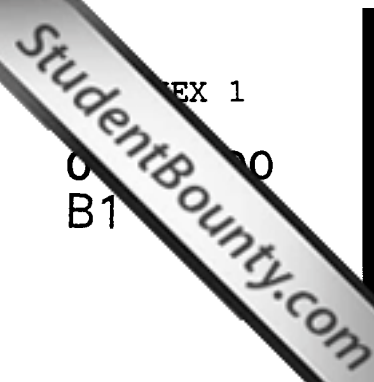
⑦② Inventor:
 Anthony Seeger
 602 Central Avenue
 Great Falls
 Montana, USA

⑦④ Representative:
 FYFE, Robert et al.
 10 High Road
 Aberfoyle
 Perthshire
 Scotland

EP 0 248 000 B1

Note: Within nine months from the publication of the mention of the grant of the European patent, any person may give notice to the European Patent Office of opposition to the European patent granted. Notice of opposition shall be filed in a written reasoned statement. It shall not be deemed to have been filed until the opposition fee has been paid. (Art. 99(1) European patent convention).

Courier Press, Leamington Spa, England.



The invention relates to tubular muffs for joining pipe ends, in particular electric welding muffs for producing welded joints between pipe ends. The muffs are formed from a synthetic thermoplastic material with an electric resistance heating winding arranged in the vicinity of the inner wall of the muff body. A welded joint is obtained by inserting the pipe ends into opposed ends of the muff, after which the resistance heating winding is heated electrically so that the material of both the pipe ends and the muff is partly melted until an intimate connection is formed. After cooling, a gas and liquid-tight weld is obtained.

When using welding muffs it is essential to know whether a satisfactory weld has been achieved.

It is therefore an object of this invention to provide the muff body with indication means which indicate that a satisfactory weld has been reached.

A further object of the invention is to provide a set of muffs in which the wire for the resistance heating windings of the muffs is chosen so that the same welding time is used for muffs of different diameter, thus allowing installations of the muffs even by unskilled labour. This is achieved by decreasing the resistance of the heating wire and thus of the windings with increasing muff diameter.

In the accompanying drawings:

35

Figure 1 is a partial longitudinal section schematically showing a welding muff with pipe ends inserted;

5 Figure 2 is an enlarged partial section of the welding muff with the indicator and

Figure 3 is an enlarged partial section of a further embodiment of the welding muff.

10 Figures 1 and 2 show part of a tubular muff body 1 which has a winding 3 of an electrical resistance heating wire. Each end of the winding 3 is connected to a contact stud 6 within a recess 5 so that a source of electrical power can be connected to the winding.

15 The muff body 1 includes a weld indicator 19 comprising a rod or rod-like protrusion 20 within a cylindrical recess in form of a blind bore 21 extending radially outwardly from adjacent the winding 3.

20 When welding, the material of the muff body 1 and of the pipe ends 23 close to the winding 3 is melted and fills the gap 22 between the muff body and the pipe ends, thereby creating an increase in pressure in gap 22 by
25 thermal expansion of the material. Due to deformation at its radially inward end, rod 20 is caused to rise relative to the muff body, moving radially outwardly in cylindrical recess 21 as indicated at 20' and giving a visible indication that the welding is completed.

30

35

In Figure 3, there is shown one end of a welding m
 formed by joining two tubular parts 25 and 26.
 Separately formed rod 20 is movable and provides a vis-
 5 ible indication that the welding of the muff and the tube
 ends is achieved. The contact stud 6 is surrounded by a
 protective collar 28.

When the resistance of the heating wire of the windings
 of different muffs is selected as an inverse function of
 10 the muff diameters, for a given supply voltage, the
 heating energy transferred to each unit volume of the
 muffs in a given time can be maintained approximately
 constant. As a result, the same welding time is obtained,
 e.g. 60 seconds, for welding muffs of different diameter.

15 In order to achieve a constant welding time for welding
 muffs of different diameter but having substantially
 similar specific heating power, the characteristic data
 of the muffs being welded at a welding voltage of about
 20 220 volts can be gathered from the following table which
 represents a group of five muffs of the same length which
 have been tested in practice.

Ex.	Muff nominal diameter (mm)	Muff internal volume (cm ³)	Heating Winding Resistance (ohms)
25	1 40	42.61	264.1
	2 50	52.04	216.3
	3 63	64.25	171.2
30	4 75	75.45	145.8
	5 90	92.84	115.8

35

Ex.	Heating Power (Watts)	Heating Power per unit volume (Watts/cm ³)	Heating Wire Diameter for:	
			Isazin (mm)	Nikrothal 20 (mm)
1	183.2	4.30	0.05	0.09
2	223.7	4.29	0.06	0.11
3	282.7	4.40	0.07	0.14
4	332.0	4.40	0.09	0.16
5	417.8	4.50	0.12	0.20

The heating wire types referred to in the table have the following compositions:

Isazin:

77% Cu (copper)
21% Ni (nickel)
2% Mn (manganese)

Nikrothal 20:

20% Ni (nickel)
25% Cr (chromium)
remainder Fe (iron)

Thus, for the winding of a welding muff of nominal diameter 40 mm, it is possible to use a heating wire of Nikrothal 20 with a diameter of 0.09 mm (overall resistance 264.1 ohms) and for the winding of a muff having nominal diameter of 75 mm it is possible to use a heating wire of Isazin having a wire diameter of 0.09 mm (overall resistance 145.8 ohms), either wire being effective to obtain the desired heating.

In order to ensure uniform heat transfer throughout the length of the heating wire it is necessary to provide proper adhesion of the wire to the muff. This may be achieved by degreasing the wire followed by catalytic reduction. The wire may then optionally be covered with a coating of the same material as the muff body, which may be a copolymer of an unsaturated carboxylic acid modified polyolefin.

The above described embodiments may be modified in many ways.

5 For example, the heating wire may be embedded in the inner region of the muff part 25 by winding the wire around the part whilst current is passed through the wire to cause the part to soften. The wire may have one or more of its windings bridged by conductive bridging elements at the region of the extreme ends of the pipes. The
10 resultant short circuiting of these windings ensures a lower rate of heating at the ends and prevents unwanted flow of material into the interior of the pipes.

15 The wire may be heated by induction heating or may be omitted along with the contact studs 6. If the wire is omitted the seal may be caused by chemical fusion or adhesive introduced via the recesses 5.

20 The rod 20 may be limited in its movement by a stop provided in recess 21 and may be calibrated to indicate the generated pressure. The colour of the rod may differ from that of the muff part 26.

25 Alternatively the rod 20 may be omitted with the expansion of the inner part 25 into recess 21 providing the indication of suitable weld conditions. In this case the inner part may be coloured differently.

30 The recess 21 may be aligned at an angle of 45 degrees to the muff axis.

35

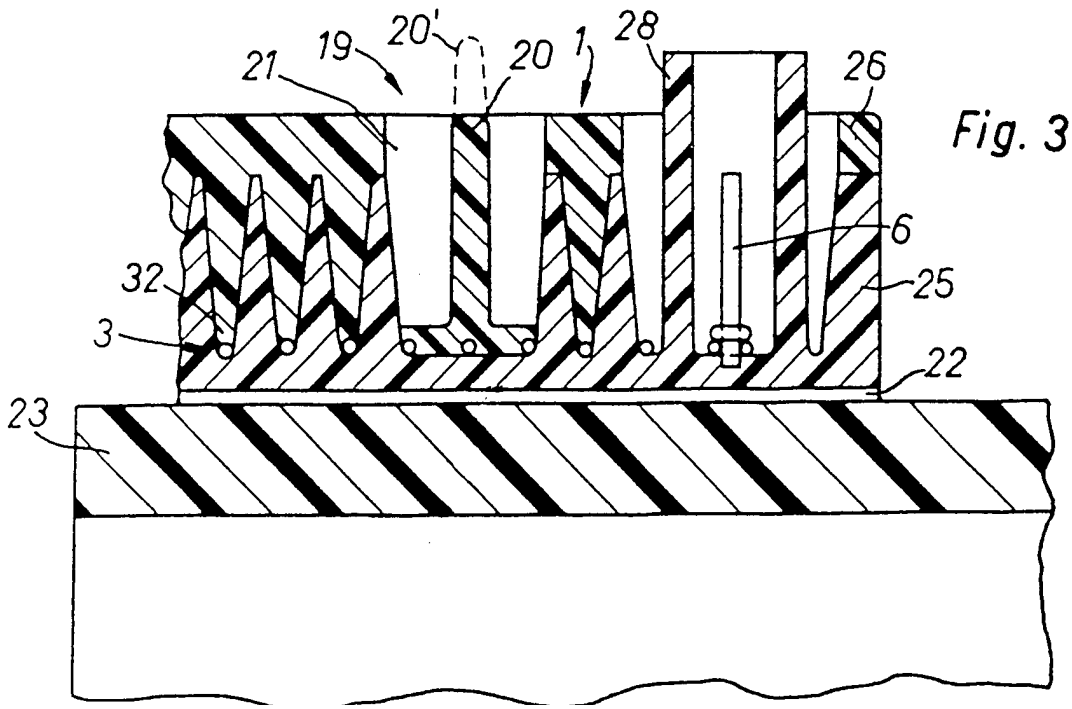
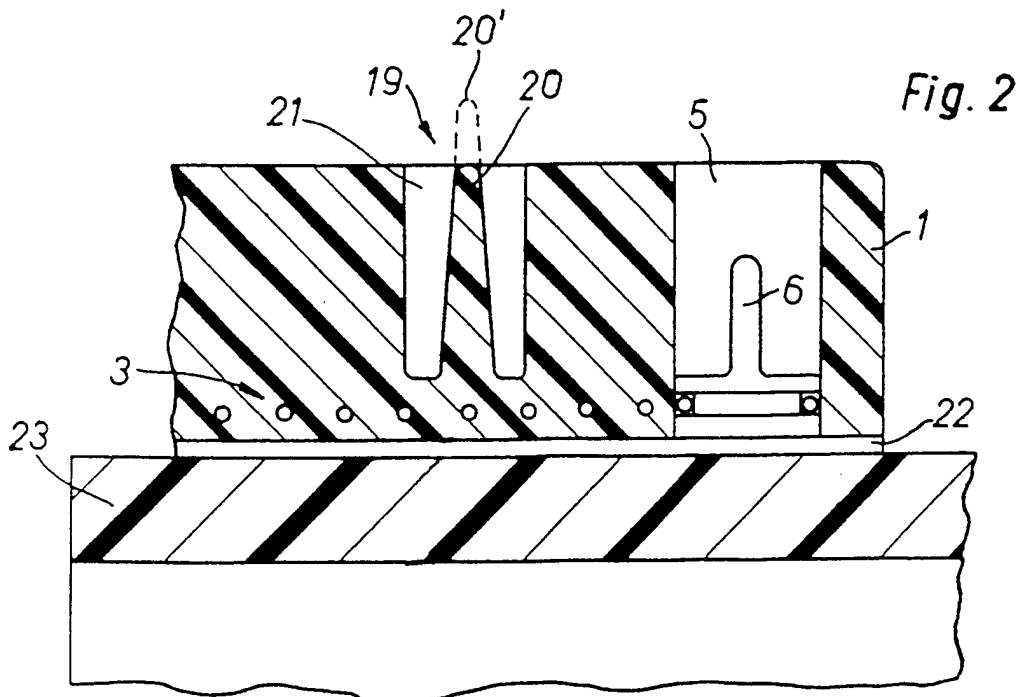
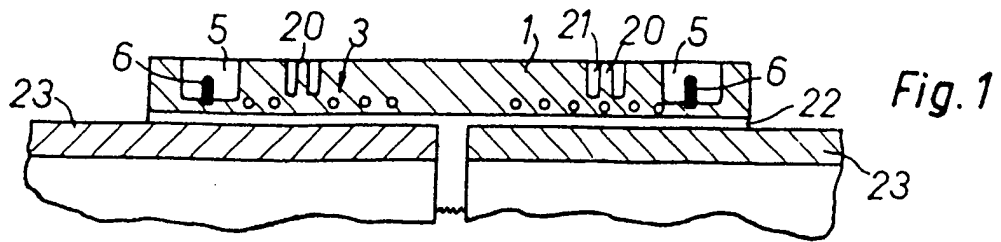
CLAIMS:

1. A muff (1) comprising a tubular plastics body for joining pipe ends (23), the body having visual indicator means (19) indicative of a proper seal.

2. A muff as claimed in Claim 1 comprising inner and outer tubular parts (25, 26) of synthetic thermoplastic material, an electrical resistance heating winding (3) embedded adjacent the outer surface of the inner part (25), said visual indicator means (19) comprising a calibrated rod or rod-like protrusion (20) located within a radially or non-radially extending blind bore (21) open at the outer surface of the outer part (26), the rod (20) being capable of movement within the blind bore when pressure is developed as current is supplied to the winding to weld the pipe ends and muff, the amount of movement of the calibrated rod being indicative of the generated pressure.

3. A method of manufacturing a tubular electric welding muff (1) formed by inner and outer tubular parts (25,26) of synthetic thermoplastic material, the method comprising subjecting an electric resistance heating wire having the composition 77% Cu, 21% Ni, 2% Mn, or the composition 20% Ni, 25% Cr, remainder Fe, to degreasing and catalytic reduction, and thereafter coating the wire with a copolymer of an unsaturated carboxylic acid modified polyolefin, winding the coated wire around said inner part (25) whilst passing current through the wire to partially soften the said inner part (25) and coating whereby the coated wire is embedded in the inner part (25) thereby forming a resistance heating winding (3), forming said outer part (26) around said inner part (25), said outer part (26) being provided with at least three recesses (5,5,21) and being of a colour different to that of said inner part (25), the inner and outer parts (25,26) and the coating of the wire being of the same copolymer.

4. A set of at least two electric welding muffs (1), muffs each comprising a tubular body of synthetic thermoplastic material with an electric resistance heating winding (3) disposed adjacent the inner surface of the tubular body, and means (6) on said winding (3) for connection to a power source, the resistance value of each heating winding (3) being selected according to the body diameter such that this value decreases with muffs of increasing diameter, whereby when the windings of the different muffs are connected to a source of electrical power with a predetermined voltage the muffs will have substantially the same predetermined welding time.



INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY

(51) International Patent Classification⁴ : B29C 33/00		(11) International Publication Number: WO 85/00122 (43) International Publication Date: 07 June 1985 (07.06.85)
(21) International Application Number: PCT/US84/11985 (22) International Filing Date: 7 December 1984 (07.12.84) (31) Priority Application Number: 942,200 (32) Priority Date: 9 December 1983 (09.12.83) (33) Priority Country: US (71) Applicant: Pipedreams Inc. 1 Yellow Brick Road Kansas City Kansas, USA (72) Inventor: Anthony Seeger 602 Central Avenue Great Falls Montana, USA (74) Agent: Bacon, Robert et. al. Chipps, Heinz & Bean Madison Square Garden New York, New York (USA)		(81) Designated States: DE (European patent), FR (European patent), GB (European patent) Published <i>With international search report.</i>
(54) Title: Muff		
(57) Abstract A muff for sealing two pipe ends by the injection method, in which the pipe ends (1, 2) are inserted into opposite ends of the muff (3) and adhesive is injected into the annular spaces (14, 15) formed between the pipe ends and the inner surface (8) of the muff, each annular space (14, 15) being limited at the muff end by an annular step (9) projecting radially inwardly from the muff inner surface, characterized in that the muff comprises a main muff body part (4) and a pair of integrally connected end rings (5, 6) each provided with a radially inwardly extending annular flange (9).		

The invention relates to a muff for sealing the ends of two pipes by the injection method, in which the pipe ends are inserted into the muff from opposite ends and adhesive is injected into the annular space between the pipes and the muff inner surface.

It is known to prevent adhesive from escaping from the ends of the muff and from entering the gap between the pipe end surfaces by providing annular flanges on the inner surface of the muff. A great disadvantage with large scale use of the injection method lies in the considerable difficulties in manufacturing a suitable injection muff, as the components are only made with relatively large dimensional tolerances.

The object of the invention is to provide an injection muff which can be made by the die cast procedure economically and trouble free on a large scale whilst still conforming to the required standards.

The solution is achieved by forming the muff from a main body part and integrally connected end rings which possess inwardly directed flanges.

In the drawings:

Fig. 1 shows a muff joined with two pipe ends; and Fig. 2 an enlarged, longitudinal sectional view of the muff.

In Fig. 1, the two pipe ends 1, 2, preferably of PVC resin, are held fixed by the muff 3, which comprises a main body 4, also preferably of PVC resin, and two, stepped end rings 5, 6 of smaller inner diameter and which are fitted into the muff body 4. The rings have an annular step 9 at their interfaces with the inner surface

8 of the body, Fig. 2.

Similarly sized steps 10 are provided on an annular flange 11 in the centre of the muff. The step 10 and flange 11 act as a stop for the pipe end surfaces 12, 13 and together with the steps 9 on the end rings 5, 6, the muff body and the pipe ends, form annular spaces 14, 15 into which adhesive can be injected from nozzle 24 via bores 22, 23.

10

A perfectly tight seal is established when a decolouring of the adhesive is observed in the bores 22, 23.

15

CLAIM:

A muff for sealing two pipe ends by the injection method, in which the pipe ends (1, 2) are inserted into opposite ends of the muff (3) and adhesive is injected into the annular spaces (14, 15) formed between the pipe ends and the inner surface (8) of the muff, each annular space (14, 15) being limited at the muff end by an annular step (9) projecting radially inwardly from the muff inner surface, characterized in that the muff comprises a main muff body part (4) and a pair of integrally connected end rings (5, 6) each provided with a radially inwardly extending annular flange (9).

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FIG. 2

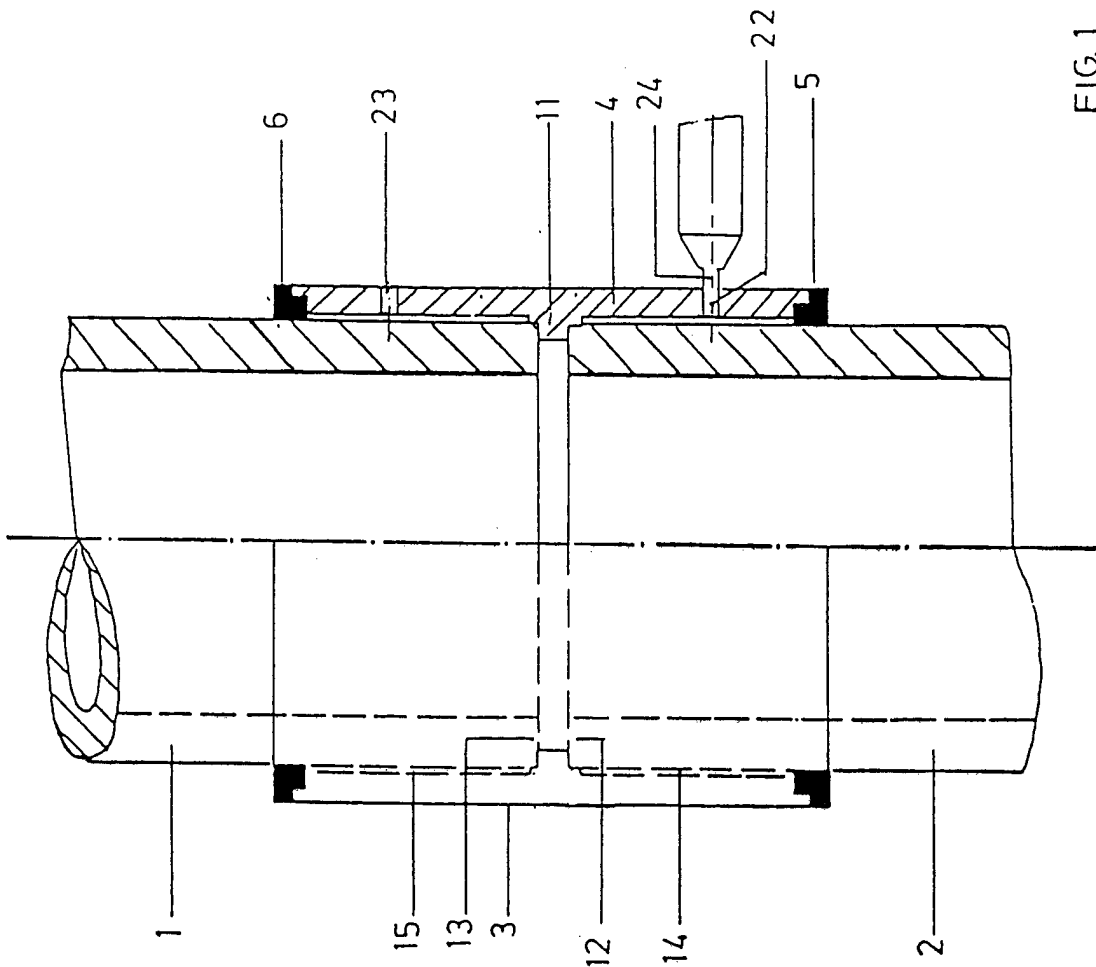
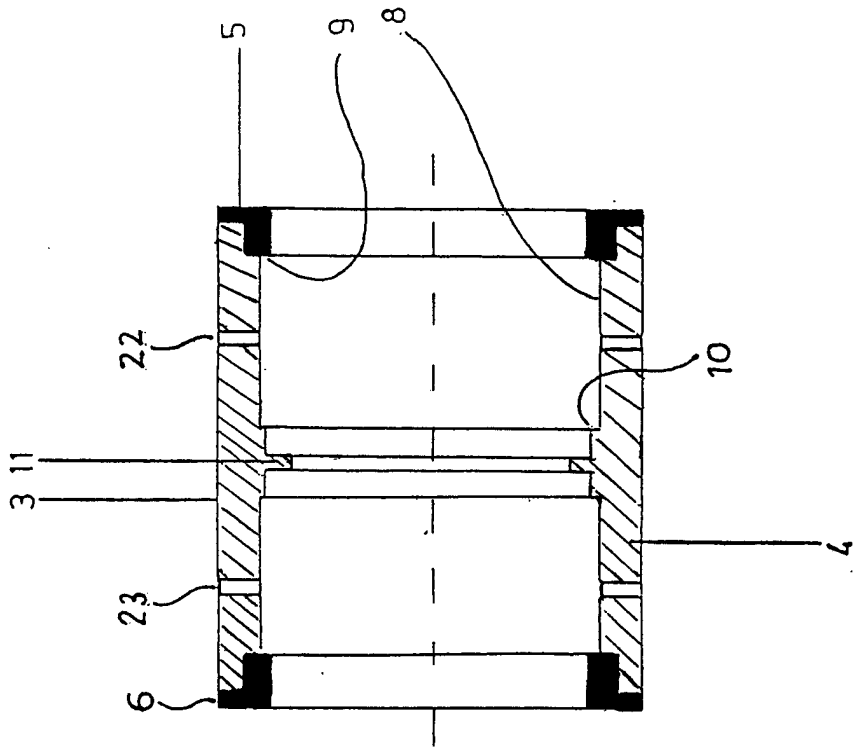
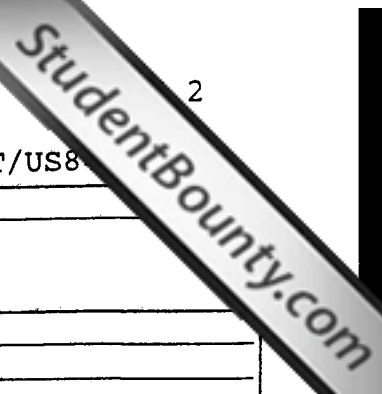


FIG. 1



INTERNATIONAL SEARCH REPORT

International Application No PCT/US8



I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) ⁶				
According to International Patent Classification (IPC) or to both National Classification and IPC				
Int.Cl. ⁴ B29C 33/00				
II. FIELDS SEARCHED				
Minimum Documentation Searched ⁷				
Classification System	Classification Symbols			
Int. Cl. ⁴	B29C			
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched ⁸				
III. DOCUMENTS CONSIDERED TO BE RELEVANT ⁹				
Category ⁹	Citation of Document, ¹¹ with indication, where appropriate, of the relevant passages ¹²	Relevant to Claim No. ¹³		
	None found			
<table style="width: 100%; border: none;"> <tr> <td style="width: 50%; border: none; vertical-align: top;"> <ul style="list-style-type: none"> * Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed </td> <td style="width: 50%; border: none; vertical-align: top;"> <ul style="list-style-type: none"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family </td> </tr> </table>			<ul style="list-style-type: none"> * Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed 	<ul style="list-style-type: none"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family
<ul style="list-style-type: none"> * Special categories of cited documents: ¹⁰ "A" document defining the general state of the art which is not considered to be of particular relevance "E" earlier document but published on or after the international filing date "L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified) "O" document referring to an oral disclosure, use, exhibition or other means "P" document published prior to the international filing date but later than the priority date claimed 	<ul style="list-style-type: none"> "T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention "X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step "Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art. "&" document member of the same patent family 			
IV. CERTIFICATION				
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report			
18 April 1985	15 May 1985			
International Searching Authority	Signature of Authorized Officer			
European Patent Office	A. Hoffmeyer			

⑤ Int. Cl. ³ - Int. Cl. ²Int. Cl. ²: F16L 47/02

⑯ BUNDESREPUBLIK DEUTSCHLAND

DEUTSCHES PATENTAMT



⑪

Offenlegungsschrift **28 77 382**

⑫

Aktenzeichen: P 28 77 382.1

⑬

Anmeldetag: 8.11.78

⑭

Offenlegungstag: 20.3.80

⑳

Unionspriorität: 12.9.1978 Schweiz 9606-78

⑳ ㉑ ㉒

⑤④

Bezeichnung: Muffe zum Verbinden von Leitungselementen

⑦①

Anmelder: Rohrbau AG, Zürich

⑦④

Vertreter: Angerer, K., Dipl.-Ing., Pat.-Antw., 5300 Bonn

⑦②

Erfinder: Egon, Jocelyn, Gerlafingen (Schweiz)

Bei der Installation von Gasversorgungsrohren ist es wesentlich, daß Verbindungen zwischen zwei Rohren oder zwischen einem Rohr und einer Armatur absolut gasdicht sind. Ein Verfahren zur Herstellung solcher Verbindungen besteht darin, thermoplastische Materialien so hoch zu erhitzen, daß sie auf die Armaturen oder die zu verbindenden Rohre aufschmelzen. Bei einem solchen bekannten Verfahren wurde eine rohrförmige Muffe mit eingebautem Heizdraht verwendet. Die Muffe aus thermoplastischem Kunststoff wurde über die Enden der beiden zu verbindenden Rohre geschoben und der Heizdraht wurde an eine Stromquelle angeschlossen. Der thermoplastische Kunststoff erweichte und verband sich mit dem Rohrmaterial.

Die vorliegende Erfindung betrifft ein Verfahren zur Herstellung von durch Wärmeeinwirkung dichtbaren Muffen gemäß dem Patentanspruch.

Im folgenden wird ein Ausführungsbeispiel der Erfindung unter Bezugnahme auf die beigefügten Figuren beschrieben.

Die Figuren 1a bis 1c der Zeichnung zeigen einzelne Schritte der Herstellung einer durch Wärmeeinwirkung dichtbaren Muffe.

Ein zylindrischer Formkern 1 wird ins Innere einer zweiseitigen Spritzgußform 2 (nur ein Teil ist gezeichnet) eingesetzt. Die Gußform und der Formkern bilden zusammen einen Hohlraum 3, in den thermoplastischer Kunststoff, wie z.B. Polyäthylen, Polybutylen oder Polypropylen, durch Kanäle 4 eingespritzt wird, so daß ein Vorformling 5 gebildet wird. Dann wird die Gußform 2 geöffnet und der Formkern 1 mit dem Vorformling 5 auf einer Wickelvorrichtung 6 aufgespannt. Ein Ende eines Stückes Widerstandsheizdrahtes 7 wird an einem Anschlußstift 8 auf dem Vorformling 5 befestigt und der Formkern wird so

auf dem Vorformling 5 befestigt und der Formkern wird gedreht, daß sich eine schraubenlinienförmige Wicklung des Drahtes auf dem Vorformling bildet. Der Widerstandsdraht wird, während er von einer Trommel 9 abgewickelt wird, durch eine Heizeinrichtung 11 geführt. Wenn die
5 Wicklung fertig ist, wird das andere Ende des Widerstandsdrahtes an einem zweiten Anschlußstift 10 befestigt. Der Formkern und der Vorformling 5 werden von der Wickelvorrichtung abgenommen und in eine weitere
10 zweiteilige Spritzgußform 12 (Figur 1c) eingesetzt. Dort wird der Heizdraht in eine Umhüllung 13 eingebettet, welche durch Einspritzen einer weiteren Lage thermoplastischen Kunststoffes durch Kanäle 14 erzeugt wird. Nach Entnahme des Formkerns und des fertigen
15 Formlings aus der Spritzgußform 12 läßt man diese abkühlen. Schließlich wird die fertige Muffe vom Formkern abgenommen.

20

PATENTANSPRUCH:

Verfahren zur Herstellung von durch Wärmeeinwirkung
25 dichtbaren Muffen mit folgenden Schritten:

Ein Ende eines Widerstandsdrahtes (7) wird an einem rohrförmigen Vorformling (5) aus thermoplastischem Kunststoff befestigt; der Widerstandsdraht wird erhitzt und der
30 erhitzte Widerstandsdraht wird auf den Vorformling als schraubenlinienförmige Wicklung aufgebracht; das andere Ende des Widerstandsdrahtes wird an dem Vorformling befestigt und die schraubenlinienförmige Wicklung wird mit thermoplastischem Kunststoff (13) umhüllt.

35

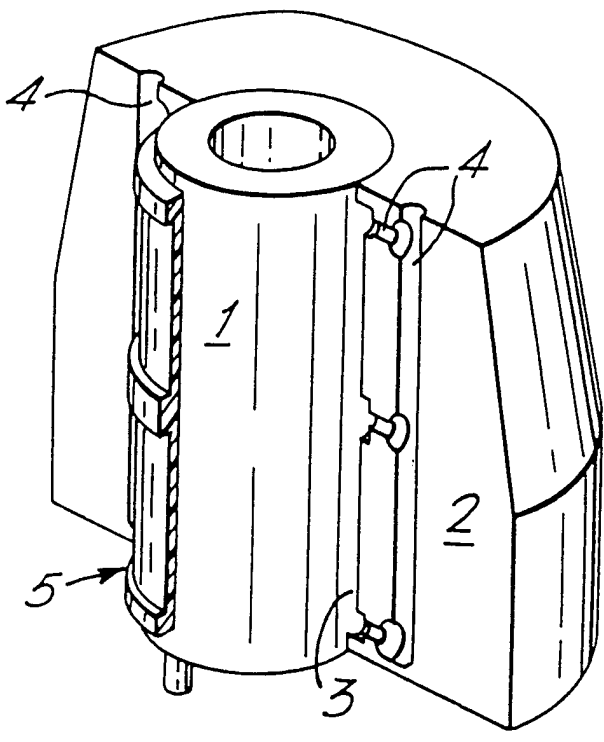


FIG. 1a.

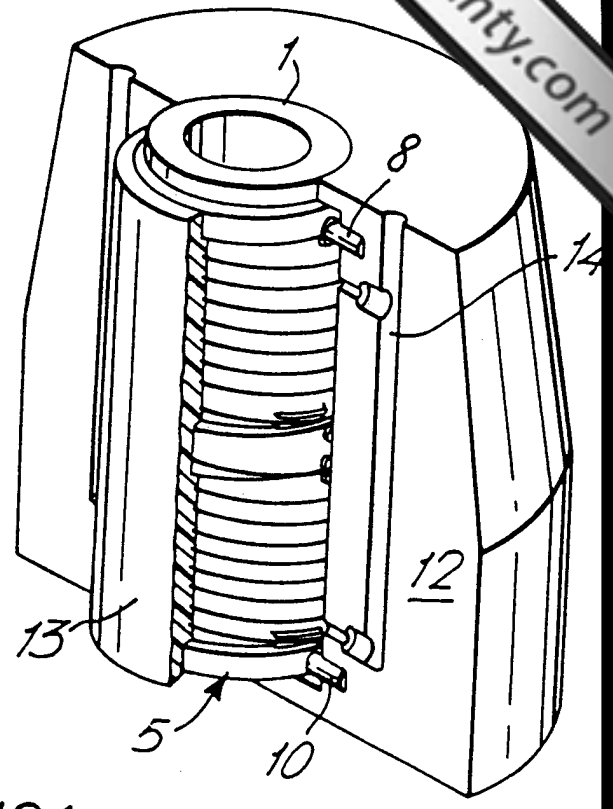
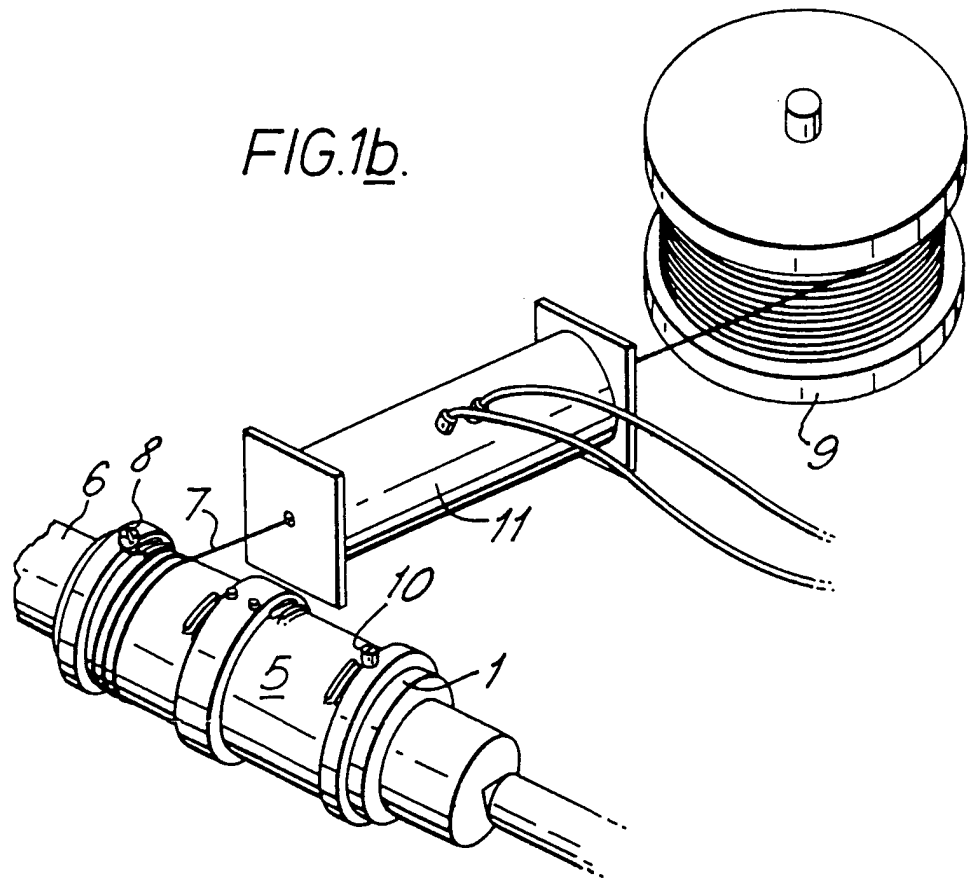


FIG. 1c.

FIG. 1b.





SCHWEIZERISCHE EIDGENOSSENSCHAFT

EIDGENÖSSISCHES AMT FÜR GEISTIGES EIGENTUM

Internationale Klassifikation:	F16L 47/02
Gesuchsnummer:	5421/67
Anmeldungsdatum:	9. März 1967, 17 Uhr
Patent erteilt:	30. September 1969
Patentschrift veröffentlicht:	14. November 1969

S

HAUPTPATENT

Heim AG, Basel

Muffe

Dr. Guy Albert, Zürich, ist als Erfinder genannt worden

Die vorliegende Erfindung betrifft eine Elektroschweißmuffe zum Verbinden von Plastikrohren, wobei die Muffe aus einem Stück Kunststoffrohr mit einer eingebetteten Wicklung aus elektrischem Heizdraht besteht. Das Fließen eines elektrischen Stroms in der Wicklung bewirkt ein Schmelzen der Muffe und der zu verbindenden Rohre und eine Verklebung der Berührungsflächen durch Thermofusion.

Ziel der vorliegenden Erfindung ist es, die Schmelzverklebung der Muffe mit den Rohren durch eine Verbesserung der Haftung zwischen der Wicklung und dem Kunststoff der Muffe zu optimieren. Dieses Ziel läßt sich mit einer oder mehreren der folgenden Maßnahmen erreichen:

- (a) Formung der Muffe aus einem adhäsiven Kunststoffmaterial;
- (b) Versehen der Wicklung mit einer im wesentlichen oxidfreien Oberfläche;
- (c) Beschichten des Wicklungsdrahts mit einer Substanz, die sowohl an der Oberfläche des Wicklungsdrahts als auch am Kunststoff der Muffe gut haftet.

Als adhäsive Kunststoffmaterialien können Copolymere verwendet werden, die aus Polyolefinen bestehen, welche modifiziert sind durch: (i) ungesättigte Carboxylsäuren oder deren Derivate, (ii) ungesättigte Epoxy-Monomere, oder (iii) Silan-Monomere mit olefinisch ungesättigten Bindungen.

Die als Ausgangsmaterial für die modifizierten Polyolefine der Muffe verwendeten Polyolefine sollten vorzugsweise die gleichen sein wie die Polyolefine, aus denen die Rohre bestehen (z.B. Polyethylen für Polyethylen-Rohre, Polybuten-1 für Polybuten-1-Rohre).

Die bei der vorliegenden Erfindung verwendete Wicklung kann aus bekannten elektrischen Heizwiderstandsmaterialien bestehen, also z.B. Kupferlegierung, Nickel-Chrom-Stahl, Konstantan (55% - 60% Cu, 40% - 45% Ni), Manganin (87% Cu, 13% Mn) oder anderem geeignetem Material für Widerstandsdrähte.

Ein Oxidfilm an der Oberfläche des Widerstandsdrahts kann durch Entfetten und anschließendes Reduzieren und Waschen entfernt werden. Fettige Bestandteile an der Oberfläche des Wicklungsdrahts werden durch oberflächenaktive Stoffe entfernt. Dann wird ein Flüssigkeitsbad aus einer oberen Lage aus einer unpolaren Lösung und aus einer unteren nicht vermischbaren Lage aus einer nicht-oxidierenden starken Säurelösung bereitgestellt. Ein Metall mit großer Tendenz zur Ionenbildung wird in die starke Säurelösung gebracht, um die Oberfläche des Wicklungsdrahts durch katalytische Reaktion des Wicklungsdrahts mit dem entstehenden Wasserstoff zu reduzieren. Bei dieser Reaktion wird der Oxidfilm entfernt. Dann wird der Wicklungsdraht in die unpolare Lösung hochgezogen, wo die anhaftende starke Säurelösung abgewaschen wird. Hierauf wird der

Wicklungsdraht aus der unpolaren Lösung herausgenommen

Als nicht-oxidierende starke Säurelösung kann z.B. Salzsäure verwendet werden und als unpolare, mit Salzsäure nicht vermischbare Lösung z.B. Benzol und Toluol.

Das Anhaften zwischen dem Kunststoff der Muffe und der Wicklung wird verbessert durch Beschichten des Wicklungsdrahts mit einer Substanz wie beispielsweise einem wie oben beschrieben - modifizierten Polyolefin, das sowohl am Kunststoff der Muffe als auch an der Oberfläche des Wicklungsdrahts gut haftet.

PATENTANSPRUCH:

Elektroschweißmuffe zum Verbinden von Plastikrohren, bestehend aus einem zylindrischen Körper aus Kunststoff, in den eine Wicklung aus elektrischem Heizdraht eingebettet ist, dadurch gekennzeichnet, daß

- (a) der Kunststoff ein adhäsiver Kunststoff ist und/oder
- (b) die Wicklung eine im wesentlichen oxidfreie Oberfläche hat und/oder
- (c) der Wicklungsdraht mit einer Substanz beschichtet ist, die sowohl am Kunststoff als auch an der Oberfläche des Wicklungsdrahts gut haftet.

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DEMANDE
DE BREVET D'INVENTION

No. 79 30075

⑳

⑤④ Raccord électrosoudable

⑤① Classification internationale. (Int. Cl. 3) F16L 47/02

②② Date de dépôt 27 novembre 1979

③③ ③② ③① Priorité revendiquée:

④① Date de la mise à la disposition du public de la demande B.O.P.I. - <Listes> n. 26 du 27-6-1980

⑦① Déposant Société des Tuyaux, résidant en France

⑦② Invention de:

⑦③ Titulaire: Idem ⑦①

⑦④ Mandataire: Cabinet Tartarin 197, boulevard de Tarascon
75017 Paris

La présente invention concerne un raccord électrosoudable utilisable pour la construction de systèmes de tubulures en matière thermoplastique, une liaison soudée étant formée entre les sections des tubulures plastiques à réunir en introduisant les sections à réunir dans le raccord électrosoudable lequel est ensuite chauffé.

Le raccord comprend une douille en matière thermoplastique munie d'une résistance chauffante électrique incorporée qui s'étend sur toute la longueur de la douille. Lorsque les extrémités des tubulures à réunir sont introduites dans la douille par les extrémités opposées, et que la résistance chauffante et donc la douille est ensuite chauffée par passage d'un courant électrique au travers de la résistance chauffante, non seulement le matériau de la douille mais aussi celui des extrémités des tubulures insérées est ramolli et fondu localement de telle sorte qu'une liaison intime est obtenue sous la forme d'une soudure qui, après refroidissement, est étanche aux fluides. Le raccord reste en place formant ainsi un élément permanent de la soudure.

On désire disposer de moyens fiables mais aussi économiques permettant de déterminer si l'intérieur de la douille et les extrémités des tubulures insérées ont été suffisamment chauffés pour permettre une bonne soudure ou s'il est nécessaire de refaire la liaison.

La présente invention propose un raccord électrosoudable comportant des moyens simples et fiables permettant d'indiquer à quel moment sont atteintes les conditions pour former une soudure satisfaisante entre les extrémités des tubulures insérées dans le raccord, ces moyens

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ne nuisant ni à l'efficacité ni à l'intégrité du raccord.

Des formes de réalisation de l'invention sont décrites
ci-après à titre d'exemple avec référence aux figures
5 ci-jointes:

La figure 1 est une coupe longitudinale à travers un
raccord électrosoudable selon l'invention.

La figure 2 est une coupe détaillée d'une partie.

10 La figure 3 est une coupe agrandie d'une partie de la
figure 2.

Un raccord électrosoudable comprend une couche interne 10
d'une matière thermoplastique, une grille tubulaire 17
15 formée de fils électriques chauffants résistants qui
s'étendent sur toute la longueur de la douille 10, et une
couche externe 14 d'une matière thermoplastique entourant
la couche interne 10 et la grille tubulaire de chauffage.
Les extrémités de la grille tubulaire de chauffage sont
20 raccordées autour de broches 16 constituant partie
intégrante de la couche interne; sur ces broches sont
disposées les fiches terminales 18 logées dans les
cavités cylindriques 20 formées dans la couche externe
14. A mi-longueur du manchon et à l'intérieur se trouvent
25 des saillies 22 servant de butées pour les extrémités des
tubulures lors de leur insertion.

Lors de la mise en oeuvre, on introduit les extrémités
des deux tubulures dans la douille par ses extrémités
30 opposées jusqu'à ce qu'elles touchent les saillies 22. On
fait ensuite passer du courant électrique dans la grille
tubulaire pendant un intervalle de temps pré-déterminé
établi en fonction de la résistance du fil et de la
dimension de la douille. Sous l'effet du chauffage, les

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matériaux voisins des couches interne et externe 10,
et finalement le matériau à la périphérie des extrémités
des tubulures est fondu de telle manière que
ces extrémités se soudent au raccord, formant ainsi une
5 liaison étanche.

Un mince diaphragme 30, fig. 3, de matière plastique est
laissé au fond de trous borgnes 24 dans la douille.

10 Pendant le chauffage, la matière thermoplastique de la
couche interne se dilate de telle sorte qu'une pression
significative se développe, ce qui permet une bonne
soudure. Lorsqu'une température appropriée pour réaliser
une bonne soudure est atteinte, cette pression suffit
15 pour rompre les fins diaphragmes 30 et pour obliger la
matière plastique ramollie et en fusion à s'élever dans
les trous borgnes 24 pour saillir sous la forme d'un
bulbe ou d'un dôme comme indiqué en pointillé en 36 sur
la figure 3. (Pour des raisons de clarté, la rupture du
20 diaphragme et la fusion du matériau ne sont pas
représentées sur la figure).

La hauteur des bulbes de matière fondue provenant de la
couche interne et s'élevant dans les cavités sert
25 d'indication de la pression produite, le bulbe étant
détectable visuellement, toutefois d'une manière moins
frappante que si les bulbes étaient d'une couleur
différente de celle du matériau formant la couche
externe.

30 Les trous 24 peuvent se prolonger directement jusqu'à la
couche interne; de cette façon, au lieu d'être fermée à
son extrémité interne par un diaphragme de matériau de la
couche externe, chaque cavité 24 est simplement fermée à

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son extrémité intérieure par la couche interne 10.
lieu de couvrir complètement l'extrémité interne du trou
borgne 24 chaque diaphragme 30 peut encore comporter une
ouverture centrale exposant la couche interne.
5 Alternativement, les trous 24 peuvent être situés aux
ultimes extrémités du manchon et peuvent s'étendre
longitudinalement.

10 **REVENDEICATION:**

Un raccord électrosoudable comprenant une douille (10,
14) d'une matière thermoplastique où est incorporée une
résistance chauffante électrique (17), le raccord ayant
15 un dispositif indicateur visuel réalisé par au moins un
trou borgne (24) pénétrant dans la douille depuis
l'extérieur, le diamètre de ladite cavité et l'espace
entre son extrémité intérieure et la surface interne de
la douille étant choisis de telle sorte que lors de la
20 mise en oeuvre, lorsque les extrémités libres des deux
tubulures thermoplastiques à souder sont ajustées dans la
douille et que la résistance chauffante électrique est
alimentée en courant électrique pour fondre ensemble la
zone de la douille voisine des extrémités des tubulures
25 et les surfaces extérieures de celles-ci, la matière
plastique ramollie et susceptible de s'écouler est forcée
par la pression produite par le chauffage et sa fusion à
s'élever dans ledit trou pour saillir de la surface
extérieure de la douille, si l'énergie fournie était
30 adéquate à effectuer une fusion appropriée.

Fig. 1.

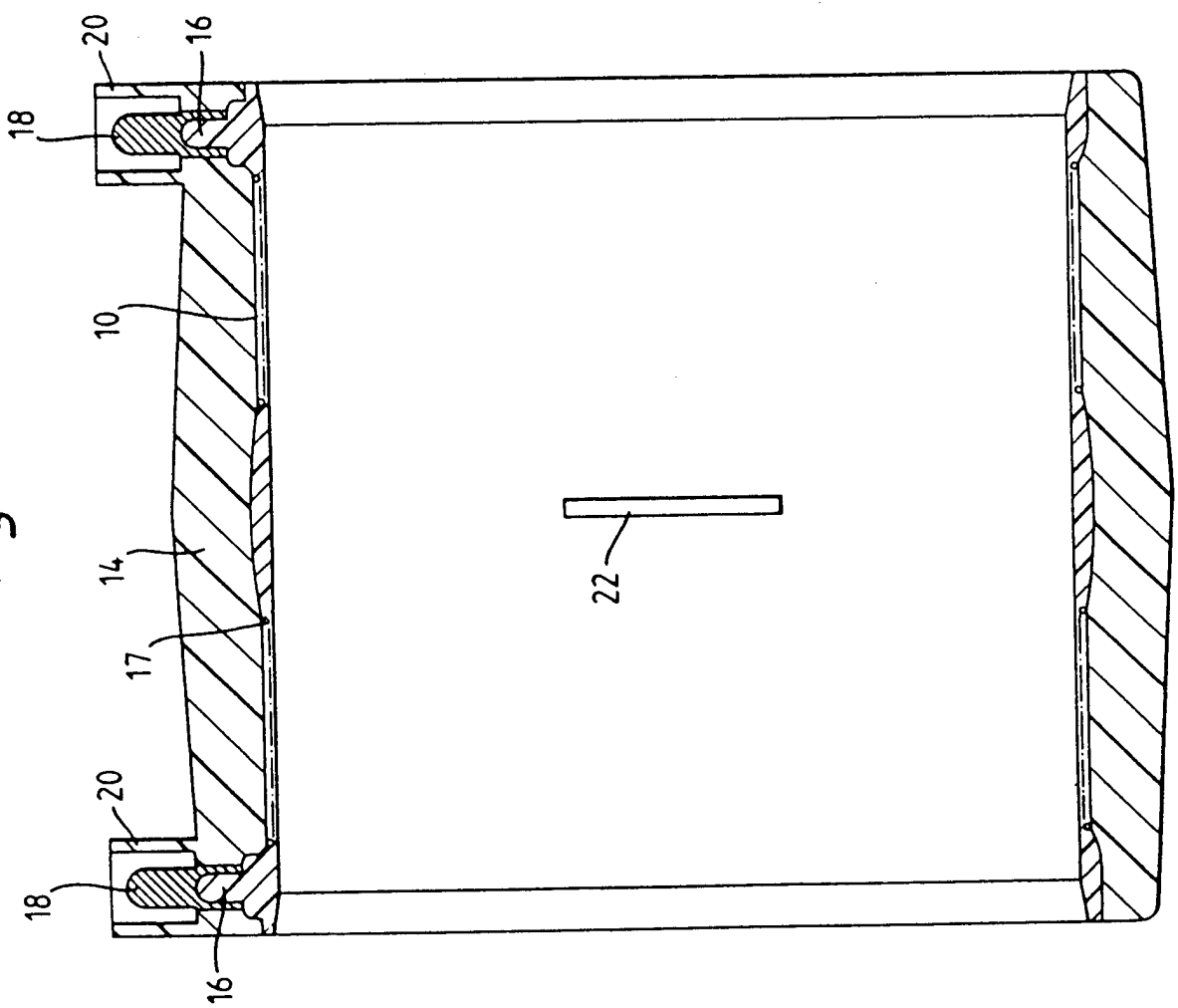


Fig. 2.

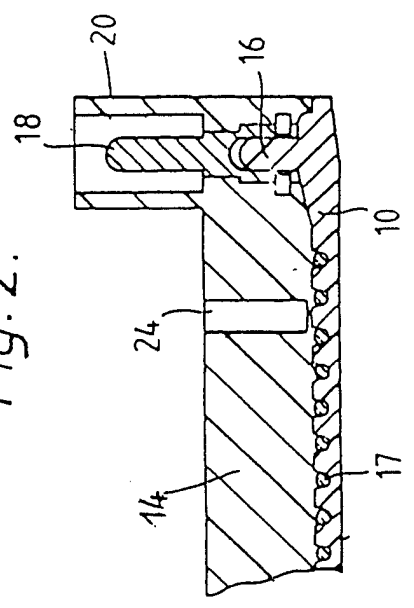
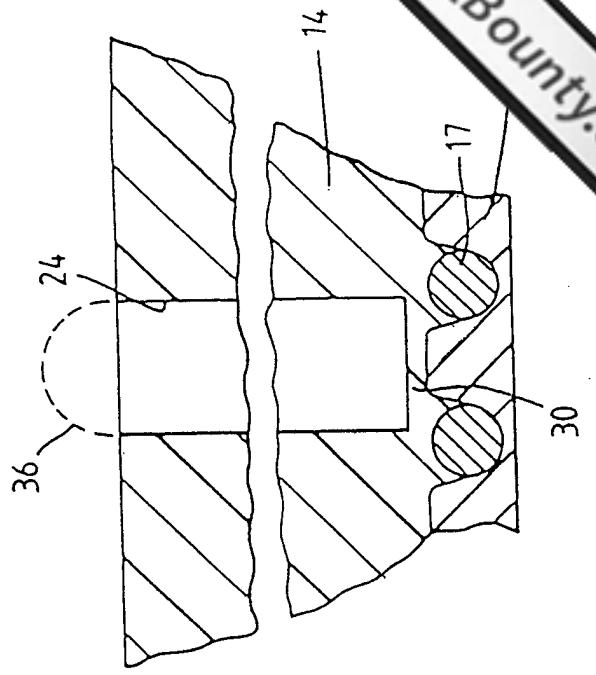


Fig. 3.



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StudentBounty.com

Jeremiah J. Johnson
(Rodmakers) Ltd. Estab. 18
Turnpike Lane
Newcastle-upon-Tyne, England

Dr. W. Hawkings
Managing Director
Construction International Ltd.
Westway,
Stevenage, Herts.
England

10th December 1985

Dear Mr. Hawkings,

We have just received supplies of our latest catalogue from the printer. A copy will be sent to you if requested; meanwhile I enclose page 111 of the catalogue showing the latest developed muffs (Models B and C).

During our annual press conference in May I was pleased to hear from the Representative of your Purchasing Department that Model A has proved entirely satisfactory.

I am certain however that you will find that Model B, with its travelling piston rod indicator, will give you even better results than muffs which rely only on the observation of the expanded molten mass.

Model C is a refinement of the Model B and allows the generated weld pressure to be determined accurately from the calibrations provided on the rod. Unfortunately imminent internal reorganisation in our Quality Control Department will lead to some delay in dispatch of this Model and any order you might place this month would not be ready for delivery until the Spring.

Another reason for the delay is that, during the conference, several of our customers wished to have muffs in different sizes, but with common welding times, and we are not yet quite sure how to achieve this.

I hope you will understand that this is all in the interest of our customers. Should you wish, however, to see the Models B and C in action you would be most welcome to visit our factory.

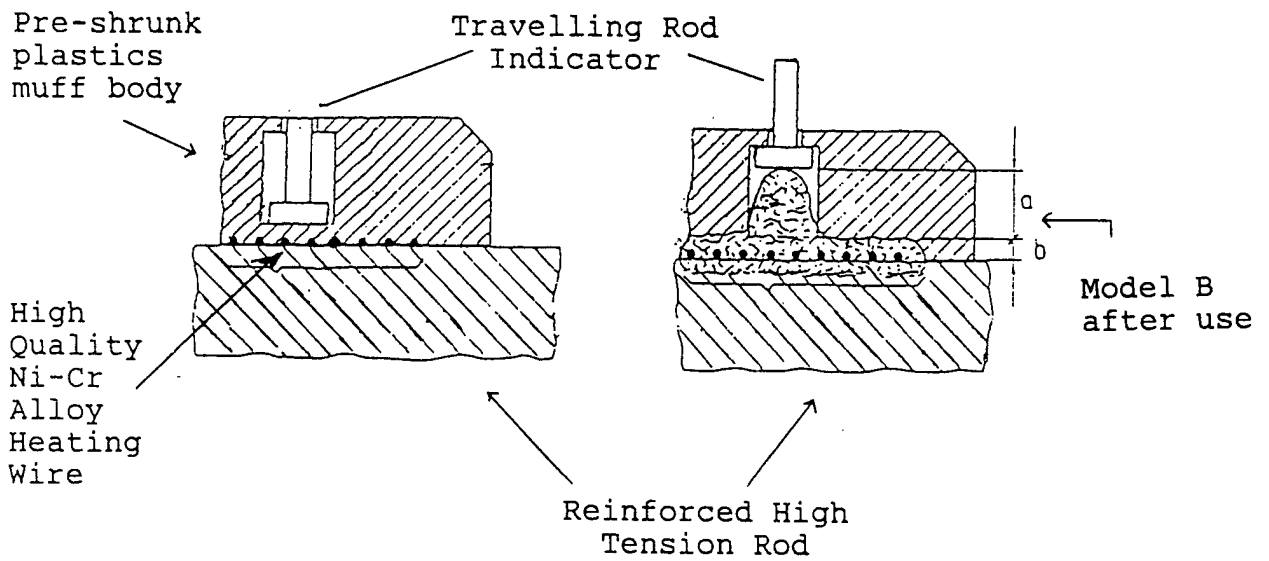
Yours sincerely,

Edward Bear

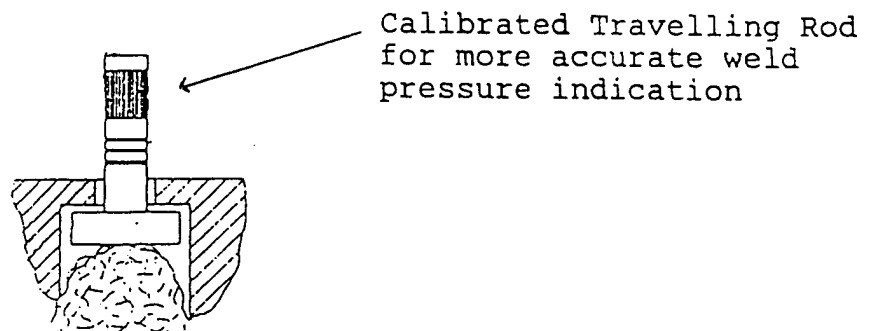
Edward Bear
(Manager, Sales Division)

encl. Page 111 Cat. 14A/507 Jan. 1986

Model B Muff with new Travelling Rod Indicator



Model C (Calibrated)



Übersetzungshilfe / Glossary / Glossaire

VLAGE 1 / ANNEX 1 / ANNEXE 1

Deutsch	English	Français	Italiano	Nederlands	Svenska
hülfe	muff	manchon	manicotto	mof	muff
weiß	to weld	souder	saldare	lassen	svetsa
Windung	winding	spire	spira	winding	lindning
Windung	winding	enroulement	avvolgimento	wikkeling	lindning
schlußstift	contact stud	broche de contact	perno di contatto	kontaktpin	auslutningsstift
Vertiefung	recess	cavité	cavità	holte	fördjupning
Stift	rod	tige	perno	stift	tapp
Erhebung	protusion	protubérance	protuberanza	uitsteeksel	utsprång
Lückenraum	gap	intervalle	intervallo	tussenruimte	mellanrum
Schutzkragen	protective collar	collier protecteur	collare di protezione	beschermdende kraag	skyddskrage
Katalytische Reduktion	catalytic reduction	réduction catalytique	riduzione catalitica	katalytische reductie	katalytisk reduktion
gesättigte	unsaturated	acide carboxylique	acido carbossilico	onverzadigd	omättad
Carboxylsäure	carboxylic acid	insaturé	insaturo	carbonzuur	karboxylsyra
Polyolefin	polyolefin	polyoléfine	poliolefina	polyolefin	polyolefin
eingebettet	embedded	noyé, incorporé	incorporato	ingebed	inbäddad
aktive Heizung	induction heating	chauffage par induction	riscaldamento per induzione	induktieve verwarming	induktiv upphettning
Schlag	stop	butée	arresto	stop	anslag
röhrenförmiger Körper	tubular body	corps tubulaire	corpo turbolare	buisvormig lichaam	rörformig kropp
in der Nähe	in the vicinity	au voisinage	in vicinanza	in de nabijheid, dichtbij	i närheten av
fetten	to degrease	dégraisser	sgrassare	ontvetten	avfetta
Zeigermittel	indication means	moyen indicateur	mezzo indicatore	indicatie middel	indikator
Leistung	heating power	énergie de chauffage	potenza di riscaldamento	verwarmingsvermogen	värmeeffekt
Schichtung, Schicht	coating	revêtement	rivestimento	laag	beläggning
Loch	blind bore	trou borgne	foro cieco	eenzijdig afgesloten holte	bottenhål

VNEX 2

Deutsch	English	Français	Italiano	Nederlands	Svenska
Düse	Düse	buse	ugello	straalpijp	munstycke
Klebstoff	Klebstoff	colle	adesivo, colla	kleefstof	lim
Harz	Harz	résine	resina	hars	plast

ANLAGE 3

Deutsch	English	Français	Italiano	Nederlands	Svenska
Vorformling	preform	préforme	preforma	prevorm	förm
Trommel	drum	rouleau	tamburo	trommel	rulle
Umhüllung	jacket	chemise	camicia	omhulsel	omhölje
Heizdraht	heating wire	fil chauffant	filamento riscaldante	opwarmdraad	värmelåd
Wickelvorrichtung	lathe	enrouleuse	bobinatrice	wikkelinrichting	lindningsanordning

ANLAGE 4

Deutsch	English	Français	Italiano	Nederlands	Svenska
ungesättigte Epoxy-monomere	unsaturated epoxy monomers	monomères non-saturés d'époxy	monomeri epossidici insaturi	onverzadigde epoxy monomeren	omättad epoxymono-merer
olefinisch ungesättigte Bindungen	olefinic unsaturated bonds	liaisons oléfiniques insaturées	legami olefinici insaturi	olefinisch onverzadigde bindingen	olefinisk omättad bindingar
verkleben	to glue together	coller	incollare	vasplakken	sammansätta
Haftung	adhesion	adhésion	adesione	adhesie	vidhäftning
ungesättigte Carboxylsäure	unsaturated carboxylic acid	acide carboxylique insaturé	acido carbossilico insaturo	onverzadigd carbonzuur	omättad karboxylsyra
entfetten	degrease	dégraisser	sgrassare	ontvetten	avfetta
Salzsäure	hydrochloric acid	acide chlorhydrique	acido cloridrico	zoutzuur	saltsyra

ANNEXE 5

Français	Deutsch	English	Italiano	Nederlands	Svenska
fiche	Stift	stud	spinato	stift	stift
saillie	Vorsprung	projecting part	protuberanza	uitsteeksel	utsprång
susceptible de s'écouler	fließfähig	flowable	in grado di colare scorre	vloeibaar	flybar
raccord électro-soudable	Elektroschweiß-Verbindung	electrofusion coupler	raccordo elettrosaldabile	elektrisch lasbare verbinding	el-svetsförbinding
douille	Hülse	sleeve	manicotto	huls	hylsa
insérer	einstecken	to insert	inserire	insteken	insätta
ramollir	erweichen	to soften	rammolliare	weekmaken	uppmjuka
fondre	schmelzen	to melt	fondere	smelten	smälta
fiabile	funktionssicher	reliable	affidabile	betrouwbaar	tillförlitlig
nuire	schaden	to be detrimental to	nuocere	belemmeren	vara skadligför
butee	Anschlag	stop	arresto	stop	stopp
trou borgne	Sackloch	blind bore	foro cieco	eenzijdig afgesloten holte	bottenhål
dilater	ausdehnen	to expand	dilatare	uitzetten	utvidgar
rompre	aufbrechen	to break	rompere	opbreken	bryta

ANNEXE 6

English	Deutsch	Français	Italiano	Nederlands	Svenska
to melt	schmelzen	fondre	fondere	smelten	smälta
refinement	Verbesserung	amélioration	miglioramento	verbetering	förbättring