JS 44 (Rev. 12/07)

CIVIL COVER SHEET

The JS 44 civil cover sheet and the information contained herein neither replace nor supplement the filing and service of pleadings or other papers as required by law, except as provided by local rules of court. This form, approved by the Judicial Conference of the United States in September 1974, is required for the use of the Clerk of Court for the purpose of initiating the civil docket sheet. (SEE INSTRUCTIONS ON THE REVERSE OF THE FORM.)

I. (a) PLAINTIFFS

HERAEUS ELECTRO-NITE CO.
One Summit Square #100
Langhorne, Pennsylvania 19047

(b) County of Residence of First Listed Plaintiff Bucks
(EXCEPT IN U.S. PLAINTIFF CASES)

(c) Attorney's (Firm Name, Address, and Telephone Number)

Jason A. Snyderman and Lewis W. Schlossberg, ESQS.
Blank Rome, One Logan Square, Philadelphia, Pa 19103

DEFENDANTS

VESUVIUS USA CORP.
250 Park West Drive
Pittsburgh, PA 15275

County of Residence of First Listed Defendant Allegheny
(IN U.S. PLAINTIFF CASES ONLY)

NOTE: IN LAND CONDEMNATION CASES, USE THE LOCATION OF THE LAND INVOLVED.

Attorneys (If Known)

II. BASIS OF JURISDICTION (Place an "X" in One Box Only)

- ☐ 1 U.S. Government Plaintiff
- ☒ 3 Federal Question (U.S. Government Not a Party)
- ☐ 2 U.S. Government Defendant
- ☐ 4 Diversity (Indicate Citizenship of Parties in Item III)

III. CITIZENSHIP OF PRINCIPAL PARTIES (Place an "X" in One Box for Plaintiff and One Box for Defendant)
(For Diversity Cases Only)

	PTF	DEF		PTF	DEF
Citizen of This State	☐ 1	☐ 1	Incorporated *or* Principal Place of Business In This State	☐ 4	☐ 4
Citizen of Another State	☐ 2	☐ 2	Incorporated *and* Principal Place of Business In Another State	☐ 5	☐ 5
Citizen or Subject of a Foreign Country	☐ 3	☐ 3	Foreign Nation	☐ 6	☐ 6

IV. NATURE OF SUIT (Place an "X" in One Box Only)

CONTRACT	TORTS		FORFEITURE/PENALTY	BANKRUPTCY	OTHER STATUTES
☐ 110 Insurance	PERSONAL INJURY	PERSONAL INJURY	☐ 610 Agriculture	☐ 422 Appeal 28 USC 158	☐ 400 State Reapportionment
☐ 120 Marine	☐ 310 Airplane	☐ 362 Personal Injury - Med. Malpractice	☐ 620 Other Food & Drug	☐ 423 Withdrawal 28 USC 157	☐ 410 Antitrust
☐ 130 Miller Act	☐ 315 Airplane Product Liability	☐ 365 Personal Injury - Product Liability	☐ 625 Drug Related Seizure of Property 21 USC 881		☐ 430 Banks and Banking
☐ 140 Negotiable Instrument	☐ 320 Assault, Libel & Slander	☐ 368 Asbestos Personal Injury Product Liability	☐ 630 Liquor Laws	PROPERTY RIGHTS	☐ 450 Commerce
☐ 150 Recovery of Overpayment & Enforcement of Judgment	☐ 330 Federal Employers' Liability	PERSONAL PROPERTY	☐ 640 R.R. & Truck	☐ 820 Copyrights	☐ 460 Deportation
☐ 151 Medicare Act	☐ 340 Marine	☐ 370 Other Fraud	☐ 650 Airline Regs.	☒ 830 Patent	☐ 470 Racketeer Influenced and Corrupt Organizations
☐ 152 Recovery of Defaulted Student Loans (Excl. Veterans)	☐ 345 Marine Product Liability	☐ 371 Truth in Lending	☐ 660 Occupational Safety/Health	☐ 840 Trademark	☐ 480 Consumer Credit
☐ 153 Recovery of Overpayment of Veteran's Benefits	☐ 350 Motor Vehicle	☐ 380 Other Personal Property Damage	☐ 690 Other		☐ 490 Cable/Sat TV
☐ 160 Stockholders' Suits	☐ 355 Motor Vehicle Product Liability	☐ 385 Property Damage Product Liability	LABOR	SOCIAL SECURITY	☐ 810 Selective Service
☐ 190 Other Contract	☐ 360 Other Personal Injury		☐ 710 Fair Labor Standards Act	☐ 861 HIA (1395ff)	☐ 850 Securities/Commodities/ Exchange
☐ 195 Contract Product Liability			☐ 720 Labor/Mgmt. Relations	☐ 862 Black Lung (923)	☐ 875 Customer Challenge 12 USC 3410
☐ 196 Franchise			☐ 730 Labor/Mgmt.Reporting & Disclosure Act	☐ 863 DIWC/DIWW (405(g))	☐ 890 Other Statutory Actions
REAL PROPERTY	CIVIL RIGHTS	PRISONER PETITIONS	☐ 740 Railway Labor Act	☐ 864 SSID Title XVI	☐ 891 Agricultural Acts
☐ 210 Land Condemnation	☐ 441 Voting	☐ 510 Motions to Vacate Sentence	☐ 790 Other Labor Litigation	☐ 865 RSI (405(g))	☐ 892 Economic Stabilization Act
☐ 220 Foreclosure	☐ 442 Employment	Habeas Corpus:	☐ 791 Empl. Ret. Inc. Security Act	FEDERAL TAX SUITS	☐ 893 Environmental Matters
☐ 230 Rent Lease & Ejectment	☐ 443 Housing/ Accommodations	☐ 530 General		☐ 870 Taxes (U.S. Plaintiff or Defendant)	☐ 894 Energy Allocation Act
☐ 240 Torts to Land	☐ 444 Welfare	☐ 535 Death Penalty	IMMIGRATION	☐ 871 IRS—Third Party 26 USC 7609	☐ 895 Freedom of Information Act
☐ 245 Tort Product Liability	☐ 445 Amer. w/Disabilities - Employment	☐ 540 Mandamus & Other	☐ 462 Naturalization Application		☐ 900Appeal of Fee Determination Under Equal Access to Justice
☐ 290 All Other Real Property	☐ 446 Amer. w/Disabilities - Other	☐ 550 Civil Rights	☐ 463 Habeas Corpus - Alien Detainee		☐ 950 Constitutionality of State Statutes
	☐ 440 Other Civil Rights	☐ 555 Prison Condition	☐ 465 Other Immigration Actions		

V. ORIGIN (Place an "X" in One Box Only)

☒ 1 Original Proceeding ☐ 2 Removed from State Court ☐ 3 Remanded from Appellate Court ☐ 4 Reinstated or Reopened ☐ 5 Transferred from another district (specify) ☐ 6 Multidistrict Litigation ☐ 7 Appeal to District Judge from Magistrate Judgment

VI. CAUSE OF ACTION

Cite the U.S. Civil Statute under which you are filing (**Do not cite jurisdictional statutes unless diversity**):
35 U.S. C. Section 1

Brief description of cause:
Patent Infringement

VII. REQUESTED IN COMPLAINT:

☐ CHECK IF THIS IS A CLASS ACTION UNDER F.R.C.P. 23

DEMAND $ Unknown

CHECK YES only if demanded in complaint:
JURY DEMAND: ☒ Yes ☐ No

VIII. RELATED CASE(S) IF ANY (See instructions): JUDGE _____ DOCKET NUMBER _____

DATE
05/27/2009

SIGNATURE OF ATTORNEY OF RECORD
L. W. [illegible]

FOR OFFICE USE ONLY

RECEIPT # _____ AMOUNT _____ APPLYING IFP _____ JUDGE _____ MAG. JUDGE _____

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

HERAEUS ELECTRO-NITE CO. One Summit Square, Suite 100 Langhorne, PA 19047	)	
Plaintiff,	)	Civil Action No.
VESUVIUS USA CORP. 250 Park West Drive Pittsburgh, PA 15275	)	**JURY TRIAL DEMANDED**
Defendant.	)	

COMPLAINT

Plaintiff, Heraeus Electro-Nite Co. ("Heraeus") brings this Complaint for patent infringement against Defendant Vesuvius USA Corp. ("Vesuvius"), as outlined below.

THE PARTIES

1. Plaintiff Heraeus Electro-Nite Co. is a Delaware Corporation with its principal place of business at One Summit Square, Suite 100, Langhorne, PA 19047.

2. Upon information and belief, Defendant Vesuvius USA Corp. ("Vesuvius") is an Illinois Corporation with its principal place of business at 250 Park West Drive, Pittsburgh, PA 15275.

JURISDICTION AND VENUE

3. This Court has subject matter jurisdiction over this action pursuant to 28 U.S.C. §§ 1331-1332 and 1338(a).

4. Upon information and belief, this Court has jurisdiction over Vesuvius because Vesuvius makes, imports, distributes, uses, sells, and/or offers to sell the infringing devices

(defined hereinafter) with the knowledge and/or intent that the infringing devices will be offered for sale, sold, or used throughout the United States, including the Commonwealth of Pennsylvania.

5. Venue is proper in this Court pursuant to 28 U.S.C. §§ 1391(b) and (c) and 1400(b) because infringing activities took place within this judicial district and Vesuvius is subject to personal jurisdiction in the Commonwealth of Pennsylvania by maintaining offices and a principal place of business in Pennsylvania.

FACTS

6. Plaintiff is the owner of U.S. Patent No. 5,209,571, issued by the United States Patent and Trademark Office ("USPTO") on May 11, 1993 and entitled "Device for Measuring the Temperature of a Molten Metal" (hereinafter "the '571 Patent"), and U.S. Patent No. 5,388,908, issued by the United States Patent and Trademark Office on February 14, 1995 and entitled "Apparatus for Measuring the Temperature of Molten Metals" (hereinafter "the '908 Patent").

7. The '571 patent is valid and enforceable. The term of the '571 patent is set to expire on July 9, 2012. A true and correct copy of the '571 patent is attached hereto as Exhibit A.

8. The '908 patent is valid and enforceable. The term of the '908 patent is set to expire on July 9, 2012, subject to a terminal disclaimer. A true and correct copy of the '908 patent is attached hereto as Exhibit B.

9. Plaintiff is the assignee of all right, title and interest in and to the '571 and '908 patents and possesses all rights of recovery under the '571 and '908 patents, including the right to sue for infringement and recourse for damages.

10. Defendant is engaged in making, using, offering to sell, selling, and/or importing measurement devices for molten metal control, including, but not limited to, its Accucone™ products, which are the same as or legally equivalent to the inventions claimed in the '571 and '908 patents (hereinafter "the infringing devices"). Upon information and belief, Defendant has made, used, sold, offered for sale, and/or imported these products in the United States, and continues to do so to the present day.

11. Defendant has not obtained, a license under the '571 and/or the '908 patents and is not authorized or permitted to use, manufacture, sell, offer for sale, and/or import the inventions claimed in the '571 and/or '908 patents.

COUNT I
INFRINGEMENT OF THE '571 PATENT

12. Plaintiff realleges and incorporates by reference paragraphs 1 through 11 of this Complaint as though fully set forth herein.

13. The claims of the '571 patent are presumed valid pursuant to 35 U.S.C. § 282.

14. Defendant, in violation of 35 U.S.C. § 271, has been and is currently infringing, contributorily infringing and/or actively inducing others to infringe the '571 patent, either literally or under the doctrine of equivalents, by making, causing to be made, using, offering for sale, selling, and/or importing into the United States, without license or authority, the infringing devices.

15. Defendant has willfully infringed and, upon information and belief, will continue to willfully infringe the '571 patent by the making, use, offer for sale, sale, and/or importation of the infringing devices unless enjoined by this Court from doing so.

16. As a result of Defendant's willful infringement of the '571 patent, Plaintiff has been damaged to an extent not yet determined.

17. Plaintiff is entitled to monetary damages adequate to compensate Plaintiff for the infringement by Defendant, increased damages under 35 U.S.C. § 284, together with interest, costs, and attorneys fees, and is entitled to enjoin Defendant from further infringement of the '571 patent.

COUNT II
INFRINGEMENT OF THE '908 PATENT

18. Plaintiff realleges and incorporates by reference paragraphs 1 through 17 of this Complaint as though fully set forth herein.

19. The claims of the '908 patent are presumed valid pursuant to 35 U.S.C. § 282.

20. Defendant, in violation of 35 U.S.C. § 271, has been and is currently infringing, contributorily infringing and/or actively inducing others to infringe the '908 patent, either literally or under the doctrine of equivalents, by making, causing to be made, using, offering for sale, selling, and/or importing into the United States, without license or authority, the infringing devices.

21. Defendant has willfully infringed and, upon information and belief, will continue to willfully infringe the '908 patent by the making, use, offer for sale, sale, and/or importation of the infringing devices unless enjoined by this Court from doing so.

22. As a result of Defendant's willful infringement of the '908 patent, Plaintiff has been damaged to an extent not yet determined.

23. Plaintiff is entitled to monetary damages adequate to compensate Plaintiff for the infringement by Defendant, increased damages under 35 U.S.C. § 284, together with interest, costs, and attorneys fees, and is entitled to enjoin Defendant from further infringement of the '908 patent.

PRAYER FOR RELIEF

WHEREFORE, Plaintiff respectfully requests all legal and equitable relief as may be recoverable for the foregoing offenses, including:

(a) a judgment that Defendant infringes the '571 and '908 patents;

(b) a permanent injunction enjoining Defendant, and those in active concert or participation with it, from infringing the '571 and '908 patents;

(c) an accounting for damages arising from the infringement of the '571 and '908 patents by the Defendant and those in privity with it;

(d) an award of damages adequate to compensate for the infringement of the '571 and '908 patents, including, but not limited to, reasonable royalties, lost profits, and damages attributable to price erosion, together with prejudgment and post-judgment interest thereon, and costs fixed by the Court, as provided by 35 U.S.C. § 284;

(e) a judgment that the infringement of the '571 and '908 patents was and is willful, and an award to Plaintiff of increased damages in accordance with 35 U.S.C. § 284;

(f) a declaration that this is an exceptional case and that Plaintiff be granted reasonable attorneys' fees in accordance with 35 U.S.C. § 285; and

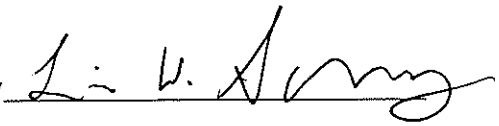
(g) a grant to Plaintiff of any such other relief as the Court may deem just, equitable, or proper.

REQUEST FOR JURY TRIAL

Pursuant to Fed. R. Civ. P. 38, Plaintiff hereby demands a trial by jury on all issues so triable.

Respectfully submitted,

Date: May 27, 2009

By 

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Attorneys for Plaintiff
Hereaus Electro-Nite Co.

Exhibit A

US005209571A

United States Patent [19]

Kendall

[11] Patent Number: 5,209,571

[45] Date of Patent: May 11, 1993

[54] **DEVICE FOR MEASURING THE TEMPERATURE OF A MOLTEN METAL**

[75] Inventor: **Martin Kendall**, Sheffield, England

[73] Assignee: **Heraeus Electro-Nite International N.V.**, Antwerp, Belgium

[21] Appl. No.: **910,964**

[22] Filed: **Jul. 9, 1992**

[51] **Int. Cl.**[5] **G01K 1/12**

[52] **U.S. Cl.** **374/139**; 374/179; 374/208; 136/233

[58] **Field of Search** 374/139, 140, 158, 179, 374/208, 209; 136/230, 232, 233

[56] **References Cited**

U.S. PATENT DOCUMENTS

3,232,794	2/1966	Korton	374/179
3,408,607	10/1968	Davis	136/233
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4,060,095	11/1977	Kurita	136/232
4,721,534	1/1988	Phillippi et al.	374/179
4,724,428	2/1988	Brown, Jr.	374/139
4,871,263	10/1989	Wilson	374/139
4,977,001	12/1990	Greenspan	374/208

FOREIGN PATENT DOCUMENTS

2427992	3/1975	Fed. Rep. of Germany	374/179

Primary Examiner—William A. Cuchlinski, Jr.
Assistant Examiner—G. Bradley Bennett
Attorney, Agent, or Firm—Panitch, Schwarze, Jacobs & Nadel

[57] **ABSTRACT**

The present invention is a device for measuring the temperature of a molten metal. The device includes a thermocouple element, a housing consisting of a heat-resistant material and a retainer member for receiving the thermocouple element. The retainer member has an open end and a closed end. The thermocouple element has a hot junction located proximate the closed end of the retainer member. The retainer member is positioned within the housing and is smaller in size than the housing to define a cavity therebetween. The cavity is substantially filled by a protective material which includes a metal oxide component and an oxygen reducing component.

18 Claims, 2 Drawing Sheets

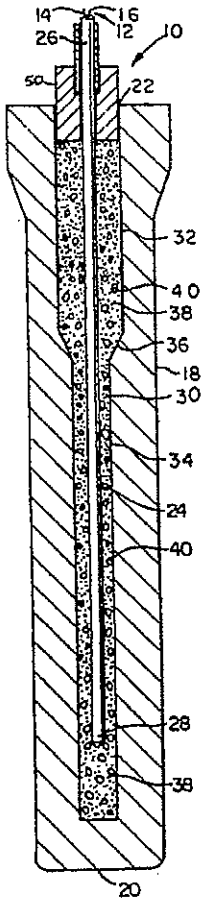

Fig. 1

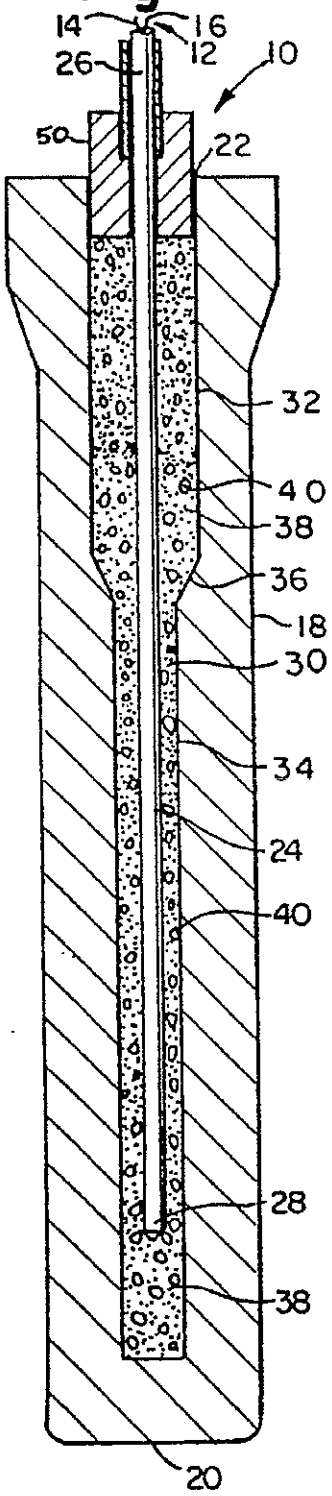

Fig. 2

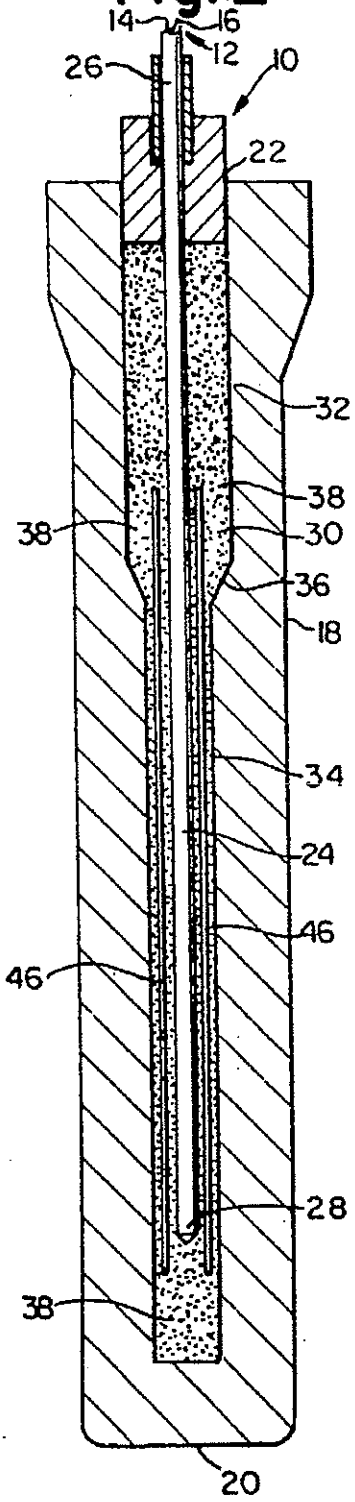

Fig. 3

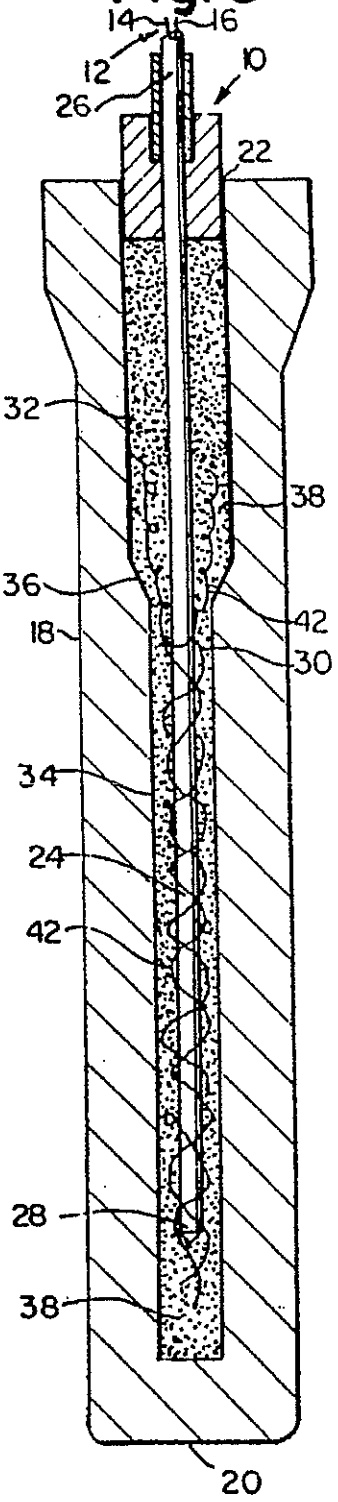

Fig. 4

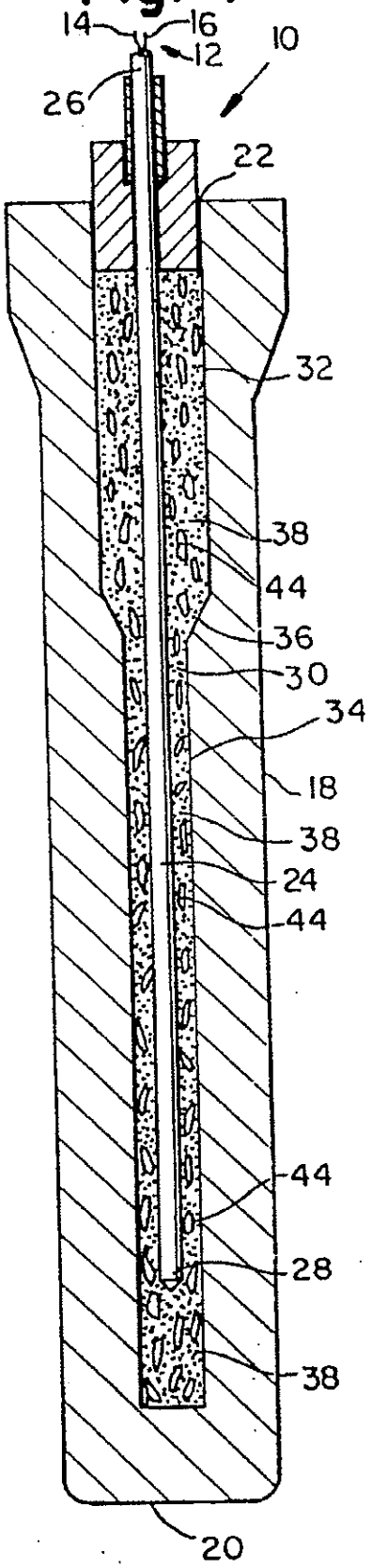
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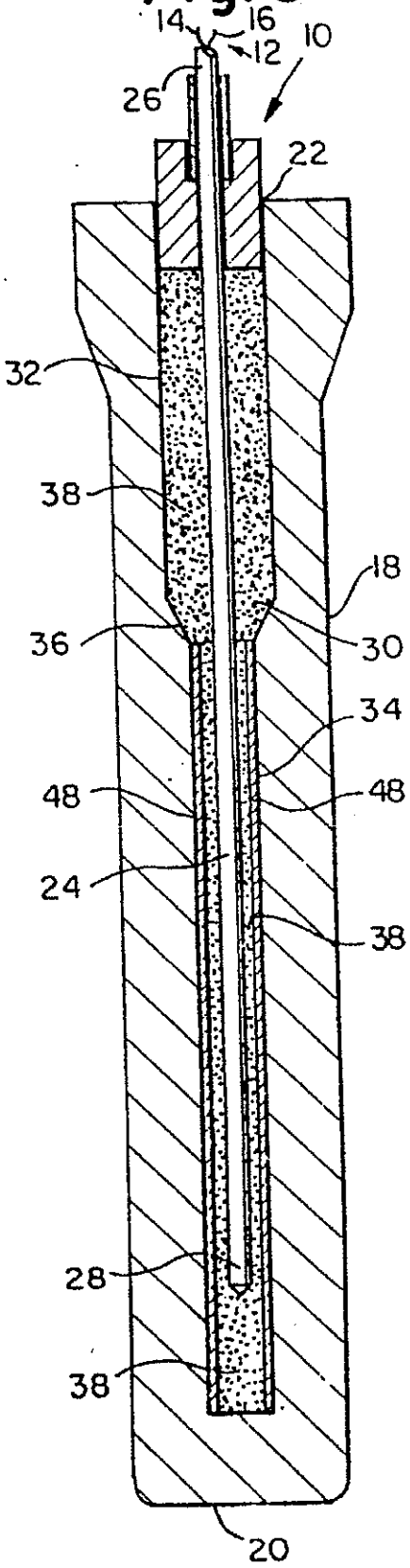
Fig. 5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DEVICE FOR MEASURING THE TEMPERATURE OF A MOLTEN METAL

FIELD OF THE INVENTION

The invention relates to a thermocouple device for measuring the temperature of a molten metal and, more particularly to a thermocouple device in which the thermocouple element is protected against chemical attack.

BACKGROUND OF THE INVENTION

The temperature of molten metal processes may exceed 3000° F. Thermocouple devices for monitoring the temperature of a molten metal must resist deterioration when subjected to high temperatures and a highly reactive molten metal environment while providing accurate temperature measurements for controlling the temperature of the melt.

Typically, a thermocouple consists of a positive element and a negative element joined at each of their respective ends such that a measurable electric current flows in a continuous circuit through the elements depending upon the temperatures of the two junctions at which the elements are joined.

The positive and negative elements may, for example, be formed from wires of different metals. The combination of a positive element of platinum/30% rhodium and a negative element of platinum/6% rhodium is useful for measuring temperatures ranging from about 1600° to about 3100° F. Another typical positive element/negative element thermocouple combination is platinum/13% rhodium and platinum, which is suitable for measuring temperatures ranging up to about 2700° F.

The positive and negative elements are joined at a hot junction, which is subjected to the temperature of the molten metal. The positive and negative elements may be joined by any means that will ensure good electrical contact when in use. Typically, the positive and negative wires are twisted together and welded to form the hot junction.

The metal components of the thermocouple, particularly platinum, are expensive. Therefore, it is desirable to shield the elements from the harsh environment of the molten metal to prolong the useful life of the thermocouple and lessen the frequency at which the thermocouple must be replaced, as well as to ensure the accuracy of temperature measurements. Consequently, in industrial applications, the thermocouple is usually placed within a protective tube.

In the prior art, there is disclosed a closed-end protective tube which encloses a thermocouple element. The thermocouple element may be formed from platinum. The protective tube is disposed in a protective outer sheath consisting generally of a heat-resistant metal oxide and graphite. An annulus or cavity is generally formed between the exterior of the closed-end protective tube and the interior of the protective outer sheath. Unfortunately, silicon monoxide and carbon monoxide may be formed in the cavity of such a device when the device is subjected to the high temperatures of the metal melt. These highly corrosive and reactive gases may penetrate the material of the closed-end protective tube. Carbon monoxide may increase the porosity and damage or destroy the protective tube. A damaged tube permits silicon monoxide to react with and damage or destroy the thermocouple element. The temperature measurements derived from the damaged thermocouple element may be faulty or nonexistant.

Also disclosed in the prior art is a thermocouple element encased in a closed-end ceramic coated impermeable molybdenum tube. The tube is embedded in a protective sheath consisting of a plurality of ceramic layers, the concentration of molybdenum decreasing in each successive outer layer. The layers compensate for temperature gradients along the length of the molybdenum tube. The ceramic coated tube is embedded in a protective sheath by a ceramic mass. In addition to being extremely expensive and difficult to produce, this device is susceptible to mechanical damage during routine handling.

The present invention comprises a thermocouple device which provides protection against chemical attack by the harsh molten metal environment. The device also prevents formation of reactive gases, such as silicon monoxide or carbon monoxide within the device, which are capable of damaging or destroying the thermocouple element. By increasing the life expectancy of the thermocouple element, the present temperature sensing device provides more accurate temperature measurements which enable the melt to be more closely controlled. By increasing the lifetime of the thermocouple element, the device may be replaced less often and the associated costs of replacement, such as disassembling and reassembling process equipment, may be ameliorated.

SUMMARY OF THE INVENTION

According to the present invention, the above and other deficiencies of the prior art are alleviated or eliminated by the present device for measuring the temperature of a molten metal. The device comprises a thermocouple element, a housing comprised of a heat-resistant material and a retainer member for receiving the thermocouple element. The retainer member has an open end and closed end. The thermocouple element has a hot junction located proximate the closed end of the retainer member. The retainer member is positioned within the housing and is smaller in size than the housing to define a cavity therebetween. The cavity is substantially filled by a protective material comprising a metal oxide component and an oxygen reducing component.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing summary, as well as the following detailed description of preferred embodiments of the invention, will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there is shown in the drawings embodiments which are presently preferred, it being understood, however, that the invention is not limited to the specific arrangements and instrumentalities disclosed. In the drawings:

FIG. 1 is a schematic of a side elevational view of a thermocouple device in accordance with the present invention, in which the oxygen reducing component is a powder;

FIG. 2 is a schematic of a side elevational view of an alternative embodiment of the thermocouple device of the present invention, in which the oxygen reducing component consists of a plurality of rods;

FIG. 3 is a schematic of a side elevational view of an alternative embodiment of the thermocouple device of

the present invention, in which the oxygen reducing component consists of wires;

FIG. 4 is a schematic of a side elevational view of an alternative embodiment of the thermocouple device of the present invention, in which the oxygen reducing component consists of pellets; and

FIG. 5 is a schematic of a side elevational view of the thermocouple device of the present invention, in which the oxygen reducing component is a tubular sleeve.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring to the drawings, wherein like numerals indicate like elements throughout, there is shown in FIGS. 1–5 several preferred embodiments of a thermocouple device, generally designated **10**, for measuring the temperature of a molten metal in accordance with the present invention.

The device **10** may be used for measuring the temperature of a variety of molten metals, such as steel, etc. The present thermocouple device **10** may be used to measure molten metal temperatures ranging from about 2500° F. to about 2950° F., and generally up to about 3300° F. The temperature range which the device **10** is capable of measuring is a function of the component materials of the device **10**, among other factors.

As best shown in FIG. **1**, the device **10** includes a thermocouple element, a portion of which is indicated generally at **12**. Typically, the thermocouple element **12** consists of a positive element and a negative element (not shown). For purposes of the present discussion, in FIGS. **1–5** the positive element is shown as a positive wire **14** and the negative element is shown as a negative wire **16**.

The positive wire **14** and negative wire **16** are typically formed from two different metals, such as platinum, a mixture of platinum and rhodium, chromel, constantan, iron, alumel and copper, for example. The thermocouple element **12** may be enclosed in a twin tube (not shown) to separate substantially the entire length of the positive wire **14** from the negative wire **16**. The twin tube may be formed from alumina, as is well known to those of ordinary skill in the art.

The positive wire **14** and negative wire **16** of the thermocouple element **12** are connected at a hot junction (not shown), which is subjected to the elevated temperature of the metal melt. Generally, the hot junction of the thermocouple element **12** may be formed by twisting, welding, or clamping the positive wire **14** and the negative wire **16**. One of ordinary skill in the art would understand that the hot junction may be joined by any means that would ensure good electrical continuity when in use.

For purposes of clarity, the twin tube and portions of the positive wire **14** and negative wire **16**, including the hot junction, which are positioned within a retainer member **24** of the device **10** are not shown in the drawings. These components of the thermocouple element **12** are well known to those of ordinary skill in the art and further discussion thereof is not believed to be necessary. The retainer member **24** and other components of the device **10** will be discussed in detail below.

The thermocouple device **10** also includes a housing **18** comprised of a heat-resistant material. Preferably, the heat-resistant material comprises graphite and a metal oxide, such as aluminum oxide, magnesium oxide, silicon oxide, zirconium oxide and mixtures thereof.

The housing **18** is generally cylindrically-shaped and has a closed end **20** located proximate the hot junction of the thermocouple element **12** and an open end **22** spaced away from the hot junction. Preferably, the housing **18** is generally cylindrically-shaped to ensure uniform heat transfer across the wall of the housing **18** and to minimize temperature gradients along the length of the housing **1B**, although the housing **18** may be formed in a variety of shapes. The housing **18** may be formed by any method well known to those of ordinary skill in the art, such as casting, molding, pressing, extruding, etc.

The thermocouple device **10** also includes a retainer member **24** for receiving the thermocouple element **12**. The retainer member **24** may be formed from a ceramic material, preferably aluminum oxide.

Referring to FIG. **1**, the retainer member **24** is preferably generally tubular to ensure a uniform temperature gradient along the length of the retainer member **24**, although the shape of the retainer member **24** may be varied as desired in keeping with the spirit and scope of the present invention. The retainer member **24** has an open end **26** and a closed end **28**. The closed end **28** of the retainer member **24** is located proximate the closed end **20** of the housing **18**. The hot junction of the thermocouple element **12** is located proximate the closed end **28** of the retainer member **24**.

The retainer member **24** is positioned within the housing and is smaller in size or diameter than the housing **18** to define a generally annular cavity **30** therebetween. The cavity **30** has an upper portion **32** having a diameter generally greater than the diameter of a lower portion **34** of the cavity **30**. The upper and lower portions **32**, **34** are connected by a sloping transitional area **36**, as shown in FIG. **1**. One of ordinary skill in the art would understand that the upper and lower portions **32**, **34** of the cavity **30** may have equal diameters or the lower portion **34** may have a diameter which exceeds the diameter of the upper portion **32**, as desired.

The diameter of the cavity **30** is generally larger than the outside diameter of the retainer member **24**, and preferably about 8–15 mm. The cavity **30** extends from the closed end **20** of the housing to the open end **22** of the housing **18** opposite the closed end **20**. The closed end **20** of the housing **18** is the end of the thermocouple device **10** which is immersed in the molten metal for temperature measurement.

The cavity **30** is substantially and preferably completely filled by a protective material and sealed with a plug **50** of a material such as cement. The protective material includes a metal oxide component and an oxygen reducing component. The metal oxide component may be selected from the group consisting of aluminum oxide, magnesium oxide, manganese oxide, titanium oxide, vanadium oxide, zirconium oxide and mixtures thereof. Preferred metal oxide components include aluminum oxide, which is relatively inexpensive, magnesium oxide and zirconium oxide.

As shown in FIGS. **1–5**, the metal oxide component is preferably in the form of a powder **38**, although one of ordinary skill in the art would understand that the metal oxide component may have any shape or form, such as a tube which substantially surrounds the thermocouple element **12**. In the present embodiment, it is preferred that the metal oxide component be in the form of a powder having an average particle size or diameter less than about 250 μm, however the metal oxide powder

may consist of a variety of different sized particles, as desired.

The oxygen reducing component of the protective material prevents the formation of corrosive and reactive gases such as silicon monoxide and carbon monoxide which may damage or destroy the retainer member **24** and thermocouple element **12**. The oxygen reducing component reacts with oxygen to suppress the formation of any oxide gases, such as silicon monoxide and carbon monoxide, and thereby prevent damage to the retainer member **24** or thermocouple element **12**.

Preferably, the oxygen reducing component is generally evenly distributed throughout the cavity **30** at least proximate the closed end **28** of the retainer member **24**. The metal oxide component promotes even distribution of the oxygen reducing component throughout the cavity **30**.

The oxygen reducing component may be selected from the group consisting of aluminum, magnesium, manganese, titantium, vanadium, zirconium and mixtures thereof. Preferably, the oxygen reducing component is aluminum.

The oxygen reducing component of the protective material may take a variety of physical configurations, or combinations of different configurations. For example, the oxygen reducing component may be selected from the group consisting of powder **40**, granules, and mixtures thereof. As best shown in FIG. **1**, the oxygen reducing powder **34** and metal oxide powder **40** may be intermixed to substantially fill the cavity **30** and form a protective barrier between the housing **18** and the retainer member **24** to prevent damage or destruction of the retainer member **24** and thermocouple element **12**.

Generally, it is desirable to avoid direct contact of the oxygen reducing component and both the retainer member **24** and housing **18** to prevent formation of a heat bridge which could expose the retainer member **24** to uneven thermomechanical stress. By intermixing the metal oxide powder **38** with the oxygen reducing component and by using only oxygen reducing components (powder **38**, granules, etc.) which are substantially smaller than the dimension of the cavity **30**, the heat bridge effect may be minimized or avoided.

In an alternative embodiment best shown in FIGS. **3** and **4**, the oxygen reducing component may be embedded in the metal oxide of the protective material. The oxygen reducing component may comprise one or more generally continuous wires **42** (only two shown for clarity), which may encircle or partially encircle the retainer member **24** best shown in FIG. **3**, or a plurality or dispersed pellets **44** or grains, best shown in FIG. **4**.

As best shown in FIG. **2**, the oxygen reducing component may additionally or alternatively be selected from the group consisting of one or more rods **46** (only two being shown for clarity), ribbons, wire wrap, and mixtures thereof. The rods **46** which extend along a substantial portion of the length of the retainer member **24**, particularly proximate the closed end **28**, may be embedded in the metal oxide powder of the protective material at spaced locations around the circumference of the retainer member **24**.

As best shown in FIG. **2**, the rods **46** are preferably generally parallel to the longitudinal axis (not shown) of the retainer member **24**. One of ordinary skill in the art would understand that the rods **46** may be positioned, for example, at an angle to the longitudinal axis so long as contact of the rods **46** with the retainer member **24** and housing **18** is inhibited to prevent formation of a heat bridge between the retainer member **24** and housing **18** and to provide a substantially uniform thermal gradient along the length of the device **10**.

As best shown in FIG. **5**, in another alternative embodiment, the oxygen reducing component may be a generally tubular sleeve **48** which at least partially encompasses the metal oxide component or powder **38** of the protective material. The tube or sleeve **48** may have perforated cylinder walls (not shown). In the present embodiment, it is also contemplated that the metal oxide of the protective material may be formed in the shape of a tube (not shown). With reference to FIG. **5**, a metal oxide tube may be positioned within the sleeve **48** of the oxygen reducing component, for example. Alternatively, the tube of metal oxide may be positioned to substantially surround the sleeve **48** of the oxygen reducing component (not shown). One of ordinary skill in the art would also understand that a plurality of metal oxide and oxygen reducing sleeves may be used in accordance with the present invention. For example, an outer sleeve **48** of an oxygen reducing component may surround alternating inner tubes of metal oxide and sleeves of the same or other oxygen reducing components (not shown).

The form of the oxygen reducing component is not restricted to the groups specifically discussed above, such as powders, granules, wires, pellets, tubes, discs, etc.

The oxygen reducing component may comprise about 5% to about 95% by volume of the protective material. Preferably, the oxygen reducing component comprises about 15% to about 75% by volume of the protective material. More preferably, the oxygen reducing component comprises about 25% to about 65%, and most preferably about 40% to about 50% by volume of the protective material.

To assemble the device **10**, the thermocouple element **12** may be inserted into the retainer member **24** prior to or after insertion of the retainer member **24** into the cavity **30** of the housing **18**. The cavity **30** may be substantially filled with the protective material prior to or subsequent to insertion of the retainer member **24** into the cavity **30**. The metal oxide and oxygen reducing components of the protective material may be intermixed by any means well known to one of ordinary skill in the art prior to, during, or after insertion into the cavity **30**. For example, if the metal oxide and oxygen reducing components of the protective material are both in powdered, granulated or pelletized form, the components may be intermixed by a conventional mixer, such as a commercial food mixer available from Crypto Peerless Ltd. of Birmingham, England, for example.

When the oxygen reducing material is in the form of rods **46**, as shown in FIG. **2**, the metal oxide powder **38** and retainer member **24** may, for example, be positioned in the cavity **30** prior to insertion of the rods **46** so that the rods **46** may be aligned substantially parallel to the retainer member **24** in a longitudinal direction. To assemble the embodiment shown in FIG. **3**, the wires **42** may be wound around the retainer member **24** prior to inserting the retainer member **24** into the cavity **30** and the subsequent addition of the metal oxide component. Alternatively, when the oxygen reducing material is in the form of a sleeve **48**, shown in FIG. **5**, the sleeve **48** may be inserted into the cavity **30** prior to or after insertion of the metal oxide component and retainer member **24**, for example.

As best shown in FIG. 1, after inserting the retainer member 24 and protective material into the cavity 30, the cavity 30 may be substantially sealed by a plug 50 which surrounds the open end 26 of the retainer member 24 and fills part of the upper portion 32 of the cavity 30. The plug 50 is preferably formed from a material such as cement. The open end 26 of the retainer member 24 may be inserted into the plug 50 prior to insertion of the retainer member 24 and plug 50 into the cavity 30. One of ordinary skill in the art would understand that the methods of assembling the device 10 set forth above are examples of the various methods of assembly and are not intended to be limiting.

From the foregoing description, it can be seen that the present invention comprises a device for measuring the temperature of a molten metal. It will be appreciated by those skilled in the art that changes could be made to the embodiments described above without departing from the broad invention concepts thereof. It is understood, therefore, that this invention is not limited to the particular embodiments disclosed, but it is intended to cover all modification which are within the spirit and scope of the invention as defined by the appended claims.

I claim:

1. A device for measuring the temperature of a molten metal, said device comprising a thermocouple element, a housing comprised of a heat-resistant material, and a retainer member for receiving the thermocouple element, said retainer member having an open end and a closed end, said thermocouple element having a hot junction located proximate said closed end of said retainer member, said retainer member being positioned within said housing and being smaller in size than said housing to define a cavity therebetween, said cavity being substantially filled by a protective material comprising a metal oxide component and an oxygen reducing component.

2. A device according to claim 1, wherein said heat-resistant material comprises a metal oxide and graphite.

3. A device according to claim 2, wherein said metal oxide of said heat-resistant material is aluminum oxide.

4. A device according to claim 1, wherein said retainer member is ceramic.

5. A device according to claim 1, wherein said retainer member is generally tubular.

6. A device according to claim 1, wherein said metal oxide component of said protective material is selected from the group consisting of aluminum oxide, magnesium oxide, manganese oxide, titanium oxide, vanadium oxide, zirconium oxide, and mixtures thereof.

7. A device according to claim 1, wherein said metal oxide component of said protective material is aluminum oxide.

8. A device according to claim 1, wherein said metal oxide component of said protective material is a powder.

9. A device according to claim 1, wherein said oxygen reducing component is selected from the group consisting of aluminum, magnesium, manganese, titanium, vanadium, zirconium, and mixtures thereof.

10. A device according to claim 1, wherein said oxygen reducing component is aluminum.

11. A device according to claim 10, wherein said aluminum comprises about 15% to about 70% by volume of said protective material.

12. A device according to claim 10, wherein said aluminum comprises about 25% to about 65% by volume of said protective material.

13. A device according to claim 1, wherein said oxygen reducing component comprises about 5% to about 95% by volume of said protective material.

14. A device according to claim 1, wherein said oxygen reducing component is selected from the group consisting of powder, granules, and mixtures thereof.

15. A device according to claim 1, wherein said oxygen reducing component is embedded in said metal oxide component of said protective material, said oxygen reducing component being selected from the group consisting of wires, pellets, grains, and mixtures thereof.

16. A device according to claim 1, wherein said oxygen reducing component is selected from the group consisting of rods, ribbons, wire wrap, and mixtures thereof.

17. A device according to claim 16, wherein said oxygen reducing component comprises a plurality of rods, said rods being generally parallel to a longitudinal axis of said retainer member.

18. A device according to claim 1, wherein said oxygen reducing component is a sleeve which at least partially encompasses said metal oxide component of said protective material.

* * * * *

Exhibit B

US005388908A

United States Patent [19]

Kendall

[11] Patent Number: 5,388,908

[45] Date of Patent: * Feb. 14, 1995

[54] **APPARATUS FOR MEASURING THE TEMPERATURE OF MOLTEN METALS**

[75] Inventor: **Martin Kendall**, Sheffield, England

[73] Assignee: **Heraeus Electro-Nite International N.V.**, Houthalen, Belgium

[*] Notice: The portion of the term of this patent subsequent to May 11, 2010 has been disclaimed.

[21] Appl. No.: **26,724**

[22] Filed: **Mar. 5, 1993**

[30] **Foreign Application Priority Data**

Mar. 6, 1992 [DE] Germany 4207317

[51] **Int. Cl.**[6] **G01K 1/12; G01K 1/10**

[52] **U.S. Cl.** **374/140**; 136/234

[58] **Field of Search** 374/140, 139; 136/234, 136/230, 232, 233; 266/88

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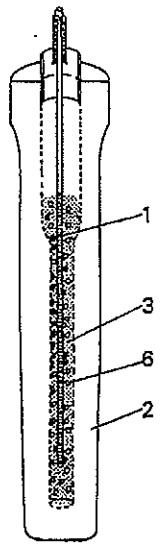
Primary Examiner—Diego F. F. Gutierrez

Attorney, Agent, or Firm—Panitch, Schwarze, Jacobs & Nadel

[57] **ABSTRACT**

Apparatus for measuring temperatures in molten metals are known with a thermocouple arranged in a closed-end ceramic tube, wherein the junction of the thermocouple is located near the closed end of the tube, and with an outer protective casing which surrounds the closed-end tube and forms an annulus between the closed-end tube and the inner surface of the protective casing, the protective casing being substantially refractory metal oxide and graphite. To create a temperature measuring apparatus in which the thermocouple is protected by simple means from chemical destruction and thereby increases the life expectancy of the thermocouple, the annulus is substantially filled with a metal oxide powder and an oxygen-reducing means, the proportion of the oxygen-reducing means being approximately 5% by volume to approximately 95% by volume.

13 Claims, 2 Drawing Sheets



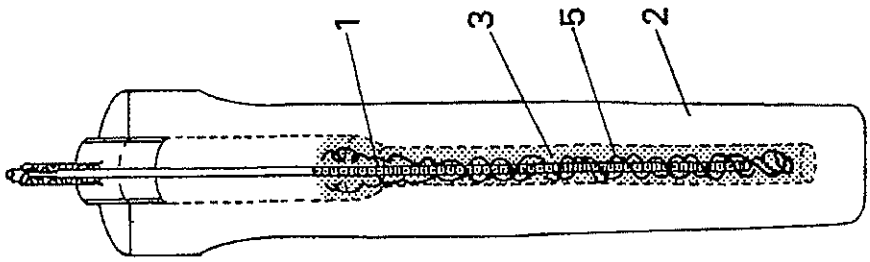


Fig. 3

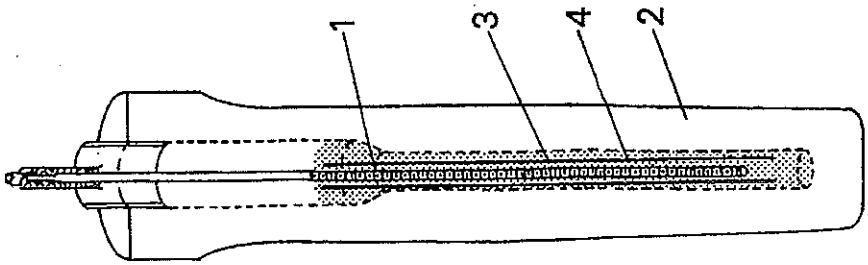


Fig. 2

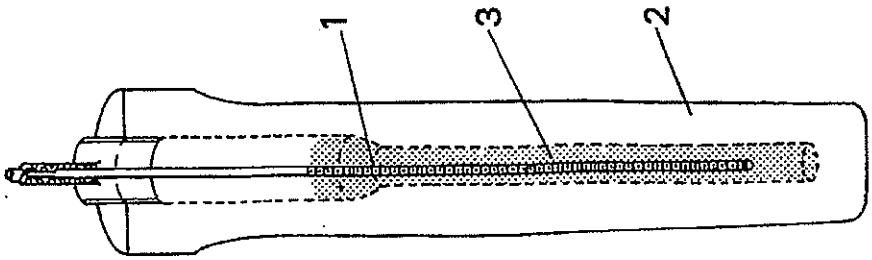


Fig. 1

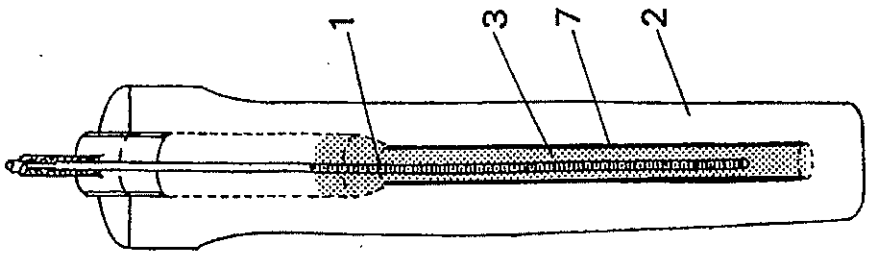


Fig. 5

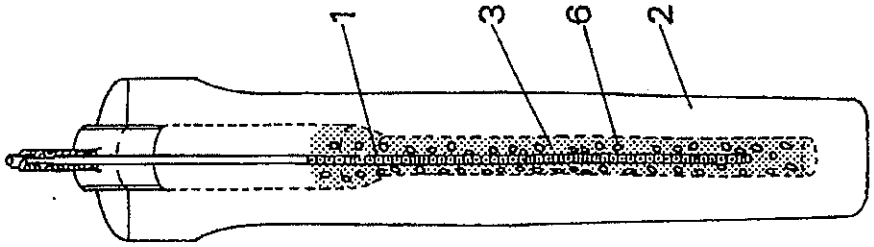


Fig. 4

APPARATUS FOR MEASURING THE TEMPERATURE OF MOLTEN METALS

FIELD OF THE INVENTION

The invention relates to an apparatus for measuring temperatures in molten metals with a thermocouple, which is arranged in a closed-end ceramic tube, wherein the junction of the thermocouple is located near the closed end of the tube, and with an outer protective structure which surrounds the closed-end tube while forming an annulus between the closed-end tube and the inner surface of the protective structure, the protective structure comprising substantially refractory metal oxide and graphite.

BACKGROUND OF THE INVENTION

Such apparatus are known, for example, from the German utility model GM 74 19 633. Described therein is a closed-end tube which encloses a thermocouple, in a protective structure of refractory metal oxide and graphite. Between the closed-end tube and the protective structure a ring slot is formed. The thermocouple, which is arranged in the closed-end tube, is made of expensive materials such as platinum, for use with the high temperatures existing in molten metal. Especially with continuous temperature measurements, which are necessary for constant control of the molten metal, the thermocouple is not fully protected inside the described apparatus, especially since reactive or corrosive gases enter through the structure which surround the thermocouple and can thereby destroy the structures and the thermocouple. Therefore multiple replacements of the thermocouple can become necessary. Under the influence of the high temperatures in the molten metals, silicon monoxide and carbon monoxide, for example, are formed within the protective structure of the apparatus, and these permeate the tube of aluminum oxide which surrounds the thermocouple. Hence, the carbon monoxide increases the porosity of this tube, whereby the tube is slowly destroyed. The silicon monoxide reacts with the thermocouple wire, so that this is destroyed and the temperature reading is faulty or can no longer be determined.

An additional apparatus of similar means is known from GB-B 2 193 375. This apparatus has a thermocouple with a closed end which is enclosed by an impermeable molybdenum tube coated with ceramic. This molybdenum tube is very expensive and is complicated to manufacture. In order to avoid destruction through thermomechanical stresses, the molybdenum tube is encased with several ceramic layers, which have an outwardly decreasing amount of molybdenum. These layers serve, among other things, to compensate for the temperature gradient along the molybdenum tube. These ceramic layers and the molybdenum tube can indeed also be destroyed by reactive gases, such as carbon monoxide or silicon monoxide.

SUMMARY OF THE INVENTION

The object of the present invention lies in the construction of a temperature measuring apparatus, wherein the thermocouple is protected by simple means from a chemical destruction and thereby the life expectancy of the thermocouple is increased.

The object is achieved by the invention, starting from the above-characterized apparatus, with the annulus being substantially filled with a metal oxide powder and an oxygen-reducing means, wherein the proportion of the oxygen-reducing means is approximately 5% by volume to approximately 95% by volume. This oxygen-reducing means prevents corrosive or reactive gases, such as silicon monoxide or carbon monoxide, from reaching the closed-end tube which surrounds the thermocouple, and from destroying this tube as well as the thermocouple itself. Silicon and carbon are formed upon oxidation of the reducing means, and these do not attack the thermocouple nor the surrounding tube.

Suitably, the oxygen-reducing means is in the form of a powder and mixed with the metal oxide powder. This allows a uniform distribution of the oxygen-reducing means in the annulus and ensures high effectiveness of the agent.

It is also possible to provide the oxygen-reducing means in the form of rods which are particularly arranged parallel to the closed-end tube. Also possible are embodiments of the oxygen-reducing means in the form of wires, pellets and/or granules, which are embedded in the metal oxide. Another possibility for placing the oxygen-reducing means in the annulus is to form this agent as a tube around the metal oxide powder. The tube can have closed or perforated cylinder walls. The tube-shaped arrangement of a powder is also possible. Also a combination of various forms of the oxygen-reducing means is possible.

Generally, the form of the reducing means is not restricted to the stated forms. Indeed, the reducing means should be distributed over the entire annulus to maximize effectiveness. It should only be avoided that the reducing means connects directly with the closed-end tube and the protective casing, since such a connection can lead to thermal bridges, which can subject the closed-end tube to an uneven thermomechanical load. A corresponding isolation from the metal oxide powder occurs.

The metal oxide powder which is located in the annulus may suitably comprise an oxide or a mixture of various oxides of the group aluminum oxide, magnesium oxide, zirconium oxide and titanium oxide. The use of aluminum oxide has proved especially suitable, since this is also very inexpensive.

Advantageously, the oxygen-reducing means comprises of at least one of the metals aluminum, magnesium, zirconium and titanium. Especially suitable is the use of aluminum due to its reduction potential. This material is also particularly inexpensive.

Suitably, the aluminum content, taken at the time of the filling of the annulus, should be approximately 15% by volume to 70% by volume, and preferably approximately 25% by volume to 65% by volume.

BRIEF DESCRIPTION OF THE DRAWINGS

The foregoing summary of the invention, as well as the following detailed description of preferred embodiments, will be better understood when read in conjunction with the appended drawings. For the purpose of illustrating the invention, there are shown in the drawings embodiments which are presently preferred, it being understood, however, that the invention is not limited to the specific arrangements and instrumentalities disclosed.

FIG. 1 is a schematic representation of the apparatus with oxygen-reducing powder;

FIG. 2 is a schematic representation of the apparatus with rod-shaped oxygen-reducing means;

FIG. 3 is a schematic representation of the apparatus with wire-shaped oxygen-reducing means;

FIG. 4 is a schematic representation of the apparatus wherein the oxygen-reducing means has the shape of pellets or granules; and

FIG. 5 is a schematic representation of the apparatus with tube-shaped arrangement of the oxygen-reducing means.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

The apparatus shown in FIG. 1 for measuring temperatures in molten metals has a thermocouple, which is arranged in the usual manner in a ceramic twin tube (not shown). This is surrounded by a closed-end aluminum oxide tube 1. The junction of the thermocouple is near the closed end of the aluminum oxide tube 1.

The closed-end aluminum oxide tube 1 is placed in a protective casing 2 made of refractory metal oxide, such as aluminum oxide and graphite. This protective casing 2 has for the insertion of the closed-end aluminum oxide tube 1 a hollow cavity longitudinal to the protective casing 2, which opens at the end of the protective casing 2 opposite from the closed immersion end. Through this so-formed opening the aluminum oxide tube 1 with the thermocouple is inserted into the protective casing 2. The diameter of the hollow cavity is approximately 8–15 mm larger than the diameter of the aluminum oxide tube 1. The thus-created annulus 3 is filled with a mixture of aluminum oxide powder and aluminum powder, wherein the proportion of the aluminum powder at the time of filling is approximately 40% to 50% by volume.

The apparatus shown in FIG. 2 is distinguished from that in FIG. 1 in that the reducing means is not in powder form but in the form of aluminum rods 4, which are arranged approximately parallel to the aluminum oxide tube 1, which encases the thermocouple. These aluminum rods 4 are embedded in the aluminum oxide powder. It is also possible to arrange the aluminum rods 4 in any other way, but the arrangement parallel to the aluminum oxide tube 1 is the most effective in respect to the reducing action.

A similar apparatus is displayed in FIG. 3. The distinguishing feature of this apparatus is that the reducing means is arranged in the form of wires 5 in the aluminum oxide powder.

Another possible form of the oxygen-reducing means is illustrated in FIG. 4. Here the reducing means is in the form of pellets or granules 6 of aluminum embedded in the aluminum oxide powder.

Another possibility is illustrated in FIG. 5, but this does not exhaust the multitude of possibilities of arranging the oxygen-reducing means. The oxygen-reducing means is arranged as an aluminum tube 7 around the aluminum oxide powder. In the drawing the aluminum tube 7 is only illustrated in cross-section. It can have cylinder walls which are closed or perforated in any desired manner. A tubular arrangement of metal powder is also possible.

During heating of the apparatus in the molten metal, as for example in molten steel, the oxygen-reducing aluminum melts. A downward running of the molten aluminum into the closed tip of the protective casing 2 is prevented in that the molten aluminum immediately enters into the hollow spaces made by the aluminum oxide powder and is thereby hindered from a downward movement.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

I claim:

1. Apparatus for measuring temperatures in molten metals with a thermocouple, which is arranged in a closed-end ceramic tube, wherein the junction of the thermocouple is located near the closed end of the tube, and with an outer protective casing which surrounds the closed-end tube while forming an annulus between the closed-end tube and the inner surface of the protective casing, wherein the protective casing comprises substantially refractory metal oxide and graphite, characterized in that the annulus (3) is substantially filled with a metal oxide powder and an oxygen-reducing means, wherein the proportion of the oxygen-reducing means is approximately 5% by volume to approximately 95% by volume.

2. Apparatus for measuring temperatures according to claim 1 wherein the oxygen-reducing means is a powder and is mixed with the metal oxide powder.

3. Apparatus for measuring temperatures according to claim 1 whereby the oxygen-reducing means is in the form of a plurality of rods (4).

4. Apparatus for measuring temperatures according to claim 3 wherein the rods (4) are arranged approximately parallel to the longitudinal axis of the closed-end tube (1).

5. Apparatus for measuring temperatures according to claim 1 wherein the oxygen-reducing means is in the form of wires (5) which are embedded in the metal oxide powder.

6. Apparatus for measuring temperatures according to claim 1 wherein the oxygen-reducing means is in the form of pellets or granules (6) which are embedded in the metal oxide powder.

7. Apparatus for measuring temperatures according to claim 1 wherein the oxygen-reducing means surrounds the metal oxide powder as a tube.

8. Apparatus for measuring temperatures according to claim 1 wherein the metal oxide powder comprises an oxide selected from the group consisting of aluminum oxide, magnesium oxide, zirconium oxide, titanium oxide, and mixtures thereof.

9. Apparatus for measuring temperatures according to claim 1 wherein the oxygen-reducing means comprises a metal selected from the group consisting of aluminum, magnesium, zirconium and titanium.

10. Apparatus for measuring temperatures according to claim 1 wherein the metal oxide powder comprises aluminum oxide.

11. Apparatus for measuring temperatures according to claim 1 wherein the oxygen-reducing means is aluminum.

12. Apparatus for measuring temperatures according to claim 11, wherein the aluminum is present in an amount of approximately 15% by volume to 70% by volume at the time of filling of the annulus.

13. Apparatus for measuring temperatures according to claim 12, wherein the aluminum is present in an amount of approximately 25% by volume to 65% by volume.

* * * * *

UNITED STATES DISTRICT COURT

FOR THE EASTERN DISTRICT OF PENNSYLVANIA — DESIGNATION FORM to be used by counsel to indicate the category of the case for the purpose of assignment to appropriate calendar.

Address of Plaintiff: Heraeus Electro-Nite Co., One Summit Square, Suite 100, Langhorne, PA 19047

Address of Defendant: Vesuvius USA Corp., 250 Park West Drive, Pittsburgh, PA 15275

Place of Accident, Incident or Transaction: Patent infringement

(Use Reverse Side For Additional Space)

Does this civil action involve a nongovernmental corporate party with any parent corporation and any publicly held corporation owning 10% or more of its stock?

(Attach two copies of the Disclosure Statement Form in accordance with Fed.R.Civ.P. 7.1(a)) Yes☑ No☐

Does this case involve multidistrict litigation possibilities? Yes☐ No☑

RELATED CASE, IF ANY:

Case Number: _____ Judge _____ Date Terminated: _____

Civil cases are deemed related when yes is answered to any of the following questions:

1. Is this case related to property included in an earlier numbered suit pending or within one year previously terminated action in this court? Yes☐ No☑
2. Does this case involve the same issue of fact or grow out of the same transaction as a prior suit pending or within one year previously terminated action in this court? Yes☐ No☑
3. Does this case involve the validity or infringement of a patent already in suit or any earlier numbered case pending or within one year previously terminated action in this court? Yes☐ No☑
4. Is this case a second or successive habeas corpus, social security appeal, or pro se civil rights case filed by the same individual? Yes☐ No☑

CIVIL: (Place ✔ in ONE CATEGORY ONLY)

A. *Federal Question Cases:*

1. ☐ Indemnity Contract, Marine Contract, and All Other Contracts
2. ☐ FELA
3. ☐ Jones Act-Personal Injury
4. ☐ Antitrust
5. ☑ Patent
6. ☐ Labor-Management Relations
7. ☐ Civil Rights
8. ☐ Habeas Corpus
9. ☐ Securities Act(s) Cases
10. ☐ Social Security Review Cases
11. ☐ All other Federal Question Cases (Please specify)

B. *Diversity Jurisdiction Cases:*

1. ☐ Insurance Contract and Other Contracts
2. ☐ Airplane Personal Injury
3. ☐ Assault, Defamation
4. ☐ Marine Personal Injury
5. ☐ Motor Vehicle Personal Injury
6. ☐ Other Personal Injury (Please specify)
7. ☐ Products Liability
8. ☐ Products Liability — Asbestos
9. ☐ All other Diversity Cases (Please specify)

ARBITRATION CERTIFICATION

(Check appropriate Category)

I, Lewis W. Schlossberg, counsel of record do hereby certify:

☑ Pursuant to Local Civil Rule 53.2, Section 3(c)(2), that to the best of my knowledge and belief, the damages recoverable in this civil action case exceed the sum of $150,000.00 exclusive of interest and costs;

☐ Relief other than monetary damages is sought.

DATE: 5/27/2009 — Attorney-at-Law — 91773 Attorney I.D.#

NOTE: A trial de novo will be a trial by jury only if there has been compliance with F.R.C.P. 38.

I certify that, to my knowledge, the within case is not related to any case now pending or within one year previously terminated action in this court except as noted above.

DATE: 5/27/2009 — Attorney-at-Law — 91773 Attorney I.D.#

CIV. 609 (6/08)

APPENDIX G

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA

V. : Civil Action No: _____

DISCLOSURE STATEMENT FORM

Please check one box:

☐ The nongovernmental corporate party, _____, in the above listed civil action does not have any parent corporation and publicly held corporation that owns 10% or more of its stock.

☑ The nongovernmental corporate party, HERAEUS ELECTRO-NITE CO., in the above listed civil action has the following parent corporation(s) and publicly held corporation(s) that owns 10% or more of its stock:

HERAEUS, INC. A NON-PUBLIC COMPANY, IS HERAEUS ELECTRO-NITE CO.'S PARENT COMPANY.

5/27/2009
Date

L. W. [signature]
Signature

Counsel for: HERAEUS ELECTRO-NITE CO.

Federal Rule of Civil Procedure 7.1 Disclosure Statement

(a) WHO MUST FILE; CONTENTS. A nongovernmental corporate party must file two copies of a disclosure statement that:
  (1) identifies any parent corporation and any publicly held corporation owning10% or more of its stock; or
  (2) states that there is no such corporation.

(b) TIME TO FILE; SUPPLEMENTAL FILING. A party must:
  (1) file the disclosure statement with its first appearance, pleading, petition, motion, response, or other request addressed to the court; and
  (2) promptly file a supplemental statement if any required information changes.

APPENDIX G

UNITED STATES DISTRICT COURT
EASTERN DISTRICT OF PENNSYLVANIA

V. : Civil Action No: _____

DISCLOSURE STATEMENT FORM

Please check one box:

☐ The nongovernmental corporate party, _____, in the above listed civil action does not have any parent corporation and publicly held corporation that owns 10% or more of its stock.

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HERAEUS, INC. A NON-PUBLIC COMPANY, IS HERAEUS ELECTRO-NITE CO.'S PARENT COMPANY

5/27/2009
Date

Signature

Counsel for: HERAEUS ELECTRO-NITE CO.

Federal Rule of Civil Procedure 7.1 Disclosure Statement

(a) WHO MUST FILE; CONTENTS. A nongovernmental corporate party must file two copies of a disclosure statement that:

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(1) file the disclosure statement with its first appearance, pleading, petition, motion, response, or other request addressed to the court; and

(2) promptly file a supplemental statement if any required information changes.

APPENDIX I

IN THE UNITED STATES DISTRICT COURT
FOR THE EASTERN DISTRICT OF PENNSYLVANIA

CASE MANAGEMENT TRACK DESIGNATION FORM

HERAEUS ELECTRO-NITE CO.	:	CIVIL ACTION
v.	:	
VESUVIUS USA CORP.	:	NO.

In accordance with the Civil Justice Expense and Delay Reduction Plan of this court, counsel for plaintiff shall complete a case Management Track Designation Form in all civil cases at the time of filing the complaint and serve a copy on all defendants. (See § 1:03 of the plan set forth on the reverse side of this form.) In the event that a defendant does not agree with the plaintiff regarding said designation, that defendant shall, with its first appearance, submit to the clerk of court and serve on the plaintiff and all other parties, a case management track designation form specifying the track to which that defendant believes the case should be assigned.

SELECT ONE OF THE FOLLOWING CASE MANAGEMENT TRACKS:

(a) Habeas Corpus – Cases brought under 28 U.S.C. §2241 through §2255. ( )

(b) Social Security – Cases requesting review of a decision of the Secretary of Health and Human Services denying plaintiff Social Security Benefits ( )

(c) Arbitration – Cases required to be designated for arbitration under Local Civil Rule 53.2. ( )

(d) Asbestos – Cases involving claims for personal injury or property damage from exposure to asbestos. ( )

(e) Special Management – Cases that do not fall into tracks (a) through (d) that are commonly referred to as complex and that need special or intense management by the court. (See reverse side of this form for a detailed explanation of special management cases.) (✓)

(f) Standard Management – Cases that do not fall into any one of the other tracks. ( )

5/27/2009	Lewis W. Schlossberg	Heraeus Electro-Nite Co.
Date	**Attorney-at-law**	**Attorney for**
215-569-5473	215-832-5473	schlossberg@blankrome.com
Telephone	**FAX Number**	**E-Mail Address**

(Civ. 660) 10/02