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(12) # EUROPEAN PATENT APPLICATION

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(54) **A composite metal anchor for refractory linings.**

(57) A composite metal anchor for securing castable refractory materials to structural supporting members wherein the anchors are constructed such that their tine section (22) is comprised of an oxide dispersion strengthened alloy (24) which is butted to a lower shank section (26) comprised of an austenitic or ferritic alloy.

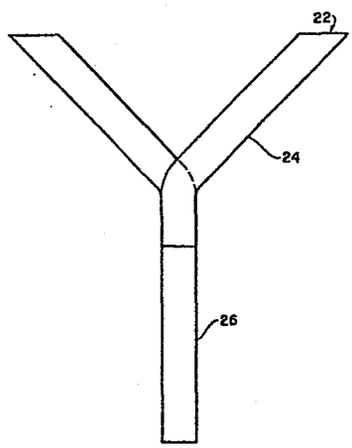

FIG. 2

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The present invention relates to a composite metal anchor member suitable for securing a castable refractory to structural supporting member, such as the interior wall of a high temperature reaction vessel.

There are many metal components, such as reaction vessels and piping, used in the petroleum and petrochemical industries which are employed in corrosive or erosive environments, or both, at elevated temperatures and pressures. Because such environments are deleterious to the surfaces of metal components, the metal surfaces are generally protected with one or more layers of refractory materials. The refractory material is conventionally held in place by metal anchoring members which are usually butt welded to the metal surfaces. The refractory material is then applied, usually gunned, over the surface of the metal of sufficient thickness to cover the anchoring members.

Examples of refractory anchoring members conventionally employed can be found in U.S. Patent No. 2,525,821, as well as the following publications: Cut Installed Cost With Stud Welded Refractory Anchors, by H. A. Chambers, Hydrocarbon Processing, December 1971; and Metal Anchors For Refractory Concrete by M. S. Crowley, Ceramic Bulletin, Vol. 45 No. 7, 1966.

Although some of the conventional refractory metal anchoring members have met with various degrees of success, all such anchoring members are subject to corrosion at sections which are closest to the front, or hot face, of the refractory lining. That is, the temperature at the hot face area of the lining is generally very high and corrosive moieties of the process stream will diffuse through the refractory material and attack the metal anchoring member. Consequently, the anchoring system is weakened, leaving the refractory layer subject to spalling.

In accordance with the present invention, there is provided composite Y-shaped metal anchor members for anchoring castable refractory material to a structural supporting member. The anchor members are constructed such that their tine section, and at least some upper portion of their shank section, are comprised of an oxide dispersion strengthened alloy which may be butted to a lower shank section, this section comprising an austenitic or ferritic alloy.

In one preferred embodiment of the present invention, the Y-shaped metal anchor members are of circular cross-section and the oxide dispersion strengthened alloy is an iron, nickel, or cobalt based alloy containing yttria as its dispersed oxide.

In other preferred embodiments of the present invention, the anchor members are employed for securing a castable refractory to a high temperature reaction vessel or high temperature piping.

In the drawing:

Figure 1 is a vertical, cross-section view of a typical reaction vessel embodying the invention;

Figure 2 is a vertical plan view of a preferred embodiment of metal anchoring member in accordance with the invention.

Referring to the drawings, particularly Figure 1, a reaction vessel generally indicated at 10 includes an outer metal shell 12 having an inlet flange 14 and an outlet flange 16. The inner wall of the metal vessel includes a plurality of the Y-shaped metal anchor members 22 of the present invention. The anchor members are typically butt welded at the ends of their outer shank to the inner wall of the vessel. Contiguous to the inner wall of the vessel and superimposed over the anchoring members is a refractory insulating layer 18 which is of a sufficient thickness to completely cover the anchoring members. The refractory insulating layer 18 may be comprised of any conventional castable refractory material suitable for thermal insulation purposes. These are usually materials having a relatively low density.

Referring more particularly to Figure 2, a composite Y-shaped metal anchor member generally indicated at 22 includes a tine section 24 which also includes a shank section which is butted to a lower shank section 26. The tine section 24 is comprised of

an oxide dispersion strengthened alloy based on a metal selected from iron, nickel, and cobalt. Such alloys are dispersion strengthened by the uniform dissemination of a relatively large number of discrete sub-micron sized refractory particles throughout the metal matrix. The refractory particles, in this case oxides, serve to stabilize the matrix microstructure at elevated temperatures, thereby increasing its tensile strength and stress rupture life at elevated temperatures. These alloys, as well as their preparation, are described in U.S. Patent No. 3,591,362 issued July 6, 1971 to Inco and incorporated herein by reference.

By employing an oxide dispersion strengthened alloy in the tine section of the anchor members of the present invention, the anchor members will have a substantially greater life expectancy when used for securing castable refractory materials to metal support members when such support members are subjected to high temperature corrosive environments. That is, the tine section being the uppermost section of the anchor member, will be more resistant to corrosion in the event that corrosive moieties diffuse through the protective refractory layer.

The tine section 24 of the Y-shaped composite metal anchor members of the present invention includes a shank section comprised of the same alloy as that of the tine section and is of course molded or machined from the same material. This tine section is attached to a lower shank section 26 which is comprised of an austenitic or ferritic alloy which is preferably weldable to the metal support member and which preferably has substantially the same coefficient of expansion as the metal support member. Of course,

other suitable means for attaching the anchor members to the metal support member may also be employed herein. Such other suitable means would include mechanical coupling.

Any suitable conventional joining method may be used for joining the tine section to the lower shank section of the anchors of the present invention. Nonlimiting joining methods which may be used herein include brazing, friction welding and mechanical coupling (threaded). Preferred is friction welding.

Non-limiting examples of refractory materials which may be used in the practice of the present invention include various fire clays, diatomaceous earths, magnesite, concrete, mixtures of metallic oxides and cement, diatomaceous earths and cement, and the like. The refractory material, and water, are prepared and pressure sprayed, gunned, or troweled into place over the anchor members and allowed to dry in situ. Enough refractory material is applied so that the anchor members are completely covered. Preferably, enough refractory material is applied such that the upper portion of the tines of the anchor members are at least about 1/2 inch from the hot face surface of the refractory layer.

Non-limiting examples of metal support members to which the composite anchoring members of the present invention may be butted include reaction vessels, piping, furnace tube sheets, and burner linings.

Although specific embodiments of the present invention have been shown and described in detail to illustrate the application of the inventive princi-

ples, it will be understood that the invention may be embodied or practised otherwise without departing from such principles.

CLAIMS:

1. A corrosion resistant composite Y-shaped metal anchor for anchoring a castable refractory material to a structural supporting member, in which anchor (i) the tine section comprises an oxide dispersion strengthened alloy; and (ii) the shank section comprises an austenitic or ferritic alloy.

2. An anchor according to claim 1 wherein the tine section comprises an iron, nickel, or cobalt based oxide dispersion strengthened alloy and the lower shank section comprises an austenitic alloy.

3. A method for anchoring a refractory material to a structural supporting member comprising the steps of fastening a plurality of Y-shaped metallic anchors according to either of claims 1 and 2 to the interior surface of the supporting member, spraying a castable layer of refractory material onto said interior surface of sufficient thickness to cover the metallic anchors.

4. A method according to claim 3 wherein the anchors are welded to the structural support member.

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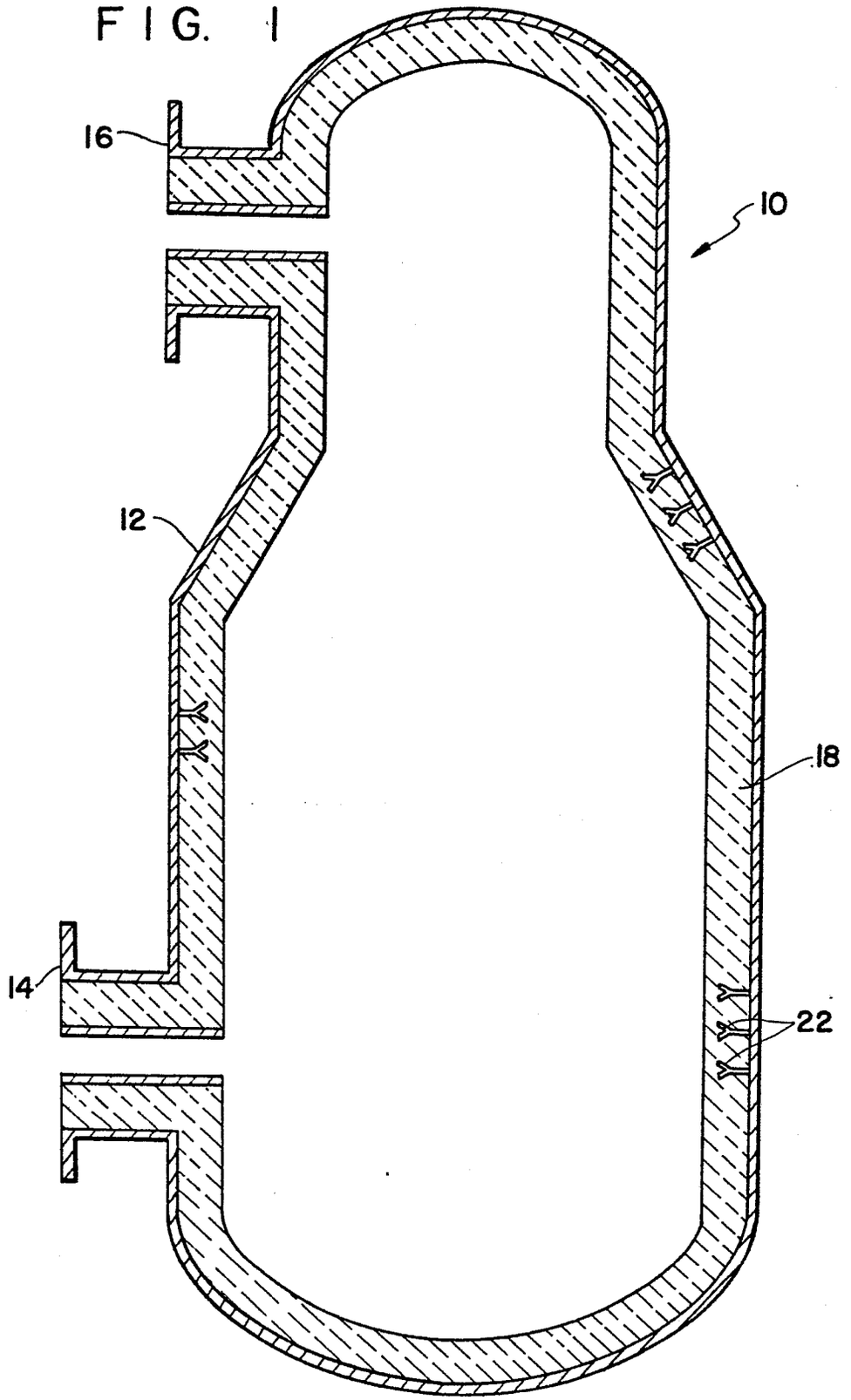
FIG. 1



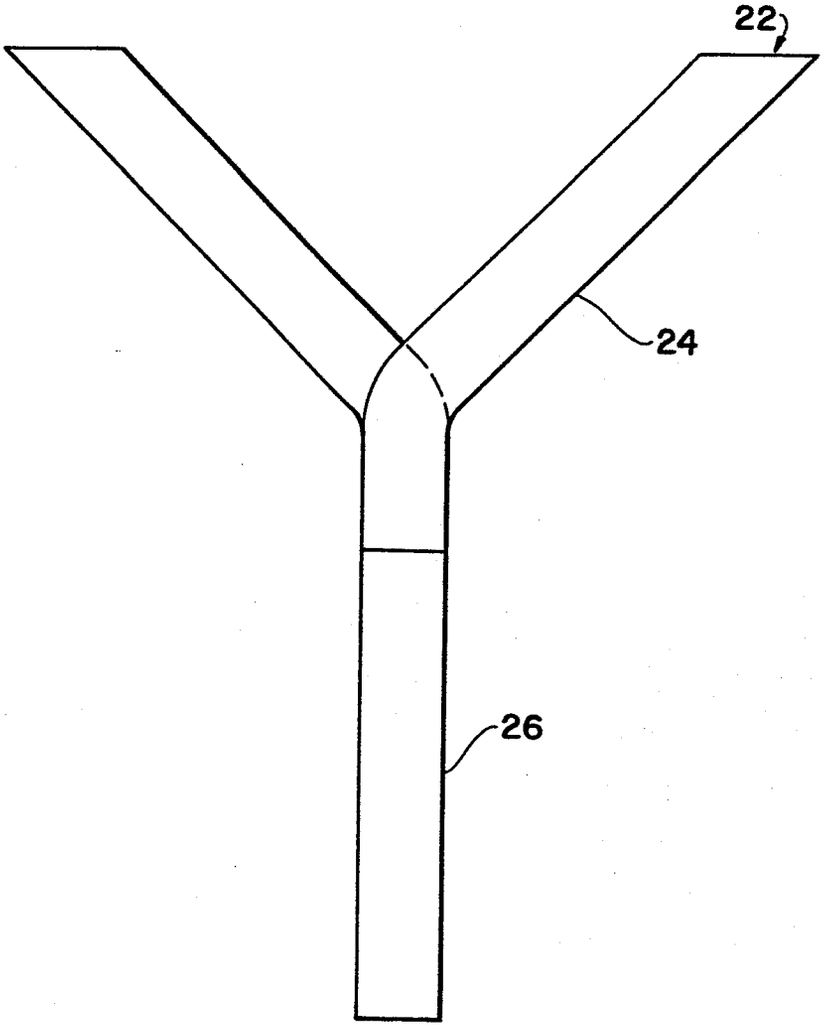


FIG. 2

European Patent Office

EUROPEAN SEARCH REPORT

0127315
Application number

EP 84 30 2781

DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int. Cl. ³)
A	FR-A-2 522 801 (ISOLITE BABCOCK REFRACTORIES CO. LTD.)		F 27 D 1/14 F 27 D 1/10
A	US-A-3 965 637 (UGO BRUSA)		
A	FR-A-1 371 822 (CAUSEWAY STEEL PRODUCTS LTD.)		
A	GB-A-2 100 397 (KLÖCKNER-HUMBOLDT-DEUTZ)		
A	US-A-3 657 851 (H.A. CHAMBERS)		
A	FR-A-2 336 651 (HILTI A.G.)		TECHNICAL FIELDS SEARCHED (Int. Cl. ³) F 27 D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
THE HAGUE	04-06-1984	COULOMB J.C.

CATEGORY OF CITED DOCUMENTS

X : particularly relevant if taken alone
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