

PATENT SPECIFICATION

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(54) REINFORCED INSULATING MEMBERS

- (71) We, UROUHART ENGINEERING COMPANY, LIMITED, a British Company of 5, Wadsworth Road, Perivale, Greenford, Middlesex, and BLOOM ENGINEERING CO. INC., a corporation organised under the laws of the State of Pennsylvania, United States of America, of Horning and Curry Roads, Pittsburgh, PA 15236, United States of America, do hereby declare the invention, for which we pray that a Patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:-
- 15 This invention relates to thermally insulating members for mounting within high temperature furnace chambers, particularly members for mounting to water cooled pipes in the supporting structures for work pieces in heat treating furnaces.
- 20 A supporting structure within a furnace chamber where temperatures may be in the order of 2000°F must be compact in order to leave sufficient combustion space in the chamber, must be strong enough to support heavy metal work pieces being treated in the furnace, and must be protected against injury by the high temperature within the furnace while at the same time not seriously interfering with the efficiency and maximum temperature of a furnace. It must also be strong enough to withstand the stresses and heavy vibration set up by the movement of the heavy work pieces within the heating chamber.
- 35 Refractory insulating materials have been used for a number of years in the production of cast insulating bodies required to line heat treating furnaces and insulate supporting structures within the interior of heat treating furnaces. More recently the advantageous insulating properties attainable by use of suitable fibrous insulating materials have become recognised, and it has been desired to find ways of utilising these materials to produce insulating members for use in heating furnaces and the like. However, the structural strength of these materials is low and does not meet all service conditions.
- 50 The present invention provides a ther-

mally insulating member comprising a refractory insulating material, a metal mesh reinforcement member structure embedded at least partly within the refractory insulating material and a fibrous insulating material interwoven within mesh loops of the reinforcement member.

The metal mesh reinforcement member acts as a reinforcement and support for the fibrous insulating material giving to it a high degree of structural strength and integrity.

The fibrous insulating material decreases the thermal conductivity of the insulating member with very substantial reductions in the amount of heat loss. Since the metal mesh reinforcement member is at least partly embedded in the refractory insulating material it is able to reinforce the refractory material and impart a high degree of strength to the cast piece.

Preferably, the fibrous insulating material is in the form of strips of material which are interwoven within the mesh loops of the metal reinforcement member so as not to fill said mesh loops completely, other portions of the mesh loops not filled by the strips being embedded in the refractory insulating material.

The insulating member of the invention provides all the advantages of a metal reinforced refractory body and a high heat-insulating fibrous material in a single integral structural unit and the engagement of the fibrous material within the reinforcement loops in conjunction with the embedding of the loops in the refractory material constitutes a secure means of fixing the fibrous material so that the latter will withstand arduous service conditions such as are encountered in a heat treating furnace.

The fibrous insulating material is preferably a material having higher heat-insulating properties than the castable refractory material. Various fibrous insulating materials are contemplated for use in this invention. Ceramic fibre material is especially preferred, but glass fibres, asbestos fibres and high-grade synthetic fibres are examples of other suitable insulating materials.

The invention also provides a method of

producing an insulating member as above by initially threading strips of the fibrous insulating material into the reticulated metal reinforcement member such that mesh loops of the member are not filled completely, and then casting a dense refractory insulating material to engage unfilled portions of the mesh loops.

The invention is further illustrated by way of example in the accompanying drawings, in which:-

Figure 1 is a cross-sectional view showing a portion of an insulating member in accordance with the invention and

Figure 2 is a plan view showing a wire fabric reinforcement member and strips of a fibrous insulating material inserted through the wire loops, prior to casting on the refractory material.

Referring first to Figure 2, there is shown a portion of metal mesh reinforcement member 1. The member 1 may comprise any suitable open work metal member, such as expanded metal or a woven wire fabric, but is preferably a reticulated metal structure comprising interlocking coils of wire extending parallel to each other. Strips 2 of a fibrous insulating material as referred to above, e.g. a ceramic fibre material, are threaded through the wire loops of the member 1. The strips 2 lie generally in the plane of the member, and are parallel. If desired, other strips 2 (not shown) may also be threaded through the wire loops in a transverse direction.

The strips 2 do not completely fill the wire loops so that when a refractory insulating material is subsequently cast onto the structure illustrated in Figure 2, the cast refractory material enters the wire loops and the reinforcement member at least is partly embedded within the refractory insulating material to reinforce both the refractory and the fibrous materials and create a bond between the two materials which imparts a high degree of strength to the entire insulating member. The application in this manner of an outer covering layer of a dense refractory material greatly increases the ability of the member to withstand the effects of high velocity gas erosion at the temperatures encountered in heat treating furnaces.

Figure 1 shows a portion of such a thermally insulating member whereof the reinforcement member 1 is only partly embedded within the cast refractory material 3 so that portions of the wire loops 4 are exposed at the inner surface of the member for welding to a pipe in a heat treating furnace. If desired, the member 1 may be wholly embedded in the refractory material 3,

other arrangements being made to anchor the member in position in the furnace.

Insulating members in accordance with the present invention may in all other respects be similar to the members disclosed in United States Patents No. 2,693,352 and 3,647,194 or in United Kingdom Patent Specifications No. 1,369,283 and 1,441,915, to which reference may be made for relevant details. The invention may in particular be applied in the production of the insulating members disclosed in Patent Specifications No. 1,369,283 and 1,441,915.

WHAT WE CLAIM IS:-

1. A thermally insulating member comprising a refractory insulating material, a metal mesh reinforcement member structure embedded at least partly within the refractory insulating material and a fibrous insulating material interwoven within mesh loops of the reinforcement member.

2. A member as claimed in Claim 1, wherein the fibrous insulating material is comprised of ceramic fibres.

3. A member as claimed in Claim 1, wherein the fibrous insulating material is comprised of glass fibres.

4. A member as claimed in Claim 1, wherein the fibrous insulating material is comprised of asbestos fibres.

5. A member as claimed in Claim 1, wherein the fibrous insulating material is comprised of synthetic resin fibres.

6. A member as claimed in any one of the preceding claims, wherein the fibrous insulating material is in the form of strips of material which are interwoven within the mesh loops of the metal reinforcement member so as not to fill said mesh loops completely, other portions of the mesh loops not filled by the strips being embedded in the refractory insulating material.

7. A method of producing an insulating member as claimed in any one of the preceding claims which comprises initially threading strips of the fibrous insulating material into the reticulated metal reinforcement member such that mesh loops of the member are not filled completely, and then casting a dense refractory insulating material to engage unfilled portions of the mesh loops.

8. A thermally insulating member substantially as hereinbefore described with reference to the accompanying drawings.

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FIG. 1

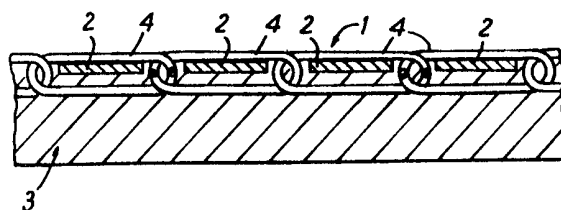


FIG. 2

