July 4, 1967 T. P. GREANEY 3,329,414

INSULATED WATER-COOLED FURNACE SUPPORTING STRUCTURE

Filed March 30, 1965

FIG. 1.

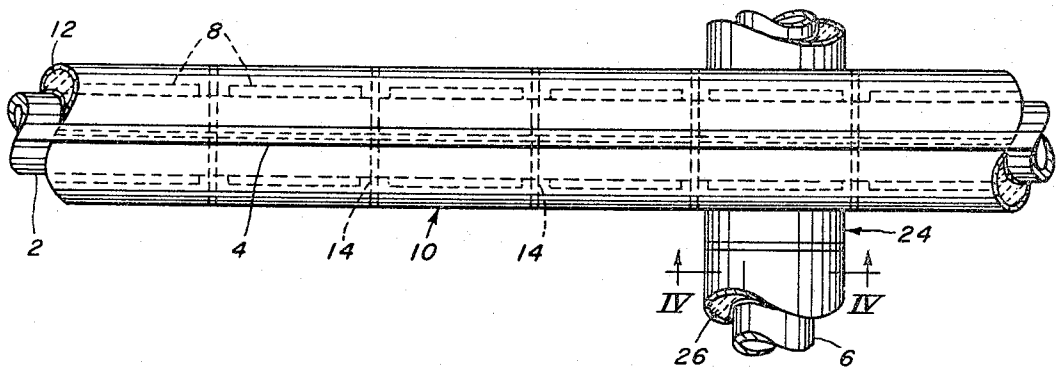


FIG. 2.

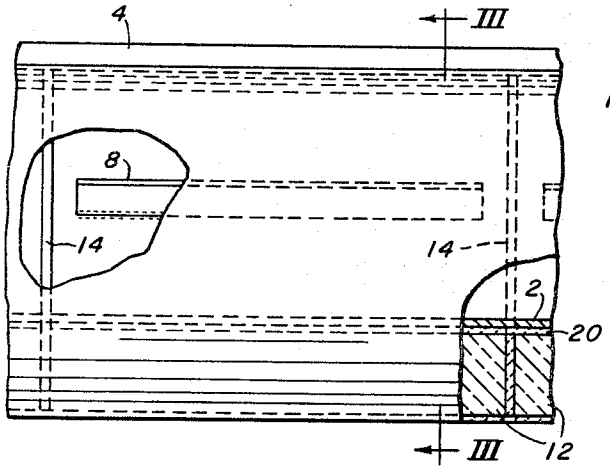


FIG. 3.

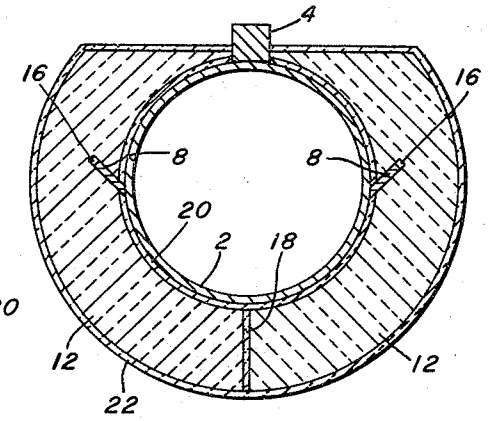


FIG. 4.

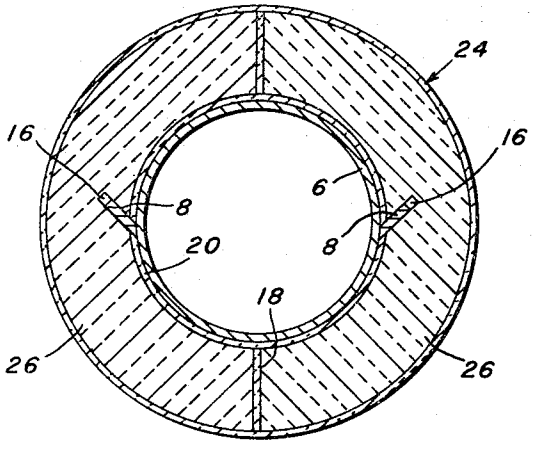
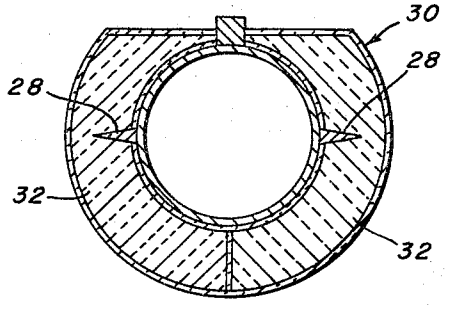


FIG. 5.



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INSULATED WATER-COOLED FURNACE SUPPORTING STRUCTURE

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13 Claims. (Cl. 263—6)

This invention relates to an insulated water-cooled furnace supporting structure and more particularly to such structures for supporting steel slabs or billets which are being heated prior to rolling. In a conventional continuous re-heating furnace, the slab to be heated is pushed through the furnace on water-cooled skids which extend longitudinally through the furnace and are supported on transversely positioned pipes, which in turn are supported by vertical pipes. The pipes must be insulated to prevent them from absorbing heat. Prior to my invention this was usually done either by applying preformed refractory sleeves or by applying the insulation in plastic form around the pipes. In most cases metallic mesh was used as a reinforcement for the insulation. Typical insulations are shown in Schmidt Patent No. 2,436,452 dated February 24, 1948, and Brough et al. Patent No. 3,149,826 dated September 22, 1964. The metallic mesh acts as a heat conductor to the pipes, thus decreasing its effectiveness. Also when the insulation becomes hot it becomes brittle and cracks as the weight of the slab causes the skids to flex. Thus, maintenance and repair costs were high.

It is therefore an object of my invention to provide an insulated, water-cooled furnace supporting structure which includes means for preventing or limiting cracking of the insulation.

Another object is to provide such a structure in which metallic reinforcement is eliminated.

These and other objects will be more apparent after referring to the following specification and attached drawings, in which:

FIGURE 1 is a plan view of the structure of my invention;

FIGURE 2 is an enlarged elevation of a portion of FIGURE 1;

FIGURE 3 is a sectional view taken on the line III—III of FIGURE 2;

FIGURE 4 is a sectional view taken on the line IV—IV of FIGURE 1; and

FIGURE 5 is a view, similar to FIGURE 3, showing another embodiment of my invention.

Referring more particularly to the drawings, reference numeral **2** indicates a horizontal tube for receiving cooling water. A longitudinal skid bar **4** is welded to or otherwise attached to the top of the tube **2**. Tube **2** and bar **4** are arranged longitudinally of the furnace, not shown, and are supported by a transverse tube **6** therebeneath. The tube **2** has a plurality of longitudinally extending lugs **8** welded thereto on diametrically opposite sides thereof. The tube **2** is surrounded by a heat barrier **10** which includes a plurality of spaced apart sets of light weight insulating members **12** and a compressible washer **14** between adjacent sets of members **12**. There are two members **12** in each set with each member extending around approximately one half the circumference of the tube **2** and being provided with slots **16** for receiving the lugs **8**. The members **12** abut each other at their lower ends with a high temperature cement mortar **18** holding them together. The top of the members **12** are flattened out so that they are below the top of the bar **4**. A high temperature air setting mortar **20** is provided between the tube **2** and members **12**. A similar air setting cement **22** covers the outside of the members **12** and gives longer

life thereto. The members **12** are made of a high temperature insulating firebrick such as "Insolite." This is a light weight, porous fireclay material well known to those skilled in the art. "Insolite" weighs approximately 48 lbs. per cu. ft. The washers **14** are made of a refractory insulation material which is compressible under temperature. It is preferred to use an alumina silica material which is melted and then blown with an air or steam jet to produce a fibrous material such as "Fiberfrax" or "Kaowool." While the length of the members **12** may vary it is preferred to have them approximately 9 in. long. I have found that the use of the washers **14** prevents or greatly reduces breakage of the members **12** which would otherwise occur due to the flexing action of the pipe **2**.

Barrier **24** used with tube **6** is the same as barrier **10** except that its insulating members **26** are not cut away at the top thereof.

In the embodiment of FIGURE 5 pointed radial lugs **28** are used in place of the lugs **8** and a barrier **30** is provided which is identical to barrier **10** except that the slots **16** are omitted from insulating members **32**. Because of the texture of the high temperature insulating firebrick the member **32** may be pressed onto the sharp lugs **28**.

The present invention reduces repair and maintenance costs, adds to the efficiency of the furnace and the quality of the product due to better insulation, and is much cheaper to install. In a typical installation the insulation cost is $5 per lineal ft. as compared to a cost of $12 per lineal ft. for conventional installations.

While several embodiments of my invention have been shown and described it will be apparent that other adaptations and modifications may be made without departing from the scope of the following claims.

I claim:

1. An insulated water-cooled furnace supporting structure comprising a tube for receiving water, a plurality of spaced apart sets of insulating members surrounding said tube, each of said insulating members extending around less than the full circumference of said tube, and a compressible washer in the space between adjacent sets of insulating members.

2. An insulated water-cooled furnace supporting structure according to claim 1 including a high temperature air setting mortar between said tube and insulating members and around the outside of said insulating members.

3. An insulated water-cooled furnace supporting structure according to claim 1 in which the insulating members are made of porous fireclay and the washers are made of porous alumina silica.

4. An insulated water-cooled furnace supporting structure according to claim 3 including a high temperature air setting mortar between said tube and insulating members and around the outside of said insulating members.

5. An insulated water-cooled furnace supporting structure comprising a tube for receiving water, a plurality of longitudinally extending lugs attached to and extending outwardly from said tube on diametrically opposite sides thereof, a plurality of spaced apart sets of insulating members surrounding said tube and supported on said lugs, each of the members in each set extending around approximately one half the circumference of said tube, and a compressible washer in the space between adjacent sets of insulating members.

6. An insulated water-cooled furnace supporting structure comprising a tube for receiving water, a plurality of longitudinally extending lugs attached to and extending outwardly from said tube on diametrically opposite sides of said tube, a plurality of spaced apart sets of insulating members surrounding said tube and supported

on said lugs, each of the members in each set extending around approximately one half the circumference of said tube, said insulating members being made of porous fireclay, air setting mortar between said tube and insulating members and around the outside of said insulating members and between the members of each set, and a compressible washer in the space between adjacent sets of insulating members, said washers being made of porous alumina silica.

7. An insulated water-cooled furnace supporting structure comprising a horizontal tube for receiving water, a longitudinal bar attached to the top of said tube, a plurality of spaced apart sets of insulating members surrounding said tube, each of the members in each set extending around approximately one half the circumference of said tube and abutting each other at the bottom thereof and abutting said bar at the top thereof with the top of the members being below the top of the bar, and a compressible washer in the space between adjacent sets of insulating members.

8. An insulated water-cooled furnace supporting structure according to claim 7 including a high temperature air setting mortar between said tube and insulating members and around the outside of said insulating members.

9. An insulated water-cooled furnace supporting structure according to claim 7 in which the insulating members are made of porous fireclay and the washers are made of porous alumina silica.

10. An insulated water-cooled furnace supporting structure according to claim 7 including a plurality of longitudinally extending pointed radial lugs attached to and extending outwardly from said tube on diametrically opposite sides of said tube for supporting said members.

11. An insulated water-cooled furnace supporting structure according to claim 10 including a high temperature air setting mortar between said tube and insulating members and around the outside of said insulating members.

12. An insulated water-cooled furnace supporting structure according to claim 10 in which the insulating members are made of porous fireclay and the washers are made of porous alumina silica.

13. An insulated water-cooled furnace supporting structure according to claim 12 including a high temperature air setting mortar between said tube and insulating members and around the outside of said insulating members.

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