Aug. 21, 1934. T. C. TOOMEY 1,970,585

FURNACE

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Fig. 1

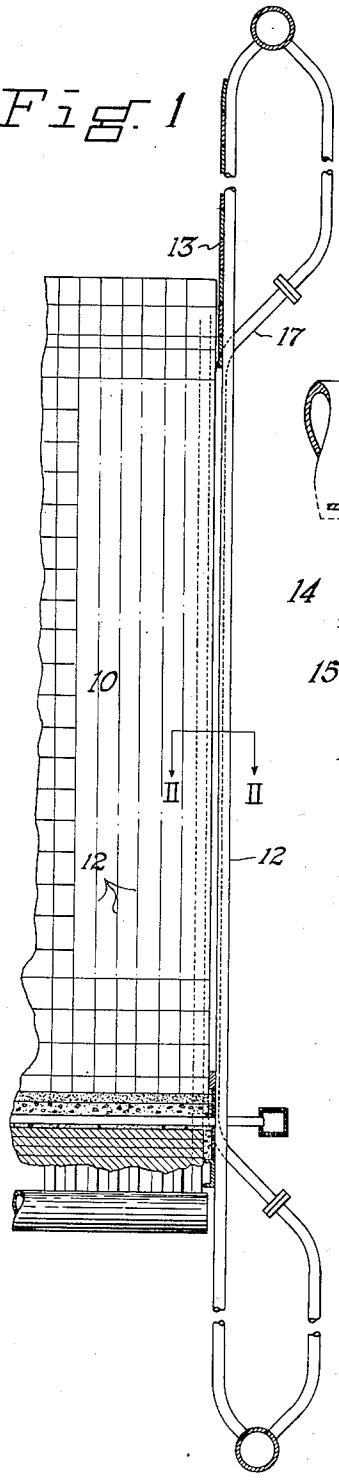
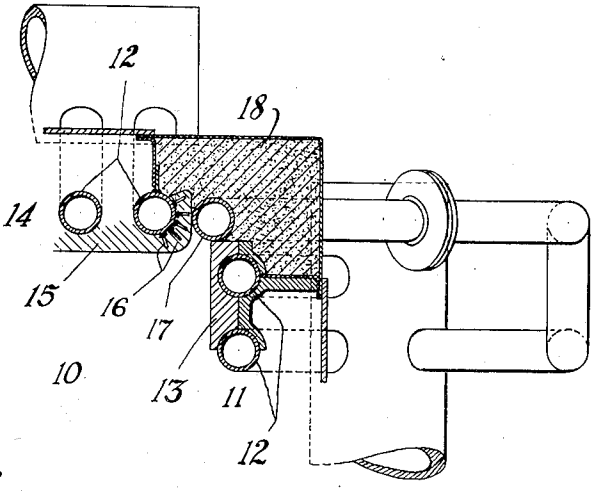


Fig. 2



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Fig. 3

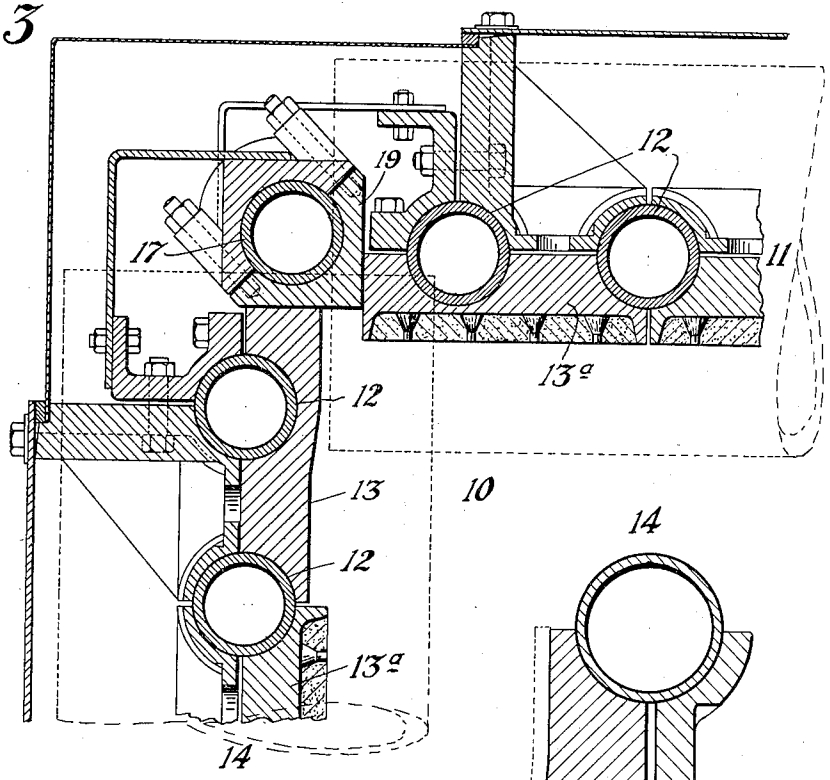
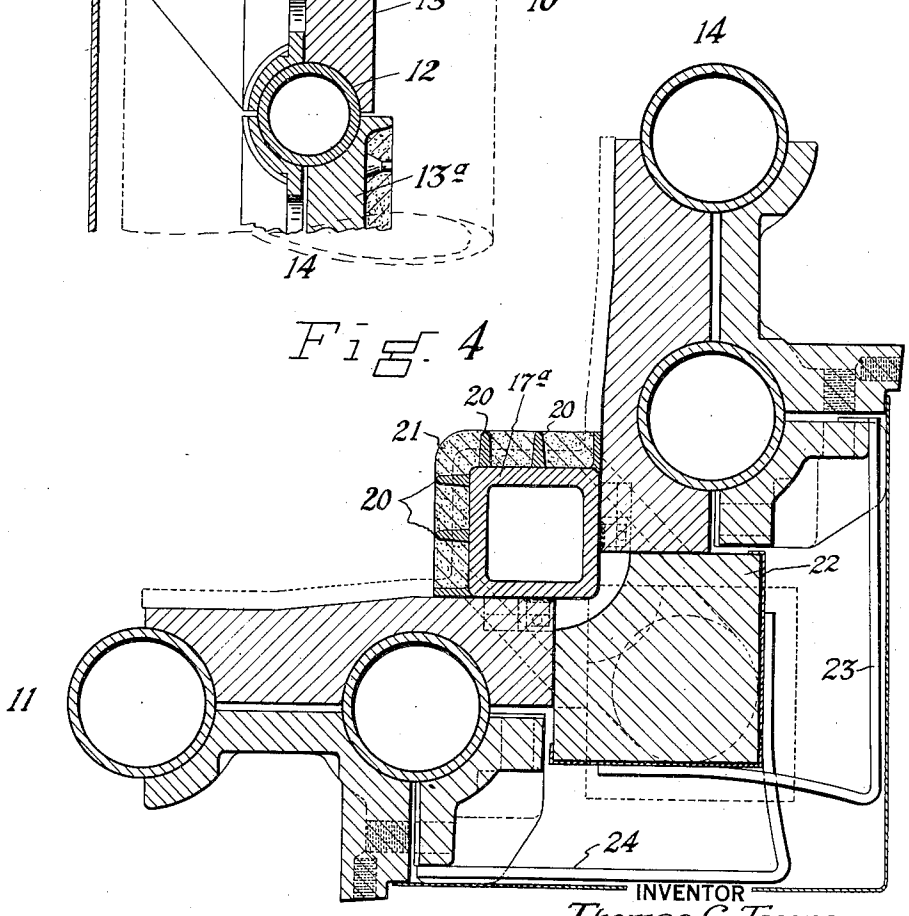


Fig. 4



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1,970,585

FURNACE

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Application August 11, 1931, Serial No. 556,352

10 Claims. (Cl. 122—6)

My invention relates to a furnace, and particularly the walls of a furnace. The invention is especially useful in connection with a seal for the junction of two furnace walls.

One object of the invention is the provision of an effective seal for use where the ends of two furnace walls come together and provision must be made for permitting each to expand. Another object is the provision of such a seal, which is itself movable and yet remains in resilient contact with each wall end. Still a further object is the provision of a fluid-cooled sealing member which will be capable of withstanding high temperature and which will also act to cool the wall ends. Other objects will be apparent upon consideration of the present specification.

The invention is illustrated by way of example in the accompanying drawings, wherein—

Figure 1 is an elevation of part of a furnace wall constructed in accordance with the invention,

Fig. 2 is a horizontal section on the line II—II of Figure 1 showing ends of two furnace walls and sealing means therefor,

Fig. 3 is a similar view showing another embodiment of the invention, and

Fig. 4 is a similar section illustrating another form of the invention.

Various types of furnace wall seals have been employed in the past with more or less success. However, improved means for properly sealing the corners of a furnace have continuously been sought. It is desirable in such a seal to provide protection of the wall ends from the flame in the furnace, and at the same time to provide a gas seal to prevent combustion gases or air from leaving or entering the furnace along the line of the wall junction. I have found that more effective means than have been used in the past for accomplishing this end may be provided by a construction which is illustrated by way of example in the accompanying drawings.

Referring now more particularly to the drawings, it will be seen that in each figure there is shown a furnace 10, a furnace wall, a second wall disposed at an angle to the first named wall, and a fluid cooled member in contact with the end of each wall. It will be apparent that the invention is not limited to furnace wall disposed at an angle to each other. Clearly, the walls may lie in the same plane, being merely spaced from each other in a manner too well known to require specific illustration. Thus, in Figure 2, one wall 11, is illustrated which comprises water tubes 12 and a refractory covering 13 thereon, the refractory covering being in block form. A second wall 14 disposed at an angle to the first is illustrated as having a refractory covering 15 deposited thereon in plastic form and held in place by pins 16 on the cooling tubes 12. Obviously, both walls might be of block construction, or both of the refractory-and-pin construction. A separate water tube 17 is shown closing the space between the two wall ends. This separate water tube is in resilient contact with the end of each wall, as will be later more clearly explained. Insulating material 18 surrounds the wall ends and the separate water tube outside of the furnace, forming a gas seal for the furnace.

In Fig. 3 the walls are illustrated as comprising water tubes 12, and Bailey blocks 13ª attached thereto. The sealing member is a separate water cooled tube 17 having a refractory covering 19 and acts essentially as does the uncovered sealing tube illustrated in Figure 1. In both cases the sealing member is disposed externally of the furnace and is held closely in resilient contact with each wall end, and is displaced against its resiliency by each wall as the wall expands.

In Fig. 4 the sealing member comprises a water tube 17ª which is substantially rectangular and has projections 20 thereon to which a refractory covering 21 is attached. The sealing member in Fig. 4 is disposed internally of the furnace. It is in contact with the end of each wall, although in this case the contact is with one face of each wall end instead of being with the end edge of each wall. Further, the resiliency of the member illustrated in Fig. 4 results in a compression which is exerted generally outwardly from the furnace, whereas in the other two embodiments the resiliency results in a compression which is inwardly of the furnace. In all three instances the sealing member closes the interval between the wall ends and maintains a position which continues to keep the interval between the wall ends closed.

In the form of the invention illustrated in Fig. 4 we may employ a second sealing member in contact with the end edge of each wall disposed outwardly of the furnace with respect to the water tube 17ª. For example—such a sealing member may be a block 22 of solid refractory, which may be held in place by spring members 23 and 24.

Attention is called to the fact that the water tube comprising the sealing member may be a part of the boiler circulation system. I have found it possible to form this member by bending inwardly of the furnace a recirculator tube so that the vertical tube floats in the corner where

the two water walls are in close juxtaposition. The bends and the offset of this tube provide the resilient contact with the walls to which reference has been made above. The sealing member thus has the advantage of being cooled by the fluid passing through it, thereby protecting the ends of the furnace walls, and being itself protected against damage from the heat of the furnace.

Sealing means constructed in accordance with the invention is simple, durable, and exceedingly effective. Aside from the cooling effect referred to above, it has the advantage of maintaining a close contact with the tube walls under all conditions, thereby forming a most effective seal. Furthermore, its action is not dependent upon separate springs or connections, but results from its own construction and conformation. By providing a non-inflammable packing beyond the sealing member, but in contact therewith and with the wall ends, it is possible to insure completely against passage of gases into or out of the furnace at the wall corner.

The particular constructions which are disclosed and illustrated in the accompanying drawings are presented merely as examples of how the invention may be applied. Obviously, other constructions, varying in detail but not in principle from those here illustrated, will suggest themselves to one skilled in the furnace art. With this understanding, therefore,

I claim:

1. In a furnace, a wall comprising water tubes and a refractory covering thereon, a second wall disposed at an angle to said first-named wall, and a water cooled member comprising a water tube and a refractory covering therefor in contact with the end of each wall and closing the interval between the wall ends.

2. In a furnace, a wall comprising water tubes and a refractory covering thereon, a second wall comprising water tubes and a refractory covering thereon disposed at an angle to said first-named wall, and a water cooled member comprising a water tube and a refractory covering therefor resiliently pressed into contact with the end of each wall and closing the interval between the wall ends.

3. In a furnace, a wall comprising water tubes and a refractory covering thereon, a second wall comprising water tubes and a refractory covering thereon disposed at an angle to said first-named wall, and a water cooled member comprising a recirculator water tube in the boiler circulating system and a refractory covering therefor resiliently pressed into contact with the end of each wall and closing the interval between the wall ends, substantially as described.

4. In a furnace, a water cooled wall, a second water cooled wall disposed at an angle to said first-named wall, a water tube resiliently pressed into contact with the end of each wall preventing flame from impinging upon the wall ends, and insulating material disposed between the wall ends and externally of said water tube to form a gas seal for the furnace.

5. In a furnace, a wall comprising water tubes and a refractory covering thereon, a second wall comprising water tubes and a refractory covering thereon disposed at an angle to said first-named wall, and a water cooled member comprising a substantially rectangular tube having projections thereon and a refractory covering on said tube, said water cooled member being resiliently pressed into contact with the end of each wall and closing the interval between the wall ends, substantially as described.

6. In a furnece, a wall comprising water tubes and a refractory covering thereon, a second wall comprising water tubes and a refractory covering thereon disposed at an angle to said first-named wall, and a water cooled member comprising a substantially rectangular tube having projections thereon and a refractory covering on said tube, said water cooled member being resiliently pressed into contact with the end of each wall and closing the interval between the wall ends, in combination with insulating material disposed against the wall ends outside of the furnace and forming a gas seal for the furnace.

7. In a furnace, rows of fluid cooled wall tubes delineating two furnace walls arranged at an angle to each other and having their adjacent ends spaced at a corner of the furnace, a fluid cooled corner sealing structure located between said walls and having separate flat faces contacting with the ends of the walls, a fluid conducting tube positioned in the corner formed by the walls and spaced inwardly from the sealing structure to protect said structure against overheating, and means for maintaining the sealing structure in operative engagement with said walls during their relative movements caused by expansion or contraction.

8. In a furnace, rows of fluid cooled wall tubes delineating two furnace walls arranged at an angle to each other and having their adjacent ends spaced at a corner of the furnace, a fluid cooled corner sealing structure located between said walls and having separate flat faces contacting with the ends of the walls, a fluid conducting tube positioned in the corner formed by the walls and protecting said structure against overheating, and means for maintaining the sealing structure in operative engagement with said walls during their relative movements caused by expansion or contraction.

9. In a water cooled furnace, two furnace walls disposed at an angle to each other and having their adjacent ends spaced and arranged so as to be movable with respect to each other, a fluid cooled corner sealing structure having separate faces in abutting relation to the ends of the walls, means for maintaining the sealing structure in contact with the ends of the walls during their relative movements due to expansion or contraction, and means providing for the circulation of fluid through said structure.

10. In a furnace, two adjoining walls disposed at an angle to each other and subject to relative movements under the influence of furnace temperature changes, a joint construction positioned between the walls and including a fluid cooled tubular member partaking of movements of each wall, means for connecting said member into fluid circulation, and means for holding said member to each wall so that it effects a furnace seal between them while permitting relative movement between the member and each of the walls.

THOMAS C. TOOMEY.