Aug. 21, 1934. C. V. HENDRICKSON 1,971,312

BOILER WALL

Filed Dec. 4, 1923

Fig. 1.

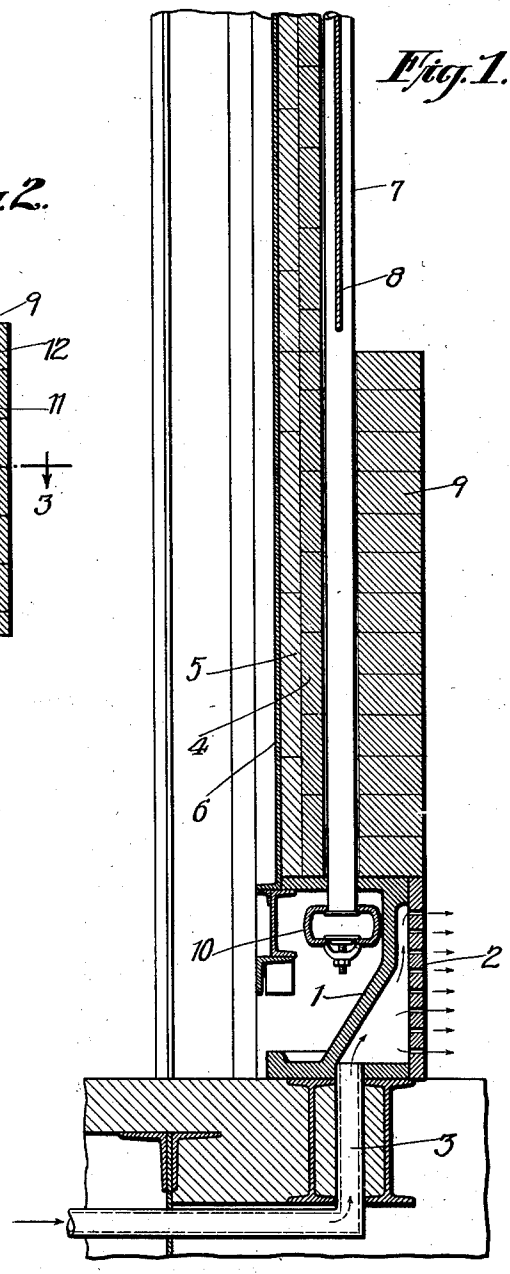


Fig. 2.

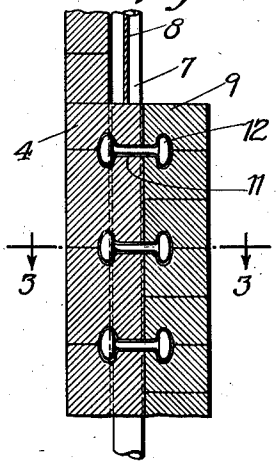


Fig. 3.

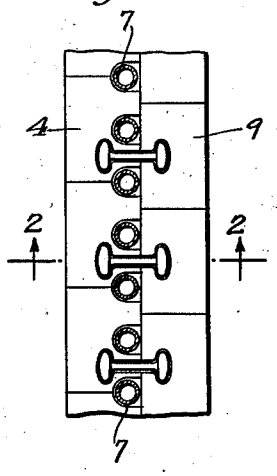
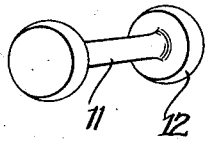


Fig. 4.



Inventor

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1,971,312

UNITED STATES PATENT OFFICE

1,971,312

BOILER WALL

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Application December 4, 1923, Serial No. 678,489

10 Claims. (Cl. 122—6)

In a pending application of Thomas E. Murray No. 678,443, filed December 4, 1923, there is described a boiler construction having tubes arranged alongside the wall, partly exposed to the heating gases and partly protected by a lining of refractory material.

The present invention is directed to a scheme for constructing such a wall in a way to hold the lining in place. The invention is applicable also to various other wall constructions.

The accompanying drawing illustrates an embodiment of the invention.

Fig. 1 is a vertical section through the boiler wall in the plane of one of the boiler tubes;

Fig. 2 is a similar section of a part of the wall in the plane of the ties which hold the lining in place, approximately on the line 2—2 of Fig. 3;

Fig. 3 is a horizontal section approximately on the line 3—3 of Fig. 2;

Fig. 4 is a perspective view of a tie.

Referring to the embodiment of the invention illustrated, at the base of the wall there is a hollow casting 1 carrying on its inner face a perforated plate 2. An air pipe 3 admits air to the hollow casting and through the perforated plate into the furnace or chamber carrying the heating gases. The side wall is supported on the base described. It comprises an outer portion consisting of blocks 4 of refractory material and an outer facing of blocks or plates 5 of insulating material held in place by a steel plate 6.

Boiler tubes 7 extend vertically along the inner face of the blocks 4. These boiler tubes are supported from their upper ends. Their upper portions are exposed to the hot gases, as indicated in Fig. 1, and have flanges 8 at their sides to close the space between them. Their lower portions are protected from the extreme heat of the furnace by a lining composed of blocks 9 of refractory material supported on the base of the wall.

The lower ends of the tubes are connected to a drum 10 located in a chamber at the outside of the casing 1 and capable of slight vertical movement therein. The tubes are adapted to expand in a downward direction from their overhead point of support. And the wall and lining are arranged to permit upward expansion from their supporting base. There is, therefore, freedom for considerable relative movement between the tubes on the one hand and the wall and lining on the other hand.

The outer portion of the wall is tied to the lining in such a way as to hold the latter in place while permitting the freedom of expansion desired.

The outer blocks 4, for a height corresponding to that of the lining, are made of a sufficient thickness to embrace the tubes and are formed on their inner face with vertical grooves in which the tubes are carried with freedom of movement. These blocks therefore serve the additional function of holding the tubes properly spaced in the horizontal direction. The lining blocks 9 have their outer bearing against the inner faces of the blocks 4 and are tied to such blocks in a way to permit more or less relative movement under the distortion caused by the heat.

For tying the blocks together, I use a tie in the form of a dumbbell (Fig. 4) with a shank 11 and rounded ends 12. The blocks 4 and 9 are preferably arranged to break vertical joints as shown in Fig. 3. The horizontal joints, however, are arranged to coincide, as in Fig. 2, to permit the introduction of the ties. The blocks 4 are shown of twice the height of the blocks 9. They may be of the same height, or any multiple thereof, so as to bring at least some of the horizontal joints of the outer wall and the lining into coincidence.

In the top and bottom walls of the blocks 9, and preferably in the center of their width, there are recesses for receiving one end of the ties. And similar recesses are arranged in the blocks 4 in such positions as to register with those in the blocks 9, and to permit the shank of the tie to pass between the grooves in which the tubes 8 lie. The recesses and grooves are of such size as to permit a slight play of the ties therein. In building the wall the ties are introduced on the top of blocks which register with each other; and additional blocks, with corresponding recesses on their undersides, are laid on top of these. Thus the lining is loosely tied to the outer wall and the tubes are protected and held in position.

Though I have described with great particularity of detail a specific embodiment of my invention, yet it is not to be understood therefrom that the invention is restricted to the particular embodiment described. Various modifications thereof may be made by those skilled in the art without departing from the invention as defined in the following claims.

What I claim is:—

1. A boiler wall structure comprising an outer portion, tubes on the inner face of the latter and a lining on the inner face of the tubes, the outer portion of the wall and the lining being tied together by ties loosely engaging the outer portion

of the wall and the lining and passing between the tubes.

2. A boiler wall structure comprising a vertical outer portion, tubes extending vertically on the inner face thereof and a vertical inner portion on the inner side of the tubes, the two portions of the wall being independently supported but flexibly tied to each other so as to permit them to expand and contract independently of each other.

3. A boiler wall structure comprising a vertical outer portion, tubes extending vertically on the inner face thereof and a vertical portion on the inner face of the tubes, said outer portion and inner portion being formed of blocks with registering horizontal joints and being independently supported, and flexible ties located in said joints to hold the two portions together while permitting them to expand and contract independently.

4. A boiler wall structure comprising a vertical outer portion, tubes extending vertically on the inner face thereof and a vertical portion on the inner face of the tubes, said outer portion and inner portion being formed of blocks with registering horizontal joints and being independently supported, and flexible ties located in said joints to hold the two portions together while permitting them to expand and contract independently, said ties being formed with a shank and with enlargements at their ends located in recesses in the horizontal faces of the blocks.

5. A boiler wall structure comprising a vertical outer portion, tubes extending vertically on the inner face thereof and a vertical portion on the inner face of the tubes, said outer portion and inner portion being formed of blocks with registering horizontal joints and being independently supported, and flexible ties located in said joints to hold the two portions together while permitting them to expand and contract independently, said ties being formed with a shank and with enlargements at their ends located in recesses in the horizontal faces of the blocks, and one of said wall portions having vertical grooves in which the tubes are located.

6. A boiler wall structure comprising an outer portion, tubes on the inner face of the latter and an inner portion on the inner face of the tubes, said wall portions being independently supported, and ties having a shank passing between the tubes and having enlargements on both ends engaging in recesses in the two portions of the wall so as to connect said portions together flexibly and to permit independent expansion and contraction thereof.

7. A boiler wall structure comprising an outer portion, tubes on the inner face of the latter and an inner portion on the inner face of the tubes, said wall portions being formed of blocks with registering horizontal joints and being supported independently of each other, and ties located in said joints having enlargements on their ends engaged in recesses in the horizontal joints between the blocks and holding the two portions of the wall together flexibly so as to permit independent expansion and contraction thereof.

8. A boiler wall structure comprising vertical outer and inner portions with tubes between them, the two portions being flexibly tied together and being supported independently of each other and being free to expand and contract independently of each other and of the tubes between them.

9. In a boiler furnace, inner and outer walls adjacent to each other with vertical passages between them adapted to receive tubes forming parts of the boiler, said walls being independently supported but flexibly tied to each other between the passages for such tubes so as to permit them to expand and contract independently of each other.

10. In a boiler furnace, inner and outer walls adjacent to each other with vertical passages between them adapted to receive tubes forming parts of the boiler and tie pieces extending between said passages and holding said walls together and having enlarged ends in rocking engagement therewith.

CLARK V. HENDRICKSON.