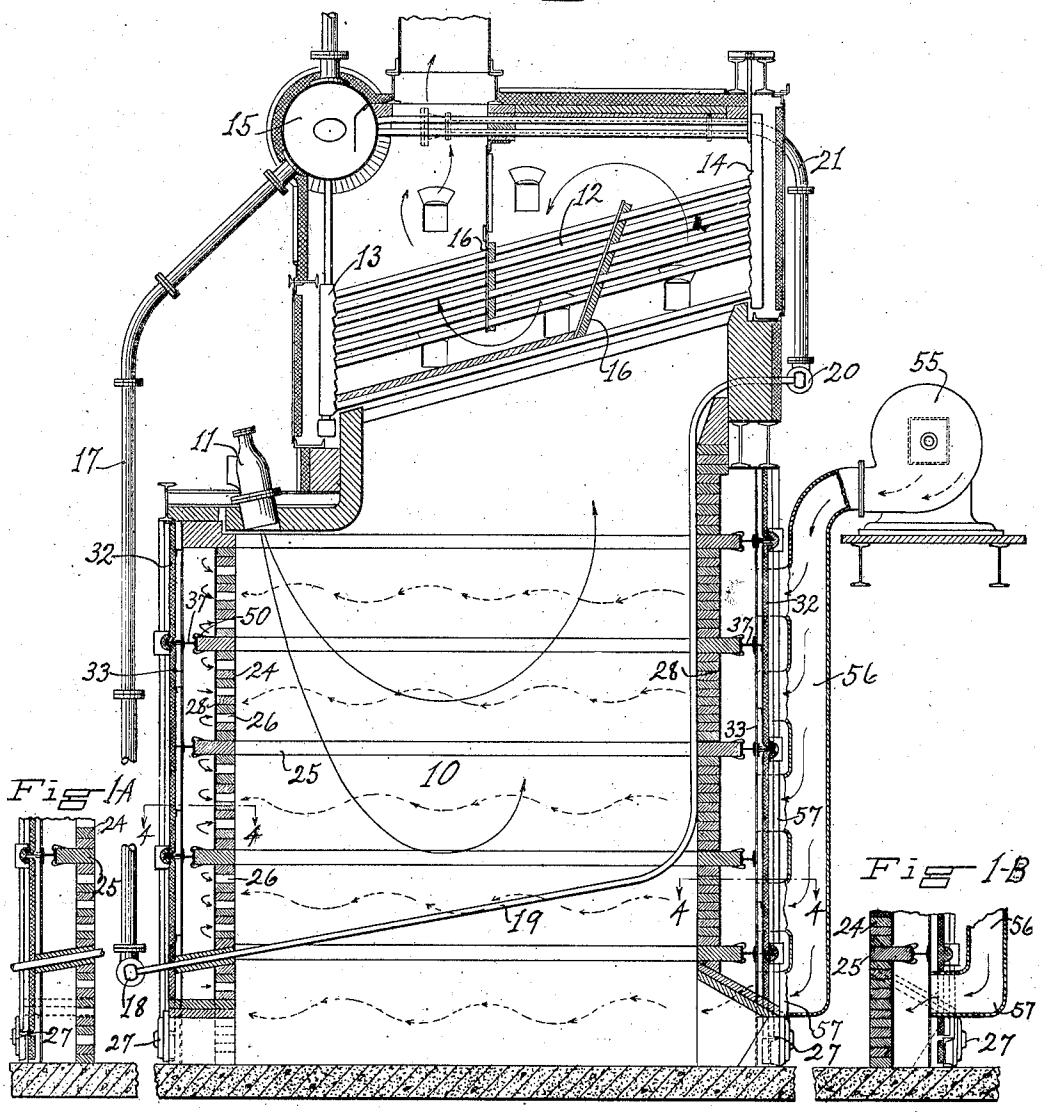
July 16, 1929. D. S. JACOBUS 1,720,958

AIR COOLED FURNACE WALL

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Fig 1



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Fig 5

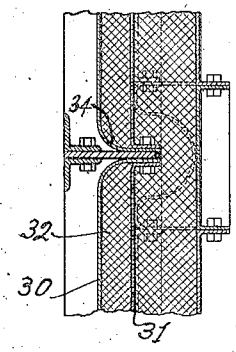


Fig 4.

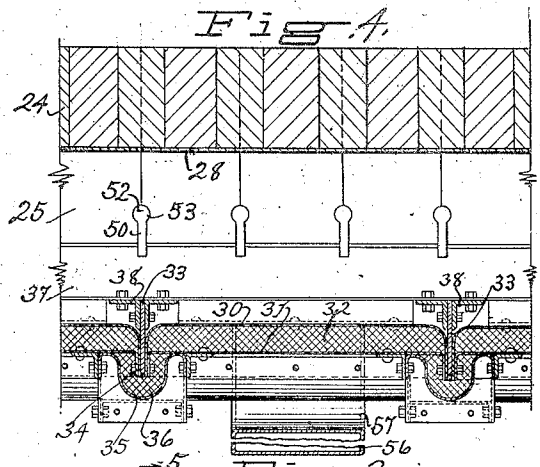


Fig 2

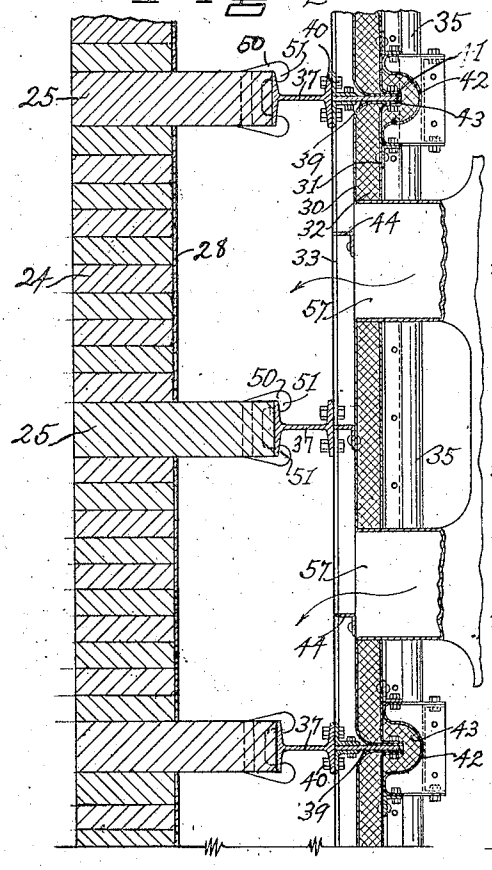
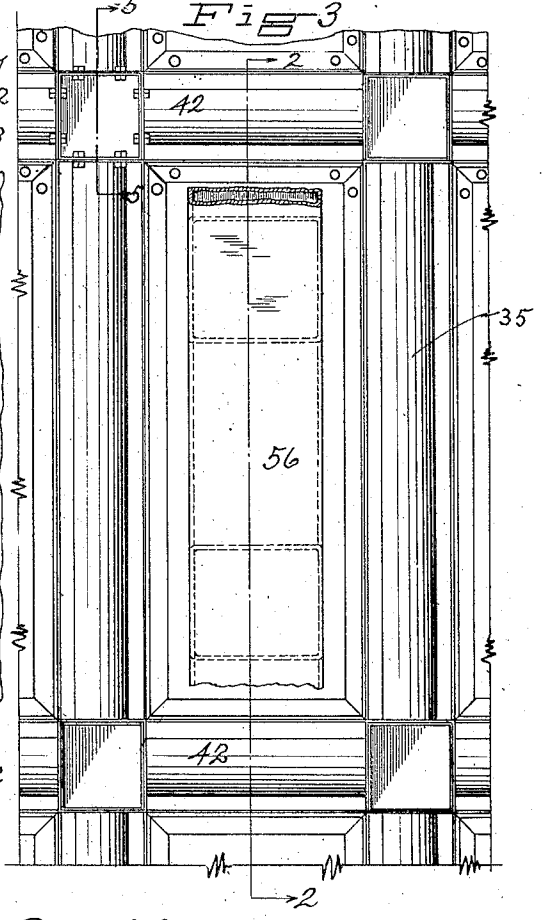


Fig 3



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Patented July 16, 1929. 1,720,958

UNITED STATES PATENT OFFICE.

DAVID S. JACOBUS, OF MONTCLAIR, NEW JERSEY, ASSIGNOR, BY MESNE ASSIGNMENTS, TO FULLER LEHIGH COMPANY, A CORPORATION OF DELAWARE.

AIR-COOLED FURNACE WALL.

Application filed September 25, 1926. Serial No. 137,701.

This invention relates to a furnace wall that is cooled by air and will be understood from the description in connection with the accompanying drawings, in which Fig. 1 is a vertical section through an embodiment of the invention; Fig. 1[a] is a fragmentary vertical section showing a portion of the wall and the casing in a different plane from that along which Fig. 1 is taken; Fig. 1[b] is also a fragmentary vertical section similar to Fig. 1[a], but taken in a different plane and illustrating the inlet from the conduit 56 to the space between the wall and casing; Fig. 2 is a section along the line 2—2 of Fig. 3; Fig. 3 is a side view of the wall, partly broken away; Fig. 4 is a section along the line 4—4 of Fig. 1 and Fig. 5 is a section along the line 5—5 of Fig. 3.

In the drawings reference character 10 indicates a furnace that is provided with a fuel burner 11 at the top thereof. A boiler having inclined tubes 12 connected to headers 13 and 14 is located above the furnace. The headers 13 and 14 are connected by nipples and tubes in a well-known manner to the drum 15, and baffles 16 are provided across the inclined tubes to direct the hot products of combustion from the furnace, as indicated by the arrows. A pipe 17 leads from the water space of the drum 15 to a header 18 located in front of the front wall of the furnace. A row of tubes 19 passes from the header 18 through the front wall of the furnace and across the lower portion of the furnace to form a water screen. These tubes pass upwardly along the inside of the rear wall of the furnace and outwardly through the wall to the header 20. Tube connections 21 lead from the header 20 to the steam space of the drum 15.

The walls of the furnace may be made up of horizontal rows of brick 24 and horizontal rows of tile 25 interspersed between the rows of brick. Openings 26 for the introduction of air are provided in the front wall of the furnace. Openings 27 having cover plates thereover are provided at the bottom of the furnace for removing the ashes. The outside of the brick wall is covered with material 28 that is impervious to air for the purpose of preventing leakage of air into the furnace, or leakage of hot products of combustion through the walls of the furnace. This layer of impervious material may be a glazed coating of any suitable sort, such as a low fusing glass or enamel, for example. Instead of using the glass or enamel, the brick wall may be coated with metal after the wall is built, or, instead of using brick, the wall may be made of glazed tile and mortar joints between the same may be covered with the impervious material.

The edges of the rows of tile 25 extend outwardly beyond the edges of the brick 24, and a casing surrounds the outside of the wall to provide an air passage between it and the wall. This casing may be made of two sets of plates 30 and 31, with insulating material 32, such as fire backing, or the like, between them. Vertical supports 33 are spaced apart a short distance from the wall, and the sides of the plates 30 and 31 are bent outwardly and attached to the supports 33, as indicated at 34. The outside edges of the supports 33 project beyond the insulating material 32, and these edges are covered by means of metal caps 35 that are U-shaped in cross-section, and insulating material 36 is enclosed in these metal caps. Horizontally-disposed I-beams 37 are attached to the supports 33 by means of angle irons 38, in the same planes as the rows of tile 25. Horizontal supports 39 are attached to the flanges of the I-beams 37 by angle irons, as shown at 40, and the outer edges of these supports 39 extend beyond the insulating material 32. The ends of the plates 30 and 31 are bent outwardly and attached to the edges of the supports 39, as shown at 41. Metal caps 42 U-shaped in cross section extend over the edges of the supports 39 and enclose insulating material 43. In this manner the casing is well insulated against the passage of heat therethrough, and is also made air-tight. Horizontally disposed angle irons 44 extend across and are riveted to the plates 30 for strengthening the same.

Metallic bulb pieces 50 are provided with hooks 51 to hang over the edges of the flanges of the I-beams 37, and their bulbed portions 52 extend into grooves 53 in the sides of the tile 25, thus maintaining the wall at the desired distance from the casing. The bulbed portions of the pieces 50 fitting in the grooves in the tile 25 permit the same to move up and down, due to expansion and contraction, and the pieces 50 can slide along the I-beams 37 so that the wall is permitted to move slightly in vertical and horizontal directions, relative to the casing.

A fan 55 for forcing air into the furnace is located at any convenient place, and a conduit 56 leads therefrom to the rear side of the rear wall of the furnace. Branches 57 extend from the conduit 56 into the space between the casing and the rear wall, and the extending edges of the tile 25 serve to guide the air from the branches 57 around the sides of the wall, as indicated by dotted lines in Fig. 1, to the front where air enters through the openings 26 into the furnace.

By this invention air can be introduced between the casing and the walls of the furnace and become heated as it passes around the furnace, to the front where the hot air enters the furnace and is used for combustion purposes. The layer of impervious material on the outside of the walls prevents infiltration of air that might interfere with combustion results, and also prevents escape of hot gases through the wall in case the pressure inside the furnace is higher than that outside of it.

I claim:

1. In a furnace, a wall of refractory material having on its outer side material substantially impervious to air, a casing outside of said wall and spaced therefrom, and means to connect said wall and casing constructed and arranged to permit relative movement between said wall and said casing in their respective planes, and means for introducing air into the space between said wall and said casing.

2. In a furnace, a wall comprising rows of brick and rows of tile, the edges of the tile extending beyond the edges of the brick, heat resisting air impervious material on said wall, a casing spaced from said wall, means comprising said tile and defining a plurality of conduits located between said wall and said casing, a plurality of passages passing through the outer casing and communicating with the respective conduits at one side of the furnace wall, means for forcing air into the respective conduits, passages extending through said wall at another side of the furnace from said first mentioned passages, whereby the air flows from said first mentioned passages from the furnace wall in a plurality of streams to the second mentioned passages and to the furnace chamber.

3. In a furnace, a wall comprising rows of tile, the edges of the tile extending beyond the side of the wall, a continuous layer of heat resisting air impervious material over said wall, a casing spaced from and surrounding said wall, means to introduce air under pressure between said wall and casing at the rear of said furnace and pass it around the sides thereof between said rows of tile to the front of said furnace, the front furnace wall being provided with openings through which the air is introduced to the furnace chamber, and means for connecting said wall and said casing for holding them in spaced relation.

4. In a furnace, a wall comprising rows of tile, the edges of the tile extending beyond the side of the wall, a continuous layer of heat resisting air impervious material over said wall, a casing spaced from and surrounding said wall, means to introduce air under pressure between said wall and casing at the rear of said furnace and pass it around the sides thereof between said rows of tile to the front of said furnace, the front furnace wall being provided with openings through which the air is introduced to the furnace chamber, and means for connecting said wall and said casing for holding them in spaced relation and constructed and arranged to permit relative movement between the wall and casing in their respective planes.

5. In a furnace, an inner wall the outer side of which is provided with a continuous glazed coating substantially impervious to gases, an outer wall, means for holding said inner and outer walls in spaced relation and constructed and arranged to permit relative movement between said wall and said casing in their respective planes, and means for conducting air between said walls and said casing to the furnace chamber.

6. In a furnace, a wall comprising rows of tile, the edges of the tile extending beyond the side of the wall, the outer side of said wall being provided with a continuous glazed coating substantially impervious to gases, a casing spaced from said wall, means attached to said tile for holding said wall and casing in spaced relation and constructed and arranged to permit relative movement between said wall and said casing in their respective planes, and means for conducting air between said wall and said casing to the furnace chamber.

7. In a furnace, a wall comprising a row of tile, the edges of the tile extending beyond the side of the wall, the outer side of said wall being provided with a continuous glazed coating substantially impervious to gases, a casing spaced from and surrounding said wall, means for introducing air between said wall and casing at the rear of said furnace and passing it around the sides thereof between said rows of tile to the front of said furnace, the front wall of the furnace being provided with openings through which the air is introduced to the furnace chamber, and means for connecting the wall and casing for holding them in spaced relation and constructed and arranged to permit relative movement between said wall and said casing in their respective planes.

DAVID S. JACOBUS.