H. R. STRAIGHT.

FURNACE FOR BRICK AND TILE KILNS.

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1,411,534. Patented Apr. 4, 1922.

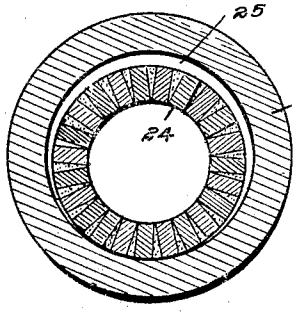


Fig. 3.

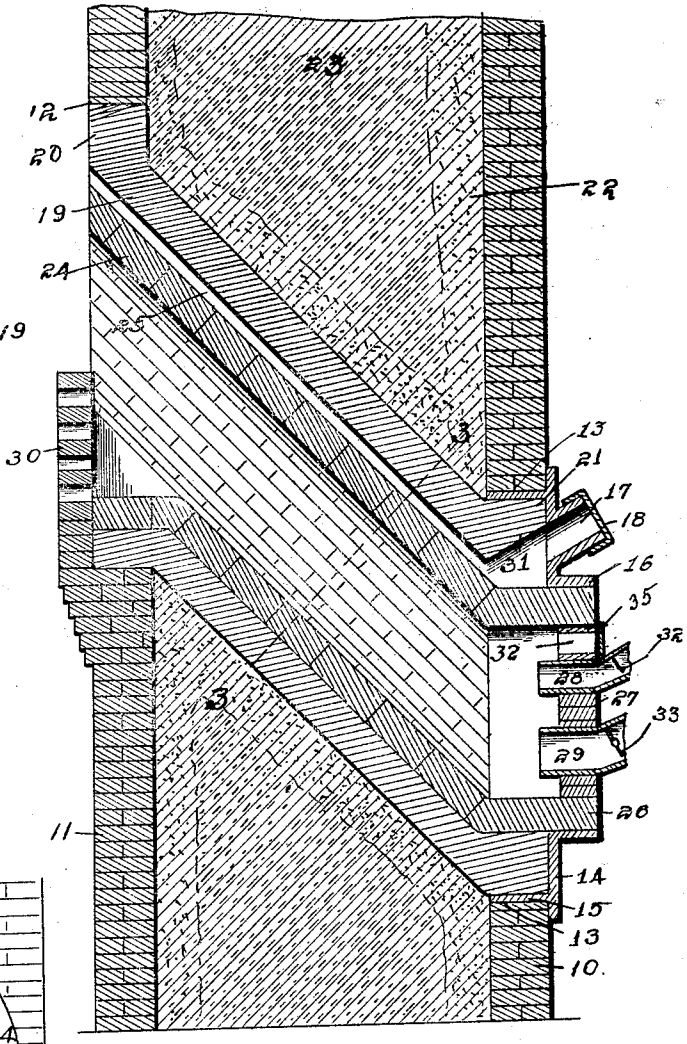


Fig. 1.

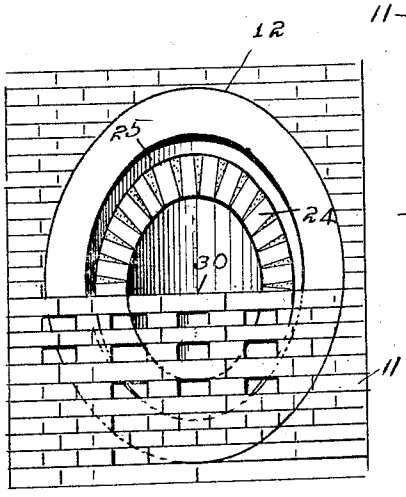


Fig. 2.

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FURNACE FOR BRICK AND TILE KILNS.

1,411,534. Specification of Letters Patent. Patented Apr. 4, 1922.

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To all whom it may concern:

Be it known that I, HALVER R. STRAIGHT, a citizen of the United States, residing at Adel, in the county of Dallas, State of Iowa, have invented a Furnace for Brick and Tile Kilns, of which the following is the specification.

This invention relates to furnaces for brick and tile kilns and is especially adapted for burning kilns by means of gas or liquid fuel.

An object of my invention is to provide gas burning furnaces for brick and tile kilns of simple, durable and inexpensive construction and provided with new and improved lining for the same.

A further object is to provide a new and improved furnace so constructed and arranged that the gas and air will become thoroughly mixed and of a uniform temperature before entering the kilns.

A still further object is to provide improvements in gas burning furnaces in such a manner that the linings may be cooled by air current and the said air current utilized to complete the combustion.

A further object is to provide new and improved means for controlling the temperature within the kilns.

My invention consists in the construction, arrangement and combination of the various parts of a device, whereby the objects contemplated are attained, as hereinafter more fully set forth, and pointed out in my claims and illustrated in the accompanying drawings, in which:

Fig. 1 is a central sectional view of my improved furnace showing the manner in which it is mounted in the wall.

Fig. 2 is an elevation of the inner end of the furnace showing a fragment of the wall in elevation.

Fig. 3 is a transverse sectional view taken on the line 3—3 of Fig. 1.

In the drawings I have used the reference numeral 10 to indicate the outer wall and 11 the inner wall of a brick or tile kiln. The said walls are built of any suitable fire proof material, such as brick, and are arranged in a cylindrical form, the inner wall being concentric with the outer wall.

My improved furnace may, however, be used in connection with straight walls forming rectangular kilns.

The inner wall 11 is provided with a series of elliptical openings 12, only one of which is shown in the drawings. The outer wall 10 is provided with a series of similar openings 13 and arranged in a radial line with the openings 12, but in a lower horizontal plane.

The opening 13 is provided with a metallic frame 14 having flanges 15 extending inward and designed to fit the opening 13. The frame 14 is provided with flanges 16 extending outward. The frame 14 is also provided with an inclined air passage 17, the purpose of which will be more fully set forth. The intake passage 17 is provided with a lid 18 which is detachably mounted thereon. The body portion 19 is formed cylindrical and inclined between the walls 10 and 11 with its upper end in communication with the opening 12 and the lower end in communication with the opening 13. The upper end of the body portion 19 is provided with an elliptic end flange 20 designed to fit the elliptic opening 12 of the wall 11.

The lower end of the said body portion 19 is provided with a similar elliptical flange 21 designed to fit the inner face of the flange 13 of the metallic frame 14.

Thus it will be seen that I have provided an inclined tube of fire proof material designed to be permanently mounted in said wall members and to form a part of said wall construction. The top of the opening 13 is below the bottom of the opening 12.

The space between the wall members 10 and 11 is filled with a loose heat insulating material 22, such as dry ashes or asbestos. the said insulating material being packed around the tube 19. To relieve the tube 19 from a portion of the weight of the insulating material it may be desirable to form a core 23 by mixing a certain per cent of a suitable cement with the insulating material. The said core 23, however, should be made considerable smaller than the space between the walls and the tube 19. The said space should be filled with loose material as above described.

By this arrangement I have constructed a wall that is capable of considerable expansion and contraction without injury thereto and at the same time capable of properly insulating the heat. To protect the tube 19 against intense heat, I have provided a lining tube 24 formed cylindrical and of fire brick. This tube 24 is arranged eccentrically

within the tube 19 and rests on the bottom of said tube, as clearly illustrated in Fig. 3. The said tube 24 is of such diameter as to form an air space 25 between the said tubes, the upper end of the air space 25 and the tube 24 being in communication with the inside of the kiln. The end of the tube 24 is provided with a horizontal portion 26 formed of fire brick and is designed to terminate in the flange portion 16 of the frame 14.

Thus it will be seen that the lower end of the tube 24 will be rigidly held in shape and also in position relative to the tube 19.

The lower end of the tube 19 is provided with the end wall 27 having an opening 32ª and provided with the air pipe 28 and a gas pipe 29, as clearly illustrated in Fig. 1.

The gas pipe 29 is placed under the air pipe 28 for the purpose of permitting the air and gases to mix more readily, due to the fact that the gas is lighter than the air and will have a tendency to raise to the top of the tube. A baffle 30 is formed in the wall 11 adjacent to the upper ends of the tubes 19 and 24, as clearly shown in Figs. 1 and 2, and is built of spaced fire bricks in the usual manner. This baffle may, however, be placed in the end of the said inner tube, instead of adjacent to the end, as illustrated. The lower end of the tube 19 is cut away, at 31, to form an air passage, to permit communication between the air passage 25 and the air intake 17.

When the kiln has been filled with ware to be burned, the cap 18 is placed over the member 17 and a torch is placed through each of the openings 32. The air and gas is then turned into the tube 24 by means of the pipes 28 and 29 and regulated by valves 32 and 33. The gases will then become ignited. The torches are left in position until the kiln has thoroughly filled with heated gases, after which the torches are removed and the opening 32 closed by a suitable valve 35. The tubes 19 and 24 are of such diameter as to permit the gases to pass upward comparatively slow. This gives them plenty of time to mix within the tube before entering the kiln. The amount of gas, however, is in excess of the amount of air necessary for completing the combustion within the tube 24. This is for the purpose of causing a long flame to enter the kiln, the combustion of which will be completed by outside air going through the cracks and peek holes and also by means of an air current which may be permitted to pass through the passages 17 and 25. The air, as it travels through the passage 25 will become heated by engaging the lining 24 and delivered to the interior of the kiln in a pre-heated state.

As the air and gas enter the tube through the pipes 28 and 29 the gas will have a tendency to raise through the air and become mixed. Not all of the gases within the tube 19, however, will become heated to an even temperature, due to the fact that the combustion is incomplete within the said tube, the cooler gases will settle along the bottom of the tube 19 and have a tendency to move towards the lower end. They will, however, be moved upwardly through the operation of the current from the pipes 28 and 29. The cooler gases will be caused to engage the baffle 30 which is heated by means of the flame within the kiln. This will cause the cooler gases to become heated before they enter the said kiln. The gases therefore enter the kiln at a comparatively uniform temperature, and for that reason the temperature within the kiln may be more easily controlled and kept uniform.

The length of the flame may be regulated by proportioning the amount of gas to the amount of air, by means of the valves 32 and 33, and the air required to complete the combustion may be supplied through the tube 17 and the passage 25.

It will be seen from the drawings that the top of the lower end of the air space 25, formed by the tubes 19 and 24, is lower than the bottom of the upper end of said air space. If both ends of said air space were level the cold air from the passage 17 would flow into the kiln and down the inside of the inner wall, without mixing with the unburned gases, and would also cool the ware to be burned adjacent to said inner wall. By inclining the tubes and said air space 25, a sort of air trap is formed, permitting air to enter only as it is headed and raises to the interior of the kiln to aid in combustion, the same action is more or less true on the inside of the tube 19 while the valve 35 is open.

It is not my intention to use a forced draft, or apply pressure, but rather use a natural draft, allowing the gases to thoroughly mix and raise to the top of the kiln, after which the gases are drawn down through the ware to be burned and through a perforated floor in the bottom of the kiln, the draft being produced by a suitable stack operatively connected with the said floor.

It will also be seen that the movement of the air between the tubes 19 and 24 will have a tendency to cool the tube 24 and prevent them from being burned out, thereby eliminates the necessity of replacing the lining very often. When the lining 24 becomes burned out, it may be quickly and easily replaced without destroying the wall construction.

It will therefore be seen that I have provided a furnace of simple, durable, and comparatively inexpensive construction, which may be easily replaced when burned out, and which will enable the operator to very accurately control the temperature within the

kiln, and will produce the maximum amount of heat from the fuel consumed.

I claim:

1. A furnace for brick and tile kilns, comprising a downwardly and outwardly inclined tube through the wall of said kiln, and having means at the lower and outer end for feeding combustible gases, and at its upper and inner end means for mixing said gases as they enter the kiln.

2. In a furnace construction for brick and tile kilns, a wall, a downward and outward inclined tube through said wall, the upper end of which is provided with a baffle and the lower end with means for feeding combustible gases to the lower end of said tube.

3. In a furnace construction for brick and tile kilns, a wall, downward and outward inclined inner and outer tubes through said wall, the upper end of said tubes being provided with a baffle and the lower end of said inner tube with means for feeding combustible gases to said inner tube.

4. In a furnace construction for brick and tile kilns, an inner wall, an outer wall spaced from the inner wall, a tube inclined downward and outward through said walls, the upper end of said tube being provided with a baffle and the lower end with means for feeding combustible gases to said tube.

5. In a furnace construction for brick and tile kilns, an inner wall, an outer wall spaced from the inner wall, a tube inclined downward and outward through said walls, the upper end of said tube being provided with a baffle and the lower end with means for feeding combustible gases to said tube, the space between said walls being filled with a loose heat insulating material.

6. In a furnace construction for brick and tile kilns, an inner wall, an outer wall spaced from the inner wall, a tube inclined downward and outward through said walls, a second tube arranged eccentrically within said first tube, the upper ends of said tubes being provided with a baffle and the lower end of the inner tube being provided with means for feeding combustible gases to said inner tube.

7. In a furnace construction for brick and tile kilns, an inner wall, an outer wall spaced from the inner wall, a tube inclined downward and outward through said walls, a second tube arranged eccentrically within said first tube, the upper ends of said tubes being provided with a baffle and the lower end of the inner tube being provided with means for feeding combustible gases to said inner tube, the lower end of the spaces between the inner and outer tubes being in communication with an adjustable air supply for the purpose stated.

8. In a furnace construction for brick and tile kilns, an inner wall, an outer wall spaced from the inner wall, a tube inclined downward and outward through said walls, a second tube arranged eccentrically within said first tube, the upper ends of said tubes being provided with a baffle and the lower end of the inner tube being provided with means for feeding combustible gases to said inner tube, the lower end of the spaces between the inner and outer tubes being in communication with an adjustable air supply for the purpose stated, and means for adjusting said air supply.

9. In a furnace construction for brick and tile kilns, an inner masonry wall provided with an opening having a baffle at its lower side, an outer masonry wall spaced from said inner wall, and provided with an opening, a metallic frame for the opening of said outer wall, inclined tubes arranged eccentrically one within the other and connecting the metallic frame at their lower ends, and with the opening in the inner wall at their upper ends, the metallic frame being provided with an air control in communication with the passage between the said tubes, and means for supplying air and combustible gases to the said inner inclined tube for the purpose stated.

10. A kiln construction comprising a wall, a downward and outward inclined tube formed integral and fire proof, in said wall, a second tube arranged longitudinally and eccentrically within the first tube and formed of fire proof masonry, a baffle adjacent to the lower side of the upper ends of said tubes, the lower end of said inner tube being provided with means for supplying combustible gases to said tube, and controlling means for admitting air to the space between said tubes, for the purpose stated.

11. In a furnace construction for brick and tile kilns, a wall, a downward and outward inclined tube through said wall, the upper side of the lower end of said tube being lower than the lower side of the upper end, the upper end of said tube being provided with a baffle and the lower end with means for feeding combustible gases to said tube.

12. In a furnace construction for brick and tile kilns, a wall, downward and outward inclined inner and outer tubes through said wall, the upper sides of the lower ends of said tubes being lower than the lower side of the upper ends, the upper ends of said tubes being provided with a baffle and the lower end of the inner tube with means for feeding combustible gases to said inner tube.

13. In a furnace construction for brick and tile kilns, an inner and outer wall, downward and outward inclined, eccentric tubes through said walls, the said tubes being one within the other, the upper side of the lower ends of said tubes being lower than the lower side of the upper ends, a baffle adjacent to the upper ends of said

tubes and means for supplying combustible gases to the lower end of said inner tube.

14. In a furnace construction for brick and tile kilns, an inner and outer wall, downward and outward inclined, eccentric tubes through said walls, the said tubes being one within the other, the upper side of the lower ends of said tubes being lower than the lower side of the upper ends, a baffle adjacent to the upper ends of said tubes and means for supplying combustible gases to the lower end of said inner tube, and a heat insulating filler between said inner and outer walls.

15. In a furnace construction for brick and tile kilns, an inner and outer wall, downward and outward inclined, eccentric tubes through said walls, the said tubes being one within the other, the upper side of the lower ends of said tubes being lower then the lower side of the upper ends, a baffle adjacent to the upper ends of said tubes, means for supplying combustible gases to the lower end of said inner tube, a heat insulating filler between said inner and outer walls, and adjustable air supply in communication with the lower end of the space between the inner and outer tubes for the purpose stated.

16. In a furnace construction for brick and tile kilns, a wall, a downward and outward inclined tube through said wall, the upper side of the lower end of said tube being lower than the lower side of the upper end, means for feeding combustible gases to the lower end of said tube, and means for controlling the flow and mixture of said gases.

HALVER R. STRAIGHT.