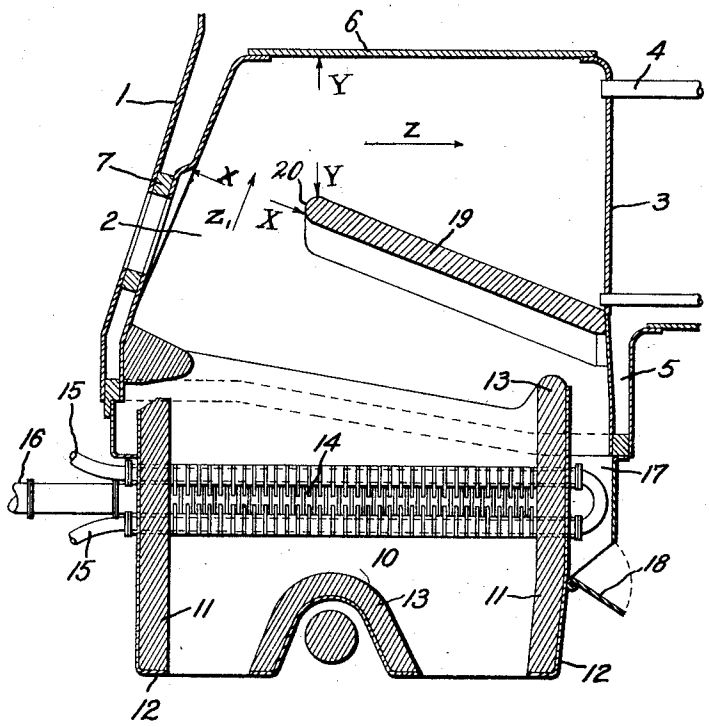
March 29, 1932. W. KLEINOW 1,851,772

FURNACE

Filed Oct. 22, 1929



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UNITED STATES PATENT OFFICE

WALTER KLEINOW, OF HENNIGSDORF, NEAR BERLIN, GERMANY

FURNACE

Application filed October 22, 1929, Serial No. 401,549, and in Germany May 1, 1925.

The subject matter of this application was originally disclosed and claimed in the joint application of myself and Albert Morgenroth, Friedrich Reinhardt and Wilhelm Bauer, Serial No. 178,073, filed March 24, 1927, now Patent No. 1,739,035, dated December 10, 1929.

The invention relates to furnaces, and especially to furnaces for burning pulverulent fuel, although it is not limited thereto necessarily, and has for its object to provide an improved construction and arrangement in a furnace of this type.

For a consideration of what I believe to be novel and my invention, attention is directed to the following specification and the claim appended thereto.

In the drawing, the figure is a vertical sectional view of a furnace structure embodying the invention.

Referring to the drawing, 1 indicates the outer shell of a boiler, a portion of the boiler only being illustrated, 2 indicates the fire box, and 3 indicates the rear wall or back tube plate. The usual tubes in the back tube plate are indicated at 4. The tube plate 3 is provided with a downward extension which forms a water leg 5. 6 indicates the crown sheet or ceiling of the boiler, and 7 indicates a fire door ring in the front wall or outer shell of the fire box. Below the fire box 2 is a combustion chamber 10, the walls 11 of which are supported by the ash tray 12 and extend vertically upward partly into the fire box 2 as is indicated at 13.

Extending along each side of the combustion chamber is a primary burner 14 to which cooling fluid is supplied by conduits 15 and to which fuel and air are supplied by a conduit 16. This burner may be of any suitable construction. It is indicated diagrammatically as being of the construction disclosed in our parent application above referred to. 17 indicates a passage through which air is supplied to the fire box, the opening to the passage being controlled by a hinged door 18.

The present invention relates particularly to an arrangement for preventing the formation of slag. According to the invention I provide in the fire box an arch 19 which may be supported in any suitable manner. This arch is designed with particular consideration of the tendency to form slag nests at the rear face of the tube plate 3. To this end the arch is made longer than the normal arch, and its inclination is less steep. The arrangement is such that the area (indicated by the arrows x—x) between the front wall and the rear edge 20 of the arch is smaller than the area between its rear edge and the crown sheet 6 (indicated by the arrows y—y). Heretofore the velocity of the gases obtained their maximum after they had passed through this area and assumed the horizontal direction of flow indicated by the arrow Z_1, but, with the relative areas as designated in the present instance, the velocity of the gases will be at maximum when flowing through the area x—x (indicated by the arrow Z_1), and will decrease when the gases are deflected horizontally. In other words, the free area x—x forms a nozzle-like constriction in the path of the flames which latter occupy the entire area of the lower part of the fire box. This constriction causes an acceleration of liquid and solid particles contained in said flames whereby said particles are hurled against the ceiling of the fire box. The separation of said particles from the gaseous material before the flames reach the tube wall 3 is further improved by the inclined arrangement of the arch such that the cross sectional area y—y is larger than that of x—x, which consequently causes a retarded motion of the flames towards the heating tubes. With this arrangement comparatively heavy particles of slag do not follow the changed direction of the gases but move on in the direction of the arrow Z_1 and are hurled against the crown sheet 6, where they are granulated so that the gases arriving at tube plate 3 are free from slag in plastic condition, and therefore nests will not form on the tube wall. It will thus be seen that by the improved arrangement I am enabled to free the gases from slag in a plastic condition.

What I claim as new and desire to secure by Letters Patent of the United States is:

A fire box comprising front, rear and side walls and a ceiling, pulverulent fuel feeding

means provided along said side walls whereby the produced flames occupy the entire lower space of said fire box, heating tubes communicating with the fire box, said rear wall being provided with openings for said heating tubes, and means causing an accelerated motion of liquid and solid particles contained in the flames in the direction to the front part of said ceiling and a retarded motion in the direction to said rear wall and tubes, said means comprising an arch inclined towards the ceiling and extending from said rear wall towards said front wall and leaving a free space between its free edge and said front wall which is narrower than the space formed between its free edge and said ceiling.

In witness whereof, I have hereunto set my hand this 5th day of October, 1929.

WALTER KLEINOW.