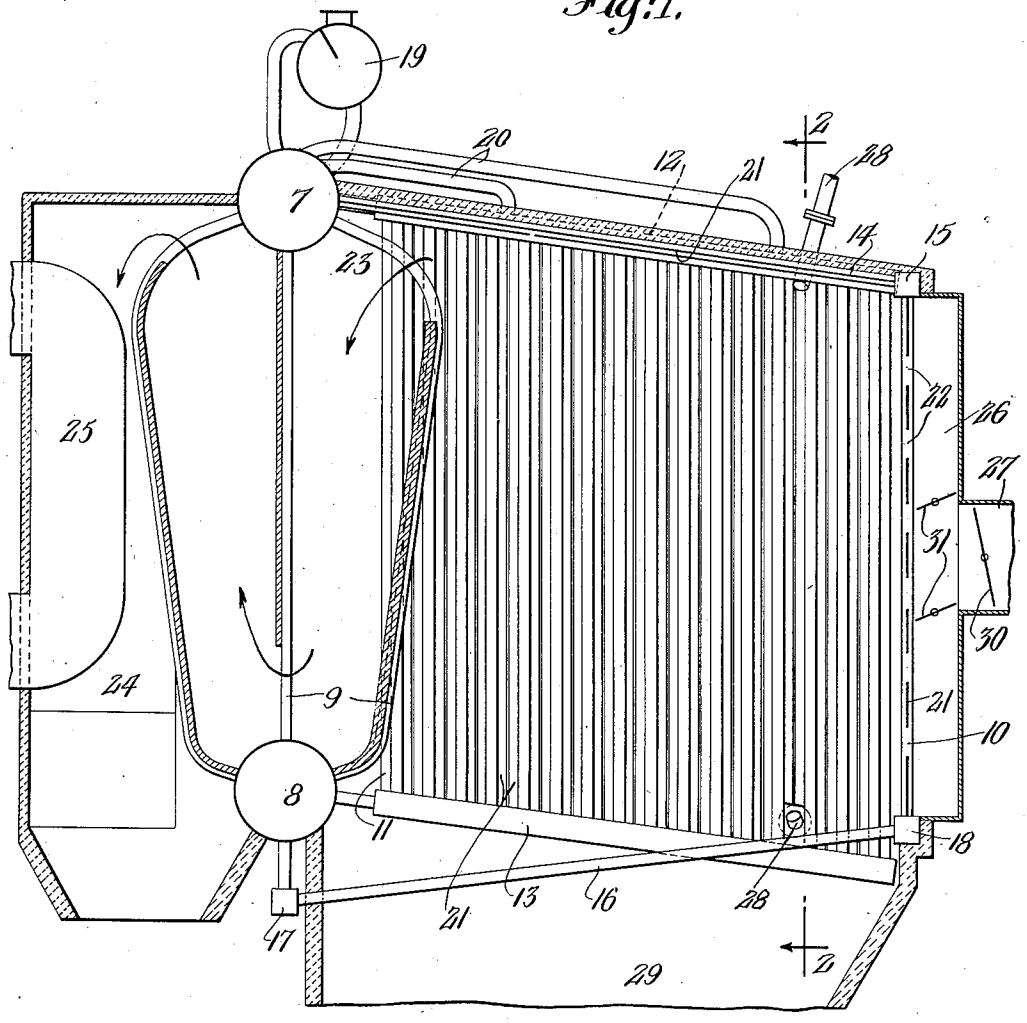
Feb. 10, 1931. O. DE LORENZI 1,792,104

PULVERIZED COAL BURNING BOILER FURNACE

Filed June 18, 1926 2 Sheets-Sheet 1

Fig. 1.



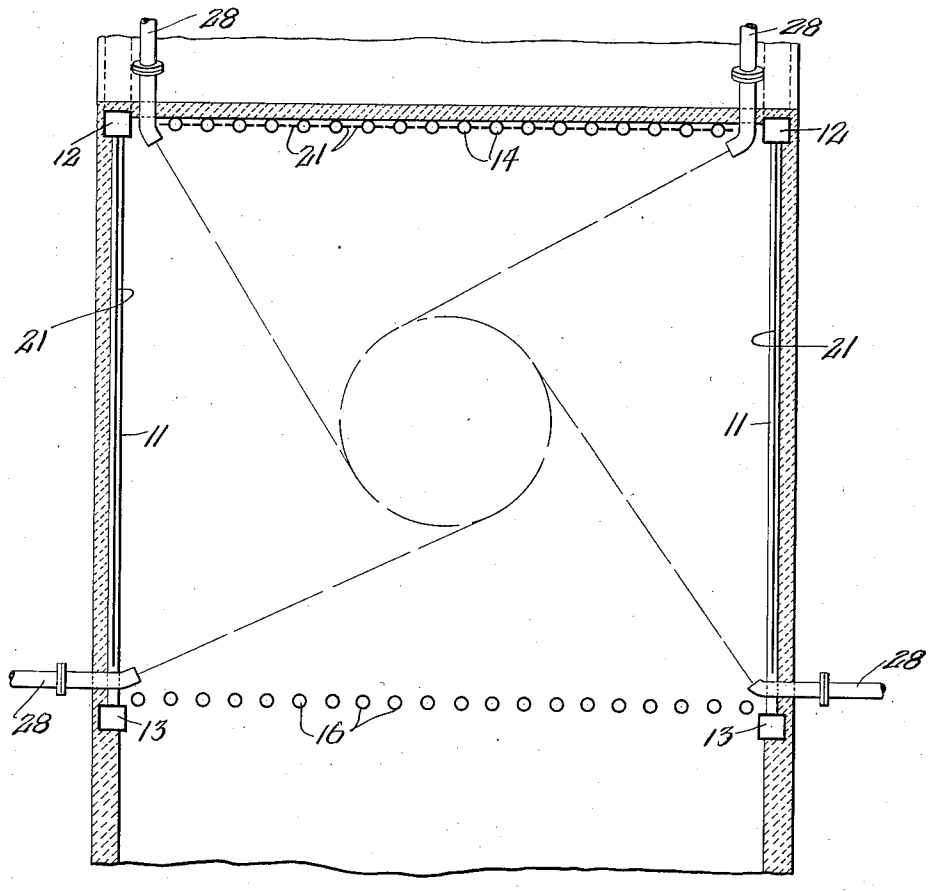
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Fig: 2.



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Patented Feb. 10, 1931 1,792,104

UNITED STATES PATENT OFFICE

OTTO DE LORENZI, OF MAPLEWOOD, NEW JERSEY, ASSIGNOR TO INTERNATIONAL COMBUSTION ENGINEERING CORPORATION, OF NEW YORK, N. Y., A CORPORATION OF DELAWARE

PULVERIZED-COAL-BURNING BOILER FURNACE

Application filed June 18, 1926. Serial No. 116,817.

This invention relates to boiler-furnaces and to the firing of the same, and is especially useful where the fuel is to be burned in space, as, for example, when the fuel is in the form of powdered coal.

One of the primary objects of my invention is to efficiently fire a boiler of this character.

The foregoing, together with such other objects and advantages as may hereinafter appear, or are incident to my invention, I obtain by means of a construction which I have illustrated in the preferred form in the accompanying drawings, wherein—

Fig. 1 is a vertical section through a boiler-furnace embodying my improvements, and

Fig. 2 is a section taken on the line 2—2 of Fig. 1.

Referring now to the drawings, it will be seen that the boiler is in the shape of a furnace, that is to say, the boiler defines its own combustion chamber. This boiler comprises the drums 7 and 8 and the bank of upright connecting tubes 9 located at the rear; the row of upright tubes 10 constituting the front wall of the combustion chamber; the rows of side tubes 11, the upper ends of which are connecting into the headers 12, and the lower ends of which are connected into the headers 13, such headers 12 and 13 being respectively connected to the drum 7 and the drum 8; the row of roof tubes 14 connected to the drum 7 and to the header 15, to which latter header the upper ends of the row of tubes 10 are connected; the row of spaced tubes 16, the rear ends of which are connected into the header 17, in turn connected to the drum 8 and the forward ends of which are connected into the header 18, to which, also, the lower ends of the tubes 10 are connected; the steam drum 19 and the tubes 20 connected to the headers 12 for purposes which will hereinafter appear. The tubes 10, 11 and 14 are provided with longitudinally extending fins 21, to the end that substantially continuous metallic walls are provided which define the combustion space. The fins on the tubes 10 are interrupted at intervals to provide inlet openings 22 for combustion air, as will further appear.

The bank of tubes is baffled in any suitable way, but it is preferred that it shall be so baffled as to provide an outlet 23 from the top of the combustion space defined by the front row of the bank of tubes 9 and the tubes previously described. The course taken by the gaseous products of combustion is indicated by the arrows.

In the offtake 24 of the installation I locate an air heater 25 by means of which the air for combustion supplied to the combustion space is highly preheated.

This air is supplied from the air heater to a casing or box 26 at the front of the boiler-furnace by means of the conduit 27 only a portion of which appears in the drawings.

The powdered coal is admitted to the combustion space near the front wall at the four corners by means of the burners 28 which are so disposed as to direct the fuel in streams tangential to a circle after the manner diagrammatically indicated in Fig. 2. The coal is preferably admitted at high velocity with but a small portion of the air required for combustion, the balance of the air required for combustion being admitted through the inlets 22.

By reason of this manner of admitting the coal streams, a violent swirling flame is produced, the axis of which, generally speaking, is horizontal. Because of the turbulence and intensity of combustion, combustion is completed in a comparatively short space, such combustion being normally completed within the combustion space defined by the tubes, with the waste gases passing over the bank of tubes 9, such gases, however, leaving at relatively high temperature, whereby highly preheated air for combustion may be obtained.

Because of the turbulence of combustion, practically the entire space, with the exception of the corners, is filled with flame, and the upright tubes are scoured in a direction longitudinally thereof, a feature which has a number of advantages, such, for example, as keeping the tube surfaces clean. The draft loss of the installation will also be low. The roof tubes will also be subjected more effectively to heat.

The tubes 16 are spaced sufficiently far

apart to permit refuse to freely gravitate therebetween to the ash collecting space 29.

In order to secure more uniform flow through the tubes of the side walls, the pipes 20 which take off at different points along the length of the headers 12 are provided.

For the purpose of controlling the air supply, the dampers 30 and 31 are provided, these dampers being manipulated to meet the variation in firing conditions resulting from changes in the rate of operating the boiler.

The arrangement is also one which makes it simple to install and maintain the burner equipment.

Other advantages will occur to those skilled in the art.

I claim:

1. In combination, a combustion chamber, boiler tubes defining the combustion space thereof, said chamber having an outlet at the rear thereof, and finely divided fuel burners at the front of the chamber arranged to direct fuel inwardly in a substantially vertical plane and tangent to a circle to produce a vortical flame, the axis of which is approximately horizontal.

2. In combination, a combustion chamber, tubular water walls defining the front, sides and top of the combustion space thereof, upright tubes at the rear of the chamber baffled to provide an outlet for the gaseous products of combustion, and a fuel burner adjacent each corner of the chamber at the front thereof directed inwardly and arranged in an approximately vertical plane.

3. In combination, a combustion chamber, tubular water walls defining the front, sides and top of the combustion space thereof, upright tubes at the rear of the chamber baffled to provide an outlet for the gaseous products of combustion, and a fuel burner adjacent each corner of the chamber at the front thereof directed inwardly and arranged in an approximately vertical plane, together with a screen of relatively widely spaced tubes defining the bottom of the combustion space proper, and an ash pit therebelow.

4. In combination, a furnace-shaped tubular boiler, pulverized coal burners arranged to direct coal streams inwardly into the combustion space provided by the boiler tangent to a circle to produce a vortical flame, the axis of which is approximately horizontal, means for admitting combustion air into the combustion chamber adjacent the point of fuel admission and an outlet for the gaseous products of combustion so located that the line of draft through the combustion space is substantially horizontal.

5. In combination, a furnace-shaped tubular boiler, pulverized coal burners arranged to direct coal streams inwardly into the combustion space provided by the boiler tangent to a circle to produce a vortical flame, the axis of which is approximately horizontal, means for admitting preheated combustion air into the combustion chamber adjacent the point of fuel admission and an outlet for the gaseous products of combustion so located that the line of draft through the combustion space is substantially horizontal.

6. In combination, a combustion chamber, tubular water walls defining the front, sides and top of the combustion space thereof, upright tubes at the rear of the chamber baffled to provide an outlet for the gaseous products of combustion, and a fuel burner adjacent each corner of the chamber at the front thereof directed inwardly and arranged in an approximately vertical plane, together with means for admitting preheated combustion air into the combustion chamber through the front wall thereof.

In testimony whereof I have hereunto signed my name.

OTTO DE LORENZI