H. J. PARKER.

AIR PREHEATER FOR FURNACES.

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907,395. Patented Dec. 22, 1908.

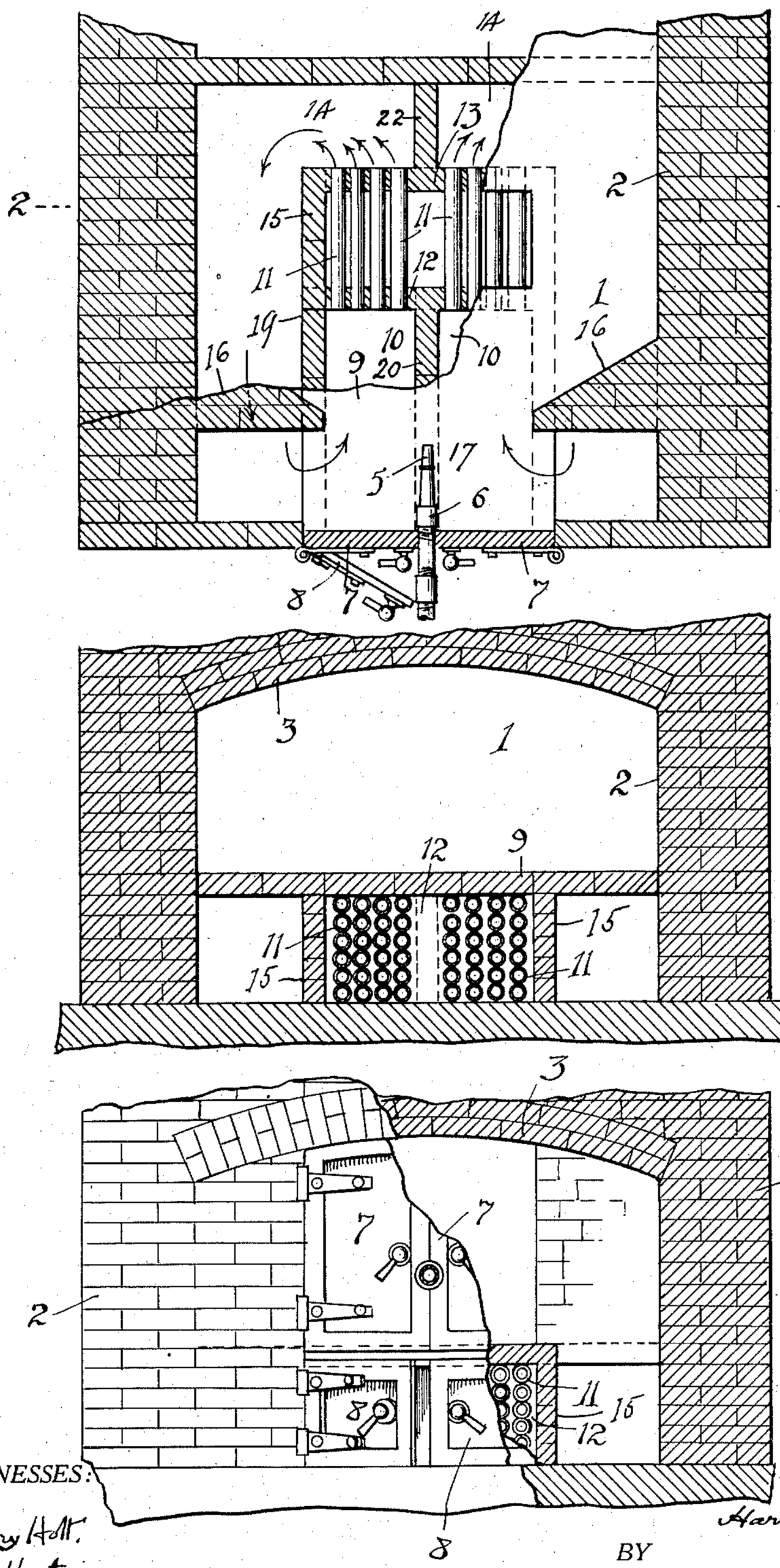

Fig. 1

Fig. 2

Fig. 3

WITNESSES:

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AIR-PREHEATER FOR FURNACES.

No. 907,395. Specification of Letters Patent. Patented Dec. 22, 1908.

Application filed March 13, 1908. Serial No. 420,828.

To all whom it may concern:

Be it known that I, HARRY J. PARKER, a citizen of the United States, residing at Oakland, in the county of Alameda and State of California, have invented new and useful Improvements in Air-Preheaters for Furnaces, of which the following is a specification.

The object of the present invention is to provide an improved apparatus for use in furnaces, and especially in oil burning furnaces, for the purpose of heating the air of combustion before it passes to the burner.

Apparatus heretofore provided for this purpose has been found to be comparatively inefficient in that the air is not raised to a sufficiently high temperature. The object of the present apparatus is to pre-heat the air much more highly than heretofore, thus burning the oil with greater economy and efficiency.

In the accompanying drawing, Figure 1 is a broken horizontal section of the furnace, partly above and partly below the floor of the furnace proper; Fig. 2 is a vertical transverse section on the line 2—2 of Fig. 1; Fig. 3 is a broken front view of the furnace.

Referring to the drawing, 1 indicates the combustion chamber of a furnace, having suitable walls 2 and an arched top 3. An oil supply pipe 6, which terminates in a nozzle 5, passes between upper doors 7, which, in the ordinary operation of the furnace, are maintained closed, so that no air can pass therethrough, but the air for combustion is supplied through open lower doors 8 below the upper doors. The floor 9 of the combustion chamber is spaced from the bottom of the furnace, and the furnace has abutments 16 extending inwards from its side walls and dividing the combustion chamber 1 from the front burner chamber 17. Said floor 9 extends under the whole of the combustion chamber except for an aperture located substantially centrally therein, but the front portion of the floor, in the burner chamber, extends only under the mediate portion of said burner chamber. Around said aperture, and between the floor 9 and the bottom of the furnace, are a front wall 12, a rear wall 13, and side walls 15, forming a well, extending from the bottom of the furnace to said floor 9. Side walls 19 extend from the front of the furnace below the floor and in line with the side walls of the well, and a central wall 20 leads from the front wall of the furnace to the front wall of the well, thus dividing the space between the walls 19 into air supply chambers 10. The side walls 19 and 15 are spaced from the side walls of the furnace, and the rear wall 13 of the well is spaced from the rear wall of the furnace but is connected to said rear wall by a central wall 22 to form return air conduits 14. Said air conduits lead to the front of the furnace below the abutments 16 and communicate with burner chamber over the edges of the floor in said chamber. Arranged longitudinally in said well are a considerable number of pipes 11 of refractory material, the ends of the pipes being inserted in the front and rear walls of the well, and thus leading from the air chambers 10 in front to the return air conduits 14 at the rear.

The walls 12, 13, and 15, as well as the pipes 11, are all below the floor 9 of the furnace, so that said walls form a well below said furnace in which the pipes 11 are exposed to radiant heat from the flames of the furnace at substantially its hottest point.

By means of this construction, the air is divided into comparatively small separate streams and receive the full benefit of the radiant heat from the furnace. In all prior constructions so far as my knowledge extends although the temperature in the furnace might be from 3,500 degrees Fahrenheit upwards, the air would not be raised to a higher temperature than 400 degrees Fahrenheit at the time it arived at the burner, while I find that, with my improved apparatus, the temperature of the air is raised to about 1500 degrees Fahrenheit. The effect of this is that the oil is more completely vaporized and the combustion is more perfect, so that a saving in fuel is effected of about 40 per cent. Moreover the efficiency of a furnace of a given size is greatly increased, owing to the fact that a greater amount of fuel can be vaporized and burned, and therefore a much greater heat obtained.

An important advantage of this invention is that it prevents leakage which, with furnaces at present in use, takes place owing to the too rapid contraction and expansion of the boilers, due to the influx of cold air which freely impinges against the boiler surface, when the fire is extinguished, or of hot gases when starting. With the present arrangement, all of the air or gas is compelled

to pass through the finely divided conduits of refractory material before passing to the boiler, so that the temperature of the air or gases becomes modified before they reach the boiler, so that contraction and expansion of the boiler take place more gradually and evenly.

A very important result attained by the use of this invention is that, owing to the very high temperature to which the air of combustion is raised before being supplied to the burner, a very low grade of oil can be used in the burner, as the oil is entirely vaporized owing to the intense heat of the surrounding air supplied thereto, and the asphaltum, which forms the base of California oils, instead of falling down, as in furnaces at present in use, is, in my improved furnace, entirely consumed, so that the entire fuel value of the oil is utilized in the furnace. The intense heat of the air of combustion, which effects the above result, is due to the construction by which the air of combustion is exposed in a large number of comparatively small streams to the heat of the furnace. Another advantageous result attained by the present invention is that the temperature in the stack is greatly reduced. Thus, whereas with ordinary furnaces, burning substantially the same amount and character of fuel, the stack temperature is between 700 and 800 degrees Fahrenheit, it is found that the stack temperature in my improved furnace is from 350 to 450 degrees Fahrenheit. This is believed to be due to the fact that the combustion is concentrated in, or confined to, the furnace itself, so that the heating effect in the stack is reduced.

The arrangement above described is particularly advantageous, for the reason that the air supply is in front of the furnace, immediately below the burner, and can be quickly regulated with the burner. By causing the air to pass through the pipes of refractory material below substantially the hottest point of the flame, and then return by the side air chambers, the air is thoroughly mixed before being supplied to the burner and is supplied thereto at substantially constant temperature. At the same time the heat is maintained in the furnace in the most efficient manner possible.

I claim:—

A furnace having side, front and rear walls, a floor spaced from the bottom of the furnace, abutments extending inwards from said walls to divide the space above the floor into a front burner chamber and a rear combustion chamber, said floor extending under the whole of the combustion chamber except for a centrally located aperture, and the front portion of the floor extending only under the mediate portion of the burner chamber, front, rear, and side walls extending downwards from around said central aperture in the floor to form a well, side walls extending from the front of the furnace, below the floor, and in line with the side walls of the well, and forming an air inlet chamber, said side walls and those of the well and the rear wall of the well being spaced from the walls of the furnace to provide return air passages beneath said abutments leading to the front of the furnace, and communicating with the burner chamber over the edges of the floor therein, a plurality of pipes of refractory material arranged longitudinally in said well, their ends being inserted in the front and rear walls thereof, and a door at the front of the furnace opening into the air inlet chamber for controlling the quantity of air admitted thereto, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

HARRY J. PARKER.

Witnesses:
F. M. Wright,
D. B. Richards.