Sept. 30, 1930. T. E. MURRAY 1,776,841

BURNER

Filed Dec. 1, 1925

Fig. 1.

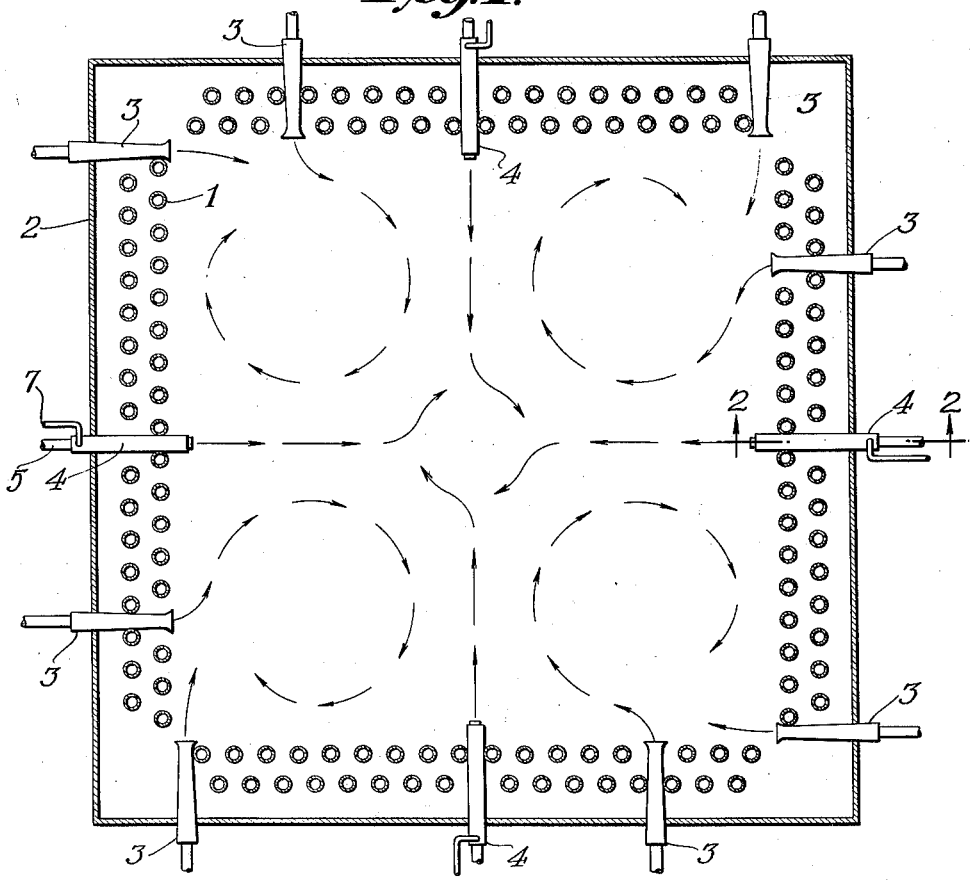


Fig. 3.

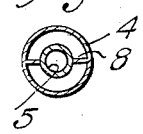
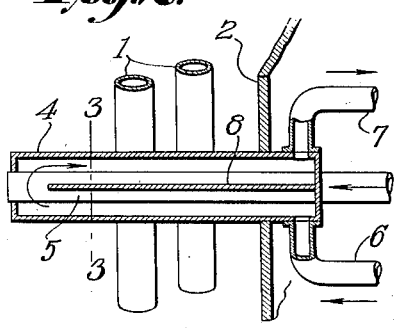


Fig. 2.



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UNITED STATES PATENT OFFICE

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BURNER

Application filed December 1, 1925. Serial No. 72,453.

In a joint application of the present applicant and John H. Lawrence for an improvement in furnaces, Serial No. 66,616 filed November 3, 1925, there is described a furnace heated by a particular arrangement of nozzle burners. The present application is directed particularly to burners of a type illustrated in the aforesaid application, the burner being of the nozzle or jet type for burning pulverized coal, oil, gas or similar fuel.

The accompanying drawings illustrate an embodiment of the invention in connection with a type of boiler furnace to which it is particularly adapted.

Fig. 1 is a horizontal cross section of the furnace.

Fig. 2 is an enlarged section of one of the nozzles approximately on the line 2—2 of Fig. 1.

Fig. 3 is a cross-section of Fig. 2 on the line 3—3.

The walls of the furnace are composed of or lined with vertical water tubes 1 surrounded by an outer shell 2. Burners 3 are arranged near the corners of the furnace so as to direct the burning gases somewhat in the manner indicated by the arrows so as to secure a thorough admixture of the gases. These burners are comparatively short and their ends are fairly well protected from burning out by the cooling effect of the adjacent water tubes.

Intermediate burners 4 are arranged to extend well beyond the tubes and into a zone where the temperature is very high. In such zones, and in fact wherever protection against high temperatures is desirable, it is proposed to cool the nozzles by a current of water or other cooling fluid. For this purpose the nozzle is provided with an inner tube 5 passing through the closed ends of the outer tube and carrying a mixture of air and fuel; or carrying the fuel only, air for combustion being admitted in other known ways. At points outside the furnace wall, tubes 6 and 7 connect with the outer tube of the nozzle so as to deliver and discharge the cooling medium. A diaphragm 8 located at either side of the pipe 5 causes the cooling medium to circulate from the outer to the inner end and back so as to thoroughly cool the fuel. Various other arrangements of cooling jackets about the fuel tube may be adopted.

The water wall formed by the tubes 1 creates in the immediate vicinity a comparatively cool zone. But the space within the water walls is a zone of much higher temperature. In the case of a single nozzle the flame commences some distance beyond the nozzle so that ordinarily there would be no excessive temperature at the end of the nozzle. But where the nozzles are arranged around the walls so as to secure a distribution of the flame by a circular or turbulent motion the heat zone is extended laterally clear to the water wall.

The corner nozzles 3 project a hot flame along the sides of the chamber. Thus the ends of the nozzles 4 in so far as they lie within the water wall are not exposed to extraordinarily high temperatures; but their ends project beyond this zone and into the zone of extremely high temperature within the combustion chamber. It is important, therefore, that the cooling fluid shall be circulated through these projecting ends and this is ensured by the longitudinal arrangement of the passages and their extension clear to the inner end of the nozzle, where they communicate with each other and cause the cooling fluid to circulate as shown by the arrow in Fig. 2.

Various modifications of the embodiment of the invention illustrated may be made by those skilled in the art without departing from the invention as defined in the following claims.

What I claim is:

1. The combination with a nozzle burner of a furnace into the combustion chamber of which the burner projects, said chamber having a water wall to maintain a comparatively cool zone in the immediate vicinity of said wall, means for directing the burning gases into a combustion zone close to the inner face of the water wall, the nozzle burner having its inner end projecting a substantial distance beyond the water wall and into the

high temperature combustion zone and being provided with a tube and a jacket forming a cooling chamber surrounding said tube and means for circulating a cooling fluid from the outer to the inner end of said tube.

2. The combination with a nozzle burner of a furnace having a combustion chamber surrounded by water walls, said burner extending through the wall and a substantial distance beyond the same into the combustion chamber and a second nozzle burner projecting a flame along the inner face of the wall, so that the projecting end of the first mentioned burner is in a zone of extremely high temperature, said first mentioned burner being provided with means for circulating a cooling fluid through said projecting end thereof.

In witness whereof, I have hereunto signed my name.

THOMAS E. MURRAY.