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PATENTED OCT. 11, 1904.

H. LUCKENBACH.

APPARATUS FOR THE COMBUSTION OF OIL IN FURNACES.

APPLICATION FILED MAR. 29, 1904.

NO MODEL.

Fig 1

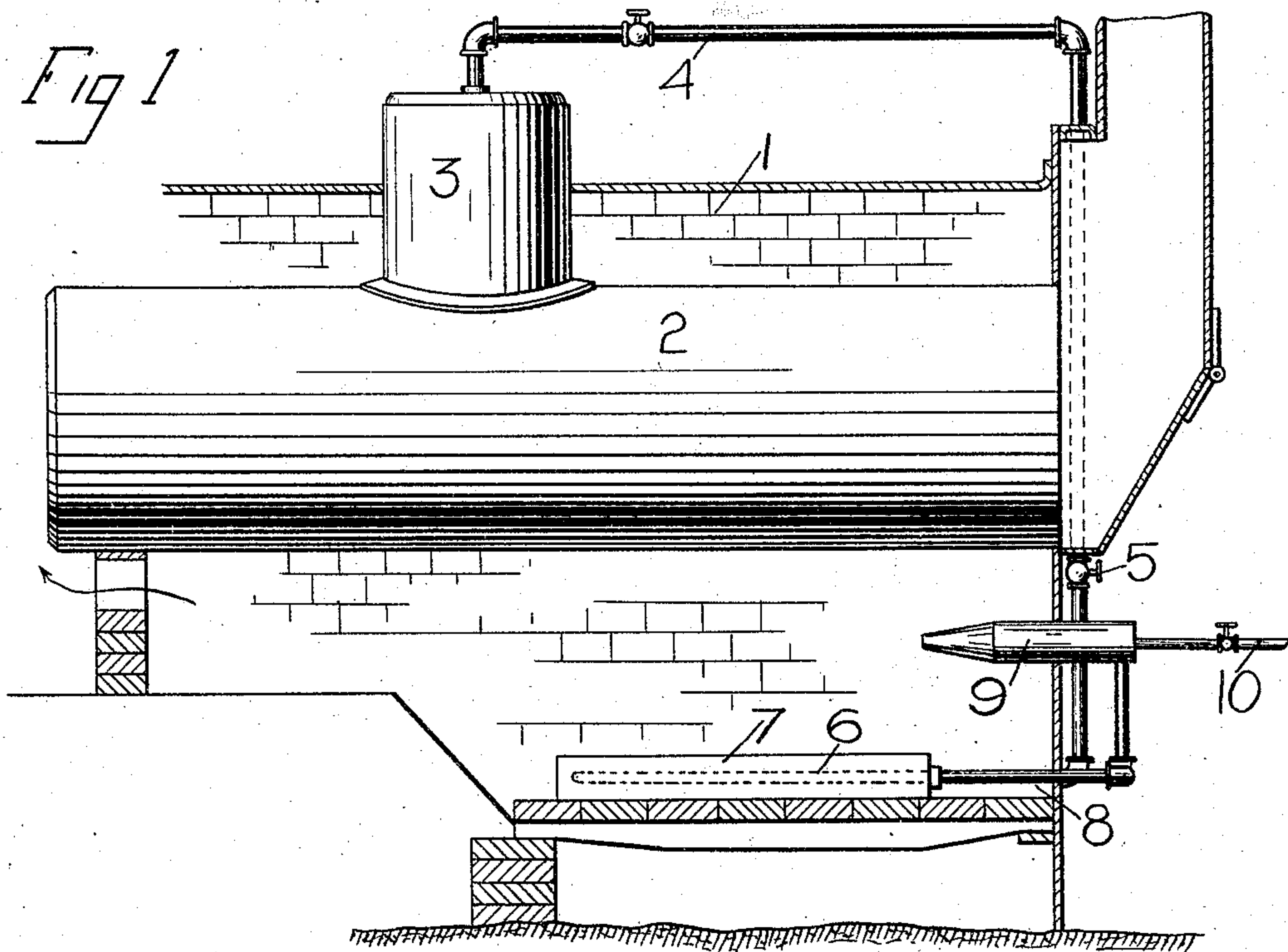
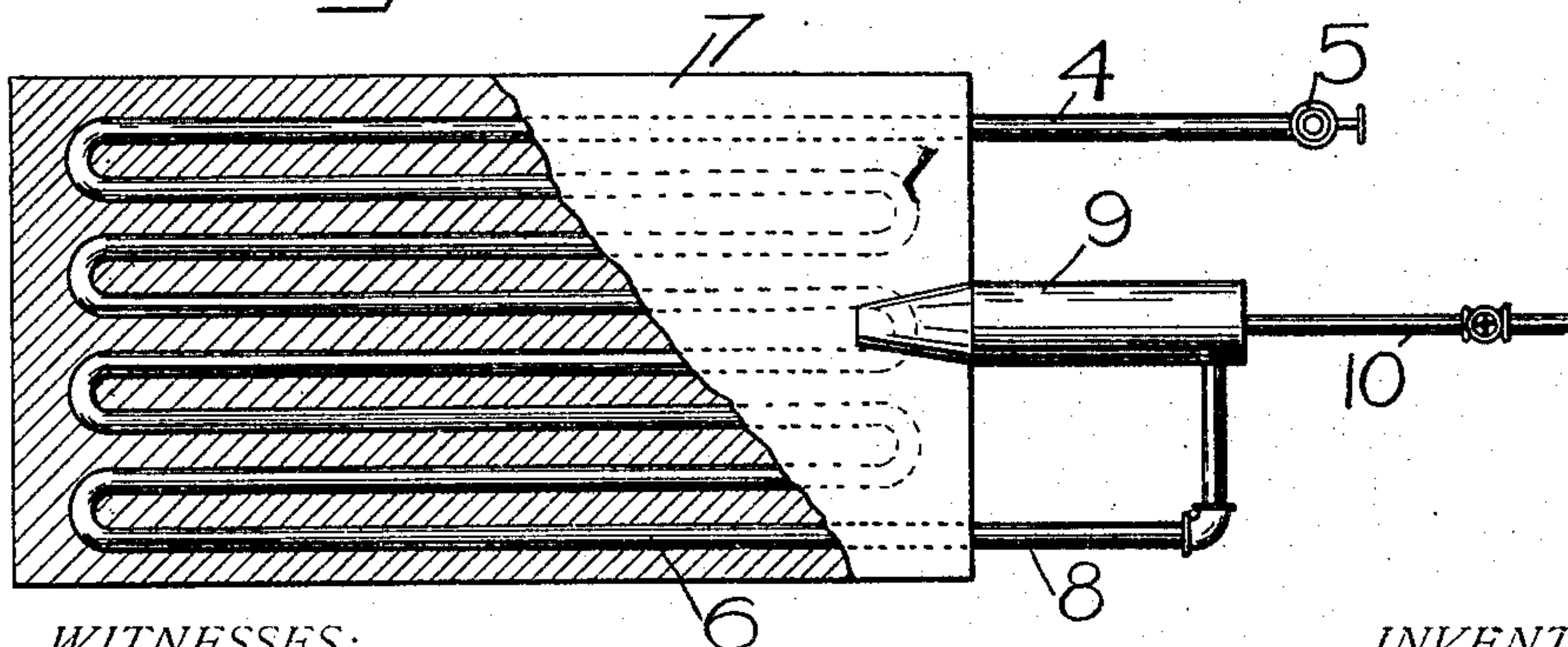


Fig 2



WITNESSES:

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# UNITED STATES PATENT OFFICE.

HARRY LUCKENBACH, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR TO HIMSELF, WILHELM BUERGERMEISTER, AND JAMES T. LUDLOW, TRUSTEES, OF SAN FRANCISCO, CALIFORNIA.

## APPARATUS FOR THE COMBUSTION OF OIL IN FURNACES.

SPECIFICATION forming part of Letters Patent No. 772,045, dated October 11, 1904.

Application filed March 29, 1904. Serial No. 200,577. (No model.)

*To all whom it may concern:*

Be it known that I, HARRY LUCKENBACH, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented certain new and useful Improvements in Apparatus for the Combustion of Oil in Furnaces, of which the following is a specification.

My invention relates to apparatus for the combustion of oil for use in furnaces and the like, the object of my invention being to provide an apparatus of this character by which the oil can be consumed in the most effective and economical manner possible.

I have found that in the use of oil-burners in which steam is employed to heat and inject the oil into the furnace far superior results are obtained by superheating the steam before using it for such purpose. By raising the steam to a high degree of heat before mixing it with the oil there is less chance of condensation both of the steam and of the oil-vapor on emerging from the burner, and the oil instead of being merely atomized is in reality converted into a vapor and is better retained in that condition. An effective method of so superheating the steam, however, in conjunction with such a burner is difficult of accomplishment by reason of the fact that if the flames of the oil-vapor be caused to impinge directly upon the superheater the abstraction of heat will be so rapid as to cause the condensation of the oil from its vaporous condition. A further difficulty has been experienced in so heating steam on account of the tendency of the flames to burn the steam-pipes when the latter are directly exposed thereto.

The object of my invention has been to provide an apparatus by means of which the burned oil may be utilized to superheat the steam without danger of condensation of said oil.

My invention therefore resides in the novel construction, combination, and arrangement of parts for the above ends hereinafter fully specified, and particularly pointed out in the claims.

In the accompanying drawings, Figure 1 is a vertical section of the apparatus. Fig. 2 is an enlarged plan view of the burner and superheater, the latter being broken away to show the construction.

Referring to the drawings, 1 represents a furnace; 2, the boiler therein, and 3 the steam-dome. From said steam-dome steam is conducted by a pipe 4, provided with a suitable cock 5, to a coil of pipe 6 in a casing 7. Said casing may be of any suitable refractory material, such as cast-iron or fire-brick, and is solidly cast or molded about the coil of pipe. From said coil a pipe 8 leads outward and is connected with the oil-burner 9, which oil-burner may be of any of the ordinary forms for burning oil by the use of steam, the oil being supplied by a pipe 10.

The relative arrangement of the superheater and oil-burner forms an important part of my invention. In my invention I take care to arrange the superheater so that it will receive only radiated heat from the burning oil-vapor and to abstract no heat therefrom by conduction. The flow of heat therefrom is not so rapid, but is more uniform and constant in quantity, and this uniform but prolonged transference of heat has been found to be sufficient to superheat the steam effectively and greatly increases the efficiency of the oil-burner.

Further important advantages of my invention are that the conduit for the steam is rounded at the turns, so as to permit the steam to flow with great velocity there-through, whereby it abstracts the heat very rapidly from the conduit and prevents it from burning, and, again, that the protective refractory material is solidly cast or molded about the coil of pipe.

An important feature of my invention is that the whole length of the coil, including the bends thereof, is embedded in the same jacket or casing, there being no part of the coil between the terminals exposed to the outer air. If a portion of the coil were thus exposed and subjected to the action of the flame, this portion would be liable to sudden and excessive



variations of temperature much more sudden and extreme than are the variations of the portion of the coil embedded in the casing. The destructive effect of these extreme and  
5 unequal variations would rapidly render the coil useless. It is also of importance that the lengths of the coil are not jointed together, as joints tend to check the flow of the steam through the coil, and wherever the steam is  
10 checked there is a rise in sensible heat either tending to raise the temperature of the coil so high as to melt it or necessitating the general temperature of the steam being kept down lower than would otherwise be possible.

15 I claim—

1. In an apparatus of the character described, the combination with a furnace, an oil-burner arranged to direct the flames into said furnace, a coil of pipe, a casing or jacket  
20 of refractory material solidly cast or molded about the coil of pipe, said jacket being placed in proximity to, but to one side of and out of direct contact with the flames from the burner, a pipe for supplying steam to said coil, and a  
25 pipe from said coil to the oil-burner, whereby superheated steam is supplied to the latter, the whole of said coil of pipe between the

entrance of the supply-pipe and the egress of the pipe to the burner being inclosed within said casing or jacket, substantially as described. 30

2. In an apparatus of the character described, the combination with a furnace, an oil-burner arranged to direct the flames into said furnace, an unjointed coil of pipe, a casing or jacket of refractory material solidly  
35 cast or molded about the coil of pipe, said jacket being placed in proximity to, but to one side of and out of direct contact with the flames from the burner, a pipe for supplying the steam to said coil, and a pipe from said  
40 coil to the oil-burner, whereby superheated steam is supplied to the latter, the whole of said coil of pipe between the entrance of the supply-pipe and the egress of the pipe to the  
45 burner being inclosed within said casing or jacket, substantially as described.

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

HARRY LUCKENBACH.

Witnesses:

FRANCIS M. WRIGHT,  
BESSIE GORFINKEL.