C. H. SPEER.

LIQUID FUEL BURNER.

APPLICATION FILED OCT. 27, 1908.

952,372. Patented Mar. 15, 1910.

Fig. 1.

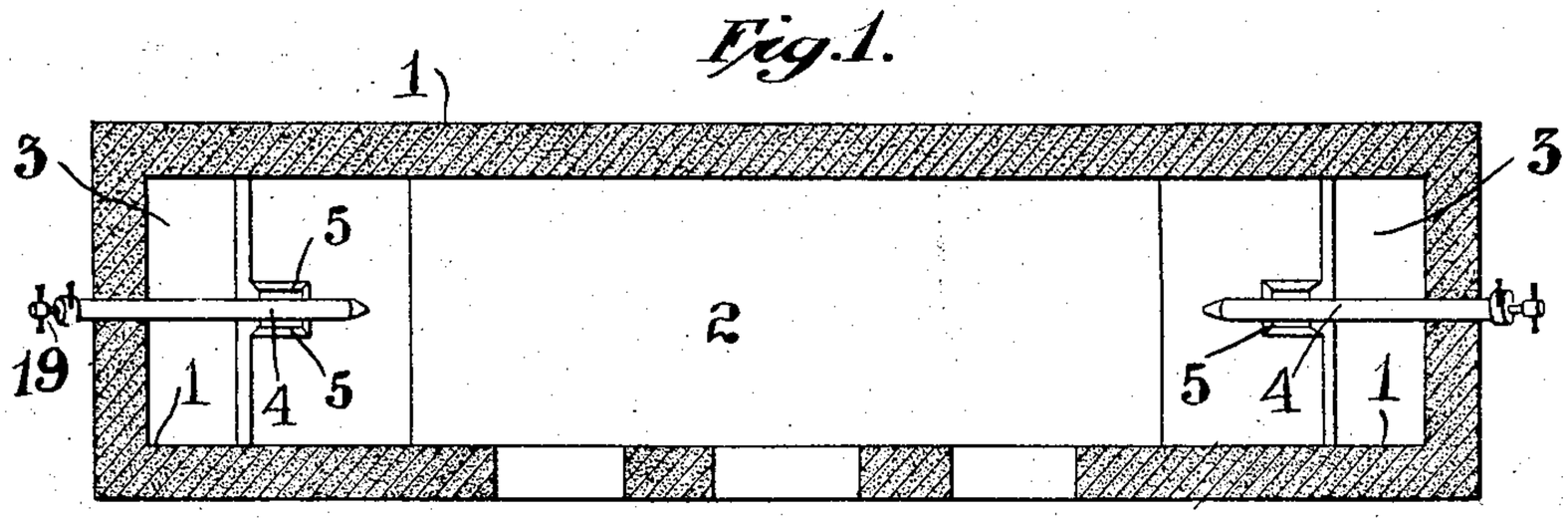


Fig. 2.

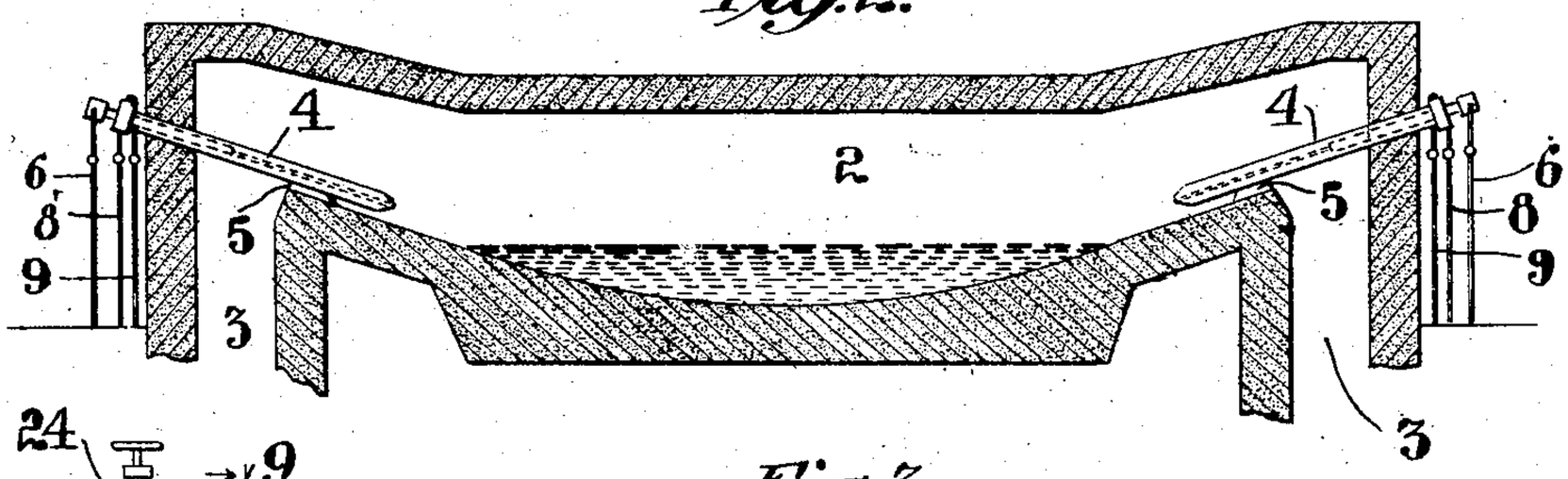


Fig. 3.

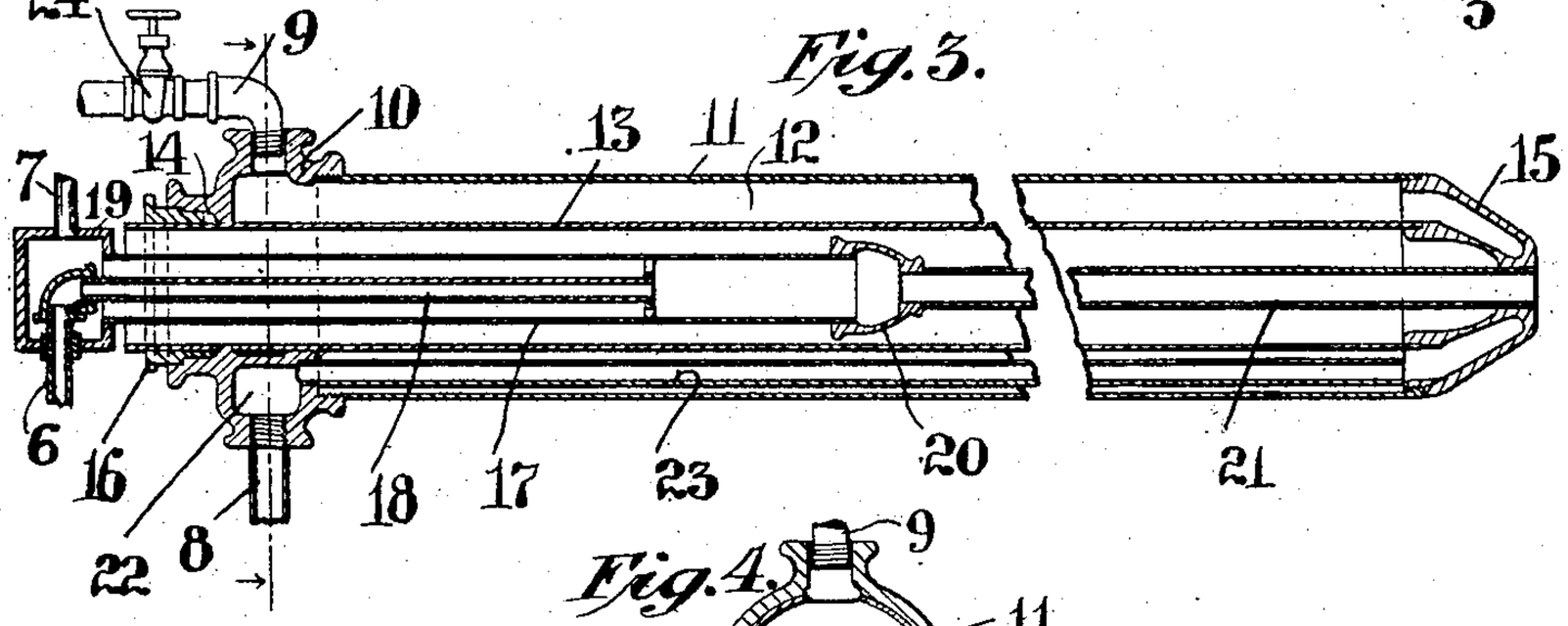
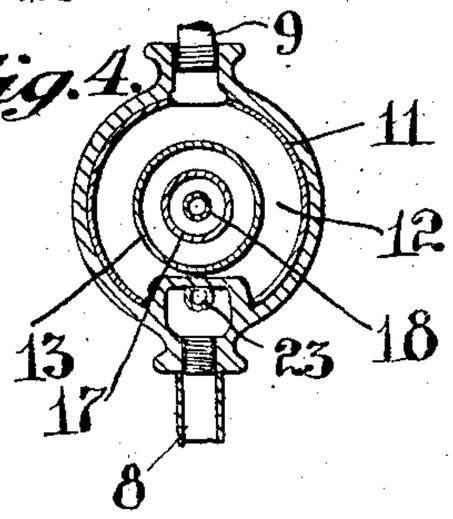


Fig. 4.



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LIQUID-FUEL BURNER.

952,372. Specification of Letters Patent. Patented Mar. 15, 1910.

Application filed October 27, 1908. Serial No. 459,746.

To all whom it may concern:

Be it known that I, CHARLES H. SPEER, a citizen of the United States of America, and a resident of Chester, county of Delaware, and State of Pennsylvania, have invented certain new and useful Improvements in Liquid-Fuel Burners, of which the following is a specification.

My invention relates to liquid fuel burners, and particularly to burners adapted for use in connection with metallurgical furnaces, and comprises a burner provided with cooling means whereby overheating of the burner and consequent destruction of it are avoided.

The objects of my invention are to improve liquid fuel burners, and particularly burners adapted for use in connection with open hearth furnaces or like metallurgical furnaces, to avoid the necessity of using movable burners for such furnaces, to avoid danger of burning out of the burners of such furnaces, to adapt such burners to withstand high temperatures and contact with highly heated furnace gases without burning out, to avoid condensation in the mixture of air or steam and fuel vapor in the burner, and generally to make the burner simple, compact, durable, and efficient.

I will now proceed to describe my invention with reference to the accompanying drawing, in which I have indicated more or less diagrammatically an open hearth furnace fitted with burners such as herein described and have also illustrated a construction of burner, and will then point out the novel features in claims.

In said drawings: Figure 1 shows a horizontal section of the furnace; Fig. 2 shows a vertical section of the furnace; Fig. 3 shows a detail longitudinal section of the burner, on a larger scale than Figs. 1 and 2; and Fig. 4 shows a transverse section of the burner.

Where open hearth furnaces and the like are heated by jets of oil projected from suitable burners arranged on opposite sides of the furnace chamber, it is the present practice to mount such burners so that when a burner is idle it may be retracted within the brick work of the furnace and so shielded from the intensely hot furnace gases issuing from such furnace chamber. Open hearth furnaces such as referred to are usually operated in connection with regenerators and have burners located on opposite sides of the furnace chamber, which burners are operated in alternation, the flame and products of combustion from the burner or burners on one side of the furnace passing out through a suitable flue or flues on the other side of the furnace after passing through the furnace chamber, and so passing near the idle burner or burners on that side of the furnace. These burners are usually mounted in masses of brick work, termed "monkeys", forming part of the structure of the furnace and containing apertures of considerable size for the insertion and removal of the burners; and these burners, which are of tubular construction, usually require at their rear ends, traveling supports; and they also require flexible connections to the oil supply pipes and the air or steam supply pipes. The traveling supports for the burners and the flexible connections to the oil and air or steam pipes required are expensive and troublesome and it is extremely desirable to eliminate them, as may be done by my invention. Furthermore, the masses of brick work in which the burners are mounted, and which are termed "monkeys" as previously stated, are objectionable, in that they reduce materially the area of the openings through which the furnace gases pass to the flues, and obstruct the flow of such gases; also they burn out and must be rebuilt from time to time.

Another objection to the use of the flexible oil connections referred to is that these flexible connections are apt to leak and permit the oil to drip on the floor, where it is apt to take fire at any time, causing a flash of flame which frequently burns severely the burner attendant.

My improved burner is provided with a water jacket through which water is circulated to maintain the outer casing of the burner at a relatively low temperature. By this means I am able to avoid burning out of the burner to such extent that the outer casing requires renewal only at relatively long intervals, even when exposed, as is the case in my furnace, to direct contact with the hot gases issuing from the furnace. For this reason I do not require to inclose the burner in any protecting "monkey" but leave it exposed to the direct action of the furnace gases. Since it would presumably be objectionable to have the said water jacket

immediately surrounding the pipe through which the mixture of fuel vapor and air or steam is injected into the furnace, I separate the jacket from such pipe by an air space, so avoiding chilling of such vapor while effectually shielding such pipe from the intense heat of the furnace.

In the accompanying drawing 1 designates the walls of an open hearth furnace of substantially ordinary construction, and 2 the furnace chamber thereof. 3, 3 designate flues on opposite sides of said chamber through one of which flues highly heated air is admitted to the furnace, and through the other of which the products of combustion escape. The furnace will be understood to be provided with the usual regenerators to which these flues 3 are connected, but I do not illustrate these regenerators.

Numerals 4 designate the burners which, as shown, project through the outer walls of the furnace, and, without being surrounded by protective masses of brick work, project into the furnace so as to be surrounded by the entering hot air or the issuing products of combustion, as the case may be.

For convenience the outer end of each burner is usually supported on a small pier 5.

6 designates a pipe for supplying oil fuel, 7 a pipe for supplying air or steam under pressure, 8 a pipe for supplying cooling water to the jacket and 9 a water discharge pipe.

Referring to Figs. 3 and 4 showing the burner in detail, this burner comprises at its rear end a section 10 adapted to form the rear end of the jacket and into which the tubular outer casing 11 of the burner, forming the outer wall of the water jacket 12, is screwed or otherwise secured. Another tubular member 13, forming the inner wall of the water jacket, projects through a stuffing box 14 at the rear end of section 10 and these members 11 and 13 are connected at their front ends by a nose piece 15, having an annular cored-out space forming a continuation of the water jacket 12. The usual gland 16 is provided in the stuffing box. This stuffing box permits relative expansion and contraction of the tubular members 11 and 13.

Within member 13 is a pipe 17 through which the air or steam for the operation of the burner is supplied, and within said pipe 17 is another pipe 18 through which the oil is supplied, said pipe 18 being led through a head piece 19 at the rear of pipe 17 and forming a continuation thereof, and being connected to oil supply pipe 6; and the air or steam supply pipe 7 is connected to this head piece 19.

Pipe 18 projects well into pipe 17, there being within pipe 17 and beyond the end of pipe 18, a combining chamber wherein the oil and the air or steam are mixed; and pipe 17 then discharges through a reducing coupling into a pipe 21 secured at its outer end to the nose piece 15.

The water supply pipe 8 is connected to a chamber 22 of casing member 10, from which chamber a pipe 23 extends through the jacket 12 to nearly the front end of the burner, so discharging the cooling water at the extreme front end of the burner, the water flowing backward through the jacket 12 to the water discharge pipe 9. In this pipe I usually provide a suitable regulating valve 24. This valve, being on the discharge pipe regulates the flow of water through the burner while maintaining the jacket full of water.

The furnace is operated with my improved burner the same as furnaces are, equipped with the present oil burners, except that it is not necessary to withdraw the burner which is to be idle when reversing the action of the furnace.

Since no protecting brick monkey for the burner is required, the entrance and discharge flues of the furnace are substantially unobstructed by the burner, and the expense of rebuilding the monkeys from time to time is obviated. Furthermore, it is not necessary to provide a traveling support for the burner, and the connections of the oil and steam or air pipes to the burners are of a permanent nature and so may be maintained tight, thus avoiding leakage and the consequent danger of fire around the burner, previously referred to.

What I claim is:—

A liquid fuel burner comprising fuel injection means, and, around such injection means, tubes, one within another, inclosing a water jacket space, a nose piece connected to said tubes at the front ends thereof and an annular member connected to said tubes at the rear ends thereof, there being heat insulation space between said fuel injection means and the inner of said water-jacket tubes.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

CHARLES H. SPEER.

Witnesses:
ANNE RULON GRAY,
B. HILLYARD SWENEY.