

No. 707,911.

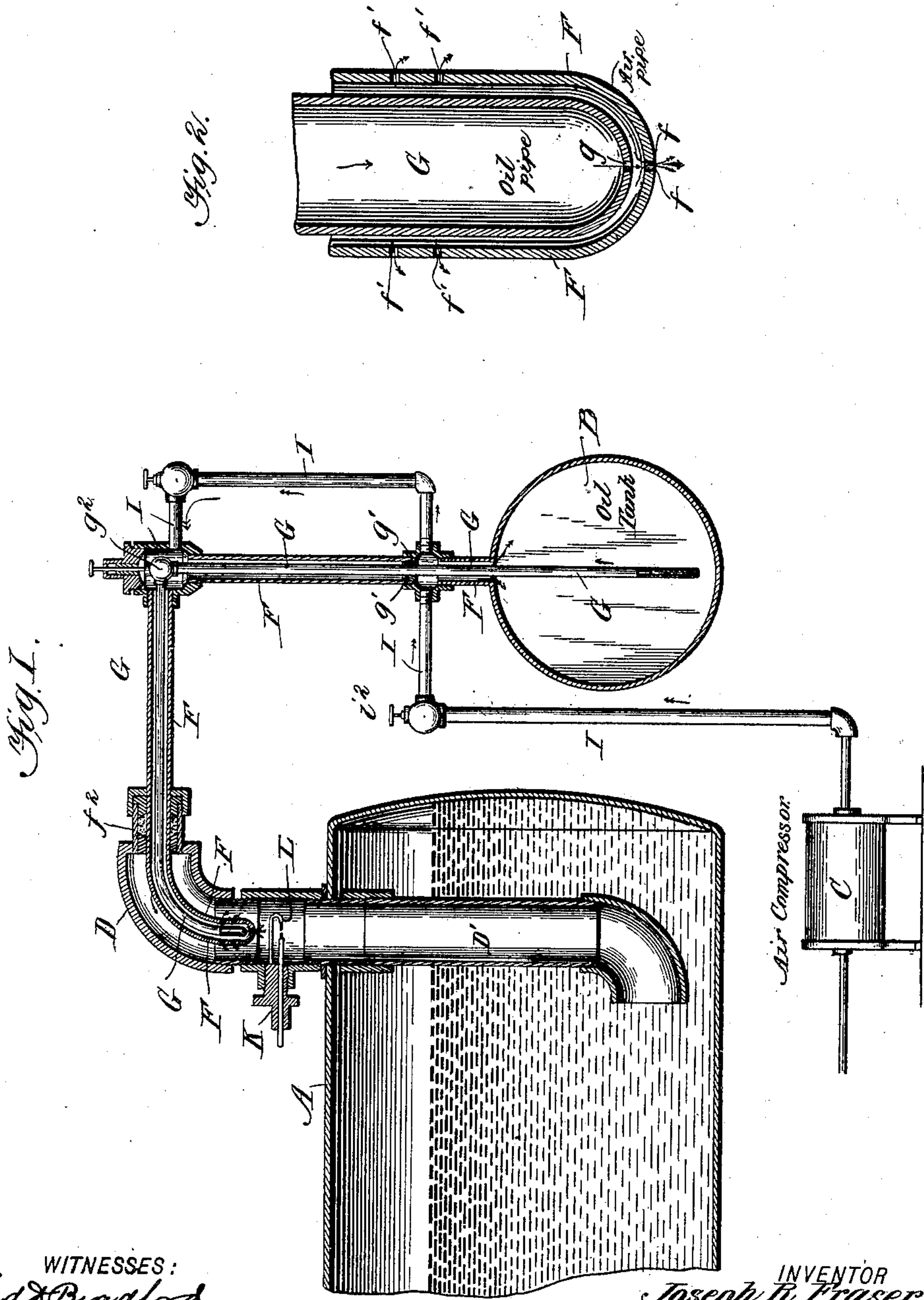
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J. R. FRASER.

COMBUSTION APPARATUS FOR STEAM BOILERS.

(Application filed Oct. 24, 1901.)

(No Model.)



WITNESSES:

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JOSEPH REID FRASER, OF DAYTON, OHIO.

COMBUSTION APPARATUS FOR STEAM-BOILERS.

SPECIFICATION forming part of Letters Patent No. 707,911, dated August 26, 1902.

Application filed October 24, 1901. Serial No. 79,828. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH REID FRASER, a citizen of the United States, residing at Dayton, in the county of Montgomery and State of Ohio, have made certain new and useful Improvements in Combustion Apparatus for Steam-Boilers, of which the following is a specification.

It is the object of my invention to effect a perfect combustion of fuel and a considerable economy in the generation of steam for operating motors or for heating purposes. In the ordinary furnace attachment for steam-boilers all the products of combustion are allowed to escape into the atmosphere, where they are lost. I have devised an improvement in the class of apparatus in which the gaseous products of combustion are directed under pressure into the water in a boiler, whereby their heat is conserved and utilized in the development of steam, and by their commingling with the latter a large volume of gaseous fluid is obtained for use in motors or for other purposes. The fuel I preferably employ is petroleum or other suitable liquid hydrocarbon, the present market price of which renders it more available and economical than heretofore.

The details of construction and operation of parts are as hereinafter described, and shown in the accompanying drawings, in which—

Figure 1 is a vertical section of a portion of a boiler and my improved attachment applied thereto. Fig. 2 is an enlarged detail section of a portion of the apparatus shown in Fig. 1.

I will first describe the preferred form of my apparatus, which is exhibited by the drawings. In this apparatus a hydrocarbon is employed as the fuel.

A indicates a tubeless boiler; B, an oil tank or holder; C, an air-compressor, and D and D' the furnace attachment proper of the boiler. The combustion-chamber D and D' is in the nature of a large tube or pipe arranged practically in vertical position, the portion D' being introduced through the top of the boiler A and extending nearly to the bottom of the same, where it is curved, as shown. The burner F for the oil is arranged in the part D of the combustion-chamber, and an electrical igniter K L is arranged directly

below the same. The igniter proper, L, is attached to a plug K, which is screwed into a nipple on the side of the pipe D. The oil is forced through a pipe G from the tank B and escapes from the burner (see Fig. 2) at the point *g*, where it is atomized by the air forced through orifice *f* in pipe F, the orifices *g* and *f* being in alinement, as shown. Air is admitted into the tank B from the compressor C by means of the pipe I and pressing upon the surface of the oil forces the latter through the pipe G, as above stated. As will be understood by reference to Fig. 2, the air escapes not only at the point *f*, but through the side orifices *f'* of pipe F, whereby air is supplied not only for atomization, but for combustion. It is not, however, expedient to introduce more air through holes *f'* than is required for combustion, since the heat of combustion is wasted in raising the temperature of the surplus air. The gaseous products of combustion pass down through the fire-box or combustion-chamber D' and escape into the water in the boiler, where their heat is taken up. A portion of the gases will, however, mingle with the steam above the water, and thus add to the amount of gaseous fluid available for use in a motor or for other purposes. It will be understood that the pressure of air in the tank B and in the pipes F surrounding the oil-pipe G must exceed the pressure of the steam in the boiler. The pipe G passes through the stuffing box or gland at *g'*, and the pipe F passes through a stuffing-box at the point *f'*. The gland *g'* cuts off air from the pipe F above the same, so that the air passes through the pipe I, which is provided with cut-off valves *i* and *i'*, whereby the admission of air may be regulated at will. A valve *g'* is also provided for regulating the passage of oil in the pipe G. It is obvious by manipulation of these valves the supply of air and oil may be cut off or regulated relatively as required. The valves *g'* and *i'* being adjacent are readily accessible for manipulation at the same time.

The apparatus constitutes a simple and compact furnace attachment for boilers particularly adapted for use in small motors, and petroleum being now produced in great quantity is more available than heretofore as an economical fuel in comparison with coal. In

my apparatus it is used to the greatest advantage, all the products of combustion being carried into the water and the heat units utilized, while the unconsumed gases are
5 availed of for increasing the motor fluid.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a steam-boiler, of
10 the furnace attachment described, the same comprising an air-compressor, an oil-tank having a pipe extending thereinto, an air-pipe connecting the tank with the compressor, whereby air-pressure is applied upon the sur-
15 face of the oil, a combustion-chamber, or fire-box, extending into the boiler and opening below the normal water-level therein, an air-pipe arranged in the fire-box, and an oil-pipe within the air-pipe, both having nozzles, lo-
20 cated in the upper portion of the combustion-chamber, which are provided with coincident end openings for escape of air and oil, and an electrical igniting device arranged in the combustion-chamber directly below the air-pipe,
25 where the oil is atomized, substantially as shown and described.

2. The combination, with a steam-boiler, and a combustion-chamber which is in the nature of a pipe extended into the boiler and
30 opening below the normal water-level therein, of an electrical igniter, an air-pipe terminating just above the igniter, and an oil-discharge pipe having its nozzle within the air-pipe, the two pipes being separated by a space

which allows the free passage of air, the air- 35
pipe having lateral discharge-openings for supporting combustion, and means for forcing air and oil to such burner, substantially as shown and described.

3. The combination with a steam-boiler, a 40
furnace attachment comprising a fuel-combustion chamber projecting into the boiler and opening below the normal water-level therein, of an electrical igniter arranged in the upper portion of said chamber, an air-pipe 45
entering such chamber and terminating at a point adjacent to the igniter where it is provided with discharge-openings, an oil-pipe arranged within the air-pipe and separated therefrom by a space which allows the free 50
passage of air and provided at its terminal with an opening for allowing escape of oil so that it may be carried out of the air-pipe and atomized as described, a series of valves ap- 55
plied to the said air and oil pipes for controlling the passage of the respective fluids therein, the oil-tank with which the air-pipe connects and into which the air-pipe projects to a point near the bottom thereof, and an air- 60
compressor for maintaining in the tank and in the oil-pipe a pressure greater than the steam-pressure in the boiler, substantially as shown and described.

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