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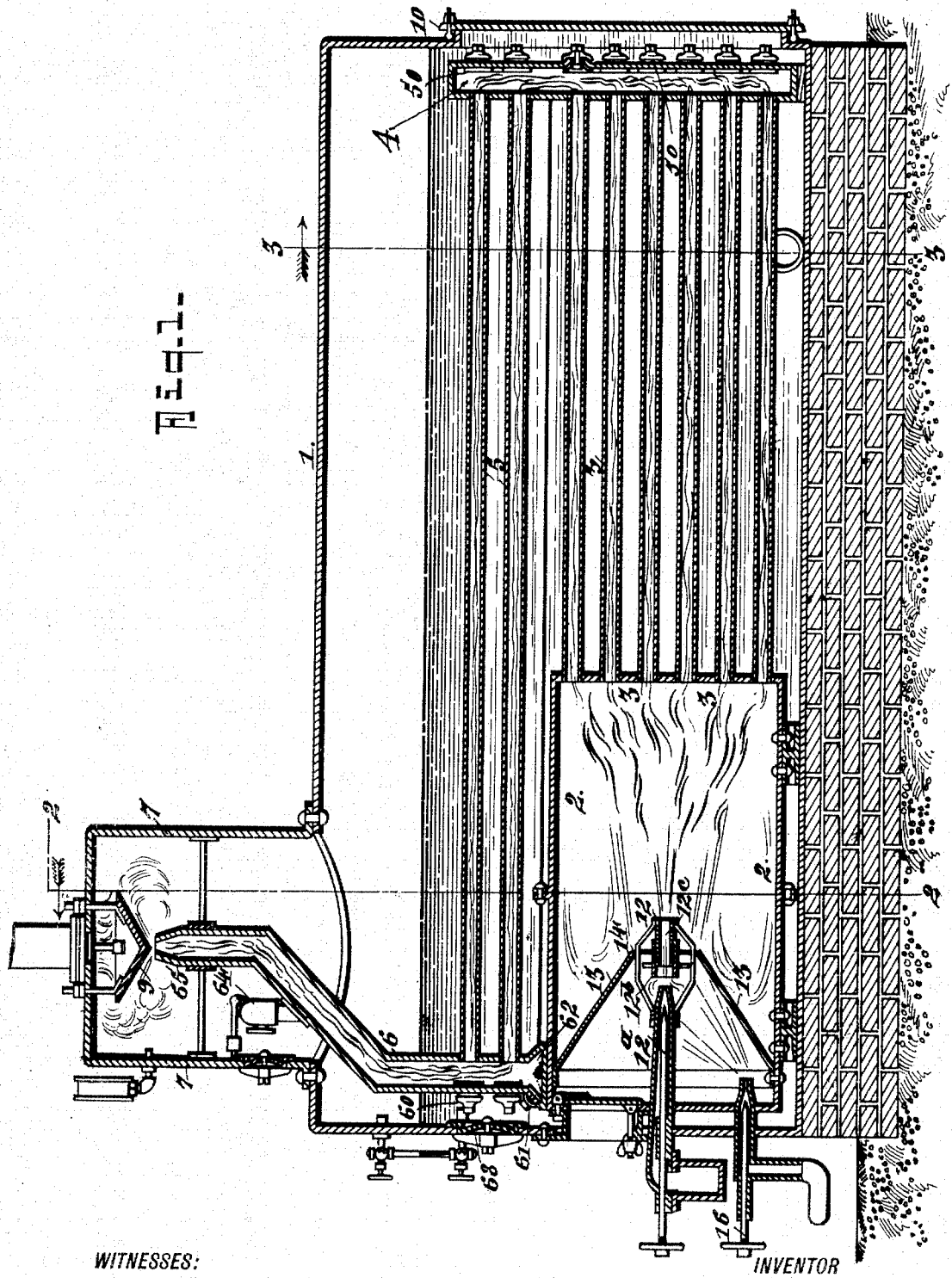
FURNACE.

APPLICATION FILED DEC. 19, 1911.

1,097,698.

Patented May 26, 1914.

3 SHEETS—SHEET 1.



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3 SHEETS—SHEET 2.

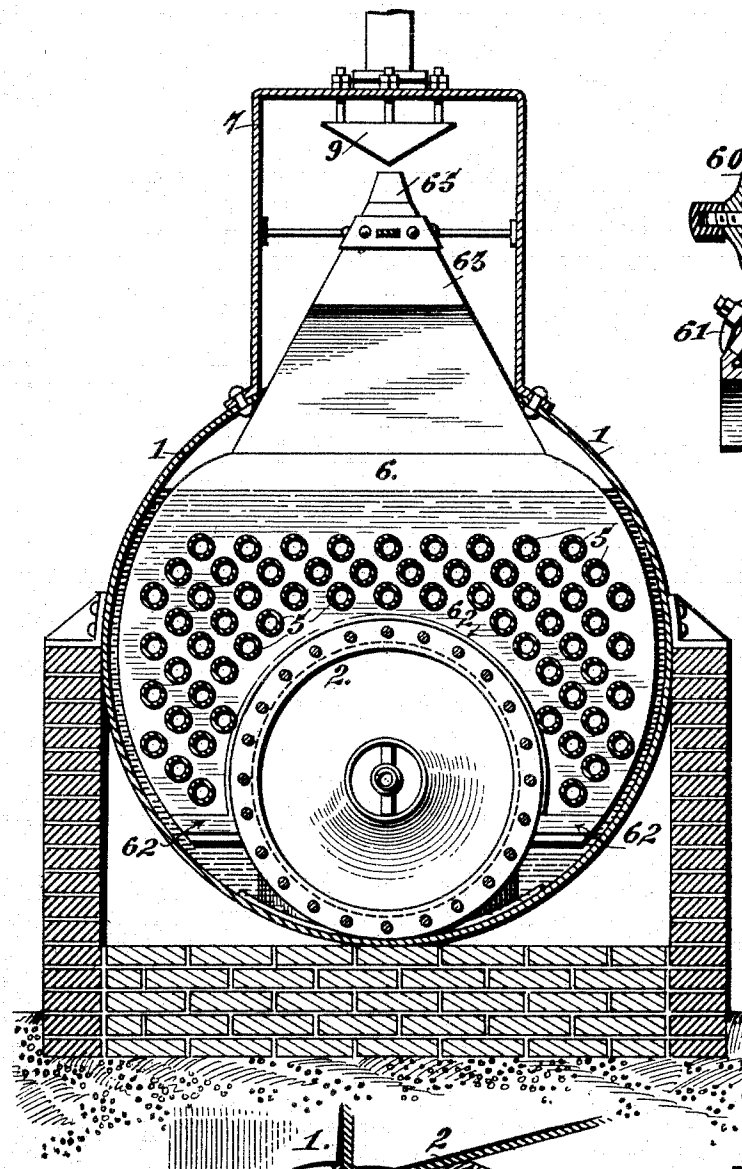


Fig. 2.

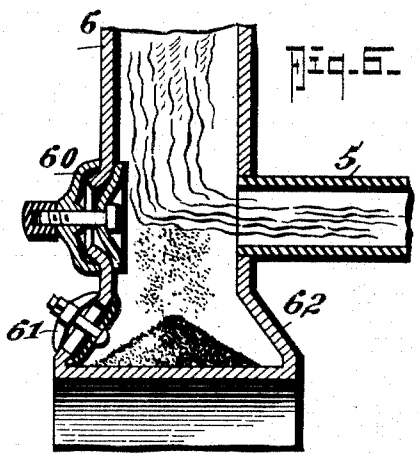


Fig. 6.

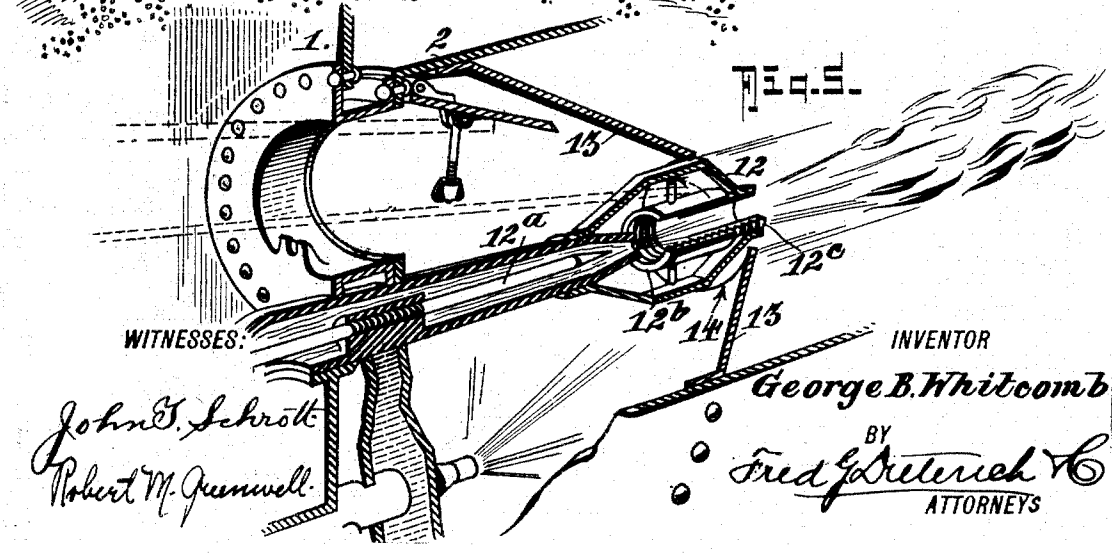


Fig. 5.

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3 SHEETS—SHEET 3.

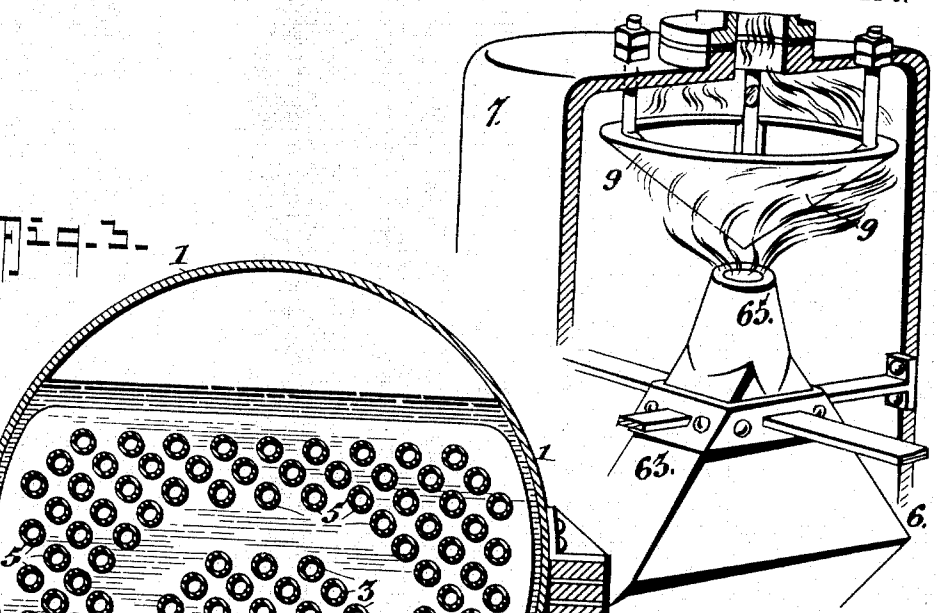
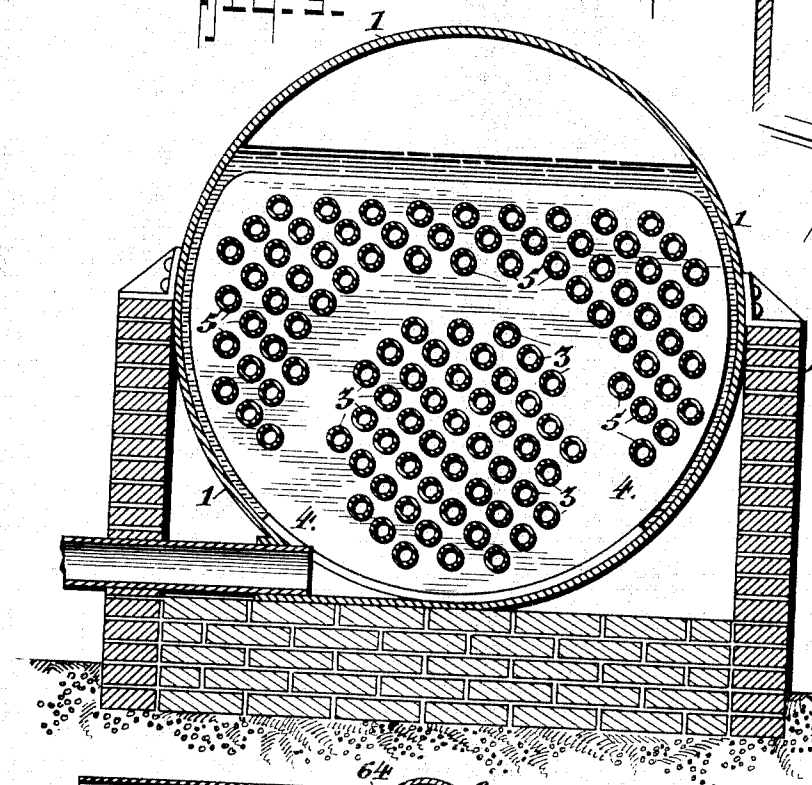


Fig. 4.

Fig. 3.



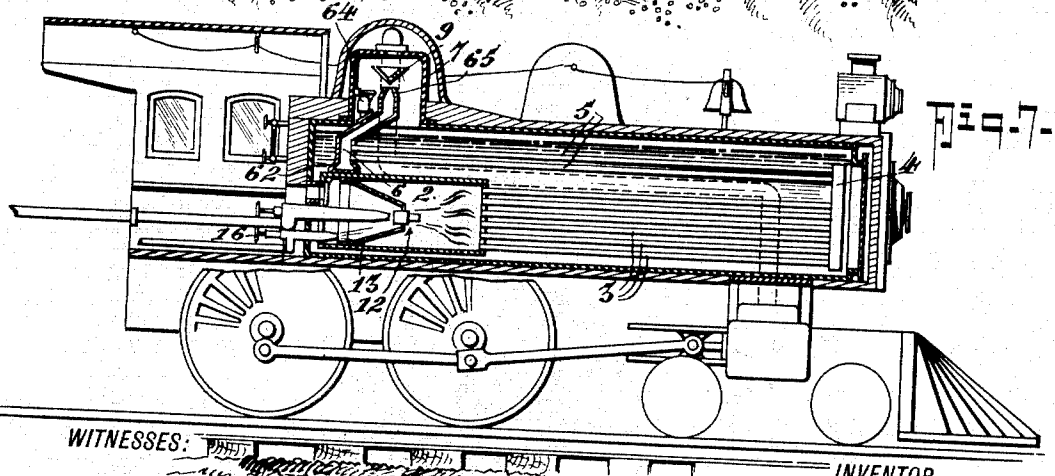


Fig. 7.

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UNITED STATES PATENT OFFICE.

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FURNACE.

1,097,698. Specification of Letters Patent. Patented May 26, 1914.

Application filed December 19, 1911. Serial No. 666,696.

To all whom it may concern:

Be it known that I, GEORGE B. WHITCOMB, a citizen of the United States, residing at Foster, in the county of Linn and State of Oregon, have invented a new and Improved Furnace, of which the following is a specification.

This invention has for its purpose to provide an improved boiler furnace of that class in which the entire combustion is produced in such a manner whereby to produce, as it were, a smokeless boiler furnace without a smoke stack or outlet other than the offtake for the products taken from the boiler to accomplish the work desired.

With other objects in view that will be hereinafter specifically explained, my invention consists of certain structural combinations and novel arrangements of parts, all of which will be hereinafter specially explained and specifically pointed out in the appended claims, and illustrated in the accompanying drawing, in which—

Figure 1 is a vertical longitudinal section of a boiler construction embodying my invention. Fig. 2, is a transverse section thereof, taken on the line 2—2 of Fig. 1. Fig. 3, is a similar view thereof on the line 3—3 on Fig. 1. Fig. 4, is a detail perspective view of the mixing and distributing devices hereinafter explained. Fig. 5, is a detail perspective view of the air and fuel feeds and intermixing devices hereinafter referred to. Fig. 6, is a detail view of the excess combustion products collecting chamber. Fig. 7, illustrates the application of my invention for use as a smokeless locomotive engine.

In the accompanying drawings, I have illustrated a practical construction of a boiler embodying the essentials of my invention, but I desire to here state that while the said drawings show one way of arranging and combining the elements that constitute the broad features of my invention, the said showing of parts may be readily modified or varied without departing from my invention, as hereinafter stated, and as comes within the scope of the appended claims.

In carrying out my invention, I employ a boiler body or outside shell 1 having the necessary strength of boilers in general. In the forward lower end thereof is the fire-box 2, with which connect the combustion flues 3—3, that open into the head space or return chamber 4 with which the return flues 5 communicate, as shown in Fig. 1, by reference to which it will be noticed, the return chamber has man-holes 50, for cleaning out the flues and the end of the boiler shell has a removable door 10 for giving access to the man-holes 50.

The return flues 5, of which there are as many as the character of the boiler may make desirable, pass over the crown of the fire-box and discharge into the lower end of a chamber 6 which has a man-hole 60 for each tube 5.

The products-collecting chamber 6 is mounted on the crown of the fire-box and its lower end is preferably enlarged to form a collecting pocket 62 that extends transversely of the lower end of the chamber 6 and it is made flaring to facilitate the ready removal of the collected solid products of combustion and to provide for one or more man-holes 61, the boiler front having a man-hole 68, (see Fig. 1,) for gaining access to the man-holes in the chamber 6.

7 designates the steam dome located over the front end of the boiler and this has the usual off-take for the outflow of the steam to points of working.

It will be noted by referring to Fig. 2, the collecting chamber 6 is broad enough at the base to receive all the products of combustion and is made tapering from the base to a smaller outlet 63 and at a suitable point it has a safety valve 64, which is for the escape of any excess combustion products, which, however, in some structures of boilers embodying my invention may be omitted.

The upper restricted or nozzle end 65 of the collector discharges into the boiler body, above the normal water level, into the steam dome and preferably near the crown thereof, as is clearly shown in Figs. 1 and 4 of the drawing, the latter showing the mixer devices in detail.

The products of combustion, as they pass up and out of the nozzle 65 are directed against mixing devices that tend to hold back the combustion vapors etc. and causing them to thoroughly intermix with the steam before the latter passes into the outflow pipe. For that purpose an inverted cone-shaped diaphragm 9 is hung under the steam outlet in the dome with its apex directly in line of the nozzle 65 and so adjusted that the

combustion products which leave the nozzle under pressure strike the member 9 and are thereby thoroughly whirled with the steam and caused to intermix before the mixture of steam and combustion vapors escape from the dome.

The burner 12 in the construction best shown in Fig. 5 is of the crude oil burner type and in addition to the needle valve 12^a, includes an adjustable nozzle section in the nature of a sleeve 12^b, threaded and rotatable on the fixedly held nozzle tube 12^c and provided with lugs for being engaged by a lever or rod, that may be readily inserted through a man-hole in the boiler front as shown. The burner 12 may be connected with and fed directly from a blast furnace, and in that case the waste gases from the furnace may be utilized for fuel. Coöperating with the burner is an air shield 13 that has a conical shape, the base being connected to the front end of the boiler and the apex being apertured for extending the burner end therethrough, see Fig. 1, the said apex end having an air outlet, as at 14, for directing the air blast to commingle with the burning fuel, as it is being consumed, the shield being designed for conducting fresh air direct to the burner at all times. An air valve 16 opens into the bottom part of the air collecting space of the fire-box, through which compressed air is forced in any approved manner.

From the foregoing taken in connection with the accompanying drawings, it is believed the advantages of my invention will be apparent.

It will be observed that the fuel, gaseous or liquid, is forced into the boiler under such conditions that combustion is effected under a pressure equal to or in excess of the pressure on the outside shell and in such a manner that the strain on the fire box and flues is materially decreased over that incident in the utilization of the ordinary types of boilers thereby making the cost of my type of boiler, relatively, much less than the ordinary types of boilers of substantially like capacity. By providing means for shielding the air and conducting fresh air to the burner or burners, as stated, the products of combustion are kept away from the same and the danger of back-fire is positively overcome. By providing a means for mixing the combustion vapors and the steam in the manner stated, a thorough intermixing of the said elements is provided for before they pass off, as a working product.

Another and important advantage of my invention is that my invention provides a practical boiler construction of high efficiency in which the fuel products are not only consumed, but are converted into a source of energy, since the heat added to the steam force increases the power of said steam force which is further increased by the natural force of the compressed air that is charged into the boiler.

Another and important advantage acquired by the use of my invention is that the boiler is stackless, and smokeless, thus overcoming one of the most objectionable features incident in the use of the common types of boilers. While I have shown my boiler adapted for being fed with gaseous or liquid fuel, the same may be also adapted for using powdered coal.

In Fig. 7, I have shown one way of utilizing my type of boiler and in this showing the same appears as being used on locomotive engines and in this type oil is preferably used for fuel.

From the foregoing taken in connection with the accompanying drawings, it will be readily apparent to those skilled in the art to which my invention relates that I have provided a simple and effective means for economically transposing the heat units of gaseous fuel into a mixture of steam and combustion gases producing, as it were, a working agent that forms the substitute for steam, that retains all the advantages of steam, without the loss of the heat energy through a stack, and at the same time doing away with the smoke nuisance, incident in the ordinary types of boilers.

By the use of my invention, the heat is first caused to be directed through the tubes that generate the steam and then directed into the steam for super-heating it and by intermixture with the superheated steam it then creates a working product for operating machinery, and in the creation of which the gases of combustion are practically all utilized and caused, in addition to the initial pressure, to produce a working agent of relatively increased density and force under a more economic consumption of fuel than possible in the ordinary type of boilers.

What I claim is:—

1. In a steam boiler furnace a firebox, a frusto-conical shield within said firebox with its portion of greater diameter secured to the walls of the firebox, and its portion of lesser diameter apertured and projected toward the rear of the firebox, and dividing said firebox into a front and rear compartment, an oil feed burner including a needle valve nozzle projecting into the front chamber of said firebox and discharging into said shield adjacent to the open end of the same, a nozzle tube held in the opening of said shield, connecting rods between said nozzle tube and said needle valve nozzle to hold said nozzle tube to project through the opening of said shield and space the same therefrom, an adjustable sleeve on said nozzle tube for adjusting the opening between said nozzle tube and said needle valve nozzle, and means for forcing a supporter of com-

bustion into the front chamber of said firebox.

2. In a steam boiler furnace, the combination with a firebox having a conical partition in the same to divide the firebox into a front and rear chamber, said conical partition having an opening through its end of lesser diameter to afford communication between said chambers, of a nozzle projecting into the front chamber of said firebox and terminating within said conical partition and held in alinement with the axis thereof, said nozzle including a needle valve, a nozzle tube supported by said needle valve and said partition, and including supporting members projected into the opening of said partition and in engagement with the walls thereof, said nozzle tube being spaced from the discharge end of said nozzle, and a sleeve threaded on said nozzle tube for adjusting the space between said nozzle tube and the discharge end of said nozzle, means for feeding oil through said nozzle tube, and means for admitting a supporter of combustion into the front chamber of said firebox.

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Witnesses:
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GEORGE E. HARDY.