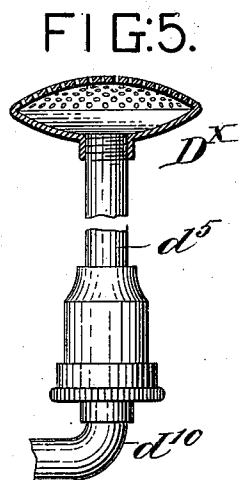
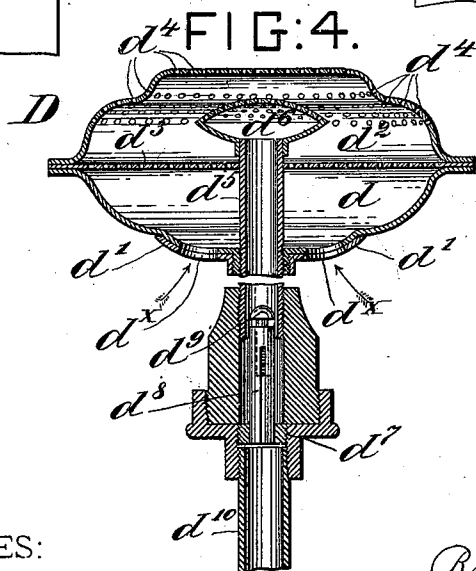
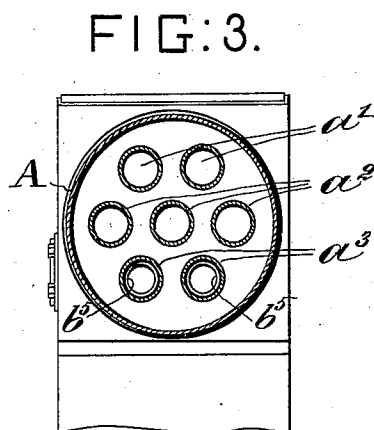
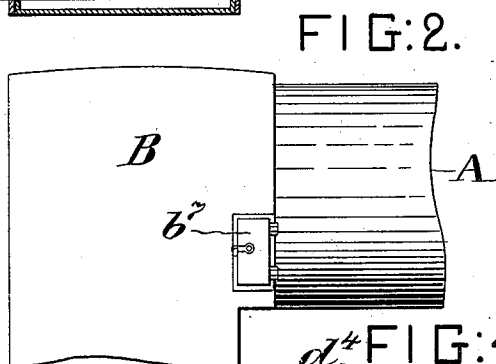
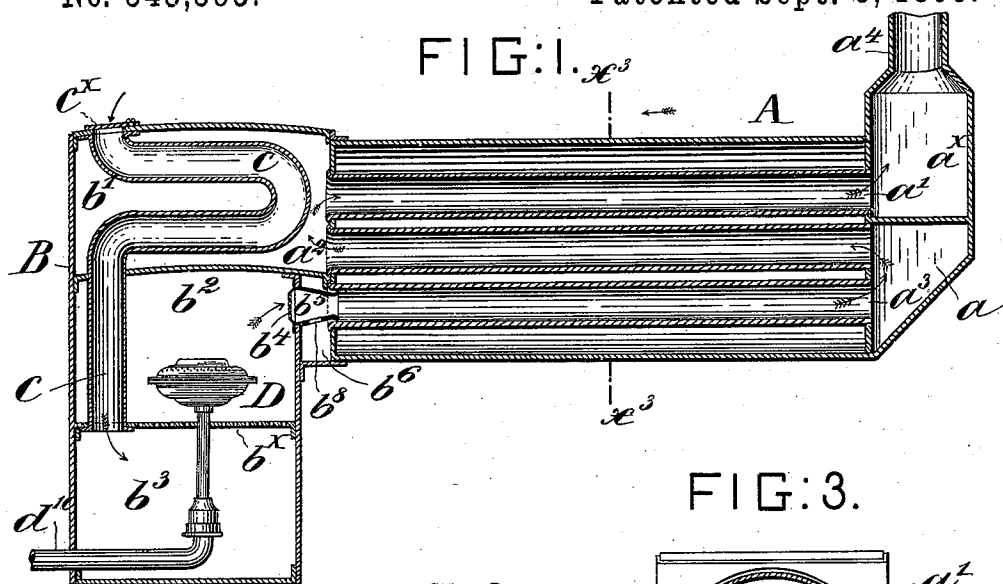


(No Model.)

B. F. LAWTON.
HYDROCARBON BURNER.

No. 545,595.

Patented Sept. 3, 1895.



WITNESSES:

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UNITED STATES PATENT OFFICE.

BENJAMIN F. LAWTON, OF RIVERDALE, NEW JERSEY.

HYDROCARBON-BURNER.

SPECIFICATION forming part of Letters Patent No. 545,595, dated September 3, 1895.

Application filed July 1, 1895. Serial No. 554,562. (No model.)

To all whom it may concern:

Be it known that I, BENJAMIN F. LAWTON, a citizen of the United States, residing at Riverdale, Morris county, New Jersey, have invented certain new and useful Improvements in Hydrocarbon-Burners, of which the following is a specification.

My invention relates to means for burning fluid hydrocarbons, either gaseous or liquid, for raising steam and for other kindred purposes; and the leading objects of the invention are to provide means for producing a mixture of air and hydrocarbon gas or vapor which shall have the maximum combustible qualities and leave no liquid or solid residues, and also to provide heated air for admixture with the hydrocarbon.

Other features of the invention relate to the facilities for igniting and the construction whereby the hot gases are best utilized for raising steam or heating water.

In the accompanying drawings I have illustrated my invention as adapted for heating water in a tubular or flue boiler.

Figure 1 is a longitudinal vertical axial section of the burning apparatus and boiler. Fig. 2 is a side elevation of a part of the same, illustrating the igniting feature; and Fig. 3 is a transverse vertical section on line $x^3 x^3$ in Fig. 1. Fig. 4 is an axial sectional view of the mixer and burner proper on a larger scale than the principal views. Fig. 5 is a sectional view of a more simple form of the inlet-nozzle for the hydrocarbon.

A represents a steam-boiler of a known kind, having three tiers of tubes or flues a' , a^2 , and a^3 . The two lower tiers of tubes open at the front into a chamber a , and the upper tier opens into a breeching a^x , which leads the gases to an uptake or chimney a^4 .

At the rear end of the boiler is what I designate the "burner apparatus." Within a casing B of this apparatus are three chambers b' , b^2 , and b^3 . The upper chamber b' is closed except to the two uppermost tiers of boiler-flues a' and a^2 . The middle chamber b^2 is the combining-chamber for the combustible gases and the lower chamber b^3 is the air-chamber. Air enters an air-pipe c through a register-controlled inlet c^x and passes to the air-chamber b^3 through the pipe c , which latter passes through the chambers b' and b^2 .

The air rises from the chamber b^3 into the combining or mixing chamber b^2 through perforations in a partition b^x , which separates the chambers b^2 and b^3 .

I will now explain the construction of the device, (shown best in Fig. 4,) and which I call the "mixer and burner," as it serves as a mixer for the air and hydrocarbon and may serve, also, as a burner, although it does not do so, in the proper sense, as arranged in Fig. 1. This mixer and burner D comprises an air-chamber d , to which air is admitted at inlets d^x , controlled by a rotatively-mounted register-plate d' . This air-chamber is separated from a mixing or combining chamber d^2 by a perforated diaphragm d^3 . The casing of the chamber d^2 has in it numerous perforations d^4 to allow the combustible mixture to escape. The hydrocarbon is admitted to the chamber d^2 through a pipe or tube d^5 , which extends up through the diaphragm d^3 and bears on its upper outlet end an outlet-chamber d^6 , with a perforated crown. To regulate the influx of gas through the pipe d^5 , I set in the socket d^7 a slitted tube d^8 , through which the gas must flow, and provide this slitted tube with a cut-off screw d^9 , by which the area of the slits through which the gas must flow can be varied in length by merely driving down or drawing back the screw. This is merely a device for regulating the quantity of gas to be admitted, performing somewhat the functions of a register. This burner and mixer D is situated in the combining-chamber b^2 and is supplied through a pipe d^{10} . The admission of air at the inlets d^x is easily regulated by turning the apertured register-plate d' about the pipe d^5 .

So far as described the operation is as follows: Gas, for example, is admitted to the combining-chamber d^2 , being broken up by passing through the perforated crown of the chamber d^6 . Air, or a mixture of air and gas, enters the chamber d^2 through the diaphragm d^3 and mixes with the gas from the chamber d^6 , the combined mixture of gas and air eventually escaping from the chamber d^2 , through perforations d^4 , into the large combining-chamber b^2 . In this chamber the gas is mixed or combined in an intimate manner and in the proper proportions with hot air, which passes down through the pipe c , as before ex-

plained, into the chamber b^3 , and thence up through the perforated partition b^x into the chamber b^2 . The intimately-combined inflammable mixture of gas and air now passes from the combining-chamber b^2 , through perforated diaphragms b^4 , into outlet-nozzles b^5 , extending from the wall of the combining-chamber b^2 , across an igniting chamber b^6 , into the respective rear ends of the flues a^3 of the boiler A. The igniting-chamber has a door b^7 , in Fig. 2, at which to ignite the gases flowing through the nozzles b^5 , the latter having apertures b^8 to afford access to the stream of combined gases. The ignited gases flow forward through the flues a^3 to the chamber a , thence back through the flues a^2 to the chamber b' , and thence forward again through the flues a' to the breeching a^x and out at the chimney. It will be noted that the hot gases in the chamber b' surround the pipe c , which passes through and may have a bend or coil in the chamber b' , and the air flowing through such pipe is thus highly heated.

As the device shown in Fig. 4 is a mixer in itself, it may be used as a burner similar to the burner of a lamp, the ignition being effected where the mixed or combined gases emerge from the perforations d^4 .

As the device included in the casing B is in itself a mixing and combining device, irrespective of the particular construction of the device seen in Fig. 4, I may employ in lieu of the device D a simple inlet nozzle or device D^x . (Seen in Fig. 5.) This device of Fig. 5 is in effect the device of Fig. 4 with the air-chamber d , the mixing-chamber d^2 , and the perforated diaphragm d^3 omitted.

I do not limit myself strictly to all of the details of construction herein set forth, as these may be varied to some extent without departing materially from my invention.

Having thus described my invention, I claim—

1. The combination with a steam-generator having flues, of an apparatus connected therewith for mixing hydrocarbon vapor or gas with air in proper proportions for use, said apparatus comprising an air-chamber b^3 , means for introducing heated air to said chamber, a combining chamber b^2 , a perforated diaphragm or partition between the chambers b^2 and b^3 , a pipe to lead the hydrocarbon to the chamber b^2 , a mixer or nozzle on the delivery end of said pipe, means for leading the mixed air and hydrocarbon to the flues of the boiler, and an igniting chamber whereat the gases are ignited at the point where they enter said flues, substantially as set forth.

2. The combination with a steam-generator having three tiers of flues a' , a^2 and a^3 , the chamber a , connecting the front ends of the tiers of flues a^2 and a^3 , the breeching a^x , to receive the gases from the upper tier of flues a' , and the stack a^4 , of the chamber b' , con-

necting the flues a' and a^2 at their rear ends, the combining chamber b^2 , the air-chamber b^3 , the perforated partition between the chambers b^2 and b^3 , the air-supply pipe c , extending through the chambers b' and b^2 and opening into the chamber b^3 , whereby a supply of heated air is provided, the pipe leading the hydrocarbon to the combining chamber b^2 , the perforated mixing nozzle on the delivery end of said pipe, the igniting chamber b^6 , between the chamber b^2 , and the rear ends of the flues a^3 of the generator, the nozzles b^5 , adapted to lead the gases from the combining chamber to the flues across the igniting chamber, and the screen or screens over the gas-outlets from the combining chamber, substantially as set forth.

3. The combination with a flue-boiler or steam-generator, of an igniting chamber b^6 , at the rear end of the flues of said generator, said chamber provided with a door, means for mixing air and hydrocarbon gas or vapor, a chamber to contain said mixed gas and air adjacent to the igniting chamber, a screened outlet for said gases where the latter pass to the generator flues, and nozzles b^5 , extending from said outlets into the flues across the igniting chamber, said nozzles having apertures b^8 , to permit of the ignition of the gases, substantially as set forth.

4. In an apparatus for mixing heated air with hydrocarbon gas or vapor, a chamber b' , adapted to receive heated gases, a hot air-chamber b^3 , an air-pipe c , extending through the chamber b' and adapted to deliver air to the chamber b^3 in regulated quantity, a combining or mixing chamber b^2 , a perforated partition b^x between the air-chamber and said combining chamber, and a pipe adapted to lead hydrocarbon gas or vapor to said combining chamber in regulated quantities, said combining chamber having a screened outlet for the mixed gases, substantially as set forth.

5. In a hydrocarbon burner, the combination with the supply-pipe d^{10} , the tube d^5 , connected therewith, means for regulating the supply of gas passing from the pipe d^{10} to the tube d^5 , the air-chamber d , about the tube d^5 , means for regulating the admission of air to said chamber d , the mixing chamber d^2 , having outlet perforations in its top or crown, the perforated diaphragm d^3 , between the air-chamber and the mixing chamber, and the chamber or perforated nozzle d^6 , on the end of the tube d^5 , within the mixing chamber, substantially as set forth.

In witness whereof I have hereunto signed my name in the presence of two subscribing witnesses.

BENJAMIN F. LAWTON.

Witnesses:

MARY R. COLFAX,
GEORGE W. MEAD.