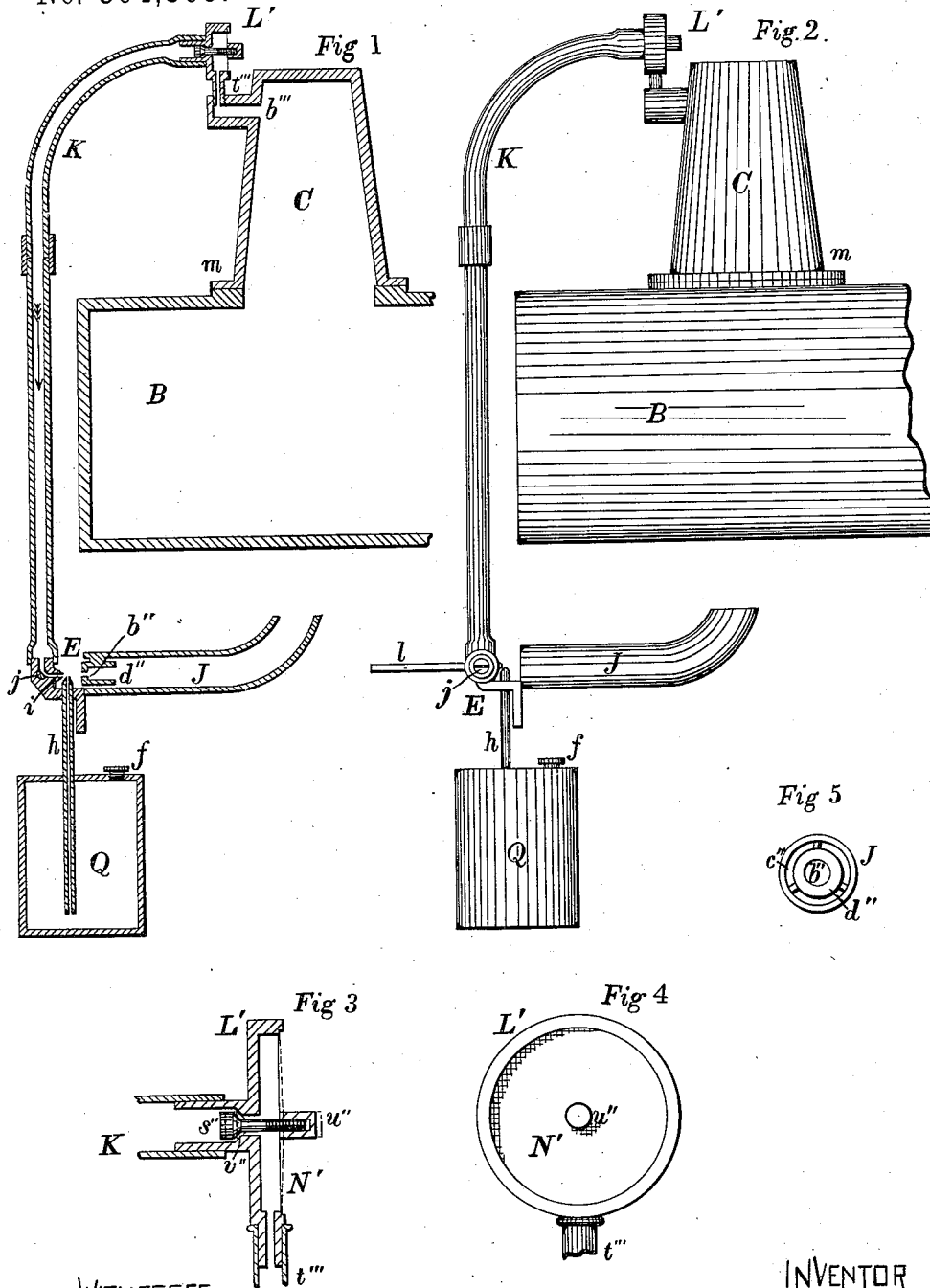


(No Model.)

A. H. SHIPMAN.
HYDROCARBON FURNACE.

No. 304,365.

Patented Sept. 2, 1884.



WITNESSES
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UNITED STATES PATENT OFFICE.

ALBERT H. SHIPMAN, OF ROCHESTER, NEW YORK.

HYDROCARBON-FURNACE.

SPECIFICATION forming part of Letters Patent No. 304,365, dated September 2, 1884.

Application filed November 27, 1882. (No model.)

To all whom it may concern:

Be it known that I, ALBERT H. SHIPMAN, of Rochester, Monroe county, New York, have invented certain Improvements in Hydrocarbon-Furnaces, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to certain improvements in steam-engines, designed more particularly for the production of power for driving sewing-machines, small lathes, and other light machinery, but capable of being applied to other uses; and my invention consists in improved means of regulating the steam-pressure by controlling the rate of combustion of liquid fuel under the boiler, and in the mechanical details thereof, all as hereinafter more fully described and specified.

My improvements in hydrocarbon-furnaces are represented in the accompanying drawings, in which Figure 1 is a central vertical section through the boiler and fuel-feeding apparatus. Fig. 2 is a side view of the same. Fig. 3 is a vertical section through the regulator. Fig. 4 is an elevation of the same. Fig. 5 is an end view of the combustion-tube.

In the accompanying drawings, representing my improvements in hydrocarbon-furnaces, B is the boiler or steam-generator, of any ordinary or preferred form. C is the steam-dome; L, the pressure-regulator; K, the steam-pipe which supplies steam to the atomizer E; Q, the fuel-tank, and J the combustion-tube.

The boiler and combustion-tube are supported by and inclosed in a suitable casing.

The reservoir Q, for holding the liquid fuel, is provided with an opening, *f*, closed by a screw cap or plug, for the purpose of introducing the liquid fuel. From the reservoir Q the liquid fuel is drawn upward through the pipe or oil-conduit *h*, which at its upper end terminates in an orifice arranged in suitable relation with the steam oil-atomizing jet *i*, forming an injector or atomizer, E, by which the sprayed oil is directed through the combustion-tube J, in which it burns, to produce the heat for generating steam in boiler B. The steam-jet *i* receives steam from the boiler through the pipe K, being provided with a regulating-valve, *j*, and handle *l*, or other suitable device for controlling the supply of steam to the jet. The inner end of the combustion-tube may be di-

rected upward, by which the flame formed by the sprayed oil is directed against the bottom of the boiler B.

In Fig. 5 I have represented the combustion-tube as seen from the outer end. The atomized jet of fuel passes through the central opening, *b'*, in the nozzle *d'*, along with a quantity of air; but an additional supply of air is admitted through the annular opening *c'*, formed between the wall of the combustion-tube and the collar or nozzle *d'*, which is supported within the tube by a radial arm or arms.

In order to provide for the regulation of the steam-pressure in the boiler, I combine with the pipe K, which supplies steam to the atomizer, the regulator L'. The regulator consists of a flexible diaphragm, N', Figs. 3 and 4, arranged, in connection with a valve, *s'*, to operate to reduce the supply of steam to the atomizer when the pressure in the boiler becomes too great. The diaphragm N' forms one side of a chamber, into which the steam is admitted through a pipe, *v'''*, communicating with the boiler or steam-dome through a hollow boss, *b'''*. The diaphragm is provided at its center with a boss, *u''*, into which the stem of the valve *s'*, Fig. 3, is screwed. The head of the valve is fitted to a suitable valve-seat, *v''*, Fig. 3, and it operates when the diaphragm N' is pressed outward, as represented by the dotted lines in Fig. 3, by the steam in the chamber, to diminish or entirely cut off the supply of steam to the atomizer. The amount of pressure which will be required to accomplish this result may be regulated by screwing the valve *s'* in or out of the boss *u''*. As shown in the drawings, this can only be effected when the pipe K is removed, the intention being to adjust the regulating-valve at the factory before the engine is sent out and to prevent any subsequent alteration of it. The practical effect of the regulator is that, if the pressure in the boiler rises above any given point at which the valve is set, the supply of steam to the atomizer is entirely cut off and the fire goes out. It will be noticed, also, that if the water should be entirely evaporated from the boiler there will be no more steam to supply the atomizer, and the fire in this case also will be extinguished. Provision is thus made for insuring entire safety under any circumstances which may arise.

I have demonstrated by practical trials un-

der various circumstances that the regulator above described is highly efficient and never fails to produce the desired results.

5 In starting an engine provided with my improved regulator, I obtain a pressure of air in the boiler by means of an air-pump, or by turning the engine backward.

10 I am aware that the supply of steam and liquid fuel to the furnace of a steam-boiler has been heretofore controlled by a diaphragm-regulator operating to control valves in the supply-pipes; but such construction I do not claim, as in my invention the delivery of the liquid fuel is controlled by varying or cutting
15 off the supply of steam to the atomizing device by a regulator operated by the pressure of the steam in the boiler.

The construction of the regulator herein shown forms no part of the present invention, as
20 it is my intention to file a separate application for Letters Patent on the novel features thereof.

I claim—

1. The combination, with a steam-boiler, of an oil-reservoir, a steam oil-atomizing jet, an oil-conduit, and the steam-supply pipe K, and
25 a steam-regulator operating to vary or cut off the supply of steam from the boiler to the atomizer, substantially as and for the purposes set forth.

2. The combination, with a steam-boiler, of
30 an oil-reservoir, the steam oil-atomizing jet *i*, and oil-conduit *h*, located above the oil-reservoir and arranged to draw oil therefrom, and a steam-supply regulator through which the steam passes on its way from the boiler to the at-
35 omizer, substantially as and for the purposes set forth.

ALBERT H. SHIPMAN.

Witnesses:

GEO. B. SELDEN,
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