

UNITED STATES PATENT OFFICE.

ABNER DOBLE, OF DETROIT, MICHIGAN, ASSIGNOR, BY MESNE ASSIGNMENTS, TO DOBLE-
DETROIT STEAM MOTORS CO., OF DETROIT, MICHIGAN, A CORPORATION OF DELA-
WARE.

FUEL-BURNER.

1,351,944.

Specification of Letters Patent.

Patented Sept. 7, 1920.

Application filed January 27, 1917. Serial No. 144,833.

To all whom it may concern:

Be it known that I, ABNER DOBLE, a citizen of the United States of America, and resident of Detroit, Wayne county, Michigan, have invented a certain new and useful Improvement in Fuel-Burners, of which the following is a specification.

My invention relates to improvements in the method of and apparatus for burning liquid fuel and is especially, though not necessarily adaptable for use in the power plants of steam propelled automobiles.

My object is to eliminate the waste, expense and complication arising from the use heretofore of steam or compressed air as the atomizing agency for the liquid fuel, and also to provide an auxiliary source of fuel for use in the event that the main fuel supply fails.

And to this end my invention consists in the atomization of the liquid fuel by means of a gas or vapor which is and of itself constitutes a fuel and is combustible. And this combustible atomizing gas can be employed to sustain combustion for the time being in the event that the main fuel supply fails or is not available.

Referring to the accompanying drawings:

Figure 1 is a sectional view of a liquid fuel burner and a combustion chamber illustrating one way in which my invention may be carried out.

Fig. 2 is a fragmentary plan view on substantially the line 2—2 of the structure shown in Fig. 1, the arch of the combustion hearth being indicated in dotted lines.

The structure shown in the drawings is intended to be illustrative of any suitable structure for the purpose of carrying out the principles and functions of my invention, and it will be obvious to one skilled in the art, after having obtained an understanding of my invention from the disclosures herein made that my invention is capable of embodiment in various other and modified structures without departing from the spirit of the invention.

The combustion chamber within which the fuel mixture is burned forms no part of my present invention, and may be of any suitable construction, and I have illustrated the same as formed by a bowl or dish shaped member of highly refractory material and

having a bottom wall A and side walls B arranged in substantially rectangular conformation, the lower corners and angles C, however, being rounded off or curved to properly direct and circulate the burning gases within the chamber. The upper side of this combustion hearth is open and is placed beneath a steam generator D so that the heat of combustion will be directly absorbed by said generator. The generator needs no particular description. At the side of this combustion chamber I provide a fuel atomizer for projecting fuel in an atomized or finely divided state into the said chamber and as before mentioned this structure may be of any suitable type for the purpose. The structure shown in the drawing, however, embodies a casting or member E, having two arms F by which it is secured in position at the side of the combustion hearth on the outside thereof. This member has two fuel passages G and H which are disposed at the proper angle with respect to each other for the purpose of securing an atomizing action. The lower passage G terminates at its upper end in a small cup or spoon-shaped depression J formed in the casting, and pointed substantially horizontally toward the interior of the combustion hearth. It is located so that the fuel which is sprayed or projected therefrom passes into the chamber through a suitable opening K in the side wall of the hearth. The lower end of passage G is connected with a source of liquid fuel. In this structure the source of fuel is shown as a tank L which is shown elevated above the structure so as to feed the fuel by gravity to the burner although any other means of supplying the fuel may be employed. In the pipe line M which leads from the fuel tank to the burner is a float valve of any suitable or standard type contained within the chamber N which is adapted to control the flow of liquid fuel to the burner. I intend this fuel to be of the cheaper grade of crude oil or any of the inexpensive heavy oils suitable for the purpose and which can be burned with a high degree of economy. I break up or divide this fuel into a fine spray and project it into the combustion chamber, but instead of using compressed air or steam, the use of which necessarily requires complicated and

extensive equipment, as an atomizing agency, I employ the gas or vapor of a fuel which in itself is combustible. This gas or vapor is projected across or in proximity to the spoon-shaped depression J in the form of a jet which in accordance with the principles of atomization operates to draw the heavy main fuel from the passage G and break or divide it up into a fine spray which is projected into the combustion chamber where the process of combustion occurs. It will be observed from the drawing that the other passage H is disposed in such manner with respect to the passage G and depression J as to form a spray nozzle. Its end terminates in a small opening P in proper relation to the depression J. This nozzle is provided with a needle valve Q manually operated for regulating the flow of atomizing gas. The atomizing gas may be generated in any suitable manner best adapted for the purpose, but for the sake of economy and simplicity I utilize the heat of combustion for this purpose and to this end I provide a vaporizing coil R within the combustion chamber and subject to the heat of the burning gases. One end of this coil is connected to a passage S in the burner member communicating with the passage H in the rear of the needle valve. The other end is connected to a pipe line T which extends to a supply tank U. Thus the fuel in liquid form passes to the vaporizer where it is converted into a gas or vapor and is emitted in this condition from the atomizer nozzle opening P and acts to break up or atomize the main fuel and spray it into the combustion chamber. The fuel which I use for this purpose is preferably of the lighter and more volatile varieties such as gasolene, distillate, naphtha and even kerosene. In starting the process of combustion when the fuels and parts are all cold the valve is opened and a small quantity of the atomizing fuel is permitted to run into the depression J and overflow down along the walls of the combustion hearth where it collects in a puddle in a suitable depression V in the bottom of the hearth beneath the vaporizer coil. This puddle may then be ignited by a match or piece of lighted waste or in any other suitable manner. This initial flame heats the vaporizer and converts the fuel therein into a gas which may then be utilized as an atomizing agency as above described. The opening K in the combustion hearth is of sufficient size to admit the proper quantity of air to support combustion and the bottom edge K' of this opening is inclined to direct the starting fuel into the depression. On account of the fact that in this construction the fuel is projected horizontally into the combustion chamber I provide an arch which is positioned over the spray of incoming fuel so as to deflect the burning fuel and

circulate it within the chamber. This arch in this case consists of two portions *w* and *w'*, the part *w'* being integral with the wall of the hearth and the portion *W* being a separate plate of refractory material. The arch is of a relative width indicated in dotted lines in Fig. 2.

I claim:

1. The combination of a liquid fuel nozzle and a source of liquid fuel connected thereto, a spraying nozzle arranged in aspirating relationship to said liquid fuel nozzle, and a source of combustible gas connected with said spray nozzle arranged to atomize and mix with the liquid fuel from said fuel nozzle.
2. The combination of two nozzles arranged in atomizing relation, a supply of liquid fuel connected to one of said nozzles arranged in aspirating relationship to said liquid fuel nozzle, a supply of liquid fuel connected with the second nozzle, a vaporizer for vaporizing the fuel to the second nozzle whereby it will serve as an atomizing agent for the liquid fuel to the other nozzle, and float-controlled means for controlling the fuel to said first nozzle.
3. The combination of a liquid-fuel nozzle and a source of liquid fuel connected thereto, a spraying nozzle and a source of combustible gas connected with said spraying nozzle, and means dependent upon the atomization of said combustible gas for aspirating said liquid fuel in liquid form from the liquid-fuel nozzle.
4. The combination with a liquid-fuel nozzle and a source of liquid fuel connected thereto, a spraying nozzle and a source of combustible gas connected thereto, and means controlled solely by the vaporization of said combustible gas for aspirating said liquid fuel in liquid form from the liquid-fuel nozzle.
5. The combination of a liquid-fuel nozzle and a source of liquid fuel connected thereto, means for maintaining the fuel at a constant level in said fuel nozzle, a spraying nozzle and a source of combustible gas connected with said spraying nozzle, and means dependent upon the atomization of said combustible gas for aspirating said liquid fuel in liquid form from the liquid-fuel nozzle.
6. The combination of a liquid fuel nozzle, a source of liquid fuel connected thereto, a spraying nozzle and a source of combustible fuel connected to said spraying nozzle, said spraying nozzle being positioned so as to direct a blast of said combustible fuel across the mouth of said liquid fuel nozzle to thereby aspirate the liquid fuel in liquid form from said liquid fuel nozzle.
7. The combination of a liquid fuel nozzle, a source of liquid fuel connected thereto, a spraying nozzle, a source of combustible

fuel connected to said spraying nozzle, said
spraying nozzle being positioned so as to
direct a blast of said combustible fuel across
the mouth of said liquid fuel nozzle to there-
5 by aspirate the liquid fuel in liquid form
from said liquid fuel nozzle, and a vaporiz-
ing coil located in the path of the flame pro-
duced by said liquid fuel and connected be-

tween said spraying nozzle and its source of
fuel supply.

Signed by me at Chicago, Illinois, this 10
29th day of November, 1916.

ABNER DOBLE.

Witnesses:

E. H. CLEGG,
AMY JEHL.