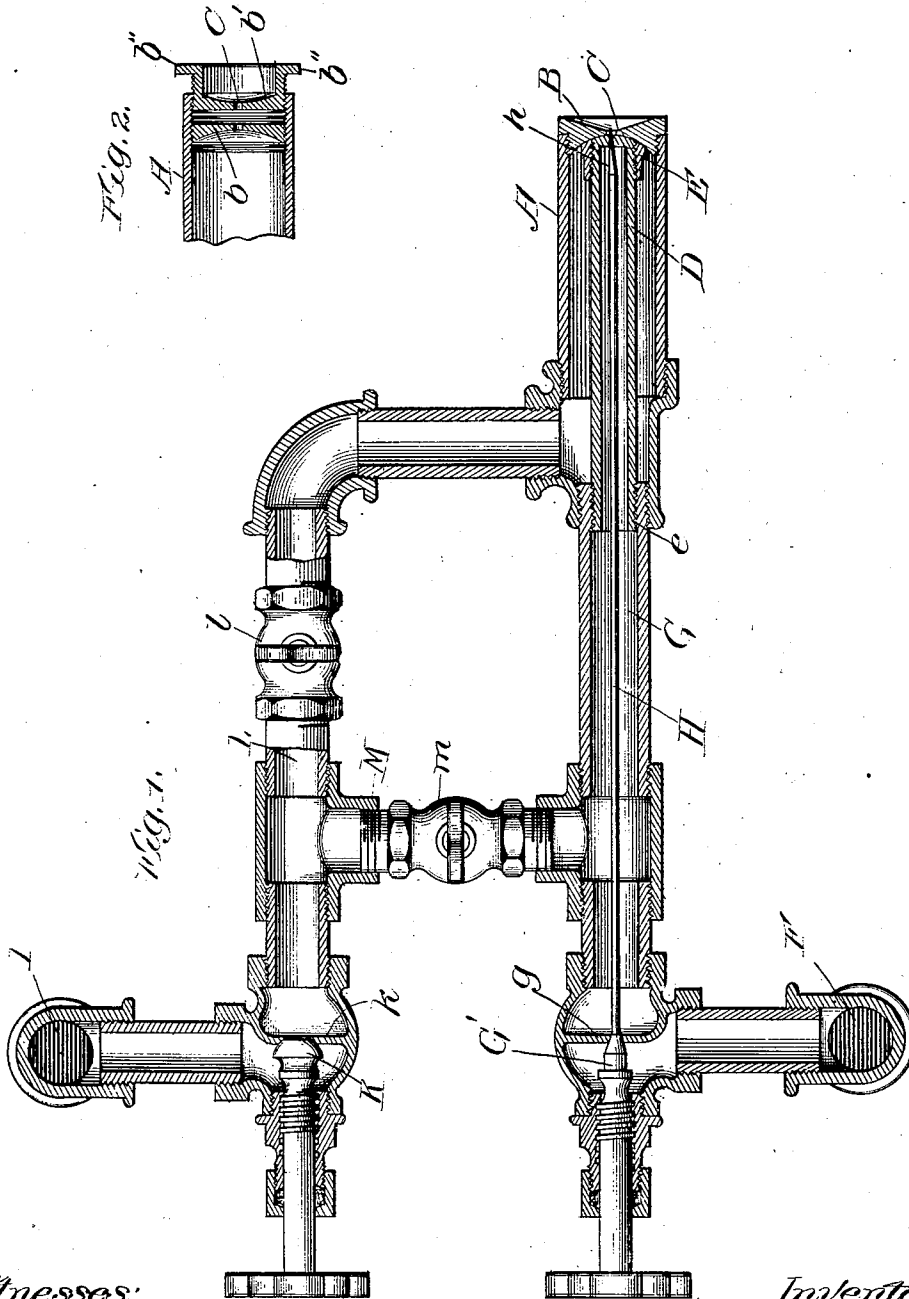


W. M. GREEN.
HYDROCARBON BURNER.

APPLICATION FILED AUG. 31, 1905. RENEWED MAY 12, 1910.

977,186.

Patented Nov. 29, 1910.



Witnesses:
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UNITED STATES PATENT OFFICE.

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HYDROCARBON-BURNER.

977,186.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, WILLIAM M. GREEN, a citizen of the United States of America, and a resident of the city of Evanston, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Hydrocarbon-Burners, of which the following is a specification.

My invention relates to compound burners in which the flame is supplied with a fluid or vaporized hydrocarbon compound, together with another fluid or gas which is either or both combustible or supportive of combustion. To the end, therefore, of thoroughly mixing the combined gases or fluid when presented to the flame, completely controlling the properties of the mixture, and thereby producing more complete and perfect combustion with its attendant increased economy and efficiency, I have invented the device herein described.

In the drawings—Figure 1 represents a vertical longitudinal section of a burner and controlling apparatus made in accordance with the principles of my invention, and Fig. 2 is an alternative form of burner and cap.

As shown in Fig. 1 the burner proper consists of an external shell A, in the outer end of which is inserted by a screw threaded attachment the disk B, having the central opening C. Inside the shell A is a nozzle D, having a centrally perforated cap E at the outer extremity thereof. The nozzle may be mounted as shown at *e* so that it stands free for the whole of its length within the burner shell A. The external part of the cap E on the end of the nozzle is formed to a rounded or other suitable contour, and the inner part of the cap B is formed to correspond therewith. The two by proper adjustments may be made to assume a close contact at any desired normal or other temperature. Connection with a source of oil supply may be made through the pipe represented at F, sufficient pressure to force the same to the burner being supplied by gravity or other means. The flow of oil is through the pipe or mixing chamber G to the burner, and is controlled by the globe valve G' seating at *g*, and to which, passing through the opening in the seat, is attached the stem H. The latter terminates in the needle valve *h* which seats in the aperture of the cap E. The stem H should be of

such length that at normal temperature the needle valve and the globe valve should operate simultaneously in the same relation to each other. Steam or air under pressure may be supplied to the apparatus from any suitable source of supply through the pipe I. The flow of such fluid is controlled by the globe valve K through the valve seat *k*. After passing therethrough the flow of fluid may be directly through the pipe L wherein the flow is checked and controlled by the cock *l*, or through the pipe M in which the flow is checked and controlled by the cock *m*.

The shape of the flame depends largely on the distance between the internal and external portions of the disk B. As represented in Fig. 1 the edges of the aperture C are very thin, and the distance between the two sides practically nothing. With this construction the flame will be very broad and fan shaped. But by the expedient shown in Fig. 2 the flame may be condensed or contracted. Instead of using a single disk I provide two disks *b* and *b'* adapted for close contact on their facing sides. Both of the disks *b* and *b'* are threaded on their outer edges so that they can be moved independently of each other. The outer disk *b'* may be provided with ears *b''* which may be engaged by a wrench or other suitable tool. When the disk *b* is placed as desired with reference to the cap E, the disk *b'* may be readily adjusted at such distance from *b* as will give the best results in the form and application of the flame.

The operation of my device is as follows: By opening the valve G' the needle valve *h* is also opened and a flow of oil or other liquid fuel is permitted through the cap E of the nozzle D. At the same time a flow of air or steam under pressure superior to that of the fuel, is permitted by opening the valve K, and its direction is controlled through the pipe L by closing the cock *m* and opening the cock *l*. Being thus directed it surrounds the nozzle D within the jacket A and flows through a slight space produced by expansion at normal temperature between the inside of the cap D and the exterior of the cap E. This flow atomizes or vaporizes the oil or other fuel fluid, and, being ignited as it passes through the burner, combustion of the two takes place. The heat of such combustion being communicated to the jacket A causes the same to ex-

pand, while the flow of air or steam through the jacket A keeps the nozzle D relatively cool. The longitudinal expansion of the jacket will, therefore, slightly increase the space between the disk B and cap E, causing the flow of air or steam to be increased to the end of making a more perfect combustion. As the heat of the chamber surrounding the burner increases, as well as that of the burner itself, the fuel becomes more and more volatilized and disintegrated, and the increasing heat of the apparatus tends to extend this condition to the portion of the fuel contained in the pipe or chamber G. If the requirement for oxygen to support combustion becomes greater the efficiency of the fuel may be greatly increased by mixing the same intimately with the volatilized oil. This can be effected by closing the cock *l* and opening the cock *m*, by which the flow of air or steam is shut off from the inside of the jacket A and diverted to the chamber or pipe G, where it is mingled with the fuel which, by the increasing heat of the burner, has become partially or quite volatilized, a condition which is completed or intensified by the heating of the nozzle D. The cooling flow of fluid through the surrounding jacket being stopped the nozzle D expands longitudinally, thus partially or quite, (as its length is greater than that of the jacket A), closing the space between the disk B and cap E. In the use of various classes of liquid fuel the relative flow of fuel and combustion supporting fluid through the different channels may be varied to advantage. The flow of fuel may be confined to the chamber G and the combustion supporting fluid to the pipe L. Both may be made to flow as described through the chamber G, or by manipulation of the cocks and valves, the flow of the combustion supporting fluid

may be divided in any proportion desired between the channels leading to the burner.

It will be seen that my invention places in the hands of the operator a simple, positive and reliable means of controlling the elements of combustion, as well as the form of flame within the combustion chamber.

Throughout this specification the word oil is to be understood to mean any kind of combustible fluid, whatever its nature or consistency; and any suitable material adapted to support or aid in supporting combustion is to be understood as included within the material adapted to be used in the improved device.

Having thus described the invention, what is claimed as new, is:

In a burner, an outer shell and a T-member connected by one of its branches to one end thereof, and a cap at the other end provided with a burner orifice and with the inner face concave, a feed pipe for the liquid fuel connected into another branch of said T-member, a feed pipe for steam or air under pressure connected into the remaining branch of the T-member, a burner tube within said shell and connected at one end into the inner end of said fuel feed tube and with the other end conforming to and bearing against the concave face of said cap and with a central valve seat, a valve engaging said valve seat and provided with an elongated stem extending through said burner tube and the fuel feed pipe.

In witness whereof, I have hereunto subscribed my name in the presence of two subscribing witnesses, this 28th day of August A. D. 1905.

WILLIAM M. GREEN.

Witnesses:

C. K. CHAMBERLAIN,
A. S. PHILLIPS.