No. 897,202. PATENTED AUG. 25, 1908.

B. C. HAMILTON.

HYDROCARBON BURNER.

APPLICATION FILED NOV. 5, 1901.

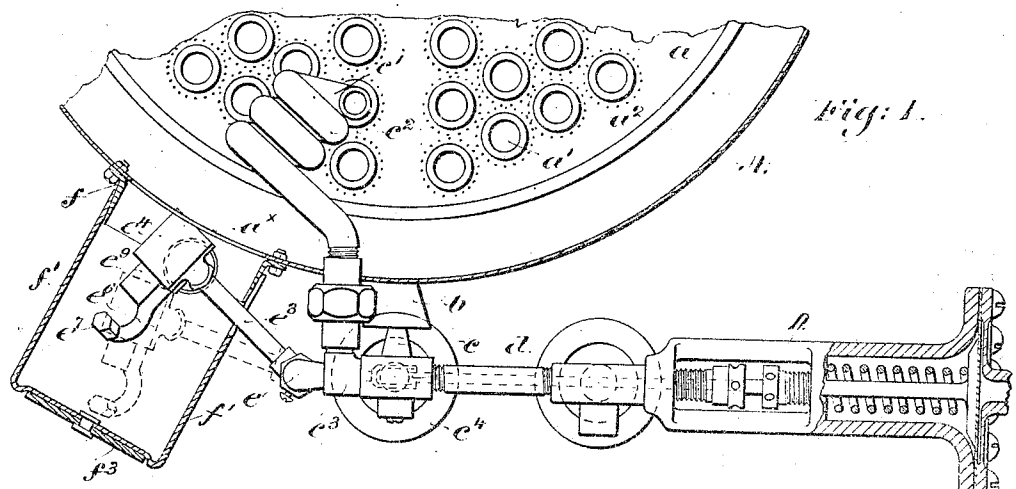


Fig: 1.

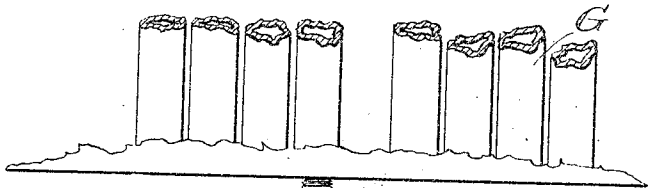


Fig: 2.

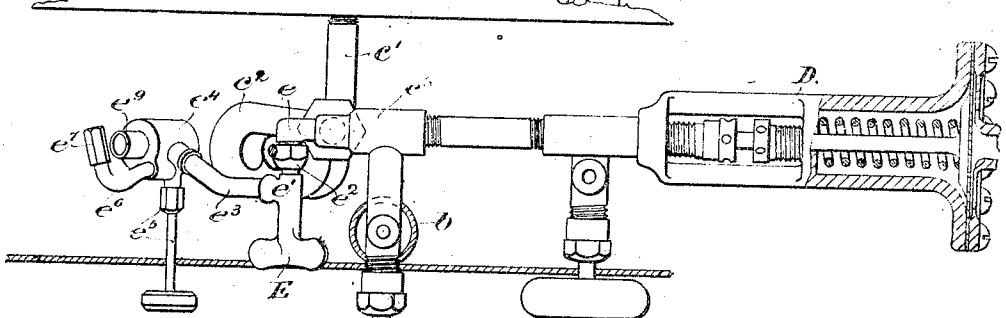


Fig: 4.

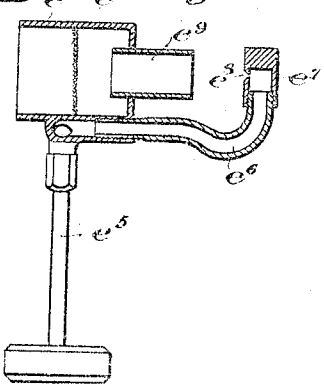
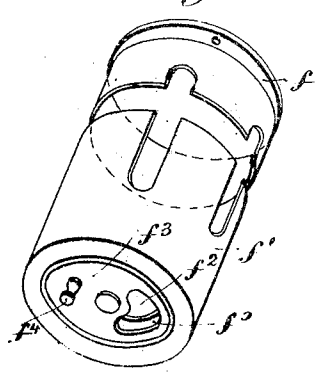


Fig: 3.



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UNITED STATES PATENT OFFICE.

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HYDROCARBON-BURNER.

No. 897,202. Specification of Letters Patent. Patented Aug. 25, 1908.

Application filed November 5, 1901. Serial No. 81,274.

To all whom it may concern:

Be it known that I, BURTON C. HAMILTON, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented an Improvement in Hydrocarbon-Burners, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

This invention relates to hydro carbon burner apparatus for heating steam generators or boilers, particularly such as are used in connection with automobiles.

In an apparatus of this class it is desirable to have a main burner to produce the principal heating effect for raising and maintaining steam in the generator, and ordinarily the main supply pipe or conduit for this main burner is carried across or into the combustion chamber immediately above the burner, in order that it may be heated by the flame from the burner and thereby serve as a vaporizer to assist in vaporizing the hydro carbon fuel to insure complete vaporization thereof before it reaches the burner. In starting the burner, however, it is necessary to initially heat this vaporizer or some portion of the supply conduit for the main burner in order to obtain the requisite vapor, and to accomplish this my invention comprehends an initial heating and lighting torch adapted when lighted to play upon the vaporizer referred to and heat the same to a degree sufficient to vaporize the contained hydro carbon. The main burner may then be turned on and the hydro carbon vapor issuing therefrom is lighted by the torch flame which furnished the heat for generating this vapor.

My invention also comprehends the employment of an automatic burner regulator responsive to variations in steam pressure within the generator or boiler and which will vary the supply of vapor fuel to the main burner according to the requirements of the boiler but without affecting the initial heating and lighting torch, which is independent of this regulator, so that when the main burner supply is wholly cut off for any purpose, the torch flame may continue to furnish such heat as may be necessary to maintain requisite pressure of steam in the boiler and also to maintain the vaporizer heated and the flame in readiness for initially lighting the main burner again when needed.

It being undesirable to permit the torch flame to play continuously upon the main burner vaporizer after said burner has been set in operation, my invention comprehends a movable torch, which, after initial heating and lighting of the main burner, may be moved or turned to one side away from the vaporizer to leave the latter free from the intense heat of the torch flame until such time as it is desirable again to bring it to bear upon said vaporizer, when said torch may be moved back again into heating position.

The foregoing with other features of my invention will be hereinafter more particularly described in connection with the accompanying drawings and the various features of my invention pointed out in the claim at the end of this specification.

In the drawings, Figure 1 is a top or plan view, partial section, of a portion of a burner apparatus and boiler equipped with devices made in accordance with my invention sufficient to enable said invention to be understood; Fig. 2 is a front elevation partially in section of the apparatus shown in Fig. 1, certain parts being removed for the sake of clearness; Fig. 3, an enlarged sectional detail, showing the torch illustrated in Figs. 1 and 2; and, Fig. 4, a perspective detail showing the torch casing detached.

In the particular embodiment of my invention selected for illustration herein and shown in the drawings, A represents the inclosing wall of the combustion chamber of a typical steam motor vehicle,—such, for instance, as the well-known "locomobile" of the present time. The bottom of this combustion chamber is formed by the burner, *a*, shown as provided with a continuous top plate through which rise the air tubes, a', surrounded by burner orifices, a^2, through which the vapor fuel escapes from the chamber within said burner. The top of the combustion chamber referred to is shown in Fig. 2 as formed by the bottom tube sheet of a tubular steam boiler or generator G of usual type. As herein shown, the combustion chamber, burner and boiler are of the general type and construction illustrated by U. S. Patent to Stanley and Stanley, dated

Nov. 14th, 1899, No. 637,176, although my invention is not restricted to such apparatus to the exclusion of others.

Fuel vapor for the main burner is injected into the burner chamber referred to, through a mixing tube, *b*, entering through the side of said burner, the vapor injector nozzle being shown at *c*, and of such diameter relative to the diameter of said mixing tube as to cause a proper quantity of air to be carried into said mixing tube by and with the fuel jet entering thereat. The fuel for the jet device, *c*, is taken from a suitable receptacle not shown, and is conducted one or more times through the length of the boiler, as in a conduit, *c'*, in well-known manner, and after entering said combustion chamber above the said burner, said pipe or conduit, *c'*, is preferably given one or more turns, c^2, or is otherwise suitably formed to constitute a vaporizer, which communicates with the valve casting, c^3. Communication between the interior of the valve casting, c^3, and the burner jet device, *c*, is controlled by a suitable valve, c^4.

An automatic regulator, typified at D and connected with the boiler, so as to render it responsive to variations in pressure therein, is connected in suitable manner with a valve, shown in dotted lines at *d*, which controls the flow of fuel from the vaporizer, c^2, to the valve, c^4, and its jet device, so that when the predetermined pressure has been obtained in said boiler, said regulator will reduce or cut off the fuel supply to the main burner, thereby to reduce the heating effect until a reduced boiler pressure operates through said regulator to open said valve for an increased supply of fuel for further heat.

The valve casting, c^3, as here shown, is provided at one side with a downwardly turned elbow, *e*, to which is jointed, to swing about a vertical axis, the swinging elbow, e^1, the connection between the latter and said fixed elbow, *e*, being protected by a suitable joint packing, e^2. The swinging elbow, *e'*, carries a laterally extended tubular arm, e^3, which, at its outer end, communicates with a suitably formed passage in the torch barrel casting, e^4, fitted with a valve, e^5, the handle of which depends in convenient position for operation. The torch barrel, e^4, is shown provided with a gooseneck, e^6, leading from the said valve, e^5, and terminating at its end in an upturned tip, e^7, provided with a very fine aperture, e^8, see Fig. 3, directed towards the tubular neck, e^9, of said torch barrel. This neck, e^9, is shown smaller in diameter than the barrel proper, and preferably projects somewhat within said barrel, the latter containing preferably a foraminous screen, e^{10}.

Vapor from the vaporizer, c^2, entering the said casting, c^3, passes to the left therefrom and free from the control of the regulator valve, *d*, said vapor passing downwardly through the swinging elbow, *e'*, and issuing from the orifice, e^8, in a fine jet that is projected across the intervening air space into and through the torch barrel, carrying with it a proper quantity of air, which may ignite so that the resultant flame will be projected upon the vaporizer, c^2, within the combustion chamber, A. The combustion chamber wall, A, is shown as perforated at $a^\times$, to permit the entrance of the torch flame to play upon the said vaporizer.

The operation of my device is as follows: Assuming the apparatus to be cold and the supply pipe or conduit, *c'*, filled with liquid gasolene or other hydro carbon fuel, the operator first applies a lighted swab, or, it may be, two or three lighted matches to the torch barrel casting and gooseneck, e^6, heating the same to a temperature sufficient to vaporize the relatively small column of liquid fuel that is permitted to pass thereto. When heated to this extent, the depending valve stem, e^5, is turned, to open the torch valve, thus admitting liquid fuel to the heated torch casting, by which it is immediately vaporized and projected by the pressure of the vaporized fuel in a forcible jet from the orifice, e^8, into the barrel of the torch where it becomes thoroughly mixed with the air drawn in with it, and is lighted, it may be, by the same flame that was used to heat the torch casting, and burns beyond the foraminous screen, e^{10}, the force of the projected column of vapor causing the flame of the combined mixture to play with intense heating effect upon the vaporizer, c^2, of the main burner. When this vaporizer has been sufficiently heated to vaporize the contained hydrocarbon, the main burner valve, c^4, is opened, to permit such vaporized fuel to pass to the burner tip, *c*, from which it is projected as a forcible jet through the mixing tube, *b*, into the mixing chamber of the burner where it is mixed with the air drawn in with it and issues through the orifices, a^2, surrounding the air tubes, *a'*, referred to. As this vapor issues from the burner it is immediately ignited by the torch flame, thus completing the operation of starting the main burner.

As the main burner heats the boiler and its contained water, the liquid fuel passing therethrough in the pipe, *c'*, is more or less heated and vaporized before reaching the vaporizer, c^2, so that the effect of the vaporizer is then as a superheater to raise the temperature of the vapor to a still higher degree, it being understood that the higher the temperature of the vapor, the more intense will be the heat from the resultant flame.

After the main burner has been started, the vaporizer, c^2, will be heated thereby, and it being no longer necessary to maintain the torch flame playing upon such vaporizer, the

said torch is swung into its dotted position, Fig. 1, to direct its flame away from said vaporizer but still playing into or in proximity to the combustion chamber, so as always to be in readiness again to light the main burner when the supply of fuel is admitted thereto after having been temporarily cut off by the regulator, D, in the manner described. To facilitate the swinging of the torch into this abnormal position with its flame directed away from said vaporizer, the said torch may be provided with a suitable device, as the handle, E, Fig. 2, depending from the swinging elbow, e', which furnishes means by which the operator may readily and conveniently swing said torch into position to direct its flame in any desired direction.

When the vehicle is stopped temporarily an hour or more, the torch flame alone projected into the combustion chamber is sufficient to maintain a working steam pressure for a considerable period of time. For the best results at such times, the torch flame should not play upon the vaporizer, for the flow of fuel therethrough would probably be insufficient to keep it from burning. When the vehicle is again needed for use, the heat of the contained water is sufficient to furnish vapor for the main burner, and when admitted thereto, will be ignited by torch flame. In the event, however, of the vehicle standing for such length of time as will permit the water within the boiler to cool to an extent that it will not vaporize the fuel flowing downwardly through the pipe, c', therein, the torch may in such event be swung into position to project its flame upon the vaporizer, c^2, for a moment or two, when the main burner may be started as first described. The torch flame projecting from its barrel, e^4, is alone sufficient to maintain said barrel and its adjacent fuel passage heated to a sufficient extent to vaporize its own fuel supply whether or not there be heat enough in the vaporizer, c^2, to vaporize fuel flowing therethrough. To facilitate initial heating of the torch by the swab or match flame and to shield such torch at such times from drafts of air, a suitable inclosing area is provided.

As here shown, there is applied to the combustion chamber wall, A, an outturned ring-like flange, f, over which is fitted a cup-shaped casing, f'. The flanged ring, f, and cylindrical wall of the casing, f', are slotted horizontally, as shown in Fig. 4, to receive the swinging arm, e^3, of the torch, and also to receive the depending stem of the valve, e^5. The casing, f', is retained in position upon the ring, f, frictionally, or otherwise if desired. At its outer closed end, the casing, f', is provided with a segmental opening, f^2, under the control of a rotatable disk or valve, f^3, having a handle, f^4, which when turned into position with its opening, f^5, registering with the opening, f^2, of the casing, permits of the introduction of the initial heating swab or matches. When the initial lighting has been effected and the swab withdrawn, the valve disk, f^3, is rotated to close the opening, f^2, thereby protecting the torch flame from action of air drafts. If desired, the opening, f^2, may be left partially uncovered, the adjustment of the disk valve depending upon the conditions of use. To gain access to the orifice, e^8, of the torch, for cleaning, the casing, f', is withdrawn, permitting the torch to be swung completely around so as to face outward instead of towards the burner, in which position its several parts may be easily cleaned.

In practice the swing arm, e^3, is preferably filled with spelter or equivalent means for controlling the flow of fuel therethrough and to prevent fluctuations in the torch flame. The perforated or foraminous screen, e^{10}, aids in dissipating the fine column of fuel and in mixing the same with the air, and also operates to prevent the flame lighting back to the orifice, e^8.

I have here described one embodiment of my invention, but my invention is not limited thereto, as it may be varied within the spirit and scope of my invention.

Having described my invention, what I claim and desire to secure by Letters Patent, is,—

1. The combination with a steam generator of a main burner therefor and having a combustion chamber arranged between said generator and burner; a fuel vaporizer located within said combustion chamber and connected to said burner; a swinging heating and lighting torch adapted to play upon and heat said vaporizer; and means for supplying fuel to said torch connected to the vaporizer.

2. In an apparatus of the class described, a main burner, its supply conduit having a vaporizer portion exposed to the action of said burner, an automatic regulator controlling communication between said vaporizer and said main burner, and a swinging, initial heating and lighting torch adapted to play upon said vaporizer and supplied therefrom independently of said automatic regulator.

3. The combination of a boiler and a main burner arranged with an intervening combustion chamber, a supply conduit for said main burner having a vaporizer portion located in said combustion chamber to receive heat from said main burner, and a swinging initial heating and lighting torch arranged to play upon said vaporizer or away from the same but within said combustion chamber, at the will of the operator.

4. The combination with a steam generator of a main burner and an initial lighting torch therefor, a supply conduit for both burner and torch and arranged to receive heat from both burner and torch, the latter being swingingly mounted whereby its flame

may be directed away from said conduit while still supplying heat to said generator.

5. In a hydro carbon burner the combination of a vaporizer, a main burner supplied thereby, a valved connection between said vaporizer and said burner, and a swingingly mounted lighting torch for said main burner supplied also by said vaporizer but independent of said valved connection.

6. In a hydrocarbon burner the combination of a main burner, a vaporizer exposed to the action thereof, a supply conduit connecting said vaporizer and said burner, a movably mounted initial heating and lighting torch adapted to initially heat said vaporizer and light said main burner, and a fuel supply conduit therefor in close proximity to the flame produced by said torch to cause vaporization of the fuel before reaching the heating torch jet.

7. The combination with a steam generator of a main burner and an initial lighting torch therefor, a supply conduit for said burner arranged to receive heat from said burner and torch, and means for adjusting the latter to direct its flame away from said conduit while still supplying heat to said generator.

In testimony whereof, I have signed my name to this specification, in the presence of two subscribing witnesses.

BURTON C. HAMILTON.

Witnesses:
FREDERICK L. EMERY,
C. W. KING.