Aug. 24, 1926. 1,597,651

G. A. HOFFMAN

HYDROCARBON BURNER

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FIG. 1

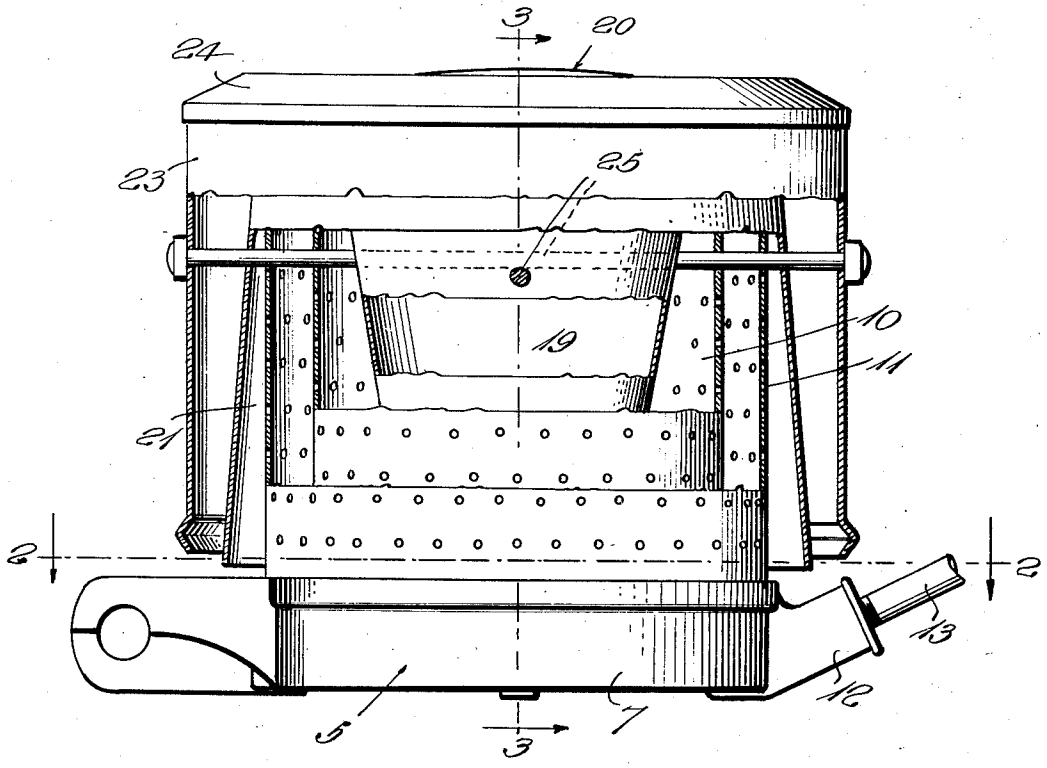
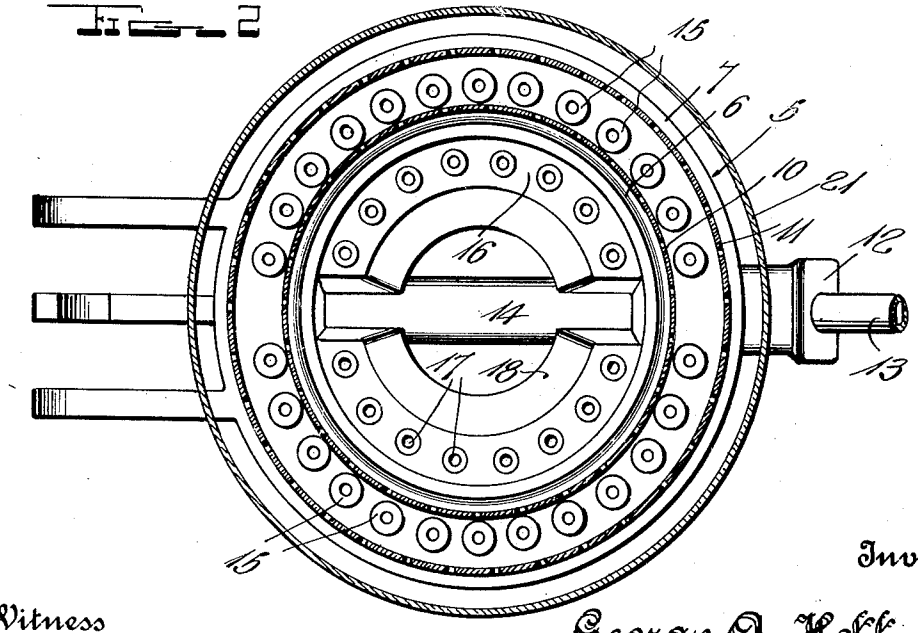


FIG. 2



Witness

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FIG. 3

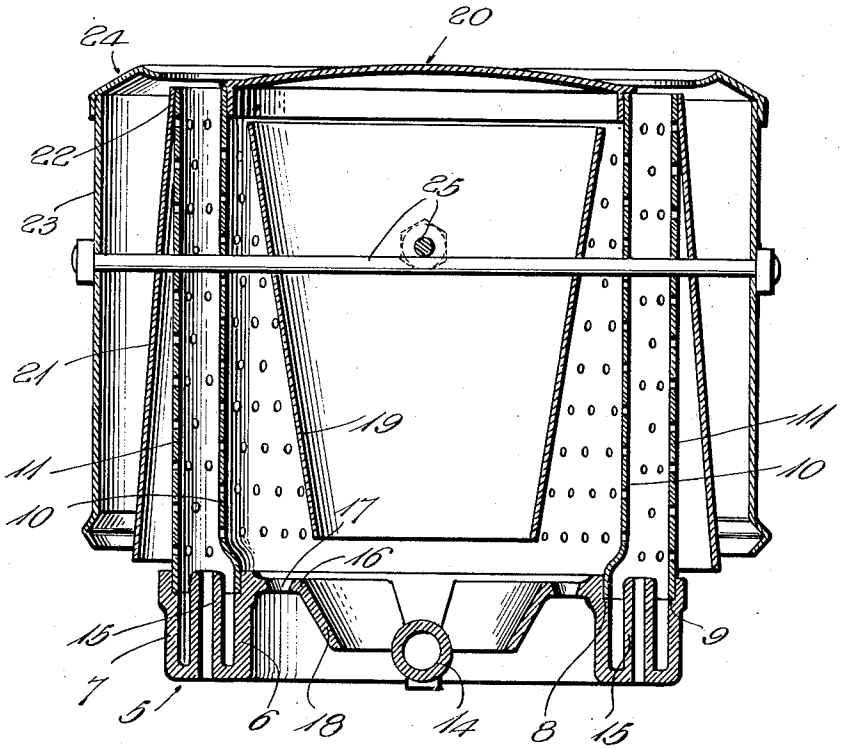
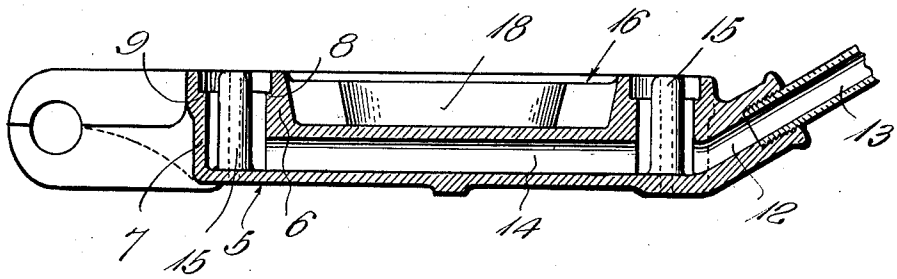


FIG. 4



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UNITED STATES PATENT OFFICE.

GEORGE ALBERT HOFFMAN, OF MANSFIELD, OHIO, ASSIGNOR TO THE NEW METHOD STOVE CO., OF MANSFIELD, OHIO.

HYDROCARBON BURNER.

Application filed March 1, 1926. Serial No. 91,576.

The invention relates to the general type of hydro-carbon burner shown in my U. S. application, Serial No. 30,308, filed May 14, 1925, and the present application constitutes a continuation in part of the case just identified.

The invention is a new and improved burner of the type in which gas is generated from liquid fuel, the generated gas being burned, mixed with air. Burners of this type are commonly provided with a trough in which a quantity of gasoline or other highly volatile fuel is placed and ignited to pre-heat the burner, so that when a relatively low grade fuel such as kerosene is introduced into the heated trough, it will gasify and can be effectively burned. One great drawback to burners of this type, is the amount of time required to initially heat the burner, before the main supply of fuel can be turned on and the device efficiently operated. This is due to a large extent, to the fact that the trough is of such construction that it cannot be quickly and easily heated by the small amount of priming fuel. Moreover, insufficient air is very often supplied to the priming liquid at the point where combustion takes place. An inadequate supply of air is also in most instances supplied to the lower portion of the burner when it is in operation, with the result that rather poor combustion takes place and a great deal of soot accumulates.

It is one object of my invention to overcome difficulties such as those above enumerated, by providing the fuel trough with a multiplicity of upstanding tubes which not only constitute inlets for conducting an adequate amount of air to the level at which gasification of the fuel takes place, but constitutes relatively small elements which are quickly and easily heated by the priming charge of fuel. These tubes are in such close relation with the inner and outer walls of the fuel trough, that they leave only very restricted spaces through which the fuel may flow around the trough from the fuel inlet. Thus, it is insured that the fuel shall be highly heated and thus effectively converted into gas, and the heated tubes serve also to supply an adequate amount of hot air to this gas, to readily support combustion.

Combustion takes place between inner and outer perforated walls which are coincident with the inner and outer walls of the fuel trough, and a further object of the invention is to make novel provision for supplying additional heated air to this combustion space, so that a great deal of air can be mixed with the fuel and an extremely hot blue flame will be provided substantially throughout the length of the perforated walls. This flame seems to discharge in jets from the air inlet tubes which rise from the bottom of the fuel heating trough, but at an elevation above said tubes, the flame spreads out into the entire space between the inner and outer perforated walls and even more thorough combustion here takes place due to the adequate amount of hot air supplied through the perforations of said walls, and in actual use, the heat produced by such combustion, has been equivalent to that produced by a burner of a gas stove.

With the foregoing in view, the invention resides in the novel subject matter hereinafter described and claimed, the description being supplemented by the accompanying drawings.

Figure 1 is a side elevation partly broken away and in section showing a burner constructed in accordance with the invention.

Figs. 2 and 3 are sectional views on lines 2—2 and 3—3 respectively of Fig. 1.

Fig. 4 is a sectional view through the fuel heating trough with the perforated walls and associated parts removed.

The drawings above briefly described, illustrate a form of construction which in actual use, has been found to be most efficient. Such details as are herein shown, are therefore preferably followed, it being of course understood however that within the scope of the invention as claimed, variations may be made.

The numeral 5 designates a continuous fuel heating and gas generating trough whose inner and outer side walls 6 and 7 preferably have their upper end portions outwardly offset to some extent, providing shoulders 8 and 9, upon which inner and outer perforated walls 10 and 11 are removably supported. A fuel inlet 12 for kerosene or other suitable fuel, is provided through the outer wall 7 of the trough 5 and is connected with a fuel supply pipe 13, the latter being of course provided with an appropriate control valve. Extending diametrically across the trough 5 and disposed in line with

the inlet 12, is a fuel conducting pipe 14. Some of the fuel from the inlet 12 of course reaches the pipe 14 and passes to the diametrically opposite portion of the trough 5, so that from the discharge end of said pipe 14 and said inlet 12, practically uniform distribution of fuel takes place around the trough.

Integral with and rising from circumferentially spaced portions of the trough bottom, are a plurality of upstanding air inlet tubes 15, these tubes being disposed in close relation with each other and in close proximity with the side walls 6 and 7 of the trough, leaving only very restricted passages through which the fuel may pass as it travels around said trough. These tubes of course become highly heated and they therefore assist materially in properly heating and gasifying the liquid fuel, as well as serving to supply an abundant quantity of heated air to the gas generated. The upper ends of the tubes 15 preferably extend above the ledges 8 and 9 and they are received between the lower ends of the perforated walls 10 and 11.

Integral with and projecting inwardly from the upper edge portions of the wall 6, is a flange 16 having perforations 17 for admitting air, heating such air and supplying it to the space around the inner side of the wall 10. Another flange 18 projects downwardly from the inner edge of the flange 16 and declines inwardly. Both this flange and the flange 16 become highly heated and it will be observed that the space bounded by these flanges is open, so as to permit the free ascent of air. Thus, this air is effectively heated and the inclination of the flange 18 permits acceleration of said air as it heats and expands.

Disposed within the inner perforated wall 10, is an upwardly flared, imperforate wall 19 which is open at both its upper and lower ends and has the latter disposed inwardly of the flange 16, so that all of the air admitted through the perforations 17 and some of the air which flows upwardly within the confines of the flange 18, will be caught by said imperforate wall and outwardly directed through the perforations of the wall 10. The remainder of the air entering within the confines of the flange 18, passes upwardly within the space bounded by the wall 19 but cannot escape, due to the provision of a cap 20 whose edge is secured to the upper end of the wall 10. This cap is in spaced relation with the upper end of the wall 19 and the latter is inwardly spaced from the wall 10, so that air rising to the upper end of said wall 19, may pass over the latter and discharge through some of the perforations of said wall 10, into the space between this wall and the outer perforated wall 11.

Surrounding the outer wall 11, is a downwardly flared, imperforate wall 21, the upper end of this wall being secured at 22 to said wall 11, in approximately an air tight manner. Thus, air may rise within the wall 21 and is by the latter directed through the perforations of the wall 11 into the space between this wall and the inner wall 10. It will thus be seen that an abundance of heated air is fed to the space between the walls 10 and 11, some of this air passing through the perforations of the inner wall, some through those of the outer wall, and some through the tubes 15. This heated air thoroughly mixes with the gas generating in the trough 5, forming a highly combustible mixture and producing better results than any other analogous structure with which I am acquainted.

A suitable jacket 23 preferably surrounds the wall 21 in spaced relation therewith and is provided at its upper end with an inturned flange 24 terminating in spaced relation with the upper ends of the walls 21 and 11. This jacket and all of the walls may be tied together and held in properly assembled position by the usual cross rods 25 or other equivalent means.

It will be seen from the foregoing that I have provided a greatly improved burner construction in which quick initial heating may be effected from burning of the priming charge of gasoline or other highly volatile fuel, and that while this initial heating is taking place, as well as during the operation of the burner under the main supply of fuel such as kerosene, effective gasification and thorough mixture of heated air with the gas, will take place, thus providing for almost perfect combustion and giving excellent results. Not only is the introduction of heated air through the tubes 15 an important factor, but the air admitted through the perforations 17 and within the flange 18, and that which enters the lower end of the wall 21, are also of importance. I have above explained that the upward flare of the flange 17 causes acceleration of the ingoing air as it heats and expands, and it may also be stated that the perforations 17 are flared in this same manner, for identically the same purpose.

As previously set forth, the details herein disclosed are preferred, but within the scope of the invention as claimed, variations may be made.

I claim:

1. A wickless gas generator and burner comprising a continuous liquid fuel receiving and gas generating trough, inner and outer perforated walls rising from the inner and outer walls of said trough, a fuel inlet into the lower portion of said trough, and a multiplicity of combined air inlet and fuel heating tubes rising from circumferen-

tially spaced portions of the trough bottom, said tubes being in closely spaced relation with each other and being spaced from but in close proximity to both said inner and outer walls of the trough, leaving only very restricted fuel passages between the walls and tubes to effect high heating of the fuel flowing around the trough from said fuel inlet, the upper ends of said tubes being disposed in spaced relation with the lower ends of said perforated walls.

2. A wickless gas generator and burner comprising a continuous liquid fuel receiving and gas generating trough having the upper portions of its vertical side walls outwardly offset to form continuous upwardly facing ledges, inner and outer perforated walls resting on said ledges, a fuel inlet opening through the outer wall of said trough, a fuel conducting pipe in line with said fuel inlet and extending diametrically across the trough to place opposite portions of the latter in communication with each other and thus equalize the fuel distribution in the trough, and a multiplicity of closely spaced combined air inlet and fuel heating tubes integral with circumferentially spaced portions of the trough bottom and rising therefrom, said tubes being in closely spaced relation with both the inner and outer walls of said trough, leaving only very restricted fuel passages between the walls and tubes to effect high heating of the fuel flowing around the trough from the inlet and pipe, the portions of the trough bottom in line with said inlet and pipe being devoid of tubes to allow free entrance of fuel, the upper ends of said tubes being disposed at points above said ledges and positioned between and in spaced relation with the lower portions of said perforated walls.

3. A wickless gas generator and burner comprising inner and outer perforated walls spaced apart and disposed in concentric relation, a continuous liquid fuel receiving and gas generating trough whose inner and outer side walls coincide with the lower ends of said inner and outer perforated walls, a fuel inlet into the lower portion of said trough, a multiplicity of combined fuel heating and air inlet tubes rising from circumferentially spaced portions of the trough bottom and disposed in close relation with said side walls of the trough, leaving only very restricted fuel passages between said tubes and side walls to effect high heating of the fuel flowing around the trough from said fuel inlet, a flange projecting inwardly from the inner side wall of the trough and having perforations for permitting upward passage of air, means within said inner perforated wall for outwardly directing such air toward this wall, and an inwardly declined air heating flange projecting downwardly from the inner edge of said first named flange, the space bounded by said downwardly projecting flange being open to permit ascent of air.

4. A wickless gas generator and burner comprising two spaced concentric perforated walls, a cap closing the space bounded by the upper end of the inner wall, an upwardly flared imperforate wall within the confines of said inner wall and having its upper end spaced from the latter and said cap, a downwardly flared imperforate wall around said outer wall and connected at its upper end thereto, in substantially an airtight manner, the spaces between the lower ends of all of said walls being open; a continuous liquid fuel receiving and gas generating trough whose inner and outer side walls coincide with the lower ends of said inner and outer perforated walls, a fuel inlet into the lower portion of said trough, a multiplicity of combined fuel heating and air inlet tubes rising from circumferentially spaced portions of the trough bottom and disposed in close relation with said side walls of the trough, leaving only very restricted fuel passages between said tubes and side walls to effect high heating of the fuel flowing around the trough from said fuel inlet, a flange projecting inwardly from the inner side wall of the trough and having perforations for admitting air to the space between the aforesaid inner perforated wall and the upwardly flared wall, and an inwardly declined air heating flange projecting downwardly from the inner edge of said first named flange, the space bounded by said downwardly projecting flange being open to admit air to the space within the aforesaid upwardly flared wall.

In testimony whereof I have hereunto affixed my signature.

GEORGE ALBERT HOFFMAN.