

Feb. 11, 1930.

B. A. SCHAUMANN

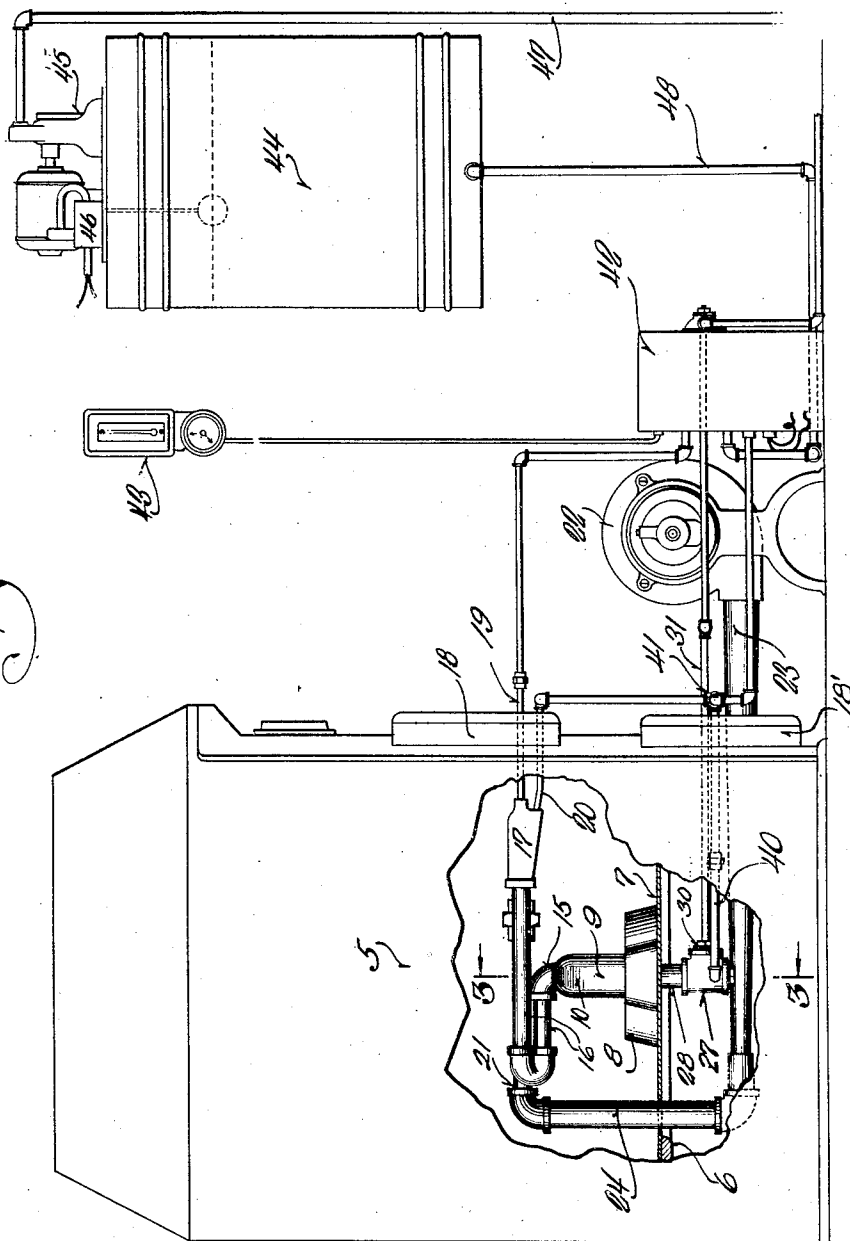
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HYDROCARBON BURNER

Filed July 13, 1927

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*Fig. 1.*



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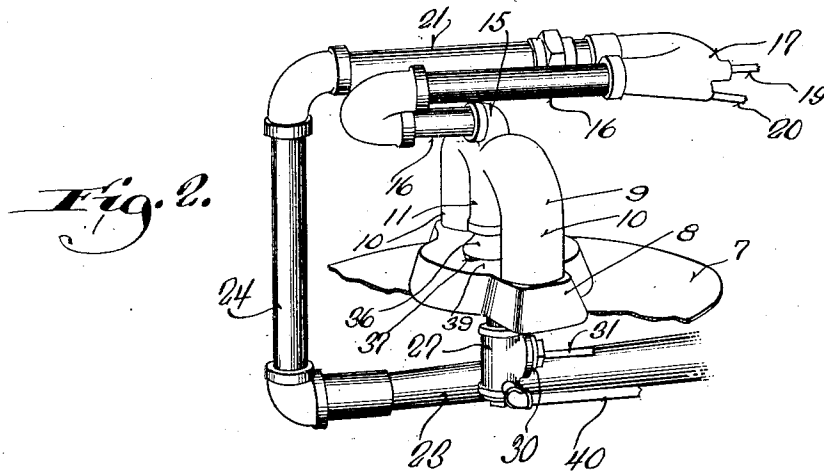
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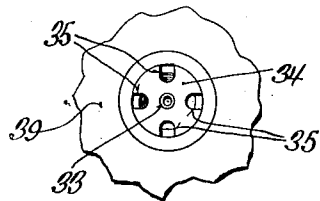
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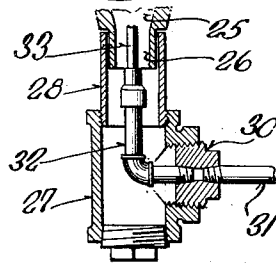
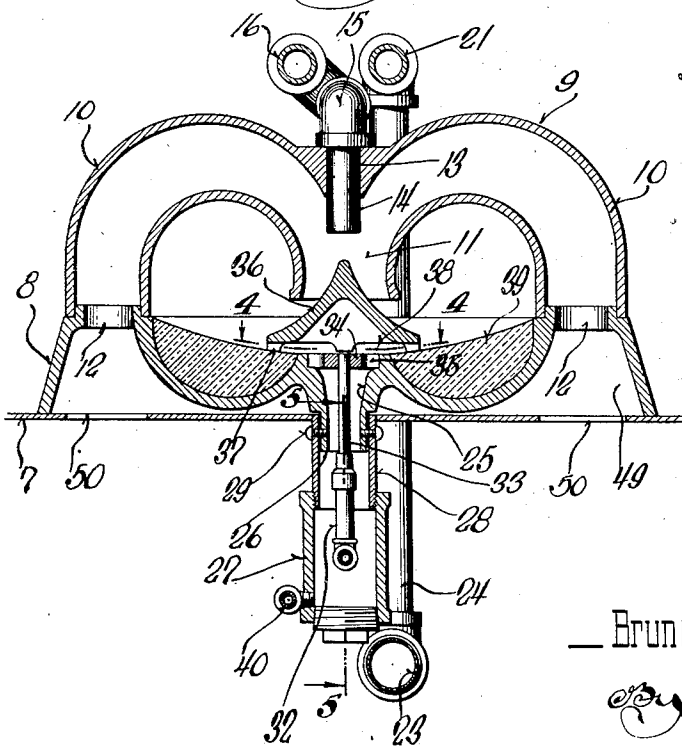
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*Fig. 4.*



*Fig. 5.*



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## UNITED STATES PATENT OFFICE

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## HYDROCARBON BURNER

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Heretofore when using hydrocarbon burners difficulty has been experienced in obtaining complete combustion and, consequently, a flame entirely free from carbon deposits and this invention has as one of its objects the provision of an improved hydrocarbon burner in which the fluid fuel is volatilized and properly mixed with air to produce a highly combustible mixture burning in a blue hydrocarbon flame.

Another object of this invention resides in the provision of a hydrocarbon burner in which air is mixed with the fuel substantially upon volatilization of the fuel, the air and fuel then traveling through a mixing chamber wherein they are thoroughly commingled before being ignited.

Another object of this invention resides in the provision of a hydrocarbon burner of the class described in which ample protection is afforded against flooding of the device due to failure of the pilot light.

It is a further object of this invention to provide an improved hydrocarbon burner having thoroughly commingled air and fuel fed to the burner proper by means of a blower with which free or idle air is mixed at the time of combustion.

A still further object of this invention resides in the provision of a new and novel hydrocarbon burner in which all formation of carbon deposits in the system is prevented, and a fully gasified and oxygenated hydrocarbon flame is obtained, whereby carbon dioxide ( $\text{CO}_2$ ) in the flue gases ranges from fourteen to fifteen per cent with no trace of carbon monoxide ( $\text{CO}$ ).

With the above and other objects in view which will appear as the description proceeds, my invention resides in the novel construction, combination and arrangement of parts substantially as hereinafter described and more particularly defined by the appended claims, it being understood that such changes in the precise embodiment of the hereindisclosed invention may be made as come within the scope of the claims.

In the accompanying drawings I have illustrated one complete example of the physical embodiment of my invention constructed

according to the best mode I have so far devised for the practical application of the principles thereof, and in which:

Figure 1 is a view illustrating my improved hydrocarbon burner applied to a furnace and illustrating diagrammatically the controlling apparatus and the fuel feed tank;

Figure 2 is a perspective view of the hydrocarbon burner detached from the furnace;

Figure 3 is a transverse sectional view of the burner taken on the plane of the line 3—3 of Figure 1;

Figure 4 is a top plan view of the pilot light and fuel outlet taken on the plane of the line 4—4 of Figure 3; and

Figure 5 is a sectional view taken through Figure 3 on the plane of the line 5—5.

Referring now more particularly to the accompanying drawings in which like numerals designate like parts throughout the several views, 5 designates a furnace of any suitable type having an annular ledge 6 within which a grate is usually placed. A plate 7 is supported within the furnace upon the ledge to take the place of the grate, not shown, and upon this plate and centrally aligned with the axis of the furnace is a base member 8 having an air chamber 9 connected therewith and extending upwardly therefrom.

The chamber 9 consists of a pair of tubular inverted U-shaped or arcuate arms 10 merging at their inner ends into a common outlet 11 which is directed downwardly above the center of the medial portion of the base member 8, the outer ends of the arcuate arms 10 engaging over ridges or flanges formed about inlet openings 12 in the upper portion of the base member at diametrically opposed points. The central portion of the chamber 9 is apertured at 13 in axial alignment with the outlet 11 to provide means for attaching a mixture jet 14 thereto, the upper end of which is provided with an elbow 15 with which a pair of pipes or tubes 16 communicate to connect the mixture jet with a mixing or generator chamber 17 positioned above the member 8 and in line with the usual fuel opening 18 of the furnace. The mixing chamber 17 has a fuel inlet pipe 19 and an overflow pipe 20 connected therewith as will be later described and

an air inlet pipe 21 which is connected with a blower 22 through ducts 23 and 24, the duct 23 entering the ash pit of the furnace through the door 18' and the duct 24 passing into the furnace fire chamber through the plate 7 and in rear of the burner proper.

The central portion of the member 8 is apertured at 25, from which a tubular extension 26 extends downwardly to provide means for supporting an overflow chamber 27 which consists of a conventional pipe T fitting having a section of pipe 28 threaded in its upper end and extended about the downwardly projecting extension 26 and secured thereto by screws or other means 29. The connection between the pipe 28 and the extension 26 is loose to permit air to enter therebetween and pass upwardly through the bore 25 to supply the pilot light, about to be described.

The stem of the T-shaped fitting 27 is closed by a plug 30 in which is threaded a gas feed line 31. Positioned within the member 27 is a pilot light structure 32 which is threaded into an aperture in the plug 30, see Figure 5, and which extends upwardly through a bore 25 terminating in a tube 33, the end of which is substantially flush with the bottom of the dish formed in member 8, as later described. The tube 33 is held in position by plate 34 which rests within a counterbore surrounding the upper end of the bore 25 and which is provided with a plurality of peripheral cut-out portions 35 extending from its periphery to provide an outlet for liquid fuel accumulating in the base member in the event the pilot light should become extinguished.

Positioned directly above the pilot light and in axial alignment with the fuel outlet 14 is a cone-shaped spreader member 36, the apex of which extends into the outlet 11 of the chamber 9 to split or spread the combustible mixture expelled from the outlet 14. The spreader member 36 is hollow and has a plurality of feet or lugs 37 at its peripheral edge and upon which the same rests to raise its edge above the bottom of the base member 8 to form burner openings 38 for the pilot flame. That portion of the member 8 substantially between the bore 25 and the bores 12 is annularly channeled or grooved to provide space for a fire clay or other suitable substance 39, the top of which is shaped to give the base member a dish-shaped or concave top surface. It will thus be seen that the direct heat of the flame is borne by the clay rather than by any of the metal parts and liquid fuel accumulating in the dish of the member flows into the chamber 27 through openings 35 where it is withdrawn through an outlet duct 40.

The overflow duct 20 which leads from the mixing chamber 17 communicates with the duct 40, as at 41, which communicates with a suitable valve mechanism, not shown. The

overflow valve mechanism forms part of a controlling element 42 as diagrammatically illustrated. As is customary, such controlling elements contain a valve operable upon the accumulation of a predetermined amount of overflow liquid fuel to render the fuel feed and blower motor inoperative.

A thermostat 43 controls the operation of the controlling elements as is customary, closing the gas valve to decrease the volume of gas supplied the pilot, which burns in a large flame simultaneously with the opening of the fuel valve and the closing of the circuit for the blower motor. A fuel supply tank 44 having an automatic pump 45 controlled by a switch 46 operable upon raising and lowering of the fuel level within the tank 44 and supplied from an outside source, not shown, through a duct 47, keeps a constant supply of fuel for the operation of the burner and is connected with the controlling element 42 through a pipe 48. As is usual in controlling elements used in connection with hydrocarbon burners, means 42 provides for the regulation of the amount of fuel supplied the burner.

The base member 8 is substantially hollow forming a chamber 49 which is closed by the plate 7 which is apertured at 50 in alignment with the openings 12 and through which air passes from the furnace ash-pit.

In operation, the flame of the burner heats the pipes 16, 21 and 24 so that the air by the time it reaches the return bend 17 is expanded and the fuel, as it enters the pipe 16, is instantly "cracked" or gasified, mixing with the preheated and expanded air. The air and gasified fuel is forced through the pipes 16 by the pressure from the blower, becoming thoroughly commingled and being discharged directly onto the apex of the spreader member at the outlet 11, at which point the commingled air and gas mixes with free or idle air from the arcuate arms 10 to form a perfect combustible mixture which burns in a fully gasified oxygenated hydrocarbon flame. The flame, by reason of the concave or disc contour of the base member, is directed upwardly and the idle or free air, which is mixed with the commingled air and gasified fuel, is preheated in its passage through the arcuate arms, and is drawn from the chamber 49 of the base member, due to the ejector effect of the discharge 14 in the outlet 11.

The operation of many burners built in accordance with the foregoing description and accompanying drawings, has proven that a perfect flame is produced thereby which is free from carbon, and that carbon formations within the generator and mixing chambers are eliminated and that the fuel consumption is reduced to an economical point and in addition the operating expenses decreased due to the elimination of the necessity of servicing, such as is required where carbon accumu-

lations block the free passage of the fuel and air.

What I claim as my invention is:

1. A hydrocarbon burner, comprising a  
5 base member, having a central bore, a tubular  
extension forming a continuation of the bore  
and extended downwardly from the base  
member, an overflow chamber having a por-  
tion engaged over the extension to support  
10 the same therefrom, said portion being of a  
greater diameter than the extension whereby  
to permit air to pass through the connection  
into the chamber, and a pilot light supply  
tube extended upwardly within the chamber,  
15 and terminating adjacent the top surface of  
the base member, air for the pilot flame pass-  
ing between the tubular extension and the  
chamber portion.

2. A hydrocarbon burner, comprising a  
20 base member having a pair of diametrically  
disposed openings, a plate supporting the  
base member within a furnace, said plate hav-  
ing openings substantially in line with the  
openings in the base member, a pair of arcu-  
25 ate tubular members communicating at their  
outer ends with the openings in the base mem-  
bers, and merging into a common outlet at  
their inner ends, and means for discharging  
a combustible mixture into said common out-  
30 let the discharge producing an ejector action  
and drawing dead air through the arcuate  
arms.

3. A hydrocarbon burner, comprising a  
base member, having an annular channel sub-  
35 stantially semi-circular in cross section, a fire  
resisting material filling the channel to form  
a concave surface for the base member, means  
for discharging a combustible mixture  
towards the base member, a member for di-  
40 recting the combustible mixture onto the re-  
fractory material at its point of maximum  
thickness where it is ignited to burn in a  
flame, and means supporting the said com-  
bustible material directing member with its  
45 lower periphery spaced from the concave sur-  
face of the base.

In testimony whereof I have hereunto af-  
fixed my signature.

BRUNO A. SCHAUMANN.

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