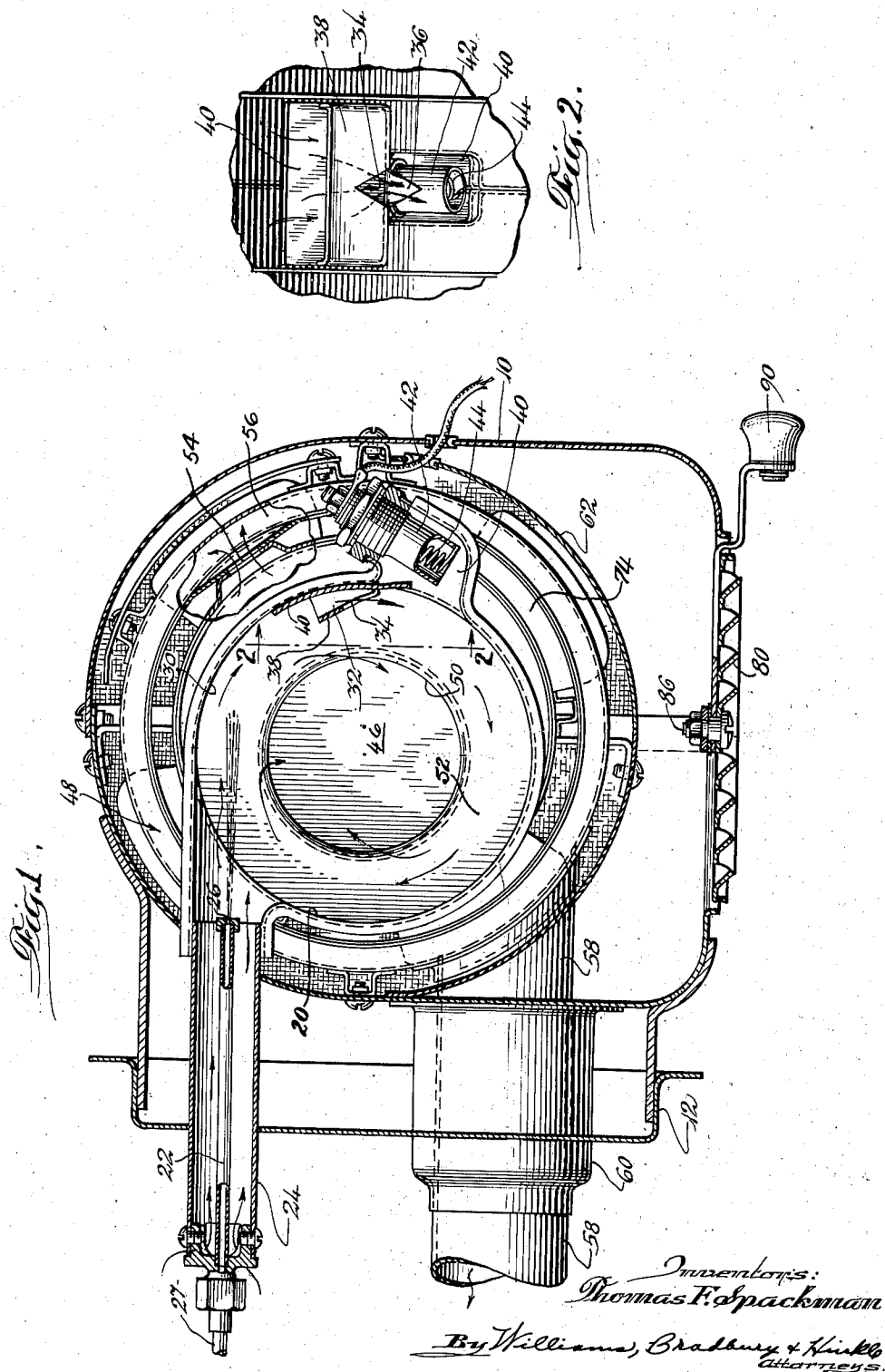


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HEATER BURNER, PARTICULARLY FUEL DELIVERY  
AND IGNITING MEANS THEREFOR  
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## UNITED STATES PATENT OFFICE

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HEATER BURNER, PARTICULARLY FUEL  
DELIVERY AND IGNITING MEANS THERE-  
FORThomas F. Spackman, Chicago, Ill., assignor to  
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1 Claim. (Cl. 158—28)

1

My invention relates to heaters and more particularly to heaters of the internal combustion type.

An object of my invention is to provide a new and improved internal combustion type of heater particularly adapted for use on automobiles and similar vehicles.

Another object of my invention is to provide an internal combustion heater which is cleaner burning, produces less noise, requires less pressure drop across the heater, and requires less power to operate than the heaters of the prior art.

Another object of my invention is to provide a new and improved internal combustion heater wherein partial surface combustion is provided to increase stability of operation, produce better vaporization of liquid fuel, and provide better mixing of fuel and air.

Another object of my invention is to provide an internal combustion type heater having improved means for insuring quick starting of the heater.

Another object of my invention is to provide an internal combustion heater having a new and improved arrangement of the combustion surface.

Another object of my invention is to provide an internal combustion heater having new and improved means for introducing and intermixing fuel and air.

Another object of my invention is to provide an internal combustion heater having new and improved means for introducing fuel and air into the combustion chamber and discharging products of combustion therefrom whereby a minimum pressure drop across the combustion chamber produces a maximum turbulence and intermixing of fuel and air therein.

Other objects and advantages will become apparent as the description proceeds.

In the drawings:

Fig. 1 is a transverse sectional view through a heater burner embodying the present invention; and

Fig. 2 is a partial sectional view showing a detail and is taken on the line 2—2 of Fig. 1.

That form of my invention illustrated in the drawings comprises a sheet metal casing 10 provided with a sheet metal bracket 12 whereby the heater may be attached to a supporting structure such as the fire wall which separates the engine compartment from the passenger compartment of an automotive vehicle.

Located in the casing 10 is a combustion chamber 20 of generally cylindrical form. This combustion chamber is supplied with fuel by way of

2

a jet 22 mounted in a combustion air supply tube 24 and terminating in a small orifice 26 slightly to one side of the circular wall of the combustion chamber adjacent the upper end of this chamber. The jet is arranged to discharge fuel in a direction which makes an oblique angle to the circular combustion chamber as clearly indicated in Fig. 1. The jet 22 and pipe 24 extend through the bracket 12 and fire wall and a pipe 27 supplies gasoline or other suitable fuel to the jet 22. The pipe 27 may be connected to any suitable source of supply and a convenient arrangement is to connect this pipe to the line connecting the automobile engine fuel pump with the engine carburetor so that fuel is delivered to the jet 22 under a slight head. This head is preferably equal to approximately six or eight inches of gasoline so that the fuel will squirt out of the orifice 26 with sufficient force to strike the opposite wall 30 (Fig. 1), of the combustion chamber. Where the force exerted by the engine fuel pump is greater than the desired head, any suitable reducing means may be interposed between the jet 22 and the fuel pump to reduce the pressure on the jet 22 to the desired amount.

Combustion air enters suitable openings provided in the left hand end of the combustion air supply pipe 24 as indicated by the arrow in Fig. 1. This air flows around the jet 22 and keeps this jet and the fuel therein relatively cool. Combustion air enters the combustion chamber 20 tangentially and flowing in the same direction as the fuel squirted from the orifice 26. This particular arrangement has the advantage of preventing carbonization of fuel in the jet 22 by maintaining this jet below the temperature at which carbonization occurs. Between the end of jet 22 and the combustion chamber proper is a zone in which carbonization of the fuel might readily occur, but the fuel is squirted through this zone by the small pressure head maintained on the jet 22 so that the fuel enters directly into the combustion chamber without previous carbonization but with some partial premixing with the combustion air.

The incoming fuel and air are directed against a downwardly inclined portion 30 of the curved wall of the combustion chamber, and this downwardly inclined or curved surface constitutes what is hereinafter referred to as the combustion surface. At the lower end of this combustion surface, I provide a trough 32 having a central outlet 34 of relatively small area. This outlet is formed by punching a triangular shaped tongue 36 out of the sheet metal wall 38 of the trough. This tongue extends downwardly into the upper

3

part of an igniter pocket 40 containing an igniter 42 having an electric igniter coil 44.

When the heater is first started, fuel sprayed into the combustion chamber will strike the surface 30 and some fuel will tend to flow along this surface and enter the trough 32. Drops of liquid fuel will pass through the outlet 34 and follow along the inner surface of the tongue 36 and be directed by this tongue into the igniter pocket 40 as indicated in Fig. 1. The heat of the igniter coil 44 will vaporize part of the liquid fuel thereby forming a rich mixture of fuel and air which will ignite readily to initiate combustion. After the heater has attained normal operating temperature, the igniter coil 44 may be deenergized by the usual thermostatic control.

When the heater is operating normally, part of the fuel will be burned immediately adjacent the surface 30. This partial surface combustion produces improved vaporization of the fuel, better mixing of the fuel and air and a more uniform and stabilized combustion. Any liquid fuel which traverses the combustion surface 30 is collected in the trough 32 between the hot walls 38 and 40 thereof and is quickly vaporized by the heat of these walls.

The hot products of combustion created in the combustion chamber 20 are discharged from this chamber into the central chamber 46 of a heat exchanger 48, by way of the circular opening 50 in a partition 52 separating the combustion chamber 20 from the chamber 46. The partition 52 confines the discharge of gases from the combustion chamber to the vortex of the whirling gases in this combustion chamber. The tangential entry of both the fuel and combustion air to the combustion chamber and the exit of products of combustion from the vortex of the whirling gases in this chamber insures the utilization of the maximum initial energy of both the combustion air and fuel for intermixing fuel and air to promote complete and efficient combustion of the fuel.

Products of combustion flow from the chamber 46 through slot-like opening 54 into the passageway 56 in the heat exchanger 48 and are discharged through pipe 58. The pipe 58 extends through the fire wall 14 and bracket 12 in

4

spaced relation thereto and to a surrounding sleeve 60 so that no appreciable amount of heat is transferred to the fire wall or bracket from the pipe 58. The pipe 58 is connected to an electrically driven suction fan or other suitable source of suction which serves to draw the combustion air into the combustion side of the heater and the products of combustion therefrom.

A ventilating air fan driven by an electric motor or other suitable means may be used for circulating air to be heated through the heat exchanger passages 74 and out an opening in the casing covered by a louvered grill 80. This grill is secured to the casing by a nut and bolt 86 and the position of the grill may be adjusted by moving a knob 90 attached thereto.

What I claim as new and useful and desire to secure by Letters Patent of the United States is:

A heater of the class described, comprising means providing a combustion chamber which is of circular cross section in a vertical plane, means for introducing fuel and air into the upper part of said chamber at an oblique angle to a combustion surface of the chamber wall, a trough adjacent the lower end of said combustion surface and adapted to collect liquid fuel, means providing a pocket below said trough and above the bottom of said chamber, an igniter in said pocket, said trough having a restricted opening located above said pocket, and a tongue extending downwardly from said trough and directing liquid fuel into said pocket.

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