Nov. 15, 1938. G. PIRICH 2,136,727

GAS GENERATING OIL BURNER

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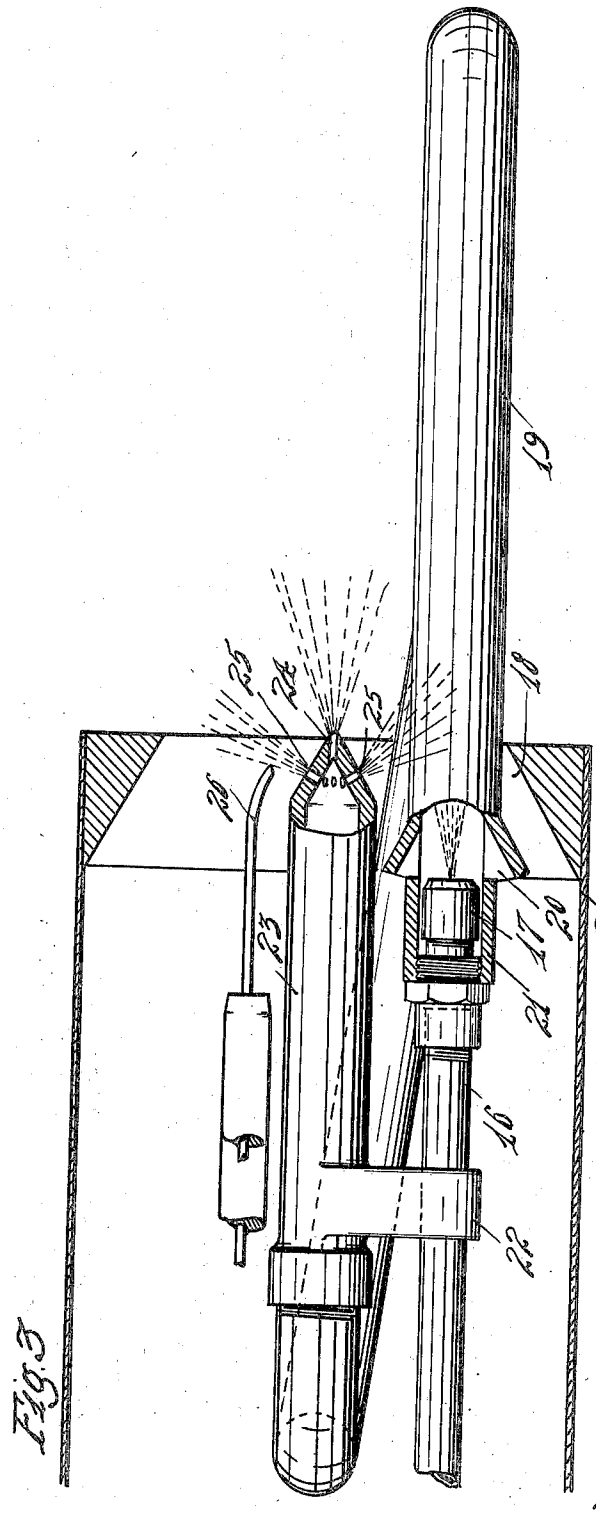


Fig. 3

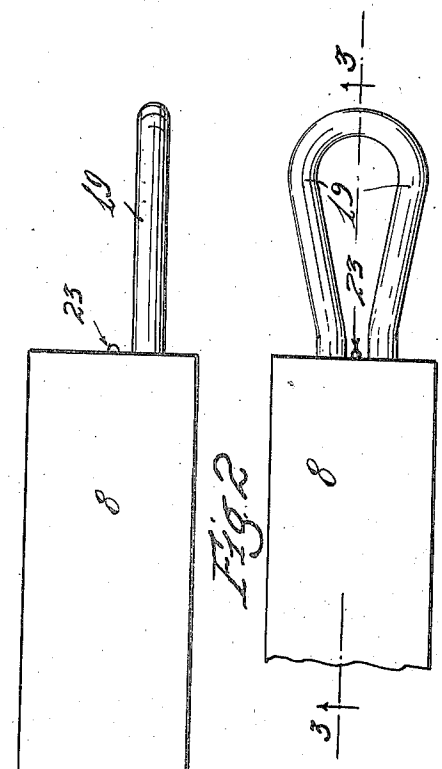


Fig. 2

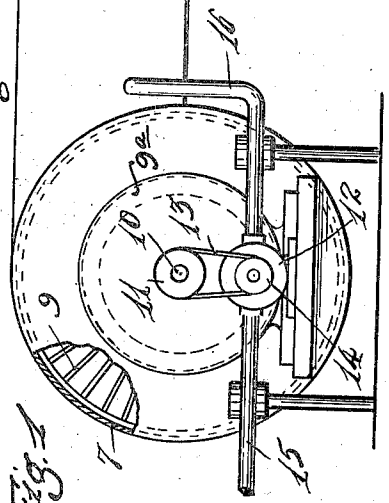


Fig. 1

INVENTOR
George Pirich
By his Attorneys
Merchant & Gibson

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GAS-GENERATING OIL BURNER

George Pirich, Minneapolis, Minn.

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4 Claims. (Cl. 158—53)

My present invention relates to the class of devices generally designated as oil burners and provides a highly important improvement therein.

My invention makes possible the efficient and economical use of the low grade hydro-carbon fluids and by process of progressive generation from the liquids to a gaseous form insures complete combustion and elimination of smoke and soot. The forms of the device or apparatus herein illustrated each involve the use of a generating tube, means for introducing commingled air and a spray of hydro-carbon liquid fuel into said tube, means for supplying heat to said generating tube to convert commingled air and oil into gaseous form, and a means for discharging the gasified combustible mixture from the tube at a place where at least a part of the produced heat will act upon the exterior of the tube to produce generation of the gaseous mixture while it is passing through said tube.

Means whereby the results above generally indicated may be effectually accomplished as illustrated in the accompanying drawing wherein like characters indicate like parts throughout the several views.

Referring to the drawing:

Fig. 1 is a side elevation showing the improved burner or device;

Fig. 2 is a fragmentary plan view of the right-hand end portions of the device shown in Fig. 1; and

Fig. 3 is a view partly in horizontal section on the line 3—3 of Fig. 2 but will include some parts shown in full and some being broken away and the parts are shown in much larger scale than in Figs. 1 and 2.

Referring to the construction illustrated in Figs. 1, 2, and 3, the numeral 7 indicates fan casing having a large air discharge barrel 8. Working within the casing 7 is the rotor 9 of the fan or blower. This rotor will be driven in a clockwise direction in respect to Fig. 1 by the customary electric motor 9' or by any other suitable means. The blower rotor 9 is mounted on one end of the motor shaft 10 which shaft is provided at its other end with a pulley 11 that drives the rotor of an ordinary oil pump 12, as shown, through a belt 13 that runs over the pulley 11 and over a pulley 14 on the shaft of the oil pump. The oil pump 14 receives oil from a pipe 15 and discharges the same through a pipe 16. The pipe 16 terminates in a primary spraying nozzle 17 of the type used in connection with conventional high pressure oil type burners; this nozzle is located within the barrel 8. The barrel 8 at its discharge end is provided with a large air discharge passage 18.

The nozzle 17 is positioned to discharge into the receiving end of a generating tube 19, the inner end of which as shown is made flaring so that it affords an annular air intake passage 20 around the nozzle 17. The nozzle 17 as shown is provided with a surrounding sleeve 21 that is spaced from the receiving inner end of said generating tube 19. The receiving end of the generating tube 19 is preferably positioned somewhat within the barrel 8 but the major portion thereof, which is a U-shaped formation projects beyond a discharge opening 18 of said barrel. The return portion of the generating tube 19, however, is extended backward through the barrel, where as shown it is rigidly connected to the oil tube 16 by a lug 22 or the like. This return end of the generating tube is connected to a tubular secondary spraying nozzle or burner head 23 the discharge end of which is brought quite close to the receiving end of said generating tube and is preferably located at the axis of the barrel 8 and is provided with a conical discharge end having a small axial discharge passage 24 and a plurality of small circumferentially spaced discharge passages 25.

For igniting the combustible mixture a conventional electric spark ignition system is preferably employed, and due to the fact that such ignition systems are so very well known that only the electrodes thereof are shown, the electrodes being indicated by 26 and being so positioned the sparks jumping between the ends thereof will ignite one or more of the combustible sprays discharged from the nozzle passages 25.

In this modified structure the sparking electrodes 26^a are located where they will produce a spark through the conical sprays delivered from the discharge passages 29^a and 30^a of the ignition nozzles 29 and 30.

The operation or action of the burner illustrated in Figs. 1, 2 and 3 is substantially as follows:

When the fan is in action the oil pump will be operated and a cold spray of oil will be injected into the generating tube 19; at the same time a minor portion of the blast of the air from the fan will be blown into the flaring receiving end of the generating tube and the major portion of the air blast will be discharged through the opening 18 and into the field of combustion. In starting the burner the cold oil spray commingled with air will be discharged from the secondary nozzle as indicated by dotted lines in Fig. 3; and this cold oil spray will be ignited by sparks produced from the electrodes 26. Under the combustion thus initiated the generating tube will be heated to quite high temperature so that the commingled oil and air delivered through the generating tube will be super-heated and converted into gaseous condition and thereafter will be discharged from the orifices of the secondary nozzle in the form of a gas or super-heated combustible mixture. Under this action of the burner the cold

oil spray is first thoroughly commingled with air, then heated to a relatively high temperature and converted into gaseous condition and then discharged and burned as a gas or super-heated commingled air and oil spray. Complete combustion of the fluid fuel is thus insured and smoke and accumulation of soot is eliminated. The main blast of air, of course, is discharged where it supports the complete combustion of the discharged gas or super-heated oil spray.

From the foregoing it will be understood that the burner described is capable of various modifications as to detail of construction and arrangement of parts, all within the scope of the invention herein disclosed and claimed. In the specification and throughout the claims for convenience the combustible fluid fuel is referred to as oil but it will, of course, be understood that as far as this invention is concerned the fluid fuel could be any suitable combustible fluid.

It is material in practicing the invention that the internal diameter of the generating tube be very great as compared to the discharge orifice in the nozzles 17 or 17a and that the total area of the discharge passages in the burner head nozzles 23 or 23a be relatively very great as compared to the discharge orifices of the nozzles 17 or 17a so that as air and oil mixture is delivered into the hood the generating tube will be free to expand within and flow freely through the generating tube and burner head. In this connection it may be said that the nozzles 17 and 17a, being preferably of the atomizing type used in connection with conventional high pressure type oil burners, are provided with a very small almost pin sized discharge aperture and deliver oil into the generating tubes in very small volume and in a finely atomized condition. This finely atomized spray of oil is readily absorbed by the air heated within the generating tubes and is delivered through the discharge apertures of the burner heads in the nature of a highly combustible gas which burns much as do commercial gases.

What I claim is:

1. In a hydro-carbon burner, an air blower having a discharge barrel terminating in an open end, and a generating tube of smaller internal diameter than the discharge barrel and having its receiving end positioned to receive air from the delivery end portion of the discharge barrel, the intermediate portion of said generating tube extending outward of the open end of the discharge barrel and the discharge end of said generating tube opening outwardly in the vicinity of and approximately concentrically with respect to the discharge end of the discharge barrel so that air from the discharge barrel will pass both through the generating tube and about the discharge end thereof and so that the heat of combustion will heat the intermediate portion of the generating tube, a liquid fuel atomizing nozzle arranged to discharge a spray of hydro-carbon fuel into the receiving end portion of the generating tube.

2. In a hydro-carbon burner, an air blower having a discharge barrel terminating in an open end, a generating tube of smaller internal diameter than the discharge barrel and having its receiving end positioned to receive air from the delivery end portion of the discharge barrel, the intermediate portion of said generating tube extending outward of the open end of the discharge barrel and the discharge end of said generating tube opening outwardly in the vicinity of and approximately concentrically with respect to the discharge end of the discharge barrel so that air from the discharge barrel will pass both through the generating tube and about the discharge end thereof and so that the heat of combustion will heat the intermediate portion of the generating tube, a liquid fuel atomizing nozzle arranged to discharge a spray of hydro-carbon fuel into the receiving end portion of the generating tube, and means for delivering hydro-carbon fuel to the nozzle under high pressure.

3. In a hydro-carbon burner, an air blower having a discharge barrel terminating in an open end, a generating tube of smaller internal diameter than the discharge barrel and having its receiving end positioned to receive air from the delivery end portion of the discharge barrel, the intermediate portion of said generating tube extending outward of the open end of the discharge barrel and the discharge end of said generating tube opening outwardly in the vicinity of and approximately concentrically with respect to the discharge end of the discharge barrel so that air from the discharge barrel will pass both through the generating tube and about the discharge end thereof and so that the heat of combustion will heat the intermediate portion of the generating tube, a liquid fuel atomizing nozzle arranged to discharge a spray of hydro-carbon fuel into the receiving end portion of the generating tube, and means for projecting into the receiving end portion of the generating tube such a finely broken up spray of hydro-carbon fuel of low volatility that it will mix with air passing through the generating tube and be projected from the discharge end of the generating tube in a readily ignitible condition both when heated or unheated.

4. In a hydro-carbon burner, an air blower having a discharge barrel terminating in an open end, a generating tube of smaller internal diameter than the discharge barrel and having its receiving end positioned to receive air from the delivery end portion of the discharge barrel, the intermediate portion of said generating tube extending outward of the open end of the discharge barrel and the discharge end of said generating tube opening outwardly in the vicinity of and approximately concentrically with respect to the discharge end of the discharge barrel so that air from the discharge barrel will pass both through the generating tube and about the discharge end thereof and so that the heat of combustion will heat the intermediate portion of the generating tube, a liquid fuel atomizing nozzle arranged to discharge a spray of hydro-carbon fuel into the receiving end portion of the generating tube, and means for delivering hydro-carbon fuel to the nozzle under high pressure, the arrangement being such that a highly combustible readily ignitible mixture of fuel and air will be present adjacent the discharge end of the generating tube both when the generating tube is cold and when it is heated.

GEORGE PIRICH.