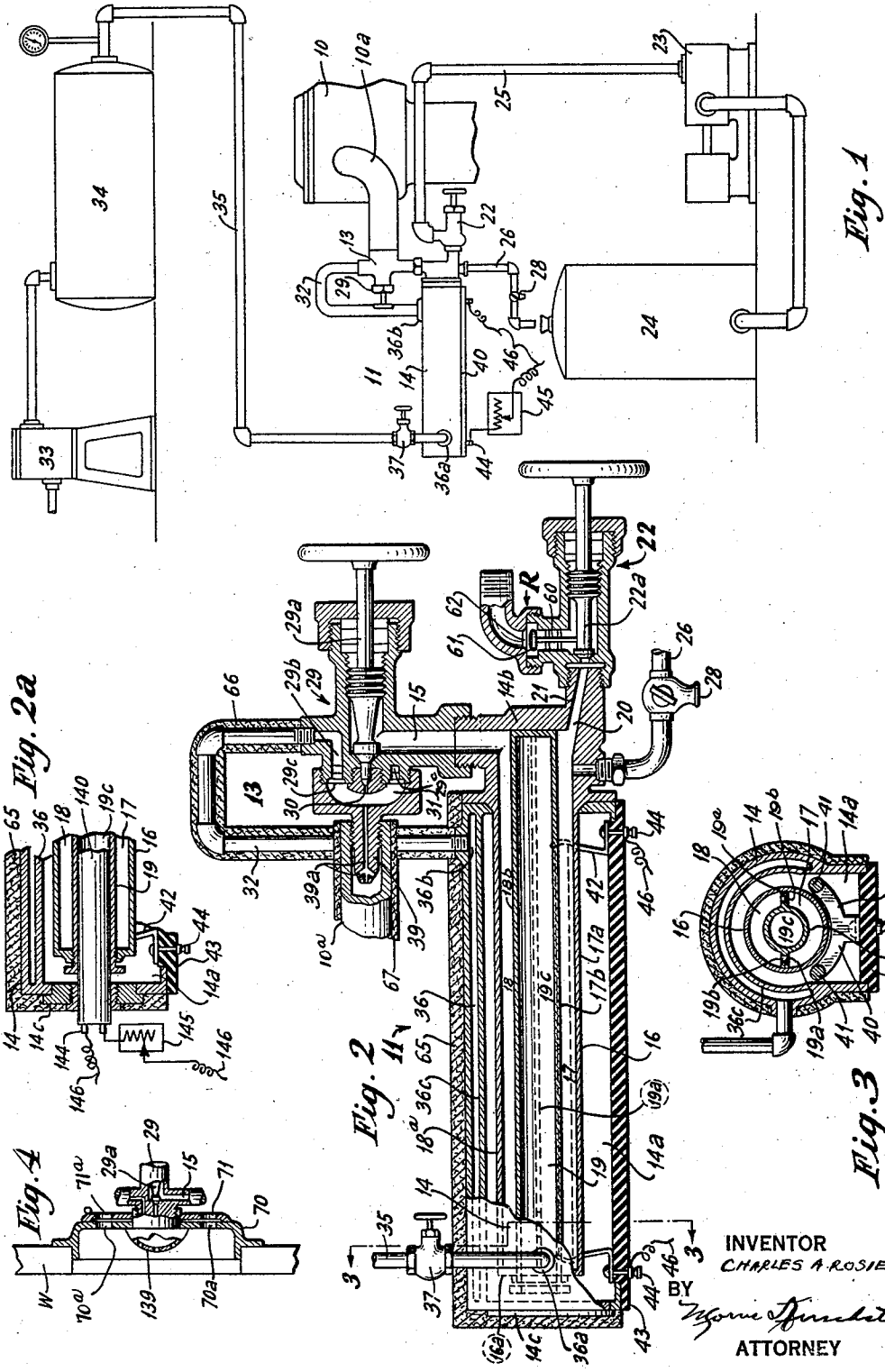
Oct. 11, 1932. C. A. ROSIER 1,882,041

APPARATUS FOR PRODUCING GASEOUS FUELS

Original Filed May 26, 1926



Patented Oct. 11, 1932 1,882,041

UNITED STATES PATENT OFFICE

CHARLES A. ROSIER, OF NEW YORK, N. Y.

APPARATUS FOR PRODUCING GASEOUS FUELS

Original application filed May 26, 1926, Serial No. 111,675. Divided and this application filed June 23, 1927. Serial No. 200,855.

This invention relates to an apparatus for producing highly combustible gaseous fuel from hydrocarbon oils and steam or air for use in internal combustion engines, steam boilers, tempering furnaces, and the like.

One object of the invention is the provision of an improved apparatus of the character described for converting fluids such as liquid fuels, and steam or air into a heated gaseous highly combustible state.

Another object of the invention is the provision of an improved apparatus of the character described for volatilizing a liquid fuel and separately preheating the fuel constituents whereby they may be readily combined to form a highly combustible gaseous product.

A further object of the invention is to provide an improved apparatus of the character described which forms a compact unit that may be readily installed and conveniently positioned in connection with gaseous fuel consumers such as engines, furnaces, or the like.

A further object of the invention is to provide in an apparatus of the character described, improved means having a catalytic action for gasifying hydrocarbon fuel oil whereby substantially eliminating carbon or other distillate residues.

A still further object of the invention is to provide an apparatus of the character described, which shall be comparatively inexpensive to manufacture, and practical and efficient in operation to a high degree.

Other objects of this invention will in part be obvious and in part hereinafter pointed out.

The present application is a division of my copending application, Serial No. 111,675, filed in the United States Patent Office on May 26th, 1926, and certain features described and claimed in my co-pending application accordingly are not claimed herein.

The invention accordingly consists in the features of construction, combinations of elements and arrangement of parts which will be exemplified in the construction hereinafter described and of which the scope of application will be indicated in the following claims.

In the accompanying drawing, in which is shown one of the various possible illustrative embodiments of this invention,

Fig. 1 is a diagrammatic view in elevation of a system for supplying gaseous fuel to an internal combustion engine embodying the invention;

Fig. 2 is a front elevational view of the improved oil gasifying apparatus shown in Fig. 1, portions thereof being broken away to expose the interior construction;

Fig. 2*a* is a fragmentary view in vertical section showing a modified construction of the oil gasifying apparatus;

Fig. 3 is a cross-sectional view taken on lines 3—3 in Fig. 2; and

Fig. 4 is a fragmentary vertical sectional view of the improved apparatus shown applied to a furnace wall.

Referring in detail to the drawing, 10 denotes a fragmentary portion of any form of gaseous fuel consuming means, such as an internal combustion engine having an intake pipe 10*a* to which is attached the improved oil gasifying device 11.

The device 11 as seen from Fig. 2 comprises a mixing, atomizing and dispensing portion 13 connected to the pipe 10*a* and an oil gasifying and fuel constituent preheating portion 14 disposed therebelow, the inlet end of the portion 13 communicating with a portion 14 through a passage 15.

The portion 14 comprises a tubular member 16 having an inner chamber divided by a central tubular baffle 19 into two compartments 17 and 18 of semi-annular cross-sectional shape, said baffle having outwardly extending partition portions 19*a*, the baffle and partition portions being disposed to extend longitudinally through said member 16 as shown in Figs. 2 and 3. The lower compartment 17 is adapted to receive liquid fuel, such as a hydrocarbon oil at the front end 20 thereof through nipple 21 which connects with the outlet side of a liquid fuel control valve 22. The inlet side of said valve 22 receives liquid fuel preferably under pressure through a pipe 25 supplied by a suitable feed pump 23 from a liquid fuel storage tank 24. The valve 22 is operated in a well understood

manner by rotating the valve stem 22*a*. Suitable means, such as a discharge pipe 26, for draining the lower compartment 17 into the tank 24 is provided, said means being operated by a suitable valve or cock 28.

In the lower compartment 17, the liquid fuel supplied thereto is adapted to vaporize, initially expanded and subjected to the catalytic action in the manner as will hereinafter appear. The upper compartment 18 which communicates with the lower compartment 17 through the passages 19*b* serves to gasify and preheat the vaporized expanded oil and is provided at its upper front end 18*a* with the upwardly extending passage 15 for leading the oil gases into the inlet side of a control and mixing valve 29 from which they emerge through an aperture 30 into a mixing chamber 31. The valve 29 controls the flow of the oil gases in the usual manner through rotation of the valve stem 29*a*. To form a more efficient gas mixture and for conditioning the oil gases generated in the portions 14, suitable amounts of a gaseous fuel constituent, such as steam or compressed air are supplied through a pipe 32 into an annular passage 29*b* formed in said valve, 29, said passage having openings 29*c* through which the steam or air is injected into the chamber 31 so that an intimate mixture of the gasified oil and steam or air is obtained. Where compressed air is used as the fuel constituent, an installation as shown in Fig. 1 may be employed. Here the air is supplied by a suitable compresser 33 to a supply tank 34, hence through a pipe 35 to an inlet 36*a* adjacent the rear end of a jacket 36 which surrounds the chamber compartments 17 and 18 in portion 14 as is clearly shown in Fig. 2. For controlling the flow of air through the jacket 36, a valve 37 is installed in the pipe line 35, the front or outlet 36*b* of the jacket being connected directly with the pipe 32 for supplying air to the valve 29.

For preheating and gasifying the fuel passing through the portion 14, any suitable heat source may be provided, preferably, as here shown, an electrically operated heater 40. Said heater is constructed to fit into a longitudinally extending pocket 14*a* in portion 14 for heating the inner jacket wall 36*c* and the walls 17*a*, 17*b* and 18*a*, 18*b* of the chamber compartments 17 and 18. The jacket wall 36*c* is spaced from the wall 17*a* and 18*a* to permit the extension therethrough of a plurality of heat resistant elements 41 of heater 40. Said elements are supported at each end by a suitable terminal member 42 which is mounted on an insulating base 43, the latter forming a closure for the pocket 14*a* as is clearly shown in Figs. 2 and 3. Suitable binding posts 44 may be provided to extend through said base for connecting said heater elements 41 in series with a suitable control rheostat 45 across a suitable electric power source (not shown) through conductor wires 46.

It is clear from the drawing that the heater 40 when connected to the electric power source is effective to supply the initial heat to the gasifying apparatus 11 for raising it to the required temperature to gasify and preheat the liquid fuel. The heater 40 may be operated to positively control the temperatures to which the liquid and vaporized fuel in compartments 17 and 18 are subjected during the gasifying and preheating process simultaneously with the preheating of the air in the jacket 36 simply by adjusting the rheostat 45 to regulate the power supply.

A dominant feature of the invention resides in the provision of the baffle 19 made of any suitable material having catalytic properties when heated, such as nickel, platinum, palladium, copper, brass or other like substances. As shown in Fig. 2, the baffle 19 is in the form of a cylindrical tubular structure, one end thereof abutting the front wall 14*b* of the portion 14 and the other end thereof being supported by the rear end wall 16*a* of the tubular member 16. The rear end of the axial passage 19*c* extending through the baffle communicates with the pocket 14*a* adjacent said wall 16*a* thereby providing a relatively large heating surface for the baffle exposed to heat from the heater 40 whereby the catalytic effectiveness of said baffle is greatly increased.

In Fig. 2*a* is shown a modified form of the invention in which a supplementary electric heater 140 having terminal posts 144 is provided, said posts being preferably connected in series with a rheostat 145 to a suitable power source (not shown) by conductor wires 146. Said heater extends through the rear end wall 14*c* of the portion 14 and into the axial passage 19*c* of the baffle 19 for independently controlling the temperature and the catalyzing effect of said baffle.

The normal operation of the equipment above described is as follows: Liquid fuel is fed under pressure through the valve 22 into the gasifying apparatus 11 where it is volatilized, expanded and subjected to catalytic action in the compartment 17, the gases therefrom being preheated further expanded and catalyzed in the compartment 18. The heated gasified fuel passes from the compartment 18 through the passage 15 and the valve 29 into the chamber 31 where it is intimately mixed with the heated compressed air coming through the pipe 32 from the jacket 36, prior to passing through distributing passages 39*a* of an elongated nozzle 39 which extends into the intake pipe 10*a* as shown in Fig. 2.

The equipment described above may have a tendency to operate irregularly especially under fluctuating load of the gas utilizing apparatus. This undesirable tendency is apparently due to the building up of a back pres-

sure during the volatilization and expansion of the liquid fuel in compartments 17 greater than the normal pressure of the liquid fuel being fed by the pump 23. To overcome this undesirable tendency, a device R for automatically regulating the feeding of the liquid fuel is provided. Said device may be inserted in any convenient location in the feed pipe line 25, or as shown in Fig. 2 may be incorporated to form a part of the valve 22. Said device R is seen to include a vertically slidable member 60 having a valve disc 61 mounted on the upper end thereof, said disc being adapted to raise against a seat 62 for shutting off the back flow of the liquid fuel due to any sudden fluctuation of load or for any other cause which is effective to increase the pressure of the gassified fuel in the compartment 17 above the feeding pressure of the liquid fuel in the pipe 25. Normally, the disc 62 is in the position shown in Fig. 2 which permits the flow of liquid fuel around the slidable member 60 and into the body of the valve 22.

The foregoing apparatus provides an efficient means for carrying out the process claimed in my co-pending application aforementioned and which briefly described consists in gasifying the oil, preheating same, and while in this preheated gaseous state, combining it with the heated air under pressure without appreciably lowering the temperature of the mixture and further subjecting the oil during the gasifying process to a catalytic action which is effective to eliminate deposits of carbon residues in the compartments 17 and 18. This process is easily and simply carried out by controlling the heating of the gasifying apparatus 11 and the valves 22, 29 and 37. The radiation heat losses may be greatly diminished by making the pipe 32 as short as possible and providing suitable heat insulating laggings or coverings 65, 66, and 67 over the exterior surface of the apparatus 11, pipe 32 and intake 10*a*, respectively.

It will be noted that the hydrocarbon oil is merely vaporized and gasified, and is not cracked or broken down due to the temperature control preventing chemical reaction during the preheating and gasifying process, the gasified oil being furthermore intimately mixed with a gaseous fuel constituent without application of additional heat, thus preventing chemical reaction between the gasified oil and the gaseous constituent during the mixing process.

In Fig. 4 is shown an apparatus applied to a furnace wall W. Here, the nozzle 39 is replaced by a burner nozzle 139, the latter being mounted in position in any suitable manner by a frame 70, orifices 70*a* being provided in said frame 70 for admitting air from the outside. The air passing through said orifice may be regulated in any suitable manner for supplying any excess air that may be needed during the operation of the burner, as by means of a ring or sleeve 71 having openings 71*a* which ring may be operated to close the orifices 70*a*.

It will thus be seen that there is provided a device in which the several objects of this invention are achieved and which is well adapted to meet the conditions of practical use.

As various possible embodiments might be made of the above invention, and as various changes might be made in the embodiment above set forth, it is to be understood that all matter herein set forth or shown in the accompanying drawing is to be interpreted as illustrative and not in a limiting sense.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:—

1. In an apparatus of the character described adapted to supply a fuel formed with a liquid constituent, a gasifying device comprising inner and outer tubular walls and a pair of apertured walls interconnecting said tubular walls to form communicating compartments, means for heating said compartments, said apertured walls being effective to catalyze the constituent in said compartments during gasification, and means for feeding the liquid constituent into one of said compartments.

2. In apparatus for producing gaseous fuel comprising an oil gasifying device comprising a tubular structure having a central chamber, a jacket spaced from and extending about the wall of said chamber, and forming a pocket, an electrically operated heating means extending into said pocket between the jacket and the wall of said chamber, said chamber and jacket being adapted to be heated by said heating means whereby oil injected into the chamber is gasified, and a gaseous medium flowing through said jacket is preheated, said jacket, pocket and chamber being independently separated from one another.

3. In apparatus for producing gaseous fuel comprising, an oil gasifying device comprising a tubular structure having a central chamber, a catalyzing member extending into said chamber, a jacket spaced from and extending about the wall of said chamber, and forming a pocket, an electrically operated heating means extending into said pocket between the jacket and the wall of said chamber, said chamber and jacket being adapted to be heated by said heating means whereby a hydrocarbon oil injected into the chamber is gasified, and a gaseous medium flowing through said jacket is preheated, said jacket, pocket and chamber being independently separated from one another.

4. An apparatus for producing gaseous fuel comprising an oil gasifying device comprising a tubular structure having a central chamber, a jacket spaced from and extending about the wall of said chamber, and forming a pocket, heating means extending into said pocket between the jacket and the wall of said chamber, said chamber and jacket being adapted to be heated by said heating means whereby oil injected into said chamber is gasified, and a gaseous medium flowing through said jacket is preheated, said jacket, pocket and chamber being independently separate from one another.

In testimony whereof I affix my signature.

CHARLES A. ROSIER.