

Filed Sept. 15, 1947

GAS CONVERSION APPARATUS

3 Sheets-Sheet 1



INVENTOR.

Daniel F. Buckley
BY Harold E. Cole
ATTORNEY

Feb. 19, 1952

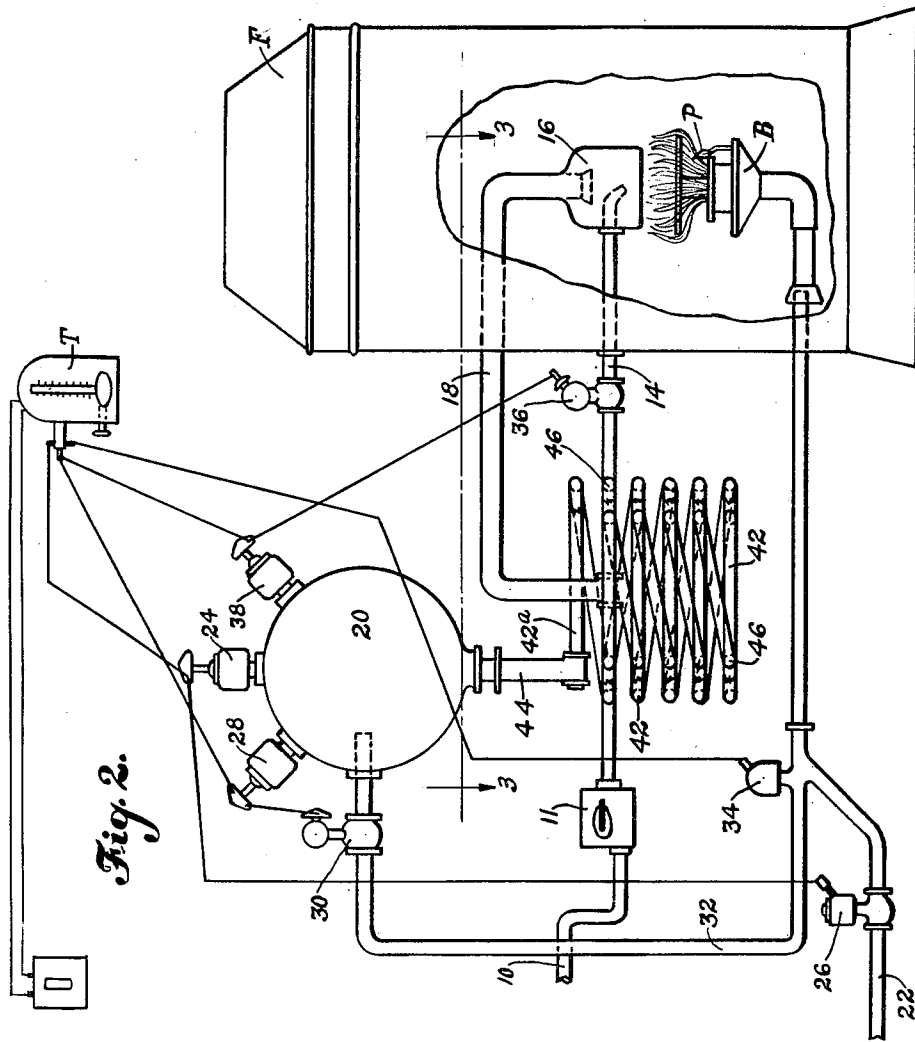
D. F. BUCKLEY

2,586,416

GAS CONVERSION APPARATUS

Filed Sept. 15, 1947

3 Sheets-Sheet 2



INVENTOR.

INVENTOR.
Daniel F. Buckley

BY Harold E. Cole

ATTORNEY

Feb. 19, 1952

D. F. BUCKLEY

2,586,416

GAS CONVERSION APPARATUS

Filed Sept. 15, 1947

3 Sheets-Sheet 3

Fig. 3.

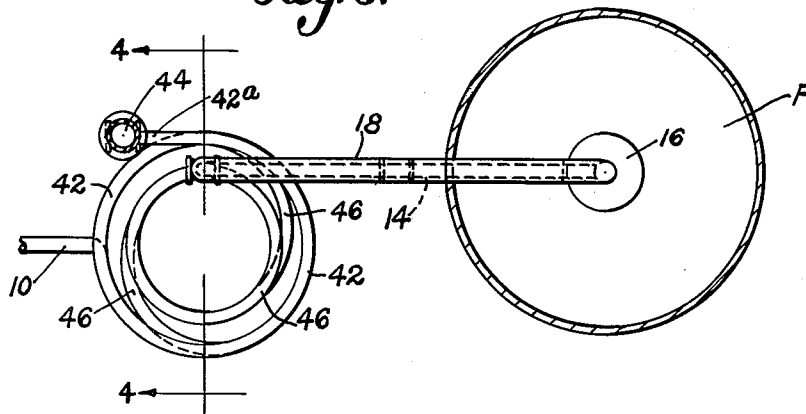
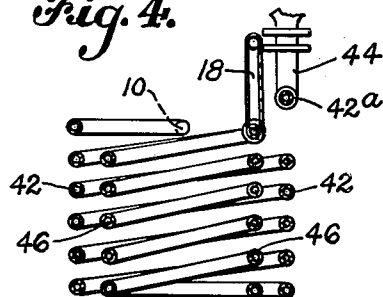


Fig. 4.



INVENTOR.
Daniel F. Buckley
BY *Harold E. Cole*
Attorney

UNITED STATES PATENT OFFICE

2,586,416

GAS CONVERSION APPARATUS

Daniel F. Buckley, Belmont, Mass.

Application September 15, 1947, Serial No. 774,096

8 Claims. (Cl. 158—53)

1

My present invention relates to burners, and more particularly to an improved gas conversion oil burner.

In my improved apparatus there is accomplished a burning, making and storing of its own permanent manufactured gas in a gas conversion burner of the Bunsen burner type.

The improved apparatus embodying my invention has been designed primarily for use in domestic house heating installations, and may be adapted to be used for much larger buildings, as well as for many industrial purposes.

My invention is a completely, fully automatic system of producing heat in domestic heaters, such as in a steam or hot water boiler or warm air furnace. It is completely fully automatic, makes and burns its own manufactured gas, and stores its own manufactured gas, in a gas conversion burner of the so-called Bunsen burner type.

An object of my invention is an improved gas conversion oil burner.

Another object is an improved gas conversion oil burner for generating gas from fuel oil of all types, and burning said gas for further conversion of said oil into gas.

A further object is an improved gas conversion oil burner operating initially on city gas and utilizing the heat generated thereby to crack fuel oil into gas and then automatically shifting from the use of city gas to the use of gas previously made from cracking the fuel oil.

Other objects and novel features of the construction and arrangement of parts comprising my apparatus will appear as the description of the invention progresses.

In the accompanying drawings;

Figure 1 is a schematic layout of one form of my invention, and

Figure 2 is a schematic layout of a modified form of my invention.

Figure 3 is a sectional view taken on the line 3—3 of Figure 2.

Figure 4 is a sectional view taken on the line 4—4 of Figure 3.

Referring to the drawings, and particularly to Figure 1, there is shown a schematic layout of one form of my invention utilizing as a heating device the common form of hot air furnace F having the usual outlets 20. Associated with the furnace F, as a source of heat, is a burner B, provided with the usual pilot P. The burner B is connected to a commercial source of gas supply, as the city gas mains, through a main supply pipe 22, having interposed therein a valve 26,

2

to be described in detail hereinafter, and which when the burner B is operating from gas supplied from the city supply, is normally opened. Electricity could be used by means of a well known electric heater and electrical connections, not shown, for initial heating purposes, in place of city gas.

A pipe 10 is connected to a source of supply of oil (not shown) as fuel oil of any type, gas oil, or other suitable gas producing oil, this pipe being supplied with a float valve 11 therein and with its end extending into a condenser tank 12. As shown, the tank 12 is cylindrical and at the end thereof, remote from the pipe 10, extends a pipe 14. In this pipe 14 is a magnetic oil valve 36, and the outer end of said pipe extends into a retort 16 located within the furnace F, and in operative association with the burner B. The normal level of the fuel oil in the condenser tank 12 is indicated by the dot and dash line 13, and it will be noted that the ends of the pipes 10 and 14 within the condenser tank are below the level of the oil therein.

The retort 16 is connected by a hot vapor gas line, or pipe 18, to the interior of the condenser tank 12 at a point below the pipe 14, and such gas line extends upwardly from the retort 16, then longitudinally, then downwardly, to the point of entrance to the condenser tank 12.

Secured on the top of the condenser tank 12, and connecting therewith, I preferably provide a gas holder tank or container 20 to store the permanent gas resulting from the cracking of fuel oil gas passing upwardly through the body of fuel oil stored in said tank 12. Extending into the gas holder tank 20 is one end of a supply pipe 32, the other end of this pipe connecting with the gas pipe 22. At the junction of the pipes 32 and 22 is a magnetically controlled valve 34, and in the pipe 32, adjacent to the gas holder 20, is a magnetically controlled valve 30. Permanent gas could be accumulated wholly in said condenser tank 12 if space is provided above the oil line.

Mounted on the gas holder 20 are the pressure control devices 24 and 28, electrically connected, as shown, to a thermostat T, mounted at any convenient point in the installation of the apparatus, and connected to a suitable source of supply of current from source S.

The device 24 controls the operation of the valve 26, and the device 28 controls the operation of the valve 30. Also, on the gas holder 20 is mounted the valve control device 38, electrically connected to the thermostat T and to

3

the magnetic oil valve 36, in the pipe 14, and which controls the operation of the valve 36.

The float valve 11 controls the level of the fuel oil within the tank 12, regardless of the level of the fuel oil in the supply tank (not shown).

With the various instrumentalities arranged as shown in Figure 1, and as above described, the operation is as follows: When the thermostat T demands heat, an electric circuit is closed between the thermostat T and main magnetic gas valve 34 of the gas conversion burner. At the same instant an electric circuit is closed between the thermostat T and city gas pressure control 24, and the city gas magnetic gas valve 26, opening said valve and allowing the city gas to flow through magnetic gas valve 34 and then to gas conversion burner B, where it is mixed with air and burned in the Bunsen gas burner. Also at the same moment an electric circuit is made between the fuel oil and gas oil pressure control 38, and the thermostat T, thus opening the magnetic fuel oil or gas oil valve 36 that allows fuel oil to flow to retort 16, where it is cracked into a hot vapor gas at a temperature of from 700° to 800° F., approximately. This hot vapor gas is allowed to flow—under pressure built up in the retort—into condenser tank 12, as in Figure 1, or into condenser coils 42—as in Figure 2. Upon hitting the condenser tank 12, or the condenser coils 42, both full of relatively cold fuel oil, the hot vapor gases separate or divide, part of such gases forming a cold permanent gas and the remainder returning to the liquid state again of the same nature as the original fuel oil, and mixes with the relatively cold fuel oil in the condenser 12, or condenser coils 42, and is again sent into the retort 16 with the new fuel oil to be cracked in the retort 16.

The cold permanent gas that is manufactured is forced—under the pressure built up from the cracking process—into the gas storage holder 20, and as the pressure rises in the gas storage holder 20 an electric circuit is made between my manufactured gas pressure control 28 and the thermostat T. Thus my manufactured gas valve 30 opens, allowing my own manufactured gas to flow through main magnetic gas valve 34 into the conversion burner.

At this period of the cycle of operations, we are still cracking fuel oil to obtain a cold permanent gas. The pressure is still increasing upon the gas that is being made and stored in the gas holder 20 during this time, and shortly after my manufactured gas valve 30 opens, the pressure put upon the city gas pressure control 24 is increased, thus breaking the electric circuit between the thermostat T and the city gas pressure control 24, thus closing the city gas valve 26 and shutting off the city gas that is flowing through the main magnetic gas valve 34 to the conversion burner B. All city gas is now shut off from use and the conversion gas burner B is now using my own manufactured cold permanent gas.

In order to ensure at all times a supply of gas large enough to meet any and all demands of the conversion gas burner when the thermostat T calls for heat, a pressure control 38 is used to govern the supply of my own cold permanent gas that is stored in the gas holder 20.

When the volume of gas in the gas holder 20 has reached the point where my own manufactured gas is feeding the conversion gas burner, and the city gas is shut off, the electric circuit between the thermostat T and the fuel oil pressure control 38 is still closed, that is, electric cur-

4

rent is still flowing between thermostat T and the fuel oil pressure control 28. Thus the fuel oil valve 36 is still open and fuel oil or gas oil is still flowing into retort 16 to be cracked into a cold permanent gas.

As more and more cold permanent gas is being made and forced into the gas holder 20, the pressure on the gas in the gas holder 20 rises until the volume of gas in such holder reaches a predetermined amount. This volume of gas in the gas holder 20 is determined by the setting of the fuel oil pressure control 38.

This fuel oil pressure control 38 may be set to give any volume of gas desired in the gas holder 20. When this volume of gas has finally reached the pressure set by the fuel oil pressure control 38, the electric circuit is broken between the thermostat T and the pressure control 38, thereby shutting off the magnetic fuel oil valve 36, thus shutting off the supply of fuel oil or gas oil going into the retort 16 and no more cold permanent gas is manufactured.

When the thermostat T calls for heat and the conversion gas burner is obtaining a constant supply of my own cold permanent gas from gas holder 20, the pressure and volume of gas in gas holder 20 drops in a marked degree.

When the pressure has fallen—controlled by predetermined volume and setting of fuel oil pressure control 38—to a point that is just below the pressure necessary to keep a constant predetermined supply of my own manufactured gas store in gas holder 20, an electric circuit is again made between the thermostat T and the fuel oil pressure control 38, thus opening the magnetic fuel oil or gas oil valve 36, and allowing the fuel oil to flow into retort 16 to be cracked into a cold permanent gas.

Thus the cycle of burning, making, and storing my own cold permanent manufactured gas goes on indefinitely throughout the heating season.

When there is no call for heat, and the thermostat T is not in use, all electric controls are shut off and all electric magnetic fuel oil and gas valves are shut off.

In the modification shown in Figure 2 of the drawings, the condenser tank 12 has been replaced by a coil condenser comprised of a relatively larger outer coil 42 and a relatively small inner coil 46. The lower end of the gas holder 20 is connected by pipe 44 to a portion 42a of the upper end of the large outer coil 42, and the pipe 10 is connected to the large outer coil 42 at the second turn thereof from the top. Also, the lower end of the larger outer coil 42 is connected to the lower end of the small coil 46, and the upper end of the small coil 46 is connected to the end of the pipe 14 and into the retort 16. The fuel oil flows from the upper end of the large coil into the lower end of the large coil, thence to the lower end of the small coil, then to the upper end of the small coil and to the retort 16. The cracked hot vapor gases flow from the retort 16 to the upper end of the small coil 46 to the lower end of the small coil 46 and thence to the lower end of the large coil 42 and to the upper end of the large coil 42 to the gas holder 20.

What I claim is:

1. In combination, a retort, a heating burner adapted to heat said retort, a container having a portion to hold liquid fuel and another portion to hold gas, an oil supply conduit in communication with and extending from said container to said retort, a valve in said oil supply conduit, another conduit in communication with and ex-

5

tending from said container to said retort for vapor gas to pass from said retort to said container, a gas supply conduit extending from the gas holding portion of said container to said burner, a valve control device connected to said container gas holding portion operable by gas pressure therein, means operably connecting said device to said oil supply conduit valve, said valve control device being adapted to open and to close said oil supply conduit valve when the pressure of gas in said container gas holding portions falls or rises respectively to predetermined points, a valve in said gas supply conduit, a valve control device connected to said container gas holding portion operable by gas pressure therein, means operably connecting said latter device to said gas supply valve, said latter valve control device being adapted to open and to close said gas supply conduit valve when the pressure of gas in said container gas holding portion rises or falls respectively to predetermined points.

2. In combination, a retort, a heating burner adapted to heat said retort, a container adapted to hold liquid fuel, a gas holding container in communication with said first container, an oil supply conduit in communication with and extending from said first container to said retort, a valve in said oil supply conduit, another conduit in communication with and extending from said first container to said retort for vapor gas to pass from said retort to said first container, a gas supply conduit extending from said gas holding container to said burner, a valve control device connected to said container gas holding portion operable by gas pressure therein, means operably connecting said device to said oil supply conduit valve, said valve control device being adapted to open and to close said oil supply conduit valve when the pressure of gas in said container gas holding portions falls or rises respectively to predetermined points, a valve in said gas supply conduit, a valve control device connected to said container gas holding portion operable by gas pressure therein, means operably connecting said latter device to said gas supply valve, said latter valve control device being adapted to open and to close said gas supply conduit valve when the pressure of gas in said container gas holding portion rises or falls respectively to predetermined points.

3. In combination, a retort, a heating burner adapted to heat said retort, a container having a portion to hold liquid fuel and another portion to hold gas, an oil supply conduit in communication with and extending from said container to said retort, a valve in said oil supply conduit, another conduit in communication with and extending from said container to said retort for vapor gas to pass from said retort to said container, a gas supply conduit extending from the gas holding portion of said container to said burner, a valve control device connected to said container gas holding portion operable by gas pressure therein, means operably connecting said device to said oil supply conduit valve, said valve control device being adapted to open and to close said oil supply conduit valve when the pressure of gas in said container gas holding portions falls or rises respectively to predetermined points, a valve in said gas supply conduit, a valve control device connected to said container gas holding portion operable by gas pressure therein, means operably connecting said latter device to said gas supply valve, said latter valve control device being adapted to open and to close said gas supply con-

6

duit valve when the pressure of gas in said container gas holding portion rises or falls respectively to predetermined points, a conduit extending to said burner through which an outside source of fuel is adapted to flow to said burner, a valve in said latter conduit, a valve control device connected to said gas holding portion operable by gas pressure therein, and means operably connecting said latter valve to said latter control device, said last-mentioned valve control device being adapted to open and close said outside fuel valve when the pressure on said container gas holding portion falls or rises respectively to predetermined points.

4. In combination, a retort, a heating burner adapted to heat said retort, a gas holding container, a condenser coil in communication with said container, an oil supply conduit in communication with said coil and adapted to communicate with an outside source of oil, an oil supply conduit in communication with and extending from said coil to said retort, another conduit in communication with and extending from said retort to said coil for vapor gas to pass from said retort to said coil, and a conduit extending from said gas holding container to said burner.

5. In combination, a retort, a heating burner adapted to heat said retort, a gas holding container, a condenser coil in communication at its upper end with said container, an oil supply conduit in communication with said coil and adapted to communicate with an outside source of oil, an oil supply conduit in communication with and extending from below said upper end of said coil to said retort, another conduit in communication with and extending from said retort to said coil for vapor gas to pass from said retort to said coil, and a conduit extending from said gas holding container to said burner.

6. In combination, a retort, a heating burner adapted to heat said retort, a gas holding container, a condenser coil in communication with said container, an oil supply conduit in communication with said coil and adapted to communicate with an outside source of oil, another condenser coil smaller than and in communication with the first said coil, an oil supply conduit in communication with and extending from said smaller coil to said retort, another conduit in communication with and extending from said retort to said smaller coil for vapor gas to pass from said retort to said smaller coil, and a conduit extending from said gas holding container to said burner.

7. In combination, a retort, a heating burner adapted to heat said retort, a gas holding container, a condenser coil in communication at its upper end with said container, an oil supply conduit in communication with said coil and adapted to communicate with an outside source of oil, another condenser coil smaller than and in communication with the first said coil at the lower ends of both said coils, an oil supply conduit in communication with and extending from the upper half portion of said smaller coil to said retort, another conduit in communication with and extending from said retort to the upper half portion of said smaller coil for vapor gas to pass from said retort to said smaller coil, and a conduit extending from said gas holding container to said burner.

8. In combination, a retort, a heating burner adapted to heat said retort, a container having a portion to hold liquid fuel and an upper portion to hold gas, an oil supply conduit in communication with and extending from said container

7

to said retort, a valve in said oil supply conduit, another conduit in communication with and extending from said container to said retort for vapor gas to pass from said retort to said container, a gas supply conduit extending from the gas holding portion of said container to said burner, a valve control device connected to said container gas holding portion operable by gas pressure therein, means operably connecting said device to said oil supply conduit valve, said valve control device being adapted to open and to close said oil supply conduit valve when the pressure of gas in said container gas holding portion falls or rises respectively to predetermined points, a valve in said gas supply conduit, a valve control device connected to said container gas holding portion operable by gas pressure therein, means operably connecting said latter device to said gas supply valve, said latter valve control device being adapted to open and to close said gas supply conduit valve when the pressure of gas in said container gas holding portion rises and falls respectively to predetermined points, a thermostat,

8

another valve in said gas supply conduit, means operably connecting said other valve to said thermostat whereby said other valve opens and closes as the said thermostat responds to lowering or raising respectively of the adjacent temperature.

DANIEL F. BUCKLEY.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
551,546	Henderson et al.	Dec. 17, 1895
799,949	Stilz	Sept. 19, 1905
906,276	Peregrine	Dec. 8, 1908
968,233	Best	Aug. 23, 1910
994,135	Eckels	June 6, 1911
1,066,295	Lion	July 1, 1913
1,357,598	Thompson	Nov. 2, 1920
1,603,824	Anderson	Oct. 19, 1926
1,747,613	Baetz	Feb. 18, 1930
2,084,297	Martin	June 15, 1937