Oct. 29, 1940. A. O. HINSCH 2,219,522

APPARATUS FOR GASIFYING LIQUID FUEL

Filed Nov. 4, 1936

Fig. 2

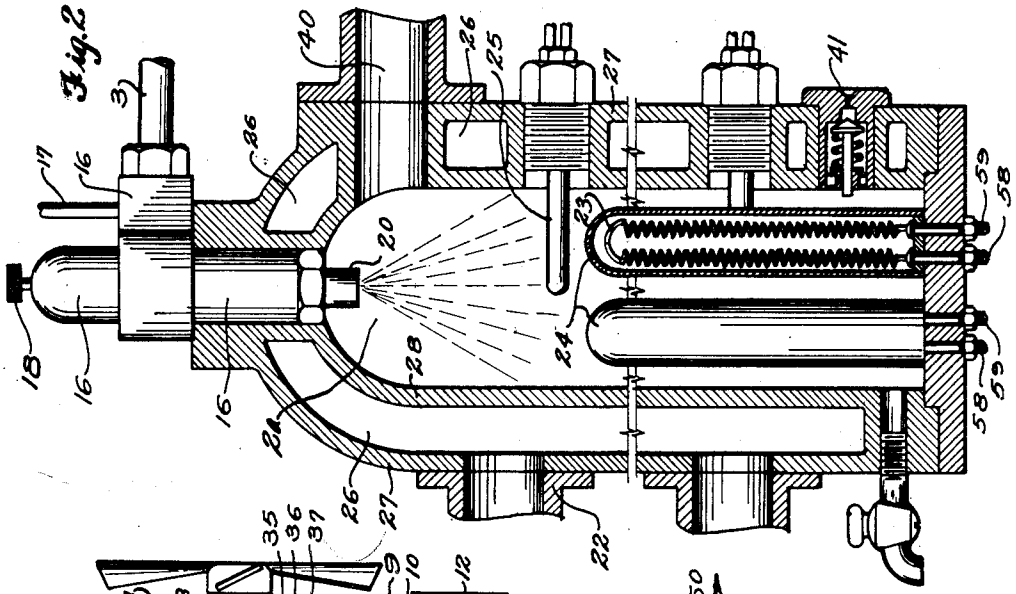


Fig. 1

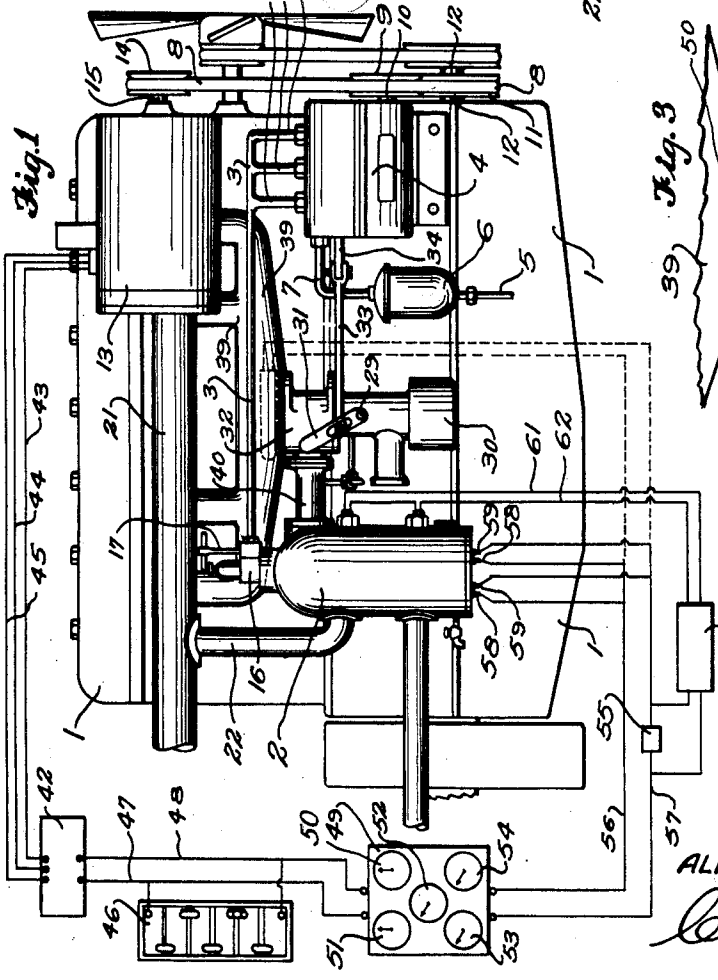


Fig. 3

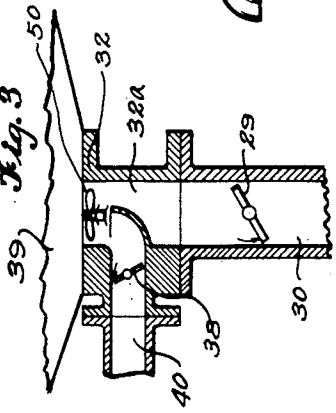
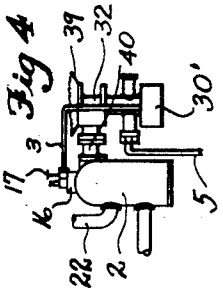


Fig. 4



INVENTOR
ALBERT O. HINSCH
BY
Cook & Robinson
ATTORNEY

UNITED STATES PATENT OFFICE

2,219,522

APPARATUS FOR GASIFYING LIQUID FUEL

Albert O. Hinsch, Seattle, Wash., assignor of one-third to O. W. Reinsdorff and one-third to W. L. Grill

Application November 4, 1936, Serial No. 109,093

1 Claim. (Cl. 48—103)

This invention relates to a means for, and method of producing gas from liquid fuel, and it has reference more particularly to the production of gas suitable for use as fuel for the operating of engines of the internal combustion types.

It is the principal object of this invention to provide a means whereby liquid fuel of the kind and quality referred to as "Diesel" oil, and other oils as well, may be quickly and economically changed into a combustible gas, suitable for power producing purposes.

It is also an object to provide means whereby the liquid fuel of the above stated kind may be delivered under pressure and in an atomized condition into a closed chamber against heated surfaces, thereby to change the atomized fuel to a gaseous state.

Still another object of the invention resides in the adaptation of the present method and means to the operation of variable speed internal combustion engines, such as are used in automobiles, trucks, boats and other vehicles, and to provide for an automatic production of gas according to the rate of gas consumption by the engine.

Still further objects of the invention reside in the details of construction of the parts of the gas generating mechanism and control devices, and in the sequence of steps involved in the method.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawing, wherein—

Fig. 1 is an illustration of a mechanism designed for practicing the method of gas generation according to the present invention, and illustrating its connection with an engine.

Fig. 2 is an enlarged detail of the vaporizing unit.

Fig. 3 is an enlarged detail of the mixing chamber.

The present method is based upon the proposition that to change liquid fuel to a gaseous condition in the quickest and most economical manner, it must first be atomized and while in an atomized condition, the particles must be heated to a degree at which they are changed to gas.

Referring more in detail to the drawing—

1 designates what may be an internal combustion engine of the type as commonly used in automobiles, trucks, boats, and for various other purposes, and which is equipped with a vaporizing unit 2 embodied by the present invention. This unit is connected by an oil supply pipe to the pump 4 from a tank or other storage means, not herein shown, through a pipe 5, strainer or filter 6, and connecting pipe 7 between the strainer and pump. The oil pump 4, in operation, delivers the oil under a maintained pressure to the vaporizing unit 2 through the connecting pipe 3. The pump is driven by a belt 8 that passes about a pulley 9 fixed on the pump drive shaft 10 and about a pulley wheel 11 on the main drive shaft 12 of the engine. The belt 8 also passes about a pulley 14 on the shaft 15 of a generator 13 and this operates in the usual way to charge a storage battery which is designated at 46.

The oil pipe 3 leads from the pump 4 to an atomizer 16 mounted in the top of the vaporizing unit 2 and arranged to discharge into the enclosed vaporizing chamber 2a. The flow of oil to the atomizer 16 is controlled by adjusting of a needle valve designated at 17, and the character of the spray delivered from the atomizer nozzle 20 is regulated by an adjustable needle designated at 18. The atomizer may be of any suitable character whereby oil delivered thereto under proper pressure from the pump 4 will be discharged into the inner vaporizing chamber 2a of unit 2 in a finely atomized condition, as indicated in Fig. 2.

Contained within the chamber 2a are electric coil heating elements 23. These are enclosed in metallic housings 24 and mounted in the bottom of the vaporizing chamber 2a, and are electrically heated to provide the initial heat to gasify the atomized oil for starting the engine. These heating units are initially in an electric circuit, but the circuit is subsequently opened by thermo-couples 25; this being after the exhaust gas from the motor has provided sufficient heat to maintain a vaporizing temperature in the chamber 19. To accomplish the heating by the exhaust gas from the engine, the gas is conducted from the exhaust manifold 21 of the engine by a pipe 22 into a chamber 26, which is formed between spaced outer and inner walls, 27 and 28 of the unit 2. It is a well known fact that this exhaust gas has a temperature sufficiently high to cause the vaporization of the atomized gas as herein described without aid of the elements 24, after the chamber has once become heated.

When the present device is in use on an engine which has been equipped with the usual carburetor as at 30, containing a throttle valve as at 29, it is understood that, as the throttle lever 31 is actuated to different positions to increase or decrease the speed of the engine, the butterfly valve 29 is operated accordingly, so as to regulate

the amount of air drawn into the mixing chamber **32** through which the carburetor is connected to the intake manifold **39** of the engine. The carburetor **30** and the chamber **2***a* of unit **2**, both are connected to the manifold through the mixing chamber **32** as shown in Fig. 3; the carburetor opening into a passage **32***a* while the unit **2** connects with a passage **32***b*, and both these passages lead into the mixing chamber **32**.

Simultaneous with the operation of the butterfly valve **29**, another butterfly valve **38** in passage **32***b* is operated, as is also a valve stem **34**; the former by means of a connection designated at **31***a* and the latter through the mediacy of a link **33** connected with lever **31**. The stem **34** operates to open or close jet valves (not shown) in the oil pump **4**, that are in registration with oil delivery pipes **35**, **36**, and **37** that connect with the oil pipe **3**. It is to be understood that when the throttle is actuated toward an open position, more oil is delivered from the oil pump at a higher pressure, to the atomizer; hence, to the vaporizing chamber; and since the butterfly valve **38** is opened in the direction of the arrow adjacent, more gas will then be allowed to pass into the mixing chamber. Also, since the butterfly valve **29** by the same operation is further opened, in the direction of the arrow adjacent, more air will be allowed to be drawn into the mixing chamber, and thus the proper mixture is maintained. However, the increase in the richness of the mixture increases the speed of the engine, and consequently the intake suction increases accordingly, and the amount of the mixture drawn into the engine will be governed by the position of these butterfly valves **29** and **38**.

It is a well known fact that when liquids are converted into a gas, there is a resultant increase of volume. Therefore, it will be obvious that the gasified oil will be readily accessible and in abundance for the necessary operation of the engine. However, an air priming check valve **41** is incorporated in the wall of the unit **2** to facilitate the starting of the engine, so that air may be drawn into the chamber **2***a* at the bottom thereof to assure the proper delivery of gas to the engine. This valve operates to break the vacuum sufficient to take care of each suction impulse in the engine cylinders. Also, a small drain valve has been incorporated in the bottom of chamber **2***a* to allow the draining off of any unused oil, or flushing of the chamber **19**, from time to time.

The generator **13** is connected by wires **43**, **44** and **45** to a voltage regulator **42**, and to the storage battery **46** by wires **47** and **48**. On the panel **49** there is a voltmeter **50**, an ammeter **51**, an oil pressure gauge **52**, a gas temperature gauge **53** and a water temperature gauge **54**, all of which would be properly connected up to assist the operator in efficient starting and operation of the engine.

To operate the engine, the manual switch **55** is closed, which completes the circuit, including the wires **56** and **57**, through the terminals **58** and **59** of the heating elements **23**, causing them to be heated. When the chamber **2***a* has reached the proper temperature, as read on temperature gauge **53**, to cause proper gasification of the fuel, the engine is started, by motor, or otherwise. When the engine is started, it operates, by suction to intake the gas charges, to compress them and they are ignited in the usual manner.

When the motor has been in operation a short period of time, the exhaust gas from manifold **21**, entering the unit **2**, will heat the chamber **2***a* by circulation in chamber **26**, as previously described, and the heater elements **23** will then be cut out of the circuit by the automatic switch **60**, which is connected to thermo-couple **25** by wires **61** and **62**.

Should the motor be shut off or slowed down, so that the heat from exhaust gases is not sufficient to maintain the gasifying temperature, the heating elements **23** automatically are brought into action again by the automatic switch **60** and thermo-couple **25**, and proper heat for continuous operation is insured.

This arrangement of parts, as above described, provides a quick starting engine, of the Diesel fuel oil type, that is operable at varied speeds, and subject to intermittent operation without the necessity of priming or operation upon regular gasoline with a fuel oil "cut-over" arrangement. The delivery of oil vapor to the cylinders of the motor is in accordance with its speed; for example, when the throttle is closed, the speed of the engine decreases and the speed of the pump is lowered and less oil is delivered to the atomizer. The reverse is likewise true when the throttle is opened to increase the speed of the engine.

As an alternative construction, I contemplate, as shown in Fig. 4, the use of a carburetor **30'** of usual form for supplying fuel oil to the unit **2**. Such a carburetor would be arranged to directly supply oil to the nozzle **16**.

It is desirable also, as obvious in Fig. 3, to include a rotatably mounted fan **50** in the connection between chamber **32** and manifold **39** which will be rotated by suction therethrough to operate as a mixer for the intaken gas and air.

Such devices, as previously described, are adaptable to various types of engines, and for various grades or qualities of fuels, and it is not intended that the claim shall be limited only to the device herein illustrated, but that it shall be given an interpretation commensurate with the scope and spirit of the invention disclosed.

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

A gasifier comprising a closed chamber having an outlet adapted for connection with an explosion chamber and having a vacuum relief port and a valve for closing said port against outlet of gas from the chamber, a jacket enclosing the chamber adapted for the passage therethrough of heated medium for heating the chamber, an electrical heating element contained inside the chamber, a nozzle disposed in the chamber for the delivery of liquid fuel in a finely atomized condition against the heating element and heated walls of the chamber, and thermostatic means within the chamber for controlling the current supplied to the electrical heating element.

ALBERT O. HINSCH.