Feb. 13, 1923. 1,445,319.

F. S. JELBART.

INTERNAL COMBUSTION ENGINE.

FILED AUG. 7, 1919. 2 SHEETS—SHEET 1.

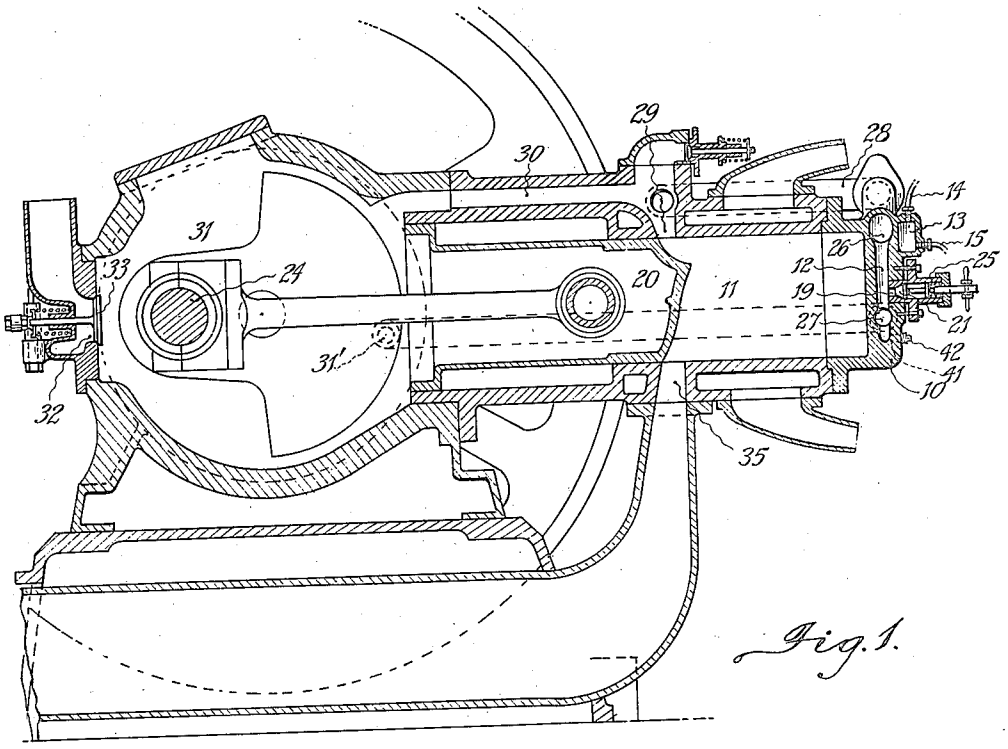


Fig. 1.

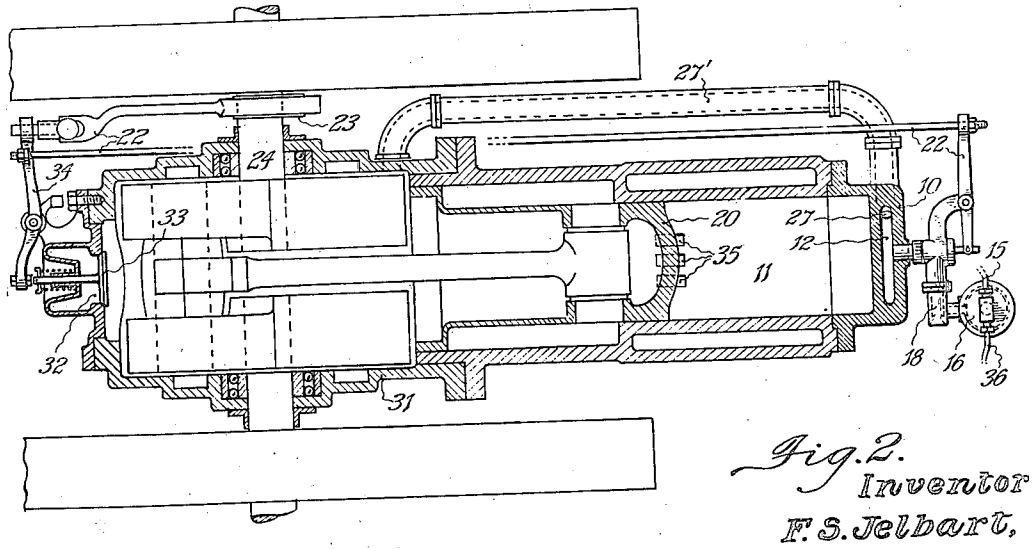


Fig. 2.

Inventor
F. S. Jelbart,
By H. R. Kerslake
Attorney

Feb. 13, 1923. 1,445,319.

F. S. JELBART.

INTERNAL COMBUSTION ENGINE.

FILED AUG. 7, 1919. 2 SHEETS—SHEET 2.

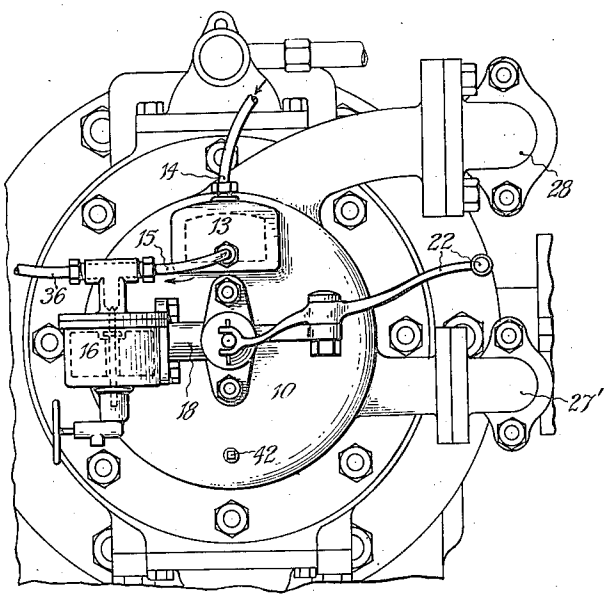


Fig. 3.

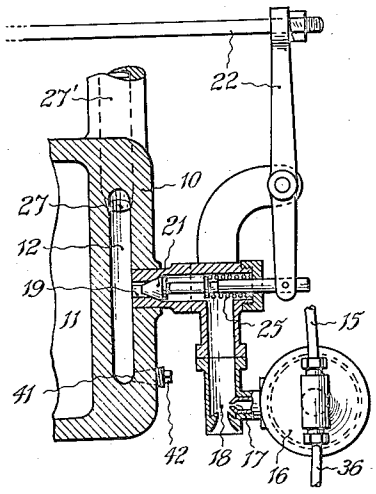


Fig. 4.

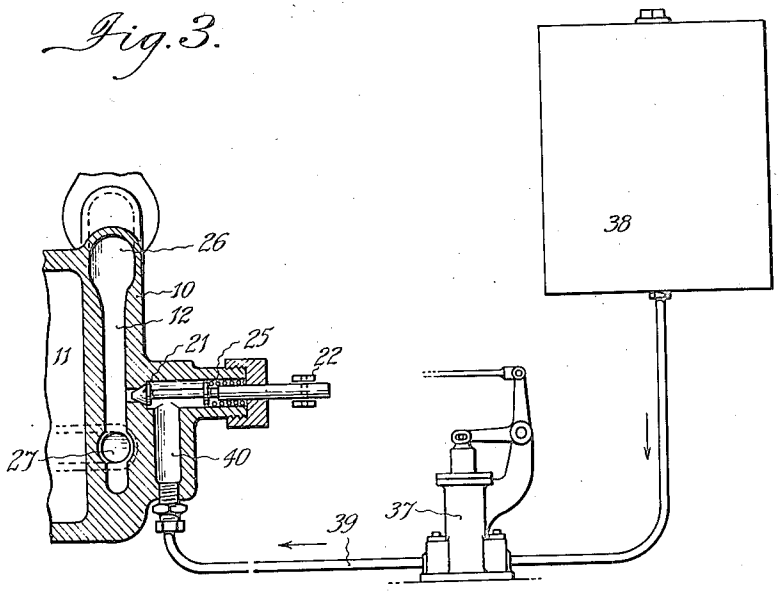


Fig. 5.

Inventor
F. S. Jelbart,
By H. R. Kerslake
Attorney

Patented Feb. 13, 1923.

1,445,319

UNITED STATES PATENT OFFICE.

FRANK STAFFORD JELBART, OF BALLARAT, VICTORIA, AUSTRALIA.

INTERNAL-COMBUSTION ENGINE.

Application filed August 7, 1919. Serial No. 315,979.

To all whom it may concern:

Be it known that I, FRANK STAFFORD JELBART, a subject of the King of Great Britain, residing at 11 Pleasant Street south, Ballarat, Victoria, Australia, have invented certain new and useful Improvements in and Connected with Internal-Combustion Engines, of which the following is a specification.

This invention relates to improvements in and connected with internal combustion engines and refers more especially to vapourizers for liquid hydro-carbon fuels for use with two stroke cycle internal combustion engines.

The object of the invention is to provide a simple and highly efficient means for use with two stroke cycle internal combustion engines whereby liquid hydro-carbon fuels can be thoroughly vapourized to form a suitable explosive mixture and means for delivering the said mixture to the cylinder prior to the commencement of the compression stroke of the piston.

I accomplish the above mentioned object by providing a preheating chamber for the fuel and arranging it adjacent to a vapourizing chamber located within or adjacent to the head of the engine cylinder and in providing means for introducing the preheated liquid fuel and air (or liquid fuel alone) to said vapourizing chamber and means for passing the vapourized fuel from the chamber to the cylinder with or without an additional supply of air at the completion of the exhaust stroke of the piston. The preheating chamber and the vapourizing chamber are arranged in such a manner that the heat generated in the cylinder due to the combustion of the vapourized fuel will radiate to and heat the walls of the said chambers. Means are provided for regulating the flow of fuel and admission of air to the vapourizing chamber.

In order that the invention may be readily understood reference will now be made to the accompanying sheets of explanatory drawings wherein—

Figure 1 is a view in sectional elevation of a two cycle engine embodying the improvements comprised in the present invention.

Figure 2 is a view in sectional plan of the two cycle engine shown in Figure 1.

Figure 3 is a view in end elevation of the cylinder of the said two cycle engine and shows the same fitted with the improvements comprised in the present invention.

Figure 4 is a view in sectional plan of the cylinder head and parts attached thereto.

Figure 5 is a view in sectional elevation of a modified form of the invention and illustrates means for supplying liquid fuel under pressure to the preheating chamber on the cylinder head.

Figures 4 and 5 are drawn to a larger scale than the other figures of the drawings.

In these drawings the numeral 10 designates the head of the engine cylinder 11 which is made sufficiently stout to enable a vapourizing chamber 12 and a preheating chamber 13 to be formed therein in such a manner that the heat generated by the combustion of gases within the cylinder will radiate to and heat the walls of the said chambers.

In lieu of forming the vapourizing chamber 12 and the preheating chamber 13 integrally with the cylinder head 10 as shown in the drawings they can be fitted thereto in any suitable manner as by bolts, set screws or the like.

The liquid fuel passes from a supply tank (not shown) through a pipe 14 to the preheating chamber 13 and from the said preheating chamber the heated oil passes through a pipe 15 to a float chamber 16 of a carburetter. The heated fuel is drawn from the float chamber 16 through an atomizing nipple 17 and passage 18 to a port 19 leading to the vapourizing chamber 12 upon the compression stroke of the piston 20.

The passage 18 is open to the atmosphere and the compression stroke of the piston causes air to be drawn forcibly past the nipple 17 and thereby atomizes the fuel prior to it passing to the vapourizing chamber 12.

The port 19 leading to the vapourizing chamber 12 is fitted with a valve 21 which is operated by lever and link mechanism 22 from a cam 23 fitted to the crank shaft 24 of the engine to permit atomized fuel to pass to the said chamber 12 in regulated quantities upon the compression stroke of the piston. The valve 21 normally is kept tightly pressed onto its seat by means of a spring 25 and the lever and link mechanism 22 may be adjusted to permit of the movement of the

said valve being so regulated as to permit the flow of fuel to the vapourizing chamber being controlled as desired.

On the opening of the valve 21 the fuel which has been previously heated is drawn from the float chamber 16 into the passage 18 through which air is drawn at a high velocity and breaks up the fuel into a fine spray which is more completely atomized or broken up on passing through the said valve into the vaporizing chamber.

The vapourizing chamber 12 is provided with two ports 26 and 27 the former of which is fitted with a pipe 28 leading to a charge admission port 29 located in the side of the engine cylinder and just in advance of the piston when it is at the end of its working stroke.

A pipe 27′ passes from the second port 27 to a port 31′ in the crank case or in the back end of the cylinder. If preferred the pipe 27′ can be arranged to pass from the port 27 to a reservoir for compressed air or to a pump (not shown) from which air may be passed under pressure to the said port as and when required.

A passage 30 passes from the charge admission port 29 in the cylinder to the crank case 31 and this said passage permits air to be passed with sufficient velocity from the said crank case to the cylinder to induce a flow of vapourized fuel from the vapourizing chamber 12 prior to the commencement of the compression stroke of the piston 20.

An air admission port 32 is formed in the side of the back end of the crank case 31 and this port is fitted with a valve 33 which is designed to open under the influence of a minus pressure produced in the crank case and back end of the cylinder when the piston is moving forward on its compression stroke.

The valve 33 on the air admission port 32 can be connected to a lever 34 which is controlled by the lever and link mechanism 22 in such a way that the said valve will open a little later than the valve 21 controlling the admission of fuel to the vapourizing chamber 12, see Figure 2 of the drawings.

The valve 33 can be made to fit tightly on its seat to prevent the admission of air to the crank case through the port 32 when sufficient air is introduced with the liquid fuel to the vapourizing chamber to provide a satisfactory explosive mixture or the said valve can be controlled as above described to permit of a regulated supply of air to be admitted to the crank case through the port 32.

In operation, when the piston 20 of the engine is moving forward on its compression stroke the minus pressure produced in the crank case 31 and consequently in the passage 30, pipe 28 and pipe 27′ induces atomized fuel and air to be drawn into the vapourizing chamber.

The valve 32 is arranged to open to admit air to the crank case either by the minus pressure produced in the latter or by the operation of the lever and link mechanism 22 after the atomized fuel and air is introduced into the vapourizing chamber 12.

When the piston has moved near to the end of its working stroke and opens the port 29 a portion of the air compressed within the crank case rushes into the cylinder by way of passage 30 and port 29 and scavenges the cylinder of all exhaust gases, and before the piston moves forwardly to close the said port some of the compressed air passes by way of pipe 27′ to the vapourizing chamber 12 and forces the vapourizing fuel or fuel and air therefrom to the cylinder by way of pipe 28 and the charge admission port 29.

The atomized fuel from the vapourizing chamber is thoroughly admixed and evenly diffused through the air passing from the crank case to the cylinder thereby ensuring a highly satisfactory explosive mixture.

By arranging a preheating chamber 13 in combination with a vapourizing chamber as hereinbefore described very heavy oils can be readily atomized and vapourized even in cold weather thereby enabling an engine to be run economically without sacrificing its efficiency. When light or more volatile oil is used for fuel it may be delivered direct to the float chamber 16 of the carburetter through the pipe 36 (see Figures 2 and 3 of the drawings) and without passing it first through the preheating chamber.

In the modification of the invention shown in Figure 5 of the drawings the carburetter is dispensed with and the fuel is forced in regulated quantities into the vapourizing chamber 12 by means of a pump 37 or the like which is operated in any suitable way at correct intervals from some movable part of the engine. The fuel is drawn from a tank or reservoir 38 and delivered by the pump 37 through a pipe 39 to a preheating chamber 40 formed on or fitted to the head of the cylinder 11 from which it passes in a heated condition to the vapourizing chamber 12 when the port 19 is opened.

The heated oil delivered to the vapourizing chamber 12 is effectually vapourized by the heat from the walls of said chamber and by the flow of air which passes through the said chamber from the pipe 27′ when the charge admission port 29 is opened by the rearward movement of the piston 20 and results in a satisfactory gaseous mixture being delivered to the cylinder.

In this form of the invention the air to vapourize the fuel is admitted to the crank case 31 through the air admission port 32 in the manner hereinbefore described.

In order to provide means for permitting the vapourizing chamber 12 to be cleaned out as and when desired an outlet port 41 is

formed at its lower level and this port is normally closed by a screw plug 42 or the like. The preheating chamber 13 may be cleaned out by unscrewing the couplings of the pipes 14 and 15 therefrom and introducing a scraper or like device in the inlet or outlet openings thus provided.

I claim;—

1. In a two-cycle internal combustion engine, a cylinder having a vaporizing chamber on its head and a charge inlet port arranged at its side, a piston in said cylinder, means for supplying a regulated quantity of fuel to said chamber, means for retaining the vaporized fuel in said chamber while the piston is moving to compress charge in the cylinder, and means for delivering the vaporized fuel in said chamber to the charge inlet port in the side of the cylinder at the completion of the working stroke of said piston.

2. In a two-cycle internal combustion engine, a cylinder having a vaporizing chamber formed in its head and a charge inlet port arranged at its side, a piston in said cylinder, means for supplying a regulated quantity of fuel to the said chamber, means for supplying air under pressure to the vaporizing chamber, and means for passing the vaporized fuel and air from the vaporizing chamber to the charge inlet port in the side of the engine cylinder at the completion of the working stroke of the piston in the cylinder.

3. In a two-cycle internal combustion engine, a cylinder having a vaporizing chamber formed in its head and a charge inlet port arranged at its side, a piston in said cylinder, a crank case, means for admitting a regulated quantity of fuel to the said chamber, and means whereby air is induced to flow under pressure from the crank case direct to the charge inlet port in the side of the cylinder and from the crank case through the vaporizing chamber to the said charge inlet port at the completion of the working stroke of the piston.

4. In a two-cycle internal combustion engine, a cylinder having a vaporizing chamber formed in the head thereof, a piston in the cylinder, a charge inlet port in the side of the cylinder, a crank case attached to the cylinder, means for supplying a regulated quantity of carburetted fuel to the vaporizing chamber during the stroke of the piston to compress the charge in the cylinder, a port in the vaporizing chamber arranged in communication with the charge inlet port in the side of the cylinder and with the crank case, a second port in the vaporizing chamber arranged in direct communication with the crank case, an air inlet port in the crank case, and means for controlling the admission of air to the crank case through the said air inlet port, constructed and arranged whereby the charge of fuel delivered to the vaporizing chamber upon the stroke of the piston to compress the charge in the cylinder will be vaporized and admixed with air from the crank case and delivered therefrom to the cylinder upon the completion of the working stroke of the said piston.

5. In a two cycle internal combustion engine, a cylinder, a vapourizing chamber formed in the head thereof, a port for admitting fuel to the said chamber, a valve normally covering the said port, a charge admission port in the cylinder, a passage from the vapourizing chamber to the charge admission port and means for supplying air under pressure to the vapourizing chamber when the piston is completing its working stroke in the cylinder and prior to it moving forward on its compression stroke substantially as described.

6. In a two cycle internal combustion engine, a cylinder having a vapourizing chamber formed in the head thereof, a port for admitting fuel to the said chamber, a valve normally covering said port, a charge admission port in the cylinder, a passage from the vapourizing chamber to the charge admission port, a crank case on the cylinder, a passage from the vapourizing chamber direct to the crank case of the cylinder, and an air inlet to the crank case.

7. In a two cycle internal combustion engine, a cylinder having a vapourizing chamber formed in the head, a port for admitting fuel to the said chamber, a valve normally covering said port, a charge admission port in the cylinder, a passage from the vapourizing chamber to the charge admission port, a crank case, a passage from the crank case to the charge admission port, a passage from the vapourizing chamber direct to the crank case, an air inlet port in the crank case, and a valve normally covering the said air inlet port.

8. In a two cycle internal combustion engine, a cylinder having a preheating chamber and a vapourizing chamber fitted to the head thereof, a carburetter interposed between and arranged in communication with the said chambers, a piston in the cylinder and a valve in the passageway between the carburetter and the vapourizing chamber adapted to be operated to permit of regulated quantities of atomized fuel to pass to the said chamber during the compression stroke of the piston in the cylinder.

9. In a two cycle internal combustion engine, the combination of a cylinder having a preheating chamber, a vapourizing chamber formed in the head of the cylinder and arranged in communication with the preheating chamber, a valve adapted to be operated to permit regulated supplies of fuel to pass to the vapourizing chamber, a piston in the cylinder, a crank case, an air inlet valve in

the crank case, means for inducing a flow of air to the cylinder at the completion of the working stroke of the piston and for inducing a flow of air from the crank case through the vapourizing chamber to the charge inlet port in the side of the cylinder prior to the commencement of the compression stroke of the piston in the cylinder.

10. In a two cycle internal combustion engine, the combination of a cylinder having a preheating chamber and a vapourizing chamber formed in the head thereof, a carburetter interposed between and arranged in communication with the said chambers, a piston in the cylinder, a valve in the passageway between the carburetter and the vapourizing chamber adapted to be operated to permit regulated quantities of atomized fuel to pass to the said chamber during the compression of the charge within the cylinder by the movement of the piston, a charge inlet port in the side of the cylinder, a crank case, passages passing from the said charge inlet port to the vapourizing chamber and to the crank case, a passage leading from the crank case to the vapourizing chamber, and an air inlet valve in the crank case adapted to open a little later than the valve controlling the admission of fuel and air to the vapourizing chamber.

11. In a two cycle internal combustion engine, a cylinder having a preheating chamber formed on the head thereof, a vapourizing chamber formed in the head of the cylinder, a passage leading from the preheating chamber to a port opening into the vapourizing chamber, a valve adapted to open during the compression of a charge in the cylinder the piston to admit preheated fuel to the vapourizing chamber, a crank case, a charge admission port in the cylinder, passages leading from the vapourizing chamber to the charge admission port in the cylinder and to the crank case, and an air inlet port in the crank case through which air is admitted during the compression stroke of the piston, constructed and arranged whereby the air admitted to the crank case will be admixed with the vapourized fuel and passed through the charge inlet port to the cylinder on the completion of the working stroke of the piston.

12. In a two cycle internal combustion engine, a cylinder having a preheating chamber formed on the head thereof, a carbureter having a float chamber arranged in communication with the said chamber, a vaporizing chamber on the head of the cylinder, a port leading to the vaporizing chamber, a passage leading from the float chamber to the port leading into the vaporizing chamber, an atomizing nipple in said passage, an air inlet to the said passage, a valve normally covering the port, lever and link mechanism operated from the crank shaft for operating the valve, two ports in the vaporizing chamber, a charge admission port in the cylinder, a pipe from one port in the vaporizing chamber to the charge admission port, a crank case, a passage leading from the charge admission port to the crank case, a pipe connecting the second port in the vaporizing chamber to the crank case, an air inlet port in the crank case, a timing gear, and a valve covering the said air inlet port adapted to open automatically under the influence of a minus pressure in the said crank case and by the timing gear when the piston is moving forward on its compression stroke in the cylinder.

In testimony whereof I have affixed my signature in the presence of two witnesses.

FRANK STAFFORD JELBART.

Witnesses:

W. D. Reid,

Doris I. Pittard.