W. W. MORSE.

INTERNAL COMBUSTION ENGINE.

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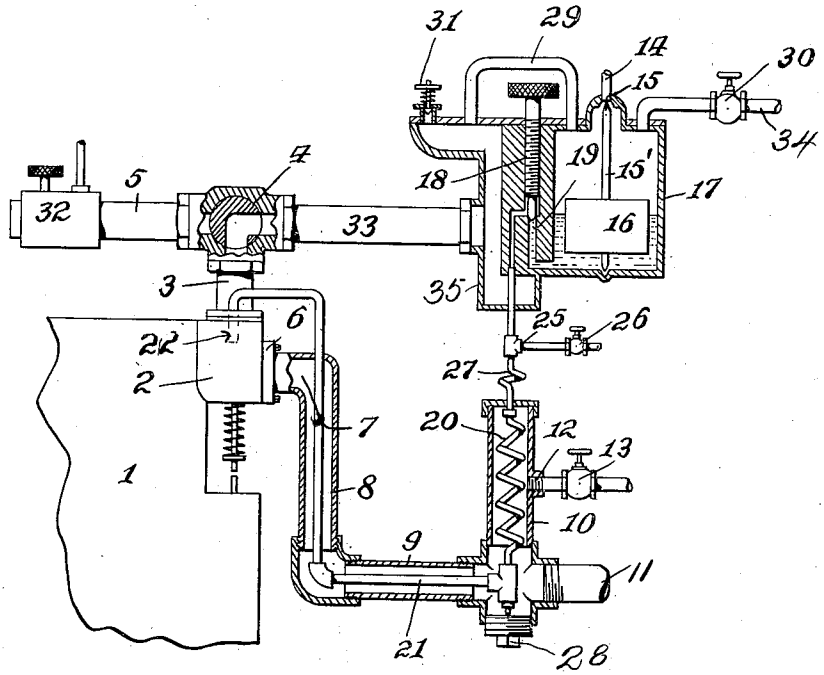
961,152.

Patented June 14, 1910.



Attest:

Edgeworth Bruce

F. W. Wright

Inventor:

William W. Morse

by Emerson R. Rowell,

Atty.

UNITED STATES PATENT OFFICE.

WILLIAM W. MORSE, OF NEWARK, NEW JERSEY.

INTERNAL-COMBUSTION ENGINE.

961,152. Specification of Letters Patent. Patented June 14, 1910.

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To all whom it may concern:

Be it known that I, WILLIAM W. MORSE, a citizen of the United States, residing at Newark, New Jersey, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a clear, full, and exact description.

My invention relates to an internal combustion engine, and one of my objects is to provide a construction which is particularly adapted for use with heavy hydro-carbon liquid fuels, such as kerosene, and which will operate with such fuel to produce a substantially smokeless exhaust when the engine has become heated up and without undesirable deposition of carbon in the cylinder or elsewhere.

Other advantages of my invention will appear from the following description. My invention will be set forth in the claims.

The drawing shows a side elevation, partly in section, of the preferred embodiment of my invention.

In operating internal combustion engines with heavy hydro-carbon fuel such as kerosene, difficulty has been experienced heretofore in supplying the fuel in such a way that the exhaust will be substantially smokeless, and such engines have been also objectionable because a heavy deposition of carbon in the cylinder has resulted, thus clogging up the cylinder, sparking points, etc. and rendering the operation of the engine defective. My invention as actually used by me avoids these objections as I have used the same in practice after long experiments and with most successful results, using kerosene as a fuel.

In the preferred embodiment of my invention shown in the drawings, 1 represents generally the casing of the engine which is as usual provided with the ordinary reciprocating piston and mixing chamber 2, either separate from the cylinder or not, together with the ordinary intake and exhaust valves which I have not considered necessary to show in detail, as such are evident to any mechanic familiar with internal combustion engines.

7, 8 and 9 represent the exhaust pipe leading from the engine to the atmosphere at 11.

3 is a main air intake pipe to the mixing chamber connected to a T provided with a hand valve 4 by which the air intake may be connected to either the pipe 33 or pipe 5.

14 is a pipe leading from a main source of liquid fuel supply (not shown) and connected to the auxiliary tank 17. From this tank 17 leads piping 27, 20, 21 to the mixing chamber 2, as indicated at the vapor intake 22.

16 is a float provided with a spindle 15′ which normally closes the end 15 of pipe 14, but when the float is depressed slightly an additional quantity of fuel will enter the tank 17.

18 is a suitable hand valve for regulating the feed.

34 is a pipe open to the atmosphere provided with a regulating valve 30, and 31 is a spring-pressed valve normally held closed but which will open from the atmosphere when the valve 30 is entirely closed.

It will be observed that with the parts as shown in the drawing, when a vacuum is formed in the cylinder by the recession of the piston, air will be drawn in through pipe 34 and the jet of air will strike the float and depress the same slightly, allowing an additional quantity of oil to enter tank 17, and the suction will also draw out of the small pipe 21 a charge of fuel. The air passes to the engine through pipes 29, 33 and 3. When using kerosene or other relatively heavy hydro-carbon, I preferably vaporize the same before it enters the mixing chamber by heating the supply pipe, and I have found that this may be conveniently done by means of the heat of the exhaust, although this may not be necessary in all cases. I preferably run the supply pipe through the exhaust pipe, as shown.

In cases where the fuel is vaporized before it enters the mixing chamber, I have found that it is desirable to prevent an undue pressure of vapor in the supply pipe, because otherwise when the engine takes its charge it would often take too much fuel in comparison with the amount of air entering through the main intake 3, and therefore produce smoke in the exhaust and deposition of carbon in the engine. In order to prevent this and also preferably to mix with the vapor a quantity of air relatively small as compared with the main air intake 3, I have provided a vent or opening into the supply pipe, as indicated at 25, which, in the embodiment shown in the drawings, is a pipe open to the atmosphere and provided with a regulating hand valve 26. This air entrance opening is preferably located between the source of

supply and the point of vaporization of the fuel, as shown.

As the engine takes a charge a small quantity of fuel will be drawn in to the supply pipe past the valve 18 and will trickle down the supply pipe and become vaporized by the heat, and at the next suction a portion of such vapor, together with a small quantity of air through valve 26, will be drawn into the engine. It will be obvious that when the pipe 25 is open to the atmosphere, a substantial pressure of vapor in the supply pipe will escape, and therefore prevent an undue pressure in the supply pipe, although this in practice is not noticeable as such a relatively small quantity of oil is drawn in. The engine will therefore take the vapor at atmospheric pressure, or somewhat higher if the valve 26 is somewhat closed. I have found that this construction operates well in actual use. It is also desirable to gradually heat up the fuel when kerosene is used, because if the same is suddenly vaporized it has a tendency to split up and deposit carbon, and in order to gradually heat up the same I have provided an extension 10 from the exhaust pipe containing coils 20 thereon and coil 27 outside of the same. The supply pipe being formed of metal, is therefore gradually heated up, and as the kerosene trickles down through it the fuel will be heated up sufficiently gradually to prevent splitting up of the oil.

12 is a pipe leading to the atmosphere and provided with a hand valve 13 which, if desired, may be used to partially regulate the temperature in the extension 10.

32 is an ordinary carbureter which may be used and connected to a gasolene or other light hydro-carbon auxiliary fuel supply vaporizable at ordinary temperatures and which may be used to start the engine, if desired. This I have not thought necessary to show in detail, as it will be evident to any one skilled in the art and is only a preferable auxiliary device.

I have not shown many of the ordinary parts of the engine, as the same will be evident to any one skilled in the art, as such skilled person would be perfectly competent to construct and use my invention from the foregoing description and the drawing without the exercise of anything but mere mechanical skill. My invention has been actually used by me both on a motor car and a launch and operated satisfactorily in each case, and, although used for long periods of time, if operated successfully, the exhaust being smokeless and without objectionable deposition of carbon in the cylinder or elsewhere. My invention is therefore not a theoretical one but is one which has been tried out after repeated experiments in actual service.

I am aware that my invention may be embodied in various other forms than shown in the drawings, and I therefore wish it to be distinctly understood that I do not limit myself to the embodiment shown in the drawings.

What I claim as my invention is:

1. In combination with a mixing chamber of an explosive engine, a source of supply for liquid fuel, piping from said source to the mixing chamber, means for heating said piping, and an air vent in said piping between the heating means and the supply, an air intake port to said mixing chamber independent of any combustible vapor intake port.

2. In combination with a mixing chamber of an explosive engine, a source of supply for liquid fuel, piping from said source to the mixing chamber, means for heating said piping, and an air vent in said piping, and an air intake port to said mixing chamber independent of any combustible vapor intake port.

3. In combination with a mixing chamber of an explosive engine, a source of supply for liquid fuel, piping from said source to the mixing chamber, means for heating said piping, and an air vent in that portion of the piping through which the liquid fuel normally flows from the source of supply to the heating means, and means for automatically preventing feed of oil except when suction is acting upon the supply, an air intake port to said mixing chamber independent of any combustible vapor intake port.

4. In combination with a mixing chamber of an explosive engine, a source of supply for liquid fuel, piping from said source to the mixing chamber, means for heating said piping, and an air vent in said piping between the heating means and supply, and an adjusting valve controlling said vent, an air intake port to said mixing chamber independent of any combustible vapor intake port.

5. In combination with a mixing chamber of an explosive engine, a source of supply for liquid fuel, piping from said source to the mixing chamber, means for heating said piping, and an air vent in said piping, said means for heating said piping comprising a chamber in communication with the engine's exhaust, and means for regulating the heat of said chamber, said vent being between the chamber and supply source, an air intake port to said mixing chamber independent of any combustible vapor intake port.

6. A gas engine comprising a mixing chamber, an air intake and an oil intake thereto, a source of supply for liquid fuel from which the oil intake leads, a chamber surrounding at least part of the oil intake and connected with the engine exhaust port, a vent in the oil intake between the source

of supply and the mixing chamber, said chamber surrounding at least part of the oil intake and having at least two portions separately opening to the air.

7. In combination with a mixing chamber, of an explosive engine, a source of supply for liquid fuel, piping from said source to the mixing chamber, means for heating said piping, and an air vent in that portion of the piping through which the liquid fuel normally flows from the source of supply to the heating means, and an auxiliary hydrocarbon supply means adapted for use independently of that hereinbefore set forth, an air intake port to said mixing chamber independent of any combustible vapor intake port.

8. In combination with the mixing chamber of an explosive engine, a source of supply for liquid fuel, piping from said source to the mixing chamber, means for heating said piping, and an air vent in said piping, said source of supply having a controlling means comprising a chamber, a valve therein connecting with the intake and chamber and an air intake to the chamber, whereby the air passing through the chamber may control the valve.

9. In combination with the mixing chamber of an explosive engine, a source of supply for liquid fuel, piping from said source to the mixing chamber, means for heating said piping, and an air vent in said piping, said source of supply having a controlling means comprising a chamber, a valve therein connecting with the intake and chamber and an air intake to the chamber, whereby the air passing through the chamber may control the valve, said valve being a float valve near the face of which the intakes are located.

10. In combination with the mixing chamber of an internal combustion engine having an air intake port, a small vapor intake port, piping leading from said vapor intake port to a source of liquid fuel supply, means for heating said piping, and a regulating air vent in said piping, between the supply and port.

11. In combination with the mixing chamber of an internal combustion engine having an air intake port, a small vapor intake port, piping leading from said vapor intake port to a source of liquid fuel supply, means for heating said piping, and a regulating air vent in said piping, between the supply and port, said means for heating the piping consisting of an exhaust pipe surrounding said vapor pipe.

12. In combination with the mixing chamber of an internal combustion engine having an air intake port, a small vapor intake port, piping leading from said vapor intake port to a source of liquid fuel supply, means for heating said piping, and a regulating air vent in said piping, between the supply and port, a feed valve in the supply chamber, a connection from the air intake to said supply chamber whereby the feed will be effected in response to the amount of air drawn therethrough.

13. In combination with the mixing chamber of an internal combustion engine having an air intake port, a small vapor intake port, piping leading from said vapor intake port to a source of liquid fuel supply, means for heating said piping, and a regulating air vent in said piping, between the supply and port, a feed valve in the supply chamber, a connection from the air intake to said supply chamber whereby the feed will be effected in response to the amount of air drawn therethrough, said vapor piping heating means comprising an exhaust pipe surrounding said vapor pipe.

14. An explosive engine in combination, a mixing chamber provided with a main air intake port, piping leading from a source of liquid fuel supply to said mixing chamber, means for heating said piping to vaporize said fuel, and an air intake port in said piping between said source of supply and said heating means.

15. An explosive engine in combination, a mixing chamber provided with a main air intake port, piping leading from a source of liquid fuel supply to said mixing chamber, means for heating said piping to vaporize said fuel, and an air intake port in said piping between said source of supply and said heating means, and a valve for regulating the air drawn into said latter air intake port.

16. In combination with a mixing chamber of an explosive engine, a source of liquid supply adapted to be vaporized by heat, piping therefrom to said mixing chamber, means for heating a portion of said piping to vaporize said liquid before it enters said chamber, an air-entrance opening into said piping between the point of vaporization and said source of supply, an intake port to said mixing chamber and piping thereto for introducing to said chamber a combustion element other than that of the liquid first mentioned.

17. In an internal combustion engine having a mixing chamber, a main air intake thereto, a fuel supply, a pipe therefrom to said chamber and smaller than said main air intake, said supply pipe having a vent therein between the fuel supply and chamber and adapted to admit an auxiliary air supply to mix with the fuel previous to its entrance into said mixing chamber, and means for heating said fuel supply pipe to vaporize said fuel.

18. In an internal combustion engine having a mixing chamber, a main air intake thereto, a fuel supply, a pipe therefrom to said chamber and smaller than said main

air intake, said supply pipe having a vent therein between the fuel supply and chamber and adapted to admit an auxiliary air supply to mix with the fuel previous to its entrance into said mixing chamber, and means for heating said supply pipe to vaporize the fuel therein, said vent being also adapted to allow a pressure of vaporized fuel therein to escape.

19. In an internal combustion engine in combination, a source of kerosene supply, a mixing chamber, a pipe from said supply leading to said engine, a main air intake to said mixing chamber larger than said pipe, means for heating said pipe sufficiently gradually to vaporize said kerosene without substantial deposition of carbon, said pipe having an auxiliary air opening thereto between said supply and mixing chamber.

20. In an internal combustion engine in combination, a source of kerosene supply, a mixing chamber, a pipe from said supply leading to said chamber, a main air intake to said mixing chamber larger than said pipe, means for heating said pipe sufficiently gradually to vaporize said kerosene without substantial deposition of carbon, said pipe having an auxiliary air opening thereto between said supply tank and point of vaporization.

21. In an internal combustion engine in combination, a mixing chamber, a main air intake thereto, a liquid fuel supply, piping therefrom to said mixing chamber, and means for gradually heating said piping whereby said liquid fuel is gradually heated to the vaporizing point of said fuel, said piping having a vent therein to allow a vapor pressure therein to escape.

22. In an internal combustion engine in combination, a mixing chamber, a main air intake thereto, a liquid fuel supply, piping therefrom to said mixing chamber, and means for gradually heating said piping whereby said liquid fuel is gradually heated to the vaporizing point of said fuel, an air intake into said piping to allow a relatively small quantity of air to mix with said vapor previous to its entrance into said mixing chamber.

Signed at New York city this 14 day of April 1906.

WM. W. MORSE.

Witnesses:
F. WARREN WRIGHT,
EMERSON R. NEWELL.