

E. HIGGINS.
INTERNAL COMBUSTION ENGINE.
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942,070.

Patented Dec. 7, 1909.

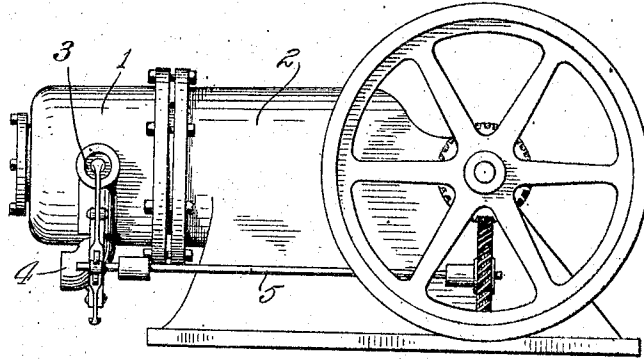


FIG. 1.

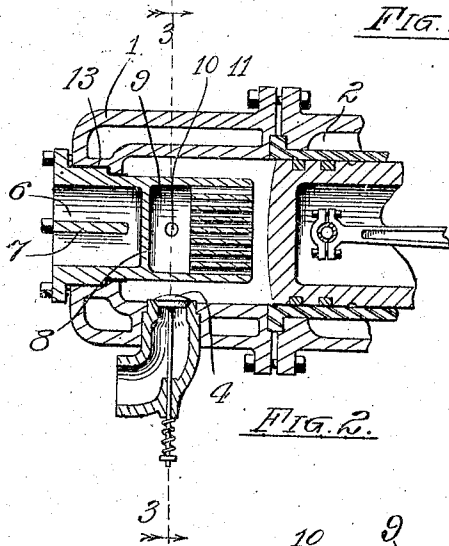


FIG. 2.

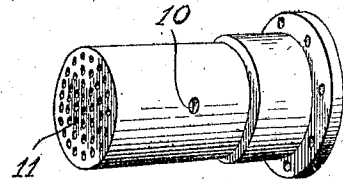


FIG. 4.

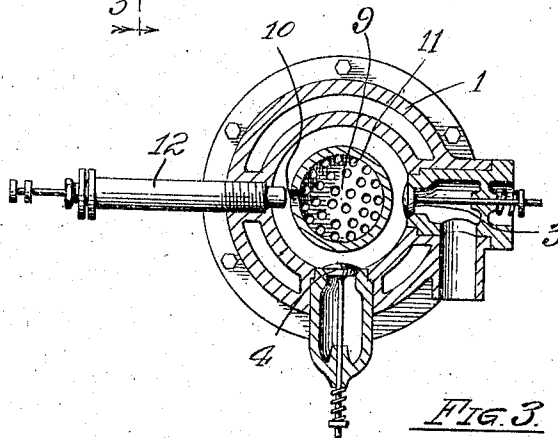


FIG. 3.

Witnesses
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INTERNAL-COMBUSTION ENGINE.

942,070.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, EUGENE HIGGINS, a citizen of the United States of America, residing at Lansing, in the county of Ingham and State of Michigan, have invented certain new and useful improvements in Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as it appertains to make and use the same.

My invention relates to improvements in internal combustion engines and more particularly to engines adapted to be operated by some heavy oil or other liquid fuel. Heretofore in such devices the fuel vapor is formed in the presence of air and necessarily ignites as soon as vaporized. I have found that by forming and super-heating the vapor before it is mingled with the air, more perfect combustion and greater expansion is secured.

The object is to provide improved means for vaporizing the fuel; improved means for superheating the vapor before it comes in contact with the air; improved means for igniting the charge, and to provide the device with various new and useful features hereinafter more fully described and particularly pointed out in the claims.

My device consists essentially of a body placed in the combustion chamber of the engine and provided with a vaporizing chamber, and means for vaporizing and superheating the vapor of the fuel before it mingles with the air whereby it is changed to a fixed gas at considerably above igniting temperature, as will more fully appear by reference to the accompanying drawings in which:

Figure 1 is a side elevation of a device embodying my invention. Fig. 2 a longitudinal vertical section of a portion of the same. Fig. 3 a transverse section on the line 3—3 of Fig. 2. Fig. 4 a perspective detail of the vaporizing, superheating, and igniting portion of the device.

Like numbers refer to like parts in all of the figures.

1 represents the combustion chamber of the engine; 2 the cylinder of the same; 3 the intake valve to admit air; 4 the exhaust valve, and 5 the cam shaft all substantially as usually constructed whereby air is compressed in the combustion chamber at each alternate rearward stroke of the piston.

Inserted in the combustion chamber (which is made somewhat larger than usual), is a device represented in perspective in Fig. 4 which comprises the main features of my invention. This device consists of a cylindrical body detachably secured in the axis of the combustion chamber and extending through a large opening in the rear of the same. The outer end of this cylinder is open as at 6 and separated from the balance by a transverse partition 8 near the middle. This outer end is preferably provided with a diaphragm 7 spaced apart from the partition 8 to facilitate initial heating of the cylinder by any suitable means (preferably a gasolene torch) to a temperature sufficient to vaporize the oil. Heat insulating material may also be inserted as at 13 between this cylinder and the combustion chamber to facilitate maintaining proper temperature of the cylinder. 9 is a vaporizing chamber near the middle of this cylinder having a small lateral opening 10 through which at proper intervals the liquid fuel is injected by a suitable pump 12. This opening 10 is made small enough to prevent fire from passing therethrough into the vaporizing chamber. The forward end of this cylinder is closed by a thick perforated diaphragm having numerous holes therethrough of a length considerably greater than their diameter, whereby the vapor of the oil in passing therethrough is superheated and combustion is prevented within the vaporizing chamber 9. This forward end may be made foraminous in any convenient manner, and may vary in shape and direction of discharge, it being only necessary to subdivide the vapor into small jets and superheat the same sufficiently and also prevent fire from passing into the vaporizing chamber.

In operation, at each working stroke a small quantity of fuel is injected into the vaporizing chamber 9 by means of the pump 12 operated by any convenient mechanism commonly used to operate such pumps the same being no part of my present invention. The temperature of this chamber is such that the fuel is instantly vaporized as it strikes the wall of the chamber. This vaporization of the fuel increases the pressure in the chamber 9 sufficient so that the vapor escapes through the small openings 11, the walls of which are highly heated by the fire in the combustion chamber, so that the va-

por is superheated and changed to a highly combustible fixed gas in passing through said openings and being unmixed with air will not be ignited before superheating. This vapor immediately upon coming in contact with the compressed air in the combustion chamber will mingle therewith in finely subdivided jets thus forming a highly explosive mixture which will immediately be fired by the high temperature of the escaping vapor, escaping from the incandescent inner perforated part of the device. I am also thus able to provide a simple and efficient means of vaporizing, superheating, and igniting the fuel, all within the combustion chamber of the engine, thus greatly simplifying the apparatus required and producing a novel device having a novel mode of operation, and a highly efficient motor adapted to operate with a great variety of liquid fuels.

What I claim is:—

1. An internal combustion engine, comprising a combustion chamber, a body inserted in said chamber having a heating chamber open at the outer end, a vaporizing chamber near the middle, and a front end having numerous small perforations, and means for periodically injecting oil into the vaporizing chamber.

2. An internal combustion engine, comprising a combustion chamber, a cylindrical body inserted in said chamber, said body having a chamber open at the outer end and

provided with a longitudinal partition and a transverse partition spaced apart, a middle vaporizing chamber, and a forward end having numerous small perforations; and means for periodically injecting oil into said vaporizing chamber.

3. An internal combustion engine, comprising a combustion chamber, a cylindrical body inserted in said chamber, said body being open at the rear and provided with a horizontal and a transverse partition spaced apart and also having a middle vaporizing chamber and a thick forward end perforated with numerous small passages of greater length than diameter; and means for periodically injecting oil into the vaporizing chamber.

4. In an internal combustion engine having a combustion chamber, means for vaporizing liquid fuel, and means for superheating the resulting vapor, consisting of a heated body projecting into the combustion chamber having numerous small and elongated passages, whereby the vapor is superheated in passing therethrough and also discharged in numerous small jets into the said combustion chamber.

In testimony whereof I affix my signature in presence of two witnesses.

EUGENE HIGGINS.

Witnesses:

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