

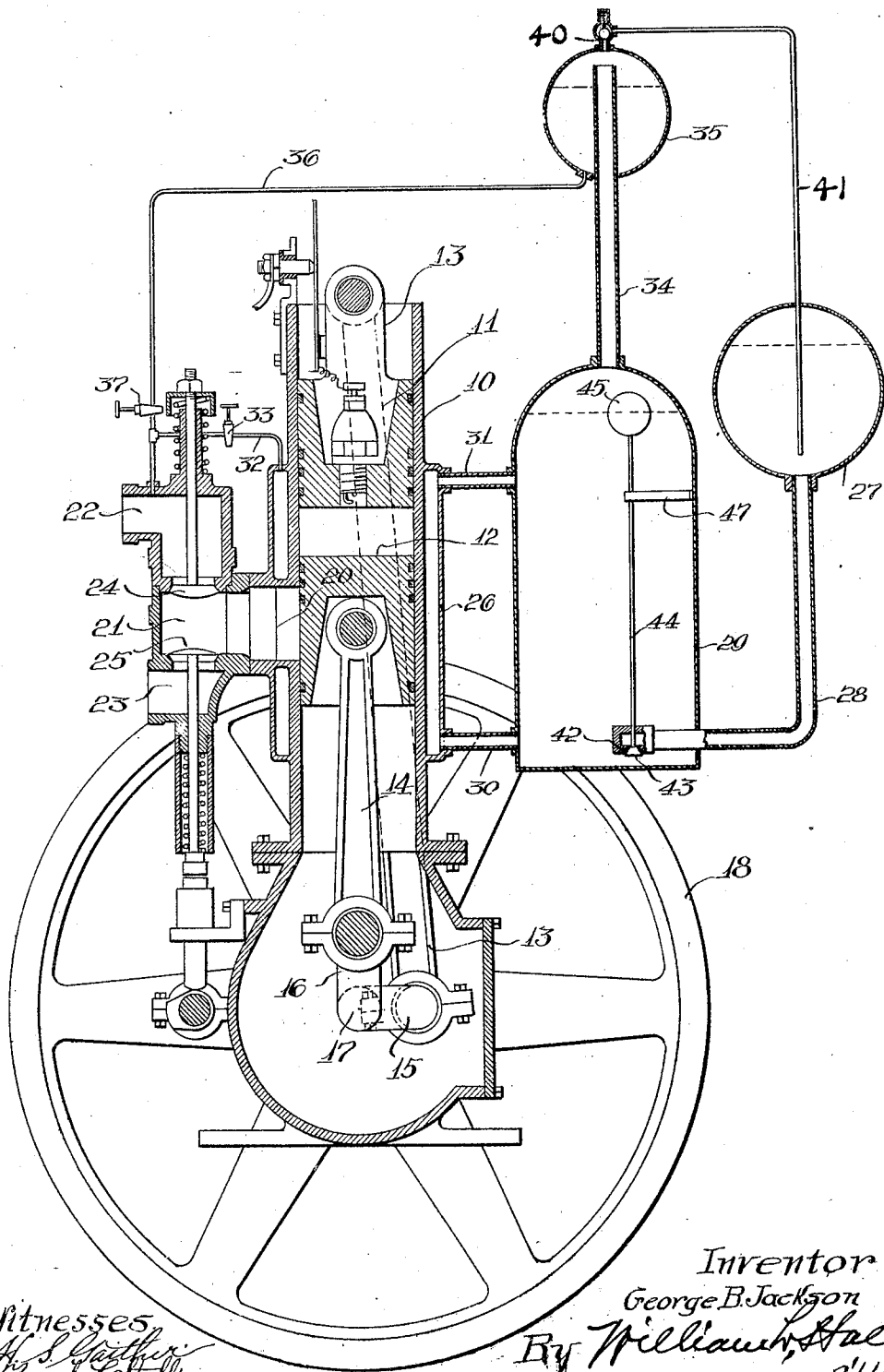
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METHOD OF AND APPARATUS FOR OPERATING PETROLEUM EXPLOSIVE ENGINES.

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1,058,591.

Patented Apr. 8, 1913.



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GEORGE B. JACKSON, OF CHICAGO, ILLINOIS.

METHOD OF AND APPARATUS FOR OPERATING PETROLEUM EXPLOSIVE-ENGINES.

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Specification of Letters Patent.

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Application filed March 13, 1912. Serial No. 683,475.

To all whom it may concern:

Be it known that I, GEORGE B. JACKSON, a citizen of the United States, and a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Methods of and Apparatus for Operating Petroleum Explosive-Engines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to improvements in internal combustion engines in which petroleum or other crude oil is used as the motive fluid; and the invention relates more specifically to an improved method of and apparatus for raising the temperature of the liquid fuel prior to its admission to the cylinder, as by applying the liquid fuel to the cooling system of the engine to maintain the working parts of the engine suitably cool, and for collecting the products of distillation of the liquid fuel and employing same for the purpose of starting the engine when cold.

Heretofore it has been common in internal combustion engines using a crude oil, such as petroleum, for fuel to provide an auxiliary tank or receptacle connected in any suitable manner with the inlet side of the cylinder for the purpose of containing a suitably light hydro-carbon, such as gasolene, to start the engine; the supply of the lighter hydro-carbon being cut off or discontinued after the cylinder has become sufficiently heated and the supply of crude oil or petroleum connected to the inlet side of the cylinder and continued as a fuel supply so long as the engine is in operation.

In accordance with my invention I propose to preliminarily heat the liquid fuel, as by circulating it through the cooling system of the engine and to collect the products of distillation resulting from the heating of the fuel and storing such light hydro-carbon constituents in a suitable receptacle to be conveniently conducted to the inlet side of the cylinder upon starting the engine. An effect of passing the hydro-carbon fuel through the cooling system of the engine, or otherwise subjecting the same to heat to raise the temperature thereof, is to bring it closer to its flashing point prior to its admission to the inlet side of the cylinder.

I have shown in the drawing my invention applied to a form of internal combustion engine such as is shown in my prior application for U. S. Letters Patent, Serial No. 657,039 filed on the 27th day of October, 1911, but it will be understood that my invention is equally adaptable to other forms of internal combustion engines.

The figure of the drawing is a partial section and partial elevation of an internal combustion engine equipped with my invention.

As shown in the drawing, 10 designates the engine cylinder, 11, 12 the pistons therein, which travel toward and from each other, and are connected by the connecting rods 13, 14 with the cranks 15, 16 of the crank shaft 17, said crank shaft being provided with the usual fly or balance wheel 18. The cylinder is provided at one side with a port 20 connected with a chamber 21 which is adapted for communication with the fuel inlet passage 22 and the exhaust passage 23; suitable valves 24, 25 being interposed between the chamber 21 and the said inlet and exhaust passages to control the admission of fuel to and exhaust of spent gases from the cylinder. Inasmuch as the particular type of engine constitutes *per se* no part of the present invention, a detailed description of the construction and operation thereof is not necessary.

26 designates the cooling jacket which surrounds that part of the cylinder which is exposed to the heat of compression and explosion. 27 designates a supply tank for the liquid hydro-carbon fuel. This tank communicates by a pipe 28 with an intermediate chamber or radiator 29, which latter communicates near its lower end by a pipe 30 with the lower part of the cooling jacket of the engine; and the upper end of said intermediate chamber or radiator 29 communicates with the upper part of the cooling space or jacket 26 through a pipe 31.

In the operation of the engine the liquid fuel circulates through the cooling space or jacket of the cylinder and absorbs the heat of compression and combustion from the cylinder and associated parts and is returned through the pipe 31 to the intermediate chamber or radiator 29 and is there cooled by its passage through the relatively large body of liquid therein. The liquid fuel is taken off at a suitable point, as from the upper part of the cooling jacket 26, as here-

in shown, through a pipe 32 and led to the inlet passage 22 of the engine, where it may be mixed with the air in any suitable manner on its way to the cylinder. The pipe 32 has
 5 a valve 33 to control the flow of the fluid therethrough.

The circulation of the liquid fuel through the cooling system of the engine, including the tank or radiator 29, raises the temperature of the liquid fuel to such a point as to
 10 vaporize the lighter constituents of said fuel, as the naphtha, benzin or gasolene, and these latter constituents, in the form of vapor, are conducted by the pipe 34 to a receiver 35 in which they are condensed and are collected.
 15 The receiver 35 is connected by a pipe 36 with the fuel pipe 32 or the inlet passage of the engine, and said pipe 36 is provided with a valve 37.

In the operation of the engine and the parts described, the circulation of the liquid fuel through the cooling system of the engine serves to maintain the cylinder suitably cool and also serves to heat the liquid fuel
 25 above its normal temperature. The liquid fuel is conducted through the pipe 32 from the upper part of the cooling space of the cylinder to supply fuel to the inlet passage 22, where it is mixed in any suitable manner
 30 with air drawn through said inlet passage by the action of the pistons or otherwise; and when the engine is in continuous operation the fuel is maintained at such temperature as will facilitate its admixture with the
 35 incoming air in the inlet passage and its vaporization in the cylinder. During the operation of the engine and the circulation of the liquid fuel through the cooling system thereof, a constant distillation of the lighter constituents of the fuel is taking
 40 place, and said fuel vapors so distilled are conducted to and collected in the receiver 35. When the engine is cold and is to be started, the valve 37 of the pipe 36 is opened
 45 to admit the lighter fuel constituents to the inlet passage to start the engine, the valve 33 being at the same time closed. After the cylinder has become sufficiently heated the valve 37 is closed and the valve 33 is opened,
 50 and thereafter the fuel is supplied from the cooling jacket 26 through the pipe 32. The said receiver 35 is provided with a relief valve device 40 to relieve the pressure therein when the pressure reaches a predetermined
 55 point, and the vapor released from the receiver at such time may be conducted by the pipe 41 back to the supply tank 27, said pipe 41 extending into the tank below the liquid level thereof.

In order to prevent the liquid fuel in the the intermediate chamber or radiator 29 from rising above a predetermined level, I may provide the outlet end of the pipe 28
 60 with a fitting having a port 42 that is controlled by a valve 43 mounted on the lower

end of a stem 44, and which carries at its upper end a float 45. The said stem is guided at its lower end in said fitting and may be
 70 guided between its ends by a guide arm 47 that is supported in any suitable manner from the wall of the intermediate chamber or radiator. The weight of the parts normally maintains the valve 43 open, but when the liquid rises above a predetermined level,
 75 the float is raised to close the valve until the level in the intermediate chamber again drops.

It is to be understood that the structural details are capable of wide variation within the scope and spirit of the invention and
 80 the invention is not limited thereby except as hereinafter specifically claimed.

I claim as my invention:—

1. The method of operating an internal combustion engine by the use of petroleum
 85 or like heavy hydro-carbon fuel, which consists in raising the temperature of the fuel prior to its admission to the inlet side of the engine, controlling the admission of the heated fuel to the inlet side of the engine, collecting the products of distillation of the
 90 heated fuel and separately and controllably conducting same to the inlet side of the engine to start said engine.

2. The method of operating an internal
 95 combustion engine by the use of petroleum or like heavy hydro-carbon fuel, which consists in passing the fuel through the cooling system of the engine, conducting the heated fuel to the inlet side of the engine and separately collecting the products of distillation
 100 of the heated fuel and controllably conducting them to the inlet side of the engine to start said engine.

3. In an internal combustion engine, the
 105 combination of the cooling space thereof, a chamber connected by pipes with the cooling space to constitute parts of the cooling system and a pipe leading from the cooling space to the inlet side of the engine and provided
 110 with a valve, of a chamber communicating with the vapor space of said chamber to collect the products of distillation from said chamber and means for controllably directing the distillates to the inlet side of
 115 the engine to start said engine.

4. In an internal combustion engine, the combination with the cooling space thereof, a chamber connected by pipes with the cooling
 120 space to constitute parts of the cooling system and a pipe leading from the cooling space to the inlet side of the engine and provided with a valve, of a receiver connected by a pipe with the upper end of said chamber, and a pipe leading from said receiver to
 125 the inlet side of the engine and provided with a valve.

5. In an internal combustion engine, the combination with the cooling space thereof, a chamber connected by pipes with the cool-
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ing space to constitute parts of the cooling system and a pipe adapted to afford communication between the cooling space and the inlet side of the engine, of a receiver communicating with the vapor space of said chamber, and adapted for communication with the inlet side of the engine, a supply tank for liquid fuel communicating with said chamber, and a float actuated valve for controlling the supply of fluid fuel from said tank to the chamber.

6. In an internal combustion engine, the combination with the cooling space thereof, a chamber connected by pipes with the cooling space to constitute parts of the cooling system and a pipe adapted to afford com-

munication between the cooling space and the inlet side of the engine, of a receiver communicating with the vapor space of said chamber, and adapted for communication with the inlet side of the engine, a supply tank communicating with said chamber for supplying fuel thereto, and a vent leading from said receiver to said supply tank.

In testimony, that I claim the foregoing as my invention I affix my signature in the presence of two witnesses, this 9th day of March, A. D. 1912.

GEORGE B. JACKSON.

Witnesses:

W. L. HALL,
G. E. DOWLE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."