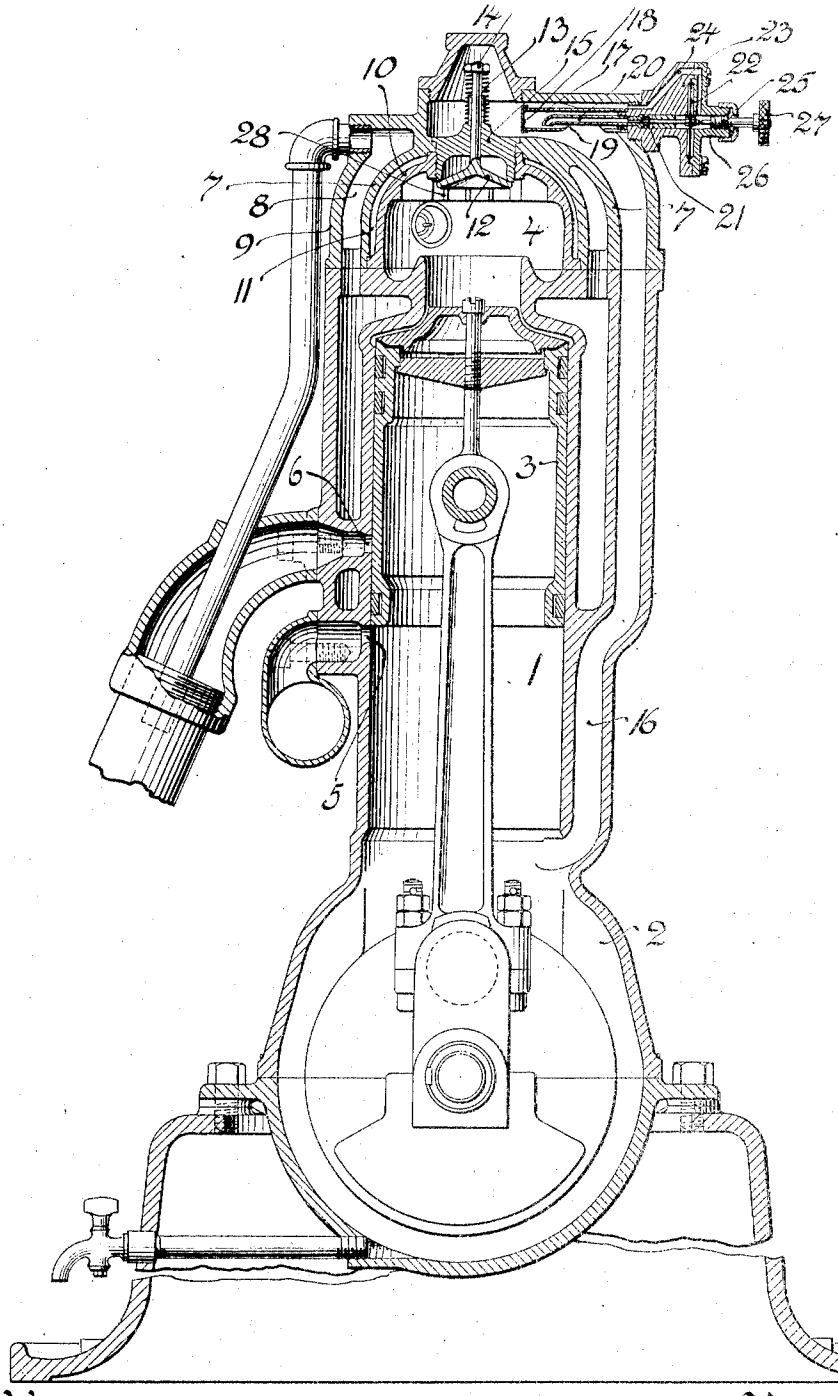
F. L. NICHOLS.

HYDROCARBON ENGINE.

APPLICATION FILED FEB. 2, 1907.

927,001. Patented July 6, 1909.



Witnesses:
Upstave Browne
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UNITED STATES PATENT OFFICE.

FRANK L. NICHOLS, OF STAMFORD, CONNECTICUT, ASSIGNOR TO NICHOLS QUADRUPLE TRACTION VEHICLE AND POWER COMPANY, OF MOUNT VERNON, NEW YORK, A CORPORATION OF NEW YORK.

HYDROCARBON-ENGINE.

No. 927,001. Specification of Letters Patent. Patented July 6, 1909.

Application filed February 2, 1907. Serial No. 355,367.

To all whom it may concern:

Be it known that I, FRANK L. NICHOLS, a citizen of the United States, and resident of Stamford, in the county of Fairfield and State of Connecticut, have invented a new and useful Improvement in Hydrocarbon-Engines, of which the following is a specification.

My invention relates to hydrocarbon engines with the object in view of simplifying the structure and rendering the feed uniform and efficient.

A practical embodiment of my invention is represented in the accompanying drawing which shows the engine in vertical section.

My invention contemplates an oil feed mechanism under the control of the pressure of the air within the cylinder and crank casing and further contemplates a particular construction of cylinder head which will maintain sufficient heat within the chamber to thoroughly vaporize the mixture and at the same time prevent overheating and consequent premature heating.

The accompanying drawing represents in vertical section an engine embodying my invention.

The cylinder in which the piston reciprocates is denoted by 1. The crank casing which forms a continuation of the cylinder is denoted by 2. The piston is denoted by 3 and the combustion chamber within the cylinder head by 4. Air is admitted to the cylinder 1 through a port 5 which is located in position to be opened when the piston is at the limit of its upward stroke. The exhaust takes place through a port 6 which is so located as to be opened when the piston reaches the limit of its downward stroke.

The cylinder head is composed of an outer wall 7 which is water jacketed by means of a circulation of water in the space 8 between the outer casing of the engine 9 and the said cylinder head is further provided with an inner wall 10 spaced from the outer wall 7 leaving an air space between the outer wall of the cylinder head and the inner wall or lining so that the inner wall or lining may become maintained at a degree of temperature to insure rapid vaporizing of the hydrocarbon, particularly where a heavy hydrocarbon, such for example, as kerosene oil is employed, and, at the same time will be kept from reaching a degree of temperature high enough to produce premature explosions because of the outer cooled wall 7 of the cylinder head which will absorb the heat across the air space 11.

In the top of the cylinder head there is located a valve 12 for admitting the explosive mixture into the combustion chamber 4 and this valve is held seated by a spring 13 interposed between a collar 14 on its stem and the top of the valve seat 15, the valve seat itself being in the form of a spider as is common.

An air passage 16 extends upwardly from the crank casing along the side of the cylinder 1 and over the cylinder head and over the outer wall of the cylinder head 7 and to this passageway 16 in proximity to the valve seat 15 there projects the fuel discharge tube 17 provided on its end with the atomizing screen 18. This tube 17 has an opening 19 in its under side across which, within the tube 17, the fuel discharge nozzle 20 extends, the said nozzle terminating within the tube 17 between the opening 19 and the atomizing screen 18.

Fuel is admitted to the discharge nozzle 20 by means of a valve 21, the stem of which is connected with a diaphragm 22 held in a support 23 in such a manner as to be free to vibrate to a limited extent and subject on its outer side to the pressure of the air through the passageway 16 and through a branch passageway 24 leading from the passageway 16 at its upper portion around the support 23 to the outer face of the diaphragm 22.

The limit of movement of the valve 21 under the influence of the diaphragm is regulated by means of a screw 25 set in the cap 26 and provided with a knurled head 27 for operating it. The cap 26 is made fast to the outer end of the support 23 and forms a cover for the diaphragm 22.

In operation, the upward stroke of the piston rarefies the air within the cylinder and crank casing below it and hence in the passageways 16 and branch passageway 24 permitting the diaphragm 22 to move outwardly and open the valve 21 to admit hydrocarbon fuel through the nozzle 20 into the tube 17.

When the piston 3 reaches the upward limit of its stroke, air will be admitted through the port 5 to equalize the pressure within and without the crank casing or part of the cylinder immediately connected therewith and when the piston under the pressure of the explosive charge is forced downwardly, it will compress the air in the crank casing and through the passageways 16 and branch passageway 24 operating the diaphragm 22 in a direction to close the valve 21 and, at the same time, will force the hydrocarbon deposited within the tube 17 out through the vaporizing screen 18. This takes place by the entrance of the air through the opening 19 into the tube 17 behind the charge of fuel which has been deposited in the tube by the nozzle 20. At the same time, this return movement of the piston as it approaches its limit of stroke, will exhaust the products of combustion through the exhaust ports 6 and will thus permit the valve 12 to open under the pressure of air in the passageway 16 and the fuel mixed with air will pass through the spider valve seat 15 and pass the valve 12 into the combustion chamber 4. In passing by the valve 12 the air and fuel will be thrown into direct contact with the flanges 28 within the top part of the combustion chamber and because of the heat of the chamber and these flanges, the fuel and air will become thoroughly mixed ready to be ignited by an electric spark or any other suitable means of ignition when the charge has become compressed by the advance movement of the piston. By regulating the screw 27, the piston may be made to draw just such a charge of fuel as may be required for the best results and this charge will be uniformly and directly introduced, atomized and forced into the combustion chamber by the pressure of the air back of the piston and the exhaust of the products of combustion in front of it.

What is claimed is:—

1. A hydrocarbon engine comprising a cylinder, a combustion chamber at the end of the cylinder, a closed crank casing at the opposite end of the cylinder, a passageway leading from the crank casing to the top of the combustion chamber, a valve for opening and closing said passageway to the combustion chamber, a piston arranged to reciprocate within the cylinder, means for admitting air to the interior of the crank casing as the piston nears the limit of its return stroke and means for depositing a body of liquid hydrocarbon in said passageway in proximity to said valve in advance of the admission of air to the crank casing.

2. In a hydrocarbon engine in which the rarefaction of the air in an air chamber is utilized to feed the hydrocarbon and the compression of the air in said chamber is utilized to force the hydrocarbon into the combustion chamber and atomize it, a valve for admitting the hydrocarbon and air into the combustion chamber and means for suspending a body of hydrocarbon in the air passage leading to said valve whereby the compressed air is permitted to rush past the body of the hydrocarbon and open the valve before the hydrocarbon reaches the valve.

3. In a hydrocarbon engine, a cylinder, an air chamber, a reciprocating piston arranged to compress and rarefy the air in the air chamber as the piston advances and returns, the cylinder being provided with a port for the admission of air to the air chamber as the piston nears the limit of its return stroke, a diaphragm operated valve for feeding a body of liquid hydrocarbon during the rarefaction of the air in the air chamber and in advance of the admission of air thereto, a combustion chamber, a passageway leading from the air chamber to the top of the combustion chamber and means for suspending the body of hydrocarbon in said passageway to be forced into the combustion chamber as the air is compressed in the air chamber.

4. In a hydrocarbon engine, a cylinder, a piston, a crank casing closed to form an air chamber, a combustion chamber opening into the cylinder at one end thereof, an air passageway leading from the crank casing to the combustion chamber, air inlet and exhaust ports located at the side of the cylinder and adapted to be opened by the piston, the one as the piston nears the limit of its return stroke and the other as the piston nears the limit of its advance stroke, a tube extending into the said air passageway and provided with an atomizing screen and with an opening in its side to the air passageway, a hydrocarbon feeding nozzle extending within the tube to a point between the said screen and opening and a diaphragm operated valve under the control of the rarefied air in the crank casing for feeding a body of hydrocarbon to the interior of said tube.

5. In a hydrocarbon engine, the combination with the combustion chamber, the valve in its wall, an air chamber in which the air is alternately compressed and rarefied by the engine piston, and a passageway leading from the air chamber to said valve, of means for suspending a body of liquid hydrocarbon within and spaced from the wall of said passageway and an atomizing screen interposed between said hydrocarbon suspending means and said valve.

6. In a hydrocarbon engine in which a column of air is employed to carry a charge of hydrocarbon into the combustion chamber, a conduit for directing the air into the top of the combustion chamber and means for retaining a body of liquid hydrocarbon in said

conduit in position to be forced by the column of air along the conduit into the top of the combustion chamber, the arrangement being such that a portion of the air column will flow freely past the body of hydrocarbon and into the combustion chamber in advance of the hydrocarbon.

In testimony that I claim the foregoing as my invention, I have signed my name in presence of two witnesses, this 31st day of January 1907.

FRANK L. NICHOLS.

Witnesses:
H. S. MILLER,
A. E. MILLER.