A. BUTSCH.

HYDROCARBON ENGINE.

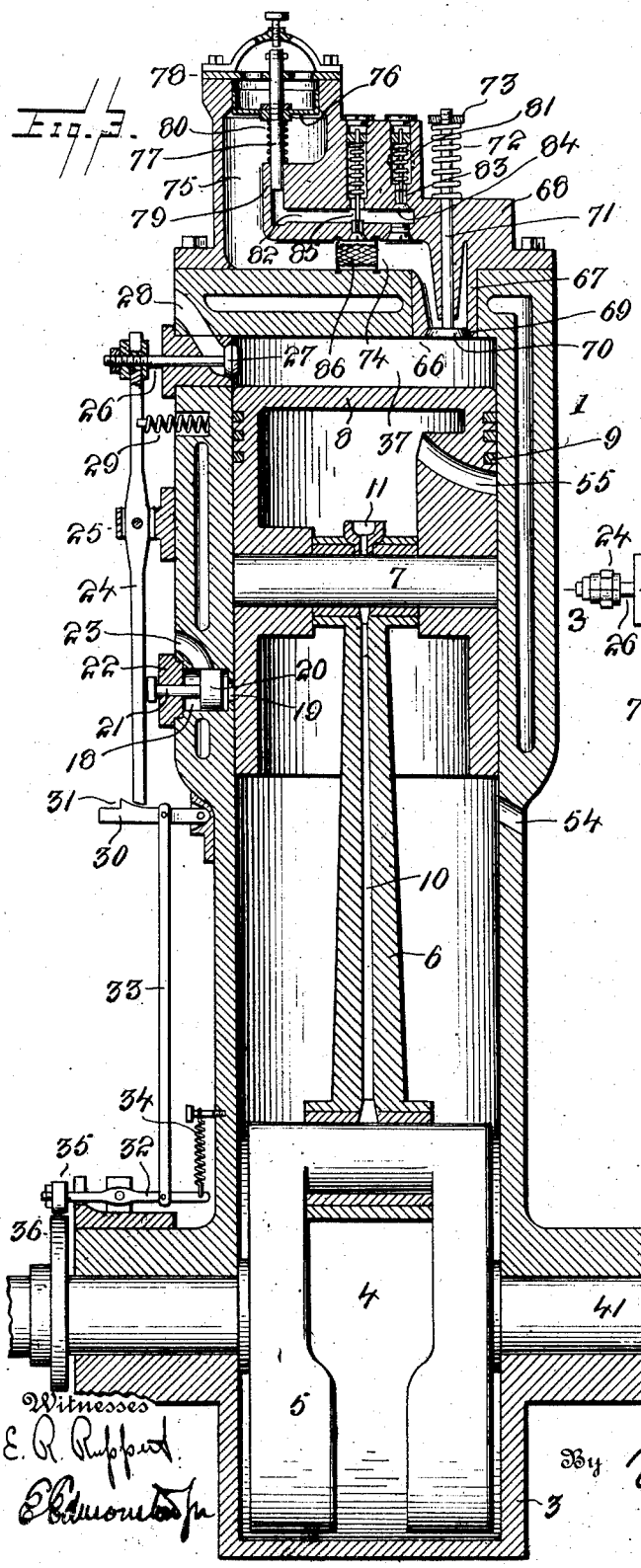
APPLICATION FILED OCT. 29, 1910.

1,042,888.

Patented Oct. 29, 1912.

2 SHEETS—SHEET 1.

Fig. 2.



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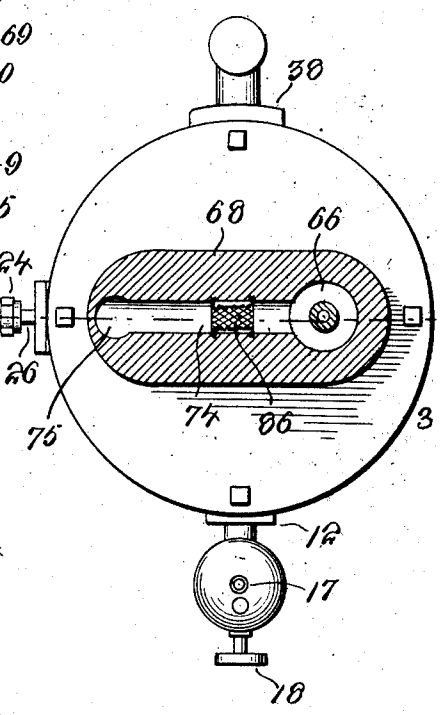

Witnesses

E. Q. Ruppert.

E. Edmonston Jr.

Inventor

Alphonse Butsch

By Victor J. Evans

Attorney

A. BUTSCH.

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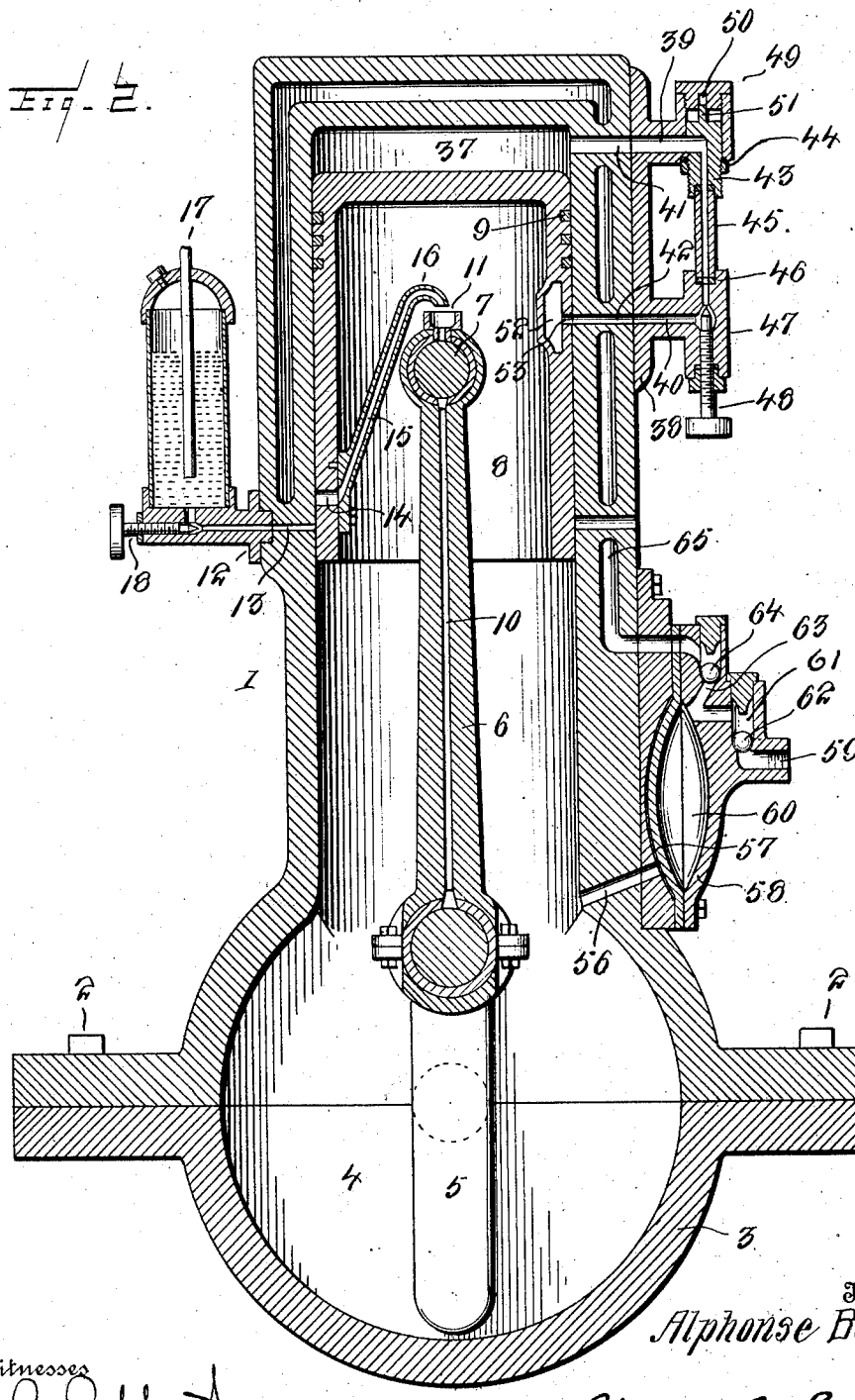

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E. R. Ruppert.

P. Edwards Jr.

Inventor

Alphonse Butsch

By Victor J. Evans

Attorney

UNITED STATES PATENT OFFICE.

ALPHONSE BUTSCH, OF ST. LUCIA, BRITISH WEST INDIES.

HYDROCARBON-ENGINE.

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To all whom it may concern:

Be it known that I, ALPHONSE BUTSCH, a citizen of no country, residing at St. Lucia, British West Indies, have invented new and useful Improvements in Hydrocarbon-Engines, of which the following is a specification.

This invention relates to hydro-carbon or internal combustion engines and particularly to that type known in the art as four cycle engines.

The object of the invention is the provision of novel means for causing a vacuum in the crank case and for utilizing said vacuum to automatically draw in a predetermined quantity of oil for lubricating the piston and crank pin.

Further objects of the invention will appear as the following specific description is read in connection with the accompanying drawing which forms a part of this application, and in which:

Figure 1 is a top plan view partly in section. Fig. 2 is a transverse vertical section taken at right angles to Fig. 3. Fig. 3 is a vertical longitudinal section on the line 3—3 of Fig. 1.

In the specific embodiment of the invention illustrated herein, the engine cylinder 1 is shown divided at its lower end and connected together by suitable bolts 2. The lower half of the casing constitutes the crank case 3 and forms the crank chamber 4 which is air-tight. Journaled between the separate halves of the crank case preferably in Babbitt or brass bearings is a crank shaft 4′ with the usual balanced crank 5 mounted thereon. Connected to the crank is a piston or connecting rod 6 which is journaled upon the crank pin 7 mounted in the piston 8. This piston is adapted to reciprocate within the cylinder and is provided with the usual packing rings 9 and the piston rod 6 is provided with a central channel 10 and an oil cup 11 communicating therewith so as to feed both of these important points with a proper amount of lubricant as will now be described.

Mounted upon the outside of the casing is a sight feed lubricator 12 which is in communication with a port 13 adapted to register with a similar port 14 in the piston. Covering the port 14 is a vertically extending tube 15 having a depending goose neck 16 arranged over the oil cup 11 so as to drop oil thereinto. The lubricator is provided with an air tube 17 which leads thereinto and a suitable needle valve 18 controls the oil through the port 13. As the piston rises a considerable vacuum is formed when it reaches a point adjacent its complete inward movement, at which time the ports 13 and 14 are in registry so that a small jet of oil is sucked through the ports 13 and 14 into the tube 15 and as the vacuum in the tube 15 is only momentary, the oil thus drawn thereinto will be discharged into the cup 11, from whence it passes around the bearing on the piston pin and through the channel 10 to the crank bearing.

Mounted in a recess 18ª which communicates through a port 19 with the interior of the cylinder at certain times is the piston or plunger 20 having a guide rod 21 extending through a packing nut or gland 22. This port 19 is unmasked when the piston reaches a point adjacent its lowest position so that the exhaust may force the plunger outwardly and thereby gain access to the outlet port 23. The plunger rod 21 in its outward movement contacts with the lower end of a valve lever 24 which is pivoted upon a bracket 25 and has adjustably secured to its upper end the exhaust valve rod 26 to the inner end of which is connected the exhaust valve 27 controlling the main exhaust port 28. Upon the operation of the plunger 20, the lower end of the valve rod 24 will be drawn outwardly and the upper end will be drawn inwardly against the tension of a spiral spring 29 so as to unseat the main exhaust valve 27 and thus unmask the port 28 so that upon the next upward stroke of the piston the burnt gases therein will have a free and unobstructed exit.

As the action of the exhaust on the plunger 20 is only momentary it is necessary that some means should be provided to hold the exhaust valve 27 unseated until the completion of the next upward stroke or the exhaust stroke of the piston. To accomplish this, a pawl 30 is pivoted to the casing and is provided with a single ratchet tooth 31. The pawl is connected to an operating lever 32 by a link 33. The operating lever is pivoted horizontally upon the lower part of the casing and has its inner end connected with a spiral spring 34 carried by the casing and adapted to normally raise the link 33 and depress the outer end of the lever 32 upon which is journaled a roller 35 adapted to engage a cam 36. When the exhaust

operates the plunger 20 the lower end of the lever 24 will snap over the ratchet tooth 31 and thus hold the valve 27 off its seat independent of any action on the part of the plunger. As the piston rises in the exhaust stroke, the cam face 36 will act upon the roller 35 to raise one end of the lever 32 and draw downwardly upon the link 33 thus releasing the pawl 30 from the lever 24 and permitting the spring 29 to positively seat the valve 27 and thus permit the piston on its next downward stroke to draw in a predetermined quantity of gas as will hereinafter be described. It will be noticed that the lever 24 is only operated and held in operative position when the exhaust from a direct explosion occurs. Should the engine miss an explosion, the piston on its downward movement would tend to neutralize the pressure in the combustion chamber 37 so that the plunger 20 would not be operated, therefore on the next upward stroke of the piston, an explosion would occur if the ignition mechanism were actuated.

While the ordinary type of sparking mechanism may be employed to ignite the charge in the combustion chamber, I prefer to dispense with the same on account of the complicated nature of make and break devices and the inaccuracy and necessary fine adjustment of reducing gears and timers used in jump spark arrangements. To take their place I prefer to use an extremely simple ignition device which will now be described. Mounted upon the casing is a suitable casting 38 having ports 39 and 40 therein which register with ports 41 and 42 in the casing. The port 41 is formed in the casing so as to be in communication with the combustion chamber 37 at all times and leads through the port 39 to a channeled plug 43 which is adjustably mounted within the casting by means of a nut 44. This nut forces the plug 43 outwardly into engagement with a porcelain tube 45 whose other end is seated in a packed socket 46 in the valve cylinder 47 supported upon the casting 38 and having a needle valve 48 to control the channel between the tube and the port 40. The plug 43 is prevented from rotating in the casting by means of a plug 49 which is provided with a slot 50 adapted to receive a rib 51 on the plug.

The piston 8 has formed in its side wall an expansion chamber 52 which is in communication with the port 42 at certain times through an outlet 53. The operation of the ignition device is as follows: During the exhaust and intake strokes the tube 45 and the parts which lead thereto remain full of burnt gases. Upon the compression stroke these burnt gases are forced by the live gases through the ports 40—42 and 41—39 toward the tube 45. The capacity of the tube and the ports leading thereto is such however, that no live gases will get into the tube during the compression stroke. At the end of the compression stroke the port 42 registers with the port 53 and the expansion chamber 52 so that the burnt gases in the combustion chamber enter into said expansion chamber and the live gases thereby gain access to the tube thus producing an explosion.

The cooling feature of the engine may be described as follows: A port 54 is formed in the casing 1 below the lowermost position of the head of the piston 8 and below the lower edge of the piston when it is in its upper position. When this port is unmasked by the piston in its instroke, a considerable vacuum is in the casing and as a consequence a quantity of air is drawn into the casing and compressed upon the down stroke of the piston. This air circulates around in the casing until a port 55 formed in the piston registers with the port 54 in the casing at which time most of the air in the casing will be expelled under compression, having first thoroughly impinged against the head of the piston 8, thus cooling the same. A certain quantity of the air thus compressed in the casing passes through a port 56 and engages a diaphragm 57 secured in a casing 58 which is in communication with the water supply through a pipe 59. The casing is hollowed out so as to form a compartment 60 to one side of the diaphragm which receives the water through a port 61 controlled by a ball check 62. A similar port 63 controlled by a ball check 64 leads into the water jacket 65 whereby the water which is drawn into the casing 58 by the diaphragm will be circulated around the engine. When the piston rises upon its instroke, a vacuum is formed in the casing which moves the diaphragm to one side of the compartment 60 and sucks in water through the ball check 62. Upon the down stroke of the piston a pressure is formed in the casing which throws the diaphragm to the opposite side of the compartment 60 and expels the water in said compartment through the port 63 past the ball check 64 into the water jacket 65, the ball check 62 at this time being seated and preventing the water from flowing into the supply pipe 59. The intake of the air in the port 54 and the escape of the same through the port 55 prevents too violent compression and vacuum so that the diaphragm 57 is operated evenly and without strain.

The head of the casing is shown as provided with an opening 66 in which is placed a channeled plug 67 formed integrally with the carbureter casing 68 and having a valve seat 69 to receive the inlet valve 70. This inlet valve is carried upon the lower end of a stem 71 which is normally raised by a spiral spring 72 positioned between the up-

per end of the casing 68 and an adjustable collar 73 carried upon the stem. A channeled plug communicates with a mixing chamber 74 which is in turn in communication with an air inlet port 75. This air inlet port is of sufficient size to permit the requisite quantity of air to be admitted to the mixing chamber 74 and has slidably mounted therein a baffle plate 76 which is rigidly mounted upon the pump plunger 77. The pump plunger is guided in its movement by an apertured inlet plate 78 at one end and at its opposite end by the pump cylinder 79 which is formed integrally with the casing 68. This plunger with its rigid baffle plate is held in raised position by a spiral spring 80 which surrounds the plunger between the baffle plate and the pump cylinder. The fuel inlet port is shown at 81 and is adapted to communicate with a lateral extension 82 of the pump cylinder through a port 83 which is controlled by a spring-pressed valve 84. The inlet port for the fuel from the extension 82 to the mixing chamber is controlled by a spring-pressed valve 85 and a foraminous cage or cylinder 86 is arranged on opposite sides of the valve 85 which receives the fuel and spreads it out into a film so as to be readily vaporized by the incoming air.

Recapitulation: In the drawings the piston in both instances is shown at the end of its instroke. If we now turn the fly wheel in either direction, the piston will descend producing a vacuum above it which draws down upon the valve 70 and sucks a predetermined quantity of air through the ports in the plate 78. This air impinging against the baffle plate 76 carries it downwardly against the action of the spring 80 and operates the pump plunger within the pump cylinder, thus injecting the fuel past the valve 85 onto the foraminous cylinder 86. The air entering the mixing chamber immediately afterward vaporizes the fuel and produces a combustible mixture. When the piston returns on its instroke, the mixture is compressed in the combustion chamber and when the crank reaches the dead center line the charge is ignited by the ignition tube as hereinbefore described. The piston then descends, driven by the expansion of the burnt gases and at the end of the outstroke the port 19 is unmasked. The exhaust forces the plunger 20 outwardly and carries the lever 24 with it so that its lower end is snapped over the ratchet teeth 31 and the valve 27 is forced to open position. Upon the exhaust stroke of the cylinder, the remaining gases are forced out of the port 28. Toward the end of the exhaust stroke, the eccentric 36 acts upon the lever 32 to withdraw the pawl 30 from the end of the lever 24 and thus releases the valve 27 which is returned to closed position by the spring 29. The piston then moves outwardly drawing in a new charge and thus continuing the cycle. During the instroke of the piston, a vacuum is produced in the crank case and toward the end of the instroke, the air inlet port 54 is unmasked so as to allow a predetermined quantity of air to enter which is compressed during the outstroke until the port 55 registers with the port 54 when the air is expelled after thoroughly cooling the piston head. This air also acts upon the diaphragm 57 to cause the circulation of water through the water jacket as heretofore described.

Having thus described the invention, what is claimed is—

1. In a device of the class described, the combination with a cylinder, a vacuum producing piston mounted therein and a crank case closed to the atmosphere, said piston and cylinder provided with ports adapted to register when the vacuum produced by the piston is at its highest point, of an oiler communicating with the port in the cylinder, a feeding tube communicating with the port in the piston, said tube adapted to conduct oil into the cylinder when the ports are brought into registration and the vacuum in the cylinder sucks the oil therethrough, and means carried by said piston and its rod adapted to receive the oil from the feeding tube and convey it to the desired bearings.

2. In a device of the class described, the combination with a cylinder, a vacuum producing piston mounted therein and a crank case closed to the atmosphere, said piston and cylinder provided with ports adapted to register when the vacuum produced by the piston is at its highest point, of an oiler communicating with the port in the cylinder, a feeding tube communicating with the port in the piston, said tube adapted to conduct oil into the cylinder when the ports are brought into registration and the vacuum in the cylinder sucks the oil therethrough, means carried by said piston and its rod adapted to receive the oil from the feeding tube and convey it to the desired bearings, and means whereby the flow of the oil may be regulated.

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

ALPHONSE BUTSCH.

Witnesses:

GEORGE MOISE,

R. J. D. CLARKE.