April 12, 1938. R. LARAQUE 2,113,990

INTERNAL COMBUSTION ENGINE

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Fig. 1

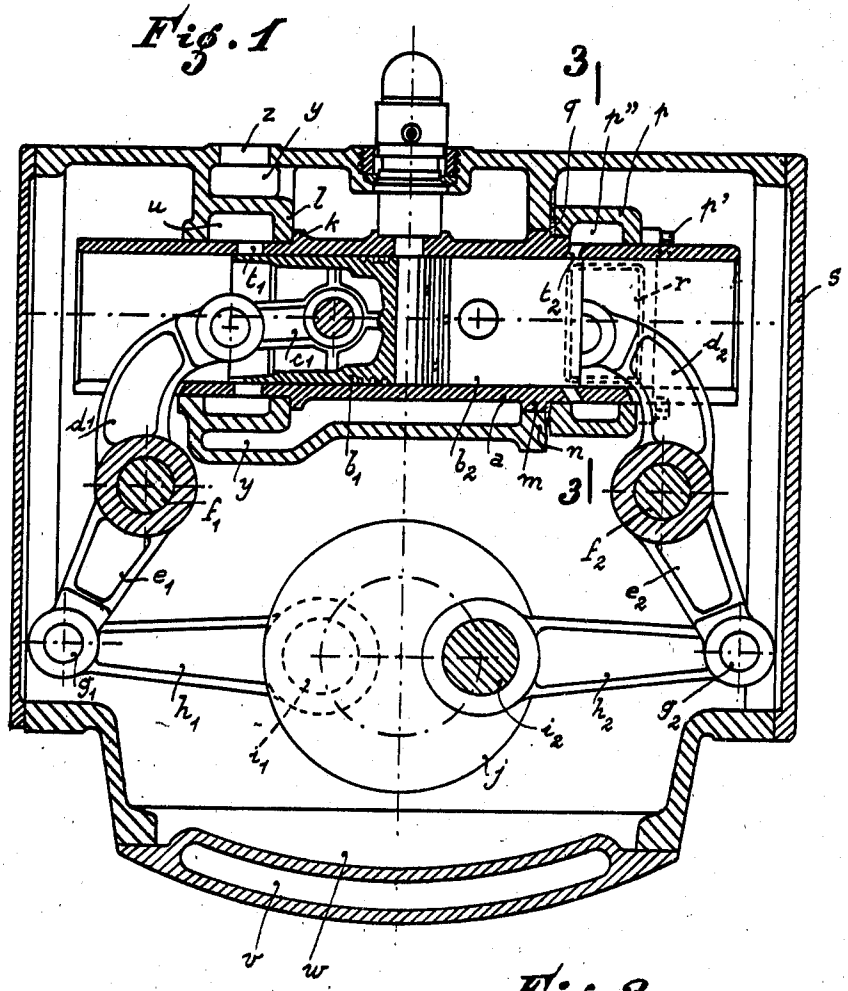
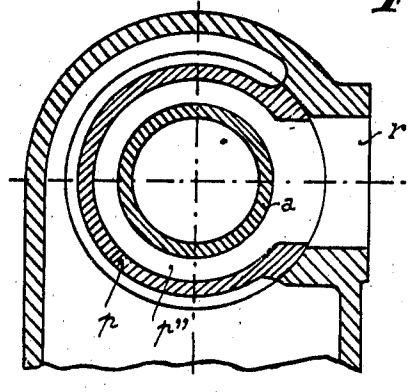


Fig. 3



Inventor
Roland Laraque
By Bilinger, atty.

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Fig. 2

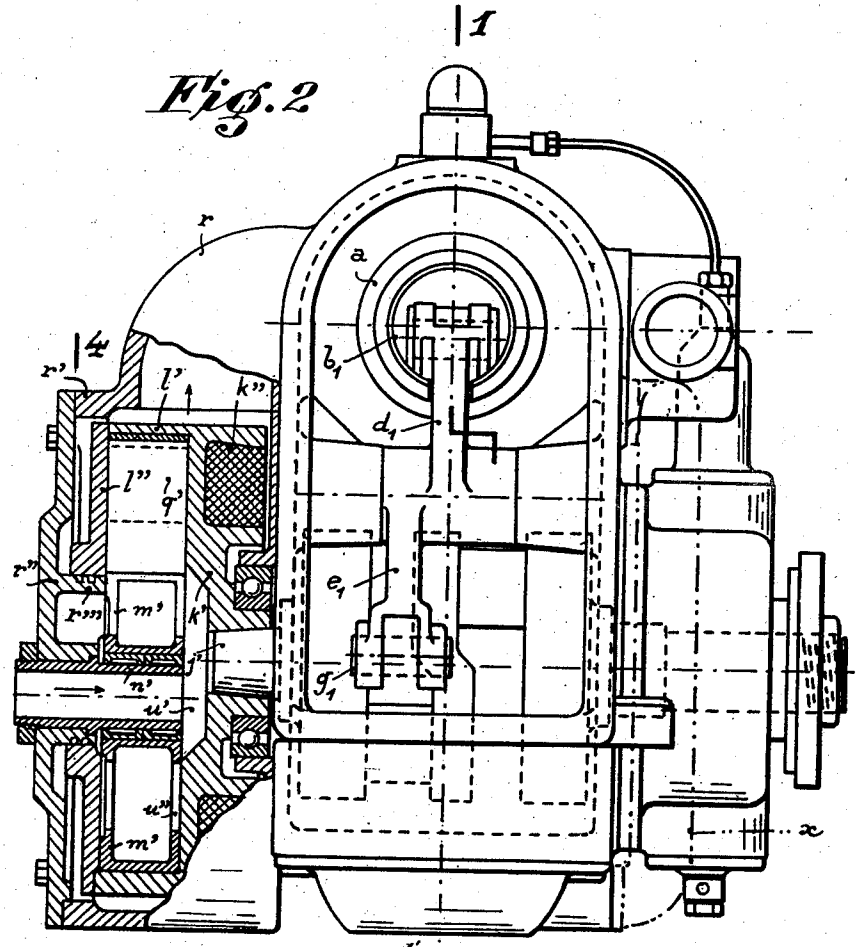
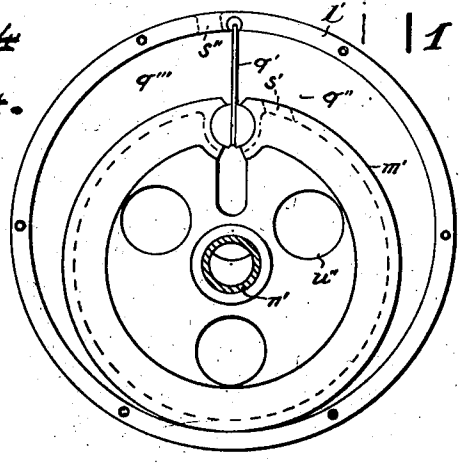


Fig. 4.



Inventor
Roland Laraque
By Blinger Atty.

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UNITED STATES PATENT OFFICE

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INTERNAL COMBUSTION ENGINE

Roland Laraque, Paris, France

Application October 31, 1936, Serial No. 108,674
In Luxemburg November 4, 1935

4 Claims. (Cl. 123—51)

The present invention has for its object improvements in internal combustion engines of the type comprising two opposite pistons moving in contrary directions in one and the same horizontal cylinder and acting through the medium of pivoting beams upon one crank-shaft.

The motor according to the invention is of the type of the two stroke cycle engines working with scavenging equicurrent air.

One feature of the invention consists in that the arms of each pivoting beam are laterally displaced with regard to each other in order to permit of their seizing the crank-shaft at two different points along its axis.

At the other part, the horizontal cylinder is disposed in the case in such manner that a shoulder of the cylinder applies against a part of the case, and a neck of this cylinder, situated toward the other extremity of the latter centers itself in a part of the case and serves as abutment and joint surface for a removable cap forming a collector for admission of the scavenging air.

In this manner, by withdrawal of the air collector the cylinder is readily accessible.

Another feature of the invention consists in that the flywheel regulating the run of the motor is constituted to form the blasting engine, the operative elements of which are situated in the interior of the fly-wheel and comprise a cell of a rotary pump acting by volumetric variations, the periphery of the fly-wheel serving directly as outer pump cylinder, by which arrangement all coupling means and all power transmitting means between the motor shaft and the engine producing the scavenging air are eliminated.

In a preferred form of realization, a pump with two eccentric rotors is employed, these rotors revolving around a stationary and hollow shaft traversed by the air sucked into the pump, the two rotors being in tangential contact with each other and forming between them a pump chamber or cell in the shape of a crescent separated by a vane carried by the outer cylinder, in two chambers of alternately increasing and decreasing volume.

In this form of realization, the case surrounding the fly-wheel of the motor forms a collector for the air to be driven and supports the hollow stationary shaft which is eccentric with regard to the cell of the pump.

Finally, according to the invention, cooling water is first led into a lower pocket in order to lower the temperature of the lubricating oil, and then into a chamber completely surrounding the cylinder in its central part forming the combustion chamber, as well as the collector containing the fluid to be exhausted.

Different other features will be referred to in the following description relating to the drawings appended showing, merely in the way of an example, a particular form of realization of the invention, the blasting arrangement being one comprising two eccentric rotors.

The drawings represent:

Fig. 1 a vertical section through the axis of the cylinder, according to lines 1—1 of Fig. 2;

Fig. 2 a lateral view, partly in section, an inspection cover being removed;

Fig. 3 a transverse section according to lines 3—3 of Fig. 1, and

Fig. 4 a section through the fly-wheel according to lines 4—4 of Fig. 2.

In a horizontal cylinder a slide, in a known manner, two pistons b_1, b_2 with their heads opposite to each other, these pistons being connected by links c_1, to two beams d_1 e_1, d_2 e_2 pivoting around axles f_1 f_2.

To the forked extremities g_1 g_2 of these beams are articulated two links h_1 h_2 engaging crank pins of a crankshaft j.

According to the invention the arms of the beams, for example d_1 e_1 (Fig. 2 are laterally displaced with regard to each other, in one direction in one beam and in the opposite direction in the other beam, so that the crankshaft j is acted upon in two different points.

The horizontal cylinder a is provided (Fig. 1) with a shoulder k supported by a part l of the case, and, toward its other extremity, with a neck m centered in a bearing surface n of the case and serving as abutment and joint surface for a removable cap p forming a collector for the scavenging air, this neck squeezing a joint q and being simply fixed by four bolts p', so that after removal of an inspection door s and withdrawal of the cap p the cylinder is immediately accessible and removable.

To the end j' of the crank shaft j is keyed the regulating fly-wheel k' hollow on one of its faces so as to form the outer cylinder l' of the air-scavenging pump.

In the example shown, the pump is of the type comprising two eccentric rotors, one of the rotors being constituted by the said cylinder l' and the other rotor being formed by an inner drum m' centered on an end of an auxiliary shaft n' eccentric with regard to the axis of the crank-pin and hollow in its interior.

This scavenging engine is located in the interior of a case r' forming a collector for the scavenging air led through a conduit r attached to this case, under pressure into the motor, as later on referred to.

A radial vane q' carried by the outer cylinder l' separates the crescent-like space between the two rotors l' and m' (Fig. 2) in two chambers q'' and q''' of respectively increasing and decreasing volumes, one of these chambers q'', communicating with the suction conduit through a hole s' provided in the peripheral wall of the

inner drum, and the other of these chambers communicating with the drive conduit through a hole s'' provided in the rim l' of the outer cylinder.

Air sucked across the bore of the shaft n' (filtrated in case of emergency) arrives into the chamber u' and through orifices u'' provided in the bottom of the drum m' into the chamber q'' in which suction is going on, and finally evacuated, in the next period, through the hole s'' into the case r' and through the conduit r toward the circular scavenging collector p'' (Fig. 3) of the cap p.

This air penetrates into the cylinder a across peripheral orifices t situated near the lower dead point of one of the pistons.

The exhaust is effected through other orifices t_1 peripherally situated near the dead point of the other piston, into a collector u forming part of the case and wherefrom the gases are evacuated into the atmosphere.

In order to compensate the hollow space in the flywheel, the same can be weighted by plumber k'' located toward the periphery of this wheel.

The eccentric stationary and hollow axle n' around which rotates the inner drum m', is supported by a removable hub r''.

This hub is situated at the extremity of the case r', so that the parts of the blasting engine are readily accessible and removable.

An inner boss r''' on this hub r'' serves as bearing surface for the bottom part l'' fixed to the fly-wheel.

The lower part of the case is water jacketed as at v and a water jacket y surrounds at least the working chamber portion of the cylinder a. Water is admitted to the chamber v in any suitable manner, from a water pump (not shown) and is conducted from chamber v to chamber y by a duct x shown in dotted lines in Fig. 2 and leaves chamber y, to be returned to the pump, through outlet z. The water in chamber v cools the oil at the bottom w of the case.

The principal advantages of the arrangement according to the invention are:

(a) Perfect equilibration of the torque, so that use of masses with alternating movements securing equal and opposite forces of inertia is dispensed with;

(b) Great simplicity of execution;

(c) Possibility to verify very easily the two link systems without dismantling the motor, simply by opening the lateral inspection doors s;

(d) Feeble encumberment;

(e) Feeble weight;

(f) Very compressed form of the whole, eventually presenting numerous advantages for many applications;

(g) The whole motor being well assembled with the scavenging engine, all coupling means as well as all power transmission means between the motor shaft and the scavenging engine are dispensed with.

The invention is of course not limited to the described and represented embodiment and permits of any modification of its single parts according to any particular requirements and, especially, in accordance with the chosen type of rotary pump.

What I claim, is:

1. In an internal combustion engine wherein is provided a casing and a horizontal working cylinder having a working chamber and being removably held in said casing, means for scavenging the burnt gases, said means including a combined flywheel-air-pump, piston controlled ports in the cylinder through which scavenging air is admitted into the cylinder, a hollow head surrounding the cylinder at the position of the openings, and a duct from said pump to said hollow head, said head serving the dual purpose of a member for entry of air into the cylinder and as a means by which the cylinder may be held in place in the casing.

2. In an internal combustion engine, a case having means removably to receive a working cylinder, a cylinder located in said means, and mechanism to scavenge the burnt mixture, said mechanism comprising inlet ports at the cylinder, a combined flywheel-air-pump, a hollow head encircling the cylinder at the position of said ports, means to secure said head to said case and in cooperation with flanges on the cylinder, hold said cylinder in place in the case, in virtue of which said head serves the dual purpose of securing the cylinder against displacement in the case and as a member for entry of air into the cylinder, and a duct to effect communication between said pump and said head for conducting air from the pump to the head.

3. In an internal combustion engine, a case having means removably to receive a working cylinder, a cylinder located in said means, and mechanism to scavenge the burnt mixture, said mechanism comprising inlet ports at the cylinder, a combined flywheel-air-pump, a hollow head encircling the cylinder at the position of said ports, means to secure said head to said case and in cooperation with flanges on the cylinder, hold said cylinder in place in the case, in virtue of which said head serves the dual purpose of securing the cylinder against displacement in the case and as a member for entry of air into the cylinder, a duct to effect communication between said pump and said head for conducting air from the pump to the head, the pump of said combined flywheel-air-pump, including an outer cylinder constituted by the outer wall of the flywheel, an inner drum eccentric to the outer cylinder and interiorly tangential, means to divide the space between said outer cylinder and said inner drum into an intake chamber and an outgo chamber, a hollow eccentric auxiliary shaft on which said inner drum is mounted, and means to carry said auxiliary shaft, the outer cylinder having an air outlet from said outgo chamber, said hollow auxiliary shaft serving as a means to admit air into said intake chamber.

4. In an internal combustion engine, a case having web-like elements in it, which elements are spaced apart and apertured, a working cylinder held in said apertures and including a shoulder to abut one of said web-like elements and having a neck with ports to the working chamber of the cylinder, a hollow cap on said neck with its space registering with said ports, means to secure said cap to said case and in engagement with said cylinder whereby said cap will perform the dual function of a means by which scavenging air is admitted to the cylinder and by which the cylinder is removably secured in place, and means forming a part of the engine for forcing air into said hollow cap.

ROLAND LARAQUE.