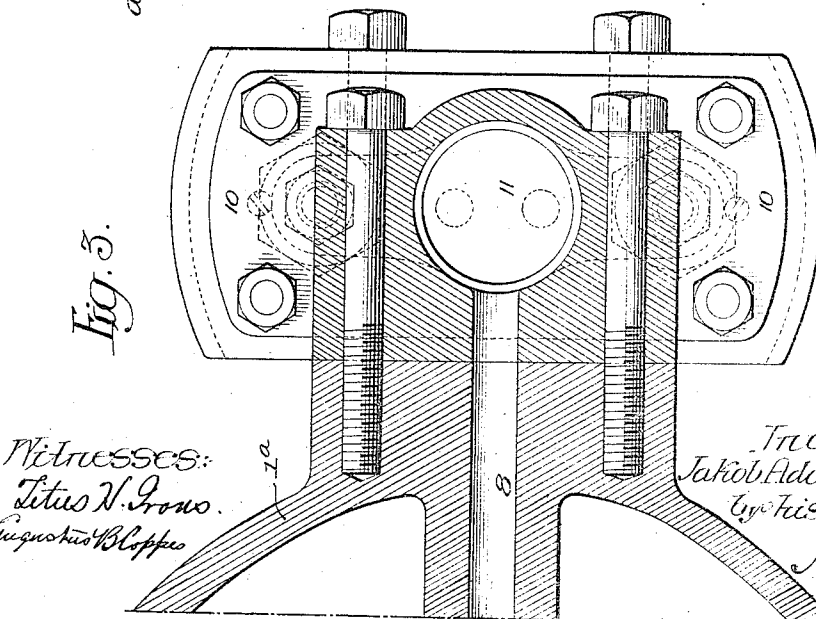
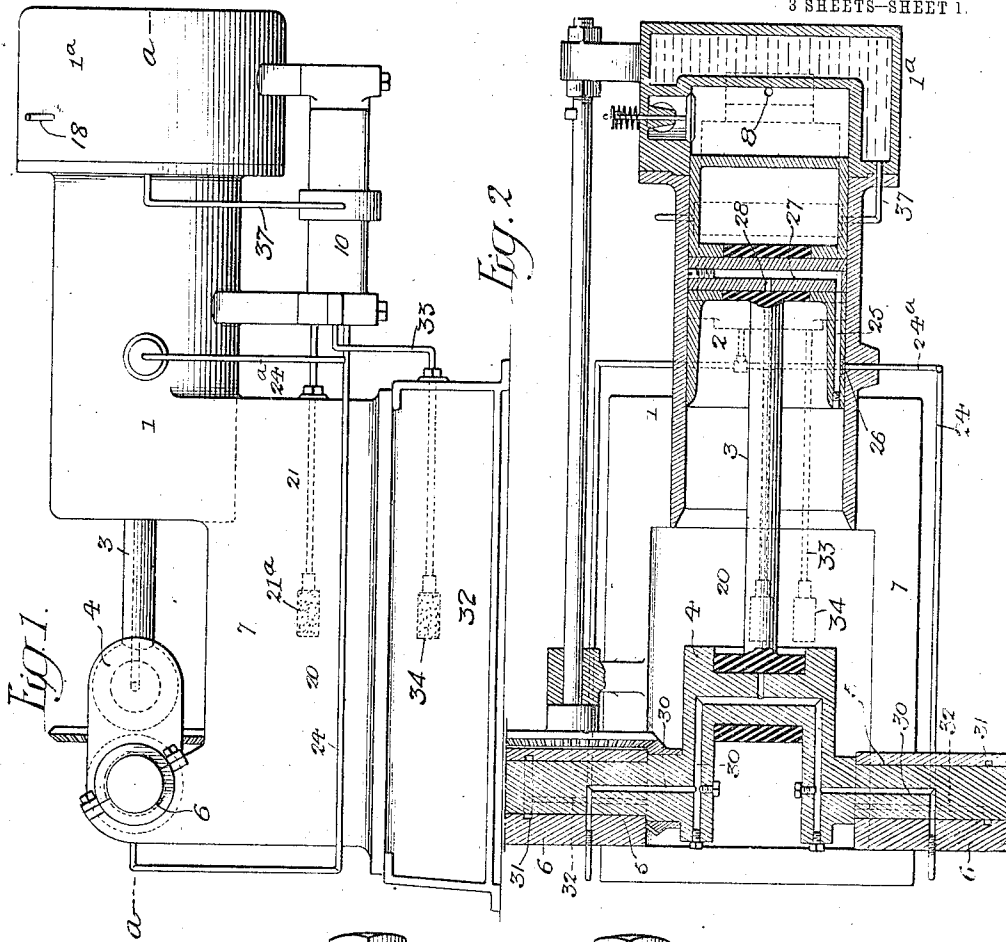


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3 SHEETS--SHEET 1.



WITNESSES:
Titus N. Irons.
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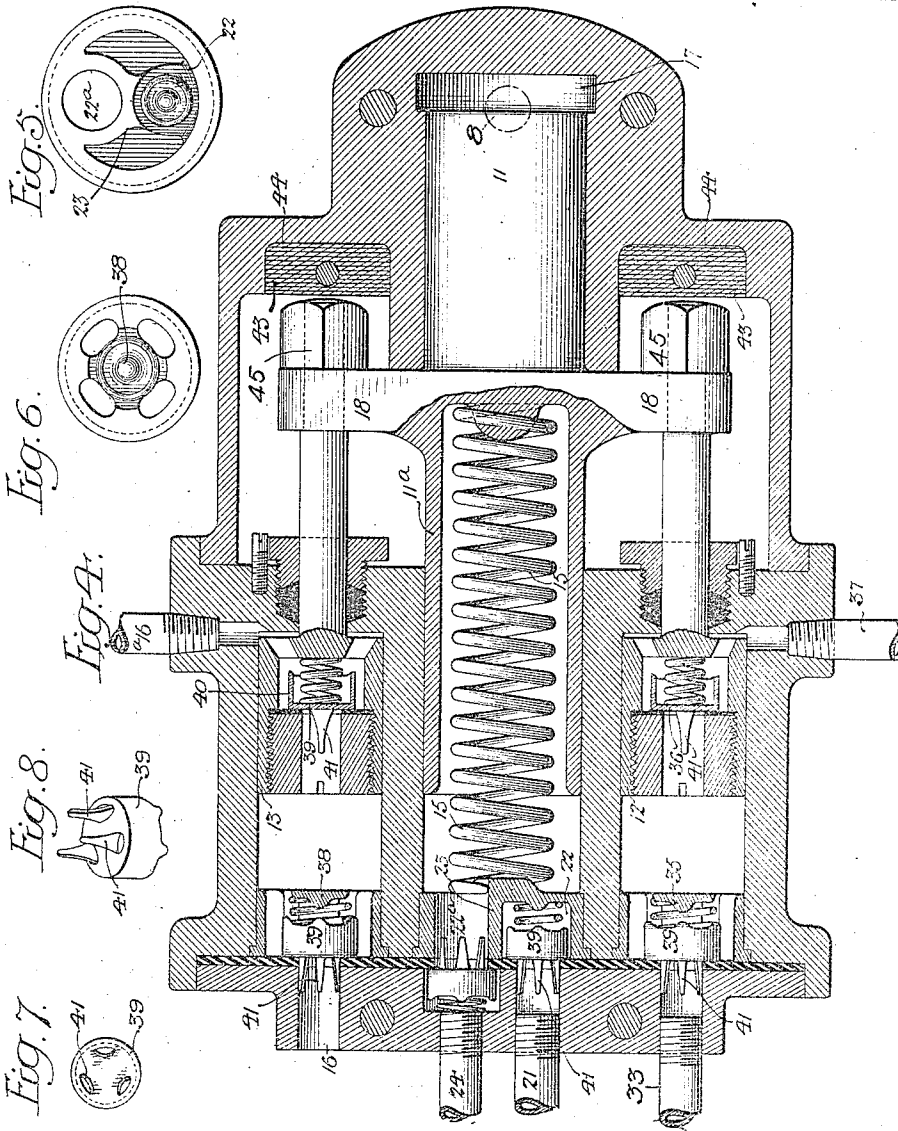
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PUMPING MECHANISM AND OPERATING MEANS THEREFOR.
APPLICATION FILED FEB. 21, 1906.

1,059,943.

Patented Apr. 22, 1913.

3 SHEETS—SHEET 2.



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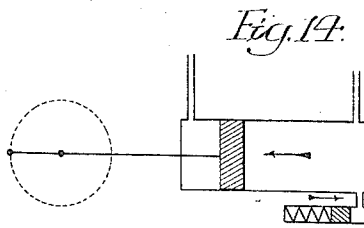
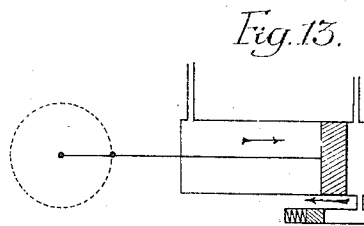
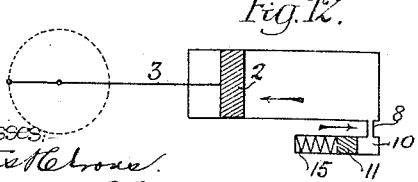
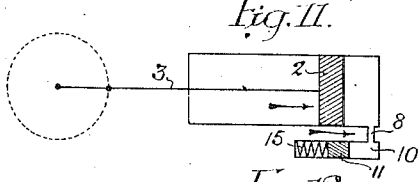
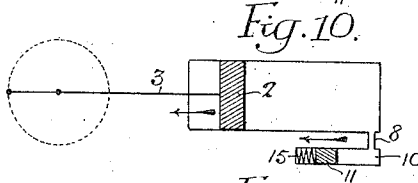
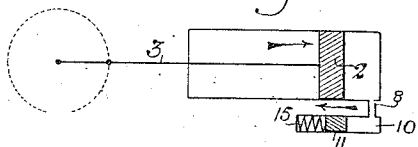
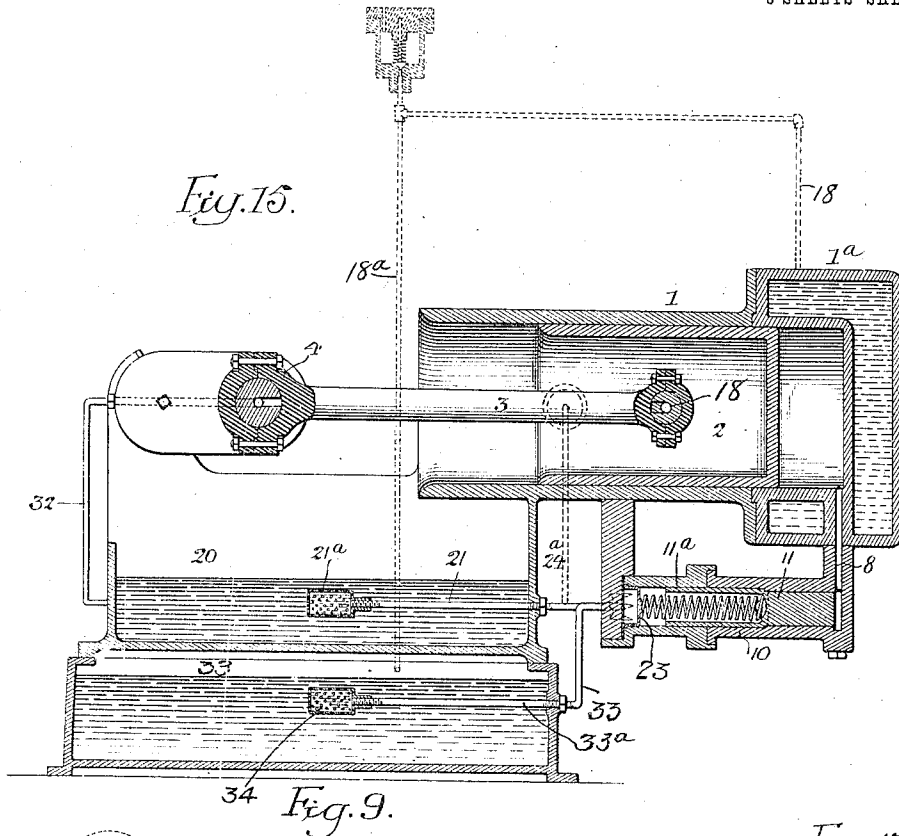
PUMPING MECHANISM AND OPERATING MEANS THEREFOR.

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1,059,943.

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3 SHEETS—SHEET 3.



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UNITED STATES PATENT OFFICE.

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PUMPING MECHANISM AND OPERATING MEANS THEREFOR.

1,059,943.

Specification of Letters Patent.

Patented Apr. 22, 1913.

Application filed February 21, 1906. Serial No. 302,261.

To all whom it may concern:

Be it known that I, JAKOB ADOLF LUETHY, a citizen of the Republic of Switzerland, having declared my intention of becoming a citizen of the United States, and a resident of Camden, New Jersey, have invented certain Improvements in Pumping Mechanism and Operating Means Therefor, of which the following is a specification.

My invention relates to pumping mechanism, and consists of an improved structure designed to be connected with and driven by force delivered from the cylinder of an engine operated by any form of expanding fluid under varying degrees of pressure.

My invention comprises an automatically operated pumping mechanism acting as an auxiliary to the motor and operated by the motive power driving the same and capable of supplying a vaporizing fluid or liquid (such as water) to and throughout the casing of the main engine cylinder; the inlet and discharge of oil to lubricate the working parts of the engine, including the inner wall of the cylinder where it serves as a packing for the piston, and the inlet and subsequent compression of air for any desired use.

A further object of my invention is to provide a pumping mechanism designed to accomplish the work noted above, that is attachable to any form of motor or engine operated by varying degrees of fluid pressure, which pumping mechanism is to be operated directly by the force derived from said fluid without any direct connection with the moving parts of said motor or engine.

My invention is fully shown in the accompanying drawings, in which:

Figure 1, is a side elevation of one type of engine and its connected parts to which my improved pumping mechanism may be applied; Fig. 2, is a sectional plan view of the same, taken on the line *a-a*, Fig. 1; Figs. 3 and 4, are sectional views illustrating the pumping mechanism forming the subject of my invention; Figs. 5, 6, 7 and 8, are views illustrating details of my invention; Figs. 9, 10, 11 and 12, are diagram views of the engine cylinder and pump casing showing the position of the pistons therein at various times during the cycle of operations of the engine piston; Figs. 13 and 14, are diagram views of my improved

pumping mechanism in connection with a steam engine cylinder, Fig. 15, is a sectional view on the line *b-b*, Fig. 2.

In the accompanying drawings, the pumping mechanism forming the subject of my invention is shown as applied to an internal combustion engine of the horizontal type; said mechanism being arranged to supply oil for lubricating the moving parts of the engine and to provide a frictionless and lubricating packing for the piston; to supply a vaporizing fluid or liquid such as water to the hollow wall of the cylinder casing head, and to effect the compression of air which is subsequently stored and utilized for starting the engine or other purposes. The engine shown herewith is of the type designed to employ gas as the fuel. With engines employing gasolene or other similar fuel requiring vaporization adjacent to the point of use, the pumping mechanism may be employed to deliver the charge to the carbureter; such modification involving no change in the principle of construction forming the subject of my invention.

In the drawings, 1 represents the cylinder of the engine, having the usual piston 2, connected by a rod 3 to a crank 4; such crank being journaled at 5 in the bearings 6 carried by the engine frame 7. Disposed below the cylinder 1 and in communication with the chamber thereof through the passage 8, is a casing 10 in which is mounted the pumping mechanism comprising a series of pistons 11, 11^a, 12 and 13; the main piston 11 being operated by force developed within the cylinder 1, which enters said pump casing through the passage 8, and this piston 11 in turn operates the pistons 11^a, 12 and 13.

The piston 11 carries the auxiliary piston 11^a in line therewith, and the pistons 11^a and 12 are connected by suitable piping to reservoirs containing oil and water respectively, so that upon the return or suction stroke of the piston 11, which is effected, partly by the spring 15 disposed within a recess in the piston 11^a, and partly by a vacuum created by the suction stroke of the main piston 2, oil and water, respectively, will be drawn into the casing 10 by the pistons 11^a and 12. Upon the discharge stroke of the piston 11 which is effected in varying degree by force developed by the action of the main piston 2 during its suc-

cessive cycles, the oil and water, respectively, gathered by the pistons 11^a and 12, will be distributed: the former to the several bearings of the crank shaft and the inner surface of the cylinder, and the latter to the hollow portion of the main cylinder casing. The piston 13, also connected to the piston 11, operates in unison with the pistons 11^a and 12, and is arranged to suck air and force the same through a suitable pipe to a convenient reservoir (not shown), and for this purpose it is unnecessary to provide a pipe or other connection at the inlet end 16. The piston 11 fits a chamber 17 in the casing 10 with which the passage 8 communicates, and this piston has arms 18 to which the pistons 12 and 13 are connected.

The piston 11^a sucks the drip oil from the crank pit 20 of the engine, on one stroke of said piston, through a pipe 21 and a valved port 22 of a duplex valve structure 23; said pipe 21 having a suitable screen 21^a at its end to prevent dirt and grit entering with said oil. Upon the other stroke of said piston, this oil is forced through the valved port 22^a of the valve structure 23, and through the pipes 24 to the crank shaft 4. A portion of this oil is also conveyed by an auxiliary pipe 24^a to the inner wall of the cylinder 1 and forms a packing medium for the piston. When the piston is in the position shown in Fig. 2, a portion of this oil supply enters a passage 25 in the wall of said piston from its groove 26, and from said passage 25 such oil will enter a communicating bore or opening 27 in the pin or spindle 28 connecting the rod 3 to the piston, which pin has a passage 29 leading to the bearing surface of said rod connection. Any excess of lubricant will distribute on the surface of the cylinder. The crank shaft 4 is also bored at 30, as clearly illustrated in the drawing, so that the oil forced through the pipes 24 to lubricate the bearings for said shaft, will also lubricate the crank bearing. At the outer ends of the crank bearings, grooves 31 are formed to receive the surplus oil, which grooves communicate with drip passages 32 leading to the crank pit of the engine.

On the same stroke of the main piston 2 that oil is sucked by the piston 11^a in the pump casing, water will be sucked by the piston 12, from a suitable source of supply, a tank 33 in the hollow base of the engine support, for instance via a pipe 33^a which is provided with a suitable screen 34 to prevent dirt and grit entering such water, through the fixed valve structure 35, such water passing through said piston, which is ported and provided with a valve 36, and thence out through the pipe 37, which leads to the hollow wall of the cylinder head 1^a. This water is supplied in small quantities and is designed to be vaporized, filling the

hollow walls of the head with steam, a medium relatively cooler than the heat developed by the explosion and hence effecting a sufficient cooling of the walls of the cylinder. The steam generated from the water within the hollow wall of the head escapes through a pipe 18. If desired, such steam may exhaust through a safety valve, shown by dotted lines in Fig. 15, and the water of condensation may find its way into a tank in the base of the engine support through an extension 18^a of said pipe 18.

The piston 13 is of the same character and is arranged in the same manner as the piston 12; being designed to draw in air which passes through the fixed valve structure 38, and also through a valve 39 carried by said piston, which is also ported, to a pipe 16^a through which it is conveyed to any suitable reservoir.

The pump is so mounted and connected with the cylinder that its action is automatic; the suction of the main piston 2 permitting the spring 15 to cause the piston 11 to effect a similar stroke, while on the other strokes of the main piston due to pressure exerted by explosion or expansion of a fluid, the piston 11 will be moved by the force of such explosion or expansion entering the passage 14, to discharge oil and water to the points desired. When the pressure on the piston 11 is relieved, it will be returned by the spring 15, assisted by the vacuum created within the main cylinder 2. During such stroke it will cause the pistons 11^a, 12 and 13 to suck into the auxiliary cylinder the desired quantities of oil, water and air, for storage and subsequent discharge.

The valves which I have employed in connection with the pistons of my improved pumping apparatus are substantially the same in construction, and comprise a cup-shaped member having a pronged guiding portion 41 and provided with the necessary openings 42 for the passage of fluid or liquid as may be necessary or desirable. These valves are fully shown in Figs. 5, 6, 7 and 8. To prevent undue shock, blocks of fiber 43 are disposed in recesses 44 in the pump casing opposite the nuts 45 connecting the pistons 12 and 13 to the arms 18 of the piston 11.

In Figs. 9, 10, 11 and 12, I have shown diagram views of the main cylinder 1, and the pump casing 10, showing the position of the main piston 2, and the operating piston 11 at the end of the compression, explosion, exhaust and suction strokes, respectively. The diagram views noted are those indicating the action of my apparatus with a four-cycle internal combustion engine. In operating my improved pumping mechanism from a steam engine cylinder, diagrams of which are shown in Figs. 13 and 14, the movements of the piston 11 will be increased

in number, while the length of such movement will be correspondingly lessened. In all cases, however, the discharge of the oil will take place during the generation of the greatest amount of friction by such engine working under normal conditions, in order that such friction may be reduced and the efficiency of the engine increased.

While I have shown and described an auxiliary cylinder having three pistons for the inlet of water, oil and air for subsequent use, it will be understood that I do not wish to be limited to any special number, as that will be determined by the number of fluids employed in connection with the particular engine.

Among the many desirable advantages incident to the operation of engines equipped with the improved pumping mechanism forming the subject of my invention, the following may be noted:

First: The mechanism is exceedingly simple in operation and durable in structure; requiring less attention, and insuring safety and comfort in the operation of the engine.

Second: The mode of lubrication being a forced one and dependent upon the pressure within the cylinder, lubrication in direct proportion to the necessities of the friction generating parts of the several moving surfaces is established, insuring at all times a sufficient amount of lubricant to prevent contact of the surfaces, and hence relieving the tendency of such parts to excessive heating.

Third: When employed in connection with an internal combustion engine, the complete enveloping of the engine piston with oil by means of my improved method of lubrication will not depend upon the resinous properties of the lubricant. In the use of my improved mechanism, a lubricant thinned by heat, even the temperature of live steam, answers all the requirement of lubrication, protecting the engine against excessive heating, insuring the proper packing of the piston, and by enabling the operation of the engine with its cylinder heated above the normal, a remarkable economy in fuel is effected. This latter item is accomplished by the more perfect combustion of the fuel, a condition that is insured by warmer cylinder walls; by the reduced heat absorbing quality of the cooling fluid; and further, by the instantaneous spread of the force of the explosion, permitting later ignition. A further economy in fuel may be effected by the vaporization and subsequent explosion of that portion of the lubricant which may be within the explosion chamber after the piston has moved outward. As the lubricant, I may employ a composition of lubricating oil and coal oil, even crude oil; a portion of which will vaporize within the explosion chamber owing to the heat of the

cylinder, as such lubricant vaporizing will take the place of a certain portion of the gas or gasoline employed as the explosive agent.

Fourth: In an internal combustion engine, my improved mechanism establishes a safe running condition with the operating structure steam hot; the evaporation of the water necessary to transform the same into steam absorbing heat from the cylinder. I can thus effect a remarkable economy in the quantity of water needed for cooling the engine cylinder, and gain in the cooling effect by the use of liberal lubrication.

Fifth: My improved mechanism possesses the further particular and desirable property that it has no direct connection with the moving parts of the engine, but may be located and attached at any desirable point with respect to the cylinder thereof; in some instances being at a point remote from the engine cylinder.

I claim:

1. In pumping mechanism, the combination of a casing, a plurality of pumping elements mounted therein comprising a main operating piston and a pair of auxiliary pistons connected thereto, an engine having a hollow-walled cylinder in which power is developed, a connection between said cylinder and the casing of the pumping mechanism providing for the passage of motive fluid under variable pressure for operating the main piston of said pumping mechanism, said engine having a series of moving parts to be lubricated, a source of lubricant, one of said auxiliary pistons being arranged to deliver such lubricant from its source to said moving parts during the operation of the engine, the operation of said main piston by pressure from the engine cylinder being such that the greatest force of said pumping mechanism tending to deliver lubricant takes place during the development of the greatest amount of friction by said moving parts, and a source of cooling liquid, the other auxiliary piston being arranged to transfer such liquid to the wall of the cylinder.

2. The combination with an explosion engine, its hollow-walled cylinder in which power is developed, and the moving parts requiring lubrication, of an independent horizontally disposed casing carried by said cylinder, a source of lubricant, a source of cooling liquid, a plurality of pumping elements mounted in said casing comprising a main operating piston and a pair of auxiliary pistons connected thereto, the cylinder of said engine being in communication with and providing a source of motive fluid under variable pressure for operating said pumping elements in one direction, and a spring for operating said pumping elements in the opposite direction, one of the auxiliary

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pumping elements being arranged to deliver
lubricant to the moving parts of said engine
during the operation of the same, and the
other auxiliary pumping element arranged
5 to deliver cooling liquid to the hollow wall
of the cylinder.

In testimony whereof, I have signed my

name to this specification, in the presence of
two subscribing witnesses.

JAKOB A. LUETHY.

Witnesses:

MURRAY C. BOYER,
JOS. H. KLEIN.