Nov. 18, 1924. 1,516,389

P. LEOW

INTERNAL COMBUSTION ENGINE

Filed April 18, 1922 3 Sheets-Sheet 1

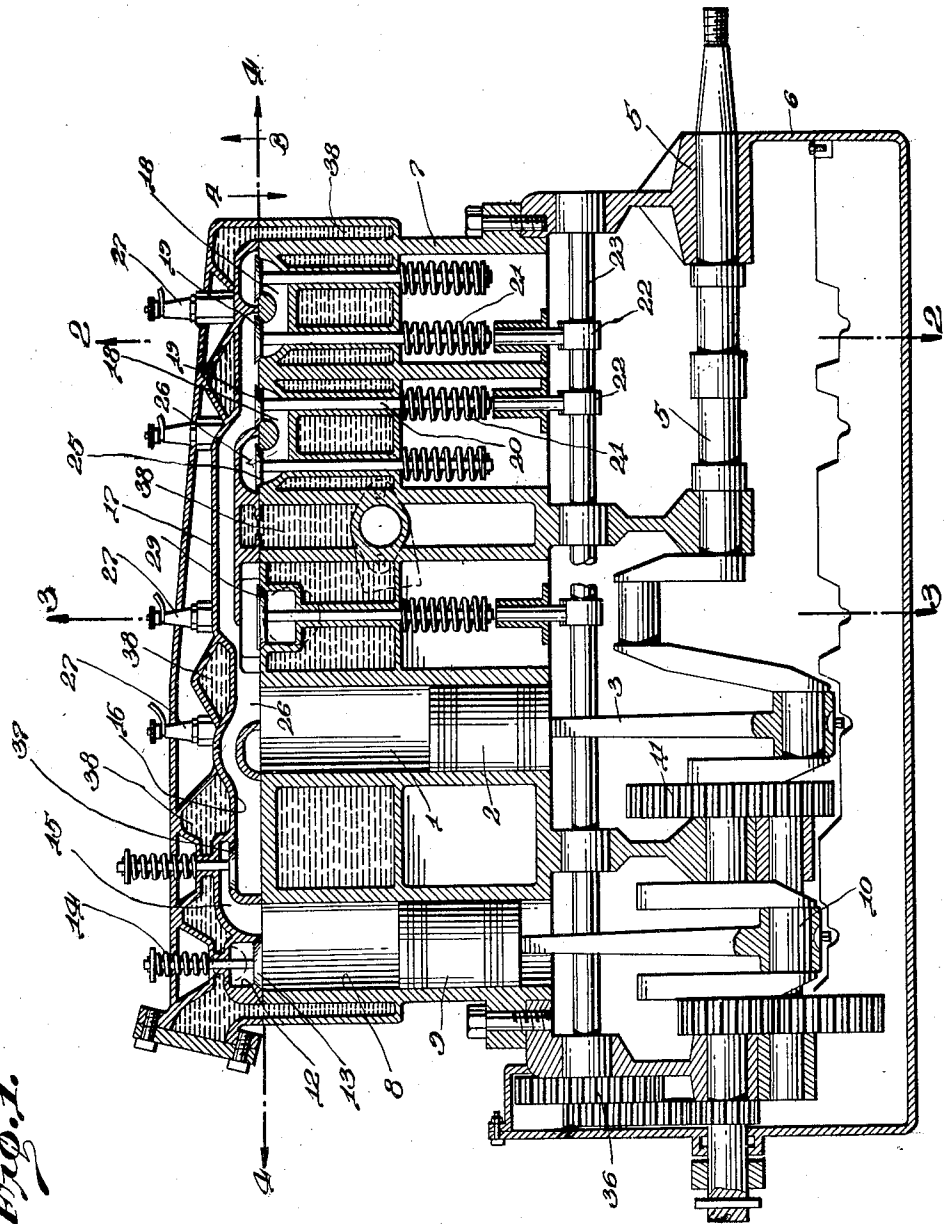

Fig. 1.

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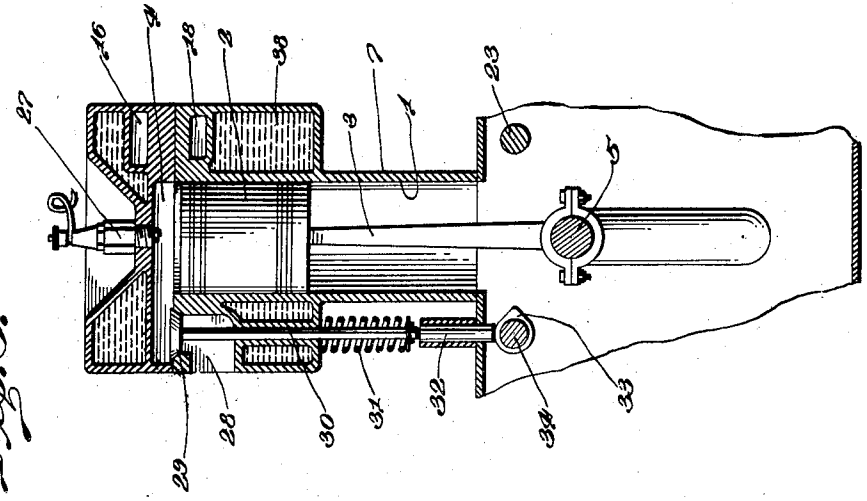

Fig. 3.

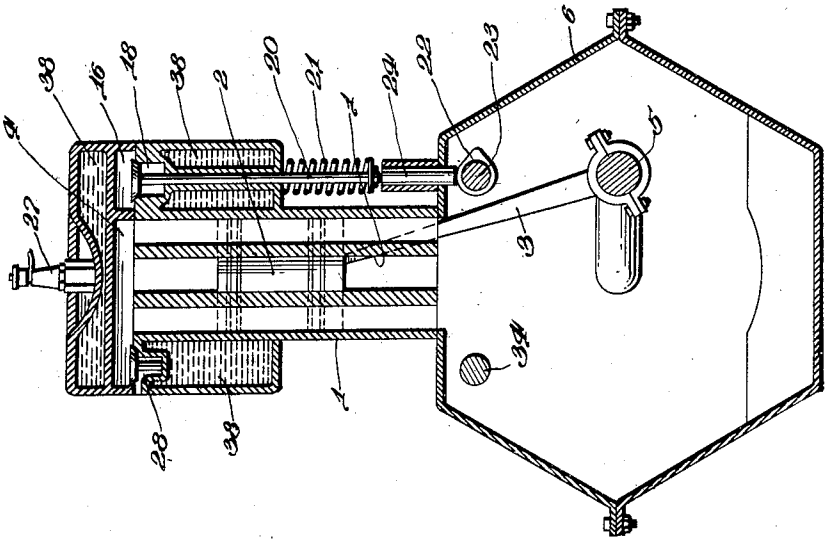

Fig. 2.

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Fig. 4.

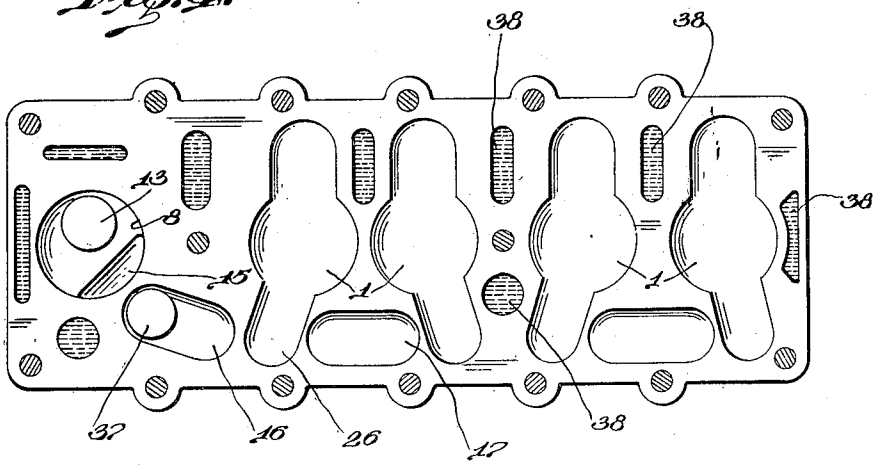
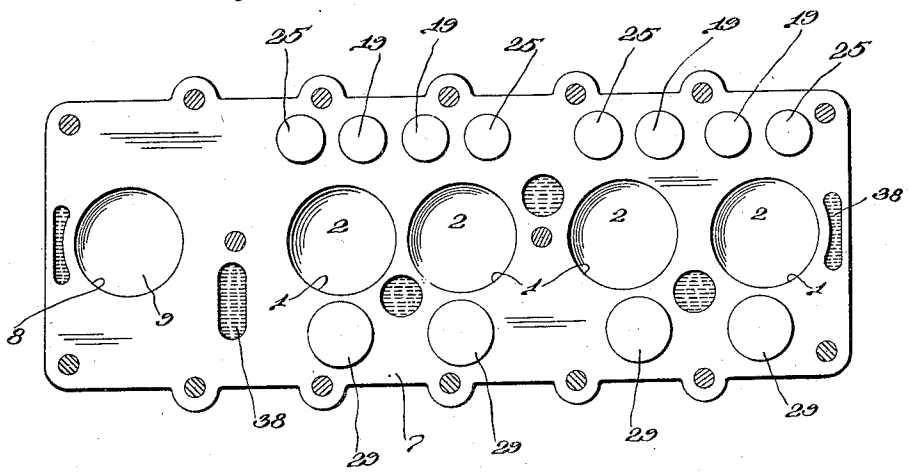


Fig. 5.



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Patented Nov. 18, 1924.

1,516,389

UNITED STATES PATENT OFFICE.

PETER LEOW, OF BOYNE CITY, MICHIGAN, ASSIGNOR OF ONE-HALF TO LESTER A. GALLAGHER, OF MILWAUKEE, WISCONSIN.

INTERNAL-COMBUSTION ENGINE.

Application filed April 18, 1922. Serial No. 554,491.

To all whom it may concern:

Be it known that I, PETER LEOW, a citizen of the United States, residing at Boyne City, in the county of Charlevoix and State of Michigan, have invented new and useful Improvements in Internal-Combustion engines, of which the following is a specification.

This invention relates to internal combustion engines of the two cycle type, and an object of the invention is to provide a motor or internal combustion engine which will be lighter in weight in proportion to its horse power than approved types of internal combustion engines now in use, and one which will result in a relatively high rate of efficiency and consequently develop a maximum amount of power upon the utilizing of a minimum amount of fuel.

More particularly, the invention relates to a four cylinder two cycle internal combustion engine which is provided with an auxiliary or fifth cylinder for compressing the combustible material prior to its entrance to the power developing cylinders, and also to provide suitable means for operating the piston in the auxiliary or compressing cylinder at four times the rate of operation of the pistons in the power developing cylinders.

Other objects of the invention will appear in the following detailed description taken in connection with the accompanying drawings wherein:

Fig. 1 is a vertical section through the motor.

Fig. 2 is a vertical section taken on the line 2—2 of Fig. 1.

Fig. 3 is a vertical section taken on the line 3—3 of Fig. 1.

Fig. 4 is a horizontal section taken on the line 4—4 of Fig. 1 and looking in the direction indicated by the arrow A.

Fig. 5 is a horizontal section taken on the line 4—4 of Fig. 1 looking in the direction indicated by the arrow B.

Referring more particularly to the drawings, the improved internal combustion engine comprises a plurality of power developing cylinders 1 in which pistons 2 are reciprocably mounted, the said pistons being adapted to be acted upon by the explosion of compressed combustible gases or analogous fuel in the firing chambers 4 of the engine. The pistons 2 are connected, by connecting rods 3 to the crank shaft 5 which is rotatably carried by the crank casing 6, in the usual manner of the construction of an internal combustion engine.

The cylinder block 7 in which the respective cylinders 1 are formed has an auxiliary cylinder 8 formed therein in which the piston 9 is mounted for reciprocatory movement. The piston 9 is adapted to compress the combustible fuel prior to its admission into the respective cylinders 1 and it is driven from a crank shaft 10 which is connected by gears 11 to the crank shaft 5, for reciprocating the piston 9 at four times the speed at which the pistons 2 are reciprocated, causing the piston 9 to complete one stroke upon the completion of each stroke of the four pistons 2 in a four cylinder engine, however, in case the number of cylinders varies from four, the pistons 9 will be reciprocated once for each complete stroke of each of the pistons of the engine. The cylinder 8 has an inlet chamber or passageway 12 communicating therewith for supplying volatile fuel or gas thereto from a carburetter or analogous device and the passage of the gas into the cylinder 8 is controlled by an inlet valve 13 which is in turn normally seated by a spring 14, and is adapted to be unseated to permit the entrance of fuel into the cylinder 8 where it is compressed by the upward stroke of the piston. The compressed fuel is forced out of the cylinder 8 by a by pass 15 into a passageway 16 which extends through the head 17 of the engine and has communication with by passes 18 one of which is provided for each of the cylinders 1.

The passage of the compressed gas into the by-passes 18 is controlled by valves 19. The valves 19 are carried by suitable valve stems 20 and are normally held seated by springs 21. The valves 19 are unseated by cams 22 mounted upon the cam shaft 23 of the engine structure, suitable plunger pins 24 being provided to engage the cams 22 and are forced into engagement with the valve stems for unseating the valves to permit the compressed combustible fuel to enter the by passes 18. The pressure of the compressed combustible fuel against the valves 25 will unseat these valves and permit the gas to flow through the passageways 26 and enter the cylinder 1 where they are again compressed as the pistons 2 move

upwardly, and confined in the confining or explosion chamber where they are exploded by means of the usual type of spark plugs 27. The explosive force of the fuel forces the pistons downwardly providing the power strokes of the engine. The burnt or used gases or fuel exhausts from the cylinder 1 through exhaust ports 28, and suitable exhaust valves 29 are provided for preventing the exhaust of the gases at the wrong time during the cycle of operation of the engine. The valve stems 30 of the valves 29 have springs 31 coiled there about which maintain the valves 29 seated, at normal times, and operating pins 32 are provided which are in turn operated by cams 33 upon the cam shaft 34 for unseating the valves 29 against the action of the springs 31 to permit the exhaust of the fuel from the cylinders. The cam shafts 23 and 34 are rotatable from the crank shaft 5 by any suitable type of gearing as indicated at 26 in Fig. 1 of the drawings.

The valve 37 is provided for controlling the entrance of the compressed fuel from the by-pass 15 into the passageway 16, and this valve is adapted to be unseated by the pressure of the compressed fuel to permit it to enter the passageway 16 and to prevent the backward passage of any of the compressed gas out of the passageway 16 into the by pass 15.

As clearly shown in the drawings, all of the working parts of the engine are surrounded by water spaces as shown at 38, to provide the efficient cooling of the engine and to prevent its overheating during operation.

From the foregoing description taken in connection with the accompanying drawings it will be apparent that an engine has been provided from which the maximum power producing proclivities of the fuel may be utilized thereby providing an internal combustion engine of a relative high efficiency and one in which the amount of power developed in proportion to the weight of the engine will be comparatively high.

It is, of course, to be understood that the invention may be constructed in other manners and the parts associated in different relations and, therefore, I do not desire to be limited in any manner except as set forth in the claim hereunto appended.

Having thus described my invention what I claim is:

An internal combustion engine comprising a cylinder block having a plurality of power cylinders and an auxiliary fuel compression cylinder formed therein, a removable cylinder head, said cylinder block and cylinder head provided with cooling fluid receiving chambers and passageways surrounding said power and auxiliary fuel compression cylinders, said removable head provided with a fuel outlet passageway communicating with said auxiliary fuel compression cylinder, said head provided with a fuel delivering passageway, a spring controlled pressure operated valve establishing communication between said first and second named passageways, said cylinder block provided with a plurality of substantially U shaped passageways, fuel supply passageways in said cylinder head communicating with the cylinders and said U shaped passageways, and a pair of valves in each of said U shaped passageways for controlling the passage of fuel into the cylinders.

In testimony whereof I fix my signature.

PETER LEOW.