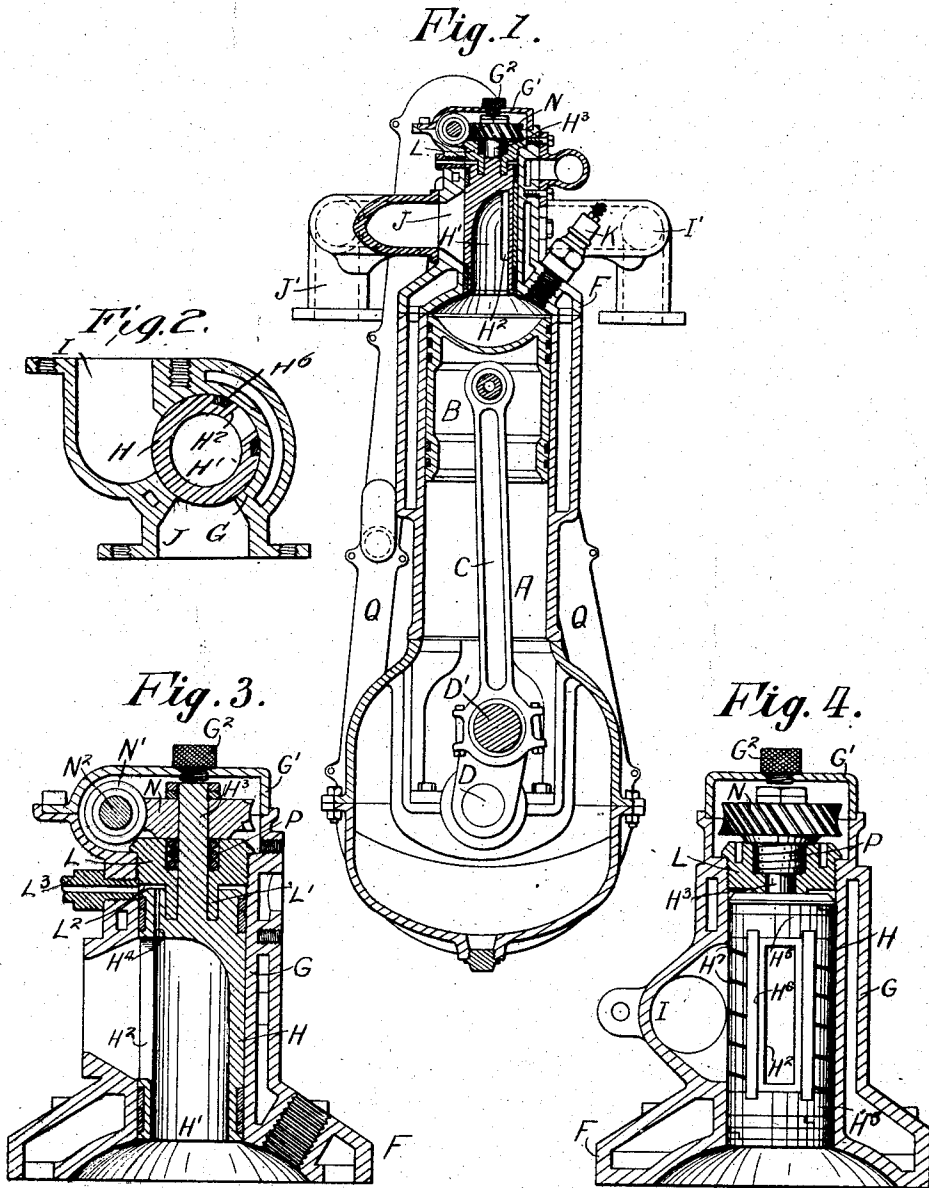


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 ROTARY VALVE FOR INTERNAL COMBUSTION ENGINES.
 APPLICATION FILED APR. 29, 1911.

1,048,020.

Patented Dec. 24, 1912.



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ROTARY VALVE FOR INTERNAL-COMBUSTION ENGINES.

1,048,020.

Specification of Letters Patent.

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Application filed April 29, 1911. Serial No. 624,019.

To all whom it may concern:

Be it known that I, HARVEY OLIVER WITWER, a subject of the King of Great Britain, and a resident of New Hamburg, in the Province of Ontario and Dominion of Canada, have invented a new and Improved Rotary Valve for Internal-Combustion Engines, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved rotary valve for internal combustion engines, arranged to control the admission of the explosive mixture and the exhaust for the products of combustion in a very simple and effective manner, to operate with uniform efficiency at all speeds, to reduce the water-cooled surface of the explosive chamber to a minimum, and to require but little power to actuate the valve. For the purpose mentioned, use is made of a cylindrical valve having a recess in one end opening into the working chamber of an engine cylinder, the valve being provided in its side with a single port leading to the said recess and adapted to register successively with the explosive mixture supply and the exhaust for the products of combustion.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a cross section through my improved valve and an engine of a type with which it is adapted to operate. Fig. 2 is a horizontal section through the valve and its casing, illustrating the form in the position it will occupy when the cylinder piston has completed its compression stroke and the charge is about to be exploded; Fig. 3 is an enlarged cross section of the valve as applied, and Fig. 4 is a sectional side elevation of the same.

In each of the four cylinders A of the engine shown in Figs. 1 and 2 is mounted to reciprocate a piston B connected by a pitman C with the crank arm D' of a crank shaft D, for transmitting the power of the engine to other machinery, the crank shaft D being provided with the usual fly wheel E. The cylinder head F on the top of the cylinder K is provided with a casing G for

a cylindrical valve H to rotate in, with a view to control the admission of the explosive mixture to the upper or working end of the cylinder A and to control the exhaust of the products of combustion from the said working chamber. The valve H is provided at its lower end with a recess H' opening into the working chamber of the cylinder A, and into the said recess H' opens a vertically disposed port H² formed in the side of the valve H and adapted to successively connect with an inlet chamber I and an exhaust chamber J, preferably formed on the casing G, as plainly indicated in Fig. 2. The several inlet chambers I of the four cylinders are connected with a pipe I' connected with a source of explosive mixture supply, and the several exhaust chambers J are connected with an exhaust pipe J' for conducting the products of combustion to a suitable place of discharge. On each cylinder head F is arranged an igniting device K, of any approved construction, for igniting the explosive mixture in the upper or working end of the corresponding cylinder A.

In the upper end of the valve casing G screws a thrust cap L, through which extends the stem H³ of the rotary valve H, and on the under side of the said thrust cap L is formed a hub L' engaging an annular groove formed in the upper closed end of the valve H. A small space L² is had between the thrust cap L and the upper end of the valve H, and a small port H⁴ (see Fig. 3) connects the recess H' with the said space L² to equalize the pressure on the ends of the valve with a view to relieve the thrust cap L of undue strain.

Oil or other lubricant may be passed into the space L² through a suitable nipple L³ screwing in the casing G so that the hub L' and its recess are lubricated as well as the peripheral face of the valve H. The peripheral valve face is provided with suitable end packings H⁵ and vertical packings H⁶ on opposite sides of the port H², and the said peripheral face of the valve H is also provided with oil grooves H⁷ to distribute the oil on the peripheral face of the valve H.

The top of the valve casing G is provided with a cap G' having a plug G², which when

removed permits of filling the upper end of the casing G with oil to lubricate a worm wheel N secured on the upper end of the valve stem H³ and in mesh with a worm N' secured on a worm shaft N² passing through the upper portion of the valve casing G and its cap G'. It is understood that the shaft N² carries the several worms N' in mesh with the worm wheels N for the several valves H controlling the admission and exhaust to the four cylinders of the engine, and on one end of the worm shaft N² is secured a sprocket wheel O connected by a sprocket chain O' with a sprocket wheel O² on the crank shaft D, so that when the engine is running each valve H is rotated once for every two revolutions of the crank shaft D.

The top of the thrust cap L is preferably recessed for the reception of a spring P bearing against the under side of the worm wheel N, so as to hold the upper portion of the valve H in proper engagement with the hub L' of the cap L.

The operation is as follows: When the engine is running the several valves H are rotated so that the pistons in the several cylinders are given successive impulses, and each valve H is rotated once for every two revolutions of the crank shaft D, so that the port H² moves in register at the proper time with the inlet chamber I and the exhaust chamber J, to insure proper drawing in of the explosive mixture into the cylinder, compression of the mixture, ignition of the compressed mixture and exhaust of the products of combustion, as will be readily understood. The cylinders A, their cylinder heads F and valve casings G are provided with suitable water jackets, and the sprocket wheels O, O² and sprocket chain O' are inclosed in a housing Q.

By providing a continuously rotating valve and driving the same positively from the crank shaft of the engine, the valve functions properly at all speeds, especially as the valve is provided with but one port which answers for both the admission of the explosive mixture and the exhaust of the products of combustion. It will also be noticed that by the arrangement described, leakage of the explosive mixture especially during the compression stroke of the pistons B is reduced to a minimum.

It will be noticed that the recess H' of the valve H communicates directly with the working chamber of the cylinder by extending the valve casing G and the valve H through the cylinder head F, and hence the piston B is permitted to move on the upstroke into close proximity to the cylinder head F.

In order to obtain the necessary capacity for the working or explosion chamber, the

under surface of the head F and the upper face of the piston B are made concave, to form a spherical explosion or working chamber, and by having the piston B moving into close proximity to the cylinder head F, the water-cooled cylinder walls are excluded from presenting any surface to the explosion chamber.

Having thus described my invention, I claim as new and desire to secure by Letters Patent:

1. An internal combustion engine, provided with a rotary valve having in one end a recess opening at all times into the working chamber of the engine cylinder, the valve having a single port at its side, opening into the said recess, a valve casing for the said rotary valve to turn in, having an inlet chamber and an exhaust chamber with which the said valve port is adapted to successively register, and a thrust cap within the casing, having an annular rib projecting inwardly and engaging in fluid-tight relation within a corresponding annular groove formed in the outer end of the valve.

2. An internal combustion engine, provided with a rotary valve having in one end a recess opening at all times into the working chamber of the engine cylinder, the valve having a single port at its side, opening into the said recess, a valve casing for the said rotary valve to turn in, the casing having an inlet chamber and an exhaust chamber with which the said valve port is adapted to successively register, a thrust cap within the casing having a projecting portion engaging a portion of one end of the said valve in fluid-tight relation, whereby to maintain the major portions of said thrust cap and said valve end in spaced relation, the said valve having a small port leading from its recess to the space thus formed between the valve and thrust cap.

3. An internal combustion engine provided with a rotary valve having in one end a recess opening at all times into the working chamber of the engine cylinder, the valve having a single port at its side opening into the said recess, a valve casing for the said rotary valve to turn in having an inlet chamber and an exhaust chamber with which the said valve port is adapted to successively register, a thrust cap secured within the casing, a stem projecting from one end of the said valve and extending through a bearing in said thrust cap, a member secured upon the stem upon the opposite side of the thrust cap to said valve, said thrust cap having an annular recess in its outer face surrounding its said bearing and an annular rib upon its inner face surrounding the bearing and projecting inwardly into fluid-tight engagement within a corresponding annular groove formed in the outer end

or the valve, and a spring seated in the said thrust cap recess and bearing against the said member which is secured on the valve stem, for the purpose of maintaining the
5 fluid-tight engagement between the thrust cap rib and the valve groove.

In testimony whereof I have signed my

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

HARVEY OLIVER WITWER.

Witnesses:

I. M. CLEMENS,
JOHN WITWER.