S. YBARRA.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED JAN. 26, 1912.

1,068,725. Patented July 29, 1913.

Fig. I.

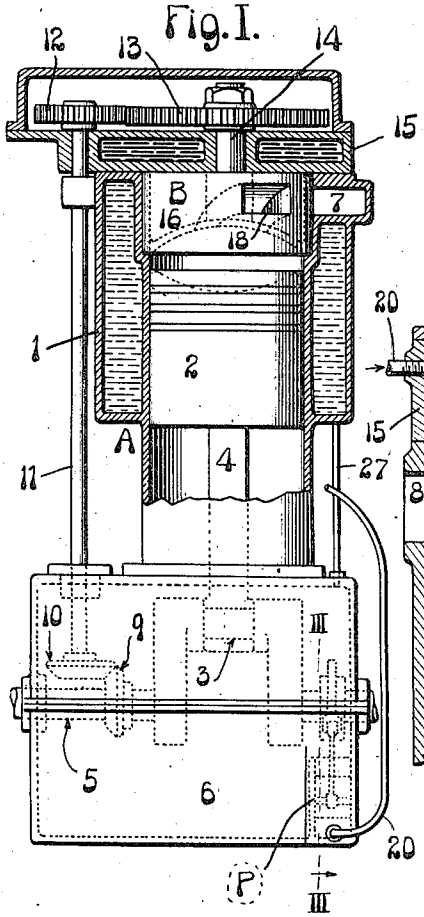


Fig. IV.

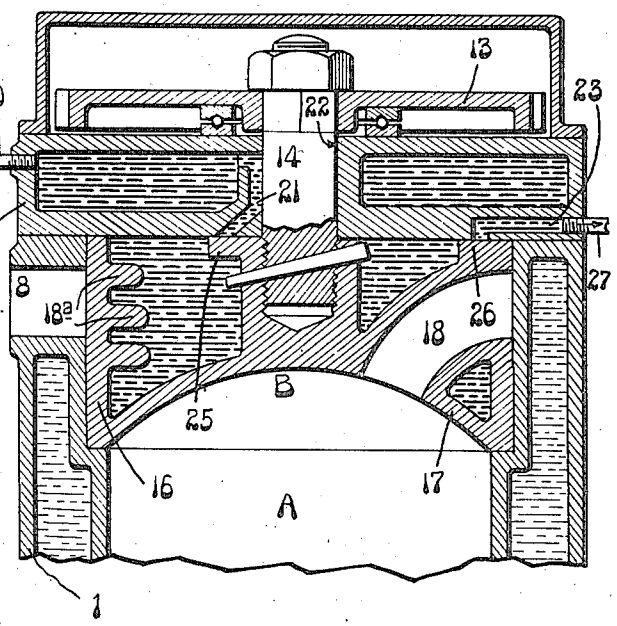


Fig. II.

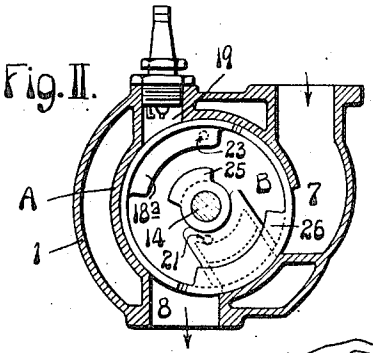
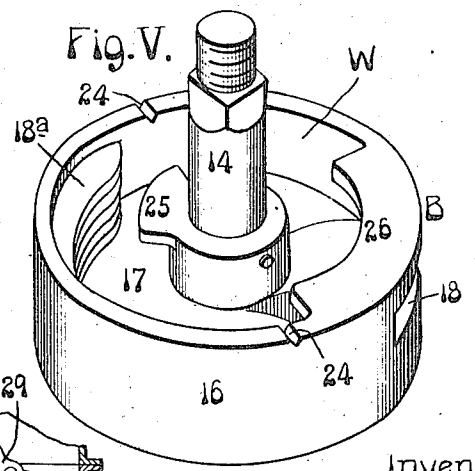


Fig. V.



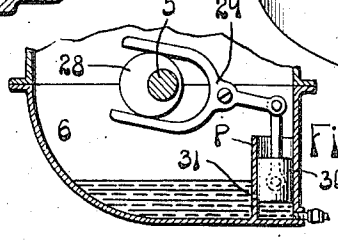


Fig. III.

Attest

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UNITED STATES PATENT OFFICE.

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INTERNAL-COMBUSTION ENGINE.

1,068,725. Specification of Letters Patent. Patented July 29, 1913.

Application filed January 26, 1912. Serial No. 673,557.

To all whom it may concern:

Be it known that I, SAMUEL YBARRA, a citizen of the United States of America, and a resident of the city of St. Louis and State of Missouri, have invented certain new and useful Improvements in Internal-Combustion Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming a part of this specification.

My invention relates to an explosive engine having a fluid cooled valve chambered for the reception of oil or other fluid. The cooling fluid is preferably circulated through the valve, and if the fluid utilized is a lubricant, it may also be utilized to lubricate the valve and other parts of the engine.

Figure I is a side elevation, partly in section, of an explosive engine embodying the features of my invention. Fig. II is a horizontal section taken through the upper portion of the engine. Fig. III is a vertical section taken approximately on line III—III, Fig. I. Fig. IV is a vertical section showing the upper portion of the engine. Fig. V is a perspective view of the valve.

In the accompanying drawings:—A designates an explosive engine cylinder which may have a water jacket 1. A piston 2 is connected to a crank 3 by a connecting rod 4. The crank 3 and crank shaft 5 are preferably housed by a crank case 6.

The cylinder of my engine has an inlet port 7 and an exhaust port 8 which are controlled by a valve B, said valve being preferably located in the head end of the cylinder so as to constitute an auxiliary cylinder head. The valve B may be rotated by any suitable means. For such purpose, I preferably employ a bevel gear 9 fixed to the crank shaft, a bevel gear 10 on a shaft 11, and a pinion 12 also on the shaft 11 meshing with a gear 13 fixed to the valve stem 14. The valve stem 14 passes through a cylinder head 15 which may be secured to the cylinder in any suitable manner.

The valve B is in the form of a cup having a cylindrical side wall 16 closely fitted to the inner wall of the engine cylinder, and a bottom wall 17 serving with said side wall to produce a well W for the reception of oil or other fluid. The valve is provided with a passageway 18 leading therethrough from its bottom, and adapted to register with the inlet and exhaust ports 7 and 8.

18ª designates counterweight members for balancing the weight of the metal forming the passageway 18.

The valve B may control the inlet and exhaust ports in any manner suitable to the type of engine with which it is associated, and I therefore do not deem it necessary to enter into a full description of the valve operation. However, I will say that in a four cycle engine, the passageway 18 in the valve registers with the inlet port 7 during the suction stroke; during the compression and power strokes said passageway 18 registers with a spark plug pocket 19, (Fig. II), and when the piston is moving on its exhaust stroke, the passageway 18 registers with the exhaust port 8.

As a valve of the type shown is subjected to a very high degree of heat during the operation of the engine, it would soon warp and become distorted so as to grind the cylinder and allow leakage, unless it is effectually cooled. I, therefore, circulate a fluid, preferably oil, through the well W in the valve that acts to cool, and, at the same time, lubricate the valve and its stem 14. The oil is delivered to the cylinder head 15 through a pipe 20, and passes from said cylinder head through a duct 21 leading to the well W in the valve. A portion of the duct 21 is a groove in the bore 22, through which the valve stem 14 passes. The oil is delivered to the oil well W through the duct 21 at a point near the axis of the valve, and is discharged from said well through a duct 23 formed in the cylinder head near the periphery of the valve.

The upper edge of the valve is grooved, as seen at 24 (Fig. V), to allow oil to pass freely over the top edge of the valve and flow between the valve and the inner face of the cylinder, for the purpose of lubricating these opposing faces. The valve preferably carries closures 25 and 26 adapted to close the ducts 21 and 23 during the compression and power strokes of the engine to prevent leakage of the fluid under pressure in the cylinder and also to prevent back pressure in the lubricating system.

The oil well W in the valve B is supplied with oil from the crank case 6 through the medium of pipes 20 and 27, the latter being connected to the cylinder head 15 at the

duct 23. The pipe 20 is preferably connected to a pump P in the crank case while the pipe 27 may lead into the crank case at any desired point. The pump P is operated by an eccentric 28 aranged in the bifurcated end of a lever 29 to which the pump piston 30 is connected. The oil in the crank case enters an inlet port 31, (Fig. III), in the pump cylinder, and during the operation of the pump is forced through the pipe 20 to the cylinder head from which it is forced through the duct 21 to the valve oil well W. After circulating through the well W, the oil passes through the duct 23, and is returned to the crank case through the pipe 27.

I claim:—

1. An internal combustion engine comprising a cylinder having inlet and exhaust ports in the wall thereof, a cup shaped cylindrical valve arranged within the head of said cylinder and having a passageway leading therethrough to its periphery for registration with said inlet and exhaust ports, the valve being closed at the bottom, and fitted to the wall of the cylinder to serve as an auxiliary head and open at the top to receive a lubricating or cooling fluid, and a cylinder head above the top of said valve.

2. An internal combustion engine comprising a cylinder having inlet and exhaust ports, a rotatable cup shaped valve closely fitted to the inner face of the cylinder, a cylinder head above said valve, said valve being closed at the bottom to serve as an auxiliary cylinder head and open at the top to receive oil, and means for circulating oil through said valve.

3. An internal combustion engine comprising a cylinder having inlet and exhaust ports, a cup shaped valve in the head end of said cylinder for opening and closing one of said ports, said valve being closed at the bottom and open at the top, and a cylinder head fitted to the top face of said valve and constituting a closure therefor, said cylinder head being provided with ducts for allowing fluid to flow into and out of the top of said valve.

4. An internal combustion engine comprising a cylinder having inlet and exhaust ports, a rotatable cup-shaped valve closely fitted to the inner face of said cylinder for opening and closing one of said ports, said valve being closed at the bottom and open at the top to receive oil, a cylinder head closing the top of said valve, and means for circulating oil through said valve, the top edge of said valve being grooved to allow oil to escape from the valve and flow between the valve and the inner face of the cylinder.

5. An internal combustion engine comprising a cylinder provided with inlet and exhaust ports, a valve for controlling one of said ports, said valve being provided with a well, said cylinder having ducts for allowing fluid to pass into and out of said well, and a closure carried by the valve adapted to close one of said ducts during the operation of the valve.

6. An internal combustion engine comprising a cylinder provided with inlet and exhaust ports, a valve for controlling one of said ports, said valve being provided with a well, said cylinder having ducts for allowing fluid to pass into and out of said well, and closures carried by the valve adapted to close said ducts during the operation of the valve.

SAMUEL YBARRA.

In the presence of—
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E. B. Linn.