G. B. ROYER.

INTERNAL COMBUSTION ENGINE.

APPLICATION FILED FEB. 9, 1916.

1,209,502.

Patented Dec. 19, 1916.

2 SHEETS—SHEET 1.

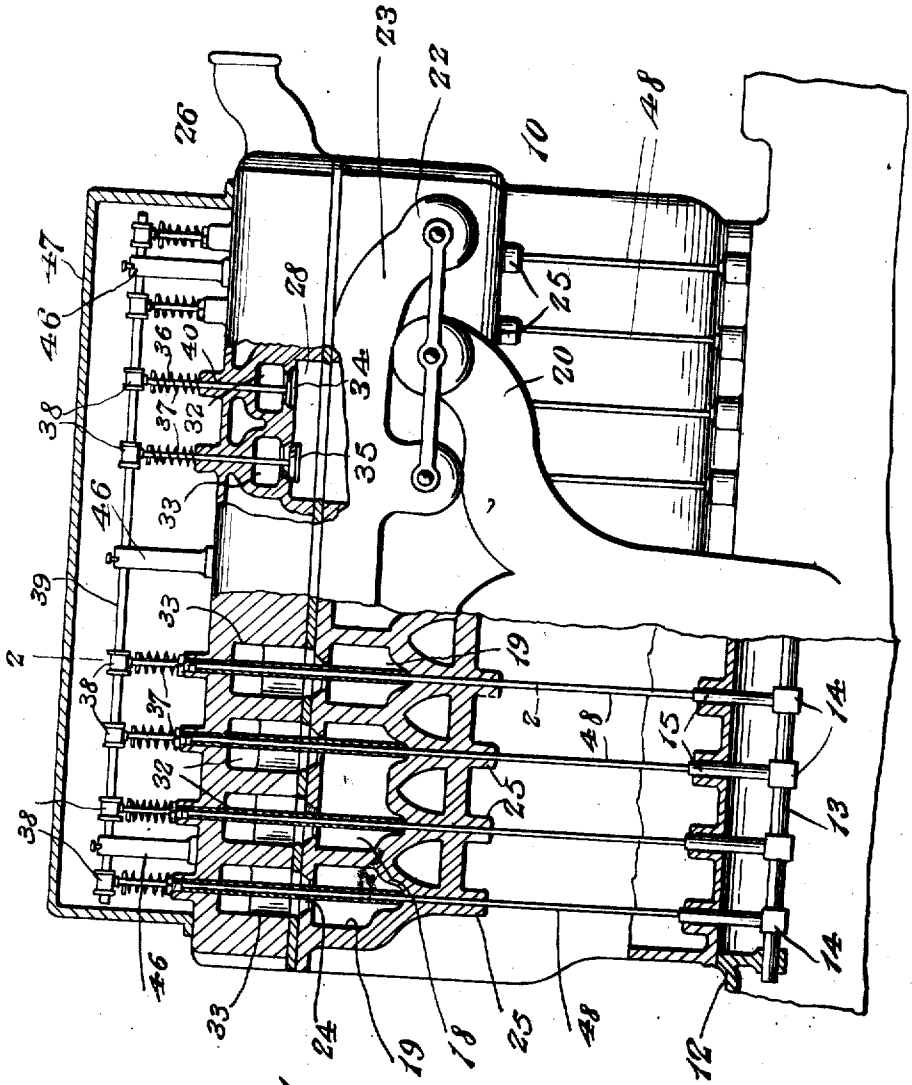


Fig. 1.

Witnesses:-

J. P. Mahler.

Carl Seebold.

Inventor

G. B. Royer.

By A. Randolph Jr.

Attorney

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2 SHEETS—SHEET 2.

Fig. 2.

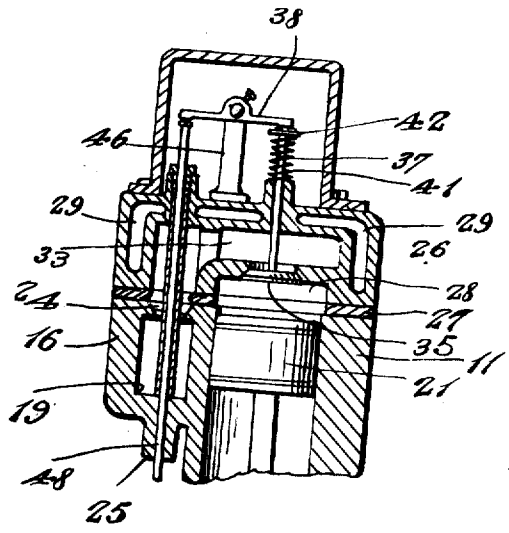


Fig. 4.

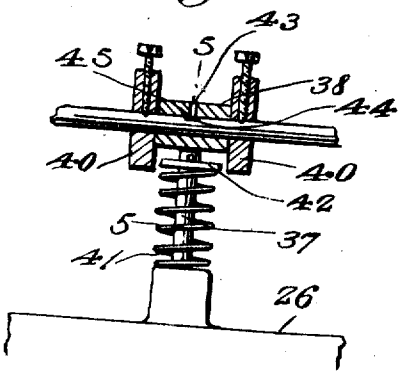


Fig. 5.

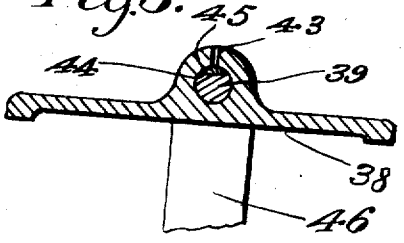
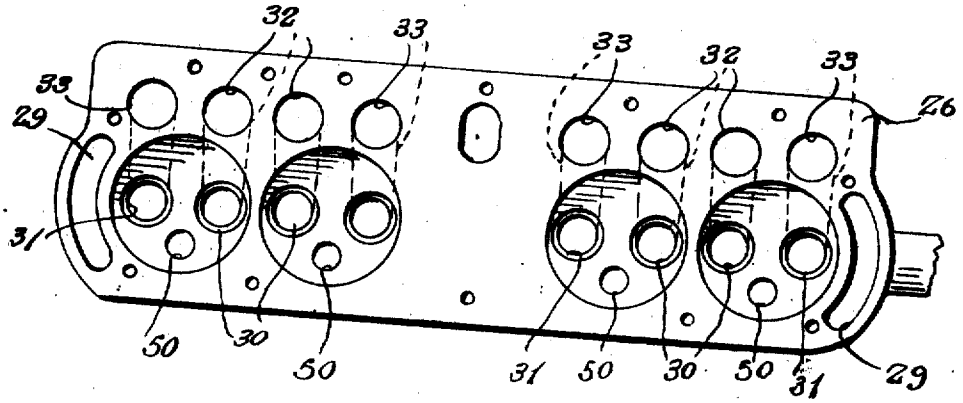


Fig. 3.



Witnesses:-
J. P. Mahler.
E. C. Seibold.

Inventor
G. B. Royer.
By V. Rudolph Jr.
Attorney

UNITED STATES PATENT OFFICE.

GEORGE B. ROYER, OF BLOOMINGTON, INDIANA.

INTERNAL-COMBUSTION ENGINE.

1,209,502. Specification of Letters Patent. Patented Dec. 19, 1916.

Application filed February 9, 1916. Serial No. 77,257.

To all whom it may concern:

Be it known that I, GEORGE B. ROYER, a citizen of the United States, residing at Bloomington, in the county of Monroe and State of Indiana, have invented certain new and useful Improvements in Internal-Combustion Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention relates to internal combustion engines and has for its primary object to provide a cylinder head particularly designed to replace the removable cylinder heads of internal combustion engines in which the inlet and exhaust valves are arranged laterally of the cylinders in housings provided for that purpose whereby the engine is converted into the more modern and efficient type of engine known as the valve-in-the-head type.

Another object is the provision of means operable by the original cam shaft of the engine for actuating the valves arranged in the improved cylinder head.

With these and other objects in view the invention consists in the construction and novel combination and arrangement of parts hereinafter fully described, illustrated in the accompanying drawings and pointed out in the claims hereto appended, it being understood that various changes in the form, proportion and minor details of construction may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

Figure 1 represents a longitudinal sectional view, partly in side elevation, through the improved engine, Fig. 2 represents a fragmental vertical sectional view on the line 2—2 of Fig. 1, Fig. 3 represents a bottom plan view of the improved cylinder head, the valves being removed, Fig. 4 represents a detail sectional view through one of the rocker arms, and Fig. 5 represents a detail sectional view on the line 5—5 of Fig. 4.

Referring to the drawings in detail, wherein similar reference numerals designate corresponding parts throughout the several views, the numeral 10 indicates generally the cylinder block including a plurality of integral individual cylinders 11 which are supported upon the crank case 12. The cam shaft 13 is operatively supported in the crank case 12 laterally of the cylinders 11 and is provided with the usual push rod operating cams 14 engaging the lower sections 15 of the valve operating push rods. The upper extremities of the cylinders 11 are formed with integral lateral hollow projections 16 in which are arranged a plurality of vertically disposed partitions 17 dividing the interior of the housing or projection 16 into inlet and exhaust chambers 18 and 19, respectively, the two inlet chambers 18 of two adjacent cylinders being intercommunicating and the two exhaust chambers 19 being separated from the inlet chambers 18 by the partitions 17. The inlet chambers 18 are connected with one terminal of an inlet manifold 20 whereby gaseous fuel is conducted to the chambers 18 from where it is drawn into the cylinders 11 of the engine during the suction stroke of the pistons 21. The exhaust chamber 19 of each cylinder is connected with a branch 22 of the exhaust manifold 23 whereby the exhaust products of combustion discharged during the scavenging stroke of the pistons 21 are conducted from the engine.

In internal combustion engine cylinders of the L-type the valves are ordinarily arranged laterally of the bore of the cylinders 11 and are adapted to engage in seats 24 formed in the upper wall of the housing 16. The stems of the valves project downwardly through guides 25 formed integral with the lower portion of the housing 16 and engage the upper ends of the push rods 15 whereby they are mechanically opened during the operation of the engine.

In applying my improved cylinder head to use, I remove the valves which ordinarily engage in the seats 24 and also the head which is bolted or otherwise secured over the upper open ends of the housings 16 and cylinders 11 and replace the old cylinder head by the improved head designated generally by the numeral 26. The improved head is preferably cast in one piece and is constructed so as to tightly fit over the upper ends of the cylinders 11 and housing 16. A suitable type

of metal bound gasket 27 is fitted between the head 26 and the cylinder block 10.

Over each cylinder 11 the head 26 is formed with a cavity 28 constituting a combustion chamber and the top, side and end walls of the head are formed with water chambers 29 whereby the head is effectively cooled during operation of the engine. The upper wall of each combustion chamber 28 is formed with inlet and exhaust ports 30 and 31, respectively which communicate with the horizontal portions of L-shaped inlet and exhaust chambers 32 and 33, respectively. The lower extremities of the vertically disposed portions of the inlet and exhaust chambers 32 and 33 communicate with the inlet and exhaust chambers 18 and 19, respectively, of the housing 16 through the original valve seats 24 of the engine. The edges of the inlet and exhaust ports 30 and 31 are beveled to provide seats for inlet and exhaust valves 34 and 35 respectively, which are provided with upwardly extending stems 36 and 37, respectively, engaged with the inner extremities of a pair of rocker arms 38 pivotally supported upon a shaft 39 and confined between pairs of adjustable collars 40. The valve stems 36 and 37 for each cylinder of the engine are slidably mounted in and engaged by apertured enlargements 40^a formed integral with the top of the head 26 of the valves 34 and 35 and also retained in closed position by springs 41 coiled about the stems 36 and 37 and engaging the enlargements 40^a at their lower ends after the caps or tips 42 fitted upon the upper ends thereof. The central portion of the rocker arms 38 are formed with lubricating apertures 43 and the upper portion of the shaft 39 is cut away as indicated at 44 to receive a wad of absorbent material 45 adapted to retain a quantity of lubricator by capillary attraction to effectively lubricate the rocker arms to operate with the engine. The shaft 39 is supported in uprights 46 attached to the top of the head 26 and the shaft, rocker arms and parts associated therewith are inclosed in a casing 47 removably attached to the cylinder head 26. The ends of the rocker arms 38 opposite those engaged by the valve stems 36 and 37 are engaged over and operated by the upper sections 48 of the cam operated push rods. The upper push rod sections 48 extend downwardly through apertures formed in the upper portion of the head 26, through tubular guides arranged in the L-shaped chambers 32 and 33, the chambers 18 and 19 in the housing 16 and the guides 25. The tubular guides are engaged at their lower ends with the guides 25 and are secured at their upper ends in apertures formed in the head 26 by ring nuts. Intermediate each pair of inlet and exhaust chambers 32 and 33, the upper portion of the combustion chamber 28 is formed with a spark plug receiving opening 50.

From the foregoing description taken in connection with the accompanying drawings, it is clearly evident that I have provided a novel and efficient type of cylinder heads for internal combustion engines having the valves arranged within the combustion chamber of the engine and operated from above the cylinder head which may be applied to existing types of L-type internal combustion engine cylinders.

What I claim is:—

1. In an internal combustion engine, a cylinder head having a cavity in the lower portion thereof constituting a combustion chamber and adapted to register with the bore of an engine cylinder, said head having L-shaped inlet and exhaust chambers therein, and ports connecting said chambers with said combustion chamber, outwardly closing valves adapted to close said ports, stems carried by said valves projecting upwardly through said head, a shaft, rocker arms pivotally mounted upon said shaft and adapted to engage and operate said valve stems, and push rod sections engaged with said rocker arms and extending downwardly through said cylinder head and said L-shaped chambers.

2. In an internal combustion engine, a cylinder having an internal bore and laterally projecting hollow housing, partitions arranged in said housing dividing the latter into inlet and exhaust chambers, a head arranged over said cylinder having a cavity therein communicating with the bore of the cylinder, and L-shaped chambers communicating at one end with the inlet and exhaust chambers in said housing and communicating at their opposite ends with said combustion chamber by ports formed in the upper wall of said combustion chamber, outwardly closing valves adapted to close said ports, stems carried by said valves extending upwardly through said cylinder head, a shaft, rocker arms pivotally mounted upon said shaft and adapted to actuate said valve stems, and push rod sections engaged with said rocker arms and extending downwardly through the L-shaped chambers in the head and the inlet and exhaust chambers in the housing.

3. A cylinder head adapted for connection with the cylinder of an internal combustion engine having a bore and lateral inlet and exhaust chambers, said cylinder head having a cavity in the lower portion thereof constituting a combustion chamber adapted to register with the bore of the cylinder, said head having L-shaped inlet and exhaust ports therein communicating with the inlet and exhaust chambers of the cylinder, and ports connecting the last-men-

tioned chambers with said combustion chamber, outwardly closing valves adapted to close the ports in said head, a shaft, rocker arms pivotally mounted upon said shaft adapted to engage and operate said valves, tubular guides extending through and secured in the chambers in the cylinder and the cylinder head, and push rod sections slidably mounted in said guides and engaged with said rocker arms.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE B. ROYER.

Witnesses:

FOREST R. WHALEY,

WILLIAM GRAHAM.