A. HOLMES.

VALVE MECHANISM SUPPORT.

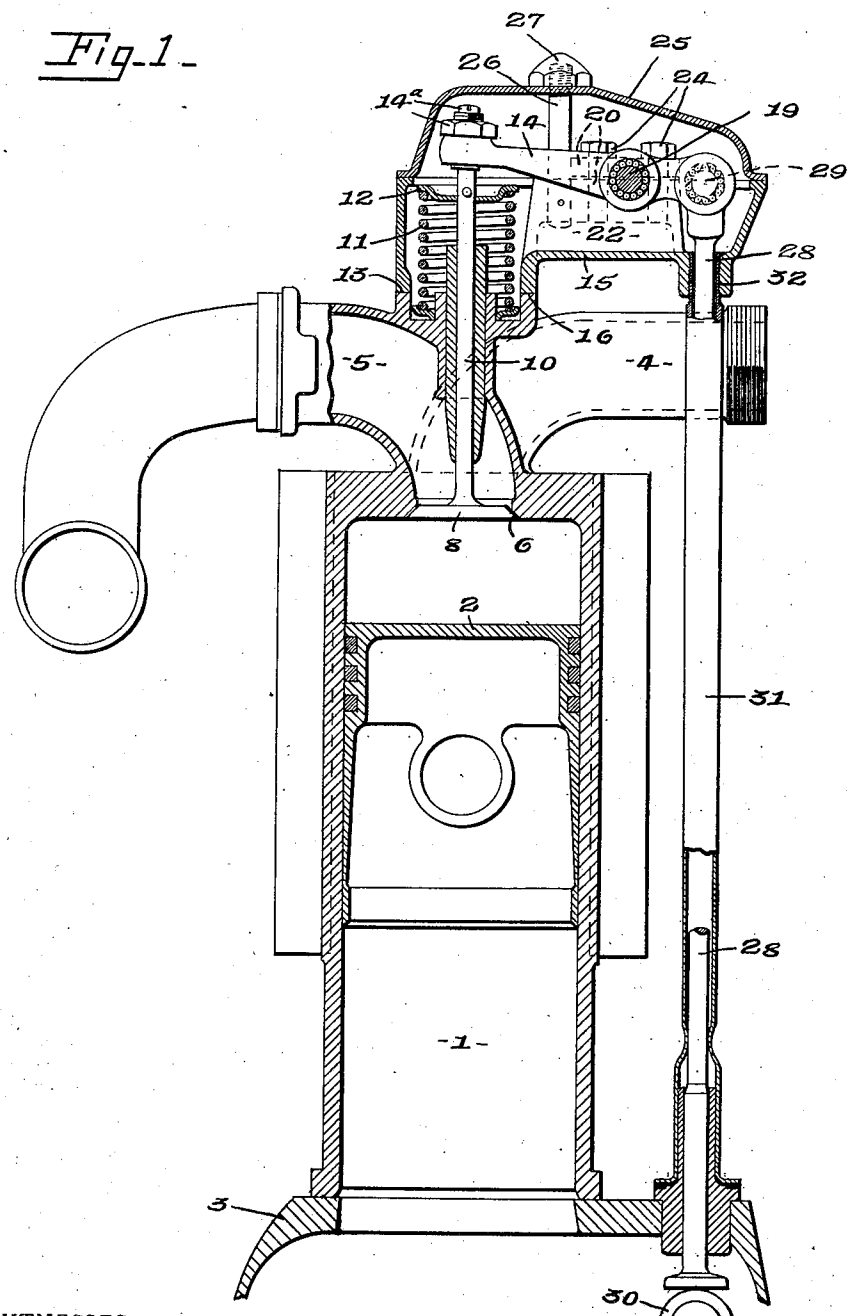
APPLICATION FILED JAN. 19, 1914.

1,352,897.

Patented Sept. 14, 1920.

4 SHEETS—SHEET 1.

Fig. 1.



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4 SHEETS—SHEET 2.

Fig. 2.

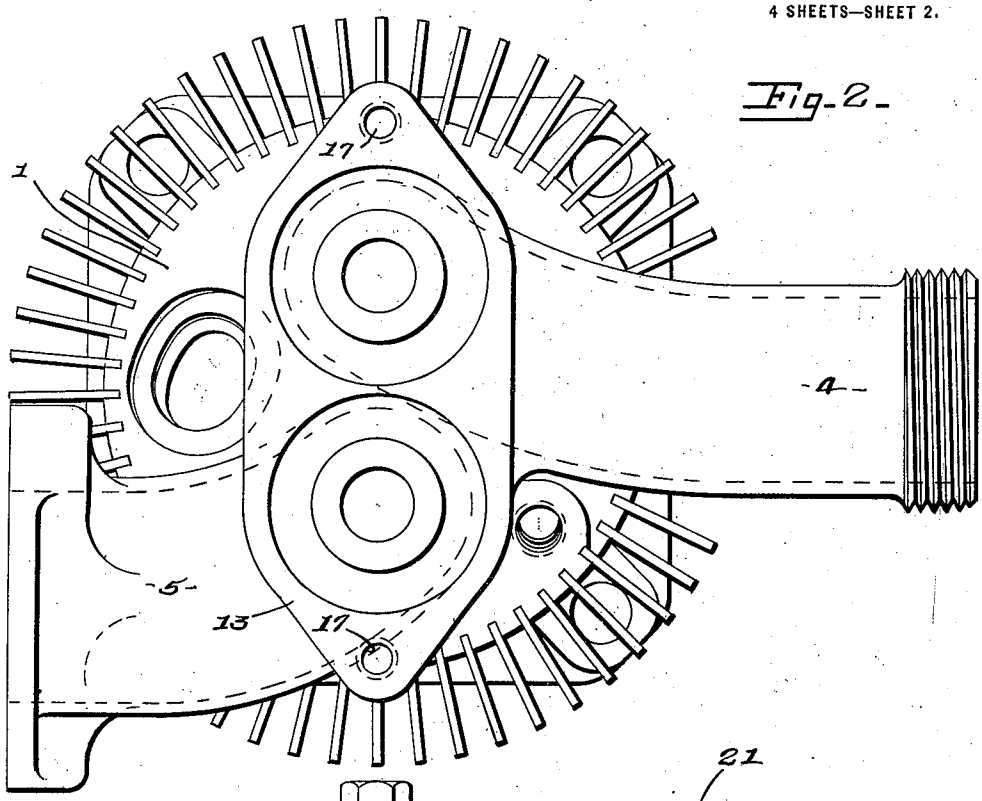
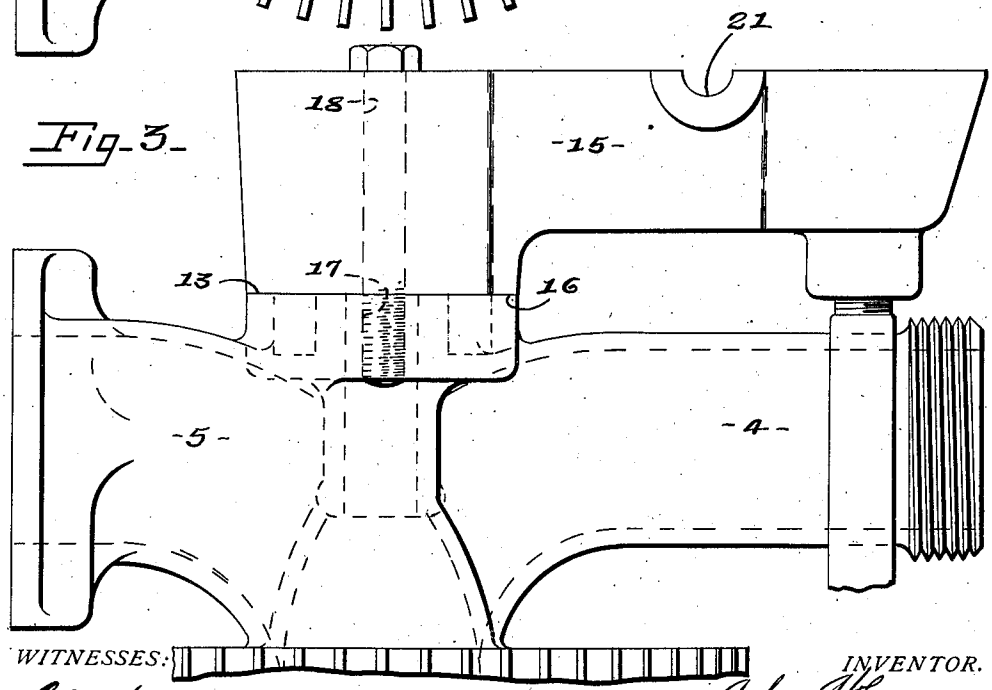


Fig. 3.



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4 SHEETS—SHEET 3.

Fig. 7.

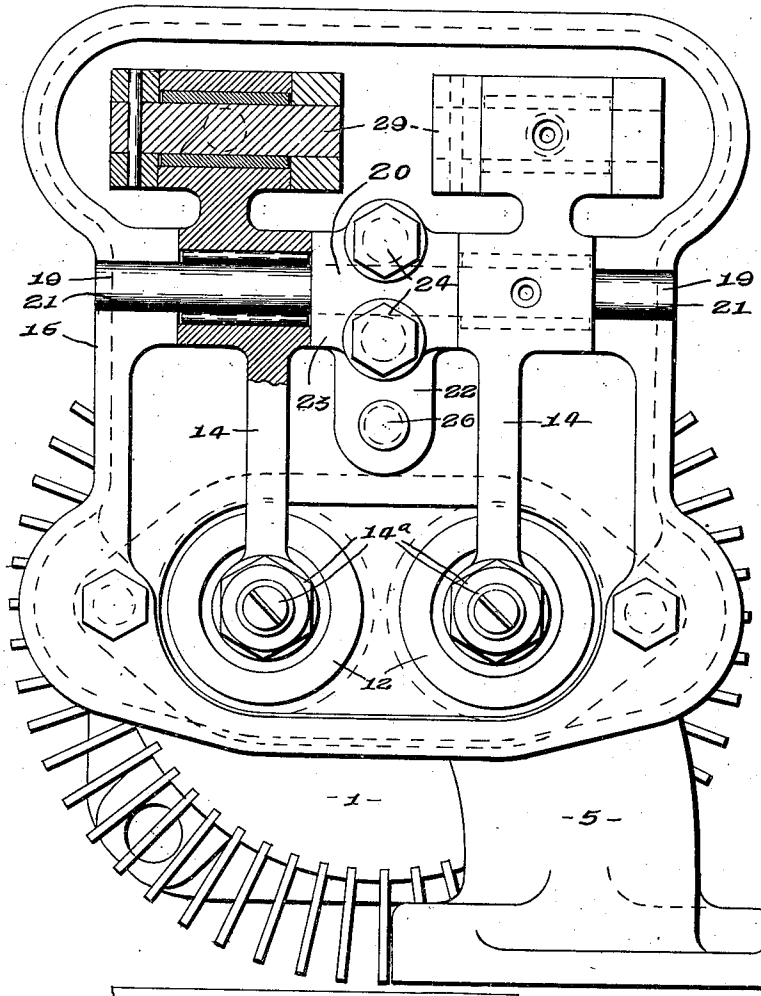
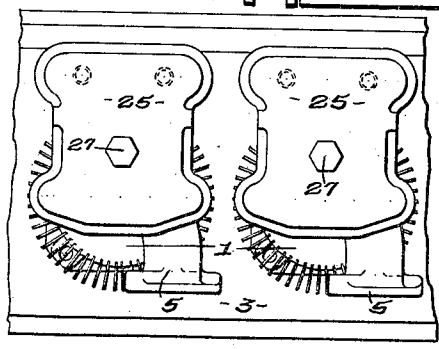


Fig. 4.



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4 SHEETS—SHEET 4.

Fig. 5.

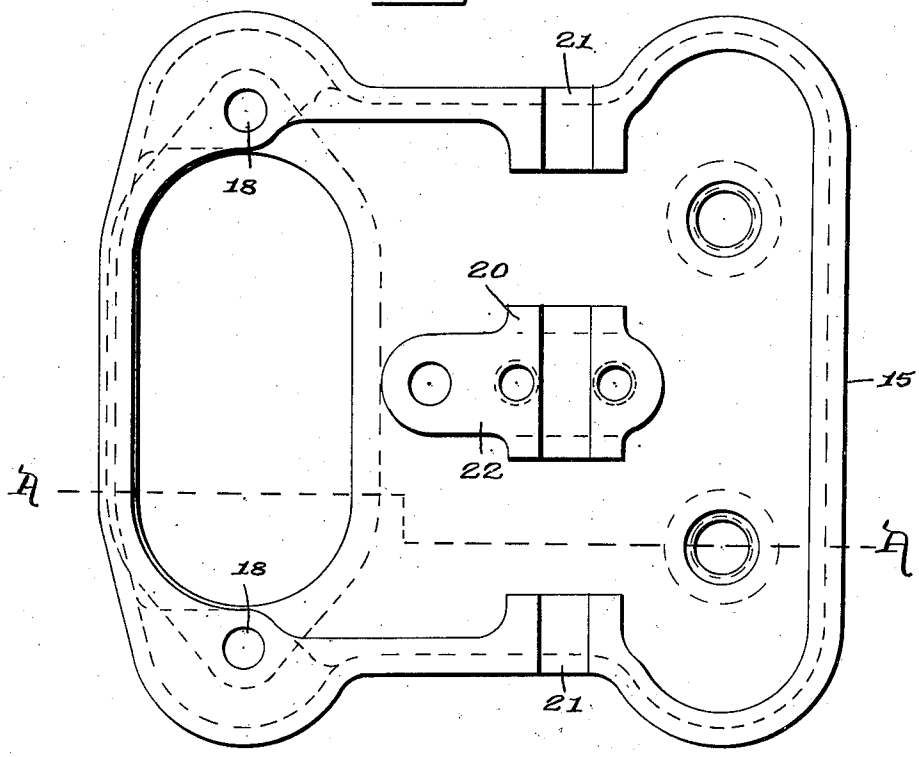
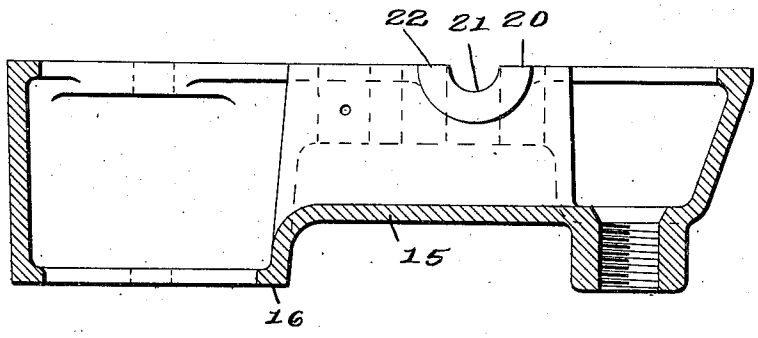


Fig. 6.



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UNITED STATES PATENT OFFICE.

ARTHUR HOLMES, OF SYRACUSE, NEW YORK, ASSIGNOR TO H. H. FRANKLIN MANUFACTURING COMPANY, OF SYRACUSE, NEW YORK, A CORPORATION OF NEW YORK.

VALVE-MECHANISM SUPPORT.

1,352,897. Specification of Letters Patent. Patented Sept. 14, 1920.

Application filed January 19, 1914. Serial No. 813,084.

To all whom it may concern:

Be it known that I, ARTHUR HOLMES, a citizen of the United States, and a resident of Syracuse, in the county of Onondaga and State of New York, have invented a certain new and useful Valve-Mechanism Support, of which the following is a specification.

This invention has for its object a particularly simple and efficient means for supporting and inclosing the valve mechanism of an internal combustion engine, whereby the operation thereof is not materially affected by the expansion and contraction of the engine cylinder; and the invention consists in the novel combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings, in which like characters designate corresponding parts in all the views.

Figure 1 is a longitudinal sectional view of an engine, partly broken away, embodying a preferable form of my invention.

Fig. 2 is a plan of the cylinder of the engine.

Fig. 3 is an elevation thereof, a portion of the casing for the valve mechanism being shown.

Fig. 4 is a plan view illustrating the casing individual to the valve operating mechanism of each cylinder.

Fig. 5 is a plan view of the base of the casing.

Fig. 6 is a sectional view on line A—A, Fig. 5.

Fig. 7 is a plan view of the base of the casing with parts of the valve mechanism thereof.

This invention comprises, generally, a casing individual to the valve operating mechanism of each cylinder and completely inclosing the same. The invention further includes a support for the valve operating mechanism, which support is carried partly by a hot portion of the engine, as the cylinder, and partly by a cold portion thereof, as the crank casing or any part other than the cylinder, whereby owing to the unequal expansion of the parts carried by the hot cylinder and cold portions of the engine, the parts remain in juxtaposition when the cylinder becomes heated. The support is usually the casing for the valve mechanism.

The valve mechanism includes inlet and exhaust puppet valves carried in the head of the cylinder and projecting above the head of the cylinder, and the valve operating mechanism includes rocker arms pivoted between their ends to the support or casing, each rocker arm coacting at one end with the stem of one of the valves and being pivoted at its other end to a link or lifter rod which is actuated by the cam shaft of the engine. Preferably, the casing or support entirely incloses the valve stems and the rocker arms and the links, and a portion of the casing is carried by the head of the cylinder and hence shifted upwardly slightly by the expansion of the cylinder, and another portion thereof extends laterally from the point of securement of the cylinder head and the casing, and overhangs the cylinder, the overhanging portion being supported near its outer side by a cold part of the engine, as the crank casing, so that it is not subject to the expansion of the engine cylinder, and hence retards or neutralizes any movement of the casing due to the expansion of the cylinder or casing supporting the rocker arms. The pivots of the rocker arms are supported by the casing between the point of securement of the casing to the cylinder and the outer side of the overhanging part of the casing near, but preferably not at, the neutral point where there is no movement due to expansion and contraction of the engine cylinder.

1 are the cylinders, 2 is the piston movable in each cylinder, and 3 the crank casing. 4 and 5 are inlet and exhaust ports opening into the head of the cylinder and terminating in valve seats 6, the ports 4, 5 extending laterally in opposite directions for connection with the intake pipe or yoke and the exhaust pipe 8 is an exhaust valve. The inlet valve is a duplicate of the valve 8, and is located directly behind the valve 8, (Fig. 1).

The inlet and exhaust valves are puppet valves having stems 10 extending upwardly above the head of the cylinder and above the ports 4, 5 these valves being held against their seats by springs 11 encircling the stems 10, and pressing upwardly against annular collars 12 thereon. The cylinder is also formed with an upwardly facing bearing face 13 around the valve stem openings.

14 are rocking members or rocker arms

for actuating the valve stems 10, said members preferably having adjustable parts 14ª at their free ends, which engage the upper ends of the valve stems. 15 is the lower section or base of the support of casing, said section having a bearing face 16 complemental to the face 13 and secured thereto in any suitable manner, as by screws extending through holes 17 and 18 in the bearing faces 13 and 16, respectively. The base incloses the springs 11 and the valve stems, and extends laterally from its supporting face 16 and supports the pivots for the rocker arms 14. These rocker arms are preferably arranged in axial alinement and are mounted on the shaft or pivot 19 which is mounted in a bearing 20 located midway between the sides of the base 15, the ends of the pivot or shaft 19 being arranged in openings 21 formed in opposite sides of the base. The bearing 20 is split and formed partly in a block 22 and includes an upper removable section 23 which is held in position by cap screws 24.

25 is a cap mounted on the base and held in position by a single fastening member 26 consisting of a threaded stem rising from the bearing block 22 and extending through a hole in the cap 25 and upon the upper end of which stem 26 a nut 27 turns. There is one support including base 15, and cap 20 for each cylinder which is independent of the support of the other cylinders

28 are reciprocating links or lifter rods, each of which is pivoted at 29 to the end of one rocker arm 14 and which extends downwardly and carries a lifter at its lower end which coacts with a cam 30 on the cam shaft of the engine, in the ordinary manner.

31 are tubes inclosing the rods 28 and fixed at their upper ends at 32 to the overhanging portions of the casing 15 and at their lower ends to the crank casing 3, the tubes constituting posts which partly support the overhanging portion of the casing 15.

In operation, it is desired to keep a certain amount of clearance between the rocker arms 14 or the bearing parts 14ª thereof, and the valve stems 10 in order that the valves may at all times have space to seat and also in order that substantially the same clearance be maintained at all times. As the rods 28 are pivoted to the rocker arms 14, obviously, upon the expansion of the engine cylinder the axes of the rocker arms 14 would be raised if said rocker arms were carried by the head of the cylinder or by supports carried wholly by the cylinder, while the outer ends of the rocker arms would be prevented from raising with the rocker arms owing to the fact that the rods 28 are pivoted thereto. Hence, when the rocker arms are mounted on the head of the cylinder, as the cylinder expands, the axes of the rocker arms are carried upwardly and the ends thereof which coact with the valve stems carried farther away from the ends of said stems than desired leaving a clearance greater than desired between the rocker arms and the valves.

By my construction, the clearance remains practically the same as the rocker arms are carried by a support which is carried partly by a hot portion of the cylinder and partly by a cold portion of the engine and the axes of the rocker arms are located so that there is only sufficient pivotal movement of the rocker arms to compensate for the lengthening of the valve stems due to the expansion thereof and of the cylinder.

What I claim is:—

1. In an internal combustion engine, the combination of a cylinder having inlet and exhaust passages, valves controlling said passages, valve operating mechanism, and a support for said mechanism carried at points spaced apart by the cylinder and a portion of the engine less subject to the heat of the engine than the cylinder, said support being mounted directly on the cylinder and spaced apart from the inlet and exhaust pipes, substantially as and for the purpose described.

2. In an internal combustion engine, a cylinder, inlet and exhaust passages, valves located in the heads of the cylinders, a cam shaft supported by another part of the engine, valve operating mechanism between the cam shaft and the valves, the mechanism for each valve comprising a rocker arm, and a support for the rocker arm carried by both the cylinder and said part and connected to the cylinder and said part at spaced apart points, the rocker arm being pivoted to the support between such spaced apart points, substantially as and for the purpose specified.

3. In an internal combustion engine, cylinders having inlet and exhaust passages, valves located in the heads of the cylinders, a cam shaft supported by another part of the engine, valves controlling said passages, valve operating mechanism between the cam shaft and the valve the mechanism for each valve including a rocker arm pivoted between its ends and coacting at one end with its valve and a lifter rod coacting with the other end of the rocker arm and with the cam shaft, and a support for the rocker arms associated with each cylinder, said support being individual to said cylinder and independent of the supports of the rocker arms connected to the other cylinders, each support being mounted at spaced apart points on the cylinder head and on another part of the engine, less subject to the heat of the engine than said cylinder, and the rocker arms being pivoted to the support between the points at which the support is mounted, substantially as and for the purpose set forth.

4. In an internal combustion engine, the

combination of a cylinder having inlet and exhaust passages, valves controlling said passages, valve operating mechanism, and a support for said mechanism mounted at points spaced apart on the cylinder and on a portion of the engine less subject to the heat of the engine than the cylinder, said support being mounted directly on the cylinder and spaced apart from the inlet and exhaust pipes, the valve operating mechanism including a rocker arm pivoted between its ends to the support between the spaced apart points on which said support is mounted, substantially as and for the purpose described.

5. In an internal combustion engine, cylinders having inlet and exhaust passages, valves controlling said passages, valve operating mechanism for the valves of each cylinder including rocker arms pivoted between their ends, one arm of each coacting with the stem of one of the valves and means for actuating each arm pivoted to the other arm thereof, a casing for the rocker arms of each cylinder, the casing of each cylinder being supported independently of those of the other cylinders, and each being mounted partly on the cylinder and partly on a portion of the engine less subject to the heat of the engine than the cylinder, substantially as and for the purpose specified.

6. In an internal combustion engine, a cylinder having inlet and exhaust passages in the head thereof, valves controlling said passages, and having stems projecting above the head, means for actuating the valves including rock arms above the head of the cylinder and pivoted between their ends and coacting at like ends with the valve stems, lifter rods connected to the other ends of the rock arms, a support for the rock arms including a section mounted on the head of the cylinder adjacent the valve stem and extending laterally from its point of securement to the cylinder and overhanging the head of the cylinder, said support being mounted directly on the cylinder and spaced apart from the inlet and exhaust pipes, and a part supporting the outer end of said section and mounted at its lower end on the crank casing and connected at its other end to said section, the pivots of the rock arms being supported by said section between the points of securement of the section to the cylinder and to said part, substantially as and for the purpose set forth.

7. An internal combustion engine comprising a cylinder having inlet and exhaust passages, valve openings in its head, and external bearing faces around the valve openings, valves for controlling said passages, the valves being carried in the valve openings and having stems extending beyond the bearing faces, a support mounted on the bearing faces and extending laterally therefrom, a post rising from the crank casing and carrying said support at its outer end, rocker arms mounted on the support between the points at which the support is carried by the cylinder and by the post, corresponding arms of the rocker arms engaging the valve stems and lifter rods coacting with the other arms of the rocker arms, substantially as and for the purpose described.

8. An internal combustion engine comprising a cylinder having inlet and exhaust passages and valve openings in its head, and external bearing faces around the valve openings, valves for controlling said passages, the valves being carried in the valve openings and having stems extending beyond the bearing faces, a support mounted on the bearing faces and extending laterally therefrom, said support being mounted directly on the cylinder and spaced apart from the inlet and exhaust pipes, a post rising from the crank casing and carrying said support at its outer end, rocker arms mounted on the support between the points at which the support is carried by the cylinder and by the post, corresponding arms of the rocker arms engaging the valve stems, lifter rods coacting with the other arms of the rocker arms, and a cap covering the rocker arms and being mounted on said support, substantially as and for the purpose specified.

9. An internal combustion engine comprising a cylinder having inlet and exhaust passages, valve openings in its head, and external bearing faces around the valve openings, valves for controlling said passages, the valves being carried in the valve openings and having stems extending beyond the bearing faces, a support mounted on the bearing faces and extending laterally therefrom, a post rising from the crank casing and carrying said support at its outer end, rocker arms mounted on the support between the points at which the support is carried by the cylinder and by the post, corresponding arms of the rocker arms engaging the valve stems, lifter rods coacting with the other arms of the rocker arms, and a cap covering the rocker arms and being mounted on said support, the cap and the support having bearings formed between them for the pivots of the rocker arms whereby upon detachment of the cap the rocker arms are removable from their pivot bearings, substantially as and for the purpose set forth.

10. In an internal combustion engine, a plurality of cylinders, valves supported by the cylinders, and mechanism for operating the valves including rocker arms, supports for the rocker arms, the supports being individual to the cylinder, each support being carried by its companion cylinder and by another part of the engine less subject to heat than the cylinder and being supported entirely independent of the rocker arms of

the other cylinders, substantially as and for the purpose described.

11. In an internal combustion engine, a cylinder, inlet and exhaust valves mounted on the head of the cylinder and having stems projecting above the head, the head being formed with an upwardly facing bearing face around the valve stem openings, a casing including a base and a cap mounted on the base, the base having a bearing face complemental to the bearing face of the head and secured thereto, the base extending laterally from the bearing face and overhanging the head and being formed with a bearing in its overhanging portion, a shaft held in the bearing, and rocking members mounted on the shaft and coacting at corresponding ends with the valve stems, rods pivoted to the other ends of the rocking members, and tubes inclosing the rods and connected at their upper ends to the overhanging portion of the base and at their lower ends to the crank casing of the engine, substantially as and for the purpose specified.

In testimony whereof, I have hereunto signed my name in the presence of two attesting witnesses, at Syracuse, in the county of Onondaga, in the State of New York, this first day of January, 1914.

ARTHUR HOLMES.

Witnesses:
R. C. SCHAFER,
C. E. HULL.