July 3, 1934. R. S. MOORE 1,965,466

VALVE MECHANISM FOR INTERNAL COMBUSTION ENGINES

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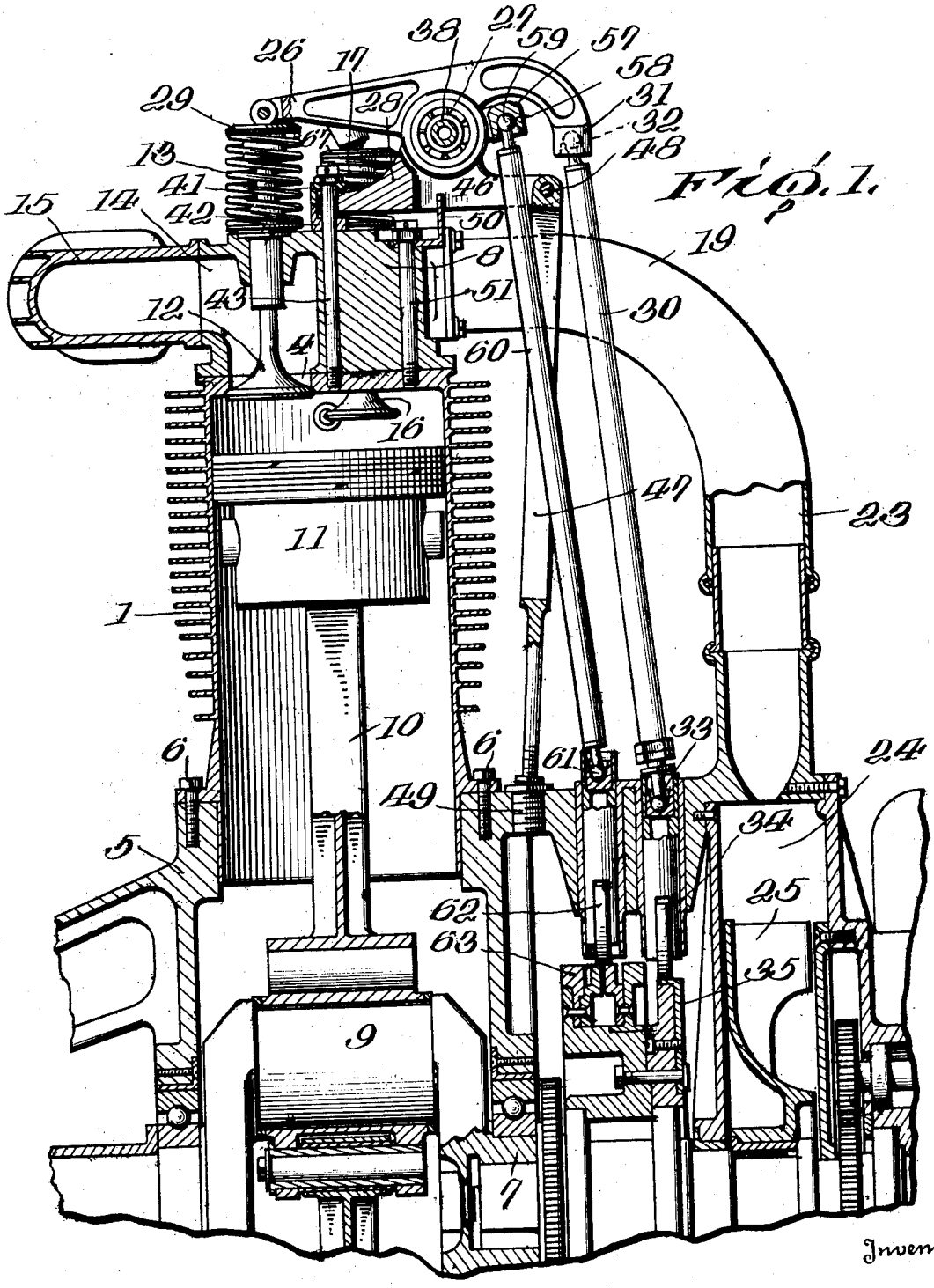

FIG. 1.

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Fig. 2.

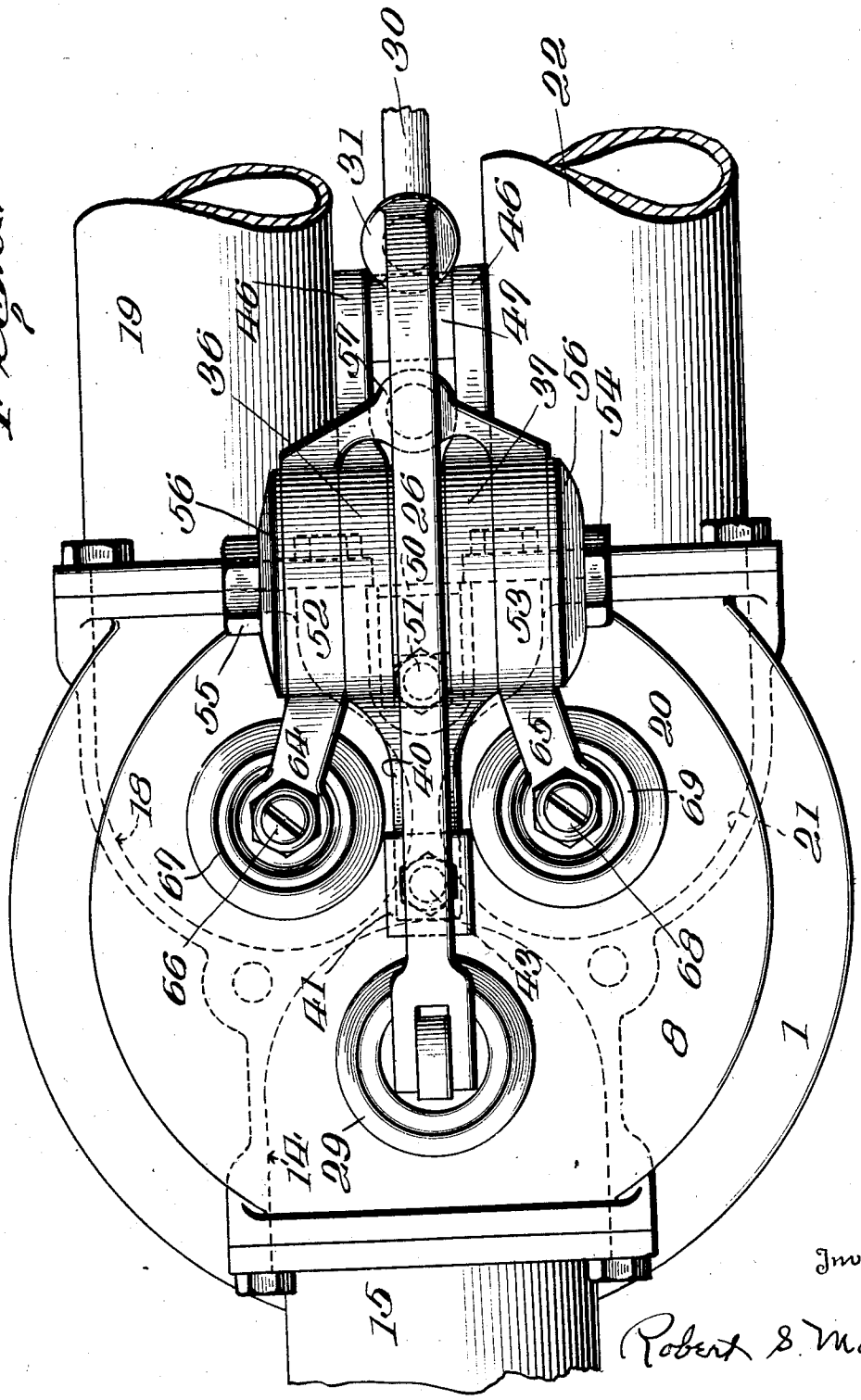

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Fig. 6.

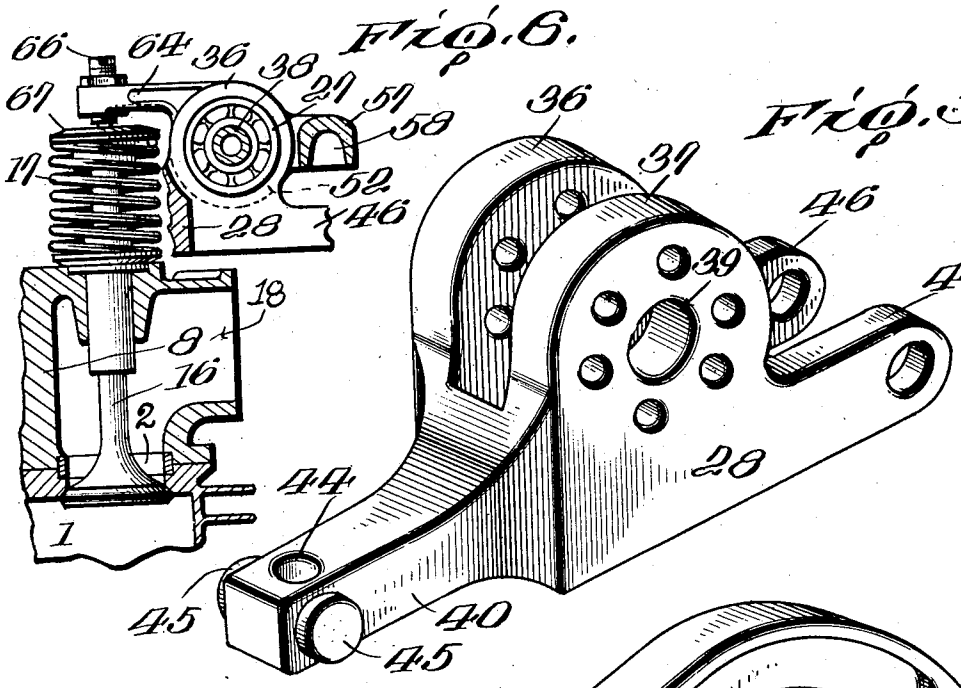


Fig. 3.

Fig. 4.

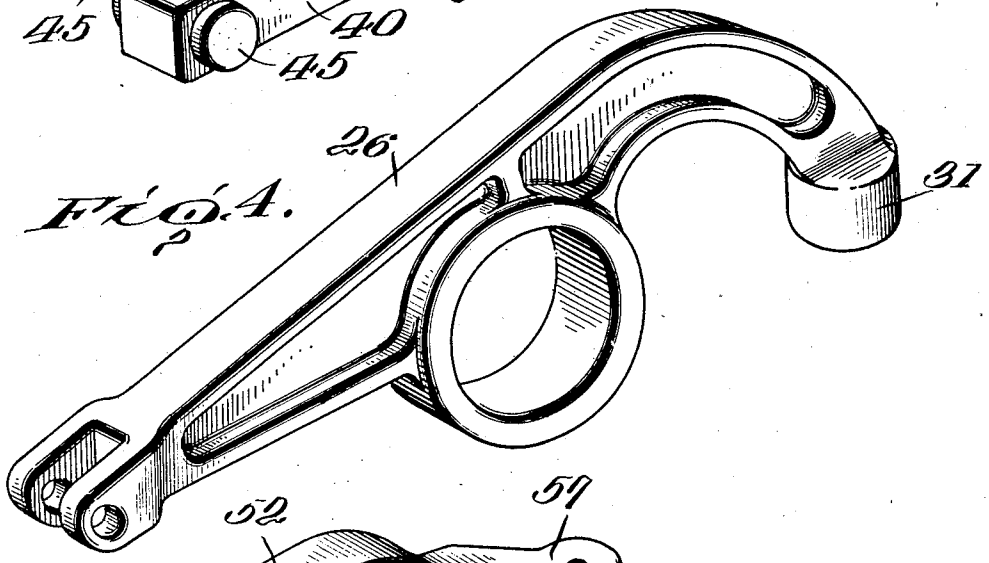
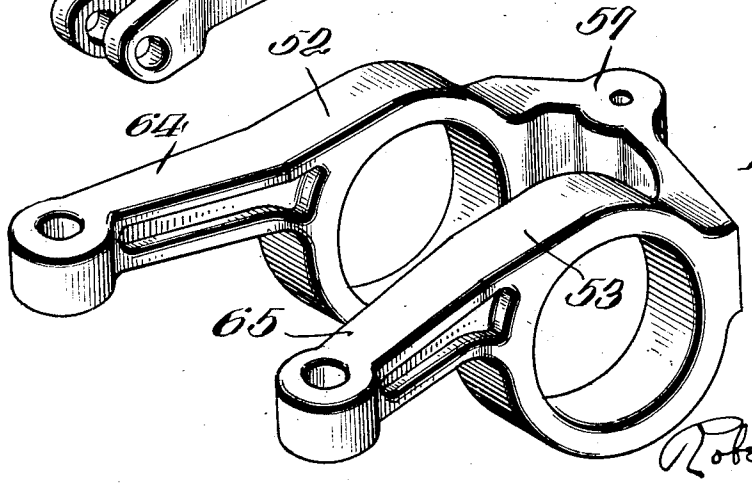


Fig. 5.



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UNITED STATES PATENT OFFICE

1,965,466

VALVE MECHANISM FOR INTERNAL COMBUSTION ENGINES

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Application March 1, 1933, Serial No. 659,224

2 Claims. (Cl. 123—90)

The invention relates to new and useful improvements in a valve mechanism for internal combustion engines and more particularly to the mounting for the valve rockers.

An object of the invention is to provide a valve mechanism wherein the bracket supporting the rockers is so mounted as to be shifted, by the expansion of the cylinder head incident to the heat of combustion, to maintain the clearance between the valve stems and the rockers substantially uniform.

In the drawings:

Figure 1 is a sectional view longitudinally and centrally of one of the cylinders of an engine embodying the improvements.

Figure 2 is an enlarged plan view of a portion of the same.

The present invention has to do with a valve operating mechanism for internal combustion engines, and more particularly to the manner of mounting the bracket supporting the rockers which control the valves.

As illustrated in the drawings the combustion engine includes a cylinder 1, provided with two intake ports and one exhaust port. The centers of these ports are arranged so that lines connecting the same form an isosceles triangle with the centers of the intake ports at the base of the triangle. I have found the best results are obtained when the ports are so dimensioned that the combined area of the intake ports is greater than the area of the exhaust port and the area of the the exhaust port is greater than the area of either intake port. The particular arrangement of the ports and the relative dimensions of the same form no part of the present invention per se, but is the subject of my co-pending divisional application, Serial No. 670,195, filed May 9, 1933, Patent No. 1,915,237.

The cylinder 1 is shown in Figure 1 as attached to the engine casing 5 through suitable bolts 6, 6. The engine is illustrated as of the poultice head type. This type of engine is shown, described and claimed in my prior Patent #1,820,475 granted August 25, 1931, and detail description thereof is not thought necessary. The exhaust port 4 is shown in Figure 1 of the drawings, and the section through the head is between the intake ports. The poultice head 8 is attached to the cylinder head and serves as a connection for the intake manifold and the exhaust manifold, a support for the valves, the springs closing the same, and the rockers which control the valves.

Within the casing 5 is the main shaft 7 which has a crank 9 associated with the cylinder 1. A piston rod 10 engages the crank and is connected to the piston 11.

The exhaust port 4 is controlled by a valve 12. Surrounding the stem of the valve 12 is a spring 13 of the usual type which maintains the valve in its closed position. Leading from this exhaust port 4 is an L-shaped port 14 in the poultice head 8, and the exhaust manifold 15 is connected to the poultice head so that the gases passing through this port 14 are led into this manifold. Controlling the intake port 2 is a valve 16 which is supported by a valve stem sliding in the poultice head and raised to closed position by a spring 17. The valve port 2 as shown in broken lines in Figure 2 leads to an L-shaped port 18. Connected to the poultice head 8 is an intake manifold pipe 19 which supplies fuel gas to the intake port 2. The intake port 3 is controlled by a similar valve which may be indicated in general by the reference numeral 20. There is a similar spring which normally holds this valve closed. There is an L-shaped port leading from the intake port 3 which is indicated at 21 in Figure 2 of the drawings, and this intake port is supplied with fuel gas from the manifold pipe 22. The intake manifold pipe 19 and the intake manifold pipe 22 are connected to a common intake manifold pipe 23. The intake manifold pipe 23 is connected with a fuel supply chamber 24 in which is located a fuel gas distributor 25. When the intake ports are open fuel gas is supplied through this intake manifold pipe 23 to the branch pipes 19 and 22, and thus equally through the intake ports to the combustion chamber of the engine cylinder.

The exhaust valve is opened by means of a rocker 26 which is pivotally supported on a bearing 27 mounted in a bracket 28, said rocker bears on the outer end of a disk 29 carried by the valve stem supporting the valve 12. When said rocker is turned in a counter-clockwise direction as viewed in Figure 1, the exhaust valve will be opened. The rocker is actuated by means of a rod 30 carrying a ball stud 31 at its upper end fitting in a socket 32 in the end of the rocker 26. This rod at its lower end engages a tappet 33 carrying a roller 34 bearing on a cam 35. Said rod 30 has adjustably attached thereto a projecting ball stud which engages a socket in the tappet 33. As the cam rotates, the tappet will be raised and lowered, and this will cause the exhaust valve to be positively opened and permit it to be closed under the action of the spring. The bracket 28 is shown in perspective in Figure 5 of the drawings. Said bracket is provided with spaced bearing portions 36 and 37. The rocker 26 lies between these bearing portions and is supported by the bearing sleeve which in turn is carried by a supporting pin 38 extending through the openings 39, 39 in the bearing members 36 and 37 of the bracket. This bracket 28 has a forwardly projecting arm 40 which extends between two bearing blocks 41 and 42 secured to the poultice head and the engine cylinder by a bolt 43. The arm has an open-

ing 44 therethrough and the bolt passes through this opening. The bracket has laterally projecting trunnions 45 which engage recesses in the bearing blocks 41 and 42. The opening 44 is of sufficient size so as to allow a slight rocking movement of the bracket which is trunnioned on these supporting blocks, while the supporting blocks are in turn rigidly clamped to the engine cylinder. The bracket 28 at its other end is provided with spaced projecting arms 46. A bar 47 extends between the arms 46, 46 and is pivotally connected to the bracket by a pin 48 which pass through the upper end of the bar 47 and through the two arms 46, 46. This bar 47, at its lower end, is connected to a stud member 49 which may be adjusted in the engine casing for setting the bracket in the desired position. There is a plate 50 bolted to the engine by bolts 51 which project upwardly between the arms 46, 46, but said plate merely serves to prevent lateral movement of the bracket. By removing the bolt 43 the bracket may be lifted from the engine cylinder, carrying with it the rocker 26 which is readily disconnected from the rod 30. The rod 47 bears on the adjustable stud 49 and can be readily disconnected therefrom. The rod 47 carries an adjustable ball stud which engages a socket in the supporting stud 49.

The intake valves are operated from a common rocker which is in the form of a yoke. Said rocker is provided with spaced bearing members 52 and 53. These bearing members are spaced so that they will receive the members 36 and 37 of the bracket therebetween. Bearing sleeves are located within these members 52, 53 and are mounted on the supporting pin 38. This supporting pin is in the form of a sleeve and a headed bolt 54 passes therethrough, and a nut 55 on the other end thereof clamps the bearing plates 56, 56 against the end of the sleeve, and this holds the bearings in the bracket and the rockers assembled on the bracket so that they may freely rock thereon. The members 52, 53 are connected by the yoke member 57, and this yoke member 57 is provided with a recess 58 which receives a ball stud 59 at the upper end of a rod 60. This rod 60 bears on the tappet 61 which carries a roller 62 engaging a sectional control cam 63. Said rod 60 carries a ball stud at the lower end thereof which engages the socket in the tappet 61. The members 52, 53 carry respectively arms 64 and 65. The arm 64 is provided with an adjustable stud 66 which engages a disk 67 carried at the upper end of the valve stem controlling the intake valve for the intake port 2 indicated at 2. The arm 65 carries a stud 68 which engages a disk 69 at the upper end of the valve stem controlling the valve for the intake port indicated at 3. This rocker controlling the intake ports operate simultaneously on both of the intake ports. Inasmuch as the rocker merely has a bearing engagement with the upper ends of the valve stems and a stud and socket connection with the rod 60, the bracket 28 with the two rockers assembled thereon can be readily removed as a unit or replaced whenever desired. The rod 47 supporting the outer end of the bracket is provided with a slot so that the rod 60 operating the rocker for the intake valves passes through said slot and has a connection with the rocker centrally of the yoke.

By adjusting the stud 49 the position of the bracket may be raised or lowered slightly. Any expansion of the metal parts incident to the heat of the exploded gases will raise or lower the bracket through its single point connection with the blocks 41 and 42, and thus maintain a uniform clearance space between the rockers and the valve stems. The bracket is raised and lowered by the permissive turning of the bracket on the pin 48 connecting the bracket to the rod 47.

From the above it will be noted that a mounting for the valve mechanism has been provided wherein the supporting bracket is not only shifted to compensate for the shifting of the valves due to the expansion of the cylinder head under heat, but said supporting bracket is guided in its shifting movements and is always maintained in a fixed vertical plane so as not to in any way disturb the action of the valve rockers. It will further be noted that there is a single point of connection between the supporting bracket for the rockers and the head of the cylinder which reduces to a minimum the weakening of the cylinder head.

It is obvious that minor changes in the details of construction and the arrangement of the parts may be made without departing from the spirit of the invention as set forth in the appended claims.

Having thus described the invention, what I claim as new and desire to secure by Letters-Patent, is—

1. A valve compensating mechanism for internal combustion engines including in combination a cylinder having intake and exhaust ports in the head hereof, a valve for controlling each port, a spring associated with each valve, rockers for operating the valves, a bracket for supporting the rockers, means for securing one end of said bracket to the head of the cylinder at a point adjacent the valves, means for securing the other end of said bracket to a cooler portion of the engine so as to be relatively non-expansible, said bracket having spaced vertical walls, a bar attached to the cylinder head and extending between said vertical walls and contacting therewith so as to prevent lateral movement of said bracket on the means for securing the same to the cylinder head.

2. A valve compensating mechanism for internal combustion engines including in combination a cylinder having intake and exhaust ports in the head thereof, a valve for controlling each port, a spring associated with each valve, rockers for operating the valves, a bracket for supporting the rockers, means for pivotally attaching the inner end of said bracket to the cylinder head so as to permit said bracket to move about said pivot in a vertical plane including clamping means for securing the pivotal means to the cylinder head, means for securing the outer end of said bracket to a cooler portion of the engine so as to be relatively non-expansible, said bracket having spaced vertical walls, a bar attached to the cylinder head extending between said vertical walls and contacting therewith so as to prevent lateral movement of said bracket on the means for securing the same to the cylinder head.

ROBERT S. MOORE.