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VALVE MECHANISM FOR THE CYLINDERS OF INTERNAL COMBUSTION ENGINES

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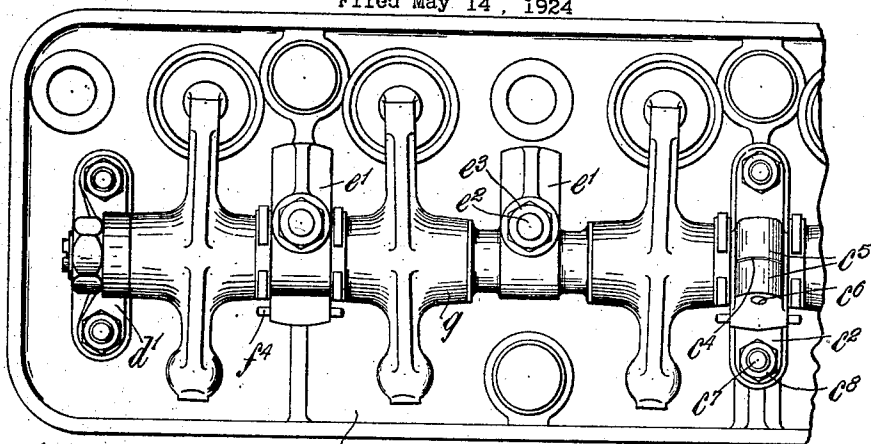


Fig. 1.

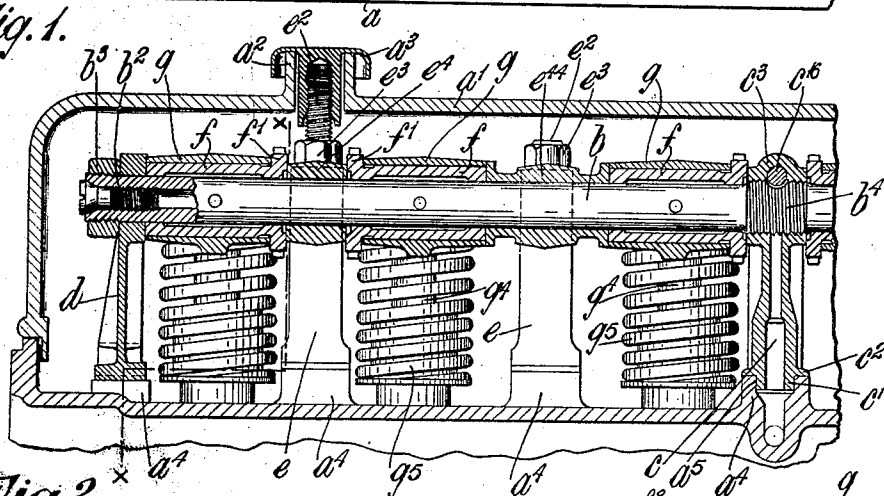


Fig. 2.

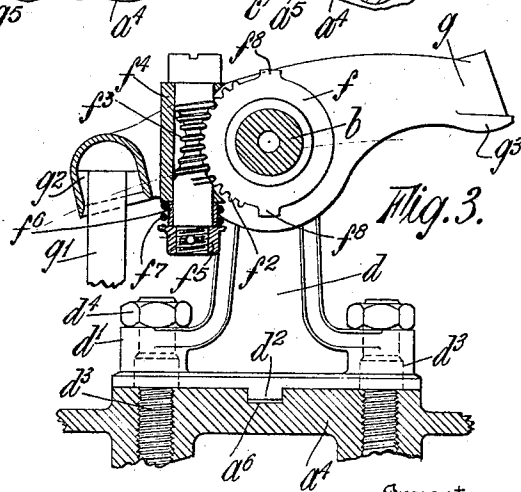


Fig. 3.

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UNITED STATES PATENT OFFICE.

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VALVE MECHANISM FOR THE CYLINDERS OF INTERNAL-COMBUSTION ENGINES.

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To all whom it may concern:

Be it known that I, FREDERICK HENRY ROYCE, residing at Derby, England, a subject of the King of Great Britain and Ireland, have invented certain new and useful Improvements in Valve Mechanism for the Cylinders of Internal-Combustion Engines, of which the following is a specification.

This invention has reference to the mechanism actuating the cylinder valves of internal combustion engines. In most such engines the valves are of the mushroom type and are actuated by a lever (commonly called a "rocker") one arm of which is in working contact with a cam or push rod actuated from the engine while the other arm is in working contact with the stem of the valve which it moves against the reaction of a spring.

It is of importance to secure a very accurate adjustment of the rocker lever to bring about the correct movement of the valve end at the same time to leave substantially no slack between the arm of the rocker lever on the one hand, and the cam or push rod or the stem of the valve on the other hand.

To secure this end means have been proposed which usually take the form of an adjusting device on the push rod or on the rocker, and in some devices the fulcrum of the rocker has been mounted on an eccentric bush by the rotation of which the movements of the rocker can be finely adjusted. In all such devices however the adjusting device has either caused a slight radial derangement which has had to be estimated and allowed for thus introducing an element of uncertainty and difficulty in the adjustment, or has added weight to moving parts which is objectionable.

The object of this invention is to improve on the valve adjusting devices heretofore adopted.

According to this invention, broadly stated each rocker is mounted on an eccentric bush, these bushes being mounted on a common shaft, and when the bushes have been accurately adjusted they are clamped axially.

An embodiment of the invention is shown in the accompanying drawings in which: Fig. 1 is a partial plan view of the cylinder head of a multi-cylinder internal combustion

engine with the valve gear casing removed; Fig. 2 is a sectional elevation of Fig. 1 on the centre line of the rocker shaft, the casing being in position, and Fig. 3 is an enlarged sectional elevation on line X—X of Fig. 2 viewed from the right hand end of said figure.

In said drawings *a* designates the head of the cylinders and *a*¹ the casing having two upturned openings *a*² (one only shown) one at each end. *a*³ designate threaded nuts engaging an extension of two of the threaded studs hereinafter referred to for the purpose of securing the casing *a*¹ to the cylinder head; *a*⁴ designate flat-topped projections on the cylinder head to receive the feet or bases of the brackets *c* hereinafter referred to and *a*⁵ is a socket formed in a projection *a*⁴ to receive a central bracket hereinafter described. *a*⁶ (Fig. 3) designate grooves formed in the projections *a*⁴ to receive the end brackets hereinafter described.

b designates a hollow shaft held in the said central bracket said shaft being threaded at both ends and having its central part of larger diameter and also threaded as at *b*⁴; *b*² designates a screw or plug to close the end of the hollow shaft *b* and *b*³ is a nut to finally tighten and secure the parts mentioned.

c is a central bracket formed with a dowell projection *c*¹ which fits in the socket *a*⁵ and having extending feet *c*² resting on the aforesaid projections *a*⁴. The said bracket is provided at its upper end with an annular head *c*³ internally threaded into which the central portion *b*⁴ of the shaft *b* is screwed. From the top of the bracket downward there is an axial split or saw-cut *c*⁴ and on each side of same are bosses *c*⁵ having registering holes *c*⁶ therethrough, through which holes is passed a threaded bolt *c*¹⁰ furnished with means such as a nut (not shown) to tighten the annular head *c*³ on the shaft *b*; *c*⁷ are threaded studs screwed into and extending from the projections *a*⁴ on the cylinder head and passing through holes in the feet of the bracket and *c*⁸ are nuts which secure the bracket in position.

d designates an end bracket (there being a similar one at the other end) with extended feet *d*¹ bearing on the end projection *a*⁴ of the cylinder head and formed with a tongue *d*² adapted to slide in the groove *a*⁶ of said projections *a*⁴. *d*³ designate

threaded studs screwed into and extending from the projection a^4 passing through clearance holes in the feet d^1 of the bracket d and secured by nuts d^4 .

e designate intermediate brackets each formed with a boss e^1 ; e^2 are threaded studs passing through holes in the said bosses and e^3 are nuts to secure the brackets in position. Between the studs e^2 and the walls of the holes through which they pass sufficient clearance is provided to allow of the required movement. e^4 and e^{44} designate annular heads on these brackets, the head e^{44} being elongated as shown to receive and support the shaft b .

f (Fig. 3) designate eccentric bushes surrounding the shaft b and carrying the valve rockers g . On the periphery of the flange f^1 of the eccentric bush are formed teeth f^2 which engage the threads of a screw f^3 carried in a lug f^4 formed on the adjacent rocker shaft bracket or standard. The lugs are formed on certain of the intermediate brackets for the reception of the adjusting screws. The latter are held in position axially by means of a threaded sleeve f^5 which is screwed and pinned onto the end of the screw f^3 . Between said screwed sleeve and the face of the lug f^4 is a further sleeve f^6 which fits freely upon the parallel portion of the adjusting screw, and is of such length that a suitable axial clearance is allowed to permit the screw to turn freely while between the adjacent ends of said two sleeves is a spring f^7 the object of which is to prevent the screw rattling when the engine is running and ultimately wearing the inter-engaging thread and teeth. Stops f^8 on the bush confine the rotation of the latter within useful limits.

The rockers g are provided with spherical recesses g^2 into which fit the hemispherically headed push rods g^1 and have hardened ends g^3 which abut against the valve stems g^4 which are encircled by spiral springs g^5 .

With the construction above described in assembling the parts the shaft b is screwed into the threaded annular head c^3 of the central bracket c whereupon the other standards or brackets d and e and the rockers g with their bushes f are threaded on said shaft in the correct position. The end clamping screws b^3 are tightened and the complete assembly is then placed on the cylinder head, and clamped in position by the bolts or studs and nuts c^7 , c^8 , d^3 , d^4 , etc., provided. The end and intermediate clamps are then loosened, the bushes f adjusting by turning the screws f^3 in the lugs f^4 and the end and intermediate clamps are then finally screwed up. Owing to the angle of the screw f^3 it is not possible to rotate same by imposing a turning effort on the bush.

From the above description it will be

seen that there is provided a number of suitably shaped standards or brackets each having an annular head through which is threaded the shaft or spindle on which the rockers with their bushes are supported. The center standard or bracket is rigidly bolted to the cylinder head in an unalterable position whilst the two end standards or brackets are arranged with a projecting tongue on their bases each of which engages a groove in the cylinder head so that until clamped as explained each of them is capable of a small amount of lateral movement towards the central standard or bracket. These two standards or brackets are provided with an expanding base through which are bolt holes which fit over the threaded bolts projecting from the cylinder head but with a clearance to enable the desired movement to take place and they are ultimately clamped by screwing the nuts on these bolts as described. The intermediate standards or brackets are each held by a side plug or stud threaded at both ends screwed into and projecting from the cylinder head, passing through a suitably arranged hole in a boss on the standard or bracket with sufficient clearance to enable a small lateral movement and are ultimately clamped with a nut.

With apparatus as described the required fine adjustment can be secured without any increase of weight of any moving parts, and without any disturbance of the adjustment resulting from clamping.

What I claim as my invention and desire to secure by Letters Patent of the United States is:—

1. In valve mechanism for internal combustion engines, the combination of a valve operating member, a rocking element adapted to engage said member, a support on which said rocking member is mounted, an eccentric bush interposed between said rocking member and support and means for applying pressure axially to the bush for securing the same in position.

2. In valve mechanism for internal combustion engines, the combination of a valve operating member, a rocking element adapted to engage said member, a support on which said rocking member is mounted, an eccentric bush interposed between said rocking member and support and means for applying pressure axially to the bush for securing the same in position, said means comprising a non rotatable shaft on which the bush is mounted and having a threaded end, a non rotatable element against which the bush impinges and a nut engaging the threaded end of the shaft.

3. In valve mechanism for internal combustion engines, the combination of a valve operating member for each valve, a rocking element for each valve adapted to engage said member, a single support on which said

rocking members are mounted, eccentric bushes interposed between said rocking members and supports, and means for applying pressure axially but not rotatively to the bushes for maintaining same in position of adjustment.

4. In valve mechanism for internal combustion engines, the combination of a valve operating member, a rocking element adapted to engage said member, a shaft on which said rocking member is mounted, an eccentric bush interposed between said rocking member and shaft, means for applying pressure axially to the bush for securing the same in position, a plurality of brackets supporting the shaft to a certain stationary one of which the shaft is rigidly secured, and means

for adjusting the remaining brackets in line of the shaft.

5. In valve mechanism for internal combustion engines, the combination of a valve operating member, a rocking element adapted to engage said member, a support on which said rocking member is mounted, an eccentric bush interposed between said rocking member and support, screw means for rotatably adjusting the eccentric bush in relation to said support and means for applying pressure axially to the bush for maintaining same in its position of adjustment.

In witness whereof I have signed this specification.

FREDERICK HENRY ROYCE.