Sept. 7, 1926. 1,599,260

J. H. WILLSON

INTERNAL COMBUSTION ENGINE

Filed Nov. 19, 1921

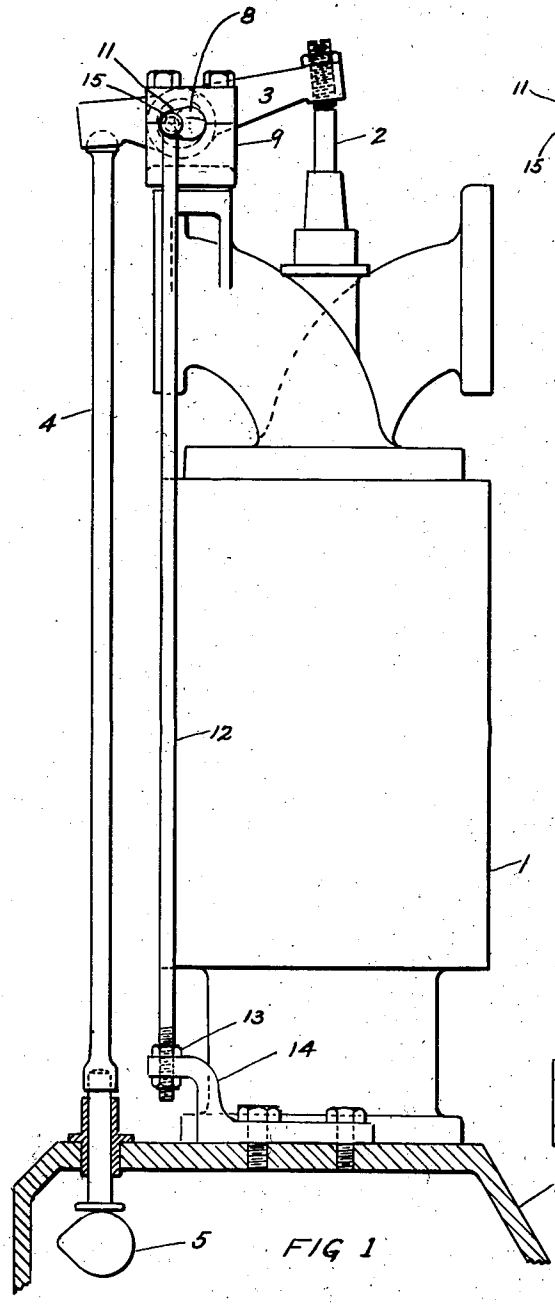


FIG 1

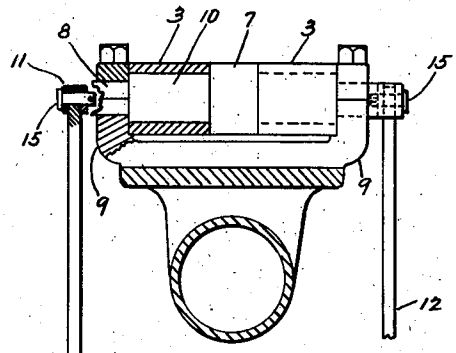
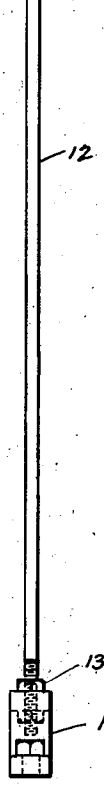


FIG 2



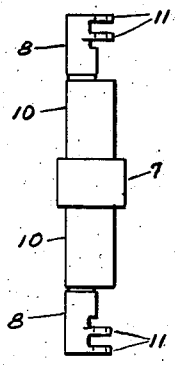


FIG 3

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UNITED STATES PATENT OFFICE.

JOSEPH H. WILLSON, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR, BY MESNE ASSIGNMENTS, TO FOX HOLDING COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF DELAWARE.

INTERNAL-COMBUSTION ENGINE.

Application filed November 19, 1921. Serial No. 516,262.

This invention relates to means for maintaining the correct relation between actuating parts of gas engine valves, particularly between the valve stems and rocker arms which actuate them, for the purpose, primarily, of preventing the usual blow with its accompanying noise and securing a comparatively silent action.

In the operation of internal combustion engines, and especially of the valve in the head type, the heating of the cylinders due to the explosion of the gases therein causes them to expand and move the rocker arms, mounted thereon, away from the push rods for actuating them, thereby increasing the amount of clearance between the two parts beyond that which they have when the engine is cold. Because of this, the engine, which is adjusted to run properly and quietly when cold, produces an objectionable noise when hot, when the rocker arm comes in contact with the valve stems in the act of opening the valve. In air-cooled engines particularly, the expansion that takes place has heretofore been accompanied by such separation between the rocker arms and the valve stems as to involve an inherent defect which is corrected by the present improvements.

These improvements are characterized, in their preferred form, by the use of adjustable eccentric bearings for the rocker arms which act upon the stems of overhead valves, and rods pivotally connected to said bearings whereby they are turned as the cylinders expand under running conditions so that the relations of the arms to and their actions upon the stems are maintained substantially constant.

In the drawings, Fig. 1 is an elevation of the cylinder of an internal combustion engine equipped with the improvements; Fig. 2 is an irregular sectional view taken vertically through the axis of the rocker arms and the connected parts, and Fig. 3 is a detached shaft having eccentric bearings for the rocker arms.

The invention, in the form thereof illustrated in the drawings, is applied to an engine cylinder 1 having the overhead valve stems 2 operated by respective rocker arms 3, the latter being oscillated by the push rods 4, through the action thereon of the cams 5 which revolve in the crank case 6.

In accordance with this invention, a shaft 7 is provided with end journals 8, which are engaged in the bearings 9 carried by the cylinder; with the intermediate cylindrical bearings 10 eccentric to the journals and on which the arms 3 are fulcrumed, and with the arms 11 fixed to the journals for turning them in the bearings 9 and for turning the bearings 10 to elevate or lower the axis of the rocker arms.

Rods 12 are adjustably anchored at one end by the nuts 13 to the brackets 14 fixed to the crank case 6, and are pivotally connected at the other end by the pins 15 to the arms 11. These connecting rods are disposed so that they are not affected substantially or changed in length by temperature changes in the cylinder due to the explosions therein. Therefore, as the cylinder expands under operating conditions, the rods act in compensating relation to cause the desired movement of the shaft 5 about its axis and the adjustment of the bearings 10 on which the rocker arms 3 are fulcrumed.

It will be understood that the nuts 13 are adjusted on the rods 12 (which act in compensating relation to each other) to set the shaft 5 in such position that whether the cylinder is cold or hot the heads 3′ of the rocker arms 3 maintain constantly their desired close relation to the stems 2, the expansion and contraction of the cylinder moving the bearings 9 together with the journals 8 so that the rods 12 act through the arms 11 to turn the shaft 7 with a resulting adjustment of the eccentric bearings 10 and the rocker arms 3 as required to effect their desired action.

Having described my invention, I claim:—

1. In an internal combustion engine, the combination with a valve stem and an actuating arm for the same, of means for automatically adjusting said actuating arm and securing a substantially constant operating relation thereof to said stem, said means comprising a bearing mounted on the engine cylinder, an eccentric fulcrum journalled in said bearing and a rod connected with said fulcrum so as to turn it upon the movement of said bearing by the expansion and contraction of said cylinder.

2. In an internal combustion engine, in combination with the cylinder and the valve stem, of a fulcrum having an eccentric

bearing journalled relatively to said cylinder, a rocker arm mounted on said bearing for actuating said stem, and means comprising an anchored rod pivotally connected to said fulcrum for adjusting the same in accordance with changes in the temperature of said cylinder.

3. In an internal combustion engine, in combination with the cylinder and the valve stem, of a shaft journalled relatively to said cylinder, said shaft provided with an arm and an eccentric bearing, a rocker arm mounted on said bearing for actuating said stem and an anchored rod pivotally connected to said arm, for adjusting said bearing.

4. In an internal combustion engine, in combination with the cylinder provided with journal bearings, valve mechanism comprising stems, and rocker arms having heads for actuating said stems; of a shaft having journals mounted in said bearings, eccentric bearings on which said arms are adapted to rock, and arms for adjusting said eccentric bearings; rods pivotally connected to said arms last named, and means for anchoring said rods.

5. In an internal combustion engine, the combination with the cylinder, a bearing carried by said cylinder, a rocker arm, mechanism comprising a push rod for rocking said arm, and valve mechanism comprising a stem actuated by said rocker arm, of a rocker arm shaft having a journal mounted in said bearing, a bearing eccentric to said journal on which said rocker arm is fulcrumed, and means for effecting the automatic adjustment of said shaft upon the movement of said bearing first named by the expansion of said cylinder and the adjustment of the fulcrum of said arm so as to maintain a substantially constant relation between said arm and rod.

6. In an internal combustion engine, the combination with an expansible cylinder and valve mechanism carried thereby, of a fulcrumed rock-shaft for operating said valve mechanism, and automatic means for moving the fulcrum of said rock shaft counter to the movement of the head of said cylinder due to contraction and expansion of said cylinder.

7. In an internal combustion engine the combination with an expansible cylinder and valve mechanism carried thereby, of a rocker arm for operating said valve mechanism, a revoluble shaft having a surface eccentric to its axis of rotation, said rocker arm being fulcrumed on said shaft, and an anchorage independent of the expansion and contraction of said cylinder and connected with said shaft so as to rotate the same upon the expansion or contraction of said cylinder.

Signed at Pitman, in the county of Gloucester, and State of New Jersey, this 12th day of November, 1921.

JOSEPH H. WILLSON.