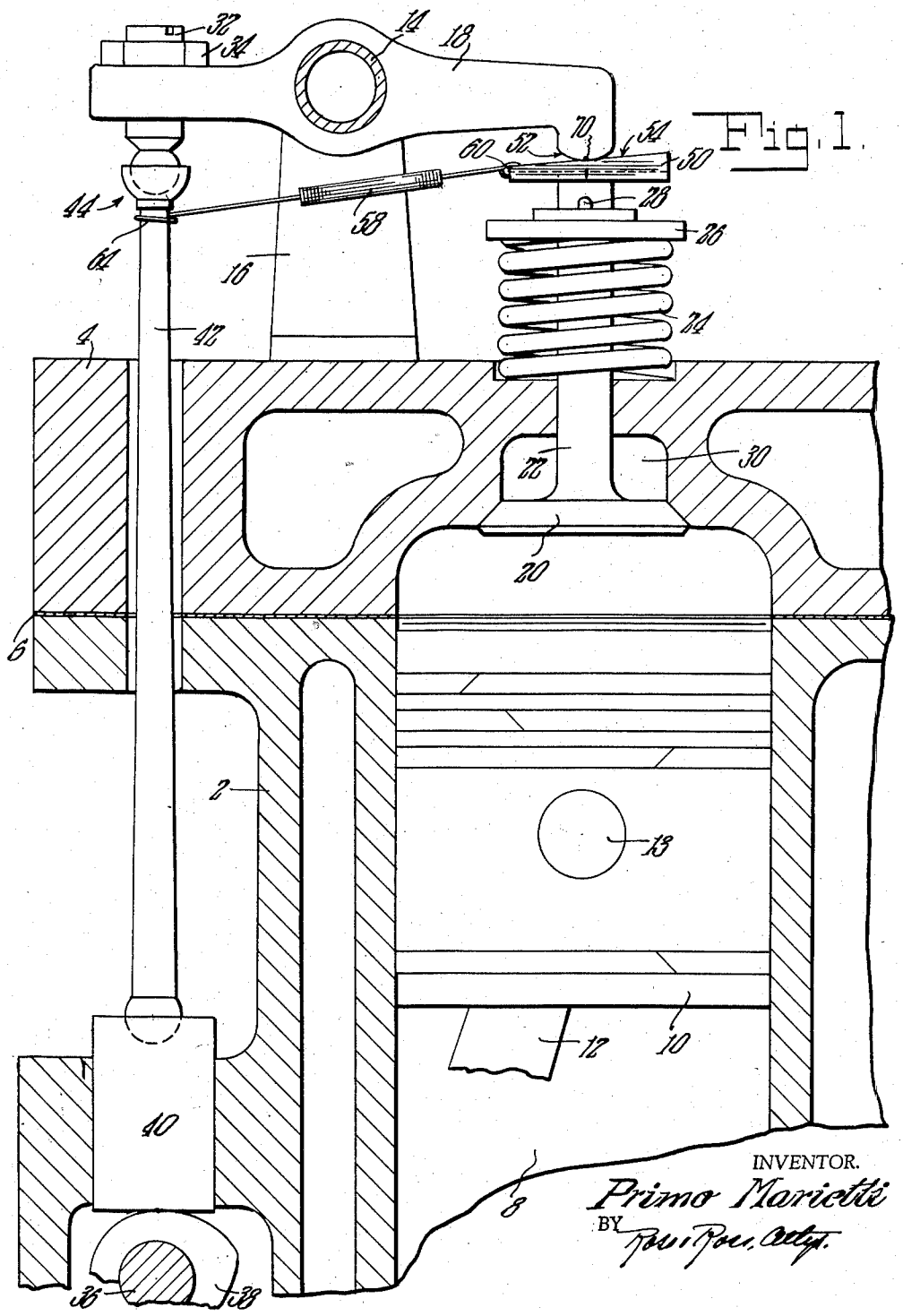
Dec. 9, 1958 P. MARIETTI 2,863,431

INTERNAL COMBUSTION ENGINE

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Fig. 1.



INVENTOR.
Primo Marietti
BY
Pennie, Pennie & Edmonds Attys.

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Fig. 2.

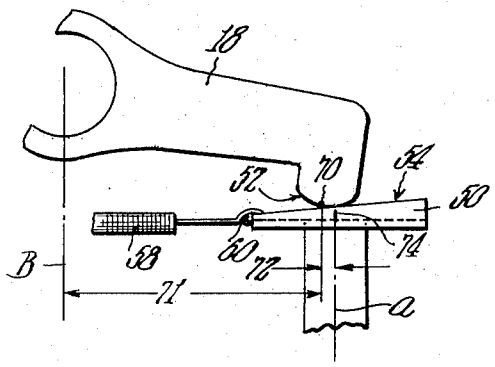


Fig. 3.

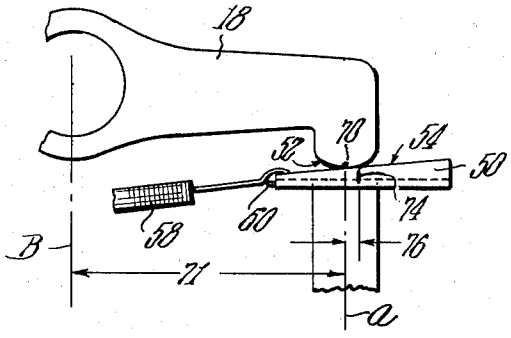
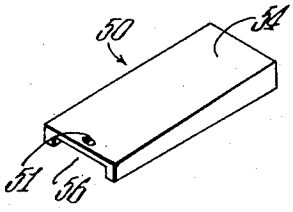


Fig. 4.



INVENTOR.
Primo Marietti
BY Pennie, Davis, Marvin & Edmonds Attys.

United States Patent Office

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2,863,431

INTERNAL COMBUSTION ENGINE

Primo Marietti, Springfield, Mass.

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1 Claim. (Cl. 123—90)

This invention relates to new and useful improvements in internal combustion engines, and it is directed more particularly to improvements in the valve actuating mechanism thereof.

The principal object of the invention is directed to the provision of a means for association with the valve actuating means of an internal combustion engine. More particularly, the novel feature of the invention is directed to the provision of a wedge or cam member disposed between the adjacent ends of a rocker arm and valve stem which is constructed and arranged so as to eliminate the clearance or spacing between the said adjacent ends of the rocker arm and valve stem thereby to insure a more direct operation of the valve as well as the elimination of objectionable noise whilst effecting an improved efficiency in the operation of the engine.

In engines, where the end of a rocker arm in the valve-opening oscillation of the arm abuts the end of the valve stem so as to open the valve against its closing spring, there is a noisy impact which is objectionable.

A clearance space, in the adjustment of the valve operating mechanism, is provided between the end of the rocker arm and the end of the valve stem so as to accommodate elongation of the valve stem as it becomes heated by the operation of the engine. In some cases, adjustments are made while the engine is cold; in other cases, after the engine has heated up. In all cases, there is at least some clearance space, when it is operating at its normal operating temperature, so that there exists the objectionable noisy impact on the opening of each inlet and exhaust valve.

During the operation of an engine, and under various conditions of operating temperature, the valves and associated parts thereof may expand or contract so as to reduce or increase the clearance space. The absolute correct spacing for all operating conditions is never definitely known, although a certain predetermined clearance or spacing is recommended.

Where the clearance space is insufficient, when the engine is heated up, the valves do not close properly. Likewise, when the clearance is too great, the valves are not fully opened. In either of such cases, the engine does not operate at the desired maximum efficiency.

According to the novel features of this invention, means is interposed in the space between the ends of the rocker arm and the valve stem which is adapted to close or to fill up the said space under all operating conditions. During operation of the engine, this means is automatically adjusted to function for its space-eliminating function accordingly as temperature changes result in any increase or decrease of the space.

Objectionable noise is eliminated by means of the invention. Additionally, the valve is fully seated in its closed position, and is fully opened to the degree intended in is open position, thereby resulting in improved engine efficiency with respect to power and fuel consumption.

According to the present practise, attempts are made

to adjust the mechanism so as to provide a certain specified clearance space between the end of the rocker arm end and the end of the valve stem such procedure is difficult. In some cases it is made more difficult by the condition of the ends of the valve stem or rocker arm, or both.

According to this invention, adjustments are made in the valve operating mechanism with the novel device in place between the ends of the rocker arm and valve stem, and said adjustments may be made with the engine in either cold or warmed up condition.

Various changes may be made in the form of the device without departing from the spirit and scope of the invention which for purposes of disclosure is shown and described in the form thereof presently preferred.

In the drawings;

Fig. 1 is a vertical sectional view through the upper portion of the block and head of an internal combustion engine having the novel features of the invention associated therewith;

Fig. 2 is an elevational view of adjacent end portions of the valve operating arm and valve stem with the device of the invention associated therewith;

Fig. 3 is a view, similar to Fig. 2, showing the parts in a different relation so as to explain the operation of the device of the invention; and

Fig. 4 is a perspective view of the device of the invention.

Referring now to the drawings in detail, the invention will be fully described. It will be understood that so much of an internal combustion engine is shown as will aid in disclosing the invention.

The upper portion of an engine block is represented by 2, to which is secured, in the well known manner, a cylinder head 4, with the usual gasket 6 disposed between said block and head.

A cylinder is shown at 8 having a piston 10 reciprocable therein. A connecting-rod 12, connected by a wrist pin 13 to the piston, is operable by a crank shaft (not shown) in the well known manner.

A rocker arm shaft 14 is supported by suitable supports, such as 16, and a plurality of rocker arms 18 are oscillatable thereon.

A valve 20 has a stem 22 reciprocable in the head 4 for movements of the valve between a closed position on its seat, as shown, and an open position away therefrom, all as is conventional. A compression spring 24 around the valve stem 22 is surmounted by a washer 26 which is held in place by the usual key or pin 28.

A space 30 above the valve 20 may be connected to the fuel inlet or to the exhaust outlet of the engine. The valve shown may, of course, be an inlet or an exhaust valve.

A threaded member 32 is provided in the outer end of the rocker arm and a lock nut 34 is in threaded engagement therewith.

A cam shaft is represented by 36 and has a lifting cam 38 fixed thereto. A lifter 40 is reciprocable in the engine block, and a push or lift rod 42 having a ball and socket connection 44 with the member 32 has a lower end supported by the lifter.

Normally, as the cam 38 rotates in one direction, the rod is moved upwardly to swing the rocker arm 18 clockwise in valve-opening direction against the action of the spring 24. Subsequently, the valve is reciprocated to closed position by the said spring 24, the stem 22 acting upwardly on the rocker arm to swing it counterclockwise.

According to the invention, a spacer or space-closing member 50 is provided which is interposed between the upper end of the valve stem 22 and the stem actuating face 52 of the rocker arm 18 at the inner end thereof.

Said space-closing member 50 is of wedge shape lon-

gitudinally, and has an upper face 54 arranged angularly relative to a lower face. The included angle between the upper and lower faces of the member 50 may be varied as desired, but very satisfactory operation has been obtained with an angle in the neighborhood of eight (8) degrees.

If desired, one of the faces of the member 50 may be grooved longitudinally, as at 56, for slidably seating said member on the upper end of the valve stem 22. The grooved portion may comprise a separate member fixed to the wedge 50, if so desired.

Spring means is provided for urging the member 50 transversely relative to the axis of the valve stem for the wedging action of said member 50 between the top of the valve stem and the surface 52 of the rocker arm.

Said spring means may take any form desired but, for purposes of disclosure, a tension spring 58 is shown having one end 60 looped in an aperture 51 through the member 50 and an opposite end 64 looped around the rod 42.

The spring means will be such as to urge the member 50 sufficiently in what may be called a wedging direction and therby to close the space between the valve rod and rocker arm surface. The said spring means will not, of course, at any time exert such a sufficient force as to cause the member 50 to influence any downward movement of the valve stem against the valve spring 24.

The parts, as shown in Fig. 1, are in the rest position thereof with the valve in its closed position, and with the member 50 closing the space between the upper end of the valve stem and the arm surface 52. The screw 34 will be adjusted so as to close or fill up the space with the member 50 disposed substantially centrally of the valve stem, about as shown.

In this rest position, a point 70, indicated on the arm surface 52 is shown on the longitudinal axis *a* of the valve stem.

In operation of the engine and with the rocker arm oscillating in a clockwise valve-opening direction, the surface 52 of the said rocker arm moves along or slides on the upper inclined surface 54 of the member 50 so as to act on the valve stem.

In this valve opening oscillation of the rocker arm, the point 70 swings on the arc of a circle having an axis on the axis of oscillation of said arm whereby said point 70 moves to the left, towards a line B extending through the axis of oscillation of said arm, a distance indicated by 71. Obviously in this oscillation of the arm, and as the surface 52 slides on the member 50, the point 70 is moved transversely away from the axis *a* of the stem through a distance indicated by 72, as shown in Fig. 2.

In the reverse counterclockwise valve-closing oscillation of the arm from the position shown in Fig. 2, the surface 52 of the arm acts on the upper surface 54 of the member 50 to slidably move said member on the stem to the right a distance substantially equal to the distance 72. That is, a line such as 74 on the member is moved to the right relative to the axis *a* of the stem a distance represented by 76, as shown in Fig. 3. Spring 24 acts on the valve stem on the upward reverse oscillation of the arm to move said valve to its closed position.

In the instantaneous upper position of the surface 52 of the arm, and with the valve closed on its seat, the spring 58 urges the member 50 to the left so that it is in intimate contact with the surface 52 and valve stem and fills up or closes any space there would be between the upper end of said valve stem and surface 52 of the rocker arm.

During operation of the mechanism, the space between the surface 52 and valve stem may vary slightly due to elongation and/or contraction of the valve stem, but at each uppermost position of the rocker arm, the spring 58 acts on member 50 to cause it to fill up said space.

In elongation of the valve stem, there would be less space between the arm surface 52 and end of valve space to be filled by the member 50 than would be the case were contraction of the stem to occur.

As stated, the spring 58 is not sufficient to interfere with the valve closing function of the spring 24.

Thus, in each valve opening movement of rocker arm, the valve stem is acted upon and depressed through member 50. In the valve closing movement of the rocker arm, the member 50 is moved outwardly in said arm. At the uppermost position of the arm, the member 50 is moved inwardly by the spring 58 to fill such space between the valve stem and rocker arm surface as there may be.

In the instance where the surface 52 is disposed above the plane of the horizontal center line of the rocker arm shaft 14, instead of below the plane as shown, the member 50 would then be urged to the right on the valve opening oscillation to be retained thereat by the valve spring 24 until the valve closing action ensues. That is to say, the action is reverse from the action aforedescribed.

Under all operating temperatures, conditions, and engine speeds, the member 50 is automatically adjusted in each cycle of operation to eliminate space between the arm surface and stem, thereby to eliminate objectionable noise and attain efficient engine operation, as is desired.

Changes and modifications may be made in the form of the invention without departing from the spirit and scope thereof, and therefore it is desired to be limited, if at all, by the appended claim rather than by the foregoing disclosure.

I claim:

In an internal combustion engine the combination with the reciprocable stem of a valve spring actuated to closed position and depressible to valve open position by the crowned face at one end of a rocker arm for acting on the end of said stem and lifter means for the other end of said arm of means interposed between the crowned face of the rocker arm and end of the valve stem for eliminating clearance therebetween comprising, an elongated relatively rigid wedge member having a longitudinal groove on the under side thereof provided with an elongated flat lower face on the said end of the stem and being arranged for guiding the wedge member in sliding movements on said end in opposite directions in a plane at right angles to a plane extending through the longitudinal axis of said stem, said member having an elongated flat uninterrupted upper face for the crowned end of the rocker arm diverging in one direction from one end thereof relative to the lower flat face of said groove to the opposite end thereof, and separate spring means connecting said one end of the wedge member and lifter means urging the wedge member in an opposite direction whereby the upper and lower faces thereof operate with a wedging action between the crowned end of the rocker arm and end of the valve stem.

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