

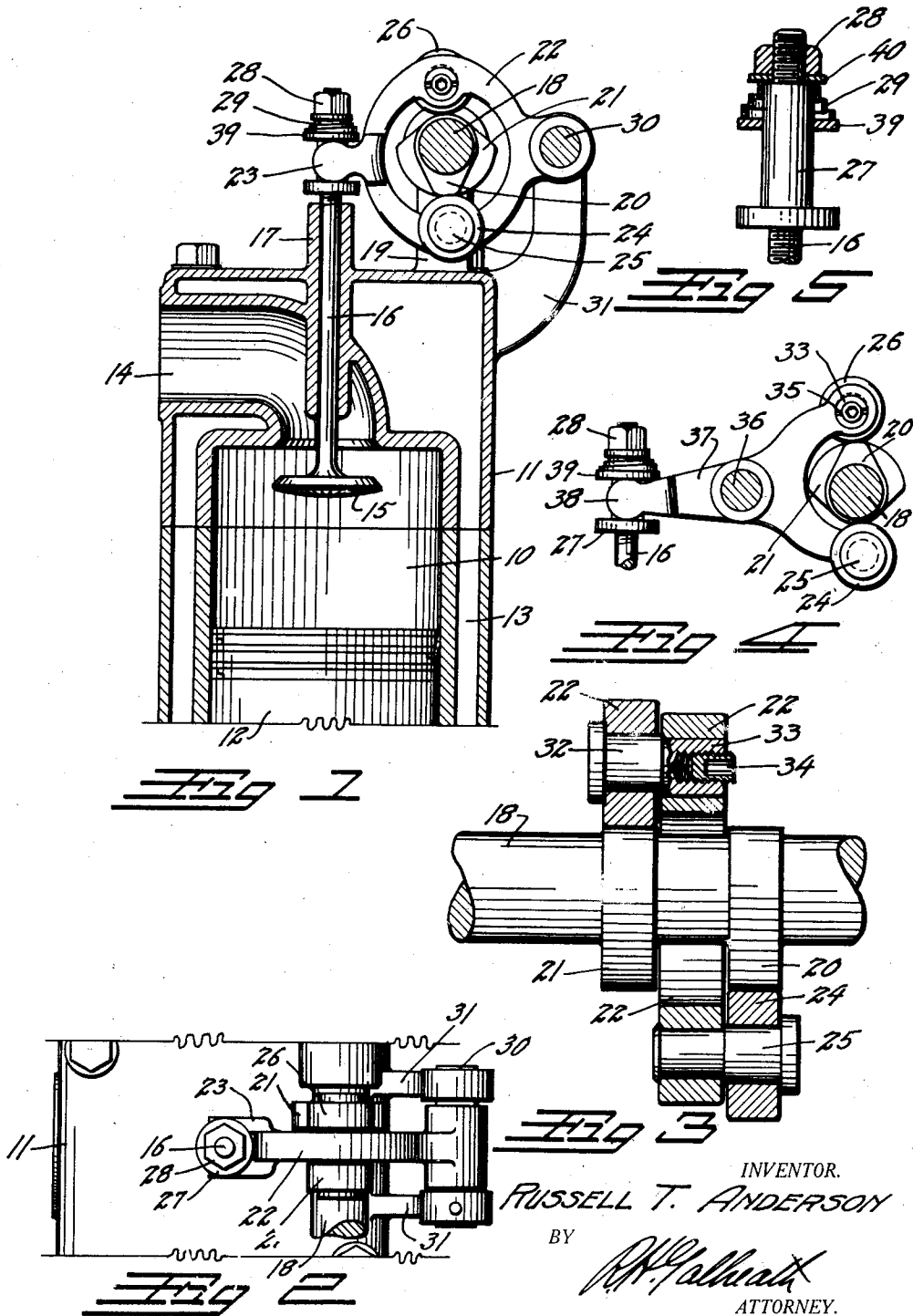
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ROCKER ARM AND CAM ASSEMBLY FOR INTERNAL COMBUSTION ENGINES

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ROCKER ARM AND CAM ASSEMBLY FOR INTERNAL-COMBUSTION ENGINES.

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This invention relates to a mechanism for operating the valves of an internal combustion engine, and has for its principal object, the provision of a device of this character which will positively open and close the valves without spring operation, and in which the action of the cam may be either multiplied or diminished upon the action of the valve.

Another object is to provide a device of this character which can be operated from a cam shaft over the cylinder heads so as to eliminate push rods, etc.

A further object is to arrange the device so that it will be practically frictionless and so that it may be adjusted to accommodate wear.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention reference is had to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

Fig. 1 is a vertical section through an internal combustion engine cylinder illustrating the device in use.

Fig. 2 is a plan view of the improved valve operating mechanism.

Fig. 3 is an enlarged vertical cross section through the rocker arm, taken at the center line of the cam shaft, illustrating the roller construction.

Fig. 4 is a detail view of an alternate arrangement of the rocker arm.

Fig. 5 is a detail view of the upper extremity of the valve stem.

In the drawing, the various parts of an internal combustion engine are designated as follows: cylinder 10, cylinder head 11, piston 12, water jacket 13, intake or exhaust passage 14, valve 15, valve stem 16, and valve stem guide 17.

My improved valve operating mechanism is installed upon or above the cylinder head 11 and comprises a cam shaft 18 supported on suitable brackets 19. The cam shaft 18 runs longitudinally of a series of cylinders 10 and carries adjacent each of the valve stems 16 in the series, an opening cam 20 and a closing cam 21.

The cams 20 and 21 are adjacent but separated on the cam shaft 18 and between them a rocker arm 22 is arranged to operate. The rocker arm 22 is pivoted on a shaft 30 carried on supporting brackets 31, and is spaced from, and surrounds, the cam shaft 18. The arm 22 carries a yoke 23 at its one extremity arranged to operate the valve 15. The yoke 23 rides in a spool 27 threaded on the valve stem 16. The spool 27 is locked in place on the valve stem by means of a lock nut 28 threaded on the upper extremity thereof. The lock nut 28 compresses a washer 40 against the upper end of the spool 27. A flat, conical spring, 29, is compressed between the washer 40 and a washer 39 arranged to slide upon the spool 27 and constantly clamp the yoke 23 between the spool flange and the washer 39.

Upon one side of the rocker arm 22, below the cam shaft 18, a roller 24 is carried on a short roller shaft 25. Similarly carried, above the cam shaft 18 upon the rocker arm 22, is a similar roller 26. The rollers 24 and 26 constantly contact with the opening and closing cams 20 and 21, respectively.

In operation, the rotation of the cam shaft 18 will oscillate the rocker arm 22 about its pivot 30, thus causing the yoke 23 to alternately raise the valve 15 to its seat and force it away therefrom. The spring 29 allows the rocker arm 22 to continue its stroke for a short distance after the valve 15 has seated, and allows for expansion in the valve stem and any carbon or other foreign material which may become lodged between the valve and its seat, thus preventing a rigid impact at the closing of the valve which might result in damage to the valve or valve mechanism.

To provide for adjustment between the rollers and the cam, I place the roller 26 upon a bearing 32 which is eccentrically carried on a stud 33 in the rocker arm 22. The stud 33 is slotted at 35 to allow expansion. The stud can be rotated, by means of a screw driver in the slot 35, to bring the roller 26 to or from its cam 21. When the proper adjustment has been obtained the stud 33 may be locked in place by means of a set screw 34 threaded into its center, which expands the stud in its seat in the rocker arm 22.

It will be noted that the action upon the valve 15 is a multiplication of the cam action, owing to the fact that the yoke 23 is

further from the pivot 30 than is the cam shaft 18. This is an advantage in that it lessens the diameter of the cams and reduces the amount of eccentric loading of the cam shaft.

In Fig. 4, I have illustrated an alternate form of the invention, in which the cam shaft 18 is placed at one extremity of a rocker arm 37, the arm being pivoted at 36 between the cam shaft and the valve stem 16. The arm 37 is also provided with a yoke 38 for engagement with the spool 27. At the cam shaft the arm 37 is forked to support the rollers 24 and 26. In this form, the action of the cam shaft is reversed with reference to the action of the valve stem and if the distances between the valve stem 16, the pivot 36 and the cam shaft 18 are equal, the action at the two extremities will be equal.

While a specific form of the improvement has been described and illustrated herein, it is desired to be understood that the same may be varied, within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention, what I claim and desire secured by Letters Patent is:—

1. A valve operating mechanism comprising a cam shaft; opening and closing cams carried by said cam shaft; a rocker arm pivoted at one side of said cam shaft and arranged to contact with said valve at its one extremity, said rocker arm arranged midway between said opening and closing cams; and oppositely extending projections on said arm arranged to engage said opening and closing cams, respectively.

2. A valve operating mechanism comprising a cam shaft; opening and closing cams carried by said cam shaft; a rocker arm pivoted at one side of said cam shaft and arranged to contact with said valve at its one extremity, said rocker arm arranged mid-

way between said opening and closing cams; and oppositely extending projections on said arm arranged to engage said opening and closing cams, respectively, said projections being carried above and below said cam shaft.

3. A device for operating the valves of an internal combustion engine comprising a cam shaft arranged adjacent said valves; a pivot adjacent said cam shaft; a rocker arm extending from said pivot to said valves; opening and closing cams carried by said cam shaft; said arm being forked so as to pass above and below said cam shaft; rollers carried on said forked portions, each of said rollers engaging a different one of said cams; means for regulating the distance between said rollers, said means comprising a rotatable eccentric bearing for one of said rollers; and means for locking said bearing in any desired radial position.

4. A valve operating mechanism for internal combustion engines having a reciprocating valve; a pivot arranged adjacent said valve; a cam shaft arranged between said pivot and said valve; and a rocker arm extending from said pivot to said valve, said cam shaft arranged to pass through said rocker arm.

5. A valve operating mechanism for internal combustion engines having a reciprocating valve; a pivot arranged adjacent said valve; a cam shaft arranged between said pivot and said valve; a rocker arm extending from said pivot to said valve, said cam shaft arranged to pass through said rocker arm; an opening and closing cam carried on said cam shaft on opposite sides of said rocker arm; and oppositely placed, oppositely extending projections on said rocker arm, each adapted to engage a cam at one side of said rocker arm.

In testimony whereof, I affix my signature.

RUSSELL T. ANDERSON.