July 29, 1924. 1,503,384

E. S. SEWELL

VALVE GEAR FOR INTERNAL COMBUSTION ENGINES

Filed Nov. 28, 1921

Fig. 1

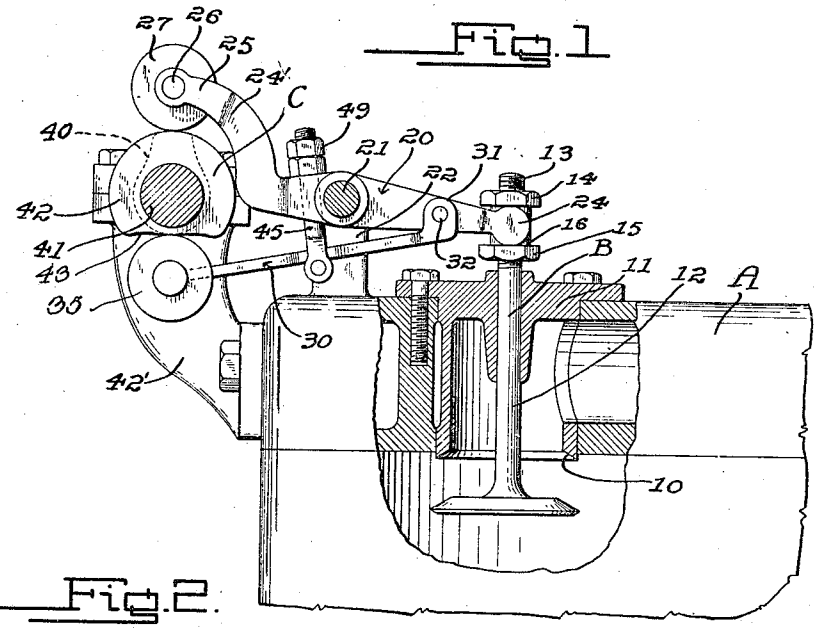


Fig. 2.

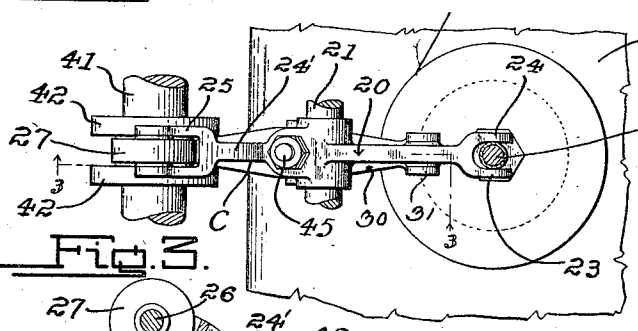


Fig. 5.

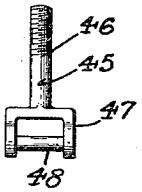


Fig. 3.

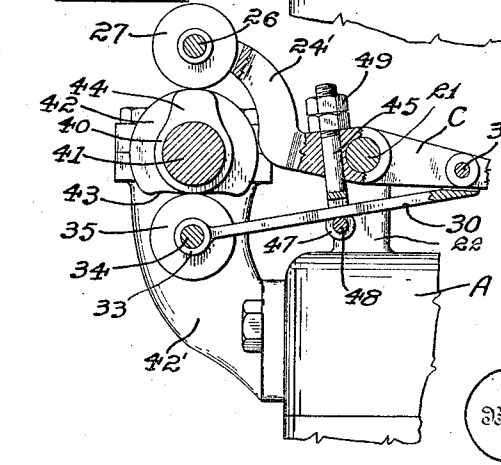
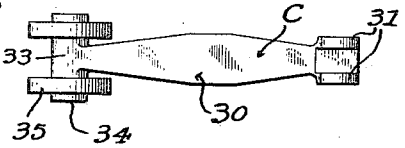


Fig. 4.



Inventor
Edgar S. Sewell

By Lancaster Allwine

Attorneys

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UNITED STATES PATENT OFFICE.

EDGAR S. SEWELL, OF WEST SCARBORO, MAINE.

VALVE GEAR FOR INTERNAL-COMBUSTION ENGINES.

Application filed November 28, 1921. Serial No. 518,337.

To all whom it may concern:

Be it known that I, EDGAR S. SEWELL, a citizen of the United States, residing at West Scarboro, in the county of Cumberland and State of Maine, have invented certain new and useful Improvements in Valve Gears for Internal-Combustion Engines, of which the following is a specification.

This invention relates to valve gears, and is an improvement on my invention relating to valve gears for internal combustion engines, disclosed in Patent No. 1,408,781, granted March 7, 1922, and the primary object of the present invention is to provide a simplified form of cam operating means for rocker arms, whereby the elimination of certain working parts is accomplished, thereby resulting in a cheaper and more durable construction.

Another object of the invention is the provision of a novel means for operating a rocker arm in both directions including a novel cam and a novel rocker arm arrangement, the cam being so mounted as to eliminate the necessity of providing independent cam shafts, as contemplated in the above mentioned application.

A further object of the invention is the provision of a novel valve gear for internal combustion engines embodying opening and closing cams mounted upon a single cam shaft, and a novel rocker arm for engaging the cams and the valve, for permitting opening and closing movement of said valve.

A further object of the invention is the provision of a novel means for mounting the resilient stub arm on the main rocker arm so as to permit the adjustment of the stub arm in relation to the rocker arm, whereby the rollers carried by said stub arm and rocker arm will be maintained in proper contact with their respective cams.

A still further object of the invention is to provide a novel valve gear for internal combustion engines of the above character, which will be durable and efficient in use, one that is simple and easy to manufacture, and one which can be placed upon the market at a reasonable cost.

With these and other objects in view, the invention consists in the novel construction, arrangement and formation of parts, as will be hereinafter more specifically described, claimed and illustrated in the accompanying drawings, forming a part of this specification, in which drawings:

Figure 1 is a fragmentary elevation, partly in section of the internal combustion engine, showing the improved valve operated means incorporated therewith.

Figure 2 is a top plan view of the improved valve operating means connected with the engine, a fragment of the engine being shown in plan and the valve stem thereof being shown in section.

Figure 3 is a fragmentary detail section taken on the line 3—3 of Figure 2, showing the improved valve gear operating means.

Figure 4 is a detail plan view of the resilient stub arm, which is carried by the rocker arm.

Figure 5 is an elevation of the adjustable link bolt for permitting the adjusting of the stub arm in relation to the main rocker arm.

Referring to the drawings in detail, wherein similar reference characters designate corresponding parts throughout the several views, the letter A indicates an internal combustion engine; B, a poppet valve of ordinary construction; and C, the improved operating means therefor.

The internal combustion engine A may be of the usual or any preferred construction, and has been merely illustrated for showing one use of the invention; and it is to be understood that the improved device may be applied to other mechanisms.

As shown, the engine A is provided with a valve port 10 on which the poppet valve B is normally adapted to seat. A valve stem guide 11 is also carried by the engine for the stem 12 of the poppet valve. The upper end of this stem 12 may be provided with threads 13 for the reception of the adjusting nuts 14 and 15, one of which may be provided with a wear sleeve 16. The purpose of the adjusting nuts 14 and the wear sleeve 16 will be apparent as the description proceeds. The poppet valve is of the ordinary construction, as can be readily seen by referring to Figures 1 and 2 of the drawings.

The improved valve gear operating mechanism C comprises a rocker arm 20 which is mounted intermediate the ends upon a suitable shaft 21, which is carried by suitable brackets 22, arranged on the engine A in any preferred manner. The inner end of the

rocker arm 20 is bifurcated as at 23 for embracing the opposite sides of the wear portion 16 of one of the adjusting nuts 14 and 15, and this bifurcated portion is provided with substantially circular bearing heads 24, which are disposed intermediate the nuts 14 and 15. The outer end of the rocker arm 20 is provided with an upwardly extending arcuate extension 24′, which terminates in a yoke 25. This yoke 25 supports a stub shaft 26 on which is mounted a roller 27. This roller is disposed in the yoke 25, as can be readily seen by referring to Figure 2 of the drawings.

A stub arm 30 is connected to the rocker arm 20 and this stub arm is preferably formed of spring steel or other suitable resilient metal. The inner end of this arm is provided with the upwardly extending pivot ears 31, which embrace the opposite sides of the rocker arm 20, inwardly of the supporting shaft 21. A suitable pin 32 is inserted through the ears 31 and the rocker arm 20, in order to pivotally connect the resilient stub arm 30 with the said rocker arm. The outer end of the stub arm 30 terminates substantially in the same plane as the outer end of the yoke 25, and the outer end of the stub arm 30 is provided with a barrel 33 for the reception of a shaft 34 which has the rollers 35 mounted on the opposite terminals thereof. By this construction, it can be seen that the roller 27 and the rollers 35 are disposed substantially in the same vertical plane, for a purpose which will be hereinafter more fully described.

The roller 27 is adapted to frictionally bear against an operating cam 40 which is secured in any preferred manner to a cam shaft 41. This cam shaft 41 can be driven in any preferred manner from the operating parts of the engine and can be supported by the engine in any preferred manner. As shown by way of example, brackets 42′ are carried by the engine A and support the cam shaft 41 in proper position. Disposed on opposite sides of the cam 40 are cams 42 which are adapted to engage the rollers 35 carried by the stub arm 30. These cams 42 are provided with indentations 43, which are substantially equal to the throw 44 of the cam 40 and the throw 44 is diametrically opposite the indentations 43 formed in the cams 42.

In order to maintain the rollers 27 and 35 in proper frictional contact with the cams 40 and 42, the adjustable link bolt 45 is provided. This link bolt 45 includes a threaded shank 46 which is extended through the rocker arm 20 outwardly of its supporting shaft 21. The lower end of the link bolt 45 terminates in a yoke 47 which is adapted to embrace the resilient stub arm 30 and a suitable pin 48 is carried by the yoke 47 for supporting said stub arm. Suitable nuts 49 are threaded upon the shank 46 of the link bolt and bear against the upper surface of the rocker arm 20 and it can be seen that by adjusting the nuts 49 the tension at which the rollers 27 and 35 engage their respective cams can be adjusted.

In operation of the improved valve gear, it will be seen that the cam 40 will positively unseat the poppet valve B when throw 44 thereof is moved into engagement with the roller 27. At this time the indentations 43 formed in the cams 42 will be in engagement with the rollers 35, thus allowing the opening movement of the valve. Upon further movement of the shaft 41, cams 42 will engage the rollers 35 and thus rock the arm 20 and positively return the poppet valve B to its seat. The cams 42 and the rollers 35 not only positively return the poppet valve to its seat, but also resiliently maintain the same on the seat. Owing to the resilient nature of the stub arm 30, all lost motion between the rollers and cams is eliminated and the arm 30 provides sufficient tension to resiliently hold the valve on its seat as heretobefore stated.

From the foregoing, it can be seen that only one cam shaft is necessary for positively opening and closing the poppet valve and any intermediate mechanism between the rocker arm and valve is eliminated.

Changes in details may be made without departing from the spirit or scope of this invention; but,

I claim:

1. In an operating mechanism, a rocker arm, means for rockably supporting the arm intermediate its ends, a single cam shaft, a cam mounted upon the shaft having a projecting throw portion thereon, spaced cams mounted upon the shaft having indentations formed therein and disposed diametrically opposite the throw of the first mentioned cam, a roller carried by the outer end of the rocker arm for engaging the first mentioned cam, a resilient stub arm secured to the rocker arm at one side of its pivot point, and rollers carried by said stub arm for engaging the spaced cams.

2. In a valve gear operating mechanism, the combination with a poppet valve having a stem, of a rocker lever, means operatively connecting one end of the lever with the stem to impart movement of the former to the latter, a single shaft, independent cams mounted upon the shaft, a resilient stub arm pivotally secured to the rocker arm adjacent its connection with the valve stem, rollers carried by the outer ends of the rocker arm and said stub arm for engaging said independent cams, and means for retaining the rollers in proper frictional engagement with the cams.

3. In a valve operating mechanism, the combination with a poppet valve having a

stem, of a rocker lever, means operatively connecting one end portion of the lever and the valve stem for imparting movement of the former to the latter, an upwardly projecting arcuate extension on the other end of the lever, a single cam shaft, a cam mounted upon the shaft having an outwardly extending throw, a second cam mounted upon the shaft having an indentation formed therein diametrically opposite the throw of the first mentioned cam, a roller carried by the arcuate extension of the rocker lever for engaging the first mentioned cam, a resilient stub arm normally inclined with respect to the rocker lever, means pivotally connecting the resilient stub arm to the rocker lever, and a roller carried by the outer end of the resilient stub arm for engaging the second mentioned cam.

4. In a valve operating mechanism, the combination with a poppet valve having a stem, and spaced flanges on the supper end of the stem, of a rocking lever, spaced ears formed on the end of the lever for engaging the valve stem between the flanges, a resilient stub arm carried by the rocking lever, a single cam shaft, a cam having an outwardly extending throw secured to the cam shaft, independent cams secured to the cam shaft on opposite sides of the first mentioned cam having indentations formed therein diametrically opposite the throw of the first mentioned cam, a single roller carried by the outer end of the rocker lever for engaging the first mentioned cam, and spaced rollers carried by the outer end of the resilient stub arms for engaging the second mentioned cams, and means for retaining the rollers in proper frictional contact with the cam.

5. In a valve operating mechanism, the combination with a poppet valve having a stem, of a rocking lever, means formed on one end of the lever for engaging the valve stem, a single cam shaft, a cam having an outwardly extending throw secured to the cam shaft, independent cams secured to the cam shaft upon opposite sides of the first mentioned cam having indentations formed therein diametrically opposite the throw of the first mentioned cam, a single roller carried by the outer end of the rocking lever for receiving the first mentioned cam, a resilient stub arm carried by the rocking lever, a pair of rollers carried by the outer end of the resilient stub arm for engaging the second mentioned cam, and an adjustable link bolt carried by the rocker arm for engaging the resilient stub arm to retain the rollers in proper frictional contact with the cam.

EDGAR S. SEWELL.