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VALVE GEAR FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED NOV. 10, 1920.

1,408,781. Patented Mar. 7, 1922.

Fig. 1.

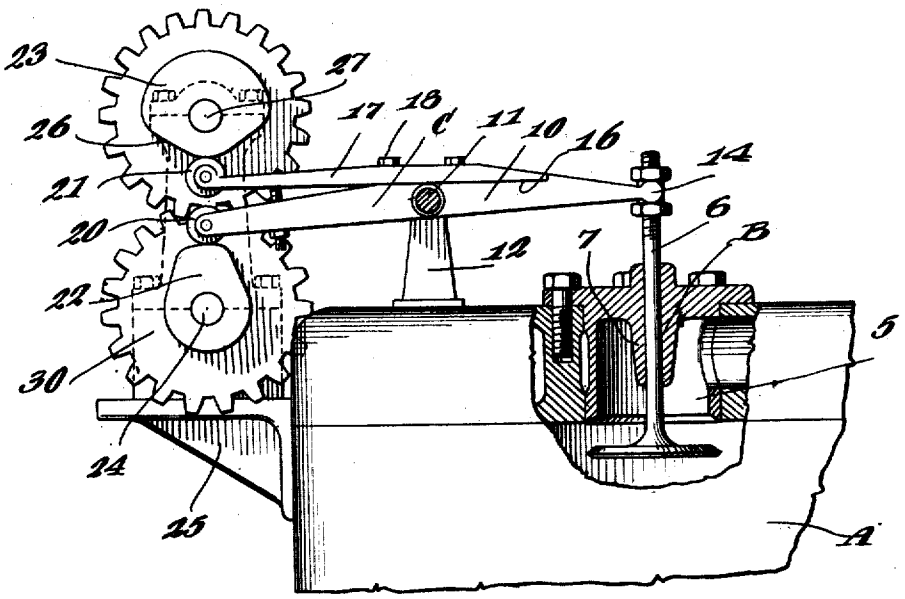


Fig. 2.

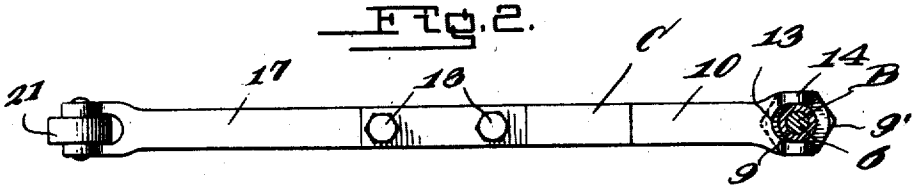


Fig. 4.

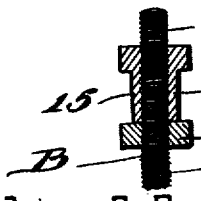
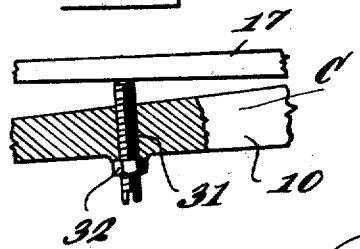


Fig. 3.



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VALVE GEAR FOR INTERNAL-COMBUSTION ENGINES.

1,408,781. Specification of Letters Patent. Patented Mar. 7, 1922.

Application filed November 10, 1920. Serial No. 423,110.

To all whom it may concern:

Be it known that I, EDGAR S. SEWELL, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, 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 for internal combustion engines, and the primary object of the present invention is to provide an improved means for positively opening and for positively closing valves of the poppet type in internal combustion engines, whereby the sticking of the valves during the closing movement thereof from any cause whatsoever is prevented.

In the operation of internal combustion engines, especially of the Diesel type, a great deal of trouble is often encountered due to the retarding of the valves during the closing movement, caused by binding between the valve stems and their guides when these parts become overheated. Many attempts have been made to positively seat the valve, but these devices have not been perfected sufficiently to warrant the adoption thereof. It is therefore another object of the invention to provide a means for positively seating the valves of internal combustion engines, which is of exceptionally simple and durable construction, and which will perform its function in a positive and silent manner, and in which all lost motion between the valve and the operating mechanism is eliminated.

A further object of the invention is to provide a pair of cams for acting upon the rocker arm of the poppet valve, the rocker arm having independent rollers for engaging the cams, one of the rollers being resiliently mounted so as to eliminate all lost motion between the valve and the operating cams.

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 drawing, forming a part of this specification, in which drawings:

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

Figure 2 is a top plan view of the rocker arm employed in the valve operating means, the valve stem being shown in connection therewith and in section.

Figure 3 is a fragmentary enlarged side elevation of the rocker arm partly in section showing the means of adjusting the resiliently mounted portion thereof, and

Figure 4 is an enlarged fragmentary vertical section through the adjusting nut employed for adjusting the position of the rocker arm in relation to the valve stem.

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 the ordinary construction, and C the improved operating means therefor.

The internal combustion engine A may be of the usual or any preferred construction and is provided with a valve port 5 on which the poppet valve B is adapted to seat.

The poppet valve B is of the ordinary construction, and the stem 6 thereof extends slidably through a guide 7 as in the ordinary construction. The upper outer end of the stem protrudes above the engine and is externally threaded as at 8 for the reception of the adjusting nuts 9 and 9′, the purpose of which will be hereinafter more specifically described.

The valve gear operating mechanism C includes a rocker arm 10 which is mounted intermediate its ends upon a suitable shaft 11, which is in turn carried by brackets 12 carried by the engine in any preferred manner. The inner end of the rocker arm 10 is bifurcated as at 13 and provided with the bearing heads of circular shape 14 and these bearing heads 14 are adapted to engage between the adjusting nuts 9 and 9′ as clearly shown in Figure 1 of the drawings. The adjusting nut 9 includes a relatively long cylindrical wear portion 15, which the heads 14 are adapted to normally embrace. The upper surface of the rocker arm 10 at a point inward of the head 14 is provided with a cut out portion 16 in which is fitted a stub arm 17 which is formed of spring steel or the like. This arm 17 is connected to the upper end of the rocker arm by means of screws 18. The outer end of the arms 10 and 17 have rollers 20 and 21 respectively carried thereby and these rollers are adapted to engage cams 22 and 23 which are arranged in superposed relation. The cam 22 is of the usual configuration employed for moving poppet valves

off of their seats, and is keyed or otherwise secured to a lower shaft 24 which is mounted in a suitable bearing carried by a bracket 25. This bracket 25 is secured to the internal combustion engine in any preferred manner. The upper cam 23 is adapted to engage the upper roller 21 carried by the stub arm 17 and has the substantially flat faces 26 formed thereon. This cam 23 is keyed or otherwise secured to an upper shaft 27, which is also rotatably mounted in suitable bearings carried by the bracket 25. These shafts 24 and 27 are operatively connected together by means of spur gears 30. One of these spur gears 30 is positively driven by the crank shaft (not shown) of the engine A, and it can be seen that upon operation of one shaft, the other shaft will be operated synchronously therewith.

In order to adjust the tension of the arm 17 so as to cause the proper seating of the valve B an adjusting screw 31 is carried by the rocker arm 10 and this screw is adapted to engage the lower surface of the spring stub arm 17. A suitable lock nut 32 is threaded on the set screw so as to hold the same in a preferred adjusted position.

In operation of the improved valve gear the cam 22 will act to rock the arm 10 and thus move the valve B off of its seat and the cam 23 will act on the upper roller 21 and tend to move and to hold the valve on its seat after the opening thereof. Owing to the resilient nature of the stub arm 17 all lost motion between the cam and rollers is eliminated, and the arm 17 provides sufficient tension so as to resiliently hold the valve on its seat and it can be seen that by adjusting the nuts 9 and 9′ and set screw 31, the valve can be set to seat at any preferred tension.

From the foregoing description, it can be seen that exceptionally simple and durable means has been provided for positively moving a valve from off of its seat, and for positively moving and holding a valve on its seat in which all lost motion is eliminated.

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

I claim:

1. In a valve operating mechanism, the combination with a valve having a stem, of a rocking lever, means connecting one end of the rocking lever to the valve stem, a resilient stub arm secured to the other end of the rocking lever, rollers carried by the free ends of the rocking arms and the resilient stub arm, the rollers being arranged in superposed relation, a pair of superposed cams arranged to engage the opposite sides of the rollers, means for synchronously operating the cams, said resilient stub arm permitting a limited movement between the rollers.

2. 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, independent rollers carried by the opposite end of the lever, a rotatable cam for engaging each one of said rollers, means for synchronously operating the cams, and means for resiliently mounting one of said rollers.

3. In a valve operating mechanism, the combination with a valve having a stem and a rocking lever, a yoke formed on one end of the lever engaging the valve stem, independent upper and lower rollers carried by the opposite end of the lever, a cam arranged to engage one of the rollers for rocking the lever to move the valve from its seat, a second cam arranged to engage the other roller to move the valve on its seat, means for synchronously operating the cams, and means for resiliently mounting the roller engaged by the cam for moving and holding the valve on its seat.

4. In a valve operating mechanism, the combination with a valve having a stem, of a rocking lever, means operatively connecting one end of the lever to the valve stem, a resilient stub arm secured to the upper end of the rocking arm, rollers carried by the free ends of the rocking arm and the stub arm, means for adjusting the tension of said resilient stub arm, superposed cams arranged to engage the rollers, and means for synchronously operating the cams.

5. In a valve operating mechanism, the combination with a valve having a stem, of a rocking lever, means adjustably connecting one end of the lever to the valve stem, a resilient stub arm secured at its inner end to said rocking arm, independent rollers carried by the outer ends of the rocking arm and the stub arm, means for adjusting the tension of said stub arm, a pair of superposed shafts, independent cams carried by the shafts arranged to engage the rollers, intermeshing spur gears keyed to said shafts, and means for rotating one of said shafts.

EDGAR SHERMAN SEWELL.