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VALVE MECHANISM FOR INTERNAL COMBUSTION ENGINES

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Fig. 2

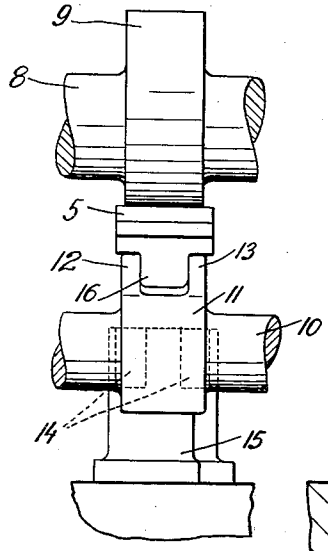
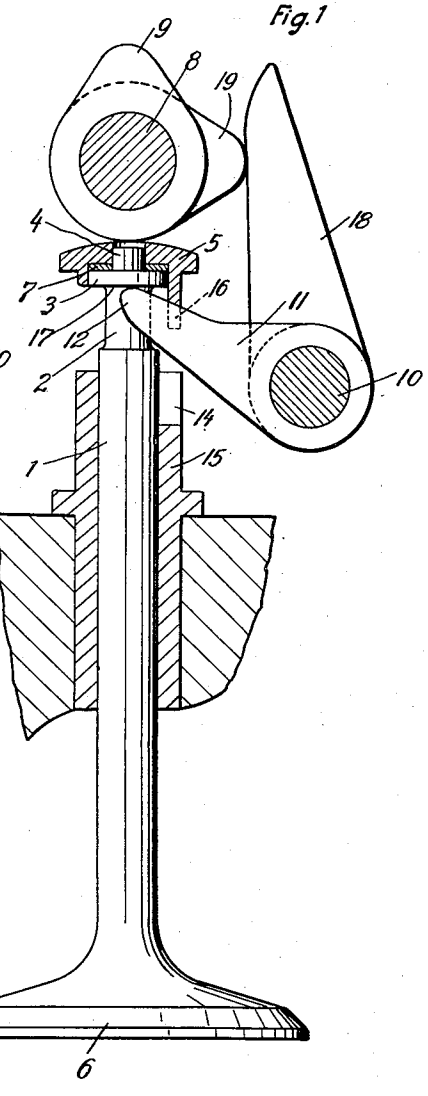


Fig. 1



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VALVE MECHANISM FOR INTERNAL COMBUSTION ENGINES

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5 Claims. (Cl. 123—90)

My invention relates to a valve mechanism, particularly for internal combustion engines, and more especially to a valve mechanism of the type in which a cam acts on a cap mounted on the end of the stem of a poppet valve.

It is the object of the present invention to provide an improved valve mechanism of this type which is largely immune against valve failures traceable to valve stem deposits and uneven seat deposits. More particularly, it is an object of the invention to provide an improved mechanism in which a poppet valve is freely rotatable about its axis without interfering with the cooperation between the cap mounted on the end of the valve stem and the cam engaging such cap.

Other objects of the invention are to provide a valve mechanism of the type indicated which is simple and lends itself to manufacture at low cost and to operation at high speeds.

Further objects of my invention will appear from a detailed description of a preferred embodiment thereof which will be described hereinafter with reference to the accompanying drawings, it being understood that the terms and phrases used in such detailed description have been chosen for the purpose of illustration rather than that of restriction or limitation of my invention, the features of novelty for which patent protection is sought being pointed out in the appended claims.

In the drawings,

Fig. 1 is a partial section taken through the top of the cylinder of an internal combustion engine showing a poppet valve and the means for actuating same,

Fig. 2 is a side view of Fig. 1 viewed from the right.

The poppet valve shown in Fig. 1 comprises a body of revolution composed of a substantially cylindrical stem **1** and a head **6**. Near its end the shaft **1** is provided with a reduced section **2** adjacent to a collar **3** forming a downwardly facing shoulder **17**. The upper end **4** of the valve stem above the collar **3** is of reduced diameter compared with the section **2** of the stem.

Suitable means are provided for mounting the valve stem **1** for reciprocation and free rotation about its axis. In the embodiment shown such means is formed by a guiding sleeve **15** inserted in the cylinder head and surrounding the cylindrical valve stem **1** beneath the reduced end **2** thereof. A cap **5** is rotatably mounted on the valve stem for common reciprocation therewith. In the embodiment shown, this cap is formed by a substantially rectangular plate having a central hole into which the reduced end **4** of the valve stem projects and having a substantially circular flange engaging over the collar **3** of the valve stem. The top face of the cap **5** is convex being substantially cylindrically shaped for engagement by a cam **9** provided on a horizontal cam shaft **8** extending above the poppet valve at right angles to the axis thereof. Thus the rotary cam **9** is mounted for engagement and for actuation of the cap **5** in the direction of the axis of the poppet valve. In operation, the poppet valve **1** may slowly and intermittently rotate about its axis under the effect of vibration and of the gas currents controlled by the valve. Experience has shown that such free rotation prevents deposits from building up on the valve stem, and that deposits on the seat are reduced and are kept uniform. Moreover, free rotation of the poppet valve prevents any particular part of the valve head from being subjected to excessive temperature for any continued period of time. It is desirable, however, to prevent the rotation of the valve from interfering with the actuation thereof by the cam **9**. For this purpose, I have provided means slidably engaging said cap and holding the same against rotation without interfering with the actuation and with the free rotation of the stem. In the embodiment shown, the means for slidably engaging the cap are constructed as follows:

While cam shaft **8** serves the purpose of accelerating the valve in opening direction and of retarding the closing movement of the valve, a second shaft **10** extending parallel to shaft **8** is provided for the purpose of accelerating the closing movement of the valve and of retarding the opening movement thereof. The shaft **10** has a bifurcated arm **11** provided with bifurcations **12** and **13** which straddle the reduced section **2** of the stem **1** and engage the shoulder **17** of the collar **3** thereof. In order to prevent interference between the arm **11** and the sleeve **15**, the latter is provided with a pair of slots **14** permitting freedom of movement to the arms **12** and **13** of the lever. The cap **5** is provided with a depending tongue **16** which projects between the bifurcations **12** and **13** and thus holds the cap **5** against rotation relative to the cam shaft **8**.

For the purpose of adjustment of the valve relative to the valve seat, one or more distance disks are inserted between the cap **5** and the collar **3** of the valve stem. The adjustment is effected by selecting and inserting disks **7** of proper thickness.

During the acceleration period of the opening movement of the valve the cam **9** of shaft **8** acts on the cap **5** directly to thereby depress the valve stem **1**. The opening movement is subsequently retarded and the valve is then closed by action of the arm **11** on the shoulder **17** of the valve stem. The shaft **10** may be actuated in any suitable manner. In the embodiment shown, the shaft **10** is provided with an arm **18** acted upon by a second cam **19** of shaft **8**. In this manner, shaft **10** is oscillated and when moving in clockwise direction causes its arm **11** to move the valve stem **1** upwardly. The arm **18** and the cam **19** will so cooperate that the lost motion existing between the cam **9**, the arm **11** and the elements **3** and **5** therebetween is negligible.

From the foregoing description it will appear that the slidable engagement between the lever arm **11** and the tongue **16** of the cap provides a simple and efficient means for preventing the cap **5** from relative rotation to the cam shaft **8**. Therefore, any rotation of the valve about its axis will in no way interefere with the proper cooperation between the cam **9** and the valve cap **5**. The reciprocatory parts of the novel valve control mechanism have a minimum of weight and are, therefore, particularly adapted for operation at high speeds.

While the invention has been described in connection with a preferred embodiment thereof, it will be understood that it is capable of further modification, and this application is intended to cover any variations, uses, or adaptations of the invention following, in general, the principles of the invention and including such departures from the present disclosure as come within known or customary practice in the art to which the invention pertains, and as fall within the scope of the invention or the limits of the appended claims.

What I claim is:

1. In an internal combustion engine, a valve mechanism comprising a poppet valve having a stem, means for mounting said stem for reciprocation and free rotation

about its axis, a cap rotatably mounted on said stem for common reciprocation therewith, a rotary cam mounted for engagement and actuation of said cap in the direction of said axis, and means for slidably engaging said cap and holding the same against rotation without interfering with said actuation and with said free rotation of said stem.

2. Valve mechanism claimed in claim 1 in which said means for slidably engaging said cap comprises a lever for positively closing said valve, said stem having a shoulder engaged by said lever.

3. Valve mechanism claimed in claim 1 in which said means for slidably engaging said cap comprises a bifurcated lever and a tongue on said cap, said stem having a shoulder, both said tongue and said stem beneath said shoulder being straddled by said bifurcated lever, the latter engaging said shoulder to positively close said valve when actuated.

4. Valve mechanism as claimed 1 in which at least one distance disk is inserted between said cap and said stem.

5. In an internal combustion engine, a valve mechanism comprising a poppet valve having a stem, means for mounting said stem for reciprocation and free rotation about its axis, a cap rotatably mounted on said stem for common reciprocation therewith, a rotary cam mounted for engagement and actuation of said cap in the direction of said axis, and means for slidably engaging said cap and holding the same against rotation without interfering with said actuation and with said free rotation of said stem, said cap being provided with a hole and said stem is provided with a reduced end projecting into said hole.

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