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HYDRAULIC SELF-ADJUSTER FOR VALVE GEARS
OF INTERNAL COMBUSTION ENGINES
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Fig. 1.

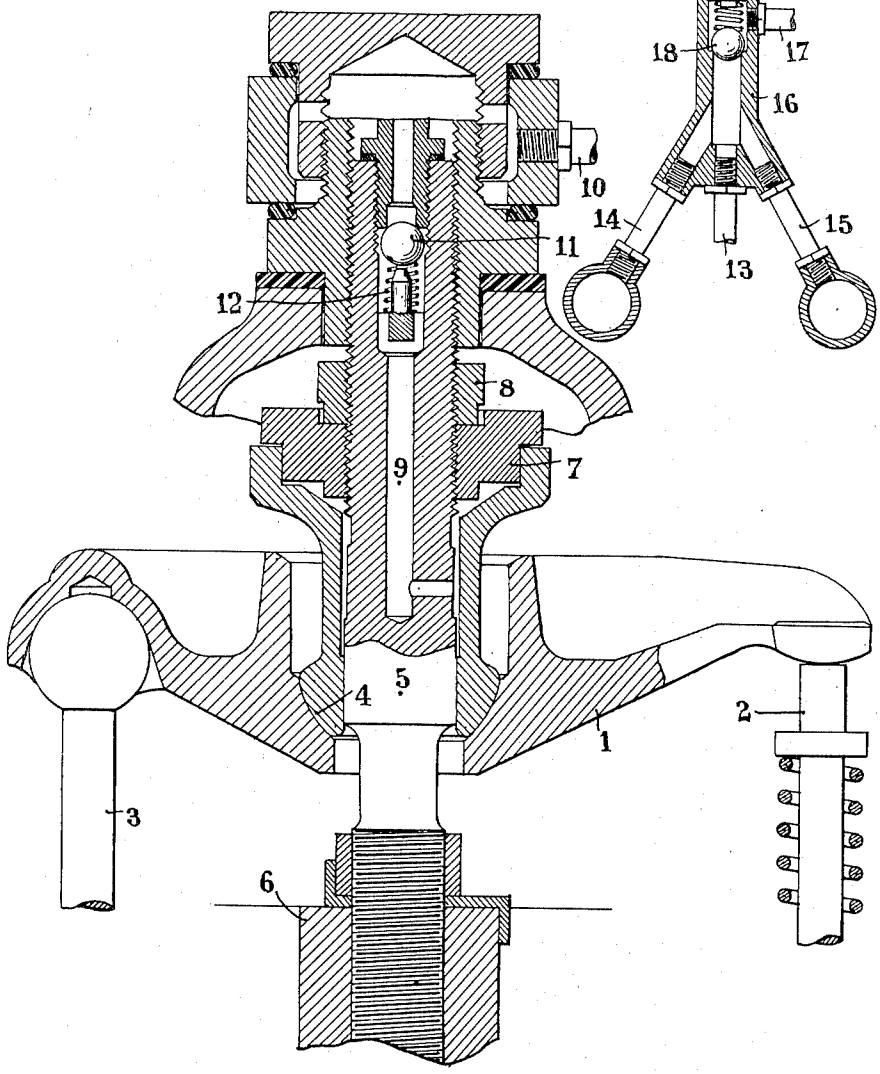

Fig. 2.

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HYDRAULIC SELF-ADJUSTER FOR VALVE GEARS OF INTERNAL COMBUSTION ENGINES

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4 Claims. (Cl. 123—90)

This invention relates to valve gears of internal combustion engines and more particularly to hydraulically-operated means for automatically taking up any play developing or provided in valve gears of this type.

In most valve gears with hydraulic play take-up this device is interposed in and movable bodily with the valve-actuating kinematic assembly. However, this conventional arrangement is detrimental in that it promotes the emulsifying of the oil therein, thereby preventing the device from operating in a reliable and regular manner; another inconvenience of this known system is that a substantial weight is added to the moving parts so that more powerful springs must be provided to assure a proper operation of the valve gear.

It has also been proposed to mount the play take-up device at the pivotal mounting of the valve rockers so that no detrimental weight is added to the moving parts; however, all the systems proposed up to now are either too intricate to permit their application to mass production or characterized by a redhibitory defect—in that no adequate provision is made for expelling the least air bubble always likely to be introduced into the system, for example when the latter is operated for the first time, this air bubble, due to its inherent resiliency, interfering irremediably with the proper operation of the device.

It is the essential object of the present invention to avoid completely these defects by providing an efficient and reliable device which is sufficiently simple in design to be economical and therefore suitable for mass production.

This device is applicable to overhead valves operated through valve rockers of the type oscillating about pins extending therethrough.

For this purpose, the rocker-operated valve gear with play take-up device independent of the push-rod and rocker mechanism and of the movements thereof, comprising a rocker ball-pivot slidably mounted on the rocker supporting pin, is characterized in that this ball-pivot is formed with a cylindrical extension enlarged at its end opposite to the ball-shaped end and adapted to receive the piston-shaped machined end portion of the adjustment nut, the cavity formed between the inner face of said piston and the bottom of said ball-pivot extension being supplied with oil under pressure through a non-return valve whereby the oil cannot flow back when the corresponding engine valve is lifted.

Other features of this invention will appear as the following description proceeds with reference to the attached drawing forming part of this specification and illustrating diagrammatically by way of example a typical form of embodiment of the invention. In the drawing:

Fig. 1 is an axial section showing the mounting of the device on an internal combustion engine with vertical cylinders, and

Fig. 2 is a vertical axial section showing a detail of the device.

In the embodiment shown in the drawing the rocker arm 1 is actuated from a push rod 3 and operates a valve

by oscillating about a ball-pivot 4 mounted for axial sliding movement on a rocker pin 5 secured in the cylinder head 6.

The pivot 4 has one end of part-spherical configuration which is engaged by a corresponding concave portion of the rocker arm 1, and another, opposite enlarged end portion of substantially cylindrical shape adapted to receive in close-fitting engagement a piston-shaped portion of the nut 7 acting as an adjustable stop member to the ball-pivot so as to provide the required and usual clearance therebetween.

A lock nut 8 is provided to prevent the assembly from becoming misadjusted by vibration or other causes.

The diameter of the piston-forming portion of the nut 7 is such that its cross-sectional area is sufficient to withstand the pressure exerted on the ball-pivot of the rocker arm when the valve 2 is opened, so as to keep the oil pressure in the space formed between the bottom of the cylinder and the piston face within reasonable limits.

This space is supplied with oil—generally the oil from the lubrication circuit—under a pressure sufficient to take up any clearance or play in spite of the inertia of the valve gear parts. This oil is supplied by a pipe 10, through a duct 9, drilled through the rocker pin 5, and cannot flow back when the engine valve is lifted, due to the provision of a non-return ball valve 11 normally seated by a spring 12.

Fig. 2 illustrates the disposal of the pipe means for supplying oil to pipes 10 of the two rocker arms 1 of a same cylinder, the oil fed through the pipe line 13 being distributed to the pair of pipes 10 by means of branch pipes 14 and 15.

It will be observed that all the pipe lines in the system are set at an angle to automatically discharge any air bubbles therefrom.

In order to keep the oil pressure to a sufficient value when the engine is idling a spring-loaded "priority" valve 18 (Fig. 2) is provided which opens to deliver the lubricating oil to the remaining parts of the engine through the pipe line 17 only when the oil pressure in the play take-up device is sufficient.

It will be observed that the branch pipes 14, 15 are adapted within the body 16 to constitute a small oil reserve so that when the engine is started the device will be supplied with oil without creating any air bubbles.

Finally, any air trapped in the device when the latter is operated for the first time is expelled automatically through the very small operating clearance provided between the piston-forming nut 7 and the enlarged cylindrical portion of the rocker ball-pivot 4.

Although a preferred form of embodiment of the invention has been shown and described herein, it will be readily understood by anybody conversant with the art that many modifications and alterations may be brought to constructional details thereof without departing from the spirit and scope of the invention as set forth in the appended claims.

What I claim is:

1. In an overhead valve gear of the push-rod and rocker-arm type, a hydraulic device for automatically taking up any clearance or play developing or provided in the valve gear, comprising a rocker pin, a ball-pivot member slidably mounted on said rocker pin, an enlarged cylindrical extension on said ball-pivot member, an adjustment nut having a piston-shaped end portion slidably engaged in said cylindrical extension of said ball-pivot member, means for supplying oil under pressure into the space formed between the inner bottom of said cylindrical extension and the piston-forming nut, and a non-return valve adapted to prevent any oil from flowing back when the rocker-operated engine valve is lifted.

2. A hydraulic self-adjuster according to claim 1, wherein said pressure oil is delivered through a duct drilled through the rocker pin, said non-return valve being adapted to close the inlet of said duct.

3. A specific arrangement of the hydraulic self-adjuster according to claim 1 in an internal combustion engine comprising a force-feed lubrication system, wherein a first pipe line is connected to supply oil to the device, another pipe line being connected to said first pipe line to feed the remaining parts of the engine, and a "priority" non-return valve at the inlet end of said other pipe line to prevent the oil from flowing therethrough until a predetermined minimum oil pressure has been obtained in the play take-up device.

4. An arrangement according to claim 3, wherein the first pipe line through which oil delivered from the lubrication system is fed towards the non-return "priority" valve and the pipe line connected to the play take-up device are strongly inclined upwardly in the direction of said non-return priority valve to permit the automatic expelling of the least air bubbles likely to be present in the device.

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