

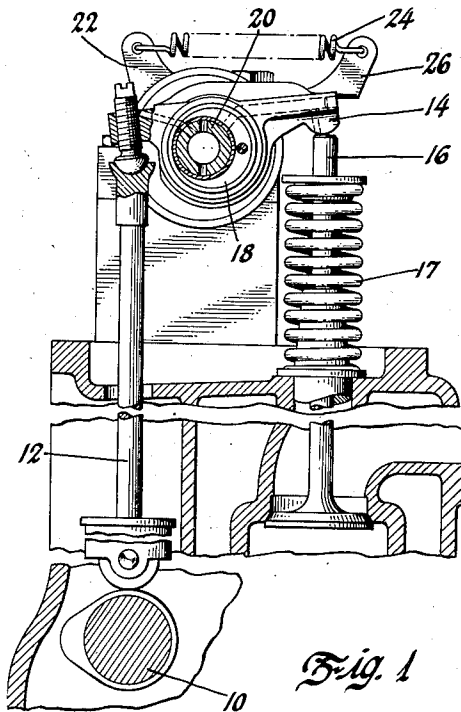
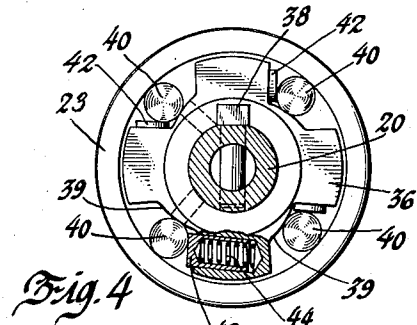
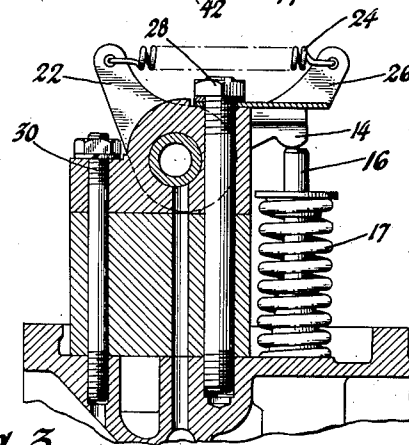
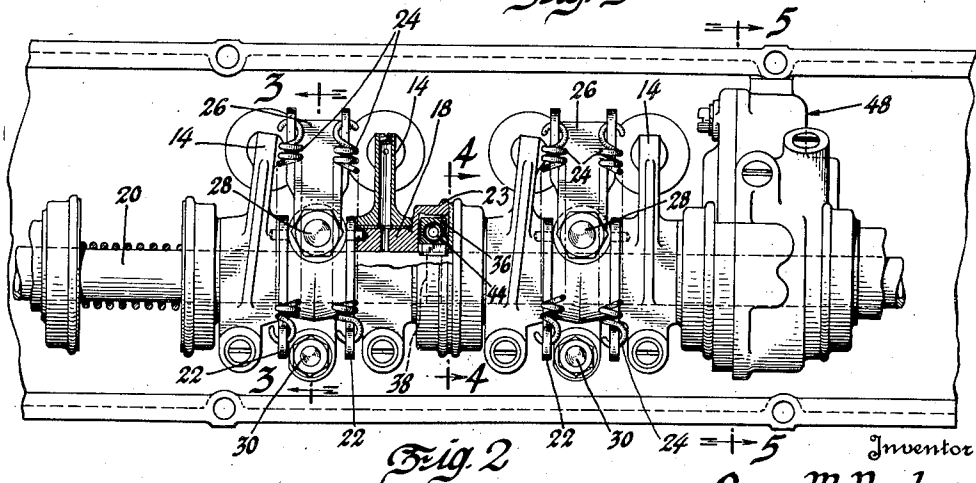
Aug. 21, 1934.

O. M. NACKER
VALVE SLACK ADJUSTER

1,970,764

Filed April 13, 1933

2 Sheets-Sheet 1



Inventor
Owen M. Nacker

By Blackwelder, Spencer & Flink
Attorneys

Aug. 21, 1934.

O. M. NACKER

1,970,764

VALVE SLACK ADJUSTER

Filed April 13, 1933

2 Sheets-Sheet 2

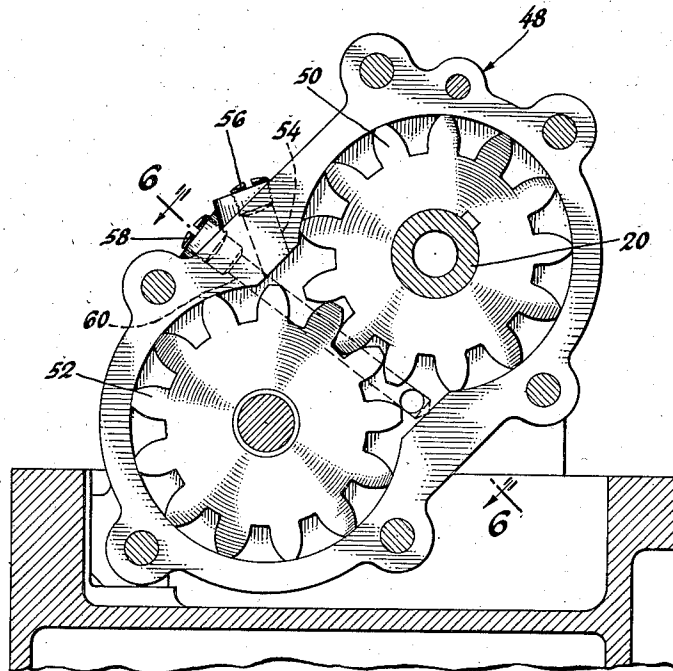


Fig. 5

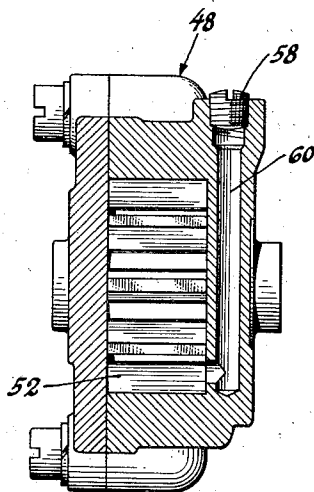


Fig. 6

Inventor
Owen M. Nacker

By Blackwelder, Spencer & Flint
Attorneys

UNITED STATES PATENT OFFICE

1,970,764

VALVE SLACK ADJUSTER

Owen M. Nacker, Pleasant Ridge, Mich., assignor
to General Motors Corporation, Detroit, Mich.,
a corporation of Delaware

Application April 13, 1933, Serial No. 665,908

2 Claims. (Cl. 123—90)

This invention has to do with a device for taking up slack in valve gear for internal combustion engines, and is an improvement on the mechanism described and claimed in the prior application of John O. Almen, Patent No. 1,936,653, granted November 28, 1933.

The present invention like that of the Almen patent embodies an eccentric bushing on which the valve rocker is journaled and a spring tending to rotate the eccentric in a direction to take up slack. However, in place of the dashpot which in the patented construction resists reverse movement of the eccentric, I have employed a brake applied to a rotatable shaft on which the eccentric is journaled and have provided a clutch between the eccentric and shaft which permits free movement of the eccentric in the direction in which it is urged by the spring, but locks the eccentric to the shaft upon movement in the reverse direction. Since rotation of the shaft is resisted by the brake, the tendency of the eccentric when the valve gear is under load to rotate in a direction to introduce slack into the system is resisted.

An advantage of my construction is the elimination of dashpots. Dashpots must be built very accurately and are consequently expensive to manufacture. Because of the small valves with which they are equipped, there is also possibility of clogging by particles of dirt lodging between the valve and seat.

Referring now to the drawings:

Figure 1 is a section through a portion of an over-head valve engine equipped with my improved slack adjuster.

Figure 2 is a top plan view of a portion of the engine of Figure 1.

Figure 3 is a section on line 3—3 of Figure 2.

Figure 4 is a section on line 4—4 of Figure 2.

Figure 5 is a section through the gear pump employed as a brake for the rotatable shaft.

Figure 6 shows a detail of the air outlet passage used in filling the pump with liquid.

For purposes of illustration, I have shown the invention applied to an over-head valve engine, but obviously it might equally well be used in L-head engines provided with rocker arms such as disclosed in the prior Almen patent.

In Figure 1 I have indicated at 10 a camshaft operating push rod 12 which in turn rocks the rocker 14 to depress valve 16 against the force of its spring 17. The described parts may be of conventional construction. The rocker 14 is mounted on eccentric bushing 18 which is rotatably mounted on shaft 20. To the bushing 18

is secured arm 22 to which is connected the spring 24 having its other end secured to stamping 26 which may be held in place by bolt 28 (Fig. 3) which, together with bolt 30, secures the rocker assembly to the cylinder. I have shown the bushing 18 provided at one end with an enlargement 23 to receive a ball clutch consisting of a cross-shaped member 36 keyed to the shaft 20 by stud 38. The surfaces 39 of the member 36 between projections have the form of cams and upon each cam surface bears a ball or roller 40 which also engages the interior of the enlargement 23. The projections 36 carry plungers 42 urged outwardly by springs 44. The plungers engage the balls or rollers 40, urging them toward the narrower end of the notches formed by the projections and the cam-shaped bottom portions. This construction constitutes a one-way clutch so that when the eccentric is rotated in clockwise direction, as shown in Figure 4, it is locked to the member 36, and when it is rotated in counter-clockwise direction, it is free of the said member.

In Figures 2, 5 and 6, I have shown a brake 48 which may be secured to the shaft 20. This brake may be of mechanical type embodying a friction member secured to the shaft and a stationary friction member, but I have preferred the construction shown. In these figures I have illustrated a fluid brake in the form of a closed circuit gear pump comprising meshing gears 50 and 52. The pump is filled through opening 54 normally closed by screw plug 56. When filling the pump screw plug 58 is removed to permit escape of air through passage 60. In order to avoid the effect of temperature changes, I have preferred to use in the brake aluminum oleate, a fluid whose viscosity is very little affected by changes in temperature.

The device operates as follows: When the cam on shaft 10 pushes the push rod 12 upwardly to rock the rocker 14 and open the valve 16 against the resistance of spring 17, the combination of the upward thrust of the cam at one end of the rocker and the upward thrust of spring 17 at the other end of the rocker tends to move the rocker bodily upwardly, and to rotate the bushing 18 in a direction to raise the axis of the eccentric, and thereby tend to introduce slack into the system. This movement of the eccentric is resisted by the spring 24 and by the following means: Rotation of the eccentric 18 operates the ball clutch 42—36—40 causing it to lock the eccentric to the shaft, and fur-

ther rotation of these members is then resisted by the brake shown in Figures 5 and 6.

When the push rod again reaches the base circle of the cam and the valve gear is relieved of the thrust of the spring 17, the spring 24 rotates the eccentric bushing 18 in a direction to lower the axis of the eccentric, and thereby take up the slack.

The described action takes place on each operation of the valve gear. During the operating portion of the cycle the eccentric is rotated in one direction against the resistance of the spring 24 and the brake, and during the non-operating portions of the cycle the spring 24 rotates the eccentric in a direction to remove all slack from the system.

This continuous adjustment of the valve gear permits the parts to expand and contract without interfering with the seating of the valve, and allows for wear of the parts for such variations in the length of the parts merely results in the next automatic adjustment of slack taking place from a new base position. Hence the valve gear operates at all times with substantially zero lash.

It will be understood, of course, that the described adjustment involves a very slight movement of the parts, but this is sufficient, for the rate of change due to other causes, such as wear or changes in temperature proceeds at a very slow rate.

Many modifications of my invention will occur to those skilled in the art; for example, if pre-

ferred, a separate shaft and brake could be employed with each valve rocker instead of using one brake on a common shaft.

I claim:

1. In mechanism for operating the valves of internal combustion engines and the like, the combination of a rotatable shaft, an eccentric bushing rotatably mounted on the shaft, a rocker rotatable on the bushing, means for urging the bushing in a direction to take up slack in the system, a one-way clutch between the bushing and shaft, said clutch permitting free movement of said bushing in a direction to take up slack and connecting the bushing and shaft when the bushing tends to rotate in the opposite direction, and means for resisting rotation of the shaft in said last named direction.

2. In mechanism for operating the valves of internal combustion engines and the like the combination of a rotatable shaft, a member rotatably mounted on the shaft, a rocker mounted on the member for rotation about an axis non-concentric with the axis of the shaft, means for urging the member in a direction to take up slack in the system, a one-way clutch between the member and shaft, said clutch permitting free movement of said member in a direction to take up slack and connecting the member and shaft when the member tends to rotate in the opposite direction, and means for resisting rotation of the shaft in said last named direction.

OWEN M. NACKER.

35	110
40	115
45	120
50	125
55	130
60	135
65	140
70	145
75	150