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VALVE TIMING MECHANISM
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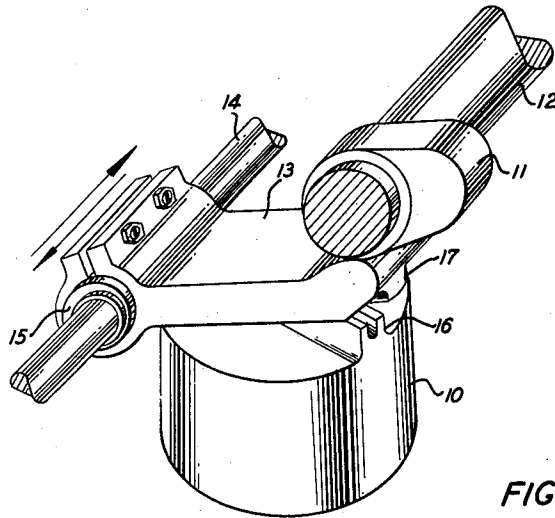


FIG. 1

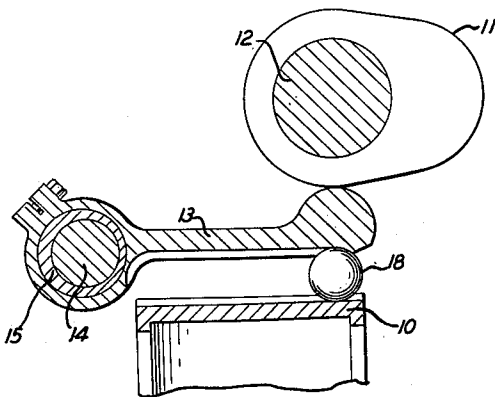


FIG. 2

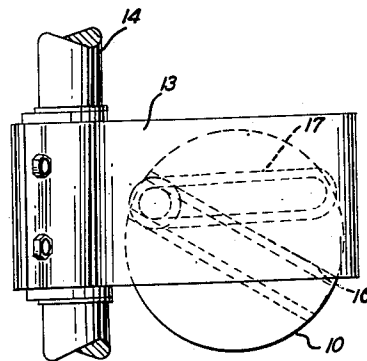


FIG. 3

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VALVE TIMING MECHANISM

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4 Claims. (Cl. 123—90)

This invention relates to a valve operating mechanism for internal combustion engines and more specifically to an apparatus for adjusting the operating characteristics of the valve without interrupting the operation of the engine.

The customary internal combustion engine valve operating mechanism provides constant valve lift and timing over the whole speed and load range. However, maximum full load power requires wide valve overlap at high speeds and small or no overlap at low speeds, while the most economical road load operation can be obtained by short valve opening periods which result in denser charges and lower pumping losses. Therefore, such valve timing and valve opening periods usually are selected which render a fair compromise of full power, high and low speed performance and of road load economy.

Valve trains according to the present invention permit variations in valve timing and valve opening periods by the introduction of mechanisms between cam and valve which vary the ratio of cam/valve lift and thus vary valve lift and timing at the same time.

Three figures of drawing are represented to enable one skilled in the art to more readily understand this invention.

Figure 1 is a pictorial view of the essential parts of a valve train modified to include the invention and,

Figure 2 is an elevation view partially in section of a portion of the valve train and,

Figure 3 is a plan view of the mechanism shown in Figure 2.

Referring first to Figure 1, there is provided a valve tappet 10 which is operated by cam 11 which is supported upon cam shaft 12. A cam follower 13 is interposed between cam 11 and valve tappet 10.

Cam follower 13 is supported upon cam follower shaft 14. Cam follower shaft 14 is capable of independent rotary and axial movements supplied by any suitable means. Such means have not been shown. Cam follower 13 is supported upon cam follower shaft 14 through an eccentric bushing 15.

The face of valve tappet 10 adjacent cam follower 13 is provided with tappet groove 16. Similarly the face of cam follower 13 adjacent valve tappet 10 is provided with a cam follower groove 17, which is preferably, although not necessarily, arranged perpendicular to cam follower shaft 14. It is essential that cam follower groove 17 and tappet groove 16 be non-parallel to each other. The base of tappet groove 16 and cam follower groove 17 are contoured to receive an appropriate keying member which will usually be spherical in shape although the shape may be varied if mechanical requirements so dictate.

Figure 2 is an elevation view of a mechanism shown in Figure 1 and shows a spherical keying member 18 interposed between cam follower 13 and valve tappet 10 and resting in and confined by tappet groove 16 and cam follower groove 17 at their intersection.

Figure 3 is a plan view of the mechanism shown in Figure 1 and clearly illustrates the cooperative action of spherical keying member 18, cam follower groove 17 and tappet groove 16, whereby motion is transmitted from cam 11 through cam follower 13, cam follower groove 17, spherical keying member 18, tappet groove 16 to valve tappet 10.

Consideration of the above description and figures of

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drawing will make it readily apparent that the valve action may readily be adjusted by an axial movement of cam follower shaft 14, which will cause a movement of spherical keying member 18 either towards or away from cam follower shaft 14. When the spherical keying member 18 is moved towards cam follower shaft 14 the valve lift becomes smaller. Similarly, the valve lift may be altered by rotating cam shaft follower 14 and so by means of eccentric bushing 15 displacing cam follower 13 in a direction perpendicular to the axis of valve tappet 10. This type of adjustment will also change the period during which the valves are open.

I claim as my invention:

1. A valve operating mechanism comprising a valve tappet, a cam, means for rotating said cam, a cam follower intermediate the cam and the valve tappet, and a cam follower shaft rotatably supporting the cam follower, said cam follower shaft being capable of independent axial and rotary movements, the surface of the cam follower adjacent the valve tappet being provided with a cam follower groove, the surface of the valve tappet adjacent the camshaft follower being provided with a tappet groove disposed at an angle to the cam follower groove, said cam follower groove and valve tappet groove being operatively joined through a keying spherical member.

2. A valve operating mechanism comprising a valve tappet, a cam, means for rotating said cam, a cam follower intermediate the cam and the valve tappet, and a cam follower shaft rotatably supporting the cam follower, said cam follower shaft being capable of independent axial and rotary movements, said cam follower being supported on said cam follower shaft through an eccentric bushing, the surface of the cam follower adjacent the valve tappet being provided with a cam follower groove, the surface of the valve tappet adjacent the camshaft follower being provided with a tappet groove disposed at an angle to the cam follower groove, said cam follower groove and valve tappet groove being operatively joined through a keying spherical member.

3. A valve operating mechanism comprising a valve tappet, a cam, means for rotating said cam, a cam follower intermediate the cam and the valve tappet, and a cam follower shaft rotatably supporting the cam follower, said cam follower shaft being capable of independent axial and rotary movements, the surface of the cam follower adjacent the valve tappet being provided with a cam follower groove perpendicular to the axis of the cam follower shaft, the surface of the valve tappet adjacent the camshaft follower being provided with a tappet groove disposed at an angle to the cam follower groove, said cam follower groove and valve tappet groove being operatively joined through a keying spherical member.

4. A valve operating mechanism comprising a valve tappet, a cam, means for rotating said cam, a cam follower intermediate the cam and the valve tappet, and a cam follower shaft rotatably supporting the cam follower, said cam follower shaft being capable of independent axial and rotary movements, the surface of the cam follower adjacent the valve tappet being provided with a cam follower groove, the surface of the valve tappet adjacent the camshaft follower being provided with a tappet groove disposed at an angle to the cam follower groove, said cam follower groove and valve tappet groove being operatively joined through a keying member.

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