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VARIABLE TIMING CAM FOLLOWER

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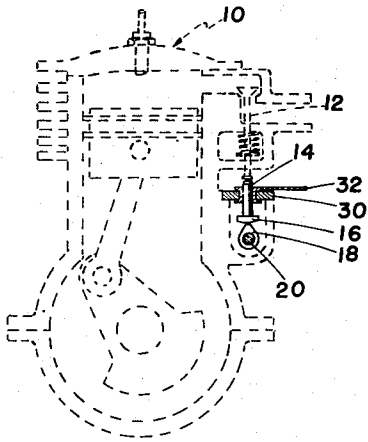


Fig. 1

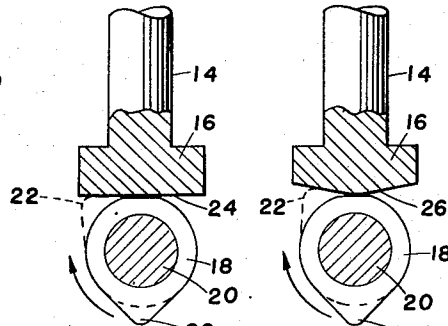


Fig. 3

Fig. 4

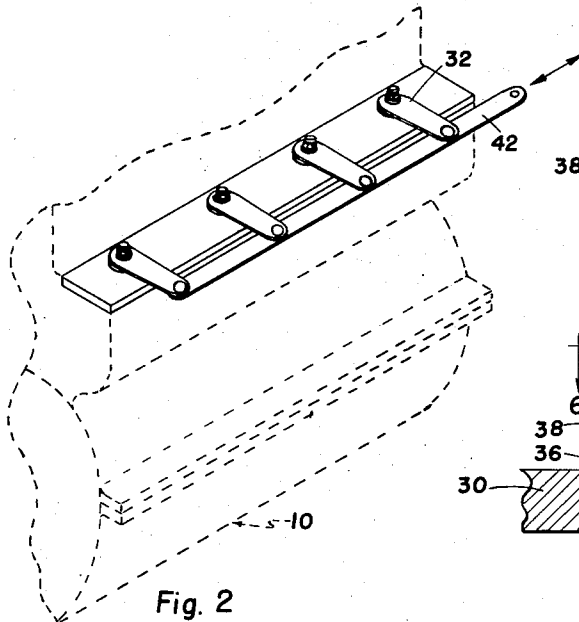


Fig. 2

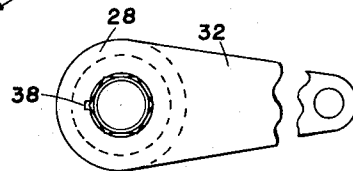


Fig. 6

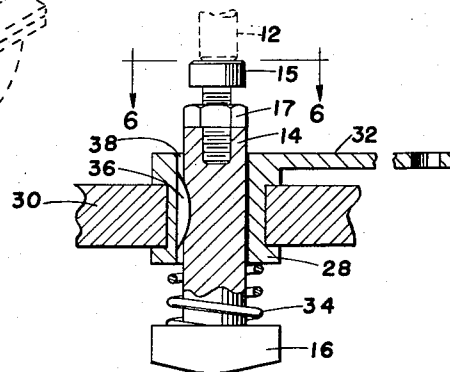


Fig. 5

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VARIABLE TIMING CAM FOLLOWER

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4 Claims. (Cl. 123—90)

1

The present invention relates generally to valve operation and more particularly to a variable timing cam follower for use with poppet type valves.

The primary object of this invention is to provide a variable timing cam follower for use with poppet type valves in which the opening and closing points of the valves and the period of opening of the valves may be adjusted.

Another object of this invention is to provide a variable timing cam follower of the type described in which the timing of the valves may be adjusted while the mechanism is in operation.

Another object of this invention is to provide a variable timing cam follower of the type described in which the adjustment of the valves may be automatically controlled or controlled by the operator.

Another object of this invention and this disclosure, ancillary to the immediately preceding object, is to teach the best known mode of carrying the invention into actual practice.

Another object of this invention is to provide a variable timing cam follower which is adapted for fabrication from many different materials, so that the choice of material can be according to the dictates of availability and price considerations, the exact sizes and proportions being matters easily determined to suit particular conditions and needs.

Finally, it is an object to provide a variable timing cam follower of the aforementioned character which is simple, safe and convenient to operate, and which will give generally efficient and durable service.

With these and other objects definitely in view, this invention consists in the novel construction, combination and arrangement of elements and portions, as will be hereinafter fully described in the specification, particularly pointed out in the claims, and illustrated in the drawing which forms a material part of this disclosure and wherein similar characters of reference indicate similar or identical elements and portions throughout the specification and throughout the views of the drawing, and in which:

Fig. 1 illustrates diagrammatically the cam follower as adapted to an internal combustion engine;

Fig. 2 is a fragmentary view of an internal combustion engine showing the method of adjusting the cam followers;

Fig. 3 is a diagrammatic sectional view of a cam in contact with a cam follower;

Fig. 4 is a diagrammatic sectional view of a

2

cam in contact with a cam follower which has been rotated through 90° from the position shown in Fig. 3.

Fig. 5 is a fragmentary sectional view of the cam follower as installed in an engine; and

Fig. 6 is a view taken on the line 6—6 of Fig. 5.

Referring now to the drawing in detail, Fig. 1 illustrates a section of an internal combustion engine, generally indicated by the numeral 10, in which the valve 12 is operated by means of a valve lifter 14 which has at one end a cam follower 16 and at the other end a threaded button 15 retained in position by means of a lock nut 17. The cam follower 16 is rectangular in cross section in one plane with a substantially rectilinear crest 24 as shown in Fig. 3 and has a face which is substantially transversely convex in a plane at 90° to the first mentioned plane, as shown in Fig. 4. The valve lifter 14 is operated by means of a cam 18 carried by a camshaft 20 and having a lobe 22 which, due to rotation of the camshaft, makes contact with the cam follower 16. It will be seen that the lobe 22 would contact the crest 24 of the cam follower so as to provide the effect of a flat face on the cam follower 16, as illustrated in Fig. 3, and contact will be made by the cam at a position reached earlier in its rotation than the position where it contacts the convex surface 26 in Fig. 4.

Referring now to Fig. 5, the valve lifter 14 is slidably mounted in a bushing 28 which is pivotally mounted in a mounting plate 30 and this bushing has an integral arm 32. The valve lifter 14 may, if desired, be biased by a spring 34 mounted coaxially of the lifter 14 and compressed between the bushing 28 and the follower 16. The valve lifter is prevented from rotating within the bushing 28 by means of a key 36 sliding in a slot 38 in the bushing. It is obvious that by rotating the bushing 28 by means of the arm 32, and thereby rotating the valve lifter, a different contour of the cam follower 16 may be brought into contact with the cam 18.

Referring now to Fig. 2 it will be noted that this figure illustrated a two cylinder internal combustion engine in which two inlet valves and two exhaust valves are operated by valve lifters of the type proposed by this invention. The arms 32 of the bushings 28 are operatively linked by means of a connecting bar 42 which in turn is connected to a suitable control. In this way all the valve lifters may be rotated simultaneously thus producing an equal change in timing of all the valves. With the cam fol-

3

lower 16 disposed to present the effectively flat contour or rectilinear crest 24 in contact with the cam the valve will open earlier and remain open for a longer period while with the cam follower disposed so that the transversely convex face 26 of the cam follower is effectively in contact with the cam the valve opening will be slightly delayed and the valve will be open for a shorter period. Thus it will be seen that the first described position of the cam follower will be suitable for high speed operation of the engine while the second named position of the cam follower will be more suited to slower speed operation. It will be obvious that the use of a cam follower of the type described is not limited to internal combustion engines but may be applied to any poppet type valve in other mechanisms such as compressors or the like.

The operation of this invention will be clearly comprehended from a consideration of the foregoing description of the mechanical details thereof, taken in connection with the drawing and the above recited objects. It will be obvious that all said objects are amply achieved by this invention.

Further description would appear to be unnecessary.

It is understood that minor variation from the form of the invention disclosed herein may be made without departure from the spirit and scope of the invention, and that the specification and drawing are to be considered as merely illustrative rather than limiting.

I claim:

1. Variable timing valve operating means for use with poppet valves, comprising a valve lifter having a cam follower with a working face transversely arcuate and having a rectilinear crest, said cam follower being rotatively adjustable

4

about an axis normal to said crest, and means holding the cam follower selectively in two positions angularly spaced 90 degrees, whereby the effects of an arcuate working face and a flat working face on said cam follower are alternatively obtained.

2. Variable timing valve operating means for use with poppet valves, comprising a valve lifter having a cam follower with a working face transversely convex and having a rectilinear crest, and adjusting means for rotatively shifting said cam follower about an axis normal to said crest, whereby the effects of a convex and a flat working face are alternatively obtained.

3. Variable timing valve operating means for use with poppet valves, comprising a valve lifter having a cam follower with a working face transversely convex and having a rectilinear crest, and adjusting means for rotatively shifting said cam follower about an axis normal to said crest, whereby the effects of a convex and a flat working face are alternatively obtained, said adjusting means comprising a sleeve bushing for said valve lifter, means preventing relative rotation of said bushing and valve lifter while allowing relative axial movement, and means for rotatively adjusting said bushing and lifter about their common axis.

4. The combination of apparatus according to claim 3 with intake and exhaust valves, whereby said valves are simultaneously adjusted.

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