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References Cited

UNITED STATES PATENTS

647,020	4/1900	Muller.....	74/586X
1,543,111	6/1925	Klipstein	74/569X
1,746,802	2/1930	Small.....	74/569
2,667,079	1/1954	Muller.....	74/55
1,531,909	3/1925	Engemann.....	123/90(B3)UX
1,701,599	2/1929	Woolson	123/90(B3)UX
3,002,508	10/1961	Barker et al.	123/90(B5)UX
3,270,726	9/1966	Cotton	123/90(B5)UX

FOREIGN PATENTS

730,974	5/1932	France	123/90(B5)UX
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[54] **ADJUSTABLE MECHANICAL TAPPET FOR AN ENGINE VALVE TRAIN ASSEMBLY**
4 Claims, 6 Drawing Figs.

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74/55, 74/569, 74/586
[51] Int. Cl. **F01L 1/20,**
F16H 53/06
[50] Field of Search..... **123/90,**
90(B), 90(B2), 90(B3), 90(B5), 90(PR); 74/55, 569, 586

ABSTRACT: This disclosure relates to a mechanical tappet for an internal combustion engine wherein adjustable mating wedge members are used within the tappet to vary the effective tappet length. Means are provided to lock the wedge members into the tappet body and means are provided to adjust the wedge members while the tappet is in the valve train.

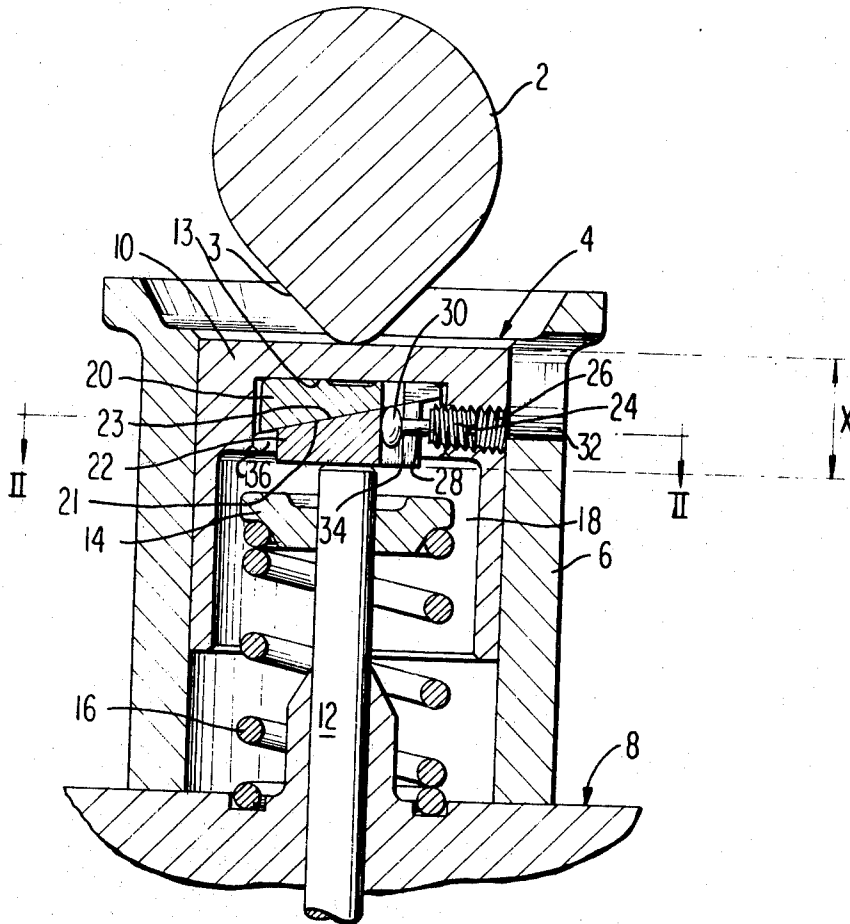


FIG 1

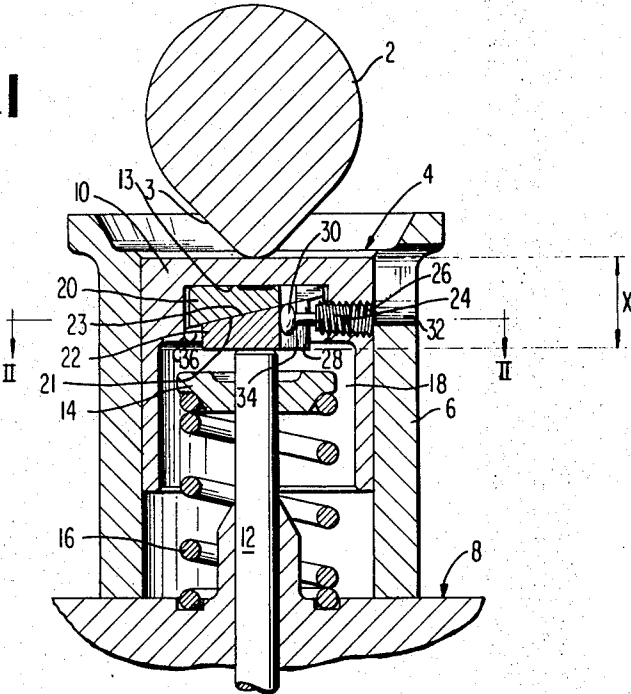


FIG 2

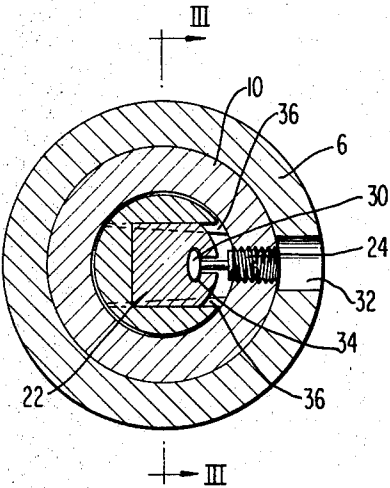
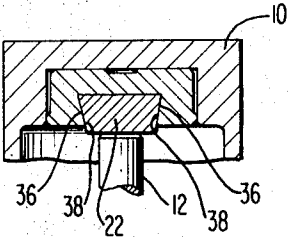


FIG 3

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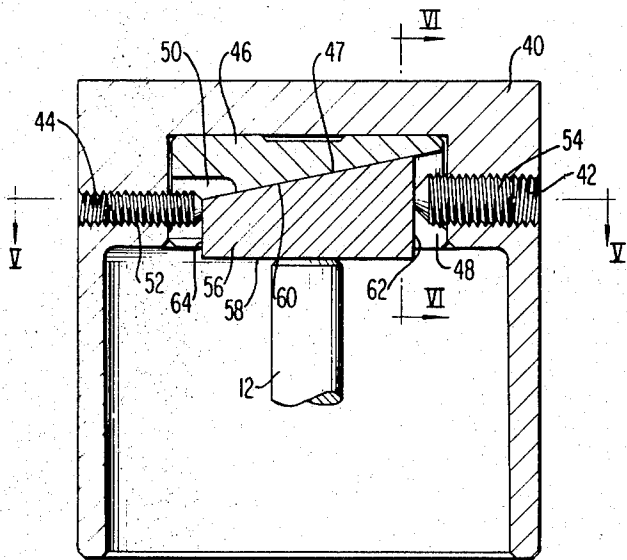


FIG 4

FIG 5

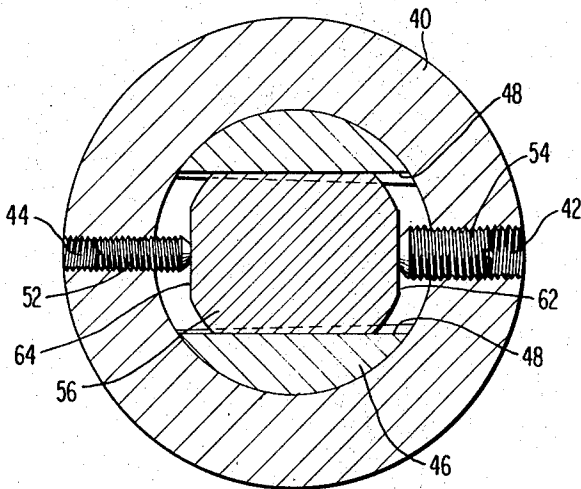
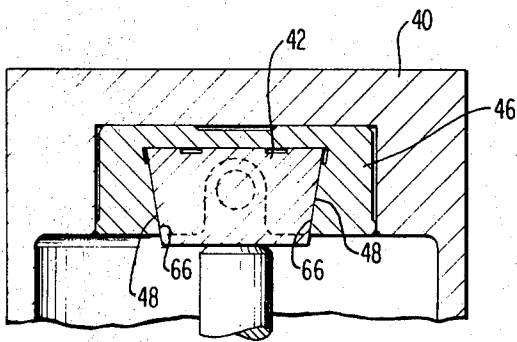


FIG 6

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ADJUSTABLE MECHANICAL TAPPET FOR AN ENGINE VALVE TRAIN ASSEMBLY

This invention relates to tappets. In one of its aspects it relates to a mechanical tappet, especially for overhead cam engines, wherein the tappet has an adjusting member which can be used to vary the effective length of the tappet.

Overhead cam shafts are becoming more popular. Some overhead cam shafts employ a mechanical tappet between the valve stem and the cam lobe. The parts, especially the tappet, must be machined to close tolerances to make the engine work properly. Even after the engine is so constructed, wear on the valve train parts causes ineffective operation of the engine.

I have now discovered a tappet which can be used for overhead cam shaft engines which tappet is adjustable such that the requirement of close tolerances in the manufacture of the valve train parts is unnecessary. By this invention, the tappet can be adjusted to compensate for engine tolerances or valve train wear.

By various aspects of this invention, one or more of the following, or other, objects can be obtained.

It is an object of this invention to provide an improved tappet construction for minimizing close tolerances required in the manufacturing of mechanical valve trains.

It is a further object of this invention to provide an improved cam valve train wherein close tolerances in the manufacture of the valve train components need not be maintained.

It is a further object of this invention to provide an adjustable mechanical tappet for an internal combustion engine valve train.

It is a further object of this invention to provide a means for compensating for wear in a valve train in an internal combustion engine.

Other aspects, objects, and the several advantages of this invention are apparent to one skilled in the art from a study of this disclosure, the drawings, and the appended claims.

According to the invention, there is provided a tappet assembly for use in a valve train between a valve actuating means and a valve. The assembly has an upper and lower surface for contacting members of the valve train to transmit force between the valve actuating means and the valve. The assembly has a body member and an adjustable member associated with the body member for adjusting the distance between the upper and lower surfaces. In this manner, the valve train length can be adjusted. Preferably, means accessible from the outside of the tappet body are provided for actuating the adjustable member so that the tappet distance can be adjusted while the tappet is in the valve train. Means are further provided for locking the adjustable member in its proper position.

The invention will now be described with reference to the accompanying drawings in which:

FIG. 1 is a sectional view of a portion of an engine block illustrating the novel tappet of the invention;

FIG. 2 is a sectional view taken along lines II-II of FIG. 1;

FIG. 3 is a sectional view taken along lines III-III of FIG. 2;

FIG. 4 is a sectional view of a portion of an engine block, like FIG. 1, illustrating a second embodiment of the invention;

FIG. 5 is a sectional view taken along lines V-V of FIG. 4;

and

FIG. 6 is a sectional view taken along line VI-VI of FIG. 4.

Referring now to the drawings, an overhead cam shaft 2 having a cam lobe 3 actuates a mechanical tappet 4 in a valve train in which an engine valve 12 (stem only is shown) is opened and closed in accordance with the movement of tappet 4. The tappet 4 reciprocates in a tappet housing 6 attached to cylinder head 8 by suitable means (not shown). The valve shaft 12 has attached thereto a collar 14 and is biased against the tappet by spring 16 within cavity or bore 18.

According to this invention, the mechanical tappet 4 is constructed of a cylindrical body 10 having the enlarged bore or cavity 18 and a smaller extended bore 11. The tappet is made adjustable so that the valve train between the cam shaft and the valve stem can be adjusted. The adjusting means com-

prises an outer female wedge 20 and an inner male wedge 22 positioned within the bore 11 of body 10. The outer wedge abuts against the terminal wall 13 of bore 11 and is fixed therein so as to be stationary. The outer wedge is circular in shape with a diameter corresponding in shape to the bore 11. It has a flat upper surface seated within the tappet housing against terminal wall 13. A channel is cut from the lower central portion for receiving the inner wedge 22. The channel is defined by a sloping surface 21, which slopes downwardly from one side of the wedge to the other, and by inwardly or downwardly sloping side walls 36.

The inner wedge 22 has an upper sloping surface 23, which slopes in the same direction as sloping surface 21 of outer wedge 20, and with wedge 20 makes an adjusting member for the valve train. The inner wedge 22 has a lower flat surface which bears against the valve stem 12. A pair of inwardly sloping side walls 38 are provided on inner wedge 22 for mating with the inwardly tapered walls 36. The channel formed by sloping surface 21 and side walls 36 is pitched at an angle to the horizontal and has the slope of surface 21 so that the wedge 22 will easily slide within the channel.

The inner wedge 22 is adapted to move laterally of the outer wedge 20 to adjust the valve train length. To this end, a threaded screw 24 is positioned within a threaded hole 26 and has a slot at the outside end thereof for adjustment with a screwdriver, Allen wrench, or similar tool. For this purpose, an opening 32 is provided. The screw 24 has an integral shaft 28 and a retainer nub 30. The retainer nub 30 is adapted to slide in vertical channel 34 as the tappet 4 reciprocates.

The threaded screw 24 serves as the actuating means for the tappet adjusting means.

In operation, the valve train length is diminished by adjusting threaded member 24. A screwdriver, for example, can be inserted in opening 32, and head 24 can be turned so as to move the wedge 22 to the right as seen in FIGS. 1 and 2. The valve train length can be increased by turning the threaded head in the opposite direction so that the wedge moves to the left as shown in the FIGS. Threaded member 24 is preferably a self-locking screw so that once the proper tolerance is set in the tappet, the wedges will remain in the same relative position.

Thus, with the use of the invention, a simple and easy method is provided for adjusting mechanical tappets in engines having overhead cam shafts.

MODIFICATIONS

Referring now to FIGS. 4, 5, and 6, the adjusting tappet is substantially the same except that opposing screws are used to lock the inner wedge into the outer wedge. More specifically, the tappet comprises a hollow body 40 having an internal cavity receiving an outer wedge member 46 and a center wedge member 56. Screws 52 and 54 threadably engage holes 44 and 42 respectively of the hollow body to position the center wedge 56 with respect to the outer wedge 46.

The outer wedge 46 has a flat upper surface and an inner channel formed by a downwardly sloping surface 47 and inwardly tapered walls 48. A hollow end 50 is provided for receiving screw 52.

The center wedge 56 has a flat bottom surface 58, a downwardly sloping top surface 60 which mates with downwardly sloping surface 47 of outer wedge 46, a pair of vertical end surfaces 62 and 64, and inwardly and downwardly sloping side surfaces 66. The side surfaces 66 mate with the inwardly tapered walls 48 of the outer wedge 46 to hold the center wedge within the channel of the outer wedge.

In operation, the center wedge is moved to the right or left as seen in FIGS. 4 and 5 by adjusting the screws 52 and 54. When the wedge is properly positioned, both screws 52 and 54 are tightened against the center wedge 56 to lock the center wedge in place. The adjusted distance between the bottom surface 58 and the top surface of tappet body 40 will then be fixed.

Whereas the invention has been described with relation to an overhead cam shaft engine, it is to be understood that the invention can be employed in other types of engines wherein the cam shafts are not overhead.

Reasonable variation and modification are possible within the scope of the foregoing disclosure, the drawings, and the appended claims without departing from the spirit of the invention.

I claim:

1. A tappet assembly for use in a valve train between a valve actuating means and a valve, said assembly comprising: a body member having a closed upper end and an upper surface for contact with one member of said valve train; said body having a hollow central portion with an open lower end; a receiving block positioned within said hollow central portion against said closed upper end, said receiving block having an inclined lower surface and depending sides forming a channel, said depending sides sloping inwardly and downwardly; an adjustable spacer member positioned within said receiving block channel, said adjustable member having an upper inclined surface mating with said inclined lower surface of said receiving block such that movement of said adjustable member within said channel causes a change in the tappet length, said adjustable member having upwardly and outwardly sloping sides to mate with the inwardly sloping sides of said receiving member, whereby said adjustable spacer member is held within said receiving member.

2. A tappet assembly according to claim 1 wherein means are provided to actuate said adjustable spacer member, said means comprising a threaded hole in a side wall of said body aligned axially with said channel and said adjustable spacer member, and a screw threadably mounted in said threaded hole having an adjustable spacer engaging means, and means are provided on said adjustable spacer member for receiving said engaging means.

3. A tappet assembly according to claim 2 wherein said receiving means comprises a vertical slot and said adjustable spacer engaging means comprises a nub on the end of said screw, said slot receiving said nub such that said nub is restrained horizontally but permitted to slide vertically within said slot.

4. A tappet assembly according to claim 1 wherein means are provided for actuating said adjustable spacer member, said means comprising first and second passages in opposite sides of said body axially aligned with said channel and said adjustable spacer member, first and second actuating means in said first and second passages respectively adapted to contact opposite ends of said adjusting spacer member to regulate the movement of said adjusting spacer member with said channel, whereby said adjusting spacer member can be locked in place in a desired position within said channel.

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