

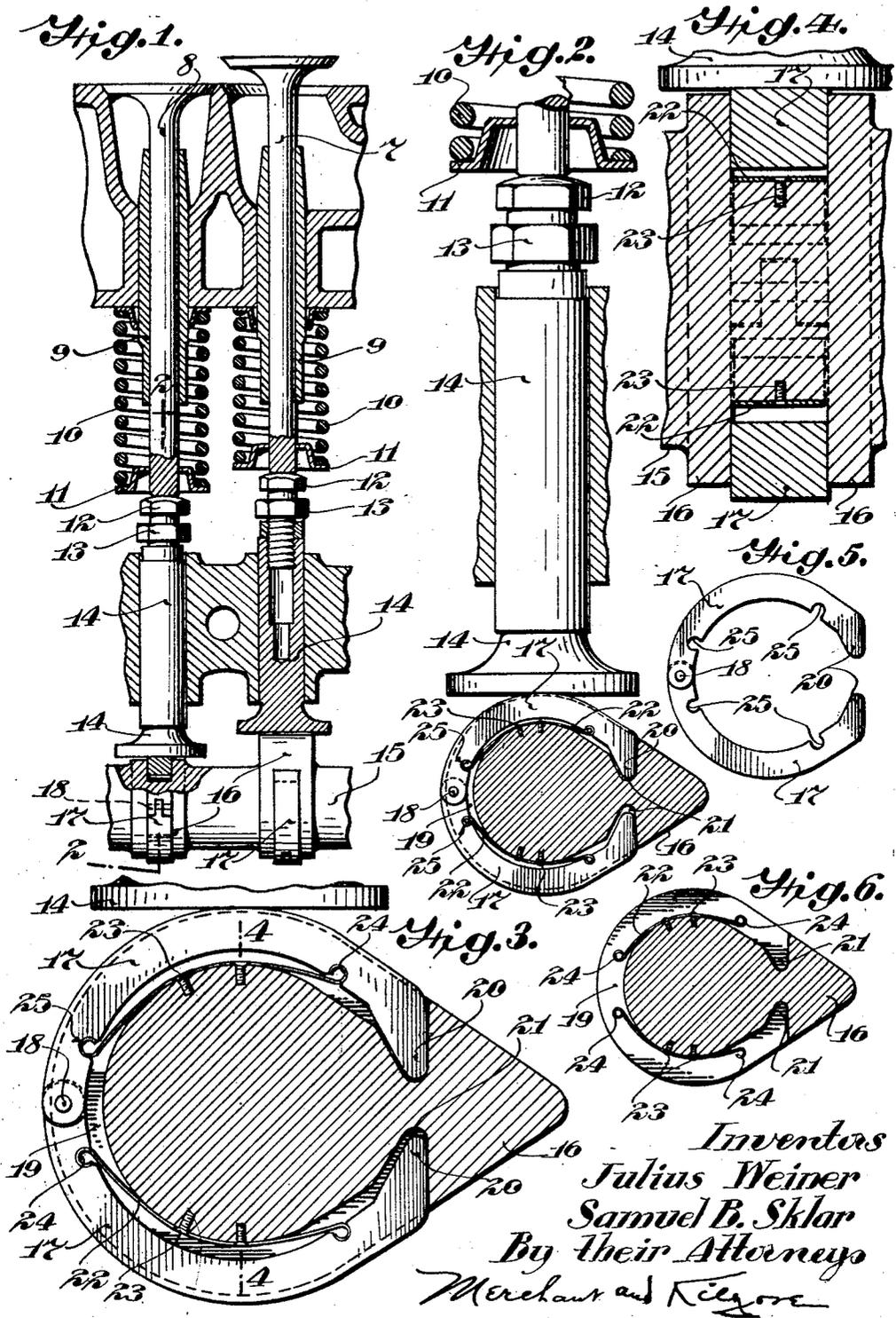
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J. WEINER ET AL

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EXPANSION COMPENSATING DEVICE FOR VALVE ACTUATING MECHANISM

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Inventors
Julius Weiner
Samuel B. Sklar
By their Attorneys
Merchant and Kelyore

UNITED STATES PATENT OFFICE

JULIUS WEINER, OF PHILADELPHIA, PENNSYLVANIA, AND SAMUEL B. SKLAR, OF
MINNEAPOLIS, MINNESOTA

EXPANSION COMPENSATING DEVICE FOR VALVE ACTUATING MECHANISM

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Our invention relates to internal combustion engines and has for its object to provide a simple and highly efficient expansion compensating device for valve actuating mechanism.

The aims of the invention are to hold the tappets of an internal combustion engine in contact with the valve stems at all times thereby eliminating valve taps and to compensate for expansion under varying temperatures, which would change the relation of the valve stems in respect to their actuating mechanism and prevent the valves from being held open to the burning thereof.

To the above end, generally stated, the invention consists of the novel devices and combinations of devices hereinafter described and defined in the claims.

In the accompanying drawings, which illustrate the invention, like characters indicate like parts throughout the several views.

Referring to the drawings:

Fig. 1 is a fragmentary view of an internal combustion engine having the invention embodied therein;

Fig. 2 is a fragmentary detail view with some parts sectioned on the line 2—2 of Fig. 1, on an enlarged scale;

Fig. 3 is an enlarged view of the cam and tappet, as shown in Fig. 2;

Fig. 4 is a fragmentary detail view principally in section taken on the line 4—4 of Fig. 3;

Fig. 5 is a side elevation of the shoes, as shown in Fig. 2, removed from the cam; and

Fig. 6 is a view of the cam as shown in Fig. 2 with the shoes removed.

Of the parts of the multiple cylinder engine illustrated in the drawings, it is important to note the exhaust and intake valves 7 and 8, respectively, valve stem guides 9, valve springs 10, valve spring seats 11, valve lifter adjusting screws 12, lock nuts 13, valve lifters or tappets 14, cam shaft 15 and cams 16 integrally formed with said shaft. The parts thus far described are of standard and well known construction.

It may be here stated that in the present

arrangement of the above described parts the tappets 14 rest directly on the cams 16 and when on the low portions of said cams the valves are held closed by the springs 10 and when on the high portions of the cams 16 the valves are held open by said cams. To insure the closing of the valves it is necessary to leave clearance between the valve lifter adjusting screws 12 and the stems of the valves. If this clearance is such as to make the action of the tappets 14 very quiet the valves due to expansion will not always close with a result of poor compression and the accumulation of carbon on the valves which often results in the burning thereof. On the other hand, if the clearance between the valve lifter adjusting screws 12 and the stems of the valves is such as to insure the closing of the valves under all conditions of the engine whether cold or hot, the tappets will be very noisy and subject to a great deal of wear.

Referring now in detail to the expansion compensating device, there being one for each cam 16, the same includes a pair of segmental shoes 17 hingedly connected at 18 for circumferentially expanding and contracting movements. This pair of shoes 17 is mounted in a circumferentially extended retaining groove 19 formed in the cam 16 substantially concentric throughout its entire length to the axis of the cam shaft 15. The hinge connection 18 is diametrically opposite the apex of the cam 16 and the shoes 17 extend on opposite sides of said cam with their free ends terminating considerably short of said apex.

Formed with the free ends of the shoes 17 are inturned calks 20 which extend into seats 21 in the end portions of the retaining groove 19. The outer faces of the calks 20 extend in the same plane and which plane is perpendicular to a line extending from the apex of the cam 16 through the axes of the cam shaft 15 and hinge connection 18. Said calks 20 at their inner faces are beveled and the seats 21 have the same general shape as said calks. The outer surfaces of the shoes 17 have the same contour as the cam 16 and

their thickness is less than that of the retaining groove 19.

A leaf spring 22 yieldingly holds each raised in the retaining groove 19 so that its outer face extends outward thereof, as best shown in Figs. 3 and 4. The springs 22 extend longitudinally in the retaining groove 19 and are intermediately secured by a pair of circumferentially spaced screws 23 to the cam 16.

The ends of the springs 22 are shaped to form small substantially round open secondary springs 24. These secondary springs 24 are removably mounted in open segmental seats 25 in the bottoms of the shoes 17. Said seats 25 are slightly more than semi-circles so that it is necessary to contract the secondary springs 24 to force the same into said seats or remove the same therefrom. The tension of the springs 22 is such as to hold the shoes 17 radially projected outward of the periphery of the low portion of the cam 16. When the valves are closed the tappets 14 rest on one of the shoes 17 of each pair and yieldingly hold the valve lifter adjusting screws 12 in contact with the stems of the valves and with the respective springs 22 compressed but with the outer surfaces of said shoes still projected outward of the low portions of the cam 16 to hold the tappets 14 out of contact therewith.

While the tension of the springs 22 is such as to always hold the shoes 17 in positions in which the tappets 14 are raised with the valve lifter adjusting screws 12 in contact with the stems of the valves said tension is not sufficient to interfere with the action of the springs 10 in holding the valves closed.

From the above description, it is evident that the springs 22 always hold the valve lifter adjusting screws 12 in contact with the valve stems thus eliminating valve taps and permit the shoes 17 to yield and compensate for expansion and wear. The retaining groove 19 holds the shoes 17 against lateral movement in respect to the cam 16 and the calks 20, by their engagement with the seats 21 hold said shoes against circumferential movement in said groove. As the tappets 14 move from the shoes 17 onto the high portions of the cams 16 to open the valves or as they move from said high portions of the cams 16 onto the shoes 17 the springs 22 will permit slight rocking movement of said shoes and the hinge connection 18 will also permit independent movements to the shoes 17 in respect to each other.

In case it is necessary to replace or repair the shoes 17 they may be readily detached from the springs 22 and at which time said springs may be replaced by a new one if necessary.

The above described device may be of material assistance in properly seating valves

after they have been ground by making the following adjustment, to wit:

When the motor is warm press down the pushrod in Fig. 13 with the fingers and test with a filler gauge between the valve stem and pushrod allowing sufficient clearance for factory specification of the car. Upon releasing the device the pushrods and valve stems will be kept in the proper positions. This device may also be of material assistance in locating sticking valves for the reason that when a valve sticks, said device will make a valve tap and thus assist in locating the trouble.

What we claim is:

1. An expansion compensating device comprising a cam, said cam having a groove therein, a pair of shoes mounted in said groove, leaf springs secured to the cam in the bottom of the groove, and the end portions of each spring engaging a shoe and yieldingly holding the same projected outwardly of the cam.

2. The structure defined in claim 1, said shoes each having a plurality of spring seats therein, and secondary springs on the ends of said leaf springs and removably mounted in said spring seats, whereby each shoe is detachably connected to said cam.

3. The structure defined in claim 1, said shoes having a plurality of spring seats therein, and secondary springs on the ends of said leaf springs and removably mounted in said seats, said secondary springs being compressible during their movement into and out of said seats.

4. The combination with a cam adapted to be used in an internal combustion engine and having a circumferentially extending groove therein, of an expansion compensating device comprising shoes mounted in said groove, means for yieldingly urging each shoe outwardly of said groove, means for holding each shoe against circumferential movement relative to the cam, and means for detachably connecting said shoe to each cam.

5. The combination defined in claim 4, said shoes comprising a pair of hingedly connected segments.

6. A cam adapted for use in an internal combustion engine, said cam comprising a body portion and an apex portion, said body portion being provided with a circumferentially extending groove, the end portions of said groove merging into a pair of inwardly extending seats, shoes mounted in said groove, an intumed calk at an end of each shoe and extending into said seats, means yieldingly holding each shoe projected outwardly of said groove, and means detachably connecting said shoes to said body portion.

7. The combination with a cam having an apex and a circumferentially extending

groove terminating short of said apex, of a pair of circumferentially extending shoes mounted in said grooves, a hinge connection for said shoes diametrically opposite said apex, means for holding said shoes against relative circumferential movement with respect to said cam, a spring urging each shoe outwardly of said groove, and means detachably connecting said shoes and cam.

8. A cam having an apex and a circumferentially extending groove terminating short of said apex, circumferentially extending shoes coextensive with said groove and mounted therein, spring means holding each shoe projected outwardly of said groove, and means connecting said shoes and cam.

9. The construction defined in claim 8, each shoe having a plurality of seats therein, and said connecting means comprising a plurality of secondary springs mounted on said spring means and adapted to removably extend into said seats.

In testimony whereof we affix our signatures.

JULIUS WEINER.
SAMUEL B. SKLAR.