Aug. 10, 1926. 1,595,317

W. A. SCHOLEY

SPRING AND SEAT THEREFOR

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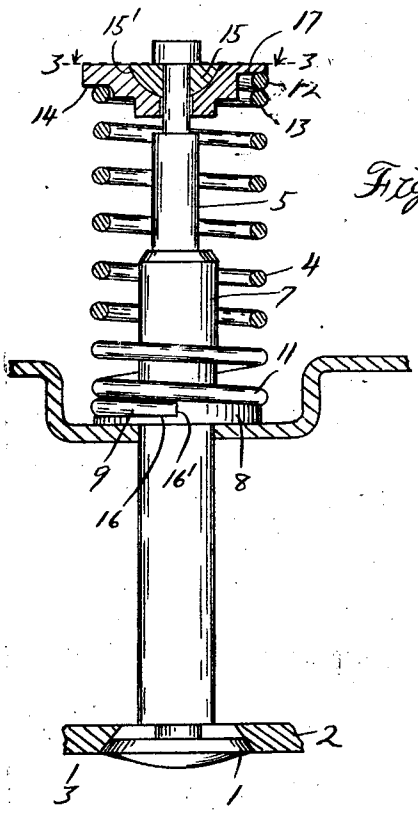


Fig. 1.

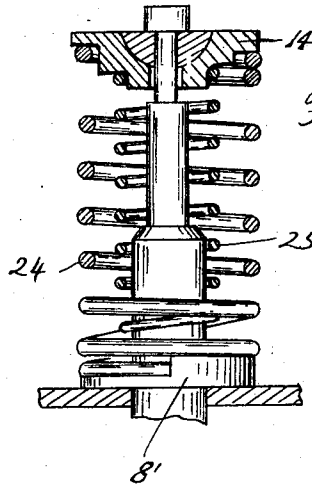


Fig. 4.

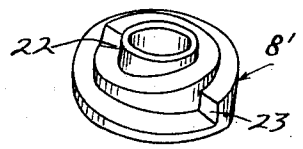


Fig. 5.

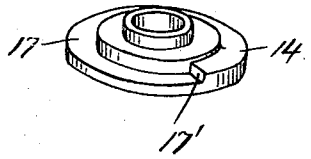


Fig. 2.

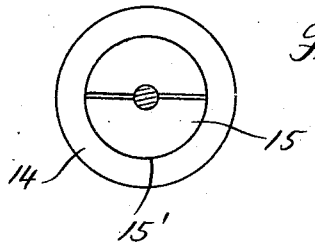


Fig. 3.

Inventor
William A. Scholey

By Whittemore, Hulbert Whittemore & Belknap Attorneys

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UNITED STATES PATENT OFFICE.

WILLIAM A. SCHOLEY, OF ANN ARBOR, MICHIGAN, ASSIGNOR TO COOK SPRING COMPANY, OF ANN ARBOR, MICHIGAN, A CORPORATION OF NEW YORK.

SPRING AND SEAT THEREFOR.

Application filed July 24, 1924. Serial No. 728,040.

This invention relates to springs and seats therefor designed for use with valve constructions of internal combustion engines and consists of certain novel features of construction, combinations and arrangements of parts as will be more fully described and particularly pointed out in the appended claims.

In the accompanying drawing;

Figure 1 is a vertical sectional view through a portion of a cylinder head and showing the valve spring construction embodying my invention.

Figure 2 is a perspective view of the upper abutment.

Figure 3 is a sectional view taken on the line 3—3 of Figure 1.

Figure 4 is a vertical sectional view through a slightly modified form of construction.

Figure 5 is a detail perspective view of the upper abutment shown in Figure 4.

Heretofore valves of internal combustion engines have been yieldably held against the cylinder heads of the motor casing by means of coil springs which had portions of the end coils thereof ground flat for engagement with relatively thin flat washers that formed seats for the springs on the usual valve stem. With such constructions, gaps were formed between the flattened extremities of the end coils and the adjacent intermediate coils against which they were bent, so that the portions of the spring bridging these gaps were not backed by the washers, consequently the uneven backing caused the spring to be distorted or bowed outwardly so that undue strain resulting therefrom frequently caused the end coils of the spring to be broken. Furthermore this distortion of the springs was transmitted to the valve stems and caused the same to bind in the valve stem guides and produce unnecessary wear. With the present construction the objectionable features just referred to are overcome and I preferably provide a continuous backing for the end coils of the spring. This is preferably accomplished by providing abutments having spiral seats therein for receiving the end coils of the spring. With this construction, the end coils of the spring preferably have the same cross sectional area throughout their length and a ball and socket connection is preferably provided between the valve stem and upper abutment so that the end coils of the spring will always seat fully against the respective abutments. Thus the load will be distributed uniformly around the circumference of the spring and wear upon the valve stem will be minimized. Moreover, the necessity of flattening portions of the end coils of the spring is obviated entirely and a cheaper and more efficient construction is provided.

Referring now to the drawing in which like characters of reference designate corresponding parts throughout the several views, the numeral 1 designates a valve that is normally held against its seat in the wall 2 of the cylinder or cylinder head 3 of an internal combustion engine by means of a suitable coil spring 4 which preferably surrounds the valve stem 5 above the cylinder or cylinder head. As shown, the stem 5 preferably extends through a short tubular guide 7 which extends through the upper wall of the cylinder or cylinder head and is provided intermediate its ends with a collar 8 that preferably rests upon the cylinder or cylinder head 3 and forms a seat for the lower end coil 9 of the spring. This lower coil 9 is preferably bent against the adjacent intermediate coil 11, while the upper end coil 12 of the spring is preferably bent against the adjacent intermediate coil 13 and bears against a collar 14 that is held upon the stem 5 by means of a split semi-spherical member 15 surrounding the stem at the upper end thereof. As shown, the semi-spherical member 15 preferably seats in a semi-spherical socket 15′ in the upper face of the upper collar 14 and abuts a suitable flange or shoulder 14′ on the valve stem.

In order that the end coils 9 and 12 respectively of the spring will be relieved of undue strains because of the bent formation thereof, the collars 8 and 14 respectively are preferably provided with spiral bearing surfaces 16 and 17 respectively for the end coils 9 and 12 of the spring. Thus, with this construction, the end coils 9 and 12 respectively of the spring will always seat fully against the spiral bearing surfaces 16

and 17 throughout their length irrespective of the inclined position of the valve stem relative to the spring, consequently the strains upon opposite sides of the spring will be equalized and wear on the valve stem will be minimized. To prevent the spring from turning, the spiral bearing surfaces 16 and 17 preferably extend in opposite directions in the collars 8 and 14 so that the shoulders 16′ and 17′ form opposite abutments for the extremities of the spring.

In Figure 4 I have shown a slight modification in which two springs are preferably used instead of one. With this construction each collar is preferably provided with the inner and outer spiral bearing surfaces 22 and 23 respectively for the end coils of the concentric springs 24 and 25 respectively. to prevent the springs from turning, the spiral bearing surfaces 22 and 23 extend in opposite directions in the collars and terminate at diametrically opposite points thereof.

Although the spring and seat construction is shown and described in connection with valve constructions of internal combustion engines, it is readily apparent that its use is not limted to that art alone but may readily be used in the shock absorbers art and other arts wherein coil springs and seats therefor are found desirable.

While it is believed that from the foregoing description the nature and advantages of the invention will be readily apparent, I desire to have it understood that I do not limit myself to what is herein shown and described, and that such changes may be resorted to when desired as fall within the scope of what is claimed.

What I claim as my invention is:

1. The combination with a reciprocating rod, and a tubular guide therefor, of a coil spring, of abutments for said spring surrounding said rod and guide having spiral bearing surfaces extending in opposite directions for the end coils of said spring.

2. The combination with a reciprocating rod, and a tubular guide therefor, of a coil spring surrounding said rod and guide, and means for equalizing the strains upon opposite sides of said spring including a semi-spherical member on the rod, an abutment having a spiral bearing surface providing a continuous seat for one end coil of said spring and having a semi-spherical socket receiving the semi-spherical member aforesaid, and an abutment on said guide having a spiral bearing surface providing a continuous seat for the opposite end coil of said spring.

3. The combination with a reciprocating rod, and a tubular guide therefor, of a coil spring surrounding said rod and guide, and means for equalizing the strains upon opposite sides of said spring including an abutment mounted for rocking movement on said rod and having a spiral bearing surface for one end coil of said spring, and an abutment mounted on said guide having a spiral bearing surface for the opposite end coil of said spring.

4. The combination with a valve stem, of a guide for said stem, a coil spring surrounding said stem and guide, a semi-spherical member on said stem, a collar having a semi-spherical socket receiving said semi-spherical member, said collar also having a spiral bearing surface for an end coil of said spring, and a collar on said guide having a spiral bearing surface for the opposite end coil of said spring.

5. The combination with a valve stem, of a guide for said stem, a collar on said guide, a collar on said stem, and a coil spring extending between said collars, the end coils of said spring having substantially the same cross sectional area throughout their length, and said collars having spiral bearing surfaces extending in opposite directions for the end coils of said spring.

6. The combination with a valve stem, a tubular guide therefor, and a coil spring surrounding said guide and stem, of means for equalizing the strains upon opposite sides of said spring and minimizing wear on said stem including an abutment having spiral grooves in one face thereof for one end coil of said spring and mounted for rocking movement on said stem, and an abutment for the opposite end coil of said spring mounted on said guide.

7. The combination with a cylinder head of an internal combustion engine having a valve seat and a valve engaging said seat, said valve having a stem extending through the head, of a tubular guide surrounding said stem, yieldable means normally holding the valve seated, and seats having spiral bearing surfaces for said yieldable means, one seat being mounted for rocking movement on said stem, the other seat being mounted on said guide.

8. An abutment for concentric coil springs comprising an annular member having concentric spiral grooves in one face thereof, the ends of the concentric grooves terminating at diametrically opposite points of said abutment.

9. The combination with a valve stem, of a tubular guide surrounding the stem, collars mounted respectively on said guide and stem, a coil spring extending between said collars, the end coils of said spring having substantially the same cross sectional area throughout their length, and said collars having continuous spiral seats for the end coils of said spring and cooperating therewith to prevent said spring from bowing outwardly and binding said stem against said tubular guide.

10. The combination with a coil spring, the cross sectional area of the end coils of said spring having substantially the same cross-sectional area throughout their length of abutments for the end coils of said spring having oppositely spiralled surfaces in one face thereof, the said surfaces adapted to form a continuous bearing for the end coils and cooperating therewith to distribute the load uniformly around the circumference of the spring.

In testimony whereof I affix my signature.

WILLIAM A. SCHOLEY.