Oct. 28, 1924. 1,513,075

L. J. TREMBLEY

SELF GRINDING VALVE

Filed Aug. 6, 1923

Fig. 1.

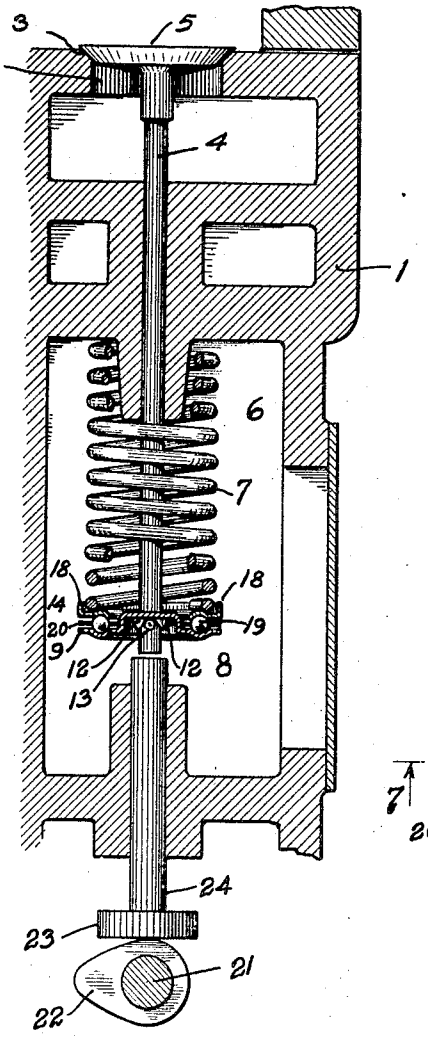


Fig. 2.

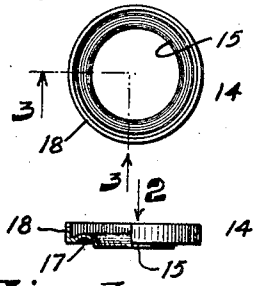


Fig. 3.

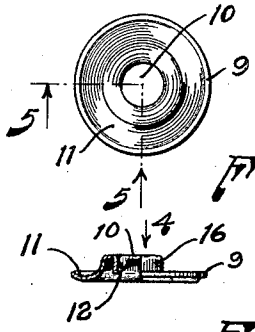


Fig. 4.

Fig. 5.

Fig. 6.

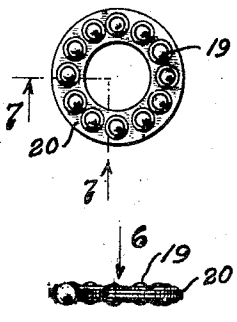


Fig. 7.

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Patented Oct. 28, 1924. 1,513,075

UNITED STATES PATENT OFFICE.

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SELF-GRINDING VALVE.

Application filed August 6, 1923. Serial No. 655,893.

To all whom it may concern:

Be it known that I, LOU J. TREMBLEY, citizen of the United States, residing at Los Angeles, county of Los Angeles and State of California, have invented certain new and useful Improvements in Self-Grinding Valves; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

This invention relates to self-grinding valves for internal combustion engines.

Internal combustion engines are usually provided with intake and exhaust valves of the type known as poppet valves. These valves have a stem, to one end of which is secured a circular disc-like valve head whose edges are chamfered so as to fit a correspondingly chamfered valve seat. The valve is normally held against the seat by means of a spring and is periodically lifted from the seat by means of a cam shaft which is provided with a cam for each valve. Between the cams and the end of the valve stem are valve tappets that have such a relation to the cams that the latter tends to rotate them.

The valves, as ordinarily constructed, cannot rotate, as the friction between the valve mechanism and the springs precludes this, and therefore the valve and the valve seat do not wear uniformly, with the result that the valves soon begin to leak. If the valves were so constructed that they would rotate slightly at each operation, then the valves would wear evenly and would be in a sense self-grinding, assuring a perfect fit for a longer period of time.

I am aware that patents have been granted for means which cause the valve to rotate a short distance at each operation and I therefore do not claim to be the inventor of this idea in its broadest sense. My invention relates to a specific improvement in the anti-friction washer which is secured to the end of the valve stem and which serves as an abutment for one end of the spring.

It is the object of this invention to produce a device of the type referred to, which shall be extremely simple in construction, adapted to be cheaply manufactured and which shall withal permit the valve to rotate quite freely whenever the valve tappet rotates.

In order to better and more clearly describe my invention, I shall have reference to the accompanying drawing in which the preferred embodiment thereof is shown, and in which:

Fig. 1 represents a vertical section through a portion of an internal combustion engine and shows a portion of the spring and the spring seat or abutment partly in section.

Fig. 2 is a top plan view of the top member of the spring abutment.

Fig. 3 is a section taken on line 3—3, Fig. 2.

Fig. 4 is a top plan view of the under part of the spring abutment.

Fig. 5 is a section taken on line 5—5, Fig. 4.

Fig. 6 is a plan view of the ball retainer employed in combination with the parts shown in Figs. 2 and 4; and

Fig. 7 is a section taken on line 7—7, Fig. 6.

The same reference characters will be used to designate the same parts throughout the several views.

Numeral 1 represents a portion of an internal combustion engine which is provided with the usual opening 2, the edges of which are chamfered, as indicated at 3, and form the valve seat. The valve consists of a stem 4 the upper end of which is in the form of a circular disc 5 whose edges are chamfered to fit the valve seat. The stem 4 extends downwardly through suitable openings and terminates within the chamber 6. A spring 7 surrounds the valve stem and abuts its upper end against the top of chamber 6. Secured to the lower end of the valve stem is a spring abutment designated as a whole by the numeral 8. This abutment comprises a member 9 pressed from a piece of steel. The member 9 is preferably circular and has a central opening 10 which is surrounded by a ball race 11. The central portion of member 9 is pressed upwardly so that the undersurface thereof is above the upper surface of the ball race. On opposite sides of the opening 10 I have provided pairs of downwardly extending spaced lugs 12 between which the ends of the pin 13 fits in the man-

ner shown in Fig. 1. It is evident that the cooperation of the pin 13 with the lugs 12 prevents relative rotation between stem 4 and member 9 and besides this the lugs 12 serve to prevent the member 9 from wabbling on the stem. This is a very important consideration and I desire to emphasize it, as the successful operation of this device is dependent on the steadying effect of the lugs 12. Cooperating with member 9 is a second annular member 14. This member has a central opening 15 which is of slightly greater diameter than the outside of the central portion 16 of member 9. Surrounding the opening 15 is a ball race 17 which is adapted to cooperate with the raceway 11 in member 9. A cylindrical flange 18 surrounds member 14 and serves to hold the spring 7 in place. The balls 19 are held in assembled relation by means of a retainer 20 preferably made in the manner shown in Figs. 6 and 7, but as this is no part of my invention, it will not be described in detail.

The parts 9 and 14 are assembled, as shown in Fig. 1, and are separated by means of a number of balls 19 assembled in the manner shown. The spring 7 is normally under tension and tends to hold the valve against its seat. For the purpose of periodically raising the valve off from its seat, a cam shaft 21 is provided. This shaft is geared to the engine and is provided with cams 22 which cooperate with the heads 23 of the valve tappets 24 for the purpose of raising the valves from their seats. The cam 22 engages the head 23 to one side of its center in the usual manner and causes the tappet to rotate at each operation. As the upper end of the tappet 24 contacts with the lower end of the stem 4 whenever the latter is raised from its seat, it will tend to rotate the valve. If the spring 7 rests upon a seat that is non-rotatably connected to the valve stem, then the valve will not be rotated. If the spring 7 rests on member 14, which is separated from member 9 by a series of balls, then when the valve is raised from its seat through the action of the valve tappet, the valve will rotate with the tappet, with the result that it will seat in a different place at each operation, thus assuring even distribution of the wear and better seating.

If the spring abutment 8 were not held from wabbling on the stem by means of the flanges 12, then the ball races would not remain in a plane perpendicular to the axis of the valve stem and the valve would be unable to rotate. Therefore the lugs 12 perform a very important function in this combination.

Having now described my invention, what I claim as new is:

1. An abutment for a valve spring comprising in combination two annular members, each of which is provided with a raceway for balls, one of said members having a plurality of downwardly projecting flanges about its central opening, said flanges being adapted to engage the sides of a valve stem and prevent the member from wabbling thereon.

2. An abutment for a valve spring comprising in combination a circular member having a central opening of a size which will fit snugly a valve stem, a number of lugs surrounding said central opening and adapted to engage a valve stem to hold the member against wabbling thereon, a raceway for balls surrounding said central opening, the bottom of the raceway being below the undersurface of the central portion, and a second annular member adapted to cooperate with the first member, said second member having a raceway.

3. An abutment for a valve spring comprising in combination a circular member having a central opening of a size which will fit snugly a valve stem, a number of lugs surrounding said central opening and adapted to engage a valve stem to hold the member against wabbling thereon, a raceway for balls surrounding said central opening, the bottom of the raceway being below the undersurface of the central portion, and a second annular member adapted to cooperate with the first member, said second member having a raceway, and an upwardly extending circular flange.

In testimony whereof I affix my signature.

LOU J. TREMBLEY.