April 13, 1926. 1,580,846

J. C. MILLER

CUSHION VALVE TAPPET FOR INTERNAL COMBUSTION ENGINES

Filed June 5, 1925

Fig. 1.

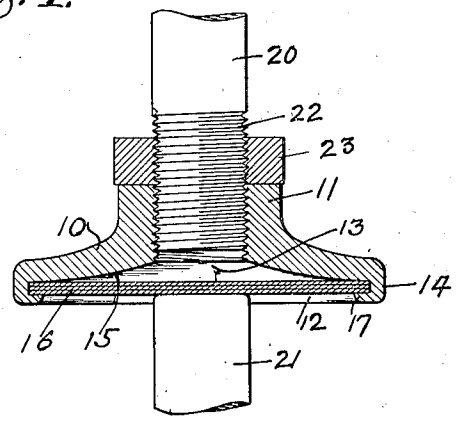
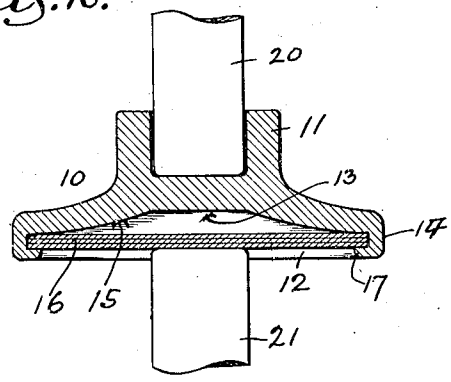


Fig. 2.



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UNITED STATES PATENT OFFICE.

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CUSHIONED VALVE TAPPET FOR INTERNAL-COMBUSTION ENGINES.

Application filed June 5, 1925. Serial No. 35,185.

To all whom it may concern:

Be it known that I, JACOB C. MILLER, a citizen of the United States, and a resident of the city of Milwaukee, in the county of Milwaukee and State of Wisconsin, have invented certain new and useful Improvements in Cushioned Valve Tappets for Internal-Combustion Engines; and I do declare the following to be a clear, exact, and complete description thereof, such as will enable persons skilled in the art to which my invention pertains to make and use the same, reference being had to the accompanying drawing for an illustration of some forms in which the invention has been embodied.

This application is in part a division of my application filed November 20, 1923, Serial No. 675,821, on which Patent No. 1,548,055 was granted August 4, 1925.

The invention resides in a silencer for the valve tappets of an internal combustion engine, and is comprised of a unit assembly which is adapted to be separably positioned between the contiguous ends of the aligned sections of a divided valve rod, and when so positioned will serve by expansive action inherent in the construction of the unit, to eliminate lost motion and hold the valve rod in close engagement with the actuating cam and the rocker arm at all times, and so obviate the tapping noise sometimes attendant upon the use of prior structures, where there is no provision for adjustment to take up such lost motion.

The device is composed of a dished member formed at one side with an axially bored hub for receiving the end of the aligned sections of the divided valve rod, whereby the device is maintained in operative position, and at the other side with a circular recess having an inwardly sloping bottom. The sloping bottom formation of the recess is uniformly convex in cross section on every radial line. Arranged in the circular recess in the dished member is a resilient metal disc, formed as a lamination, which is supported at its inner side by bearing at its margin upon the elevated outer circular portion of the bottom of the recess. The resilient disc may be secured in position by turning inwardly the rim of the wall of the recess, so as to confine the disc within the recess and prevent its accidental displacement.

The adjacent or contiguous end of the other section of the valve rod bears upon the exposed side of the resilient disc with a yielding pressure, and when the disc is deflected toward the hollow in the bottom of the recess in the movement of the valve rod, the resistance to such deflection is increased as the circular line of contact of the disc with the convex surface shifts toward the axis and decreases in diameter, thus shortening the radius of the effective portion of the resilient disc and so decreasing the leverage.

The invention will now be specifically described, and the novel features residing therein will be pointed out in the appended claims.

In the accompanying drawing:

Figure 1 is a vertical central sectional view through a form of the device adapted for use in connection with valve rods not having provisions for longitudinal adjustment, other than such as are embodied in the construction of the present invention.

Fig. 2 is a like view of a modified form of the device adapted for use in connection with valve rods which are in themselves provided with means for effecting such longitudinal adjustment.

In the drawing, the numeral 10 indicates a dished member which is formed at one side with an axially bored hub 11 by which it is sustained in fixed position, and at the other side with a recess 12, the latter having a bottom which slopes or tapers inwardly to form a central depression 13. The bottom of the recess is convex in cross section on all radial lines leading from the wall 14 circumscribing the recess to the central depression, as indicated at 15. Thin metal discs 16, in such number as will serve to present the requisite degree of resiliency in the laminated arrangement, are laid into the recess 12, the border of the lamination resting at the inside of the recess upon the more elevated circular portion of the bottom formation contiguous to the wall 14 surrounding the recess, as to provide a space with the central depression 13 into which the lamination may be laterally deflected when pressure is applied to the outer side thereof.

The rim of the wall is inturned as at 17 so as to overlie the lamination and retain it within the recess.

The features of construction above described are common to all forms in which the invention has been embodied, and constitute the unit thereof.

In Fig. 1, the silencing device or unit is shown as in the fixed position which it will occupy when used in a Ford or other automobile having an internal combustion engine in which there are no provisions for longitudinal adjustment of the valve rods. In applying my invention to an automobile engine of this class, I divide the valve rod into two sections, indicated 20 and 21, and thread the adjacent end of the section 20, as at 22. To position the valve silencer unit upon the said section, I thread the axial bore of the hub 11. The silencer is thereafter threaded upon the rod 20, and when adjusted properly in longitudinal relation thereon, the jam nut 23, previously threaded onto the section 20, is run down so as to lock the silencer in the position in which it has been adjusted.

In Fig. 2, the silencer unit is shown as in the fixed position which it will occupy when arranged between the ends of the aligned sections of a divided valve rod provided with other means for effecting longitudinal adjustment. The hub 11 is bored axially as before, but the threading of the bore is omitted, and into the bore the plain or unthreaded end of the section 20 of the valve rod is inserted to position the silencer and support the same.

In operation, the assembly is made with the unit positioned as illustrated, and with the lamination 16 indirectly opposed at one side through the dished member 10 by the end of the supporting rod section 20 and directly opposed at the other side by the end of rod section 21, the two rod sections being maintained in alignment. Careful longitudinal adjustment of the sections of the valve rod is then made to take up any lost motion, and place the lamination 16 under a suitable initial tension. The thrust of the actuating cam upon the rod section 21 will cause a deflection of the lamination from its normal plane into the central depression of the recess in the dished member 10. Such deflection will shift the circular line on which the lamination 16 bears upon the convex surface at the bottom of the recess and by thus decreasing the leverage, interpose an increasing resistance to the deflection. The inherent resiliency of the lamination 16 will serve to maintain the outer ends of the sections of the valve rod in contact with the rocker arm and the cam, notwithstanding any variations in the relations of these parts.

Having thus described my invention, what I claim and desire to secure by Letters Patent of the United States, is:

1. A valve silencer for internal combustion engines constructed as a separable unit and comprising a dished member having upon one side a recess and a resilient lamination secured therein, the bottom of the recess having a rigid circular surface convex in radial section over which the lamination is adapted to be deflected with an increasing resistance.

2. A valve silencer for internal combustion engines constructed as a separable unit and comprising a dished member having upon one side a recess and a resilient lamination secured therein, and means for confining the lamination in the recess, the bottom of the recess having a rigid circular surface convex in radial section over which the lamination is adapted to be deflected with an increasing resistance.

3. In an internal combustion engine, a divided valve rod, in combination with a cushioning device interposed between the sections thereof, such cushioning device supported upon one of such sections and comprising a recessed member and a resilient lamination in such recess, the bottom of the recess having a rigid circular surface convex in radial section which contacts with variable resistance upon one side of the lamination, and with the continuous end of the other rod section contacting upon the other.

4. In an internal combustion engine, a divided valve rod the sections of which are aligned, in combination with a cushioning device attached to the end of one such rod section and comprising a recessed member having a resilient lamination secured in such recess, the bottom of the recess having a rigid circular surface convex in radial section which contacts with variable resistance upon one side of the lamination, and with the contiguous end of the other rod section contacting upon the other.

5. In an internal combustion engine, a divided valve rod the sections of which are aligned, in combination with a dished member attached at one side to the end of one such rod section, and recessed upon the other side, a resilient lamination in disc formation in the recess and supported at its margin by the dished member, and with the contiguous end of the other rod section bearing centrally against the other side of the lamination to deflect the latter toward the dished member.

In testimony whereof, I have signed my name at Milwaukee, this 11th day of May, 1925.

J. C. MILLER.