

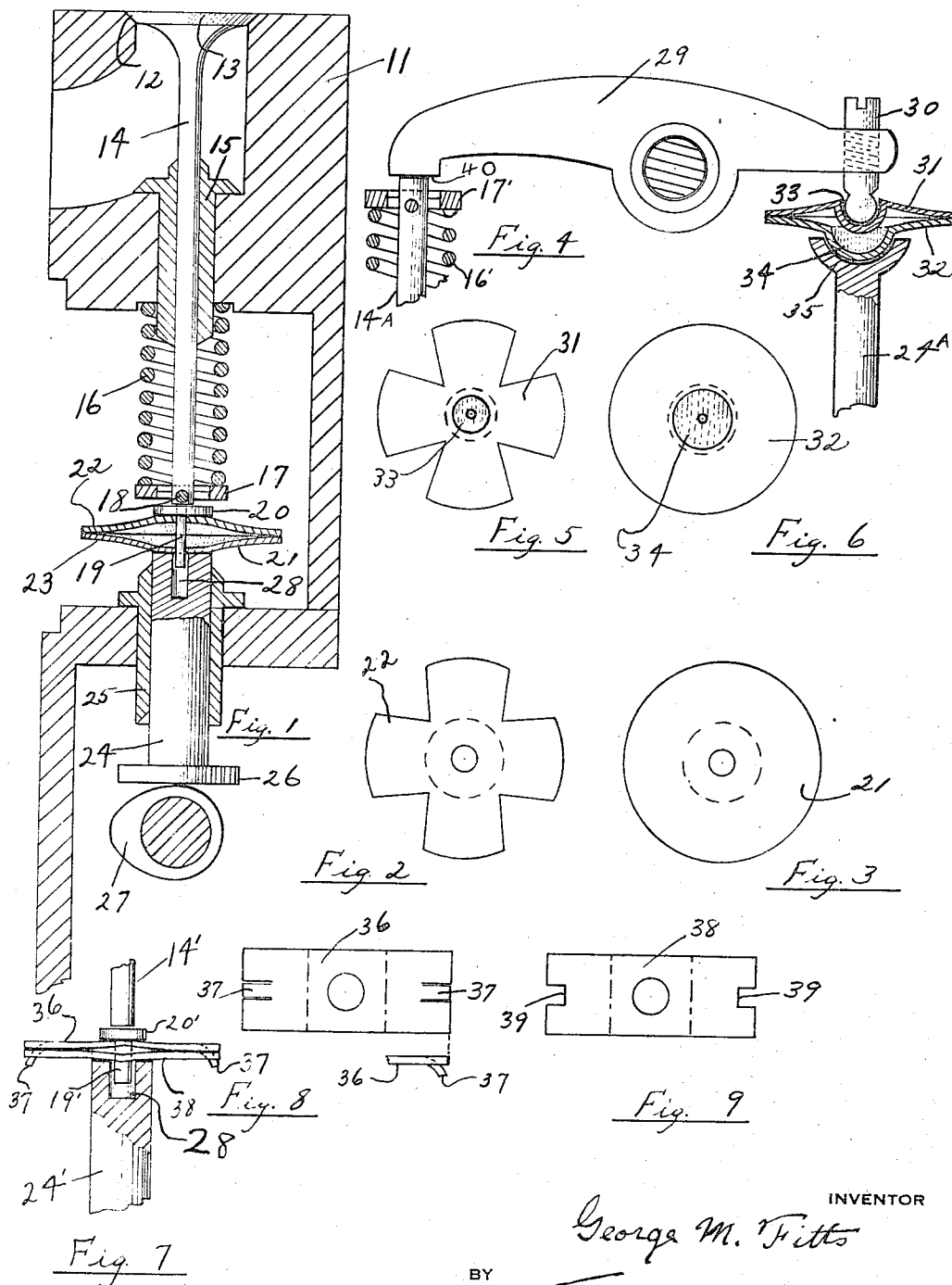
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RESILIENT SPACING MEANS FOR VALVE-ACTUATING MECHANISMS

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RESILIENT SPACING MEANS FOR VALVE-ACTUATING MECHANISMS

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This invention relates generally to valve-operating mechanisms, with more particular reference to flexible, silencing spacers adapted for interposition in the valve-operating mechanism of an internal combustion engine.

The invention of the present application constitutes a modification of and an improvement over my application filed November 10, 1936, Serial No. 110,163, wherein I showed, described and claimed a flexible spacer, interposed between the valve-stem and an actuating push-rod, formed from an integral sheet-metal blank suitably curved and folded upon itself with means for yieldingly interlocking the meeting free end edges thereof.

It is well known that there are numerous types of motor construction, necessitating varying types of valve-actuating mechanisms. It has been found that the spacer of my earlier application aforesaid, while adaptable for some types of motor construction, is capable of modification and further improvement to adapt it for use in substantially all known types of automotive motor construction.

The general objects of the present invention are the same as those set forth in my earlier application aforesaid, although the attainment of these objects is accomplished in a somewhat different constructional manner. Instead of forming the spacer from an integral sheet-metal blank, suitably curved and folded upon itself, with meeting-end edges yieldingly interlocked, the present invention contemplates a spacer comprising two individual members, curved to provide when assembled the necessary resiliency, with means provided to insure proper positional relationship at all times and under all conditions.

The underlying or basic idea of individualizing the superposed leaves of the spacer is to insure what may be termed a "rocking-chair" movement of the leaves, when pressure is applied to the spacer as a unit, with substantially uniform co-operative distortion. To accomplish such result, it is essential that the peripheral edges of the spacer segments have free relative movement throughout their entire extent. This necessitates the provision of means for retaining the leaves in proper positional relationship at all times—unnecessary where the leaves are parts of an integral structure.

My invention will be more readily understood by reference to the accompanying drawing, forming a part of this specification, in which:

Fig. 1 is a vertical cross-sectional view of one

type of valve-actuating mechanism which includes a resilient spacer embodying the present form of my invention;

Fig. 2 is a plan view of the upper member of the spacer, and Fig. 3 a similar view of the lower member, each illustrating preferred forms of construction;

Fig. 4 is a partly sectional side view in which is shown a manner of application of my invention to the rock-arm type of valve-actuating mechanism;

Figs. 5 and 6 are views similar to Figs. 2 and 3 showing, respectively, the upper and lower members of the spacer shown in Fig. 4;

Fig. 7 is a partly sectional side view illustrating a slight modification of the spacer-actuating mechanism as shown in Fig. 1, with the spacer in condition of maximum compression;

Figs. 8 and 9 are plan views of upper and lower spacer members, respectively, illustrating one of many forms of spacer-member configuration, Fig. 8 including an appended fragmentary edge view of one end of the upper member.

Referring now to the drawing in detail, numeral 11 designates a conventional type of motor block provided with a port 12 for the reception of a valve 13. This valve is at the end of a valve-stem 14 reciprocable in slide bearings 15 in the block 11. Surrounding the lower portion of the stem 14 is a coil spring 16, seated at the upper end in the block 11 and at its lower end against a retaining cap 17 secured to said stem by means of a cross-pin 18. In the preferred construction, as illustrated in Fig. 1, I have shown the lower end of the stem 14 provided with a reduced portion 19 adapted to pass through registering apertures in the upper leaf 22 and the lower leaf 21 of the spacer 23, as hereinafter more fully described. I have shown a washer 20 interposed to dissipate the otherwise concentrated localized pressure against the upper leaf 22 of the spacer.

Below the resilient spacer 23 and in contact with the lower leaf 21 thereof, I provide a push-rod 24 reciprocal in slide bearings 25 and provided with a head 26 for cooperation with a cam 27 to provide for reciprocation of said push-rod in common and well known manner.

In the upper end of the push-rod 24 is provided a bore 28 for the reception of the reduced portion 19 of the stem 14 projecting through spacer 21.

This spacer 21 preferably comprises two superposed discs 22 and 23 struck from resilient sheet-metal strips and curved to provide, generally speaking, oppositely disposed concavo-convex sur-

faces, although it will be noted—and this is one of the features of my invention—that the oppositely disposed concavities are medial, merging into convexities as the peripheral edges of the discs or leaves are approached for a purpose which will be hereinafter set forth normally positioned as shown in Fig. 1 and subject to resilient compression to relative positions as illustrated in Fig. 7. It will be apparent that upon rotation of the cam 27 the push-rod 24 will be raised at intervals, first acting upon the spacer 21 to yieldingly compress the same and during compression against the stem 14 to open the valve 13. As the cam 27 passes beyond operative position, resiliency of the spacer 21 would depress the push-rod 24 at the same time restoring the spacer members 22 and 23 to normal positions.

In adapting my invention to valve-actuating means to the rock-arm type, as illustrated in Fig. 4, I have shown adjustably mounted at one end of the rock-arm 29 a stud 30 so positioned as to cooperate, through the medium of a resilient spacer, with the upper end of the cam actuated push-rod 24A. While it is possible that at the lower end of the stud 30 there might be provided a reduced portion, corresponding to reduced portion 19 of the construction shown in Fig. 1, slidable through apertures in the spacer, I have shown the lower end of this stud 30 provided with a substantially spherical boss and the upper leaf 31 of the spacer provided with a concavity 33 for the reception of this boss. The lower member 32 of this form of spacer is similarly provided with a concavity 34 for the reception of the concave portion of the upper member of the spacer, while the upper end of the push-rod 24A is provided with a cup-shaped head which provides a socket 35 for the reception of the lower-leaf concavity 34.

The other end of the rock-arm 29 is elbowed to provide a head 40 adapted to impinge against the upper end of the valve-stem 14A for the operation of a valve similar to the valve 13 shown in Fig. 1 although in reversed position. This valve-stem 14A is surrounded by a coil spring 16' in compression between a seat 17' and the motor block, this construction being identical with that shown in Fig. 1 although in inverted disposition.

To guard against fracture due to rapidly repeated compression and expansion of the spacer member, I prefer to indent the upper member of the spacer as shown in Figs. 2 and 5.

In Fig. 7 I have shown a construction which corresponds very closely to the construction shown in Fig. 1 except that the lower end of the valve stem 14' is not provided with a reduced portion but merely abuts the head 20' of the stem 19', said head corresponding to the washer 20 and said stem to the reduced portion 19 as shown in Fig. 1.

The spacer need not necessarily be of circular configuration. In the construction heretofore described the relative rotating positions of the spacer members is of little importance. However, the spacer may be made of substantially rectangular configuration as illustrated in Figs. 7, 8 and 9, equally well adapted to the constructions of Figs. 1 and 4. In this case means must be provided to prevent relative rotative movement of the spacer members, and for this purpose I have shown the upper member 36 provided with tongues 37, 37 bent or curved downwardly and adapted to be passed through recesses 39, 39 in the lower member 38.

In the preamble of this specification I referred

to a "rocking-chair" movement of the leaves when under pressure. To more fully explain the desirability of such movement and the nature thereof it may be stated—as any skilled metal worker well knows—that a purely up-and-down vibratory movement of said leaves, rapid and continuous, with all or a portion of the peripheral edges rigidly connected, producing abnormal lateral stresses, will result in a hardening of the metal and in many cases premature cleavage or breakage.

In the device described as exemplifying my present invention, it will be apparent that the peripheral edges of the leaves first receive the compressive forces, and due to the merger of the medial leaf concavities into peripheral convexities, continuation of the compressive forces has the effect of "rolling" the leaves together, toward the center. Each leaf being free for lateral expansion the hardening effect of restricted vibration is minimized.

Many other modifications of minor details of my improved resilient spacing means for valve-actuating mechanisms will doubtless readily suggest themselves to those skilled in the art to which the present invention appertains, and I therefore do not limit my invention to the specific constructions herein shown and described.

I claim:

1. A resilient spacer adapted for interposition in valve-actuating mechanism comprising a pair of individual, oppositely-disposed concavo-convex leaves superposed for yielding compression as a unit, and means for preventing relative rotary movement of said leaves, said means comprising offset tongues on one of said leaves cooperating with registering recesses in the other leaf.

2. A resilient spacer adapted for interposition in valve actuating mechanism comprising oppositely-disposed concavo-convex leaves yieldingly compressible as a unit, the concavities being median merging into convexities as the peripheral edges of the contacting leaves are approached.

3. A resilient spacer adapted for interposition in valve actuating mechanism comprising oppositely-disposed concavo-convex leaves yieldingly compressible as a unit, the concavities being median, merging into convexities as the peripheral edges of the leaves are approached, and cooperative means common to said spacer and the actuating means spaced thereby to retain the spacer member in operative positions.

4. A resilient spacer adapted for interposition in valve actuating mechanism comprising concavo-convex leaves in inversive superposition to provide median clearance therebetween whereby said leaves are yieldingly compressible as a unit, the median concavities merging into convexities as the peripheral edges of said leaves are approached, and cooperative means common to said spacer and the actuating means spaced thereby to retain said spacer members in operative positions.

5. A resilient spacer adapted for interposition in valve-actuating mechanism comprising a pair of individual spring-metal leaves having oppositely disposed median concave portions providing clearance therebetween, said concave portions merging into convexities as the outer edges of said leaves are approached.

6. A resilient spacer adapted for interposition in valve-actuating mechanism comprising a pair of individual spring-metal leaves having oppositely disposed median concave portions providing clearance therebetween, said concave por-

tions merging into convexities as the outer edges of said leaves are approached whereby compression of the spacer as a unit is first effective at the edges of the leaves which roll together toward the center as the compressive forces are increased.

7. A resilient spacer adapted for interposition in valve-actuating mechanism comprising a pair of individual spring-metal leaves having oppositely disposed median concave portions providing clearance therebetween, said concave portions merging into convexities as the outer edges of said leaves are approached, and cooperative means common to said spacer and the actuating means spaced thereby to retain the spacer members in operative positions.

8. A resilient spacer adapted for interposition in valve-actuating mechanism comprising a pair of individual spring-metal leaves having oppositely disposed median concave portions providing clearance therebetween, said concave portions merging into convexities as the outer edges of said leaves are approached whereby compression of the spacer as a unit is first effective at the edges of said leaves which roll together toward the center as the compressive forces are increased, and cooperative means common to said spacer and the actuating means spaced thereby to retain the spacer members in operative positions.

9. A resilient spacer adapted for interposition in valve-actuating mechanism comprising a pair of individual spring-metal leaves having oppositely disposed median concave portions provid-

ing clearance therebetween, and said leaves being provided with means noninterferent with free lateral expansion of said leaves for preventing relative rotative movement thereof.

10. A resilient spacer for interposition in valve-actuating mechanism comprising a pair of individual resilient leaves having medially located concavities and in inversive superposition to provide median clearance therebetween, whereby said leaves are yieldingly compressible as a unit, said valve actuating mechanism including a valve stem and an actuating push rod, a leaf retaining member said member being provided with a disc head and a reduced portion adapted to project through registering apertures in the resilient leaves and into a socket in the push rod, whereby the resilient leaves are retained in proper positional relationship.

11. A resilient spacer adapted for interposition in valve-actuating mechanism comprising a pair of individual resilient leaves having medially located concavities in inversive superposition to provide median clearance therebetween, whereby said leaves are yieldingly compressible as a unit, the concave portions of said leaves merging into outer edge convexities, said valve actuating mechanism including a valve stem and an actuating push rod, a leaf retaining member said member having a disc head and a reduced portion projecting through registering apertures in the resilient leaves and into a socket in said push rod, whereby the resilient leaves are retained in proper positional relationship.

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