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AUTOMATIC TAKE-UP DEVICE.

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1,413,535. Patented Apr. 18, 1922.

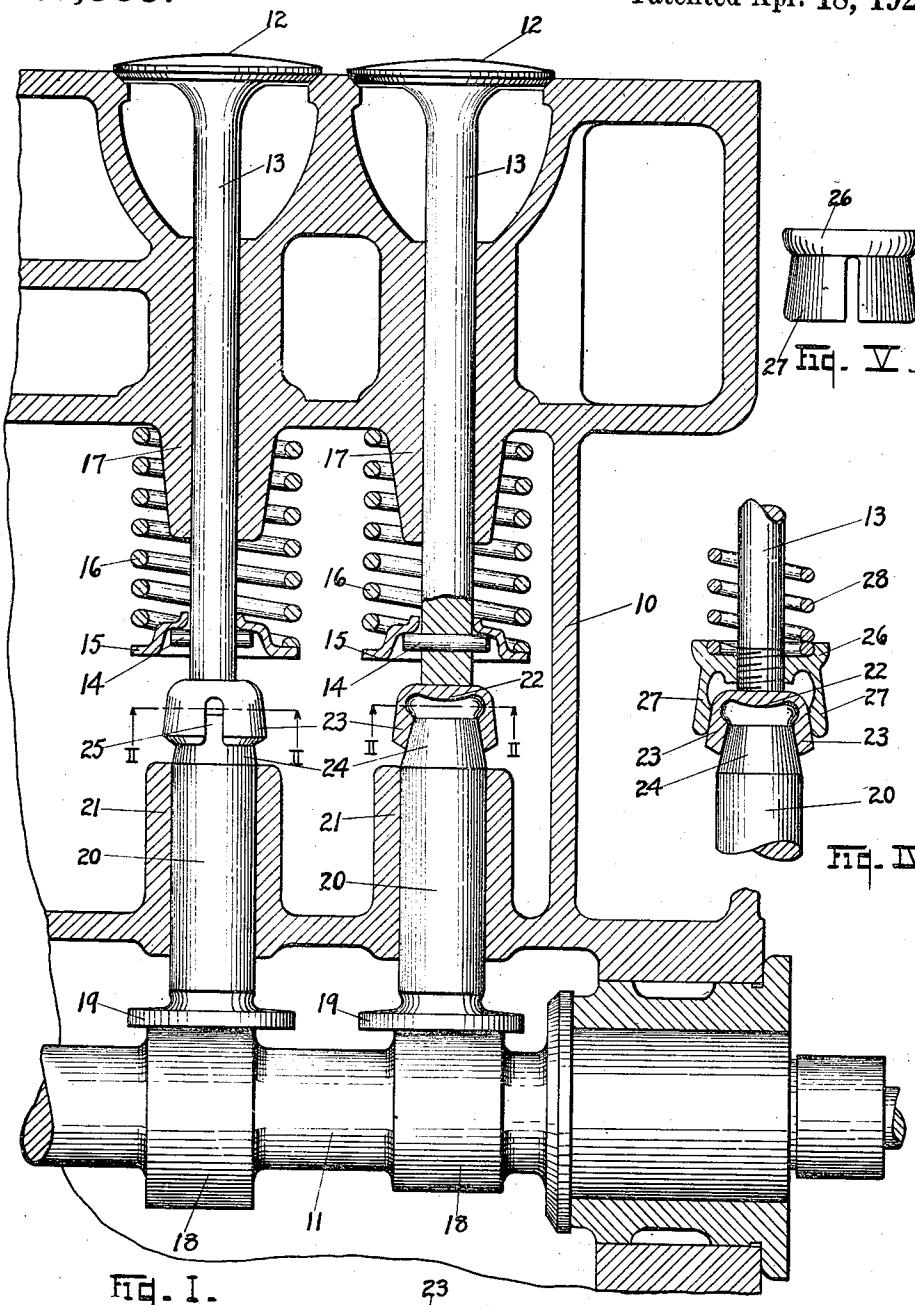


FIG. I.

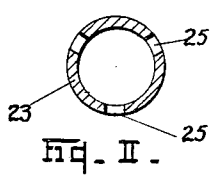


FIG. II.

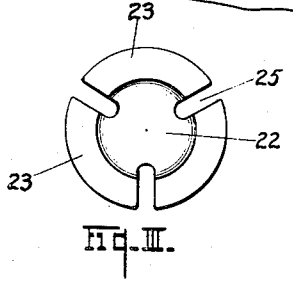


FIG. III.

FIG. V.

FIG. IV.

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AUTOMATIC TAKE-UP DEVICE.

1,413,535. Specification of Letters Patent. Patented Apr. 18, 1922.

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To all whom it may concern:

Be it known that I, FRANCIS JERDONE, Jr., residing at Toledo, Lucas County, and State of Ohio, have invented certain new and useful Improvements in Automatic Take-Up Devices, of which I declare the following to be a full, clear, and exact description.

My invention relates to an automatic take-up device adapted to compensate for lost motion between two or more moving members and has for its object to simplify and greatly reduce the number of parts to be provided for accomplishing the desired result, thereby reducing the cost of manufacture to a minimum degree.

Another object of the invention is to provide a single self-adjusting or automatic take-up member adapted to be inserted between two or more moving parts, such as the valve stems and push rods of an internal combustion engine.

Another object of the invention is to provide a plurality of yieldable members arranged to be telescoped one upon another and adapted to be interposed between two movable parts, one of said members being designed to yieldingly engage one of said parts and another being adjustable upon the other of said parts.

Still another object of the invention is to provide a self-adjusting member having a portion forming the seat for one of two movable parts, said seating portion being provided with angularly disposed yieldable members arranged to extend into yielding engagement with the other of said movable parts.

Another object of the invention is to provide, between the valve stem and push rod of an internal combustion engine, a member forming a seat for the valve stem and having inclined yieldable portions arranged to be expanded by a tapered end of the push rod, said yieldable portions being resisted by similar yieldable portions of another member adjustable upon the valve stem and forming a seat for the valve closing spring.

To these and other ends the invention comprises certain novel features of construction and arrangement of parts as will be hereinafter more fully described and claimed, it being understood that the invention is susceptible to certain modifications not shown in the drawings, which will be comprehended by the appended claims.

A construction constituting one embodiment of my invention is illustrated in the accompanying drawings forming a part of this specification in which:

Figure I is a fragmentary sectional elevation illustrating the application of my invention to the valve stems and push rods of an internal combustion engine.

Figure II is a sectional plan taken on lines II—II of Figure I.

Figure III is a plan view of a blank from which the automatic take-up device is formed.

Figure IV is a fragmentary sectional elevation of a modified form of invention.

Figure V is a detailed view of one of the parts shown in Figure IV.

Similar reference numerals refer to similar parts throughout the several views of the drawings.

The automatic take-up device shown and described in the present application as a compensating means for lost motion between the valves and cam shaft of an internal combustion engine may readily be applied to other mechanisms where it is desired to provide compensating means for lost motion between an operating and operated member or members, it being understood that the present application is merely illustrative of one of the uses to which the invention may be put.

Referring to the drawings, 10 represents a portion of the cylinder block or frame of an internal combustion engine and 11 the cam shaft of the engine. The valves 12 are provided with the usual valve stems 13 through the lower ends of which are extended the pins 14 for supporting the spring seats 15 carrying the lower ends of the valve closing springs 16, the upper ends of said springs being held by the valve stem guides 17 which are preferably cast integral with the cylinder block. Seated upon the cams 18 of the cam shaft 11 are the heads 19 of the push rods 20 which are reciprocally mounted in the guides 21 of the engine frame or block 10.

The present device in its simplest form comprises a single cup shaped member having a central portion 22 forming a seat for the valve stem 13, said central portion being provided with a plurality of angularly disposed yieldable portions 23 adapted to be telescoped upon the tapered or conical end

24 of the push rod or other movable member 20 as shown in Figure I. In the construction of the cup-shaped members a suitable blank is first provided in the form of a disk which may be constructed as shown in Figure III by the use of suitable dies or forging machines, the radial slots 25 being formed, if desired, at the same time and by the same machine used for producing the blank as it is shown in said figure. In the first operation upon the blank the metal at the center or that portion forming the seat for the valve stem is forged somewhat thicker than at the point where the angularly disposed yieldable portions 23 are bent upon said seating portion 22. The outer annular portions of the disk forming said parts 23 are also considerably thicker at the point where they engage the tapered portion of the push rod than at the point where they are bent. By proportioning the metal of the blank in this manner and bending the parts 23 to form a cup-shaped member as shown in section at the right of Figure I, said parts form yieldable or spring-like members having inclined faces both interiorly and exteriorly, the inner faces of said members engaging the correspondingly inclined face 24 of the push rod 20. This construction forms a more or less rigid take-up device between the valve stem and push rod, by which I mean that its resisting capacity as a spring is only slightly less than that of the valve spring 16, or just enough to insure the seating of the valve by the action of said spring. However, it is sufficient to immediately compensate for any lost motion occurring from time to time between the valve and cam shaft, as the cup-shaped member is constantly tending to lift itself off of the conical portion 24 of the push rod by reason of the fact that it is telescoped thereon under considerable pressure when applied, whereby the yieldable portions 23 are slightly expanded, and hence are constantly tending to contract or move toward each other. In the lifting of the valve the amount of expansion of said yieldable members will be extremely small and not enough to cause any appreciable movement of the push rod relatively to the valve stem or enough to produce rupture of the metal at the yielding points of said portions 23.

In forming the cup-shaped member it will be understood that the same may, if it is found desirable, be constructed at one operation or by the use of one machine for producing the blank as shown in Figure III and then bending it to the form shown in Figure I.

In Figures IV and V, I have shown a modification in which the same cup-shaped member shown in Figure I is used with an additional reinforcing member 26 adjustably mounted upon the valve stem, the latter being threaded through said reinforcing member into engagement with the seat 22 of said cup-shaped member. It will be seen that the construction of the reinforcing member 26 is similar to the cup-shaped member and that it is telescoped upon said cup-shaped member with the yieldable portions 27 thereof extending into engagement with the yieldable portions 23 which engage the tapered end of the push rod. The reinforcing member 26 is preferably recessed upon its upper face to receive the valve closing spring 28, or if desired the flange surrounding the recess may be omitted and the pin 14 and seat 15, shown in Figure I, used for supporting the lower end of the spring 28. In the modification, however, the reinforcing member may be adjusted from time to time for the purpose of both decreasing the tension on the spring 28 and increasing the tension offered to the yieldable portions 23 of the cup-shaped member first described.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:

1. In an automatic take-up device, the combination with a member to be actuated, an operating member therefor, and a cup-shaped spring interposed between said members and adapted to surround the extremity of one of the same and to automatically compensate for lost motion between the members.

2. In an automatic take-up device, the combination with a member to be actuated, an operating member therefor provided with a tapered portion, and a cup-shaped member interposed between said first mentioned members and provided with inclined inherently yieldable portions seated upon the tapered portion of said second mentioned member.

3. In an automatic take-up device, the combination with two spaced members mounted for reciprocating movement, one of which is provided with a conical portion, and an intermediate member between said first mentioned members having inclined inherently yieldable portions seated upon said conical portion.

4. In an automatic take-up device, the combination with a member to be actuated, an operating member therefor, and a unitary resilient member interposed between said members and adapted to surround and frictionally engage the extremity of one of the same, and to automatically compensate for lost motion between the members.

5. In an automatic take-up device, the combination with two spaced longitudinally disposed members, one of which is provided with a tapered portion, and an intermediate member having inherently yieldable portions

engaging said tapered portion and a transversely disposed connection for the yieldable portions forming a seat for the member opposite to that having a tapered portion.

6. In an automatic take-up device, the combination with two spaced members mounted for reciprocating movement, one of which is provided with a tapered portion, an intermediate member between said first mentioned members having yieldable portions seated upon said tapered portion with an integral connection forming a seat for the member opposite to that having the tapered portion, and means for reciprocating said members.

7. In an automatic take-up device, the combination with two spaced members mounted for reciprocating movement, an intermediate member between the first mentioned members having a plurality of circumferentially arranged springs engaging one of the spacing members, said springs having an integral connection forming a seat for the other of said spacing members, and means for reciprocating said means.

8. In an automatic take-up device, the combination with the valve and push rod of an internal combustion engine, one of said parts being provided with a tapered end, and a member interposed between said parts having inherently yieldable portions directly engaging said tapered end, said yieldable portions being provided with a connection forming a seat for the part opposite to that having the tapered end.

9. In an automatic take-up device, the combination with the valve stem and push rod of an internal combustion engine, said push rod having its end adjacent the valve stem made conical, and an inherently yieldable member telescoped upon said conical end and forming a seat for the valve stem.

10. In an automatic take-up device, the combination of two spaced movable members, a plurality of inherently yieldable members telescoped one upon another and interposed between said spaced members, and means for actuating said members.

11. In an automatic take-up device, the combination of two spaced movable members, an intermediate member having a seat for one of said first mentioned members, said seat being provided with angularly disposed yieldable portions extending into yielding engagement with the other of said spaced members, and a member adjustable upon said seated member and provided with yieldable portions extending into engagement with the yieldable portions of said intermediate member.

12. In an automatic take-up device, the combination with the valve stem and push rod of an internal combustion engine, said push rod being provided with a tapered end adjacent the valve stem, an intermediate member having a seat adapted to receive the end of said valve stem, said intermediate member being provided with inclined yieldable portions engaging the tapered end of said push rod, and a member adjustable upon said stem and having inclined yieldable portions extending into engagement with the yieldable portions of said intermediate member.

13. In an automatic take-up device, the combination with the valve stem and push rod for an internal combustion engine, said push rod being provided with a tapered end adjacent the valve stem, an intermediate member having a seat adapted to receive the end of said valve stem, said intermediate member being provided with inclined yieldable portions engaging the tapered end of said push rod, a member adjustable upon said stem and having inclined yieldable portions extending into engagement with the yieldable portions of said intermediate member, a spring seated upon said adjustable member and adapted to move the several parts in one direction, and means for moving said parts in an opposite direction.

14. In an automatic take-up device, the combination of two spaced movable members, a plurality of yieldable members telescoped one upon another and interposed between said spaced members in engagement therewith, a spring seated upon one of said yieldable members and serving to actuate the several parts in one direction, and means for moving said parts in an opposite direction.

15. An automatic take-up device adapted to compensate for lost motion between two or more moving parts comprising a plurality of yieldable cup-shaped members telescoped one upon another.

16. An automatic take-up device adapted to compensate for lost motion between the valve stem and push rod of an internal combustion engine comprising a pair of yieldable cup-shaped members telescoped one upon the other, one of said members being adapted for adjustment upon the valve stem and the other adapted to telescope upon the push rod.

17. An automatic take-up device adapted to compensate for lost motion between two or more moving parts comprising a plurality of cup-shaped members, one of which is of inherently yieldable material, said members being telescoped one upon another.

18. An automatic take-up device adapted to compensate for lost motion between the valve stem and push rod of an internal combustion engine comprising two telescoping members, one of which forms a seat for the valve stem compression spring and the other being of inherently yieldable material and adapted to telescope upon the push rod.

19. In an automatic take-up device, the

combination of the valve stem and push rod of an internal combustion engine, a cup-shaped yieldable member telescoped over the end of the push rod and an adjustable member upon the valve stem adapted to tension said yieldable cup-shaped member.

20. In an automatic take-up device, the combination of two spaced members mounted to reciprocate and a pair of telescoping members interposed between said spaced members, one of said telescoping members being provided with yieldable tongues encircling the spaced member with which it is associated and the other telescoping member being adjustable upon the member with which it is associated to vary the tension of said tongues.

In testimony whereof, I affix my signature.

FRANCIS JERDONE, JR.