March 31, 1925. 1,531,950

P. JOHNSON

VALVE SPRING COMPRESSOR

Filed April 24, 1924

Fig. 1.

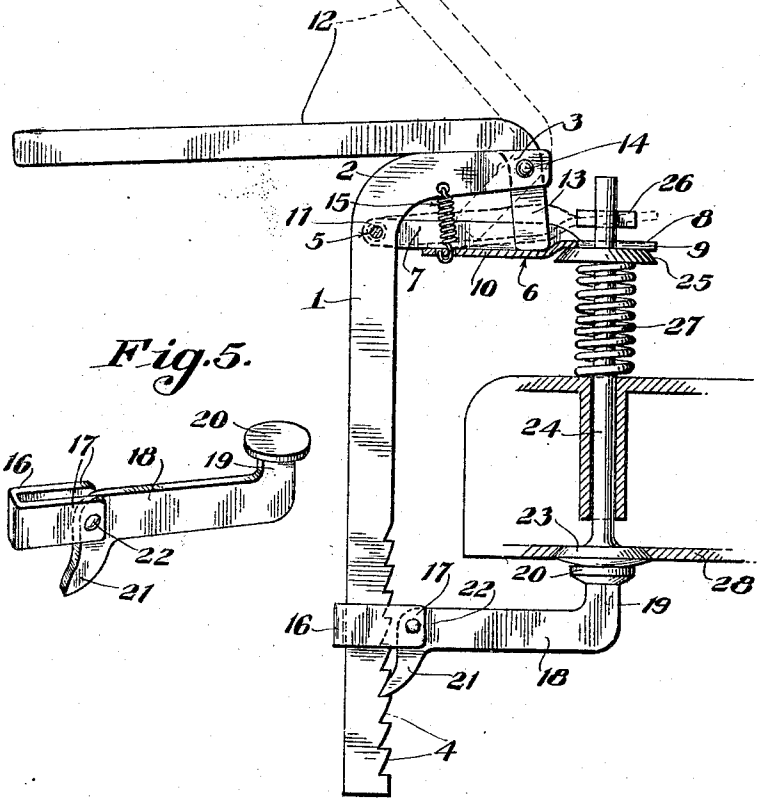


Fig. 2.

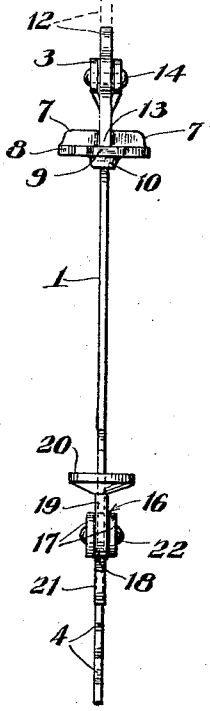


Fig. 5.

Fig. 3.

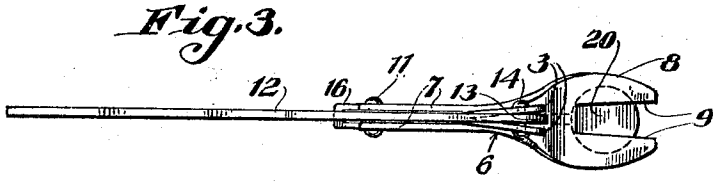
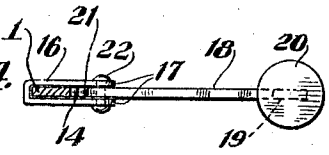


Fig. 4.



Perry Johnson
INVENTOR

WITNESSES
Louis Goodyear
Howard D. Orr

BY E. G. Siggers
ATTORNEY

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UNITED STATES PATENT OFFICE.

PERRY JOHNSON, OF BOONVILLE, MISSOURI.

VALVE SPRING COMPRESSOR.

Application filed April 24, 1924. Serial No. 708,770.

To all whom it may concern:

Be it known that I, PERRY JOHNSON, a citizen of the United States, residing at Boonville, in the county of Cooper and State of Missouri, have invented new and useful Improvements in Valve Spring Compressors, of which the following is a specification.

This invention relates to valve spring compressors.

The object is to improve the construction of valve spring compressors, which are used principally in connection with automobile engines for the removal of the valves therein when it is desired to grind, repair or replace the same, and to provide a device which may be easily and quickly applied in position to do the work of placing the valve spring under compression, and of locking the same in such position, while both hands of the operator may be engaged in removing the usual cotter pin or key.

Another object is to provide a device of this character which may be cheaply manufactured, being constructed of few parts, and is strong and durable and easily placed in position to hold the valve proper, engage the usual washer at the end of the spring, especially in the valve-in-head type of motors, said valve-engaging member being roughly adjustable to adapt the same to different sizes, and by the simple manipulation of a single operating lever compress the spring to free the cotter key, and by a further movement of said lever, lock the parts in this position.

A full and complete understanding of the invention may be obtained from a consideration of the following detailed description, taken in connection with the accompanying drawing forming a part of this specification, it being understood that while the drawing shows a practical form of the invention, the latter is not to be confined to strict conformity with the showing thereof, but may be changed or modified, so long as such changes or modifications mark no material departure from the salient features of the invention, as specifically pointed out in the appended claims.

In the drawing, in which similar reference characters designate corresponding parts throughout the several figures:—

Figure 1 is a side elevation of the device shown in connection with a motor valve.

Figure 2 is a front elevation of the same.

Figure 3 is a top plan view thereof.

Figure 4 is a detail plan view of the adjustable abutment.

Figure 5 is a detail perspective view of the same.

In that class of motors in which the inlet and exhaust valves are actuated by tappet arms, great difficulty is encountered in removing the cotter pins or keys from the valve stems, when it is desired to remove the valves for the purpose of grinding the same or the valve seats. The springs surrounding the valve stems and which serve the purpose of returning the valves to their seats upon the return stroke of said tappet arms, are necessarily placed under such tension as to render very difficult the removal of said keys which hold the washers abutting one end of the springs, and while tools or devices for such purpose have been designed and used, many of them provide no means for locking the same when the spring is compressed, and thus permit the use of only one hand of the operator for removing the key.

The present invention is designed to overcome these difficulties, by the provision of means for easily and quickly applying the device in position to engage the lower face of the valve proper and the upper face of the washer on the valve stem against which the spring bears, and, by the action of one hand, to force the washer and the spring away from the cotter key and to lock the same in spaced relation thereto, so that both hands may be used for removing said key, thus effecting a great saving of time and labor.

In the drawing there is shown an elongated shank or body member 1 formed of a steel bar, preferably rectangular in cross section and having one end, constituting the upper end, bent at substantially right angles to provide a supporting arm 2, the length of said supporting arm being substantially one-third the length of the shank 1.

At the outer, free end, the supporting arm 2 is bifurcated to provide a fork 3, for a purpose to be explained, and at the opposite or lower end, the shank is provided with a series of notches defining teeth 4 having lower sides which are inclined inwardly and downwardly and upper sides perpendicular to the longitudinal axis of the shank.

Adjacent to the bend between the shank 1 and the arm 2, the said shank is provided

with a transverse aperture 5 for the pivotal connection of a presser foot 6, which is constructed of similar metal somewhat thinner than the shank and arm, and has its side portions turned up to form stiffening flanges, which are extended at one end beyond the joining portion to provide projecting arms 7.

At the other or outer end, the presser foot 6 is provided with a widened portion, preferably rounded on its outer edges to constitute a head 8, having an open-ended slot 9 therein for straddling a cotter key and permitting the entrance of a valve stem, in a manner to be explained. That portion of the presser foot between the upstanding flanges is slightly depressed to form a seat or groove 10, and the outer free ends of the arms 7 are spaced apart a distance to freely admit the shank therebetween, and have suitable alined apertures registering with the aperture 5 of the shank to which the presser foot is pivotally secured by a rivet 11, passing through the aforesaid alined openings to permit the said presser foot to swing upwardly and downwardly.

An operating lever 12 similar to but somewhat smaller in cross section than the shank 1, is provided at one end with a right-angular bend to provide an actuating arm 13, and the latter is provided near said bend with a suitable aperture to aline with similar apertures through the arms of the fork 3, for the reception of a rivet 14, which pivotally connects the said operating lever to the supporting arm 2, with the actuating arm 13 extending through the bifurcation and depending below the same, the lower end of said arm 13 being square and bearing in the aforesaid groove 10 of the presser foot 6. A retractile spring 15 connects the presser foot, at an intermediate point, to the overhanging supporting arm 2, and when the operating lever 12 is forced downwardly to lie parallel to and upon the supporting arm 2, as indicated in Figure 1 of the drawing, the actuating arm 14 forces the presser foot downwardly, thus stretching the spring 15, and as said arm 13 passes the center, the squared end thereof rests flat upon the groove and the presser foot is locked in depressed position, the retractile force of the spring being unable to return the presser foot until the lever 12 is rocked upwardly again, as shown in dotted lines in Figure 1.

A U-shaped steel clip 16 surrounds the shank 1 on three sides, the open side of the clip being on that side edge of the shank having the teeth 4, and the arms of the clip are extended to provide ears 17 between which a steel abutment member 18 is rockably mounted, the said member 18 having at its outer end, an upstanding arm 19 provided with a rounded head 20, which may have a flat upper face or the same may be concave. At the inner end the member 18 is directed downwardly and formed into a dog 21, the tip of which is directed inwardly and downwardly to conform to and engage with the recesses defining the teeth 4, the angle portion of the member 18 where joined to the dog 21 being provided with an aperture to aline with similar apertures in the said ears 17, and through which a pivot pin 22 is passed to permit the abutment member 18 to be adjusted with respect to the shank. By raising the free end of the member 18, the dog is disengaged from the tooth and the member may be moved upwardly or downwardly upon the shank 1.

In using the device, the adjustable abutment member 18 is moved along the shank to the proper position to suit the valve to be removed, and the dog engaged in the proper tooth for the purpose. The head 20 is then placed against the under face of the valve 23 and, with the lever raised, as in dotted lines of Figure 1, the presser foot 8 is applied to the upper portion of the valve stem 24 which passes into the bifurcation 9, and said presser foot is pressed downwardly by the lever 12 to bear upon the usual washer 25. The width and length of the bifurcation is sufficient to allow the cotter pin or key 26 to freely pass through the same during such movement, and as pressure is brought to bear on the lever 12, the said washer is forced downwardly against the pressure of the valve spring 27, which is thus compressed sufficiently to entirely free or expose the cotter pin or key, and as the arm 13 passes the center, it locks the presser foot down under the combined pressure of the spring 27 and the spring 15, so that both hands of the operator may be employed for driving the cotter pin from its seat in the valve stem.

From the foregoing it will be seen that a simple, cheaply maunfactured, and easily operated device has been provided for the removal of cotter pins or keys from valve stems, to permit the valves and their seats to be ground, and that the device may be employed with equal convenience and ease for the assembling of the parts of the valve structure again after grinding.

What is claimed is:—

1. A valve spring compressor comprising a shank angularly bent at one end to form a supporting arm, a presser foot pivoted at one end to the shank adjacent the bend thereof and extending in the direction of the supporting arm, said presser foot having a slot in its free end to receive a valve stem, a retractile spring connecting the presser foot to the supporting arm, an operating lever comprising a long arm constituting a handle and an angularly bent short arm and pivoted at its angle to the end of the supporting arm, said short arm bearing at its

free end upon the presser foot, and an adjustable abutment mounted on the shank to bear against a valve in opposition to the presser foot.

2. A valve spring compressor comprising a shank bent at one end to provide an outstanding supporting arm, said arm being bifurcated at its free end, a presser foot having spaced hinge-arms pivoted at one end to the shank adjacent to the bend thereof and extending in the same direction as the supporting arm but beyond the same, said presser foot having a longitudinal groove or seat intermediate its ends and having its free end widened and longitudinally slotted to receive a valve stem, a coiled spring connected at one end to an intermediate point of the presser foot and at the other end to the supporting arm, an operating lever angularly bent at one end to form an actuating arm, said lever being pivoted adjacent to its angle in the bifurcation of the supporting arm, with the free end of the actuating arm bearing in the groove or seat of the presser foot and adapted to force the latter away from the supporting arm in opposition to the spring when the said lever is rocked, and an adjustable abutment carried by the other end of the shank to bear against the valve in opposition to the presser foot.

3. A valve spring compressor comprising an elongated shank having one end bent at a substantially right angle to provide a supporting arm, a presser foot pivoted at one end to the shank near the bend thereof and having at its other end means for engagement with a valve stem, a spring having a tendency to pull the free end of the presser foot towards the said arm, a lever having an angular actuating arm pivoted to the supporting arm and bearing on the presser foot, said lever, when depressed, resting upon the supporting arm and extending beyond the shank with the actuating arm locking the presser foot from movement towards the supporting arm.

4. A valve spring compressor comprising an elongated shank having one end bent at a substantially right angle to provide a supporting arm, a presser foot pivoted at one end to the shank near the bend thereof and having at its other end means for engagement with a valve stem, a spring having a tendency to pull the free end of the presser foot towards the said arm, a lever having an angular actuating arm pivoted to the supporting arm and bearing on the presser foot, said lever, when depressed, resting upon the supporting arm and extending beyond the shank with the actuating arm locking the presser foot from movement towards the supporting arm, said shank having teeth in its edge in line with the supporting bar, a clip surrounding three sides of the shank and projecting beyond the toothed edge, a lever pivoted to the projecting arms of the clip, said lever having an upstanding arm at its free end provided with a head to bear against the valve, and having a depending dog at the pivoted end to engage the teeth of the shank and resist the pressure of the presser foot.

5. A valve spring compressor comprising a main bar having teeth in one edge adjacent one end, a supporting bar extending outwardly from the other end of the main bar, a presser foot pivoted at one end to the main bar and adjacent to the supporting bar, said presser foot having a slot to straddle a cotter pin and receive a valve stem, an actuating lever having an arm bearing on the presser foot and pivoted to the supporting arm and adapted to force the foot downwardly, a spring connecting the foot and arm to oppose the lever, and an adjustable abutment comprising a head to bear against the valve, an arm extending from the head toward the shank and provided with a depending dog integrally joined thereto and having a nose shaped to engage the teeth of the shank, a clip slidably embracing the latter and having ears, and a pivot traversing the ears and the said arm above the dog to hold the abutment in opposition to the presser foot.

In testimony that I claim the foregoing as my own, I have hereto affixed my signature.

PERRY JOHNSON.