

[54] **AUTOMOTIVE VALVE SPRING
COMPRESSING TOOLS**

[72] Inventor: **James T. Clark**, Ft. Morgan, Colo.

[73] Assignee: **Clark-Feather Manufacturing Co.**, Fort
Morgan, Colo.

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269/228**

[56] **References Cited**

UNITED STATES PATENTS

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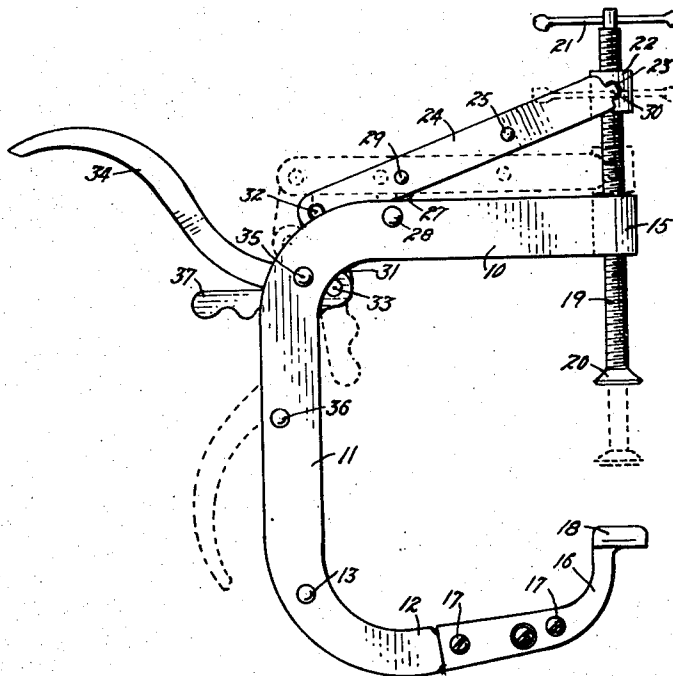
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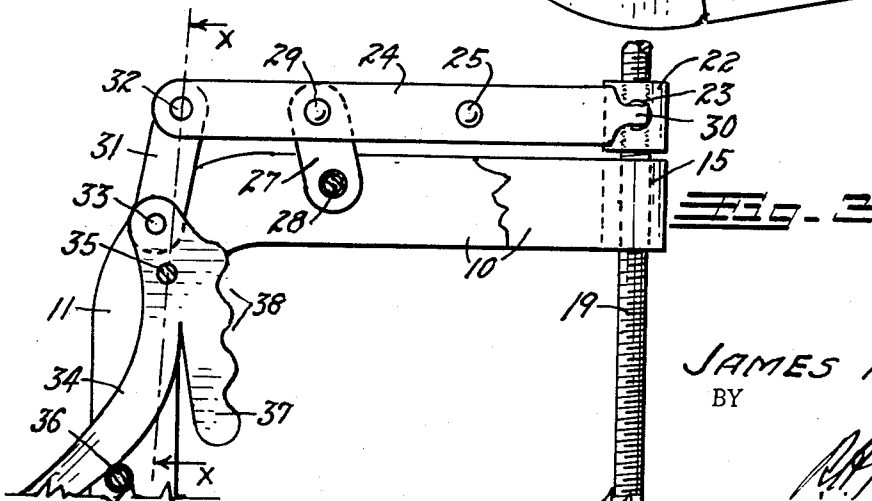
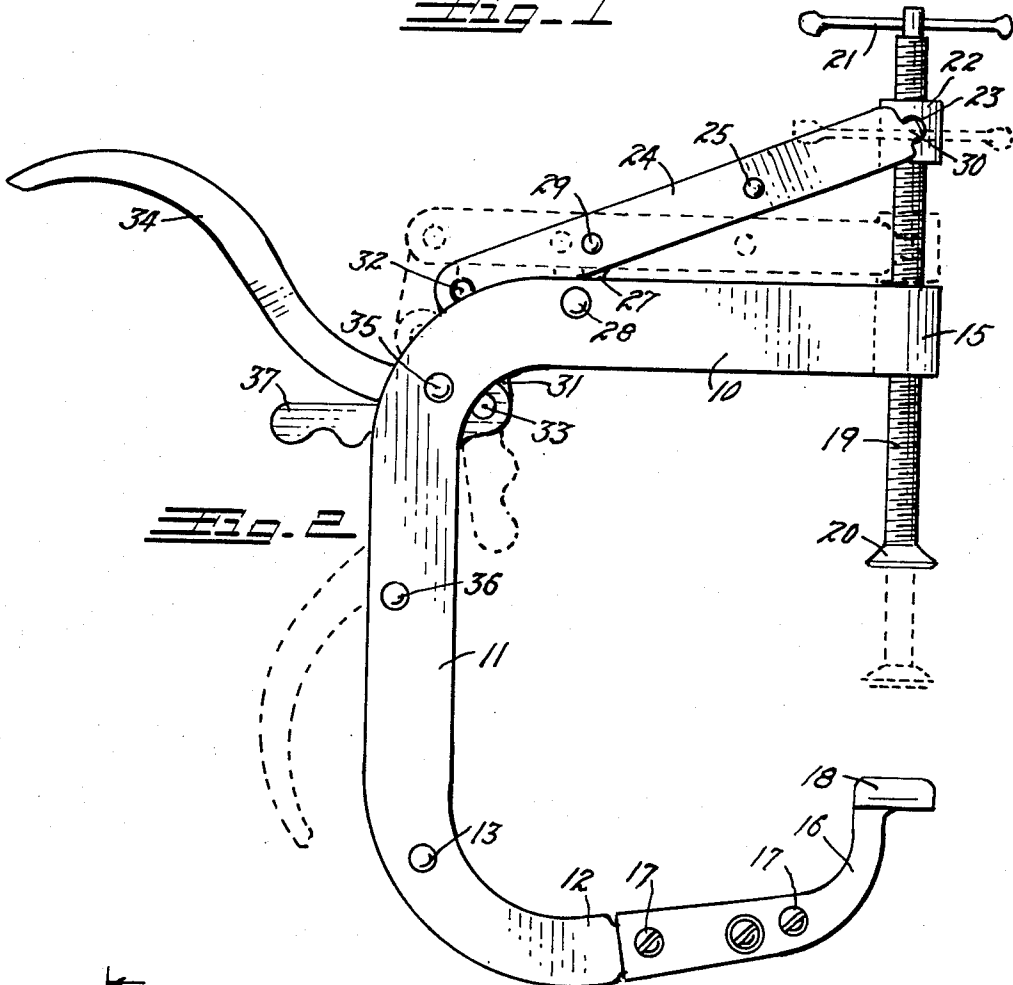
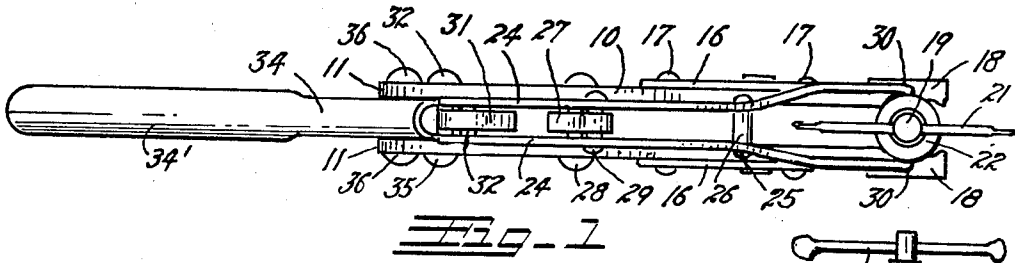
Primary Examiner—Andrew R. Juhasz
Assistant Examiner—Michael Kocz, Jr.
Attorney—R. H. Galbreath

[57] **ABSTRACT**

A C-shaped frame having an upper horizontal portion, a vertical side portion, a lower horizontal portion and an open side with an elongated, threaded presetting screw vertically slidable in a vertical screw slide sleeve on the forward extremity of the upper horizontal portion in axial alignment with a valve spring seat mounted on the forward extremity of the lower horizontal portion. A tiltable lever medially mounted on and above the upper horizontal portion and pivotally connected at its forward extremity to an actuating nut threaded on the presetting screw above the screw slide sleeve. A handle member pivoted on the vertical side portion in the plane of the frame and a toggle link connecting the rear extremity of said tiltable lever to the handle member so that vertical movement of the handle member will impart vertical movement to the presetting screw to compress the valve spring between the valve seat and the presetting screw without rotation of the latter.

5 Claims, 3 Drawing Figures





INVENTOR.
JAMES T. CLARK
BY

Attorney
ATTORNEY

AUTOMOTIVE VALVE SPRING COMPRESSING TOOLS

This invention relates to a tool for compressing the valve springs of internal combustion engines to facilitate removal of the valves for regrinding, repair and replacement.

The working speeds of automotive engines have been increased over the years and as a result it has become necessary to proportionately increase the stiffness of the valve springs to a point where it is exceedingly difficult to compress the springs sufficiently to remove the spring retaining keys from the stems of the valves for replacements and repairs.

Attempts have been made to provide compressing tools having a manually rotatable threaded nut for the expansion of jaws to impart compression of the springs. With the modern heavy stiff valve springs however, it is difficult and time consuming to rotate the nut against the excessive friction and loads imparted by the springs.

The principal object of this invention is to provide a spring compressing tool which can be readily preset in advance to accommodate any given type of valve and which can then be repeatedly actuated without the usual manual rotation to instantly and properly compress the valve springs and automatically retain them in a compressed position to facilitate ready removal and replacement of the conventional retaining means on the valve stems.

Present automotive engines are so encumbered with paraphernalia that it is difficult to reach the poppet valves and their valve springs with present spring-compressing tools without considerable dismantling.

A further object of this invention is to provide a lever actuated spring-compressing tool with the above advantages which can be conveniently and easily placed in position for use on present engines and which can be instantly released with one hand in limited spaces and under crowded conditions leaving the other hand free to properly position the conventional spring retaining locks on the valve stem.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is made to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

FIG. 1 is a top plan view of the improved valve spring compressing tool in the released position;

FIG. 2 is a side elevational view thereof showing in broken line the positions occupied by the elements thereof when in the locked compressed position; and

FIG. 3 is a partially broken away fragmentary detail view of the compressing tool in the compressed and locked position.

The improved valve spring compressing tool employs two similar spaced apart, C-shaped frame bars each being formed with a forwardly extending upper portion 10, a vertical intermediate portion 11 and a lower forwardly extending portion 12. The frame bars are flat elongated bars of rectangular cross section and are maintained in parallel spaced relation by means of suitable rivets 13 surrounded by conventional spacing sleeves. The forward extremities of the upper portions 10 of the two frame bars are welded to, or otherwise fixedly connected to, a vertical, unthreaded, screw guide sleeve 15 and the forward extremity of the lower portion 12 of each of the frame bars terminates in a spring seat bracket 16, secured thereon by means of suitable attachment screws 17.

The spring seat brackets 16 terminate at their upper forward extremities in ledges which cooperate to form a bifurcated spring seat 18 which receives the conventional retainer of the valve spring to be compressed. The brackets 16 and the seat 18 are conventional and can be found in prior US Pat. No. Re. 19,414 dated Jan. 8, 1935.

As thus far described, the compressor is generally similar to the C-shaped valve spring compressors at present on the market except for the fact that the sleeve 15 is not internally

threaded. This invention relates more particularly to a lever for compressing a conventional valve spring against the spring seat 18 and maintaining the spring in the compressed condition.

The improved lever mechanism includes a threaded presetting screw 19, which is freely and axially slidable through the unthreaded screw guide sleeve 15 in axial alignment with the spring seat 18, and which is provided with an axially rotatable valve clamp disc 20 on its lower extremity, to contact a poppet valve, and with a hand grip pin 21 slidably and diametrically mounted across its upper extremity by means of which manual rotation can be imparted to the screw 19. A cylindrical internally threaded actuating nut 22, provided with a diametric pivot bore 23, is threaded upon the screw 19 above the guide sleeve 15.

An elongated tiltable lever 24, comprising two similar elongated bars secured in parallel spaced relation by means of suitable rivets 25 and spacing sleeves 26, is supported above and between the upper portion 10 of the frame bars upon a fulcrum link 27 which is pivoted at its lower extremity between the frame bars 10 upon a lower link rivet 28 and which extends upwardly between the bars of the tiltable lever 24 to an upper link rivet 29. The forward extremities of the bars forming the tiltable lever are reduced in width and are turned oppositely inward to form pivot hooks 30 which extend into the diametric pivot bore 23 of the actuating nut 22 to form a hinged connection with the latter. A toggle link 31, mounted on an upper link rivet 32, extends downwardly between the rear extremities of the bars of the tiltable lever 24 to lower link rivet or pivot element 33 to pivotally connect the toggle link 31 to the forward extremity of a handle member 34 which is pivotally mounted, and extends rearwardly from, between the vertical portions 11 of the frame bars on a handle pivot 35.

The rear or lower portion of the handle member 34 is preferably U-shaped in cross section to form a comfortable, rounded, curved hand grip as shown at 34'. The forward or upper portion of the handle member is bifurcated to pass on opposite sides of the lower extremity of the toggle link 31 and into engagement with the lower link rivet 28. A stop rivet 36 extends between the vertical portions 11 of the frame bars in the path of the downward movement of the handle member 34 to limit its arc of downward movement at the desired point.

When the handle is in the down position, it will be seen in FIG. 3 that the lower link rivet 33 will be positioned rearwardly of a dead center line "X-X", extending between the handle pivot 35 and the upper link rivet 32, so that upward pressure from the screw 19 will urge and maintain the handle member against the stop rivet 36 to prevent upward movement of the actuating nut 22 under the bias of the valve spring being compressed. This will maintain the tool in the locked compressed position until repairs or replacements have been completed on the valve. The valve spring can be instantly decompressed and released to the "in use" position by swinging the handle member slightly rearward from the stop rivet 36 so as to move the lower link rivet 33 forward of the dead center line "X-X".

To allow the latter decompressing or releasing to be accomplished by one hand while the other hand maintains the valve stem spring retainers in position, the handle member 34 is provided, adjacent its pivot 35, with aligned finger grip levers 37 having finger engaging notches 38. When in the locked position of FIG. 3, the finger grip levers 37 project downwardly and forwardly from the handle pivot 35 so that the user can grip the vertical portion 11 of the frame with the one hand with his fingers in the finger notches 38 of the grip lever 37. He can instantly release the tool by simply contracting the hand, to urge the finger grip levers 37 forwardly, while still supporting the tool in the single hand.

It is believed the function and use of the improved valve spring compressing tool will be apparent to those skilled in the art from the above description. Briefly, the presetting screw is preset by rotation so that when in the open position of FIG. 2

the clamp disc 20 can be readily placed over the valve to be worked upon and the spring seat can be readily placed below the conventional spring retaining cup of that valve. No further presetting is necessary on similar valves. When in place, the handle member is simply moved from the solid line position in that Fig. to the broken line position therein to compress and retain the valve spring compressed to free the conventional spring retaining keys from the stem. After repair or replacement the retaining keys are replaced and held in place with one hand while the compressing tool is gripped in the other hand to actuate the finger grip lever to instantly free the tool from the valve.

Throughout the specification and claims the adjectives "upper," "lower," "forward," "rear," "horizontal," "vertical," etc., refer only to positions on the drawing, since the tool itself is capable of use in any desired position.

While a selected form of the invention has been above described, it is understood that mechanical variations and detail substitutions can be made by one skilled in the art without departing from the spirit of the invention.

Having thus described the invention what is claimed and desired to be secured by Letters Patent is:

1. An automotive valve spring compressing tool comprising:
 - a. a C-shaped frame consisting of upper and lower substantially horizontal portions connected by a substantially vertical side portion;
 - b. a spring seat member mounted on the forward extremity of said lower portion;
 - c. a tubular vertical guide sleeve fixedly mounted on the forward extremity of said upper horizontal portion in axial alignment with said spring seat;
 - d. a threaded screw axially mounted in, and vertically slidable in, said guide sleeve and extending above and below the latter;
 - e. a handle member pivotally mounted on the side portion of said frame so as to rotate in the plane of the latter;
 - f. an internally threaded actuating nut threaded upon the above extending portion of said screw;
 - g. an eccentrically positioned pivot element in said handle member;
 - h. a tiltable lever medially pivoted on the upper horizontal portion of said frame and pivotally mounted at its forward extremity on said actuating nut;
 - i. a toggle link pivotally extending between the rear extremity of said tiltable lever and said eccentrically positioned pivot element for transmitting the eccentric movements of said eccentrically positioned pivot element to the rear

extremity of said tiltable lever to cause the forward extremity of the latter to axially move said screw upon rotation of said handle member;

- j. an upper link rivet pivotally securing the upper extremity of said toggle link to the rear extremity of said tiltable lever, the lower extremity of said toggle link being pivotally secured to said eccentrically positioned pivot element;
 - k. a handle pivot pivotally securing said handle member to said frame;
 - l. a stop member limiting the degree of downward rotation of said handle member; and
 - m. the axes of said upper link rivet, said eccentrically positioned pivot element and said handle pivot being relatively positioned so that as said handle member is brought into engagement with stop member, said eccentrically positioned pivot element will travel past an imaginary dead center line extending between the axes of said upper link rivet and said handle pivot to assist return movement of said eccentrically positioned pivot element.
2. A valve spring compressing tool as described in claim 1 in which the tiltable lever comprises:
 - a. two similar spaced apart bars positioned in side by side relation with their forward extremities positioned on opposite sides of said actuating nut; and
 - b. means for pivotally mounting said forward extremities upon said nut.
 3. A valve spring compressing tool as described in claim 2 in which the means for pivotally mounting comprises:
 - a. a diametrically positioned bore through said actuating nut; and
 - b. inwardly turned forward extremities on the spaced apart bars of said tiltable lever said inwardly turned extremities pivotally engaging opposite sides of said bore.
 4. A valve spring compressing tool as described in claim 1 having:
 - a. a finger grip lever formed integrally with said handle member positioned so as to be gripped by the fingers of a hand gripping the vertical side portion of said frame to impart return movement to said eccentrically positioned pivot element.
 5. A valve spring compressing tool as described in claim 4 having:
 - a. means permitting longitudinal movement of said tiltable lever to accommodate the straight axial movement of said screw.

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