C. J. BOUSFIELD.

DEVICE FOR REMOVING PUPPET VALVES.

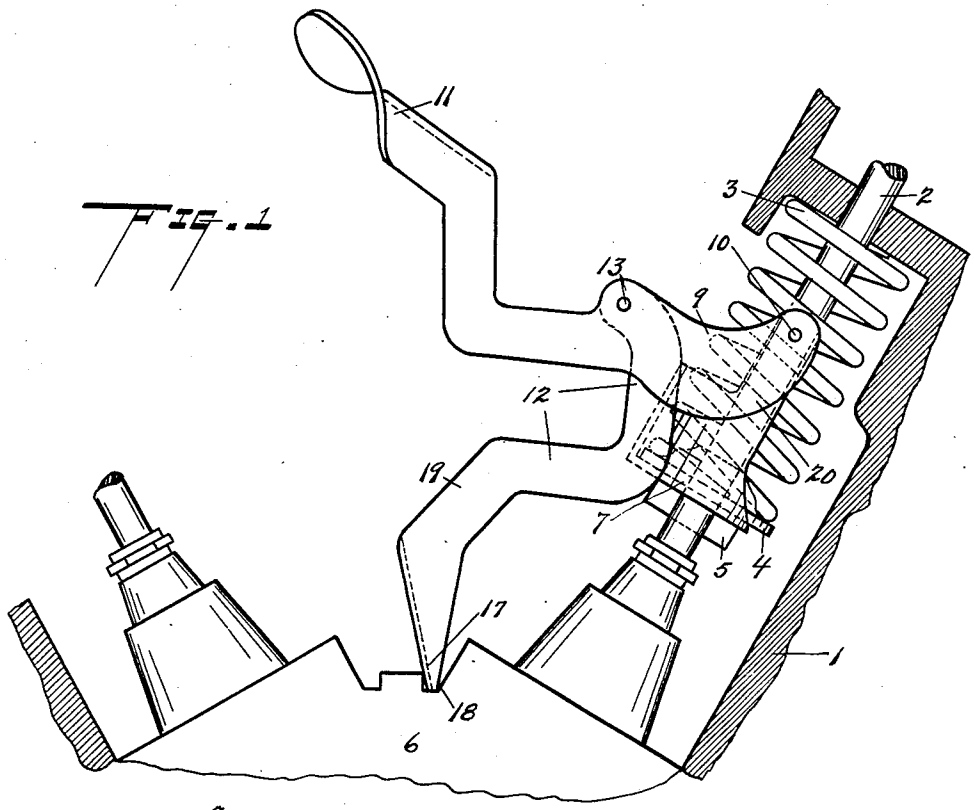
APPLICATION FILED MAR. 3, 1916.

1,245,667.

Patented Nov. 6, 1917.

2 SHEETS—SHEET 1.

FIG. 1



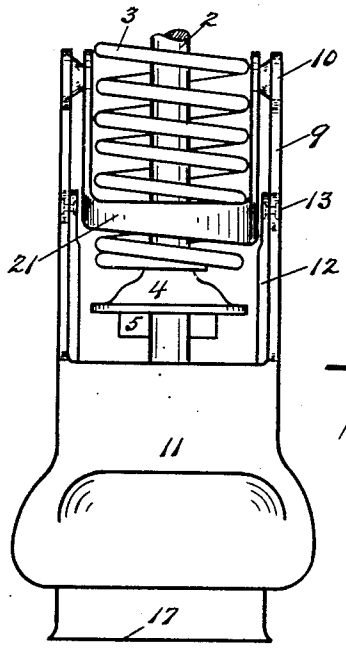
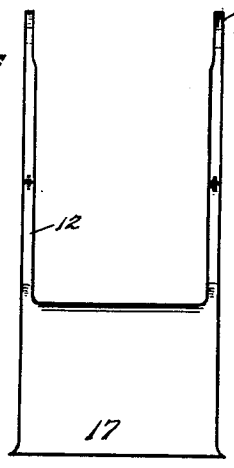


FIG. 2

FIG. 3



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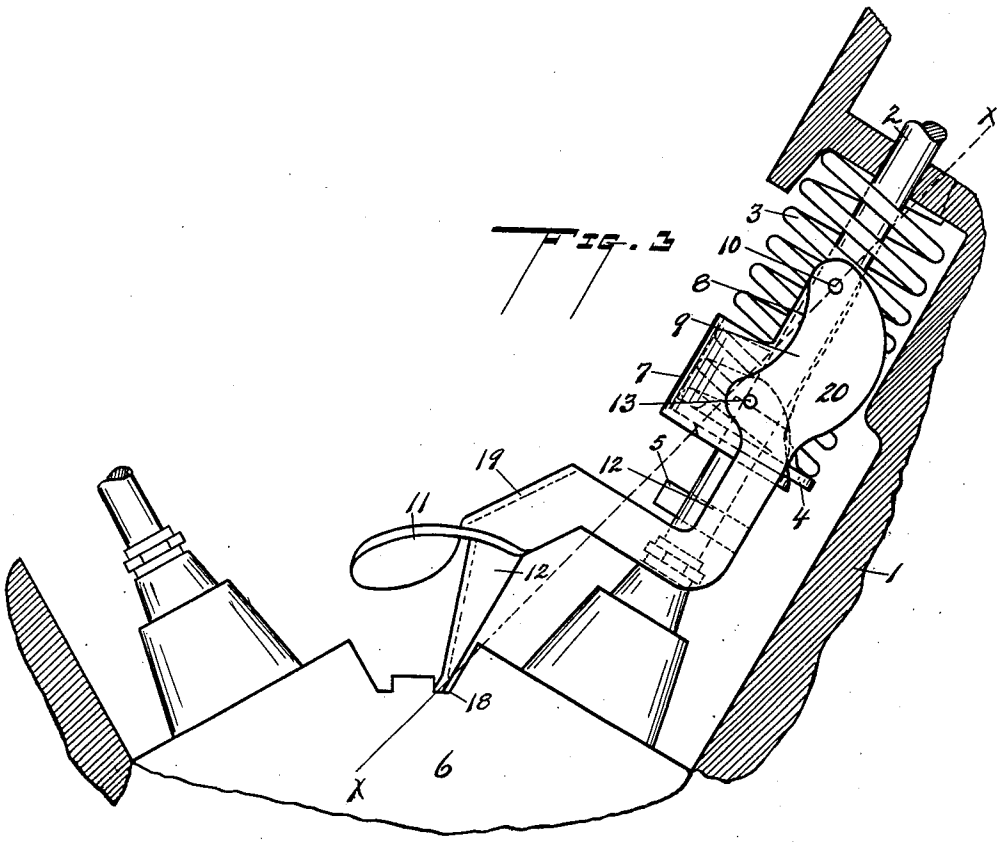


FIG. 3

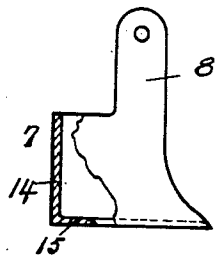


FIG. 4

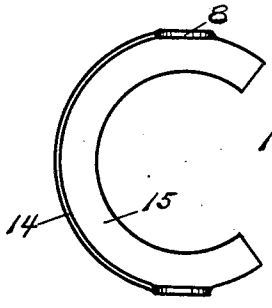


FIG. 5

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UNITED STATES PATENT OFFICE.

CHARLIE J. BOUSFIELD, OF BAY CITY, MICHIGAN.

DEVICE FOR REMOVING PUPPET-VALVES.

REISSUED

1,245,667. Specification of Letters Patent. Patented Nov. 6, 1917.

Application filed March 3, 1916. Serial No. 81,896.

To all whom it may concern:

Be it known that I, CHARLIE J. BOUSFIELD, a citizen of the United States, residing at Bay City, in the county of Bay and State of Michigan, have invented certain new and useful Improvements in Devices for Removing Puppet-Valves; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

This invention is a device for lifting the lower ends of valve springs of internal combustion engines by compressing the springs, in order to facilitate the removal of the valves when it is desired to replace or repair them.

The objects of the invention are to provide a lifting device of simple construction that can be easily and quickly attached to and removed from a valve spring and that will raise even a stiff spring without the exercise of a great amount of force by the operator.

A further object is to provide a spring-lifting device that will automatically lock itself in position when the spring is raised and that will permit free access to the valve-spring washer and to the lower end of the valve stem while the spring is compressed, without liability of slipping and injuring the operator.

With these and certain other objects in view which will appear later in the specification my invention consists in the devices described and claimed and the equivalents thereof.

In the drawings, Figure 1 is a part sectional side view of the valve spring of an engine, showing the device in its preferred form applied to the washer and in position to commence lifting the spring.

Fig. 2 is a front view of the device showing a modified form of lifting cup, the cup and spring being in raised position.

Fig. 3 is a side view of the parts shown in Fig. 1, the lifting device being shown in the position it occupies after having lifted the spring.

Fig. 4 is a part sectional side view of a preferred form of lifting cup.

Fig. 5 is an enlarged top plan view of the same.

Fig 6 is a front view of the thrust-bar detached.

In the drawings, 1 represents the cylinder casting of the engine, 2 the valve stem, 3 the usual valve spring, and 4 the washer loosely fitting the valve stem and supporting the lower end of the spring 3. The washer 4 is usually held in place by a key 5 or its equivalent. The key passes through a transverse opening in the valve stem 2. 6 indicates the base or frame of the engine.

When it is desired to renew or replace a valve it is necessary to lift the valve stem 2, which is normally pressed downward by the compressive force of the spring 3 and to release the valve and its stem 2 it is necessary to lift the lower end of the spring 3 against its compressive force and thus free the key 5, or other fastening device, so it can be removed.

To easily and quickly lift the spring and to hold it in its raised position I provide a cup or receptacle 7 to receive the lower end of the spring and to lift it. The cup is preferably provided with upwardly projecting lugs 8 pivotally secured at their upper ends to the lever 9 by means of pivots 10. The handle 11 of the lever is of any suitable shape, but is preferably L-shaped, as shown in Fig. 1.

A correspondingly L-shaped thrust bar 12 is pivoted near its upper end to the lever 9 by means of pivots 13, as shown in Figs. 1 and 3.

The cup 7 is preferably formed with a part-cylindrical rim 14 adapted to extend around and inclose the outer part of the spring 3 when the device is in place. An interrupted annular flange 15 is formed around the lower edge of the rim 14, leaving an opening 16 at one side to permit the cup to be slipped over the stem 2.

The thrust bar 12, which as has been noted, is preferably L-shaped to conform to the shape of the arm of the handle 11 so as to give free access to the spring, has its lower end supported on the base 6, and it may be held against slipping by resting in a groove 18 formed in the base.

To use the device for lifting a spring, the lower end of the thrust bar is placed on the base 6 while the handle 11 is in the raised position shown in Fig. 1 and the cup 7 is slipped in place with the flange 15 engaging the under-side of the washer 4. The handle 11 is then forced down to the position shown in Fig. 3, thereby raising the washer 4, compressing the spring 3 and releasing the key

5 from engagement with the washer, as shown in Fig. 3. When in its lowered position, the handle 11 rests against the thrust bar 12, the edge 19 of the bar 12 serving as a stop. In this position the thrust of the spring 3 locks the thrust bar 12 and the handle 11 so they can not become accidentally displaced.

It will be observed in Fig. 3 that when the handle is in its lowered position the pivotal point 13 lies beyond the line X—X connecting the upper pivotal point 10 with the point of support at 18. The lever and thrust bar thus constitute a self-locking toggle lever. The upper parts of the lever and of the thrust bar are preferably bifurcated, one member located at each side of the spring, as shown in Figs. 2 and 6, the lower ends being formed in one piece, as at 11 and 17. Thus both members may be conveniently and cheaply made of sheet metal, each member formed of a single piece.

It will be noted that I have described the cup 7 as taking under the washer 4, but it is not essential that this particular form of cup be used. A modified form of the cup is shown in Fig. 2, where 21 is a cup adapted to engage one of the lower convolutions of the spring 3, thereby lifting the lower end of the spring clear of the washer 4, so the washer may be easily lifted from the key 5, permitting the key to be removed or the valve stem lifted.

To permit the raising of the valve spring 3 without liability of bringing lateral pressure or bending strain on the valve stem 2 to cause the stem to bind, I prefer to make the lug 8 of the cup of considerable length, in order that the point of suspension 10 may be relatively high above the lifting flange of the cup. By this means the angular displacement of the cup, due to the relative movement of the pivotal points 10 and 13 is reduced to a minimum and the spring is lifted in a substantially straight line without any appreciable binding action being brought on the stem 2. To further guide the travel of the cup I prefer to form the back edge of the lever 9 with an outward curvature, as indicated at 20, the back edge of the lever thereby forming a guide that engages the side wall of the cylinder 1 to keep the pivotal point 10 and the cup in substantial alinement.

By the means above described, I have produced a simple and effective lifting device that can be quickly applied to the valve stems of engines to lift the valve springs. It enables even a very stiff spring to be lifted with ease because the handle 11 travels through a relatively long distance from its open position to its locked position, and the leverage or power exerted by the handle increases with the increased resistance of the spring, due to its compression. The device is so constructed that the lower part of the spring, the washer and key are all easily accessible when the spring is lifted. Risk of accident to the operator by slipping of the spring is obviated, for the device is firmly locked by the pressure of the spring itself, when the spring is in its raised position.

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

1. In a spring-lifting device of the class described, the combination of a lifting cup adapted to be removably applied around the valve stem and adapted to lift the spring, a bifurcated lever pivotally secured to the upper part of said cup and having a handle, a thrust bar pivoted at its upper end to said lever, its lower end adapted to engage a stationary support, the pivotal connection between the lever and thrust bar adapted to travel past an imaginary line connecting the pivotal connection of the cup and the point of support of the thrust bar, to lock the thrust bar and lever in place, said thrust bar engaging said handle when in locked position, for the purposes set forth.

2. In a spring-lifting device, for engine valves, the combination of a lifting cup formed with an interrupted flange adapted to be removably applied around the valve stem and adapted to lift the lower end of the spring, a bifurcated lever pivotally secured to the upper part of said cup, and having a handle, a bifurcated thrust bar pivoted at its upper ends to said lever, its lower end adapted to engage a stationary support.

3. In a spring-lifting device for engine valves, the combination of a lifting cup formed with an interrupted flange and upwardly extending lugs, said cup adapted to be removably applied around the valve stem and to engage the spring to lift it, a bifurcated lever pivotally secured at its ends to the ends of said lugs and having a handle, a bifurcated thrust bar pivoted at its upper ends to said lever, its lower end adapted to engage a stationary support.

4. In a valve-spring lifting device of the class described, the combination of a lifting cup formed with an interrupted annular flange adapted to be removably applied around the valve stem and adapted to lift the spring, a bifurcated L-shaped lever pivotally secured to the upper part of said cup and having a handle, a bifurcated L-shaped thrust bar pivoted at its upper end to said lever, its lower end adapted to engage a stationary support, and a stop on said bar adapted to be engaged by said lever, for the purposes set forth.

5. In a spring-lifting device of the class described, the combination of a lifting cup formed with an interrupted annular flange adapted to be removably applied around the valve stem and adapted to lift the spring, a

bifurcated lever pivotally secured to the upper part of said cup, and having a handle, the rear edges of said lever being curved and adapted to engage a stationary part of the engine, a bifurcated thrust bar pivoted at its upper ends to said lever, its lower end adapted to engage a stationary support.

6. In a spring-lifting device for engine valves, the combination of a lifting cup formed with an interrupted flange adapted to be removably applied around the valve stem and adapted to lift the lower end of the spring, a bifurcated lever pivotally secured to the upper part of said cup and having a handle, a bifurcated thrust bar pivoted at its upper ends to said lever, its lower end adapted to engage a stationary support, the pivotal connection between the lever and thrust bar adapted to travel past an imaginary line connecting the pivotal connection of the cup and the point of support of the thrust bar, said thrust bar engaging said handle to stop its further inward movement.

In testimony whereof, I affix my signature in presence of two witnesses.

CHARLIE J. BOUSFIELD.

Witnesses:
NELLIE M. ANGUS,
ROY WALLER.