H. C. RUSH.

VALVE REMOVING APPARATUS.

APPLICATION FILED FEB. 6, 1912. RENEWED JAN. 18, 1913.

1,069,028. Patented July 29, 1913.

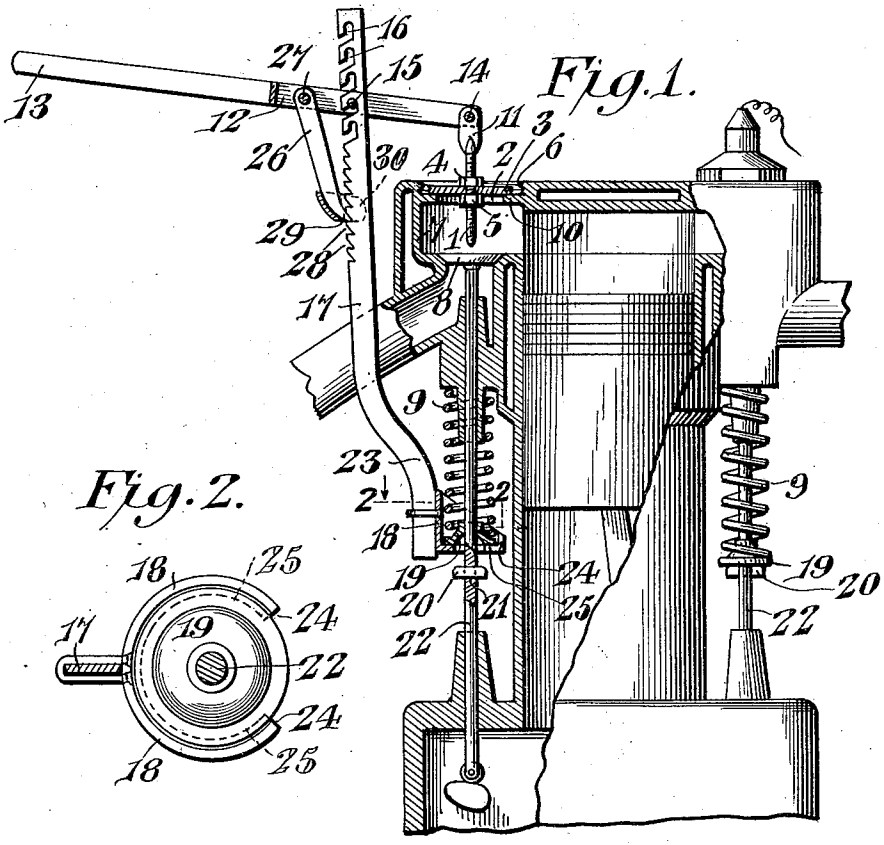


Fig. 1.

Fig. 2.

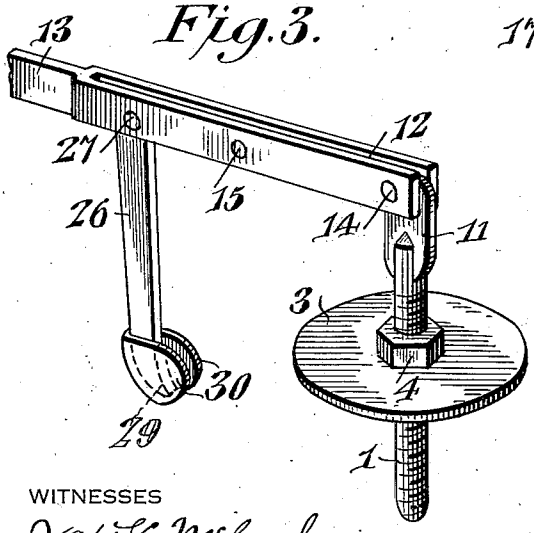


Fig. 3.

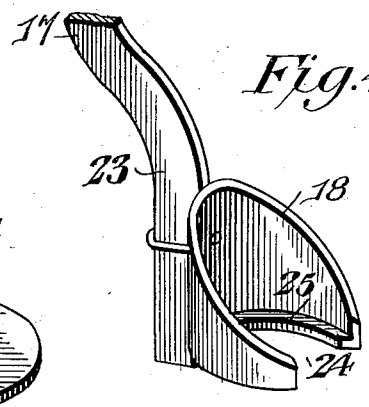


Fig. 4.

WITNESSES

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VALVE-REMOVING APPARATUS.

1,069,028. Specification of Letters Patent. Patented July 29, 1913.

Application filed February 6, 1912, Serial No. 675,801. Renewed January 18, 1913. Serial No. 742,982.

To all whom it may concern:

Be it known that I, HARRY C. RUSH, a citizen of the United States, residing at Dawson, in the county of Fayette and State of Pennsylvania, have invented a new and useful Valve-Removing Apparatus, of which the following is a specification.

The invention relates to an improvement in valve removing apparatus for internal combustion engines.

Heretofore devices have been provided for compressing the actuating springs of valves of internal combustion engines, but difficulty has been experienced with such devices for the reason that the fulcruming or supporting means engaged the valve and clamped the same against the seat rendering it practically impossible to partially rotate the valve stem for arranging the pin or key in the most convenient position for ready removal. Also with lever operated devices of this character there has been more or less liability of the spring slipping off the device and pinching or otherwise injuring the fingers of the operator.

The present invention has for its object to provide a simple, inexpensive and efficient valve removing apparatus, equipped with means adapted to support the device on the valve casing, and capable of adjustment so as to arrange it out of contact with the valve to permit the stem to be freely rotated to facilitate the removal of the pin or key, when the same is relieved of spring pressure.

Another object of the invention is to provide a valve removing apparatus, equipped with a spring support capable of embracing the spring receiving washer so as to effectually prevent the same from accidentally slipping off the support.

It is also the object of the invention to provide a valve removing device adapted to lift the spring with a straight vertical movement to avoid straining or otherwise injuring the same, and capable of securely holding the spring in a compressed condition while the pin or key is being removed from the aperture of the valve stem.

With these and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawing, and pointed out in the claims hereto appended; it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claims, may be resorted to without departing from the spirit or sacrificing any of the advantages of the invention.

In the drawing:—Figure 1 is a vertical sectional view of a valve removing device, constructed in accordance with this invention and shown applied to an internal combustion engine. Fig. 2 is an enlarged horizontal sectional view on the line 2—2 of Fig. 1, the spring being removed. Fig. 3 is an enlarged detail perspective view of the adjustable fulcrum, the pivoted dogs and the inner portion of the lever. Fig. 4 is a detail perspective view of the cylindrical support.

Like numerals of reference designate corresponding parts in all the figures of the drawing.

In the accompanying drawing in which is illustrated the preferred embodiment of the invention, 1 designates a vertically adjustable screw extending through a central opening 2 of a horizontal supporting disk or plate 3, and rigidly secured to the same by upper and lower nuts 4 and 5, arranged on the screw and engaging the upper and lower faces of the disk and clamping the same. The disk is adapted to be arranged in a threaded opening 6 of the valve casing 7 when the screw cap or closure (not shown) is removed, and the screw is adjustable vertically to maintain it out of contact with the exhaust valve 8 to enable the same to be freely rotated when relieved of the pressure of the coiled actuating spring 9, which normally maintains the valve in a closed position. The disk 3 is seated on the shoulder formed by an interior annular flange 10 against which the said screw plug or closure abuts when in place. The screw is provided at its upper end with a flat head 11, fitting in a slot or bifurcation 12 of an operating lever 13, which is fulcrumed at one end to the screw by a transverse pin or rivet 14. The lever 13 is provided at a point intermediate of the ends of the slot or bifurcation with a transverse pivot 15, which is engaged with one of a vertical series of approximately L-shaped bearing slots 16 of a lifting bar or member 17, connected at its upper portion with the lever and provided at its lower portion with an approximately cylindrical spring support 18. The slots 16, which are composed of downwardly and outwardly inclined lower entrance portions and inner upwardly extending vertical bearing

portions, permit a vertical adjustment of the lifting bar to arrange the seat to properly engage the washer 19 against which the lower end of the coiled spring 9 bears. The washer, which is cup-shaped, extends into the lower end of the spring and bears against a pin or key 20, which is removably arranged in an aperture 21 of a valve stem 22.

The cylindrical support 18, which is tapered to provide an extended back, is suitably secured to the lower end of the lifting bar 17, and the latter is provided adjacent to its lower portion with a bend 23, off-setting its lower end from the plane of the body portion of the lifting bar to position the support 18 directly beneath the adjustable fulcrum, in order to enable the device to compress the coiled spring by a direct vertical lift, so as to avoid straining or otherwise injuring the spring. The support 18, which is rigidly secured to the lower off-set end of the lifting bar by any suitable means, is provided at the front with an opening 24 of sufficient width to permit the passage of the valve stem to enable the support to be arranged beneath the lower end of the coiled spring. The support, which has a horizontal lower edge, is provided with an inwardly extending flange 25, forming a seat for the washer 19, and as the approximately cylindrical support 18 has a curvature of greater extent than a semi-circle, it embraces the major portion of the periphery of the washer, as clearly illustrated in Fig. 2 of the drawing. The washer is securely held against outward movement, and there is no liability of the spring and the washer slipping off the support.

The outer portion of the lever is raised to lift the bar or member 17 and compress the spring, which is maintained in such condition by a pawl or dog 26, pivoted by a pin 27 in the slot or bifurcation 12 at the inner portion thereof and depending from the said lever and adapted to engage any one of a series of notches 28 of the lifting bar 17. The notches 28 are located below the slots 16, and their lower walls form shoulders to be engaged by the lower ends of the pawl or dog 26. The pawl or dog 26 is provided at its lower end with a tooth 29 to engage the notches or the teeth formed by the notches of the lifting bar, and the said pawl or dog is provided at opposite sides of its lower end with flanges 30, spaced apart to receive the lifting bar and adapted to prevent the pawl or dog from moving laterally out of engagement with the notched or toothed portion of the lifting bar. After the pin or key is removed from the valve stem, the outer portion of the operating lever is lifted to disengage the pawl or dog from the lifting bar and the latter is then lowered to release the spring. The device is then removed from the valve casing and access may then be readily had to the valve and the valve seat for cleaning, grinding or otherwise operating on the same.

By means of the slots and the adjustable fulcruming screw, the device may be readily adjusted to enable it to operate on various internal combustion engines without touching and clamping the valve, and the actuating spring may be readily compressed without damaging the same and without liability of the spring slipping and pinching or otherwise injuring the fingers of the operator.

What is claim is:—

1. A valve removing device including a supporting plate adapted to be arranged on or fitted against a valve casing, a fulcrum adjustably connected with the supporting plate and extending through the same into the casing and movable inwardly and outwardly to arrange it out of contact with the valve, a lever pivotally connected with the fulcrum, a lifting bar pivoted to the lever and provided with means for engaging the spring of the valve, and means for locking the parts against movement to maintain the spring in a compressed condition.

2. A valve removing device including a disk adapted to be fitted against a valve casing and having an opening, a screw extending through the opening and provided with nuts arranged at the opposite faces of and clamping the disk, a lever pivotally connected with the screw, a lifting bar pivotally connected with the lever and provided with means for engaging the spring of the valve, and means for locking the parts against movement to maintain the spring in a compressed condition.

In testimony, that I claim the foregoing as my own, I have hereto affixed my signature in the presence of two witnesses.

HARRY C. RUSH.

Witnesses:
W. A. Rush,
Frank P. Stickel.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."