Oct. 31, 1950 J. W. KING ET AL 2,527,555

MECHANISM FOR REMOVING AND REPLACING VALVES

Filed Feb. 14, 1946 2 Sheets-Sheet 1

FIG. 1

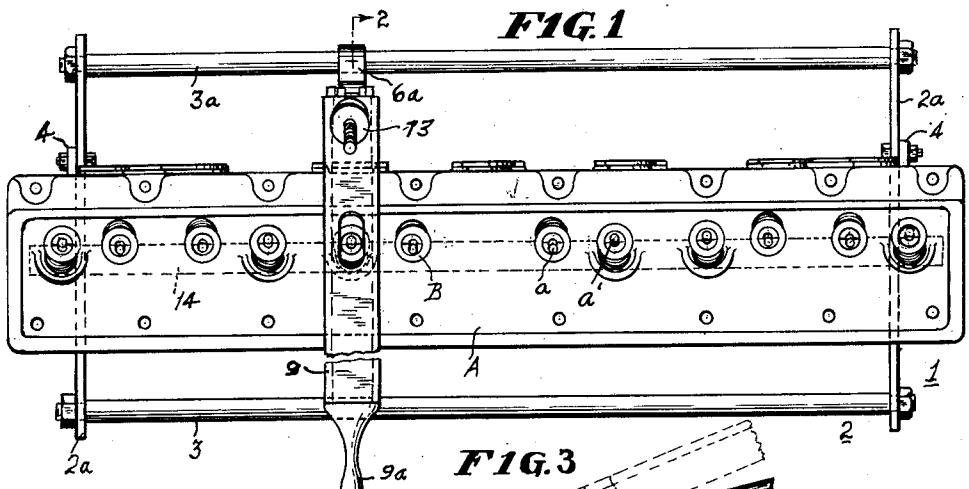


FIG. 3

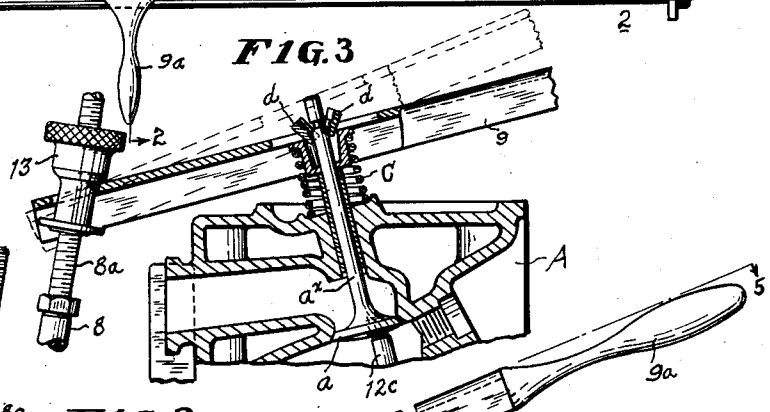
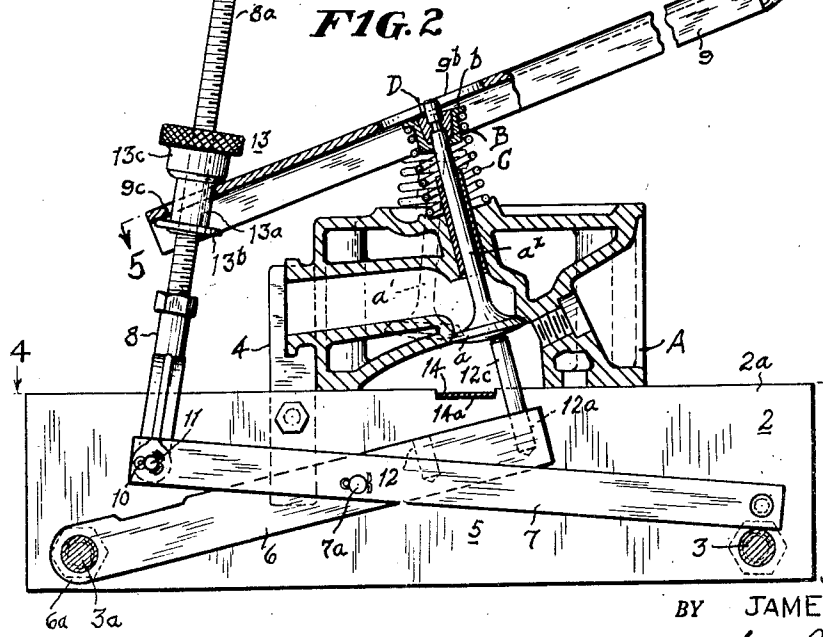


FIG. 2



INVENTOR.
JOHN W. KING.
BY JAMES J. McNAMEE
Geo. B. Pitts
Attorney

Oct. 31, 1950 J. W. KING ET AL 2,527,555

MECHANISM FOR REMOVING AND REPLACING VALVES

Filed Feb. 14, 1946 2 Sheets-Sheet 2

FIG. 4

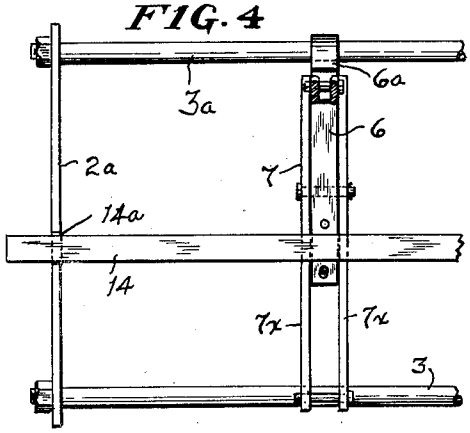


FIG. 6

FIG. 5

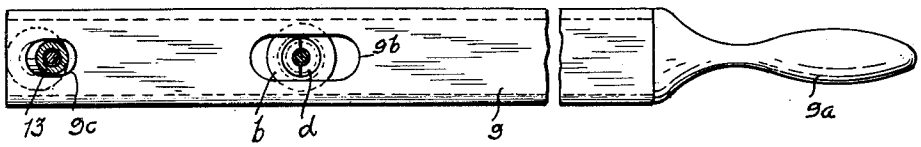
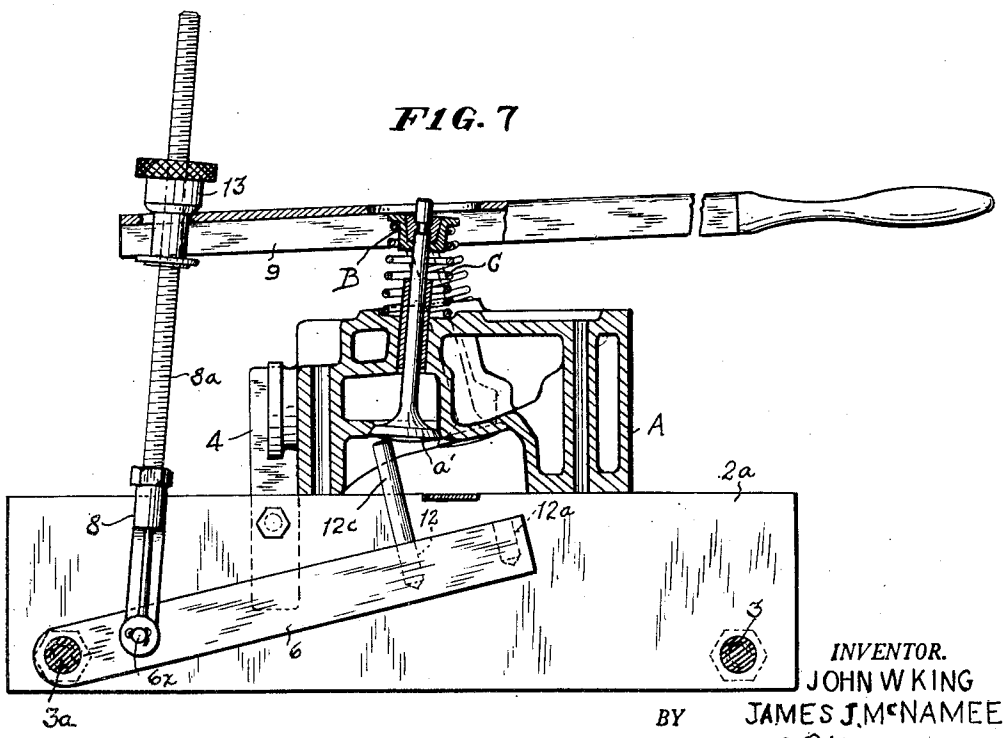


FIG. 7



INVENTOR.
JOHN W KING
JAMES J. McNAMEE

BY Geo. B. Pitts
Attorney

Patented Oct. 31, 1950 2,527,555

UNITED STATES PATENT OFFICE

2,527,555

MECHANISM FOR REMOVING AND REPLACING VALVES

John W. King and James J. McNamee, Cleveland, Ohio, assignors to Miles Park Machine & Tool, Inc., Cleveland, Ohio, a corporation of Ohio

Application February 14, 1946, Serial No. 647,495

2 Claims. (Cl. 29—216)

1

This invention relates to a mechanism for removing and replacing the intake and exhaust valves in the head of an internal combustion engine.

One object of the invention is to provide an improved mechanism of this type constructed to facilitate the operation of removing or replacing one or more valves of an engine, whereby both the labor and time required are materially reduced and hence enables engine repairs or service to be economically carried out.

Another object of the invention is to provide an improved mechanism of this type having incorporated therein a support for the valve, whereby compression of the valve spring and release of the valve or its replacement is readily effected.

Another object of the invention is to provide an improved mechanism of this type constructed to remove or replace both the intake and exhaust valves of any engine where these valves are alternately disposed out of alinement without moving the engine head.

Another object of the invention is to provide an improved mechanism of this type consisting of few parts and capable of adjustment to accommodate valves having seat engaging walls of different widths and/or shanks of different lengths.

Other objects of the invention will be apparent to those skilled in the art to which our invention relates from the following description taken in connection with the accompanying drawings, wherein

Fig. 1 is a plan view of a mechanism embodying our invention and an engine head in position.

Fig. 2 is a section on the line 2—2 of Fig. 1.

Fig. 3 is a fragmentary sectional view showing the operation of compressing the spring for a valve.

Fig. 4 is a fragmentary section on the line 4—4 of Fig. 2.

Fig. 5 is a section on the line 5—5 of Fig. 2.

Fig. 6 is a perspective view of an element employed in the assembly for each valve.

Fig. 7 is a sectional view substantially similar to Fig. 2, but showing a modified form of construction.

In the drawings, A indicates an engine head of any suitable construction and mounting a plurality of intake valves *a* and related exhaust valves *a'*. The valve removing and replacing mechanism, indicated as an entirety at 1, is adapted to remove or replace one or more of the valves where all thereof are in alinement,

2

but, as shown, it is capable of removing or replacing one or more valves where the valves for each cylinder are disposed in the engine head A at angles to each other, without requiring the head to be moved or repositioned.

Each valve assembly is shown as consisting of a cup member B having a flange *b* which forms the seat for the outer end of the valve spring C, the inner end of the latter being seated on the adjacent wall of the head A. The shank a^x of the valve extends through the bottom wall of the member B and the inner wall of the latter is of conical shape to accommodate a lock D which surrounds the shank a^x and is provided internally with a rib fitting into an annular recess formed in the shank a^x. As the lock D consists of two side-by-side separable elements *d*, *d*, and fit the conical wall of the member B, the pressure of the spring C on the latter serves to maintain the elements *d*, *d* in position, but upon compression of the spring, as hereinafter set forth, these elements may be inserted in position or removed (see Fig. 3).

The mechanism 1 comprises the following: 2 indicates as an entirety a frame adapted to be positioned on a table, work bench or other support and consisting of side plates 2*a* spacedly and rigidly connected together by a pair of rods 3, 3*a*, each rod being arranged adjacent corresponding ends of the plate 2*a* to provide an unobstructed space between them. As shown in Fig. 1, the frame 2 is of less length than that of the engine head A, so that the latter may be supported on the plates 2*a* and shifted endwise thereon where the valves are positioned beyond either or both plates. 4 indicates stops or abutments supported on and projecting upwardly from the plates 2*a*, against which the head A is positioned. 5 indicates as an entirety a linkage bodily movable endwise of the frame 2 on the frame rods 3, 3*a*, whereby the linkage may be adjusted into alinement with each valve *a*, *a'*. In the form of construction shown in Figs. 1, 2, 3, 4, and 5, the linkage consists of (*a*) a link 6 provided at its inner end with a hub 6*a* which is rotatably and slidably mounted on the rod 3*a*, (*b*) a link 7 having a pivotal connection 7*a* intermediate its ends with the link 6*a* intermediate the ends of the latter, (*c*) a link 8 pivotally connected to the inner end of the link 7 and (*d*) a lever 9 pivotally connected at its inner end to the link 8, the lever 9 being extended, so that its outer end portion 9*a* may serve as an operating handle. The outer end of the link 7 is supported on the rod 3 and is free to slide endwise thereof when the linkage

is adjusted and also ride on the rod 3 at right angles thereto due to the articulation of the links 6, 7, in operating the linkage 5. The link 7 preferably consists of a pair of spaced bars 7x disposed upon opposite ends of the link 6 and inner end of the link 8. The outer ends of the bars 7x are connected by a bolt 10 and their inner ends are held in position by suitable cotter pins for the pivot 11 which connects the bars 7x to the link 8. Means are provided for holding each valve against downward movement while its spring is being compressed. This means consist of an abutment member carried by one of the links and arranged to engage the valve, so that the valve spring may be compressed relative to its shank, as later set forth. To provide for the engagement of both valves for each cylinder where the valves are operable at angles to each other, the abutment member is adjustable on the adjacent link. In the form of construction shown, the outer end portion of the link 6 is formed with inner and outer inwardly extending recesses 12, 12a, each of which forms a seat for the inner end portion of a valve abutment member 12c. The member 12c preferably consists of a pin shaped to removably fit each recess 12, 12a, and project therefrom, whereby its outer end may serve as an abutment to engage the inner face of each valve a, a', while its spring is being compressed, as shown in Figs. 2 and 3. The abutment member 12c is positioned in one recess when one valve is to be removed or replaced and then removed and positioned in the other recess when the other valve for the adjacent cylinder is to be removed or replaced. The lever 9 is formed with an elongated opening 9b the side walls of which engage the flange b provided on the cup member B, so that when the lever 9 is operated to force the member B downwardly relative to the valve shank a^x and through it to compress the valve spring C, the locking elements d, d, can be removed or replaced, as shown in Fig. 3.

The pivotal connection between the link 8 and lever 9 is adjustable to adapt the linkage to engine heads which vary in height and/or valves the seat engaging walls of which vary in thickness or their shanks vary in length. To provide for this adjustment, the link 8 is provided throughout a portion of its length with screw threads 8a on which an internally threaded collar 13 is mounted. The collar 13 consists of an elongated round section 13a provided at its lower end with an annular wall 13b and at its upper end with a ring 13c, which provides an annular wall spaced from the wall 13b. As shown, the round section 13a of the collar 13 projects through an opening 9c formed in the inner end of the lever 9 and engages the walls thereof to pivot the link 8 and lever 9 together. The opening 9c is elongated to permit free pivotal and rocking movement between the collar 13 and lever 9. By preference, the inner wall of the collar section 13a is threaded for engagement with the screw threads 8a on the link 8 and its upper end is extended and threaded into the adjacent end of the ring 13c, so that the section 13a and ring 13c may be connected with the section 13a within the opening 9c.

14 indicates a support mounted at its opposite ends of the plates 2a and in position below the valves a, a'. The support 14 serves to support the valve or valves to be replaced while the linkage 5 is being positioned; also, when a valve is released from the lock D in the operation of removing it, the valve is allowed to drop or gravitate onto the support 14 and stored thereon while other valves are being released for removal. The support 14 is seated in recesses 14a formed in the plates 2a, so that its upper surface is substantially flush with the top edges of the plates and the sides of the recesses maintain the support 14 in position.

In operation, where a valve is to be replaced or assembled in the head A, the latter is positioned on the frame 2 with the valve shank in its guide sleeve and the valve placed on support 14. The linkage 5 is moved along the frame 2 in alinement with the valve, which is then raised and the abutment member 13c engaged therewith; the valve spring C and cup member B are assembled on the valve shank a^x and the lever 9 is swung into engagement with the flange b of the member B, and forced downwardly to compress the spring C (see full lines in Fig. 3), whereupon the locking elements d, d, may be inserted in the cup member B (see Fig. 2). In removing a valve, these operations are reversed. It will be observed, in carrying out either operation, that the connection of the lever 9 with the link 8 may be adjusted along the latter so that the force applied to each spring C to compress it will be opposed by the abutment 12c substantially axially of the valve shank a^x as well as axially of the valve spring C. Accordingly, the operation of compressing each spring may be effected in a quick and ready manner and danger of the spring buckling or being distorted is eliminated.

Fig. 7 illustrates a modified form of linkage, indicated as an entirety at 5', which differs from the form of construction shown in Figs. 1, 2 and 3 in that the link 7 is omitted, so that the link 8 is pivotally connected directly to the link 6, as shown at 6x. The linkage 5' is operated similar to that above described.

To those skilled in the art to which our invention relates many changes in construction and widely differing embodiments and applications of the invention will suggest themselves without departing from the spirit and scope of the invention. Our disclosures and the description herein are purely illustrative and are not intended to be in any sense limiting.

What we claim is:

1. In mechanism of the class described, the combination with a frame arranged to support an engine head and provided with a rod extending from end to end thereof and in a plane below the head, of a link provided with an inner end and an outer end, said link being rotatably and slidably mounted at its inner end on said rod for alinement with each of the valves on the head and extending transversely of said frame below the head, the outer end of said link being provided with a member arranged to engage a valve and form an abutment therefor while the adjacent valve spring is being compressed, a second link provided with a lower end and an upper end, said second link being pivotally connected at its lower end to said first mentioned link inwardly of the mounting thereof on said rod, and a lever provided with an inner end and a handle at its outer end portion, said lever being pivotally connected at its inner end to the upper end portion of said second mentioned link, said lever intermediate its ends being formed with an opening to permit the adjacent valve shank to extend therethrough and at opposite sides of said opening said lever being arranged to engage the abutment for the outer end of the adjacent valve spring, whereby operation of said lever down-

wardly about its pivot in opposition to said abutment member serves to compress the valve spring relative to the valve shank.

2. In mechanism of the class described, the combination with a frame adapted to support an engine head and provided with parallelly related spaced rods extending from end-to-end thereof in a plane, below the head, of a pair of transversely disposed links each provided with an inner end and an outer end, said links being disposed below the head and pivotally connected together intermediate their respective opposite ends, the inner end of one of said links being rotatable and slidable on one of said rods and the inner end of the other link having sliding engagement with the other rod, whereby said links may be alined with each valve in the head, the outer end portion of one of said links being provided with an abutment arranged to engage the adjacent valve while its spring is being compressed, a separate link provided with a lower end and an upper end, said separate link being pivotally connected at its lower end to the other one of said first mentioned links, and a lever provided with an inner end and an outer end, said lever being pivotally connected at its inner end

to the upper end portion of said separate link and provided with a handle at its outer end, said lever intermediate its ends being formed with an opening to permit the shank of each valve to extend therethrough and at opposite sides of said opening said lever being arranged to engage the abutment for the outer end of the adjacent valve spring, whereby operation of said lever downwardly about its pivot in opposition to said abutment serves to compress the adjacent valve spring relative to the adjacent valve shank.

JOHN W. KING.
JAMES J. McNAMEE.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,480,513	Daniken	Jan. 8, 1924
1,849,538	Bernitz	Mar. 15, 1932
2,173,398	Michener et al.	Sept. 19, 1939

FOREIGN PATENTS

Number	Country	Date
292,803	Great Britain	June 28, 1928