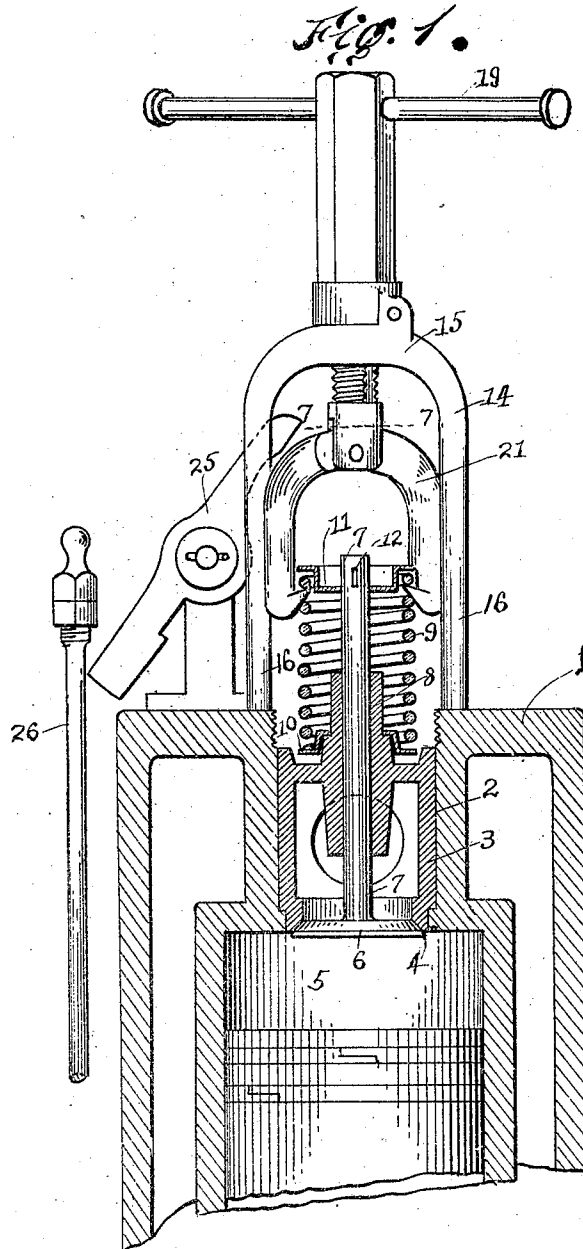


U. E. G. JOHNSON.
VALVE REMOVER.
APPLICATION FILED FEB. 26, 1920.

1,378,463.

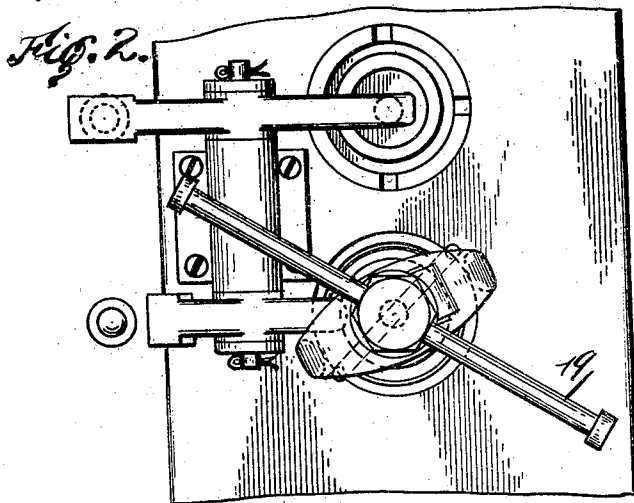
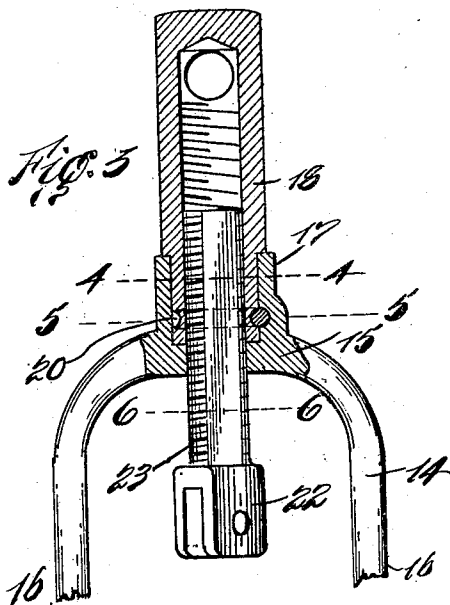
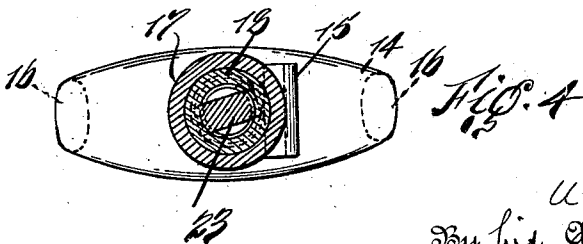
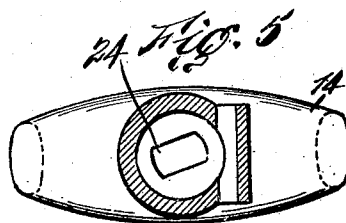
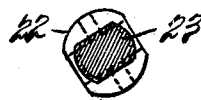
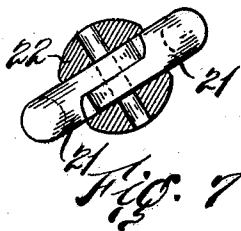
Patented May 17, 1921.
3 SHEETS—SHEET 1.



U. E. G. Johnson Inventor
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Curson & Newell

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3 SHEETS—SHEET 2.



Inventor
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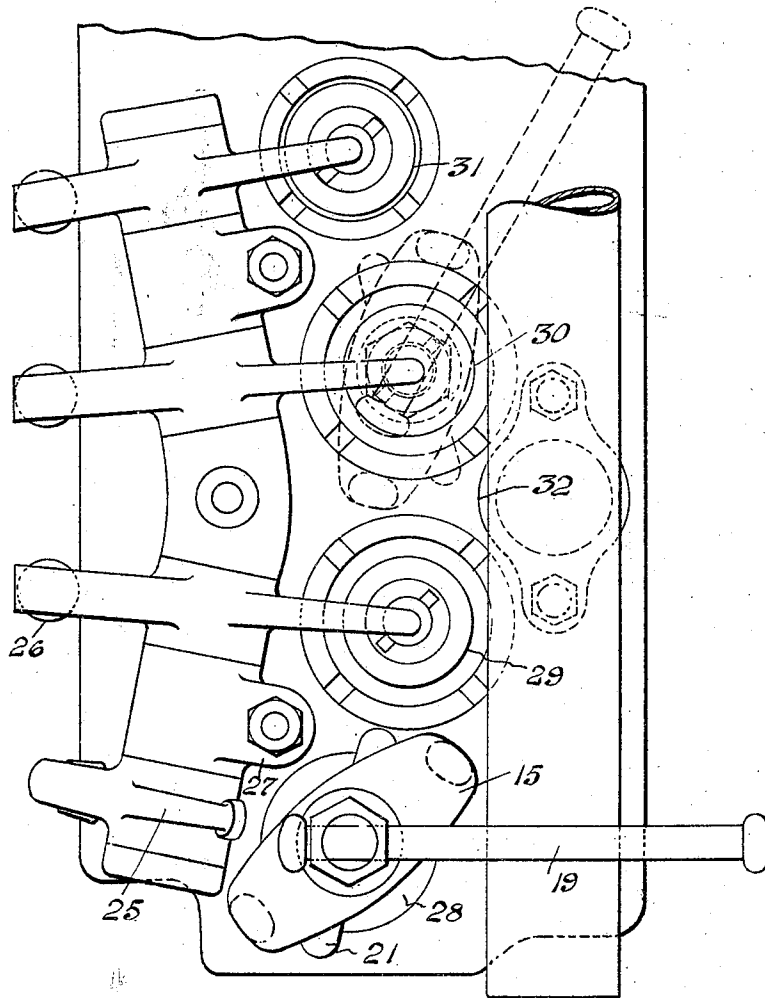
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3 SHEETS—SHEET 3.

Fig. 8.



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UNITED STATES PATENT OFFICE.

ULYSSES E. G. JOHNSON, OF PITTSFIELD, MASSACHUSETTS.

VALVE-REMOVER.

1,378,463.

Specification of Letters Patent.

Patented May 17, 1921.

Application filed February 26, 1920. Serial No. 361,428.

To all whom it may concern:

Be it known that I, ULYSSES E. G. JOHNSON, a citizen of the United States, residing at Pittsfield, Massachusetts, have invented certain new and useful Improvements in Valve-Removers, of which the following is a clear, full, and exact description.

My invention relates to tools for removing the valve assembly of internal combustion engines, and the invention has for its object, among other things, the provision of a tool having few parts, one which is convenient in use, and is adapted for any variety of engine.

The various features of construction by which the above and other desirable objects are attained will become apparent from a consideration of the following detailed description and claims when taken in connection with the accompanying drawings, in which—

Figure 1 is a perspective view of the valve removing tool in operative position on the top of an engine cylinder;

Fig. 2, a top plan view;

Fig. 3, a part sectional and part perspective view showing particularly the construction of the tool head;

Fig. 4, a view along the line 4—4, Fig. 3;

Fig. 5, a view along the line 5—5, Fig. 3;

Fig. 6, a view along the line 6—6, Fig. 3;

Fig. 7, a view along the line 7—7, Fig. 1 and

Fig. 8 is a top plan view showing my invention in actual use on the engine of the Buick type.

Referring to the drawings, 1 designates an engine cylinder, in an opening 2 of which is seated the valve assembly comprising a valve cage 3 having ports, one of which—designated at 4—communicates directly with the combustion chamber 5 of the cylinder. A valve 6 is shown seated in the port 4, which valve may be either an inlet or exhaust valve. The stem 7 of the valve extends through the valve cage and projects beyond the same, being longitudinally movable through a guide 8, consisting of a tubular extension of the valve cage. The valve is normally held closed by the usual spring 9, one end of which is sustained by a cup 10 which

is adjacent to the cage 3, and the other end by the cup washer or cap 11 which is held in place on the valve stem 7 by the usual pin or key 12.

All of the parts thus far described are of the usual construction and arrangement now in common use in engines of the valve in the head type.

The valve assembly removing tool of this invention comprises a substantially U-shaped frame or yoke 14, which is inverted when in its operative position, said frame comprising an arched crown top 15 and substantially parallel legs 16. The distance between the legs is such that the yoke 14 may straddle the valve assembly and rest directly upon the top of the cylinder, as shown in Fig. 1. The crown of the yoke is formed into a socket 17, in which a head 18 is mounted for rotation. This head is interiorly screw-threaded and may be shaped on its exterior such as to readily accommodate a wrench, and in addition an opening through said head may accommodate a cross-bar 19, which cross-bar may also be used for rotating the head. In order to hold the head in place within the socket 17, the head is formed with a circular groove 20 near its lower end, and a ring or screw is passed through the socket 17 for engagement with said groove.

Valve engaging jaws 21 are pivotally supported in the bifurcated end 22 of a jack-screw 23, having threads to fit the threads of the head 18. The jaws are constrained to move in a single plane in said jack-screw or jaw-supporting member 23, and in order to provide a tool which is adapted to various models of engines, the said jack-screw is mounted so that it cannot rotate during its up-and-down movement in the head, and preferably such rotation is prevented by providing an opening in the crown of the yoke, said opening having flattened sides 24, the sides of the jack-screw 23 being correspondingly flattened. It will be noted, by reference to Figs. 4 and 5, that the plane formed by the flattened sides makes an angle with the vertical plane of the legs of the yoke, and this angle is preferably such that the jaws may open beyond the yoke legs but are in close proximity to said legs. This is an im-

portant feature, as it enables a tool of the present invention to be used on some models of engine where it would be impossible to use a tool having the jaws moving in a plane at a right angle or at substantially a right angle to the plane of the yoke. Said legs preferably act as guides during the opening and closing movement of said jaws. Furthermore, the jaws moving in this manner make it convenient to grasp them in attaching the tool to the top of the valve cage with the left hand, while leaving the right hand free to adjust the jaws to the valve spring when the tool is in place.

It will also be noted that the jaws are attached directly to the jaw-supporting member or jack-screw 23, dispensing with a cross-head or other cumbersome substitute, thus simplifying the construction.

In operation, the tool is placed in the position shown in Fig. 1, the jaws 21 being placed to engage the spring 9 as shown, it being of course necessary to first remove the rocker arm 25 from its connection with the valve cage, said rocker arm being also disconnected from the cam-actuated rod 26, these parts operating in a manner well understood by those familiar with this art. The tool head 18 is then rotated either by the bar 19 or by means of a wrench. Any valve in a series may be removed independently without interfering with any other valve.

In Fig. 8 which shows a practical application of my improved device as applied to a Buick engine of the 1919-20 type, the rocker arm 25 is shown as removed from the first cylinder 28 and the valve remover applied to this particular valve. By reason of the fact that the jaws 21 move in a plane close to the plane of the legs of the yoke, each individual valve may be removed without first removing any other valve. If the jaws 21 were mounted at right angles as has been proposed in prior constructions, said jaws would interfere with the boss indicated at 27 in said figure. This would also be true when the valve remover was applied to the valve indicated by 29 and furthermore the jaws in this case would interfere with the water connection shown at 32. Similar conditions would cause interference if the valve remover were applied to the valve 30 or the valve 31, as will be readily apparent.

What I claim as new is:

1. In a valve removing tool, the combination with a yoke having supporting legs, of a pair of jaws supported in said yoke, said jaws having pivotal and vertical movement, means for constraining said jaws against rotational movement, said restraining means acting to confine said jaws in their pivotal movement to a vertical plane, which makes but a slight angle with the vertical

plane of the legs of the yoke, whereby said jaws may open past said legs but in close proximity thereto.

2. In a valve removing tool, the combination with a yoke having supporting legs, of a supporting member mounted for vertical movement in said yoke, jaws pivoted to said member and confined to movement in a single plane, and means preventing rotation of said member, said rotation-preventing means acting to confine said member to vertical movement in said yoke so that said jaws in their pivotal movement may escape said legs but are constrained to move immediately adjacent thereto.

3. In a valve removing tool, the combination with a yoke having a head and supporting legs, of a supporting member mounted for vertical movement in the head of said yoke, jaws pivoted to said member and confined to movement in a single plane, said member being screw-threaded and being flattened to prevent rotation in said yoke head, said flattened portion of said screw-threaded member forming such an angle with the vertical plane of the legs of the yoke as to merely permit clearance of each leg by the jaw adjacent thereto.

4. In a valve removing tool, in combination with a yoke having supporting legs, of jaws supported by said yoke, and means for confining said jaws to open and close in a plane forming such an angle with the vertical plane of the legs of the yoke whereby the legs of the yoke act as a guide for the jaw adjacent thereto in its opening and closing movements.

5. In a valve removing tool, the combination with a yoke having supporting legs, a member rotatably mounted in the crown of said yoke, said member being internally screw-threaded, a jaw supporting member engaging the threads of said first mentioned member, and jaws pivotally mounted in said jaw-supporting member and confined thereby to movement in a single plane.

6. In a valve removing tool, the combination with a yoke having supporting legs, a member rotatably mounted in the crown of said yoke, said member being internally screw-threaded, a jaw supporting member engaging the threads of said first mentioned member, jaws pivotally supported in said jaw supporting member, said yoke having a hole with flattened sides through which said jaw supporting member passes, whereby the latter is permitted vertical movement but is restrained from rotative movement.

7. In a valve removing tool, the combination with a yoke having supporting legs, a member rotatably mounted in the crown of said yoke, said member being internally screw-threaded, a jaw supporting member engaging the threads of said first mentioned member, jaws pivotally supported in said

jaw supporting member, said yoke having a
hole with flattened sides through which said
jaw supporting member passes, whereby the
latter is permitted vertical movement but
5 is restrained from rotative movement, the
flattened sides of said member located in a
vertical plane making such an angle with
the vertical plane of the legs of said yoke

as to merely permit of the clearance of each
leg by the jaw adjacent thereto.

Signed at Pittsfield Mass., this 19th day
of February, 1920.

U. E. G. JOHNSON.

Witnesses:

DANA S. MERRIMAN,
F. HARRIS RAY.