Dec. 12, 1944. A. J. TAYLOR 2,365,023

DEVICE FOR DISLODGING VALVE-ASSEMBLIES OF INTERNAL-COMBUSTION ENGINES

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Fig. 1.

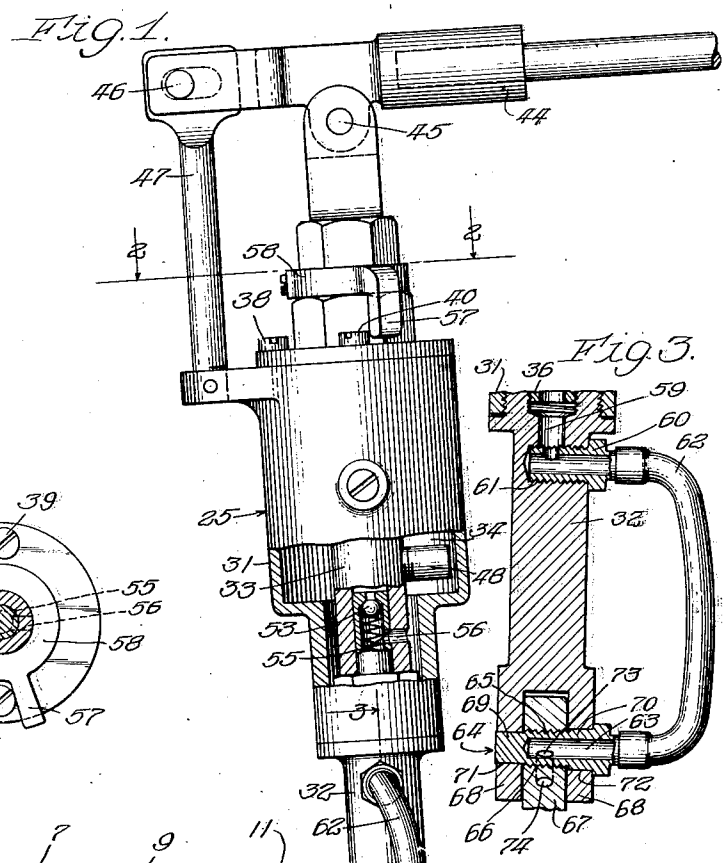
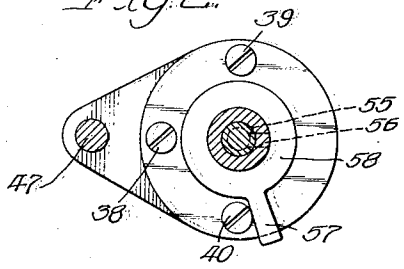
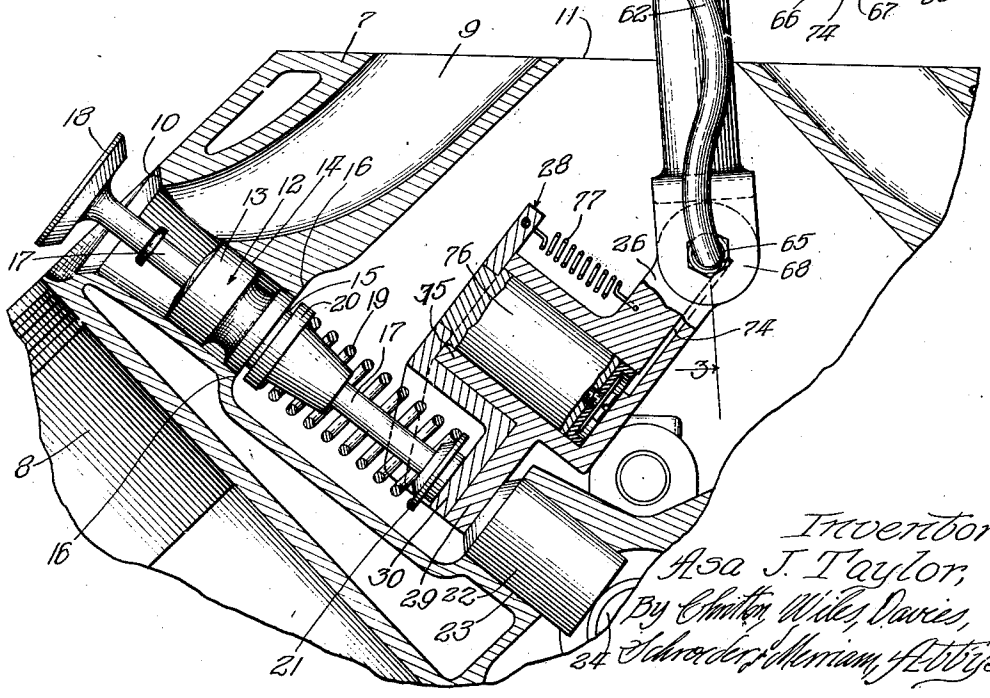



Fig. 3.

Fig. 2.




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Fig. 4

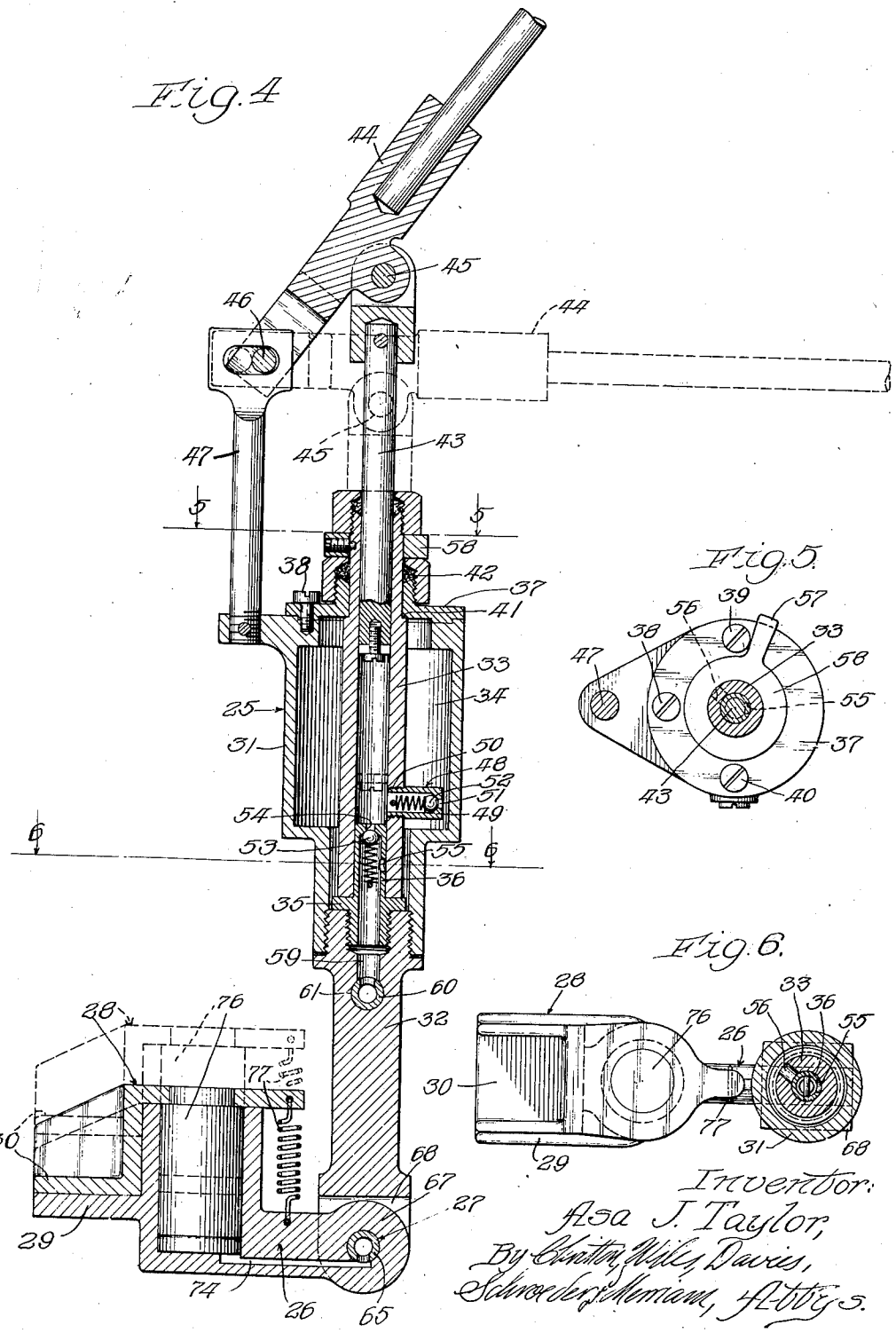



Fig. 5.




Fig. 6.




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# UNITED STATES PATENT OFFICE

2,365,023

## DEVICE FOR DISLODGING VALVE ASSEMBLIES OF INTERNAL-COMBUSTION ENGINES

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Application June 14, 1943, Serial No. 490,730

3 Claims. (Cl. 29—214)

My invention relates to a device for use in dislodging valve-assemblies as, for example, for the purpose of repair or substitution, from openings in internal combustion engine blocks in which they are positioned for use. Such valve-assemblies, which commonly comprise bushings or housings at which they fit in the openings referred to, and reciprocable valve elements in the bushings, oftentimes become so tight in the engine blocks as to render them very difficult of removal, often resulting, according to the present day methods employed to remove them, in impairment of the valve-assemblies as, for example, by bending them out of shape, and requiring a long time to dislodge them.

My primary object is to provide a device for the purpose stated which shall be of simple construction, easy to operate, highly effective to dislodge the valve-assemblies as desired, and by a quick operation and by the use of which impairment of the valve-assemblies is avoided. Other objects will be apparent from the following description.

Referring to the accompanying drawings:

Figure 1 is a fragmentary view, partly in vertical sectional elevation, of an internal combustion engine of the type currently used in Ford automobiles showing, in full elevation, one of the valve-assemblies thereof controlling, for example, the inlet of gas to the cylinders: this view also showing a valve-assembly-dislodging device constructed in accordance with my invention, applied to position preliminary to its operation for dislodging the valve-assembly.

Figure 2 is a section taken at the line 2—2 on Fig. 1 and viewed in the direction of the arrows.

Figure 3 is a fragmentary sectional view taken at the line 3—3 on Fig. 1 and viewed in the direction of the arrows.

Figure 4 is a view in vertical sectional elevation of the device showing, by full lines, its operative parts conditioned for operation of the device to dislodge a valve-assembly to which it may be applied.

Figure 5 is a section taken at the line 5—5 on Fig. 4 and viewed in the direction of the arrows; and

Figure 6, a section taken at the line 6—6 on Fig. 4 and viewed in the direction of the arrows.

As a preface to a description of the construction of my device, reference is made to the illustrated construction of internal combustion engine which is of the conventional current Ford type for use in connection with which, to dislodge its valve-assemblies, I have more particularly devised my dislodging device, although not with the intention of limiting the invention to a device for use in connection with such an engine.

The engine shown comprises a cylinder block 7, its cover, not shown, being removed and one of the cylinders thereof being shown at 8, the block 7 having gas passages with terminal seats, one of these passages being shown at 9 and its seat at 10 and being recessed at 11, the recess 11 opening through the top of the cylinder block.

The engine shown also comprises valve-assemblies controlling the gas passages referred to, the valve-assembly for the gas passage 9 being represented at 12 and, by way of example and as shown, being of the construction described in U. S. Letters Patent No. 2,286,695 granted to me June 16, 1942.

The valve-assembly shown comprises a bushing or housing 13 which fits in an opening 14 in the cylinder block in alignment with the valve seat 10. The bushing 13 has a peripheral groove 15 to receive a stirrup bracket (not shown) which flatwise abuts the portion 16 of the wall of the recess 11 which surrounds the opening 14, to prevent accidental outward displacement of the valve-assembly in the operation of the engine. Reciprocable in the bushing 13 is a stem 17 carrying a valve head 18 for cooperation with the valve seat 10, the valve head 18 being pressed against the seat 10 by a coil spring 19 surrounding the stem 17 and interposed between a shoulder 20 on the bushing 13 and an abutment 21 on the lower end of the stem 17.

The stem 17 is in alignment with a plunger 22 reciprocable in an opening 23 in the cylinder block and against which the stem 17 constantly bears under the action of the spring 19, the plunger 22 bearing against cam mechanism carried by the cam shaft illustrated at 24.

It may here be stated that in accordance with my invention it is intended the dislodging device hereinafter described, be applied to operative position between the inner end of the valve-assembly (more specifically the inner end of the valve stem 17) and the plunger 22 and operated to exert outward force on the valve-assembly to dislodge it from the opening 14.

Referring now to the particular illustrated construction of my dislodging device, it comprises a main member 25, an auxiliary member 26, pivotally connected at 27 to the lower end of the main member 25, a member 28 movable on the auxiliary member 26 and means for exerting force to spread the members 26 and 28 apart. The

members 26 and 28 terminate in flatwise opposed portions 29 and 30, respectively, at which the device is adapted to be inserted between the valve stem 17 of the valve-assembly to be dislodged and the plunger 22 cooperating with this valve-assembly, whereupon when force is applied to spread the members 26 and 28 apart, the valve-assembly will be forced to dislodged position from the opening 14.

The means shown for actuating the member 28 relative to the auxiliary member 26 are of the hydraulic type, the member 25 being formed of a tubular section 31 screwed on the upper end of a bar section 32. Within the tubular member 31 and concentric therewith, is a tubular section 33 of much smaller diameter than the tubular section 31 and forming therewith an oil storage chamber 34. The tubular section 33 which forms a pump cylinder and is rotatably adjustable for a purpose hereinafter described, bears at its lower end at which it is circumferentially spaced from the section 31, against the annular flange 35 of the casing 36 of a downwardly opening check valve device screwed into the upper end of the bar member 32 to be unitary therewith.

The top of the chamber 34 is closed by a cover member 37 shown as fastened to the section 31 by screws 38, 39 and 40, the tubular section 33 extending upwardly through the cover member 37 and having its upper end of reduced diameter affording an annular shoulder 41 against which the cover member 37 bears. Leakage along the tubular section 33 is prevented by a packing gland 42 on the cover member 37.

These hydraulic means also comprise a pumping piston 43 reciprocable in the cylinder 33 and operable by means of a lever 44 pivotally connected at 45 between its ends to the upper end of the pumping piston 43 and fulcrumed on a sliding fulcrum 46, to the upper end of a post 47 rising from, and rigidly connected with, the member 31.

The valve device controlling the inflow of oil from the chamber 34 to the cylinder 33 and in the form of an inwardly opening check valve device is represented at 48 and the valve device which controls the discharge of oil from the cylinder 33 and which is an outwardly opening check valve device, is the valve device hereinbefore referred to, the casing of which is represented at 36.

The valve device 48 comprises a casing 49 screwed into an opening 50 in the side wall of the cylinder 33 and opening at one end into the interior of this cylinder and at its other end, through a port 51, into the storage chamber 34, and a spring-pressed ball check valve 52 controlling the inlet 51 from the chamber 34.

The valve device for controlling the discharge from the cylinder 33 comprises, in addition to the parts above described, a downwardly opening spring-pressed ball check 53 which controls the inlet 54 of the casing 36.

The side wall of the casing 36 has a port 55 which is closed by the tubular member 33 except when the latter is rotated to a predetermined position in which a port 56 in the side wall of the tubular member 33 registers with the port 55. A stop finger 57 on a ring 58 rigid with the tubular member 33 and cooperating with the screws 39 and 40, determines the selective positioning of the tubular member for registry or non-registry of the port 56 with the port 55.

The lower open end of the valve casing 36 opens into a passage 59 in the member 32 communicating with the interior of a nipple 60 screwed into a socket 61 in the member 32 and connected with one end of a flexible tube 62, the other end of which connects with a socket 63 in a nipple 64 having a threaded portion 65 between its ends at which the nipple is screwed into an opening 66 in a lug 67 on the member 26 and located between a pair of lugs 68 provided on the lower end of the member 32; the ends 69 and 70 of the nipple 64 being journaled in openings 71 and 72 in these lugs, the structure thus providing a desirable pivotal connection between the members 25 and 26.

The socket 63 of the nipple 64 communicates at a port 73 in its side wall with a passage 74 in the member 26 which opens into the bottom of a cylinder 75 provided by the member 26 and in which a piston 76 forming a part of the member 28 is slidable, a spring 77 connected with the members 26 and 28 yieldingly urging the member 28 toward the member 26 to the position shown in Fig. 1 and by full lines in Fig. 4.

As will be understood, each upstroke of the piston 43 causes oil to be drawn from the chamber 34 into the cylinder 33 (the outlet check valve 53 remaining closed) and each downstroke of the piston 43, assuming the tubular member 33 to be in the rotatably adjusted position shown in Figs. 4 and 6 (in which position the ports 55 and 56 are out of registration) causes the charge sucked into the cylinder 33 through the check valve 48, to be forced into the cylinder 75, exerting lift on the piston 76 therein.

A description of a manner of using the device is as follows:

When it is desired to dislodge a valve-assembly, the operator, upon removing the cover plate from the cylinder block and removing the stirrup bracket above referred to from the groove 15, pries the valve head and stem assembly to the position shown in Fig. 1, as for example by means of a screw driver inserted between the valve head 18 and the valve seat 10. The operator inserts the dislodging device, through the opening 11, in the top of the cylinder block and positions it at its portions 29 and 30 in the space between the inner end of the valve stem 17 and the plunger 22 as shown in Fig. 1. The positions of the parts of the device as shown in Fig. 1 in which the portions 29 and 30 flatwise engage each other are those which result from the manipulation of the tubular member 33 from a position in which the stop finger 57 is against the screw 39 (Figs. 4–6) and the ports 55 and 56 are out of registration, to a position in which the stop finger 57 is against the screw 40 (Figs. 1 and 2) and the ports 55 and 56 are in registration permitting the pumped liquid to flow back to the storage chamber 34 and the member 28 to assume its lowermost position (Fig. 1 and the full line position of Fig. 4) which is the desired conditioning of the device after each dislodging operation.

Upon positioning the device between the valve-assembly 12 and the plunger 22 as stated, the operator rotates the tubular section 33 counter-clockwise in Fig. 5 to the position therein shown in which the stop finger 57 engages the screw 39, thus closing the port 56 to the port 55. Then by successive operations of the piston 43 oil is forced from the storage chamber 34 into the cylinder 75 to force the piston 76 upwardly and dislodge the valve-assembly.

As will be understood if the force required to

be exerted against the valve-assembly to dislodge it is greater than that required to force the spring 19 to bottomed condition, continued pumping of the oil will eventually bottom the spring and exert the necessary force to dislodge the valve-assembly.

One of the highly desirable features of the device is the application of the dislodging force to the valve-assembly along such a path that forces tending to bend a part or parts of the valve-assembling is avoided.

The feature of providing for the pivoting of the member 26 on the member 25 is also of advantage as it permits the use of the device with engines requiring for the introduction of the device into the engine block to the desired position, different angular relationships of the members 25 and 26 to each other.

While I have illustrated and described a particular embodiment of my invention, I do not wish to be understood as intending to limit it thereto as the same may be variously modified and altered and the invention embodied in other forms of structure without departing from the spirit of the invention.

What I claim as new, and desire to secure by Letters Patent, is:

1. A device for loosening and removing a valve guide of a valve assembly from its position in an internal combustion engine, by pressure applied to the end of the valve stem of said assembly, comprising, pressure applying shoes adapted for insertion in a position between the lower end of the valve stem and a relatively stationary part of the engine, one of said shoes being constructed for engagement with said relatively stationary part and the other thereof having a plate portion for engagement under the end of the valve stem, means mounting said shoes for relative straight-line movement for exerting force on the end of the valve stem for forcing the assembly outwardly, and hydraulic means for causing said relative movement.

2. The combination of claim 1 wherein the hydraulic means comprises a piston and cylinder, and wherein the shoes are carried by the wall of the cylinder and the head of the piston respectively and the connection of the shoes to said portions includes side brace plates, the brace plates of one shoe nesting within the plates of the other shoe to provide guides against relative rotation of the piston and cylinder.

3. The combination of claim 1 wherein the hydraulic means comprises a piston and a cylinder, the latter formed with an auxiliary member rigid therewith and a pressure accumulating pump formed with a bar section projecting rigidly therefrom and pivotally connected to said auxiliary member.

ASA J. TAYLOR.