

T. O'BRIEN.  
VALVE GEAR.

APPLICATION FILED FEB. 24, 1908.

Patented Sept. 21, 1909.

2 SHEETS—SHEET 1.

934,750.

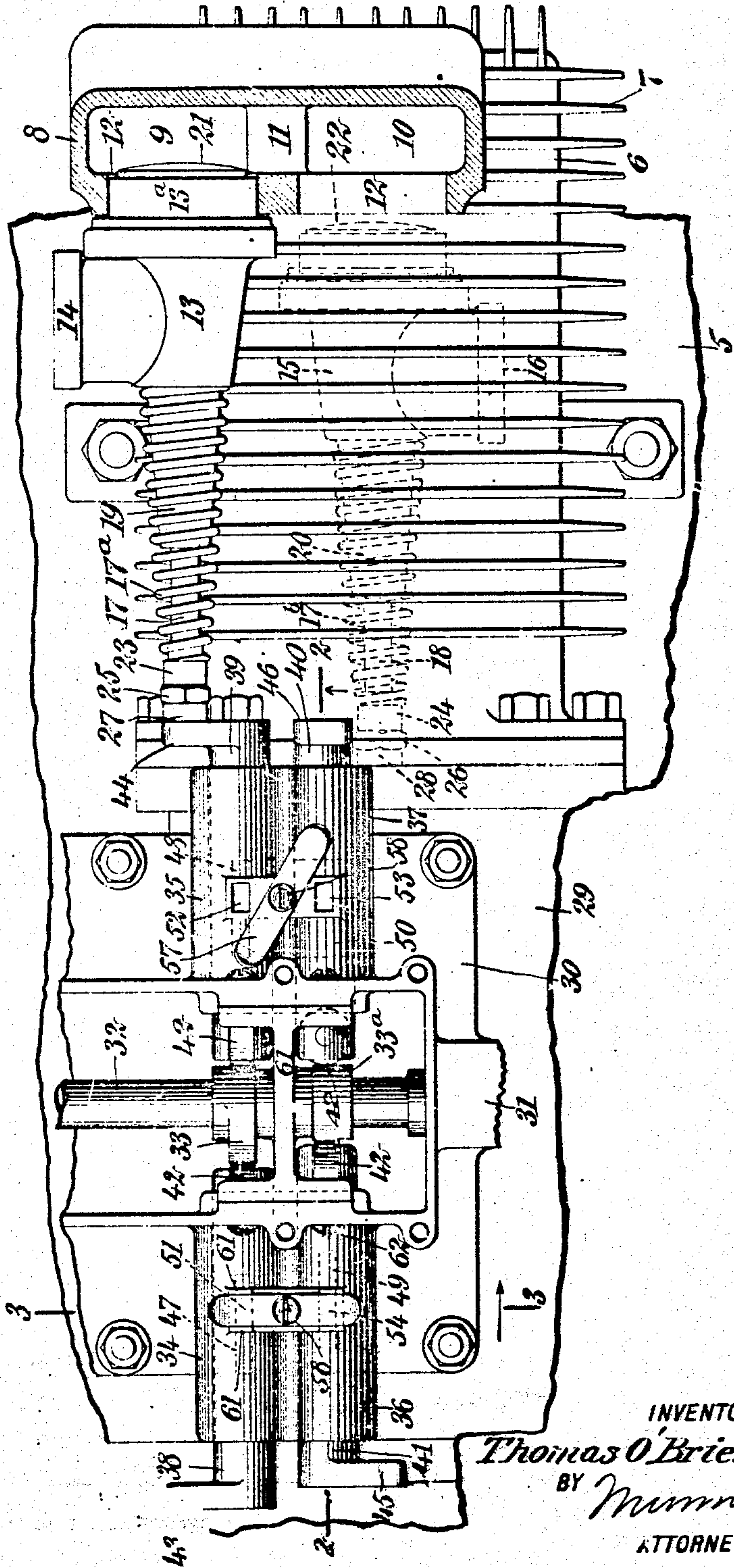


Fig. 1

WITNESSES

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*Walter Harrison*

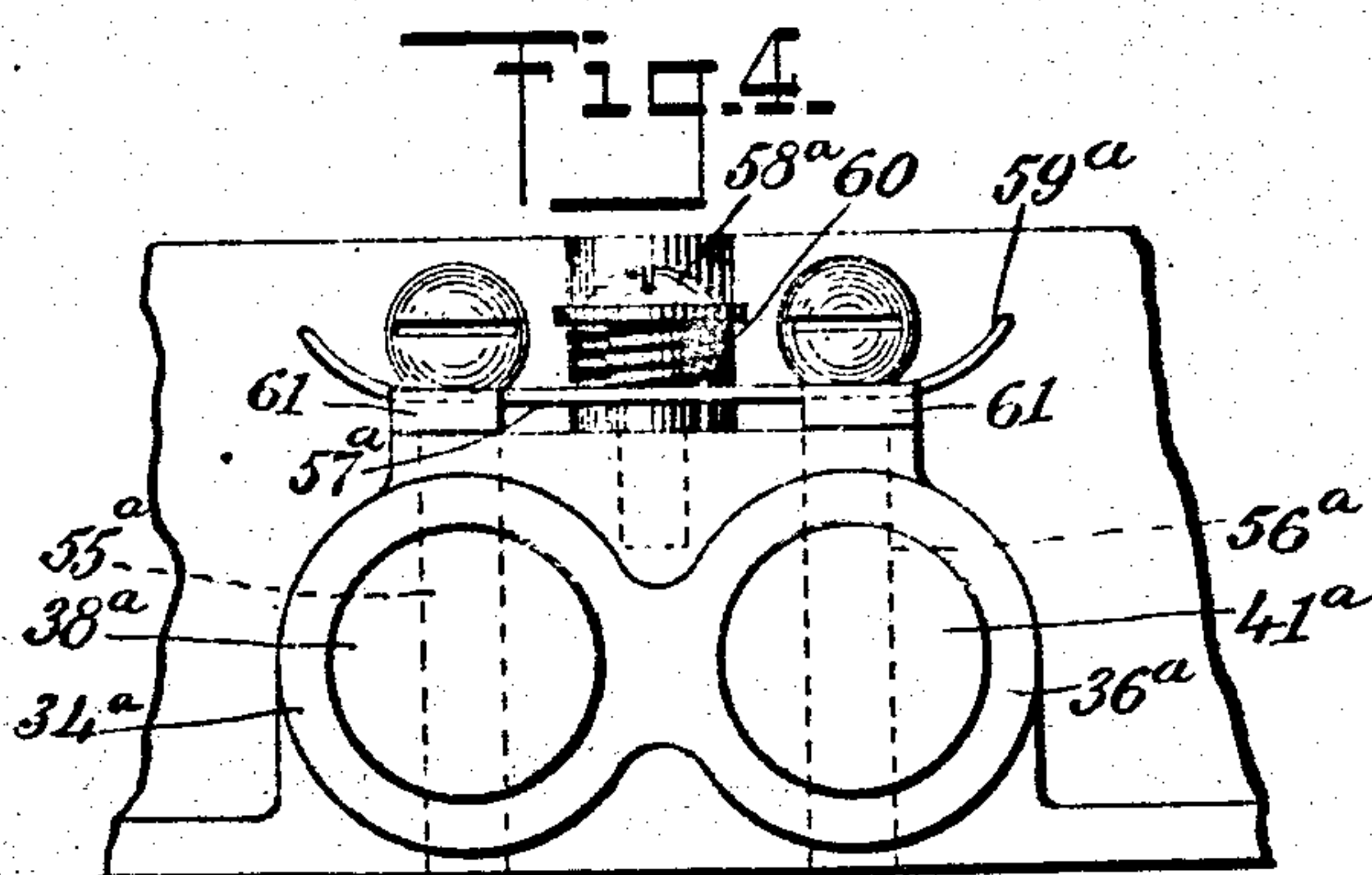
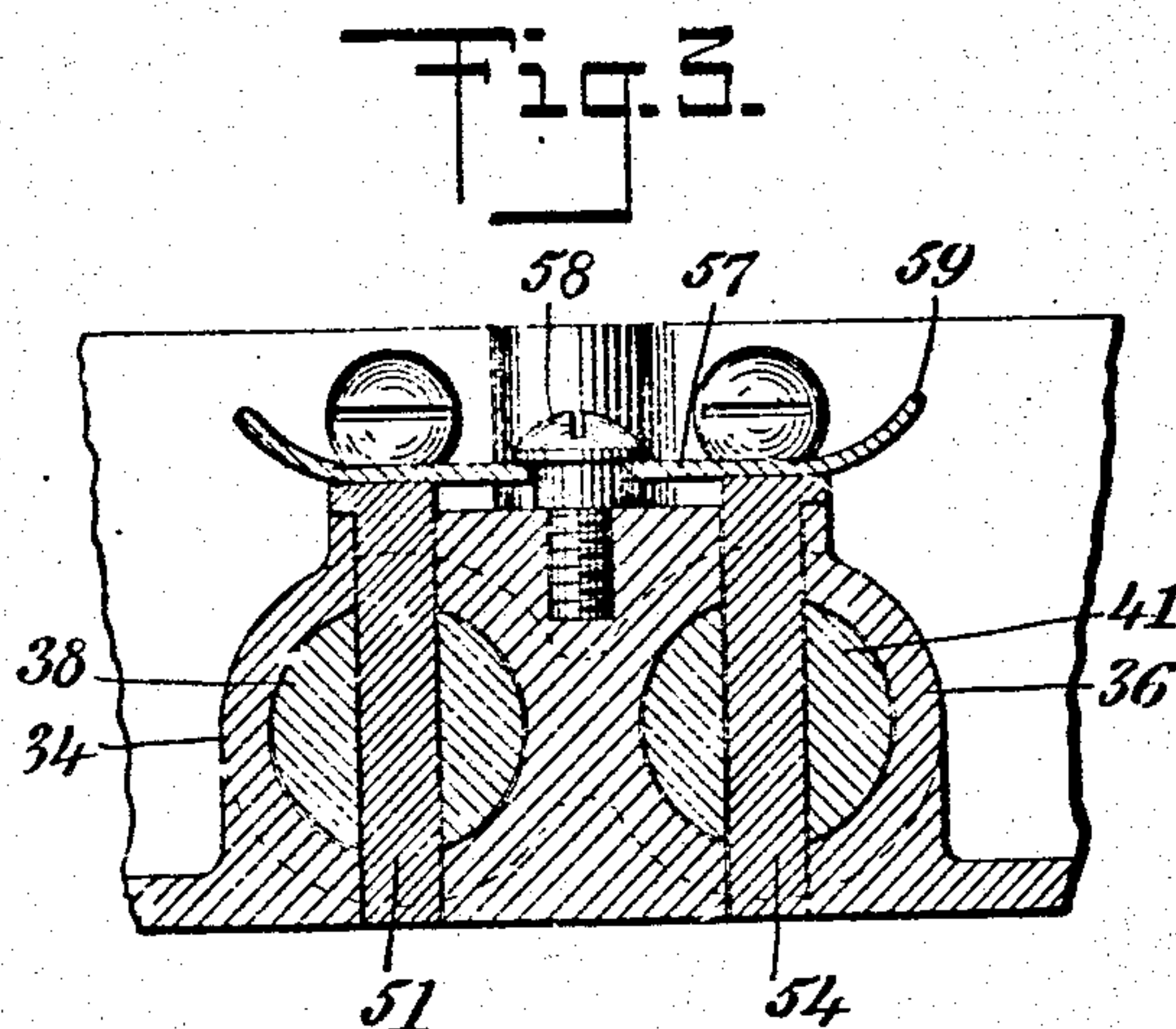
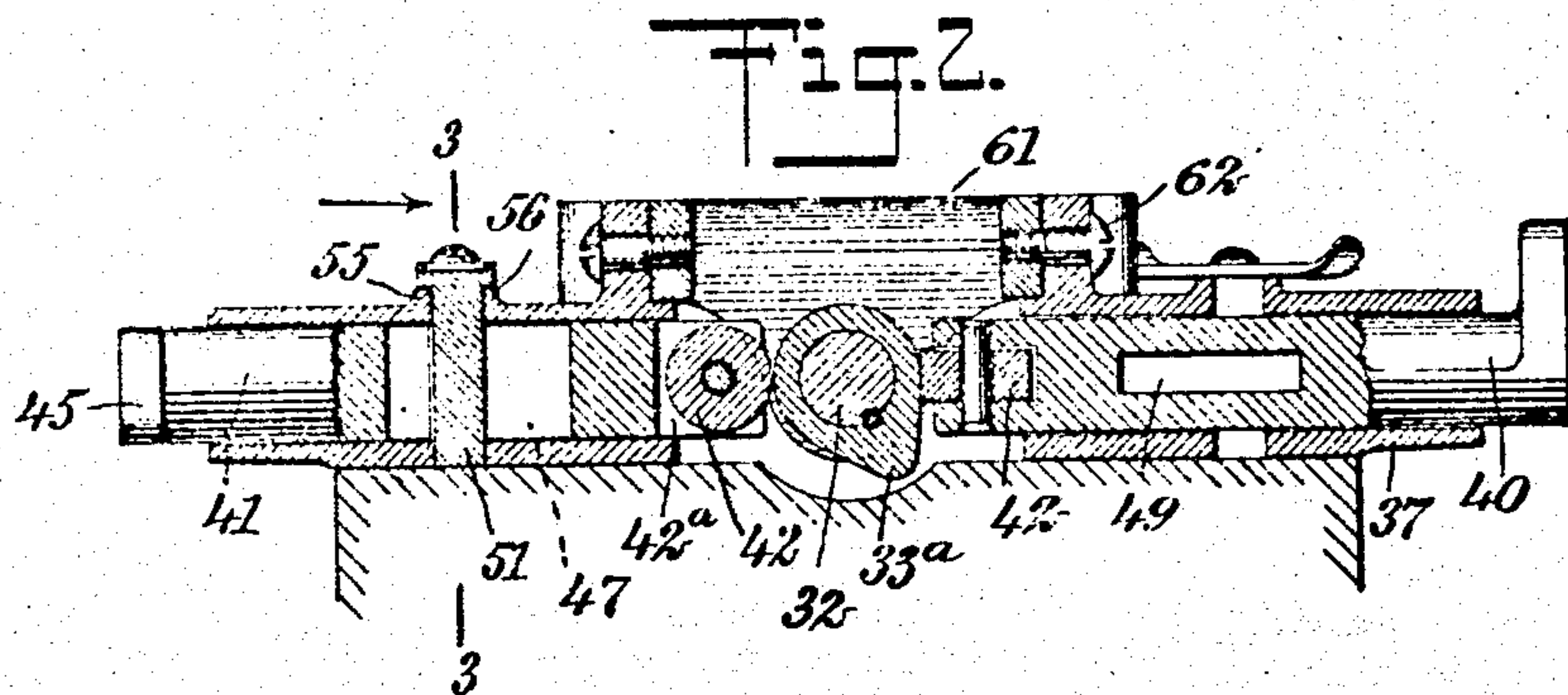
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# UNITED STATES PATENT OFFICE.

THOMAS O'BRIEN, OF NEW YORK, N. Y.

## VALVE-GEAR.

934,750.

Specification of Letters Patent. Patented Sept. 21, 1909.

Application filed February 24, 1908. Serial No. 417,362.

*To all whom it may concern:*

Be it known that I, THOMAS O'BRIEN, a citizen of the United States, and a resident of the city of New York, borough of the Bronx, in the county and State of New York, have invented a new and Improved Valve-Gear, of which the following is a full, clear, and exact description.

My invention relates to internal combustion engines, my more particular object being to provide a valve gear so constructed as to readily permit the removal and replacement of certain valves and their fittings.

More particularly stated my invention comprises a construction whereby certain movable valves actuated periodically by push rods are readily disconnected from the latter and from their housings, and thus removed from the engine and easily replaced within the engine by reversing the steps necessary to remove them.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a fragmentary plan of a gas engine equipped with my invention, this view showing in full lines the normal position of one of the push rods and of the valve which it controls, and in dotted lines showing how the removal of a valve and its fittings is readily accomplished, and to this end showing how the push rod is turned out of engagement with the valve; Fig. 2 is a vertical section upon the line 2-2 of Fig. 1, looking in the direction of the arrow, and showing one of the push rods as released from certain locking mechanism normally holding it, the push rod being in this view turned into an abnormal position in order to disengage it from the valve; Fig. 3 is an enlarged cross section upon the lines 3-3 of Figs. 1 and 2, looking in the direction of the arrows, and showing how the keys extend through slots in the push rods, thereby preventing the latter from turning under ordinary conditions to prevent their partial rotation upon removal of the keys, this view showing one form of spring lock for holding the keys in their normal positions; and Fig. 4 is a fragmentary side elevation showing a slightly modified form of locking device for holding the keys in their normal positions, the view showing other-

wise substantially the same parts as indicated in Fig. 3.

Mounted upon an engine frame 5 is a cylinder 6 provided with ribs 7 for the purpose of radiating heat in the usual manner. Connected with the cylinder 6 is a chest 8 provided with passages 9, 10, separated by a partition 11. At 12 are openings merging into the passages 9, 10. A valve casing is shown at 13 and is provided with a portion 13<sup>a</sup> fitting into one of the openings 12. The valve casing 13 is provided with a portion 14 serving as an inlet pipe.

Another valve casing is indicated by dotted lines at 15 and is provided with a portion 16 serving as an outlet pipe. Valve stems 17, 18 extend into the casings 13, 15, the latter being provided with necks 19, 20, for this purpose. The valves 17 and 18 are provided with valve members 21, 22, which move relatively to the chest 8 so as to open and close the openings 12. A spiral spring 17<sup>a</sup> encircles the valve stem 17 and the neck 19, and a similar spiral spring 17<sup>b</sup> encircles the stem 18 and neck 20. These spiral springs abut at their smaller ends against collars 23, 24 secured in position by nuts 25, 26, the latter being held in position by cushion nuts 27, 28, which also serve the purpose of holding the nuts 25, 26 firmly in position.

Mounted upon a framework 29 is a plate 30 provided with a bearing 31 in which is journaled a revoluble shaft 32. This shaft is provided with cams 33, 33<sup>a</sup>, staggered relatively to each other. Tubular casings 34, 35, 36, 37 are fashioned as bearings and mounted within them are push rods 38, 39, 40, 41. The push rods are adapted to turn and also to slide longitudinally within these bearings. The push rods 38, 39, 40, 41 are severally provided with rollers 42 adapted to be engaged by the cams 33, 33<sup>a</sup> for the purpose of actuating the push rods with a minimum of friction. The cams merely press the push rods away, the action of the springs 17<sup>a</sup>, 17<sup>b</sup> being relied upon to retract them after each outward movement by the cams. Each roller 42 is journaled within a slot 42<sup>a</sup>. The push rods 38, 39, 40, 41 are provided with presser feet 43, 44, 45, 46 integral therewith and so arranged as to engage the cushion nuts 27 when the parts are in normal position.

The push rods are provided with slots 47, 110



48, 49, 50 disposed diametrically, as will be understood from Fig. 2. Keys 51, 52, 53, 54 extend through the slots 47, 48, 49, 50 and are removable. When these keys are in position, the presser feet extend horizontally, but when the keys are removed, the presser feet may be turned vertically, as will be understood from Fig. 1. Lugs 55, 56 (see Fig. 2) support the keys in such position that the latter may be readily grasped and removed. Leaf springs 57 are revolvably mounted upon screw bolts 58 and are provided with upturned ends 59. By grasping these ends the springs 57 may be turned. Normally the springs press upon the keys, but upon being turned this pressure is released and the keys are uncovered.

In the form shown in Fig. 4 the push rods 38<sup>a</sup>, 41<sup>a</sup> are encircled by casings 34<sup>a</sup>, 36<sup>a</sup>, serving as bearings, and keys 55<sup>a</sup>, 56<sup>a</sup> extend through the push rods, substantially as above described with reference to the other views. In this instance, however, the leaf spring 57<sup>a</sup> having upturned ends 59<sup>a</sup> is not pressed upon directly by the bolt 58<sup>a</sup>, a spiral spring 60 being disposed intermediate these parts. By turning the screw bolt 58<sup>a</sup> when the parts are first placed in position, the spiral spring 60 presses upon the leaf spring 57<sup>a</sup>. The spring 57 or 57<sup>a</sup> is held in position transversely of the casings 34, 35, 36 and 37 by lugs 61 (see Fig. 1).

The operation of my device is as follows: The keys 51, 52, 53, 54 being in position and held fixedly by pressure of the leaf spring 57 (or 57<sup>a</sup>) and, the shaft 32 being rotated, the cams 33, 33<sup>a</sup> press against the rollers 42, thereby causing the push rods 38, 39, 40, 41 to travel each in the longitudinal direction of its own axis so as to actuate this particular valve. When the parts are in normal position, therefore, the action of the engine is not greatly different from what it has been heretofore. Suppose, now, that the operator desires to remove the valve casing 13, together with all parts accompanying it. He turns the spring 57 into the position indicated at the center in Fig. 1 and removes the two keys previously held down by this spring. This leaves the presser feet 44, 46 free to turn, and the operator, by turning

either of them, can disengage it from its valve mechanism. Then by taking hold of the valve casing 13 (or 15) he can remove the valve together with its appurtenances. To replace these parts he merely places the casing back in position, turns the presser foot to a right angle, replaces the key and turns the spring 57 back into its normal position.

In the construction shown in Fig. 4, the action differs slightly from that just described. In this instance the spiral spring 60 normally presses the spring 57<sup>a</sup> into its fixed position, and when the spring 57<sup>a</sup> is lifted slightly, in order to turn it, the spiral spring 60 is compressed.

In each form of my device the rollers carried by the push rods are brought into and out of proper working relation to the cam by merely turning the push rods upon their respective axes.

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

The combination of a cam, a roller disposed adjacent to said cam and adapted to be engaged thereby, a push rod provided with a slot and supporting said roller being disposed adjacent to said cam and supporting said push rod so that the latter may turn upon an axis extending in the general direction of the length of said push rod, said roller being adapted to turn upon an axis crossing the general direction of the axis of said push rod, the rotation of said push rod bringing said roller into and out of proper working relation to said cam, a casing provided with a tubular portion encircling said push rod and further provided with a key-way adapted to register with said slot in said push rod, a key for extending through said key-way and through said slot, and spring mechanism for normally holding said key in said key-way and said slot.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

THOMAS O'BRIEN.

Witnesses:

WALTON HARRISON,  
EVERARD B. MARSHALL.