W. A. H. HOERSTING.

ENGINE VALVE.

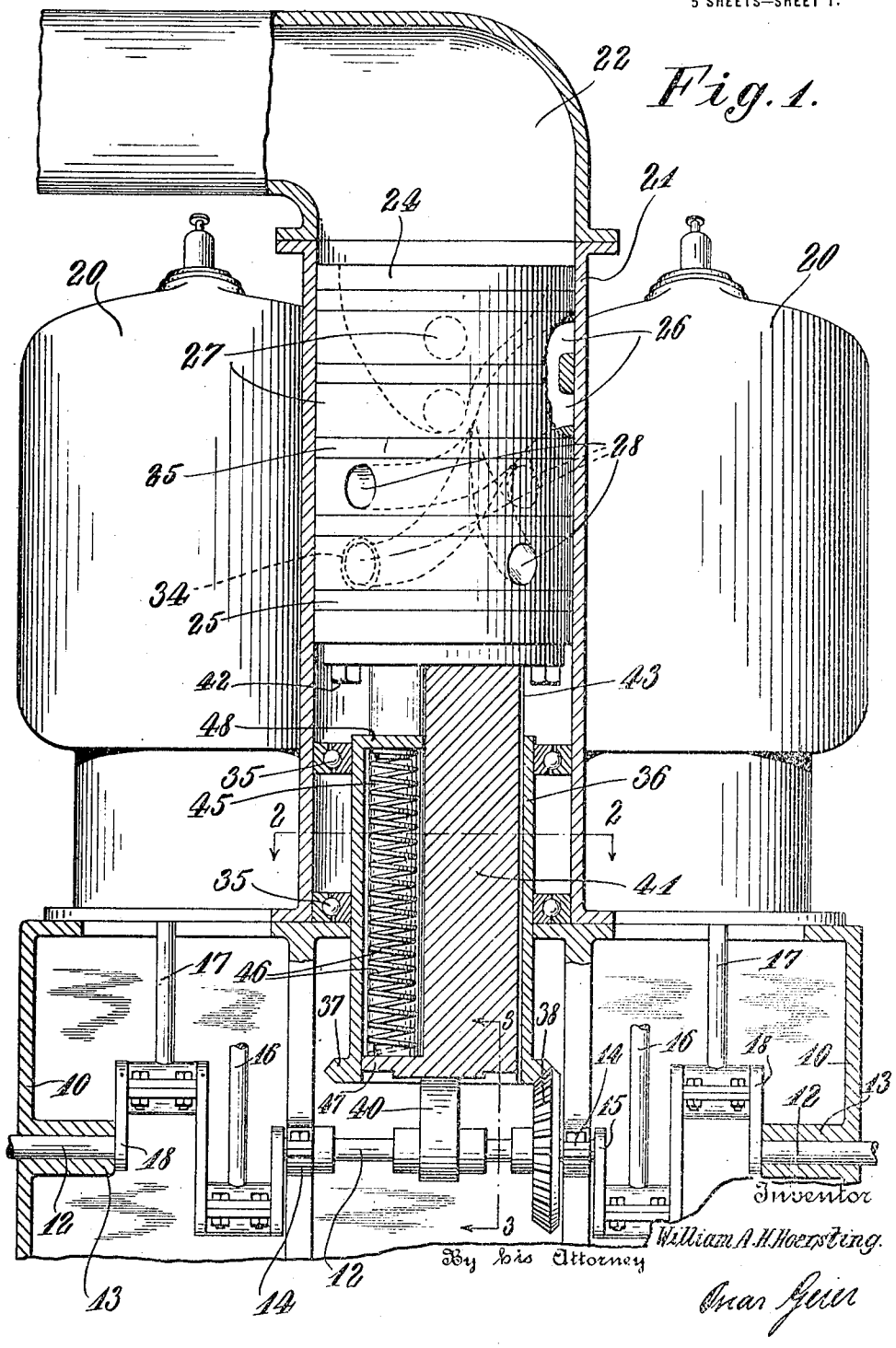
APPLICATION FILED AUG. 22, 1917.

1,286,000.

Patented Nov. 26, 1918.

5 SHEETS—SHEET 1.

Fig. 1.



Inventor

William A. H. Hoersting.

By his Attorney

Oscar Geier

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Fig. 4.

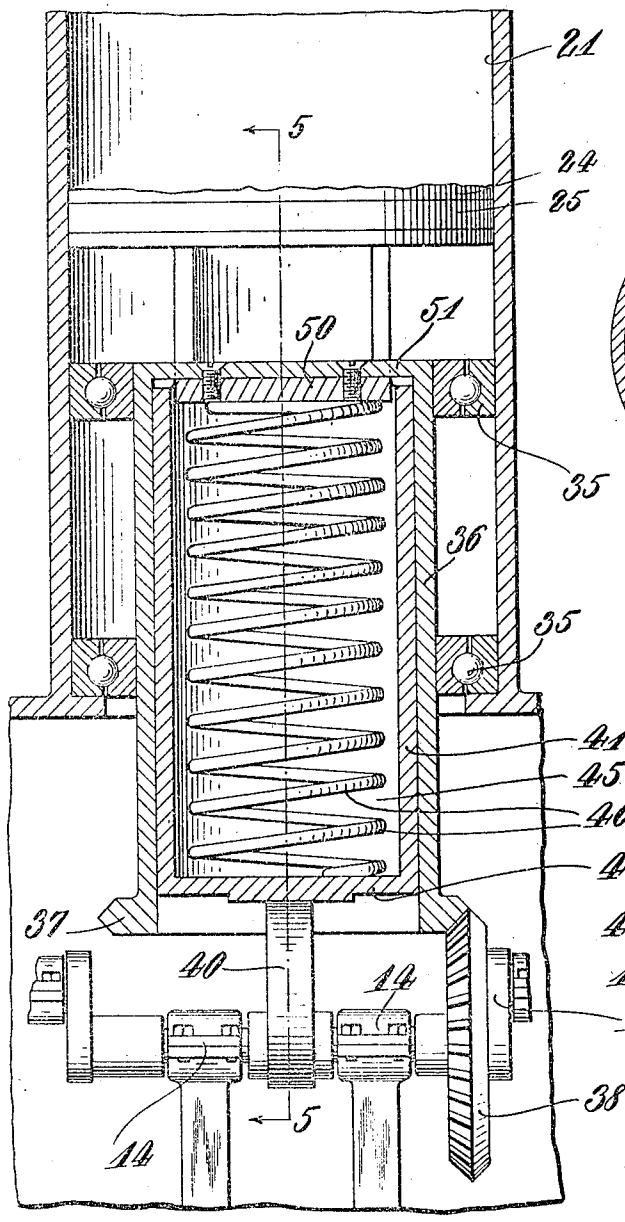

Fig. 2.

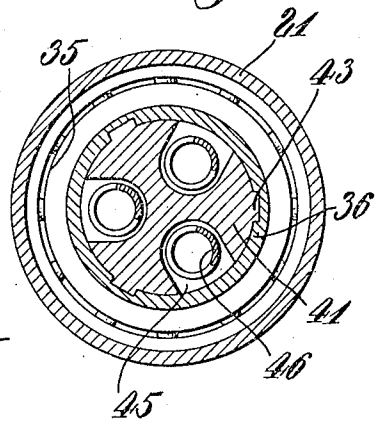

Fig. 3.

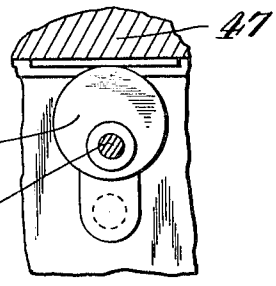

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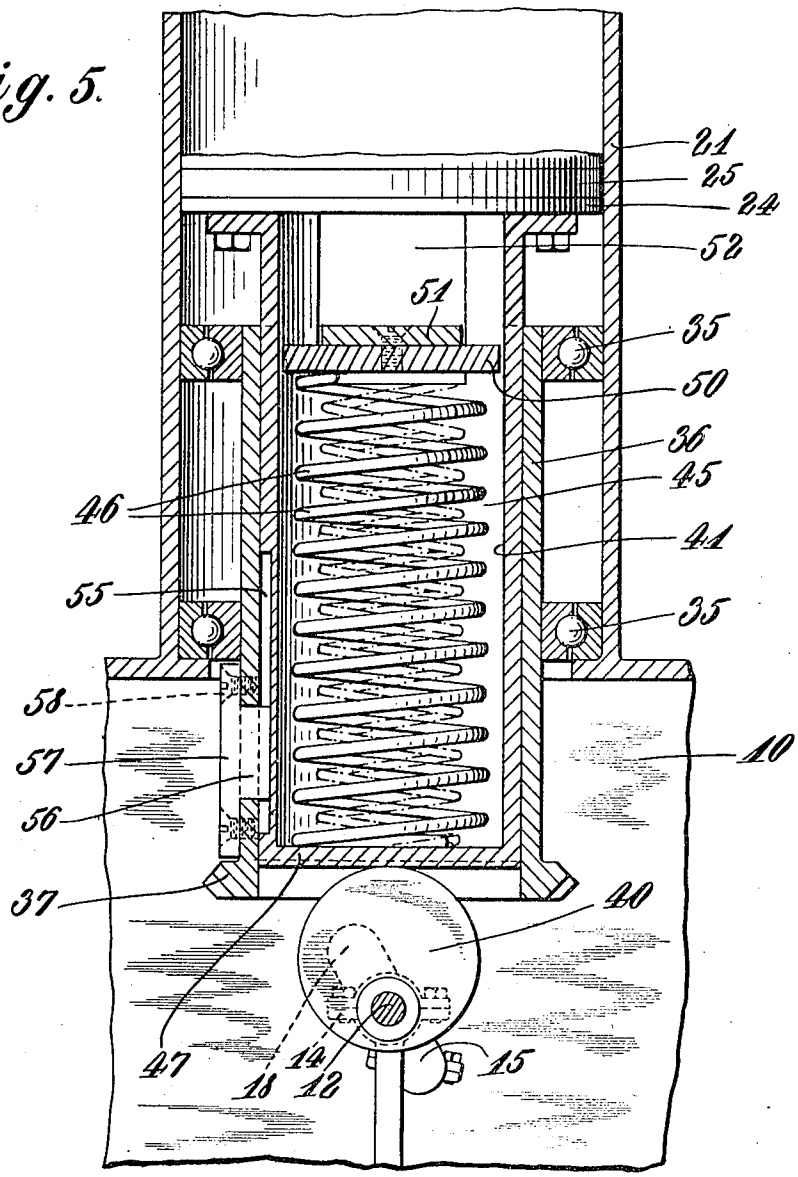
Fig. 5.



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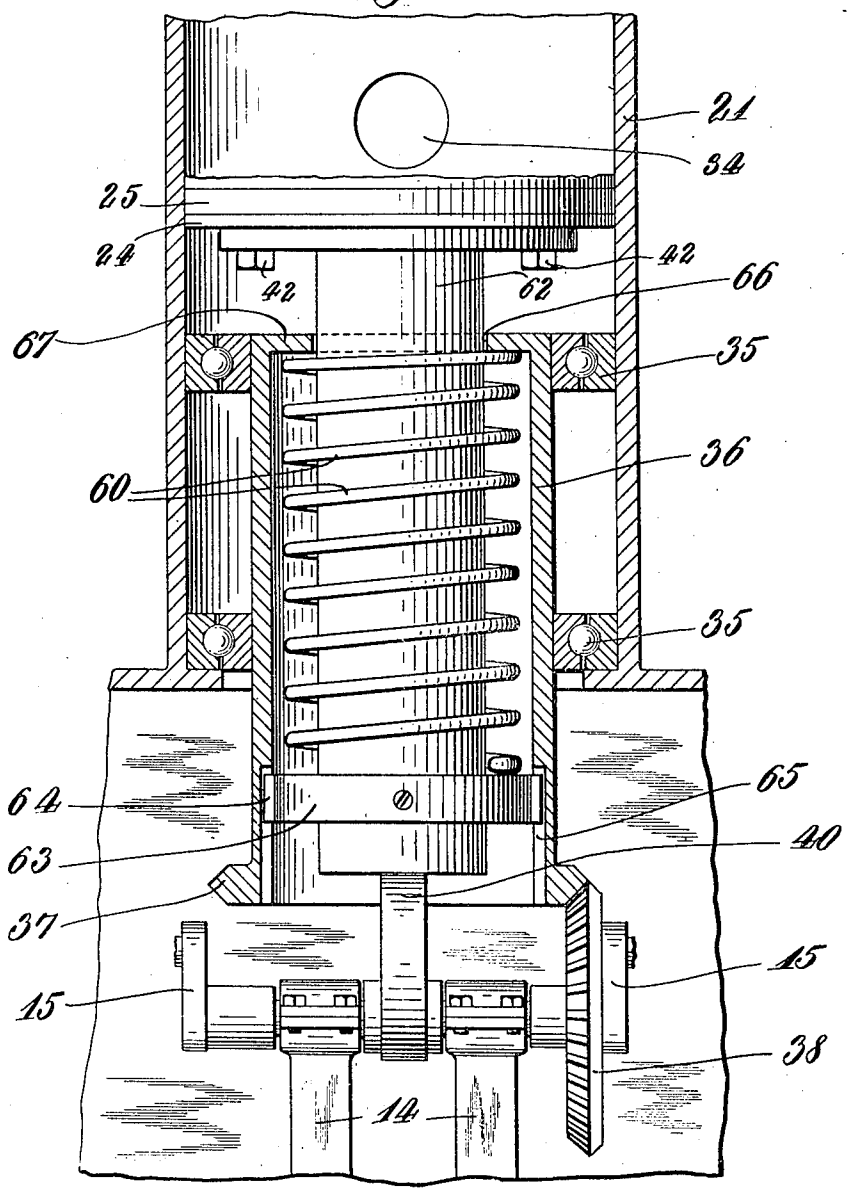
5 SHEETS—SHEET 4.

Fig. 6.



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5 SHEETS—SHEET 5.

Fig. 8.

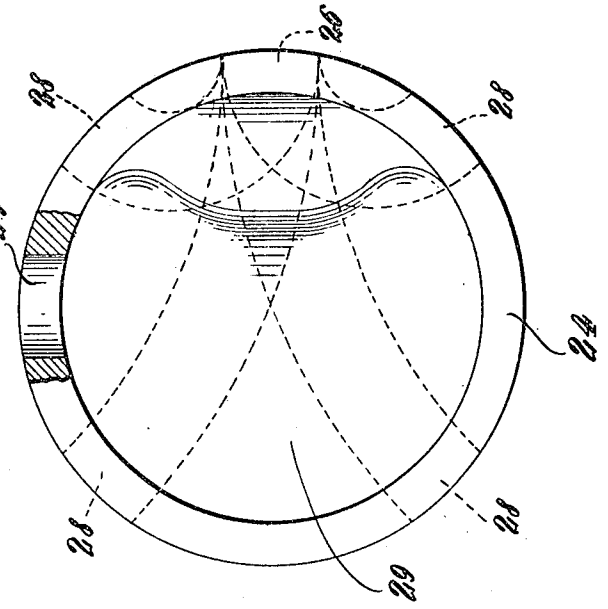
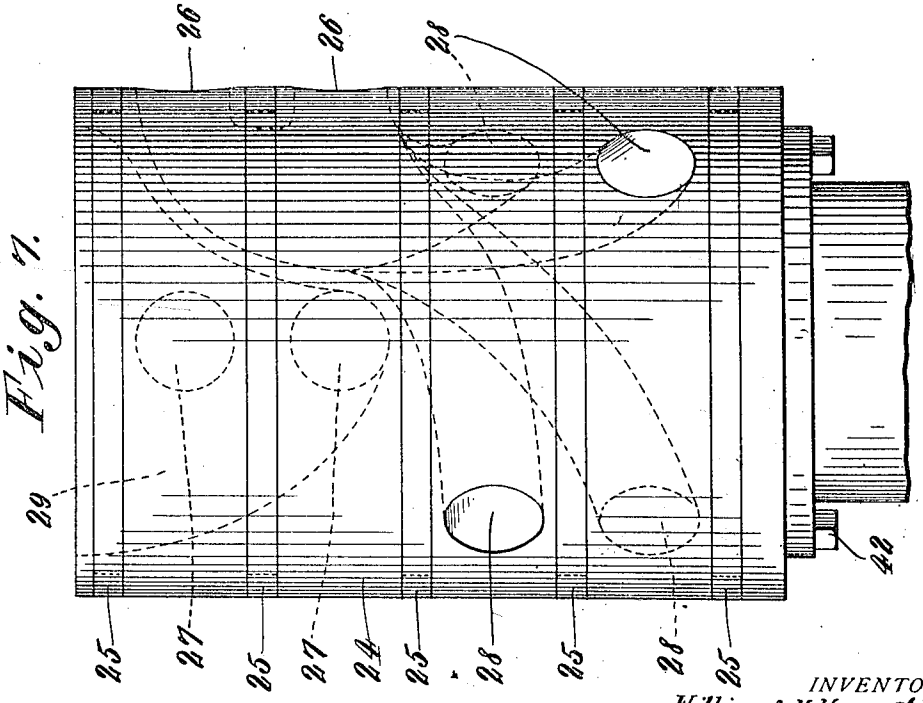


Fig. 7.



INVENTOR.
William A. H. Hoersting
BY Oscar Guth
HIS ATTORNEY

UNITED STATES PATENT OFFICE.

WILLIAM A. H. HOERSTING, OF NEW YORK, N. Y.

ENGINE-VALVE.

1,286,000. Specification of Letters Patent. Patented Nov. 26, 1918.

Application filed August 22, 1917. Serial No. 187,625.

To all whom it may concern:

Be it known that I, WILLIAM A. H. HOERSTING, a subject of the Emperor of Germany, resident of New York, county of New York, and State of New York, have invented certain new and useful Improvements in Engine-Valves, of which the following is a specification.

This invention relates to improvements in engine valves, and particularly those adapted to use with explosive gas mixtures, and has as its principal object the provision of a novel form of valve, the same being arranged to both rotate and slide reciprocatively the invention being an improvement on a co-pending application, filed June 7, 1916, (Serial No. 102,350).

A further object is to provide a device by means of which the operating valve is actuated by a cam or eccentric on the crank shaft of the engine without shock, jar or vibration, the action being cushioned so as to avoid abruptness.

A still further object is to simplify the construction and dispense with the well known disadvantages of a crank action.

These and other like objects are attained by the novel construction and combination of parts hereafter described and shown in the accompanying drawings, forming a material part of this disclosure, and in which—

Figure 1 is a partial side elevational and sectional view showing an engine having a valve made in accordance with the invention.

Fig. 2 is a transverse sectional view taken on line 2—2 of Fig. 1.

Fig. 3 is a fragmental sectional view taken on line 3—3 of Fig. 1.

Fig. 4 is a partial vertical sectional view taken through the center line of the valve, on the axis of the crank shaft.

Fig. 5 is a similar sectional view taken in another plane, substantially on line 5—5 of Fig. 4.

Fig. 6 is another sectional view similar to Fig. 4 but showing a modified form of the valve cushion arrangement.

Fig. 7 is an enlarged side elevational view showing a preferred form of piston valve, and Fig. 8 is a top plan view of the same shown partially broken away.

In Fig. 1 a four cylinder engine is shown, comprising a casing 10, in which is mounted a shaft 12, in bearings 13 at the end of the casing, other bearings 14 being closely adjacent to the crank elements 15, which are connected by piston rods 16, with pistons in one pair of the cylinders, other piston rods 17 extending from the outer cranks 18 to pistons in the cylinders 20, while centrally between the grouped cylinders is a valve casing 21, from which leads the exhaust tube 22.

A piston valve 24 is fitted to the bore of the valve casing and provided with packing rings 25 in the usual manner, the valve being adapted to deliver an explosive gaseous compound to the cylinders through the port openings 26 and to receive the exhaust therefrom through the port openings 27, communicating with a chamber 29 formed in the valve and which is open to the atmosphere through the exhaust tube 22, the charge being received into the valve through the ports 28 arranged in opposite sides and in different planes, from the inlet 34 formed through the casing 21.

In the lower part of the casing 21 are secured two annular bearings 35, in which is rotatably engaged a sleeve 36 having at its lower end a bevel gear 37, driven by a mating pinion 38, affixed within the bearings 14 to the shaft 12, so that the sleeve 36 is caused to be rotated at a definite speed relative to the shaft.

An eccentric 40 is secured to the shaft 12, the same being in peripheral contact with the end of a cylindrical plug 41, secured by screws to the ring 32, and is provided with keys 43, engaging within slots formed in the sleeve 36, so that as the plug is rotated it is also moved longitudinally with respect to the sleeve.

Formed in the plug 41 are one or more longitudinal recesses 45, adapted to contain the helical springs 46, the same abutting against the bottom 47, of the plug at their lower ends, while the upper ends of the springs press against the flange 48, formed at the upper end of the sleeve 36 as shown in Fig. 1, or making indirect contact therewith as shown in Figs. 4 and 5 through a plate 50, secured to the bridge 51, the same extending transversely across from side to side of the sleeve 36, through openings 52 formed in the plug 41, thereby cushioning the action transmitted to the plug through the eccentric 40, and at the same time maintaining the lower end 47 of the plug in intimate contact with the eccentric at all times

preventing lost motion and obviating the "dead center" effect consequent upon the use of crank connections.

In Fig. 5 a modified form of key device is indicated in which the hollow plug 41 has a key slot 55 formed longitudinally in its periphery, the key 56 passing through an opening in the wall of the sleeve 36 to which the extending elongated shank 57 is secured by screws 58.

In the modified form shown in Fig. 6, a spring 60 encircles a solid plug 62, against which the eccentric 40 operates, and which is provided with a fixed band or ring 63, on which are formed oppositely disposed keys 64, the same engaging with appropriately formed keyways 65, formed in the inner periphery of the sleeve, 36, the spring 60 abutting at one end against the band 63 and against the head 67, formed integrally with the sleeve 36, which is rotatably mounted in the annular bearings 35 as before explained and which is driven in a like manner by gearing at the bottom, the plug 62 extending through the sleeve and gear at the bottom and passing through a central annular opening 66 at the top of the sleeve.

From the foregoing, it will be seen that an essentially practical device has been disclosed for operating the valve in which all lost motion is eliminated, and which is caused to move in a smooth and regular manner.

Having thus describel my invention what I claim as new and desire to secure by Letters Patent is,—

1. In an engine valve, the combination with a cylindrically bored casing and a shaft mounted transversely thereof, a piston valve suited to said casing, a gear engaged at the lower end thereof, a driving gear meshing therewith fixed upon said shaft, a plug extending from said piston valve, means on said shaft adapted to operate said plug, and means adapted to hold said plug in close engagement with said means.

2. In an engine valve, the combination with a cylindrically bored casing and power shaft transversely disposed therebelow, of a piston valve movable in said casing, a plug extending from said valve, a sleeve surrounding said plug, a key engaging between said plug and sleeve, means for rotating said sleeve by said shaft, means on said shaft adapted to make contact with the lower end of said plug, and one or more springs abutting between said sleeve and said plug adapted to keep the latter in constant engagement with said means.

3. In a multiple explosive engine valve, the combination with a cylindrical valve casing between the cylinders, and a shaft rotatably mounted transversely to said casing, of a piston valve movable in said casing, means for the inlet and exhaust from said valve to said cylinders, a plug engaged at the lower end of said piston valve, a sleeve rotatably mounted in said casing and encircling said plug, a gear formed with said sleeve, a pinion on said shaft engaging with said gear by means of which said sleeve is rotated, means on said shaft contactable with said plug, keys engaging between said sleeve and said plug, and one or more springs adapted to exert pressure between said sleeve and said plug whereby the latter is kept in intimate contact with the periphery of said means.

4. In an engine valve, the combination with a cylindrical valve chamber, a rotatable piston mounted therein and means for rotating said piston, of a rotating shaft transversely of said piston, a cam fixed thereon, connections between said piston and said cam whereby said piston is caused to slide in one direction and one or more springs adapted to press said connection against said cam.

5. In an engine valve, the combination with a cylindrical valve chamber and a shaft journaled transversely thereof, of a piston valve movable in said valve chamber, a cylindrical element secured to said valve extending therefrom, a sleeve encircling said element, keys engaging said element and said sleeve, means on said shaft for rotating said sleeve, means on said shaft for moving said cylindrical element longitudinally within said sleeve and one or more springs in said cylindrical element adapted to oppose said longitudinal movement.

In testimony whereof I have affixed my signature.

WILLIAM A. H. HOERSTING.