A. D. GRANT.

ROTARY VALVE MECHANISM FOR ENGINES.

APPLICATION FILED MAY 8, 1917.

1,246,912. Patented Nov. 20, 1917.

3 SHEETS—SHEET 1.

Fig. 2.

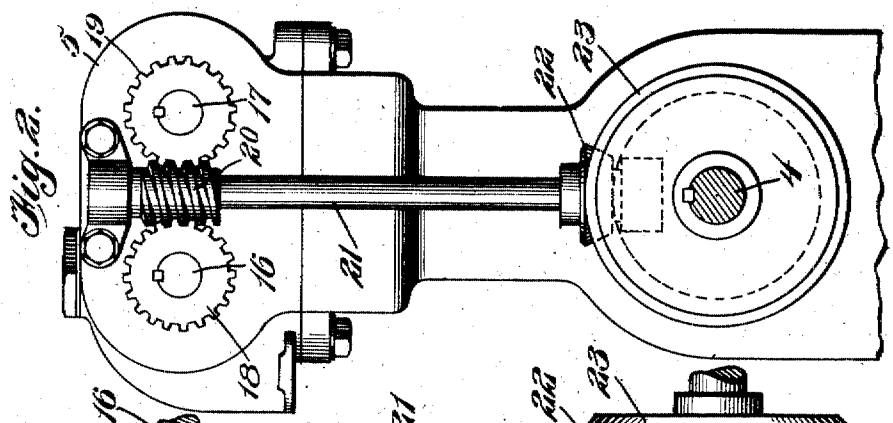
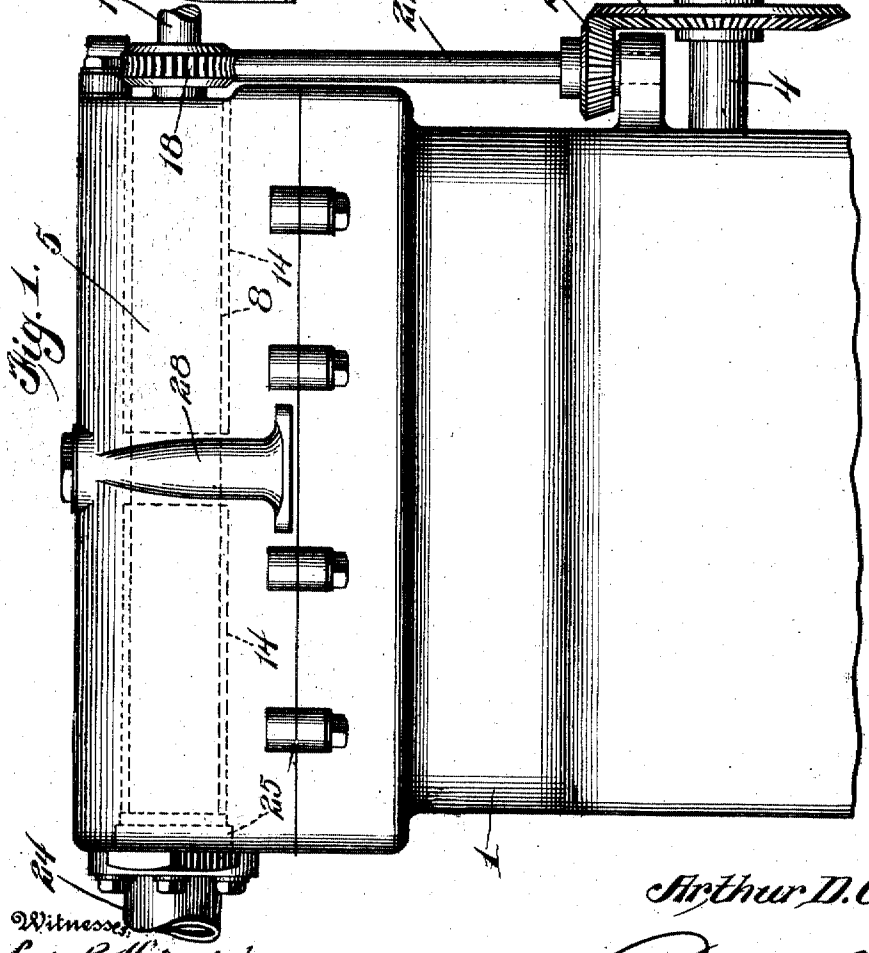


Fig. 1.



Witnesses:
Louis R. Heinrichs
A. A. Hines.

Inventor
Arthur D. Grant
By Pennie & Edmonds
Attorney

A. D. GRANT.

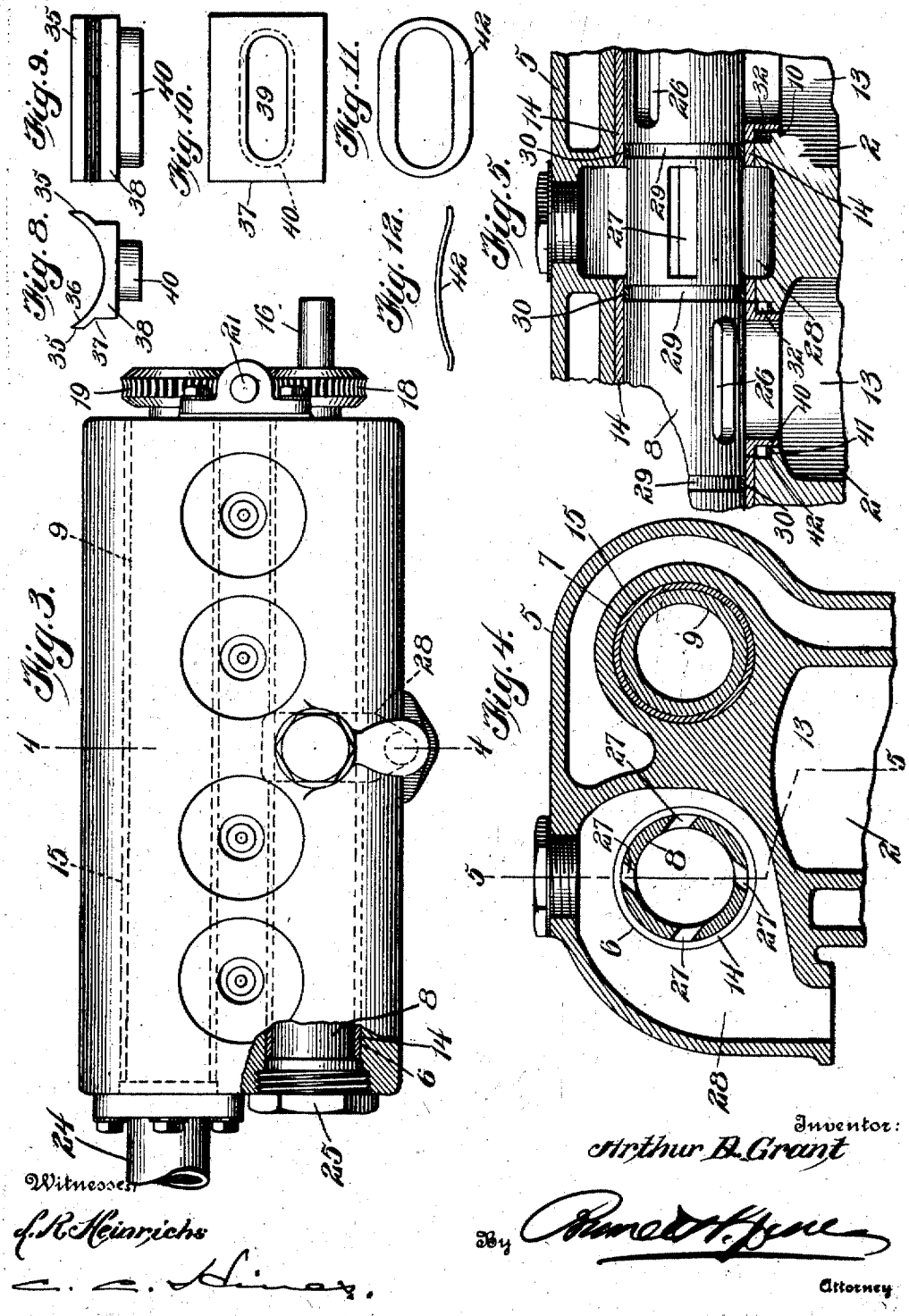
ROTARY VALVE MECHANISM FOR ENGINES.

APPLICATION FILED MAY 8, 1917.

1,246,912.

Patented Nov. 20, 1917.

3 SHEETS—SHEET 2.



Witnesses:

J. R. Heinrichs

C. C. Linz.

Inventor:

Arthur B. Grant

By Munn & Co

Attorney

A. D. GRANT.

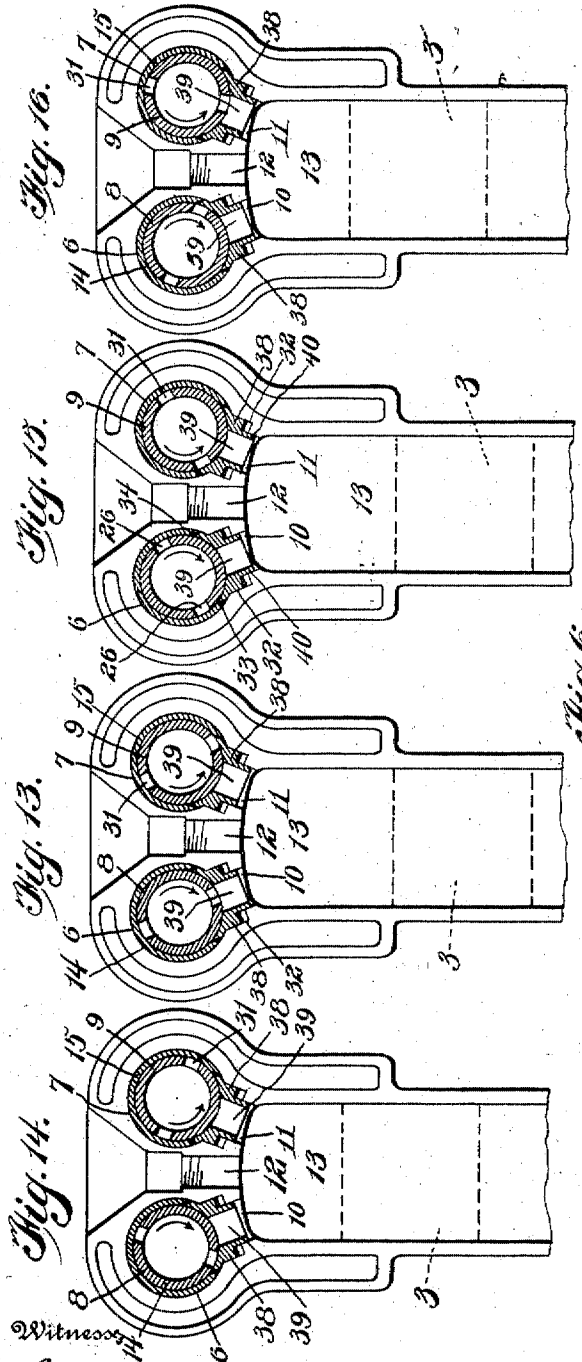
ROTARY VALVE MECHANISM FOR ENGINES.

APPLICATION FILED MAY 8, 1917.

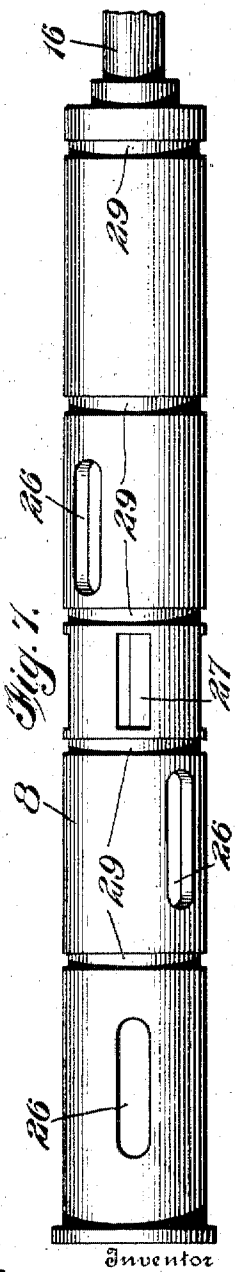
1,246,912.

Patented Nov. 20, 1917.

3 SHEETS—SHEET 3.







Witness:
Louis R. Heinrichs
C. A. Hines.

Inventor
Arthur D. Grant
By Ahmed F. Grant
Attorney

UNITED STATES PATENT OFFICE.

ARTHUR D. GRANT, OF HUDSON, NEW YORK

ROTARY VALVE MECHANISM FOR ENGINES.

1,246,912. Specification of Letters Patent. Patented Nov. 20, 1917.

Application filed May 8, 1917. Serial No. 167,276.

To all whom it may concern:

Be it known that I, ARTHUR D. GRANT, a citizen of the United States, residing at Hudson, in the county of Columbia and State of New York, have invented certain new and useful Improvements in Rotary Valve Mechanism for Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to rotary valve mechanism for engines, particularly internal combustion (gas or gasolene) engines, the primary object of the invention being to provide novel and improved rotary intake and exhaust manifold valves which will be operated from the engine shaft and act in timed accord to govern the supply of the fuel and exhaust of the spent gases.

A further object of the invention is to provide a valve mechanism for governing the supply of fuel to and discharge of the spent gases from a plurality of cylinders, and which embodies simple and effective means for preventing leakage of the fluid past the valves between the cylinders and also for compensating for wear of the valves and preventing leakage about the same.

A still further object of the invention is to provide a rotary valve mechanism which is simple of construction, reliable and efficient in action, and adapted to be economically manufactured.

With these and other objects in view, the invention consists of the features of construction, combination and arrangement of parts hereinafter fully described and claimed, reference being had to the accompanying drawings, in which:—

Figure 1 is a side elevation of a portion of an engine equipped with my improved valve mechanism.

Fig. 2 is an end elevation of the same.

Fig. 3 is a top plan view of the engine with a portion of the valve casing broken away.

Fig. 4 is a vertical transverse section on line 4—4 of Fig. 3.

Fig. 5 is a vertical longitudinal section on line 5—5 of Fig. 4.

Figs. 6 and 7 are side elevations of the exhaust and intake valves.

Figs. 8, 9 and 10 are, respectively, a front view, a side view and a plan view of one of the adjustable valve seat members or follower blocks.

Figs. 11 and 12 are, respectively, a plan view and an edge view of one of the springs for holding the follower blocks in engagement with the valves.

Figs. 13, 14, 15 and 16 are transverse sections through the engine in the central line of one of the cylinders and showing the valves in the different positions they take during the cycle of operation of the engine.

Referring to the drawings, 1 designates the engine body or casing, which may contain any desired number of cylinders 2, within each of which operates a piston 3, shown in dotted lines in Figs. 13 to 16, inclusive, which pistons transmit motion through the usual or any desired form of connections to the engine shaft 4. Suitably secured to the top of the engine body is a manifold chest or casing 5 provided with longitudinally extending passages 6 and 7 in which are arranged intake and exhaust valves 8 and 9, the respective passages being in communication with the upper ends of the respective cylinders through intake and exhaust ports 10 and 11. Formed in the manifold head or casing 5 are threaded openings 12 communicating with the explosion chambers 13 of the respective cylinders for the reception of spark plugs or other suitable igniting devices.

The valves 8 and 9 are mounted to rotate within bushings 14 and 15 lining the passages 6 and 7, and each of said valves is in the form of a hollow tube or cylinder, the two valves extending exteriorly at one end of the manifold head and being provided with stub shafts 16 and 17 on which are mounted gears 18 and 19 meshing with a worm 20 on a shaft 21, whereby said valves are driven in timed accord. The shaft 21 may be driven in any preferred manner from the engine shaft as by means of a beveled pinion 22 thereon meshing with a beveled gear 23 on the shaft 4. The opposite end of the exhaust valve 9 is open and arranged to communicate in any suitable manner with an exhaust pipe 24, while the opposite end of the valve 8, which is also open, is closed against the escape of the gaseous fuel by a suitable plug or closure 25 threaded or otherwise fitted into the adjacent end of the passage 6.

The valve 8 is provided with ports 26, arranged at different points along its length and at different positions around the valve, for the supply of charges of fuel to the

respective engine cylinders, and said valve is also provided with a centrally arranged annular series of ports 27 for constant communication with an inlet or intake chamber 28, from which the fuel is drawn by the suction of the pistons on their intake strokes. These series of ports 27 provide for constant communication with the interior of the valve and the intake chamber 28, as will be readily understood. The ported portions of the valves are separated from each other by intervening annular grooves 29, which receive packing rings 30 which fit therein and which bear against the bushing 14, and thus prevent leakage about the valve between the same and the bushing and also longitudinally of the valve passage. It will thus be understood that a constant supply of fuel will be driven into the intake valve by the suction of the pistons, and that this fuel will be successively supplied in regulated quantities to the respective cylinders in the rotation of the valve, whereby fuel charges to the cylinders will be successively furnished in the operation of the engine. The vave 9°is provided with ports 31 arranged to communicate at proper intervals in the rotation of said valve with the exhaust ports of the engine cylinders so that on the exhaust stroke of the piston of each cylinder the spent gases will be forced outward through the ports in the cylinder and valve, and discharged through the valve to the atmosphere or to a suitable exhaust pipe 24.

An essential part of my invention consists in the provision of means for preventing leakage of the fuel mixture between the valves and cylinders, or vice versa, and for compensating for wear of the valves and constantly maintaining a fluid tight connection between the same and their bushings. To this end the ports 10 and 11, which are preferably oblong rectangular in form, are made to communicate with similarly shaped, recesses or pockets 32 connecting the same with the respective passages 6 and 7, and the bushings 14 and 15 are formed on their inner sides with correspondingly shaped openings 33. The openings 33 have their edge walls beveled, as at 34, for lapping engagement with the beveled edge walls 35 of the segmental portions 36 of valve seat members or follower blocks 37, which fit about the inner portions of the valves 8 and 9, said blocks having angular body portions 38 conforming to the shape of the recesses or pockets 32 and which fit therein for sliding movement toward and from the valves. The seat members or follower blocks have openings or ports 39 extending therethrough to connect the cylinder and valve ports, and these ports 39 extend through reduced elliptical portions 40 of the follower blocks which fit and slide within the cylinder ports 10 and 11 which are correspondingly shaped. The ports 10 and 11 are of less area than the recesses or pockets 32 to provide base shoulders 41 on which rest the terminal portions of bowed springs 42. These springs are apertured for the reception and passage of the reduced portions 40 of the follower blocks and have their bowed body portions bearing on the bases of the body portions 38 of the blocks, said springs acting to normally force the blocks toward the valves, and to thereby maintain a fluid tight seat for each valve and a fluid tight joint between the valves, valve bushings and ports at their points of intersection. It will thus be understood that as wear upon the valves occurs, said wear will be taken up by the action of the springs in forcing the follower blocks against the valves, to constantly maintain a fluid tight seating connection, by which leakage of the flowing fluid will be prevented in a simple and effective manner, the advantages of which will be readily understood.

From the foregoing description, taken in connection with the drawings, the construction of my improved rotary valve mechanism for engines will be readily understood, and it will be seen that the invention provides a valve mechanism consisting of rotary intake and exhaust valves which are driven from the engine shaft whereby, in the operation of the engine, regulated supplies of the motive fuel to the respective cylinders will be furnished and the exhaust of the spent gases from the respective cylinders permitted at proper times, so as to secure a smooth, even and regular working action of the engine without the irregularities and disadvantages attendant upon the use of valve mechanisms of ordinary construction. It will also be seen that the invention provides a valve mechanism which is materially simpler in construction, than the valve mechanisms commonly employed which operates at the expenditure of less power, and which is not liable to get out of order or to result in loss of compression and power, such as is experienced in engines of ordinary construction owing to the improper seating of independent valves. In practice, the ports will be constructed to permit of ready cleaning of the valves for the removal of deposits without removing the valves, and also to provide for the ready removal of the valves when required for thorough cleaning, repairs or the substitution of new valves.

It will be observed that in the operation of these valves during the revolution of the same that as the valve tubes are provided with double ports the valves are adapted to do the necessary work assigned them at one-half the speed that is required in the usual type of puppet valve mechanism, *i. e.*, at a ratio of 4 to 1 instead of

2 to 1. This feature will allow plenty of time for the entrance and escape of gases, produce less friction with consequent heat, use less power, produce a quieter motor, allow the use of a very high speed motor, and eliminate vibration. Another feature is the fact that it is strictly an overhead valve motor in the strictest sense, having no pockets in combustion chamber as is common in the T and L motors.

Having described my invention, I claim:

1. In a valve mechanism for engines, the combination of an engine body provided with cylinders, a manifold provided with intake and exhaust passages having inlet and exhaust ports communicating with the cylinders, bushings mounted within said passages and provided with openings in alinement with said ports, rotary tubular valves mounted within the bushings and provided with coöperating ports, and spring actuated movable valve seat members fitted within the openings in the bushings and arranged to partly surround the valves, said valve seat members being in guided engagement with the inlet and exhaust ports of the cylinders.

2. In a valve mechanism for engines, the combination of an engine body provided with cylinders, a manifold provided with intake and exhaust passages having inlet and exhaust ports communicating with the cylinders, bushings mounted within said passages and provided with openings in alinement with said ports, rotary tubular valves mounted within the bushings and provided with coöperating ports, movable valve seat members fitted within the openings in the bushings and arranged to partly surround the valves, and means acting upon said valve seat members to normally maintain them seated against the surfaces of the valves against which they bear.

3. In a valve mechanism for engines, the combination of an engine body provided with cylinders, a manifold provided with intake and exhaust passages having inlet and exhaust ports communicating with the cylinders, bushings mounted within said passages and provided with openings in alinement with said ports, rotary tubular valves mounted within the bushings and provided with coöperating ports, valve seat members comprising follower blocks fitted within the openings in the bushings and arranged to partly surround the valves, said blocks having portions in guiding engagement with the inlet and exhaust ports of the cylinders, and springs acting upon said follower blocks to normally maintain them seated against the surfaces of the valves against which they bear.

In testimony whereof I hereunto affix my signature in the presence of two witnesses.

ARTHUR D. GRANT.

Witnesses:
EMERSON BARLOW,
WILLIAM GRAF.