W. E. EWART.

ROTARY GAS ENGINE VALVE.

APPLICATION FILED FEB. 25, 1909.

983,546. Patented Feb. 7, 1911.

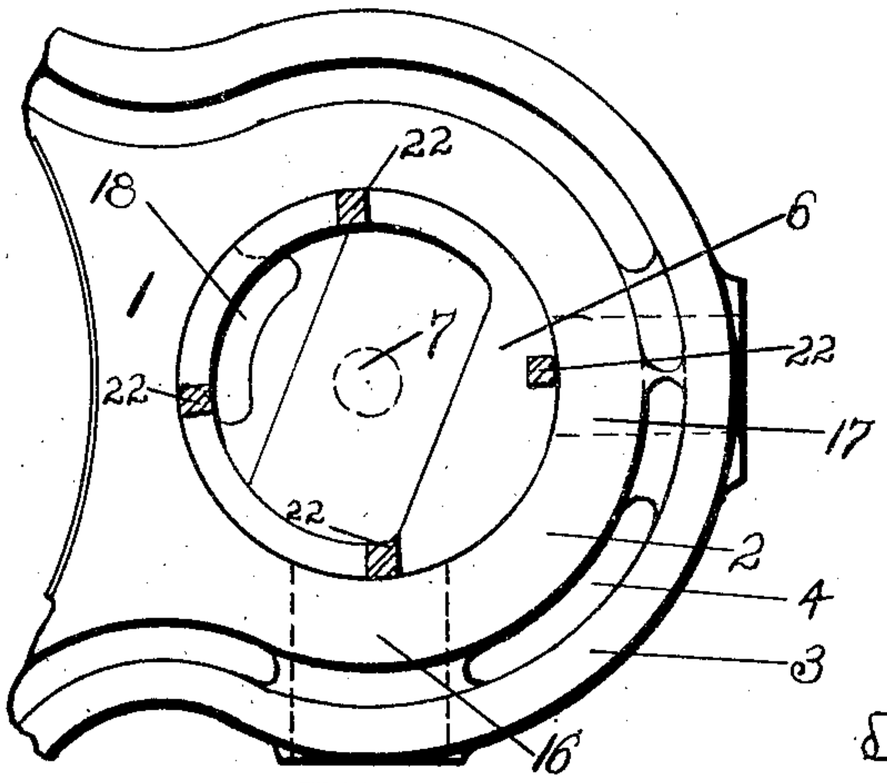


Fig 1.

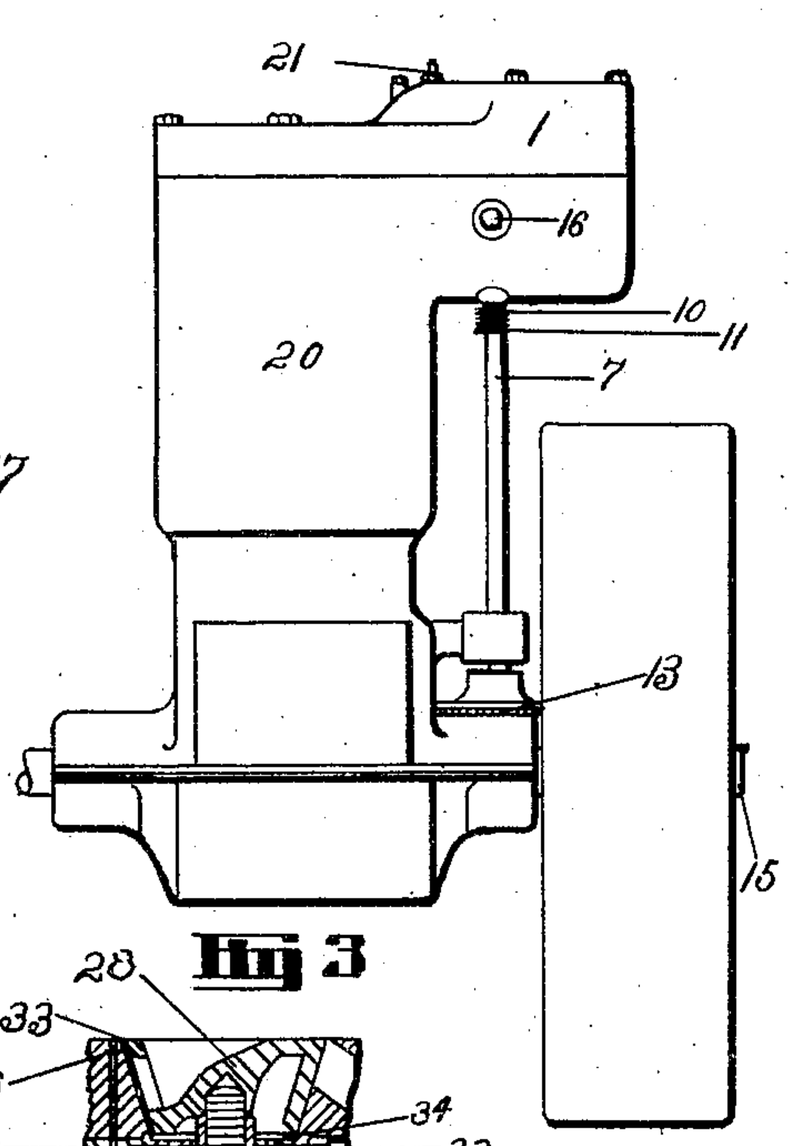


Fig 3.

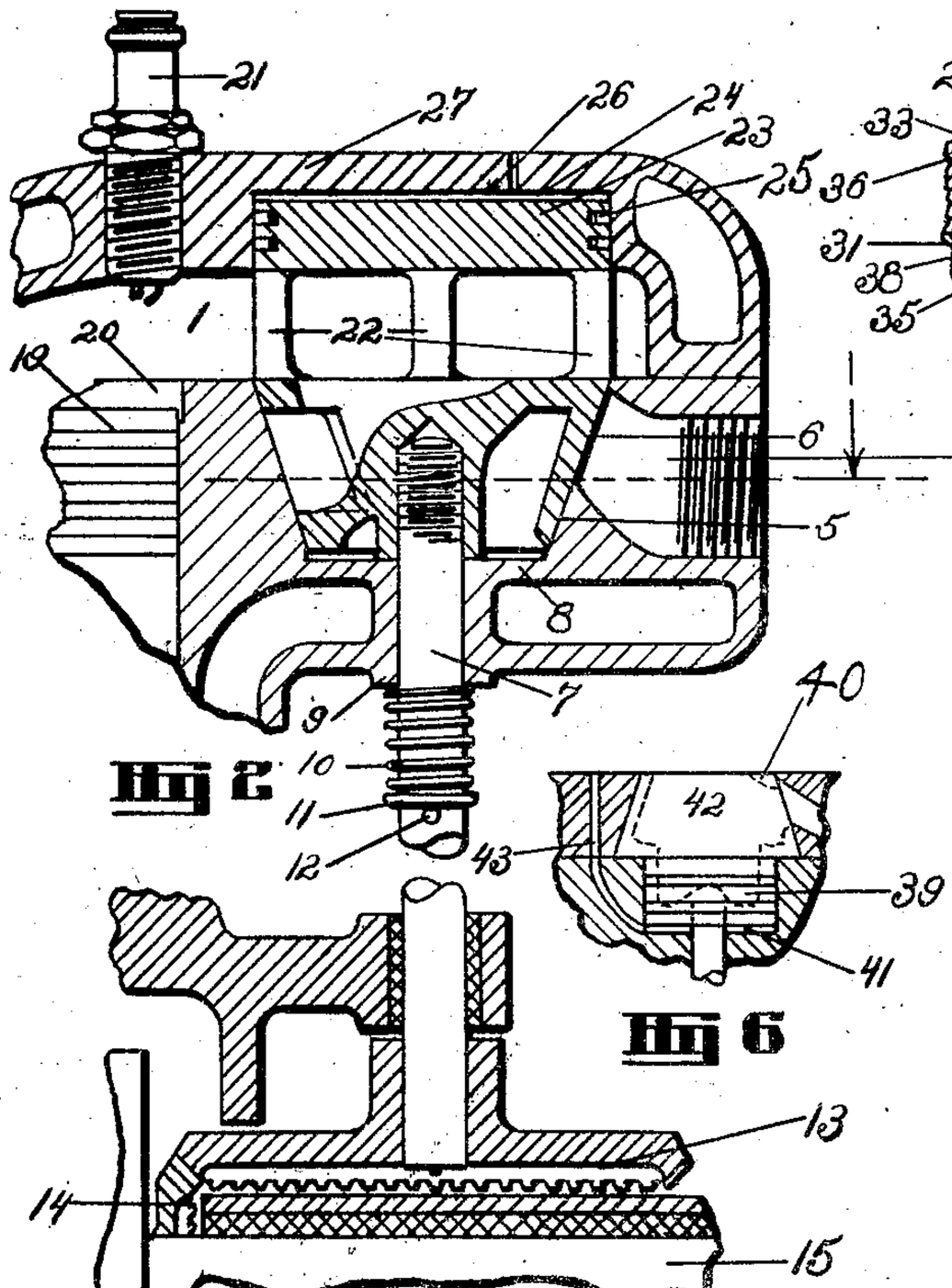


Fig 2.




Fig 5.

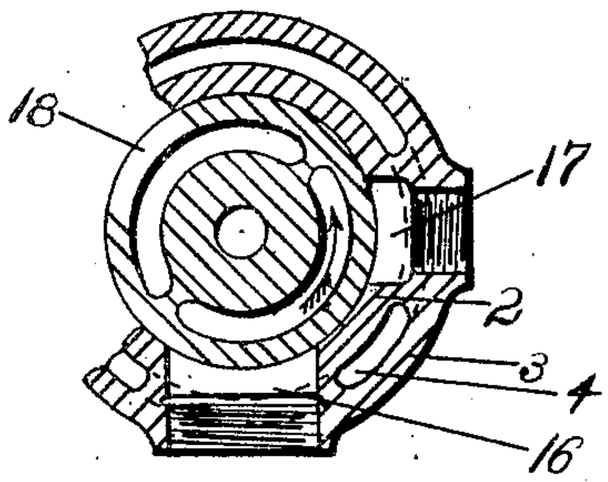


Fig 4.




Fig 6.




INVENTOR.

WILLIAM ERVIN EWART.

BY

HIS ATTORNEY.

WITNESSESS.

S. Albin.

R. S. Hurd.

# UNITED STATES PATENT OFFICE.

WILLIAM E. EWART, OF SEATTLE, WASHINGTON.

## ROTARY GAS-ENGINE VALVE.

983,546. Specification of Letters Patent. Patented Feb. 7, 1911.

Application filed February 25, 1909. Serial No. 480,064.

*To all whom it may concern:*

Be it known that I, WILLIAM E. EWART, a citizen of the United States, residing at Seattle, in the county of King and State of Washington, have invented a new and useful Rotary Gas-Engine Valve, of which the following is a clear and concise specification.

My invention relates to a rotary valve for gas engines which is perfectly balanced and the expansion and contraction of the valve as well as the air will not materially affect its operativeness.

The objects of my invention are to provide a rotary valve for gas engines which will at all times remain tight under varying thermo conditions; to provide a perfectly balanced gas engine valve and to provide a wear taking up means for rotary gas engine valves.

I accomplish these as well as minor objects by the construction now preferred by me and illustrated in the accompanying drawings in which—

Figure 1 is a plan view of my device, Fig. 2 is a transverse section of the preferred form of my device; Fig. 3 is an elevation showing the application of my device; Fig. 4 is a transverse section showing the arrangement of the ports and valve, Figs. 5 and 6 are modifications showing the balancing means of my device.

I have provided a valve chamber 1 having water cooled walls 2, the water traveling between said walls 2 and the jacket wall 3 forming a water space 4 therebetween. The valve chamber is preferably provided with a tapering valve seat 5 conforming to the general periphery of the valve 6 which is substantially the shape of a frustum of a cone, said valve 6 is rigidly secured to the stem 7 whereby said valve is rotated, said stem 7 preferably passing through the under wall 8 of the valve chamber, and into the boss 9 whereby said valve stem is guided. I have provided a spring 10 on the exterior of the valve chamber which rests against said boss 9 and against the washer 11 which is prevented from longitudinally sliding on said valve stem by the pin 12 permitting said spindle 7 to yieldingly move longitudinally when by the valve when expanding more than the material in the seat therearound draws the spindls 7 farther into the valve chamber. When the valve cools relative to the walls of the valve seat, the valve stem will be withdrawn to a degree from said valve chamber by said spring 10. Said spring 10 also takes up the wear between the valve and the seat.

The valve spindle is preferably rigidly secured at the lower end thereof to the gear wheel 13 which meshes with the gear wheel 14 secured to the crank shaft 15 of the engine. The gear wheel 14 being $\frac{1}{2}$ the pitch diameter of the gear 13 revolves said valve once to every two revolutions of the crank. By referring to Fig. 4 it will be seen that both the exhaust port 16 and intake port 17 are closed and that the port 18 of the valve 6 is disposed nearly opposite said intake port 17 the valve traveling in the direction of the arrow is at the point of compression relative to the piston head 19 which is at the extreme upper end of the stroke. It is obvious that as the valve travels but $\frac{1}{2}$ of the number of revolutions of the crank shaft that $\frac{1}{4}$ of a revolution of the valve will be accomplished in the same period of time as a $\frac{1}{2}$ revolution of the crank shaft and that when said piston 19 is at the lower end of the stroke from the position shown in Fig. 2 the valve port 18 will communicate with the exhaust port 16 permitting the burned gases within the cylinder 20 to escape through said exhaust port 16. When the piston again returns on its upward travel toward the top end of the cylinder, said exhaust port 16 will remain in communication with the cylinder 20 whereby the engine is scavenged until the valve port 18 begins to communicate with the admission port 17. At this point said exhaust port is closed simultaneously with the opening of the intake port 17 to communicate with said cylinder 20 which port 17 begins to open at the end of the stroke permitting a new supply of gas to enter therethrough while the piston travels downwardly. It being obvious that said exhaust port 16 and said intake port 17 will be closed while the piston again travels to the top end of the cylinder and also during its downward travel during which time the explosion of the newly admitted gas is propelling the engine which is accomplished by said newly admitted gases being ignited by the spark plug 21 which may be of any common type now in use in internal combustion engines. The valve 6 is provided with upright stanchions 22 which rigidly secure the balancing head 23 thereto, said balancing head 23 engages and travels within a similar shaped cylinder or chamber

24 and is prevented from wasteful leaking by the piston rings 25. What leakage passes said rings is discharged into the atmosphere through an aperture 26 provided in the top walls 27 of said chamber 1.

In Fig. 5 I have shown a modification of my device in which said valve 28 performing the function of said valve 6 is counterbalanced by the head 29 which is rigidly secured to a stem 30. Said head 29 is provided with a peripheral surface 31 fitting the walls 32 which act as a seat therefor, said peripheral surface is substantially of the same taper as said valve 28. Said valve 28 is partially counterbalanced by pressure from said chamber 1 which is transmitted through the duct 33 acting on the undersurface of said valve in the chamber 34 and also by pressure applied to the undersurface of said head 29 which is maintained in a chamber 35 adjacent the under surface of said head 29 which communicates with the valve chamber 1 by means of a duct 36 thus the pressure in the chambers 34 and 35 is kept substantially the same as in the valve chamber 1 which communicates therewith. An leakage escaping between the walls 32 and head 29 escapes into the atmosphere through the duct 37 which communicates with the chamber 38 on the upper side of said head 29.

In Fig. 6 I have shown a modification in which I have provided an extension 39 formed integral with the valve 40 which performs the function of said valve 6. I have provided a pressure chamber 40 communicating with the interior 42 of said valve 40 which communicates with the valve chamber, the pressure being supplied to said chamber 41 by means of the duct 42.

I do not wish to be limited to the specific construction herein set forth and illustrated in the accompanying drawings but desire to depart from such details as are within the scope of the appended claims.

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

1. In a rotary gas engine valve, a piston operated crank shaft, a tapered valve rotatably driven by said crank shaft and yieldingly held in contact with the valve seat thereof whereby the wear and expansion and contraction of said valve are overcome preventing leakage and a balancing head having substantially straight parallel sides connected to said tapered valve whereby the expansion and contraction of the connection are permitted by longitudinal movement of said balancing head.

2. In a valve for gas engines, a rotary valve tapering from a larger diameter at its one end to a smaller diameter at its opposite end, having a port communicating with the intake and exhaust ports to the engine, a balancing head to balance the pressure on the end of said valve and having parallel sides permitting longitudinal travel between the tapered valve and said balancing head.

3. In a valve for gas engines, a rotary valve tapering from a larger diameter at its one end to a smaller diameter at its opposite end, having a port communicating with the intake and exhaust ports to the engine, a balancing head, having parallel sides permitting longitudinal travel between said tapered valve and said balancing head.

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

WILLIAM E. EWART.

Witnesses:
PAUL A. TALBOT,
ELLA E. WEDING.