C. T. CLEVE.

VALVE MECHANISM FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED APR. 24, 1912.

1,067,865.

Patented July 22, 1913.

Fig. 1.

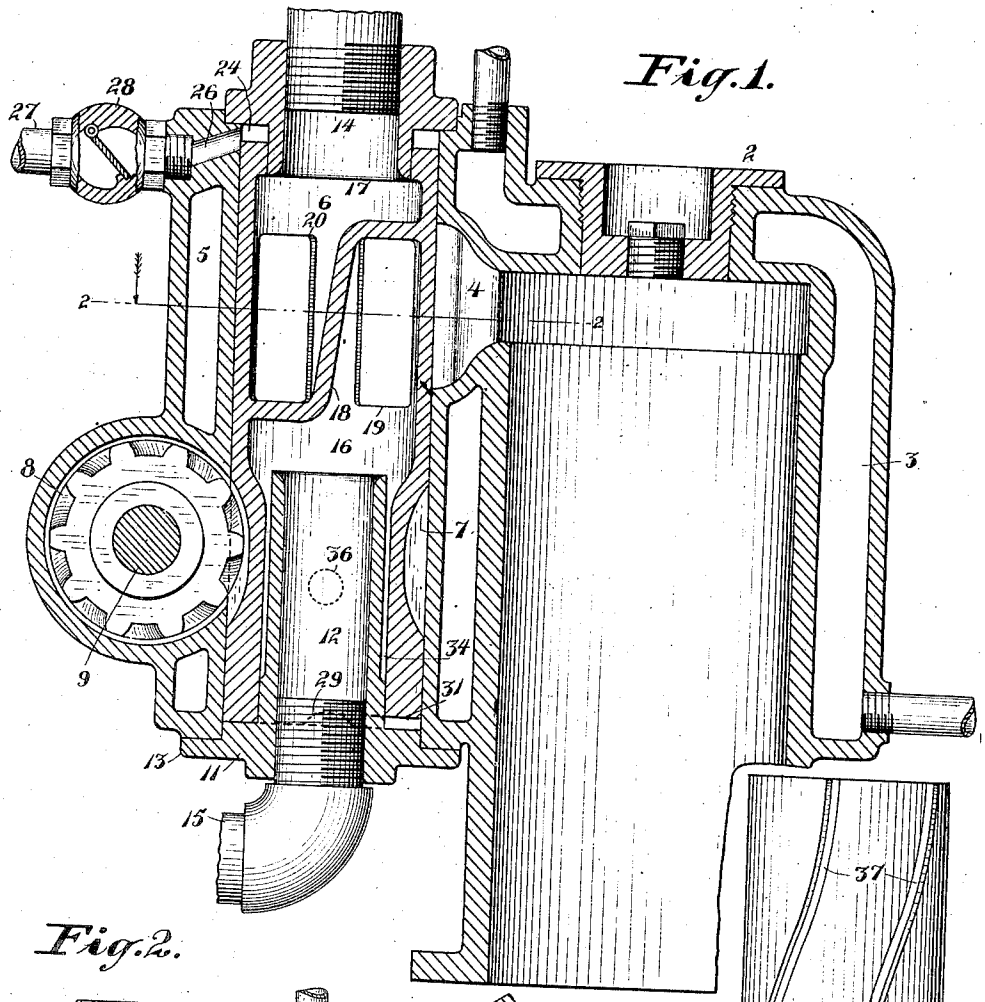


Fig. 2.

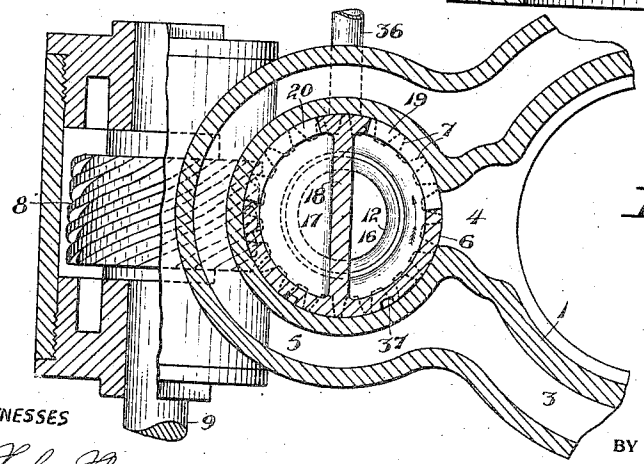
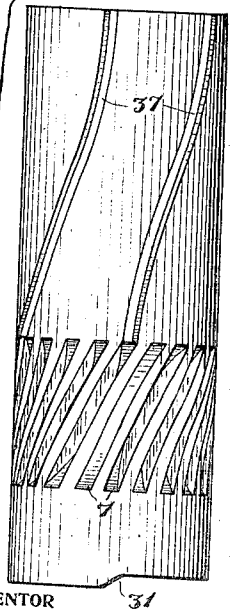


Fig. 3.



WITNESSES

F. C. Fliedner

N. B. Keating

INVENTOR

C. T. Cleve,

BY

Fm. Wright,

ATTORNEY

UNITED STATES PATENT OFFICE.

CLARENCE T. CLEVE, OF SAN FRANCISCO, CALIFORNIA.

VALVE MECHANISM FOR INTERNAL-COMBUSTION ENGINES.

1,067,865. Specification of Letters Patent. Patented July 22, 1913.

Application filed April 24, 1912. Serial No. 692,779.

To all whom it may concern:

Be it known that I, CLARENCE T. CLEVE, a citizen of the United States, residing at San Francisco, in the county of San Francisco and State of California, have invented new and useful Improvements in Valve Mechanism for Internal-Combustion Engines, of which the following is a specification.

The present invention relates to improvements in internal combustion engines, the object of the invention being to provide a simple and effective valve mechanism for use with such engines.

In the accompanying drawing, Figure 1 is a vertical section of a portion of an internal combustion engine having my improved valve mechanism applied thereto and shown in an upright position, though this position is not necessary; Fig. 2 is a transverse section on the line 2—2 of Fig. 1; Fig. 3 is a side view of the valve detached.

Referring to the drawing, 1 indicates the cylinder of an internal combustion engine, having a head 2 and a water jacket 3. Near said head is formed a conduit 4 leading to a cylindrical valve casing 5, in which can rotate a tubular valve 6. Said valve 6 has formed on its exterior surface a spiral gear wheel having teeth 7 engaged by a worm 8 on a shaft 9 connected with the crank shaft of the engine, which connection, being customary, is not here shown. Said tubular valve is not only rotatable but also movable longitudinally in said valve casing, its longitudinal movement being limited, at the bottom of said valve casing by a head 11 of a gas tube 12, the lower end of which is connected with a tube 15 for conducting combustible mixture to the internal combustion engine, said head having a flange 13, by which it is secured to the lower end of the valve casing, and the tubular valve being limited at the upper end by the flange of an exhaust outlet tube 14 secured at the upper end of said valve casing. Said tubular valve is separated into an inlet conduit 16 and an outlet conduit 17 by means of a partition 18, which is directed obliquely across the tubular valve in a curved or ogee form, and so that the upper end of said partition is higher than the lower end by a distance approximately equal to the height of the end, adjacent to said valve, of the conduit 4 which leads through the wall of the internal combustion cylinder. Through the wall of said tubular valve, on opposite sides of said partition, but at the same level as one another, and approximately at the level of said adjacent end of the conduit 4, are formed inlet and outlet ports 19, 20, the inlet port 19 communicating with the gas tube 12, and the outlet port 20 communicating with the outlet tube 14.

With the above construction it will be seen that, when the tubular valve 6 rotates in the direction shown by the arrow in Fig. 2 the cylinder is being filled with combustible mixture passing through the gas tube 12 and the inlet port 19. While the tube rotates through about half a revolution the conduit 4 is closed, and during this time compression and explosive combustion take place. The port 20 then comes opposite to the conduit 4 and the waste gases are expelled from the cylinder through the outlet conduit 17.

The valve does not fit tightly at its ends between the flange 13 of the gas tube 12 and the flange of the exhaust outlet 14, but is spaced slightly therefrom, so as to leave a small annular oil chamber 24 at the top of the tubular valve 6, which chamber communicates by means of a conduit 26 with a lubricating oil supply pipe 27 having a check valve 28 therein. Once in each revolution of the valve it is moved longitudinally in the valve casing by means of a cam 29 formed on the flange of the inlet tube which engages a cam portion 31 of the lower end of the tubular valve and raises the valve a short distance, say, one-eighth of an inch. The raising of the valve produces three effects. First, by reason of the sliding engagement of the teeth 7 of the valve with the teeth of the worm 8, it causes the valve to rotate more rapidly at the instant of engagement of said cam 29 and cam portion 31 than at its regular speed, thus permitting a more rapid opening of the valve, and consequently a more rapid passage of gases from the combustion chamber. Secondly, the longitudinal movement of the valve distributes the lubricating oil between the valve and its casing. Thirdly, the reciprocating motion of the valve 6, in conjunction with

the action of the check valve, which prevents backward movement of the oil, causes the valve 6 to act as a pump plunger to positively force the oil down between the valve and casing.

The purpose of the gas tube 12 being extended a considerable height above the head 11 is to form an oil well 34 in which the lower part of the valve can rotate, the level of the oil in said oil well being determined by the height of an escape pipe 36 through the valve casing.

The outer surface of the tubular valve 6 is formed with helical conduits 37 for lubricating oil, which conduct oil to said well.

I claim:—

1. In combination with a cylinder of an internal combustion engine having a port, a cylindrical valve casing having in a cylindrical side thereof an opening communicating with said port, one end of said casing communicating with a source of supply of combustible mixture and the other end being open to exhaust, a rotary cylindrical valve in said casing formed with an oblique partition dividing the interior of the valve into compartments opening at opposite ends thereof, and having ports in the respective compartments adapted in the rotation of the valve to register alternately with said opening, means for rotating said valve, means at the ends of said valve casing for limiting the longitudinal movement of said valve therein, and means for producing said longitudinal movement automatically with the rotary movement of the valve.

2. In combination with a cylinder of an internal combustion engine having a port, a cylindrical valve casing having in a cylindrical side thereof an opening communicating with said port, one end of said casing communicating with a source of supply of combustible mixture and the other end being open to exhaust, a rotary cylindrical valve in said casing formed with an oblique partition dividing the interior of the valve into compartments opening at opposite ends thereof, and having ports in the respective compartments adapted in the rotation of the valve to register alternately with said opening, means for rotating said valve, means at the ends of said valve casing for limiting the longitudinal movement of said valve therein, a pipe for conducting lubricating oil to the interior of the valve casing near one end thereof, a check valve in said pipe, and means for producing said longitudinal movement automatically with the rotary movement of the valve.

3. In combination with a cylinder of an internal combustion engine having a port, a cylindrical valve casing having in a cylindrical side thereof an opening communicating with said port, one end of said casing communicating with a source of supply of combustible mixture and the other end being open to exhaust, a rotary cylindrical valve in said casing formed with an oblique partition dividing the interior of the valve into compartments opening at opposite ends thereof, and having ports in the respective compartments adapted in the rotation of the valve to register alternately with said opening, means for rotating said valve, means at the ends of said valve casing for limiting the longitudinal movement of said valve therein, a pipe for conducting lubricating oil to the interior of the valve casing near one end thereof, a check valve in said pipe, a gas tube within the valve at the other end thereof and forming with said valve casing an oil well, and means for producing said longitudinal movement automatically with the rotary movement of the valve.

4. In combination with a cylinder of an internal combustion engine having a port, a cylindrical valve casing having in a cylindrical side thereof an opening communicating with said port, one end of said casing communicating with a source of supply of combustible mixture and the other end being open to exhaust, a rotary cylindrical valve in said casing formed with an oblique partition dividing the interior of the valve into compartments opening at opposite ends thereof, and having ports in the respective compartments adapted in the rotation of the valve to register alternately with said opening, means for rotating said valve, means at the ends of said valve casing for limiting the longitudinal movement of said valve therein, a pipe for conducting lubricating oil to the interior of the valve casing near one end thereof, a check valve in said pipe, a gas tube within the valve at the other end thereof and forming with said valve casing an oil well, said casing having an overflow opening therethrough to limit the height of the lubricating oil in said well, and means for producing said longitudinal movement automatically with the rotary movement of the valve.

5. In combination with a cylinder of an internal combustion engine having a port, a cylindrical valve casing having in a cylindrical side thereof an opening communicating with said port, one end of said casing communicating with a source of supply of combustible mixture and the other end being open to exhaust, a rotary cylindrical valve in said casing formed with an oblique partition dividing the interior of the valve into compartments opening at opposite ends thereof, and having ports in the respective compartments adapted in the rotation of the valve to register alternately with said opening, means for rotating said valve, means at the ends of said valve casing for limiting the longitudinal movement of said valve therein, a pipe for conducting lubricating

oil to the interior of the valve casing near one end thereof, a check valve in said pipe, the outer surface of the tubular valve being formed with conduits for lubricating oil, and means for producing said longitudinal movement automatically with the rotary movement of the valve.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

CLARENCE T. CLEVE.

Witnesses:
N. B. KEATING,
FRANCIS M. WRIGHT