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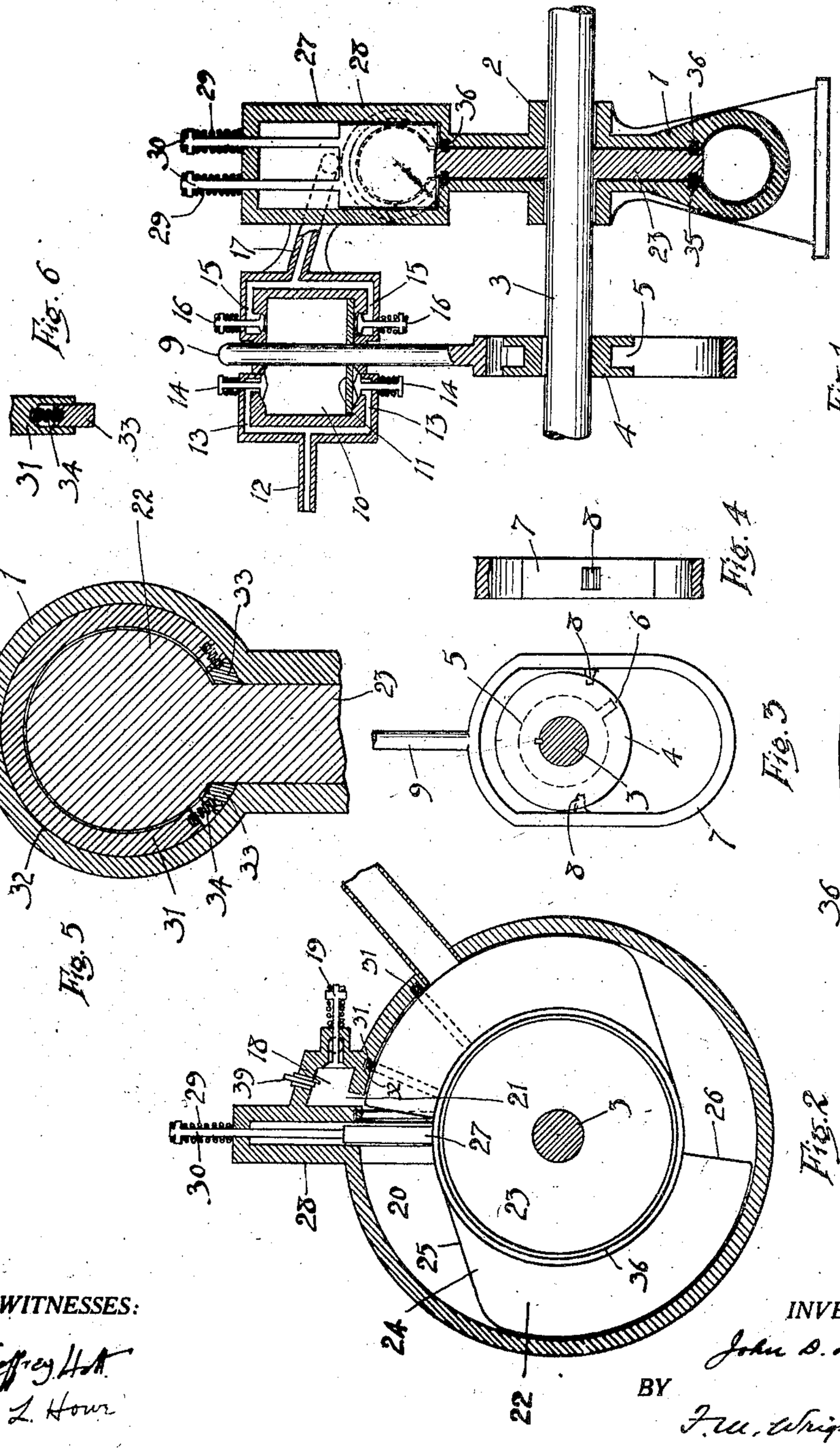
J. D. LONG.

ROTARY EXPLOSIVE ENGINE.

APPLICATION FILED MAY 16, 1907.



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ROTARY EXPLOSIVE-ENGINE.

No. 878,144. Specification of Letters Patent. Patented Feb. 4, 1908.

Application filed May 16, 1907. Serial No. 374,036.

To all whom it may concern:

Be it known that I, JOHN D. LONG, 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 Rotary Explosive-Engines, of which the following is a specification.

The object of the present invention is to provide a rotary explosive engine which will be of high efficiency in proportion to its size, and in which the parts shall be so arranged as to prevent leakage of the gases resulting from explosion.

In the accompanying drawing, Figure 1 is a longitudinal section of the engine; Fig. 2 is a transverse section through the cylinder; Fig. 3 is a side view of the connection with the compressor; Fig. 4 is a broken internal view of the loop of said connection; Fig. 5 is an enlarged side view partly in section of one of the packing rings; Fig. 6 is a corresponding section of the end thereof; Fig. 7 is a side view of the split ring.

Referring to the drawing, 1 indicates a casing having a hub 2, through which passes the shaft 3 of the engine. Upon said shaft is secured a ring 4 having a grooved periphery, and having in said groove 5 a bridge 6. Surrounding said ring is a loop 7 from the opposing faces of the inner side of which extend inwards two lugs 8, said lugs traveling in said grooves, so that they are adapted in turn to be actuated by said bridge, and thereby impart to said loop a reciprocating motion from the rotary motion of the shaft. Said loop is connected to a piston rod 9 which passes in a compression cylinder 10 and carries a piston 11 reciprocating in said cylinder.

Carbureted vapor is supplied to both ends of said compression cylinder 10 by a feed pipe 12 having branches 13 entering the opposite ends of said chamber and controlled by spring-actuated valves 14. Also arranged in opposite ends of said compressor cylinder are outlet openings 15 controlled by spring-actuated valves 16 and leading to a common supply conduit 17. Hence, said compressor is double-acting, that is, at each half of the reciprocation of the piston, the explosive fluid is compressed in said chamber, and is expelled by an outlet 15 to the supply conduit 17, while at the same time the carbureted vapor is being drawn into the other end of the cylinder to be in its turn compressed and expelled upon the return movement of the piston.

The compressed gases are conducted by the conduit 17 to an explosion chamber 18 controlled by a valve 19. Said explosion chamber is provided with a sparking device 39 of any common construction. The explosion chamber connects with the working chamber 20 of the casing 1 by means of a passage 21. In said working chamber 20 rotates a piston 22 having a web 23 and annular segmental piston heads 24. Each head is formed with a sloping front or advancing face 25 and a square or radial rear face 26. Each advancing face 25 in turn passes under the lower edge of a gate 27, which slides in a casing 28 and is normally depressed by springs 29 around rods 30 secured to said gate. In so passing under said gate it raises the gate, which, under the action of the springs 29, immediately falls when the rear face of the piston has passed thereunder.

The explosion is arranged to take place in the explosion chamber when the parts are in the position shown in Fig. 2, in which position it is seen that the passage 21 to the working chamber 20 of the cylinder is closed by the rear end of the piston head. The said passage is immediately thereafter opened, and the compressed gases resulting from the explosion then press upon the rear face of the piston and force it onwards.

In order to prevent leakage of the pressure fluid, I provide packing rings 31 which are received within recesses 32 in the casing of the cylinder. The inner surface of each ring is slightly beveled, or slopes inward and forwards, so as to prevent said inner surface catching against and impeding the piston. In the ends of the ring are sliding pieces 33, which are normally pressed outwards by springs 34, and said sliding pieces bear against the sides of the web of the piston adjacent to the annular head thereof. Also contained within counterpart circular groove 35 in the web of the piston and in the casing of the cylinder, on each side of said piston, is a split ring 36, which prevents leakage of the pressure fluid inwards from the working chamber of the cylinder.

The operation of the engine will be readily

understood from the foregoing description. As the rear end of each piston passes the opening from the explosion chamber into the working chamber of the cylinder, the gases, which have been exploded in said working chamber, escape therefrom into said working chamber and propel the piston onwards, thus rotating the shaft 3 and compressing the gases in the compressor chamber, and then forcing them into the explosion chamber.

An important feature of this invention is the construction of the piston, in that it is formed of a web and segmental annular heads of substantially circular cross section. This enables the piston to be effectively packed against the leakage of the pressure fluid, a result which is very difficult to attain with rotary explosive engines.

It will also be seen that since the apparatus for compressing the carbureted gases is so constructed that two explosions are obtained in each rotation of the engine shaft, it results that for a given size of engine there is obtained substantially twice the amount of power which would otherwise be obtained.

The apparatus for cooling and for timing of the spark are omitted as they may be of any ordinary form or construction, and form no part of the present invention.

I claim:—

1. The combination of a shaft, a rotary piston secured thereto having a web and an annular segmental head, of substantially circular cross section, a casing having an annular working chamber in which said piston rotates, and an explosion chamber connected with said working chamber, a spring-actuated gate adapted to close the working chamber of the cylinder behind the piston, the piston being formed with a sloping front face to lift said gate, packing rings around the piston, the casing having recesses for said rings, the ends of said rings having sliding pieces adapted to abut against the sides of the piston, and springs for pressing said sliding pieces thereagainst, substantially as described.

2. The combination of a shaft, a rotary piston, secured thereto having a web and an annular segmental head, of substantially circular cross section, a casing having an annular working chamber in which said piston rotates, and an explosion chamber connected with said working chamber, a spring-actuated gate adapted to close the working chamber of cylinder behind the piston, the piston being formed with a sloping front face to lift said gate, packing rings around the piston having forwardly and inwardly sloping inner surfaces, substantially as described.

3. The combination of a shaft, a rotary piston secured thereto having a web and an annular segmental head of substantially circular cross section, a casing having an annular working chamber in which said piston rotates and an explosion chamber connected with said working chamber, a spring actuated gate adapted to close the working chamber behind the piston, the piston being formed with a sloping front face to lift said gate, a compression chamber, a piston reciprocating therein, a vlave-controlled feed pipe leading to said chamber, a valve-controlled supply conduit leading from said chamber to the cylinder, and means for reciprocating said latter piston from the rotary movement of the shaft, substantially as described.

4. The combination of a shaft, a rotary piston secured thereto, a casing having an annular working chamber in which said piston rotates, and an explosion chamber connected with said working chamber, a spring-actuated gate adapted to close the working chamber of the cylinder behind the piston, the piston being formed with a sloping front face to lift said gate, a compression chamber, a piston reciprocating therein, a valve-controlled feed pipe leading to said chamber, a valve-controlled supply conduit leading from said chamber to the cylinder, and means for reciprocating said latter piston from the rotary movement of the shaft, said means comprising a circular device upon the shaft and a loop around said device and connected to said piston, said loop and device having parts adapted to engage each other and impart reciprocating motion to the loop from the rotary motion of the shaft, substantially as described.

5. The combination of a shaft, a rotary piston secured thereto, a casing having an annular working chamber in which said piston rotates, and an explosion chamber connected with said working chamber, a spring-actuated gate adapted to close the working chamber of the cylinder behind the piston, the piston being formed with a sloping front face to lift said gate, a compression chamber, a piston reciprocating therein, a valve-controlled feed pipe leading to said chamber, a vavle-controlled supply conduit leading from said chamber to the cylinder, and means for reciprocating said latter piston from the rotary movement of the shaft, said means comprising a grooved circular device upon the shaft, having a bridge in said groove and a loop connected to the piston, said loop having inwardly extending lugs entering said groove and adapted to be engaged by said bridge, substantially as described.

6. The combination of a shaft, a rotary piston secured thereto having a web and an annular segmental head of substantially circular cross section, a casing having an annular working chamber in which said piston rotates and an explosion chamber connected with said working chamber, a spring-actuated gate adapted to close the working chamber

of the cylinder behind the piston, the piston being formed with a sloping front face to lift said gate, the web of the piston and the casing having counterpart grooves on each side of the piston and a split packing ring in each groove, substantially as described.

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

JOHN D. LONG.

Witnesses:
H. A. TAYLOR,
D. B. RICHARDS.