

APPLICATION FILED MAY 7, 1914.

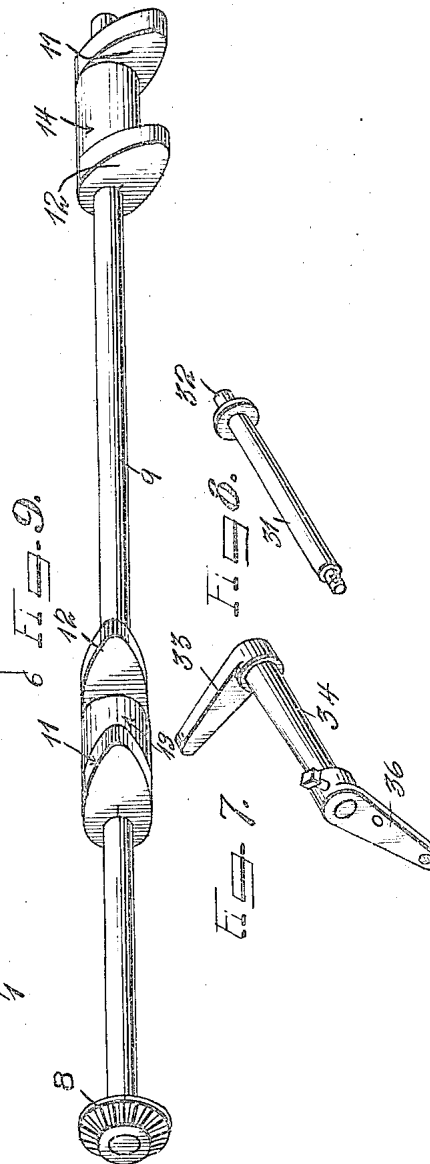
3 SHEETS—SHEET 2.

Witnesses

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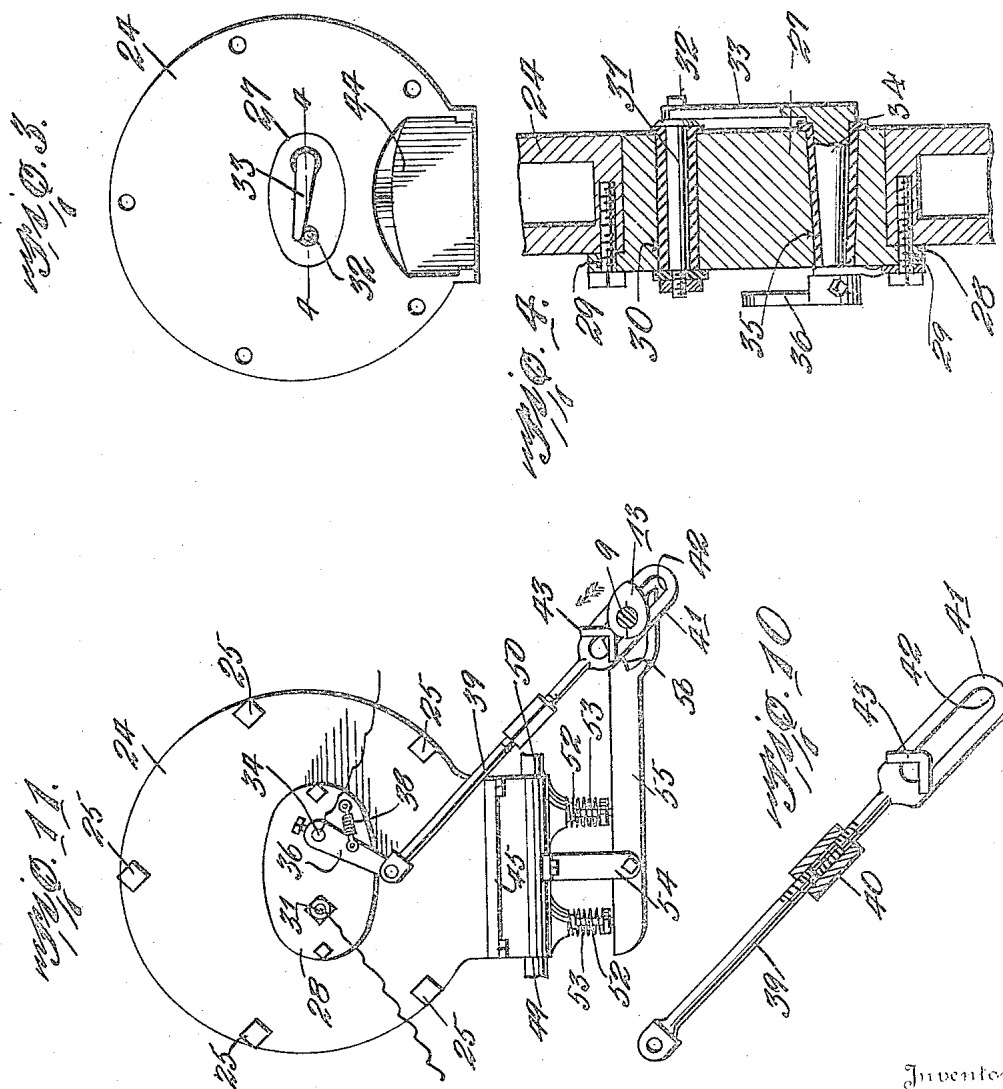
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R. M. DAY.
GAS ENGINE.
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UNITED STATES PATENT OFFICE.

RICHARD M. DAY, OF HUDSON, SOUTH DAKOTA.

GAS-ENGINE.

1,253,159.

Specification of Letters Patent.

Patented Jan. 8, 1918.

Application filed May 7, 1914. Serial No. 837,019.

To all whom it may concern:

Be it known that I, RICHARD M. DAY, a citizen of the United States, residing at Hudson, in the county of Lincoln and State of South Dakota, have invented certain new and useful Improvements in Gas-Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to explosive engines and has for its object the production of a simple and efficient means for timing the spark within the cylinder so as to cause the explosion to take place at the proper time after the inlet ports have been closed.

Another object of the invention is the production of a simple and efficient engine which consists of a minimum number of parts and which is simple in construction and efficient in operation.

With these and other objects in view this invention consists of certain novel combinations, constructions, and arrangements of parts as will be hereinafter fully described and claimed.

In the accompanying drawings:—

Figure 1 is a side elevation of the engine.

Fig. 2 is a central longitudinal section through the cylinder of the engine.

Fig. 3 is a plan view of the inner face of one of the cylinder heads.

Fig. 4 is a section taken on line 11—11, of Fig. 3.

Fig. 5 is a sectional view of the spark plug holding device showing the actuating arm in longitudinal section.

Fig. 6 is a detail perspective of one of the links adapted to actuate the spark plug.

Fig. 7 is a detail perspective of a circuit closing device for the spark plug.

Fig. 8 is a detail perspective of the spark bar of the spark plug.

Fig. 9 is a detail perspective of the cam carrying rod adapted to actuate the valves and actuate the sparking mechanism.

Fig. 10 is a side elevation partly in section of the spark plug actuating rod.

Fig. 11 is an end view of one end of the engine.

By referring to the drawings it will be seen that 1 designates the base of the engine, and this base carries at one end a crank shaft 2 of the usual construction to which crank shaft is connected a crank rod 3. A fly wheel 4 is carried by one end of the crank shaft 2 for the purpose of causing the crank

shaft to evenly rotate, and a driving gear 5 is carried by the opposite end of the crank shaft 2, which driving gear 5 meshes with an auxiliary driving gear 6. This driving gear 6 carries a beveled gear 7 upon its inner face, which beveled gear 7 meshes with a beveled gear 8 carried by the valve actuating rod 9, which rod extends longitudinally of the base 1 and is supported in engagement therewith by means of the journals 10. The valve actuating shaft 9 which is illustrated in detail in Fig. 9 is provided with a spark actuating cam 11 and a valve actuating cam 12, which cams are arranged in pairs to actuate the respective valves and spark devices carried by the opposite ends of the cylinder. For the purpose of clearly describing the device one pair of cams will be referred to as the primary pair 13 and the other pair of cams will be referred to as the auxiliary pair of cams 14, which cams are adapted to actuate the respective valves and spark plugs as above stated. It should be understood that the auxiliary pair of cams 14 are set at an angle to the primary pair of cams 13 so as to cause the explosion to take place in the opposite ends of the cylinder at different times.

The crank arm 3 of the engine straddles the cylinder 15 as is illustrated in Fig. 2, and has its forked ends engaging a transversely extending shaft 16, which shaft 16 engages the piston frame 17. This piston frame 17 carries a pair of piston heads 18 as is illustrated in Fig. 3, and this shaft 16 works through the longitudinally extending slots 19 formed in the sides of the cylinder 15. A plurality of lubricating pipes 20 are employed upon the cylinder 15 for the purpose of efficiently lubricating the piston heads 18 as the same work within the cylinder 15. It, of course, should be understood that the cylinder 15 is provided with the usual water jackets 21 to which water jackets is fed the usual cooling water supply through the medium of the pipes 22. A drain 23 is placed in the cylinder 15 upon the bottom thereof for the purpose of draining surplus fluid or liquid from the cylinder 15.

The cylinder 15 is closed at each end by means of a cylinder head 24, which cylinder head is firmly secured to the cylinder 15 by means of the securing bolts 25. Each cylinder head 24 is provided with a centrally located aperture 26, within which centrally

located aperture 26 is fitted a spark plug holding device 27. This spark plug holding device 27 comprises an elongated body which is substantially elliptical in cross-section and carries a flanged head 28, which flanged head 28 is secured to the cylinder head 24 by means of bolts or other securing devices passing through the apertures 29 formed in the flanged head 28. The spark plug holding device 27 is provided with an aperture 30, which aperture 30 receives the insulated sparking bar 31, which sparking bar 31 is provided with a projecting stud 32 for the purpose of forming a contact with the contact arm 33 of the circuit closing member 34. This circuit closing member 34 passes through an insulated aperture 35 as is clearly illustrated in Fig. 11. An actuating arm 36 is keyed to the circuit closing member 34. The actuating arm 36 is normally held in an inoperative position by means of a tension spring 38, which will normally hold the contact arm 33 out of engagement with the stud 32 of the sparking bar 31.

A spark plug actuating arm 39 is secured to each of the arms 36, and this arm 39 is formed of a plurality of sections for the purpose of increasing or decreasing the length thereof by means of a turn buckle 40. The lower end of the arm 39 is provided with a widened longitudinal slotted head 41, and the slot 42 formed in the head 41 passes over the valve actuating rod 9 as is clearly illustrated in Fig. 5. The slotted head 41 carries a V-shaped cam plate 43 near the upper end thereof, and this cam plate 43 is adapted to normally engage the spark plug actuating cam 11 of one of the pairs of cams 13 or 14. It will, therefore, be seen that as the cam 11 is rotated in the direction of the arrow indicated in Fig. 5, the rod 39 will be pushed upwardly, thereby swinging the arm 36 upwardly and causing the contact arm 33 to close the circuit with the spark bar 31 and cause the spark to take place at one end of the engine cylinder. It should be understood that the cylinder

head 24 at each end of the cylinder 15 is provided with a similar actuating sparking mechanism as above described.

Each cylinder head 24 is provided with an intake and outlet pocket 44 opened at its lower end for receiving a manifold casing 45. The manifold casing 45 carries inlet and exhaust pipes 49 and 50. Valve stems 52, carrying suitable valves, pass through the casing 45, and springs 53 are carried by the stems 52. A hanger bracket 54 is suspended from the valve manifold 45 and a valve actuating rod 55 is pivoted upon the bracket 54. This actuating rod 55 is provided with a fork-shaped end 56 which fits over the cam 12 of one of the sets of cams 13 and 14.

The cylinders are provided with the usual cylinder heads 24 as above stated, and suitable valve means and ports are arranged therein for controlling the entrance and exhaust gases to and from the explosive cylinders.

Having thus described the invention what is claimed as new, is:—

A device of the class described comprising a cylinder, a cylinder head, a spark plug, a lever for actuating said spark plug, an operating arm secured to said lever, means for normally holding said lever in an inoperative position, means for permitting the adjustment of said operating arm, one end of said operating arm provided with a longitudinally extending slot, a substantially V-shaped plate secured to said arm adjacent said slot, a cam adapted to engage said substantially V-shaped plate for reciprocating said arm as said cam is rotated for causing the operation of said spark plug, and means for controlling the inlet and exhaust to and from said cylinder.

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

RICHARD M. DAY.

Witnesses:

A. O. OFSLAEL,
R. O. JOHNSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."