J. M. DAYTON.

IGNITION SYSTEM FOR GAS ENGINES.

APPLICATION FILED APR. 25, 1914.

1,269,062.

Patented June 11, 1918.

2 SHEETS—SHEET 1.

Fig. 1.

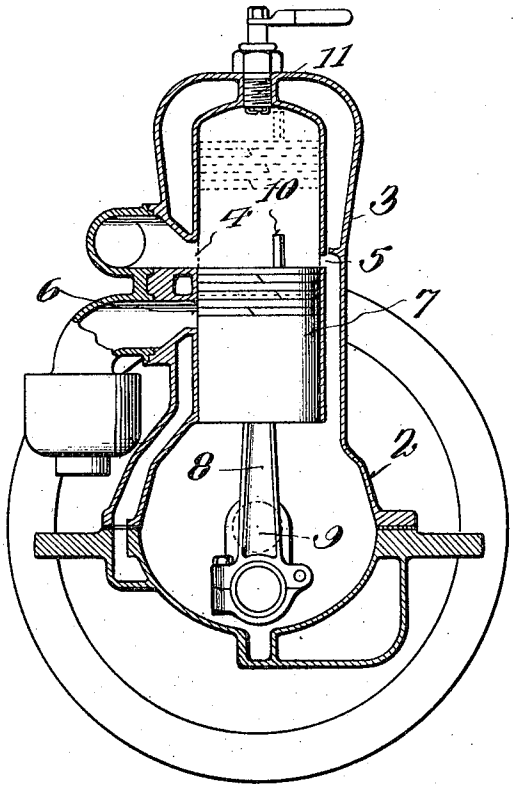
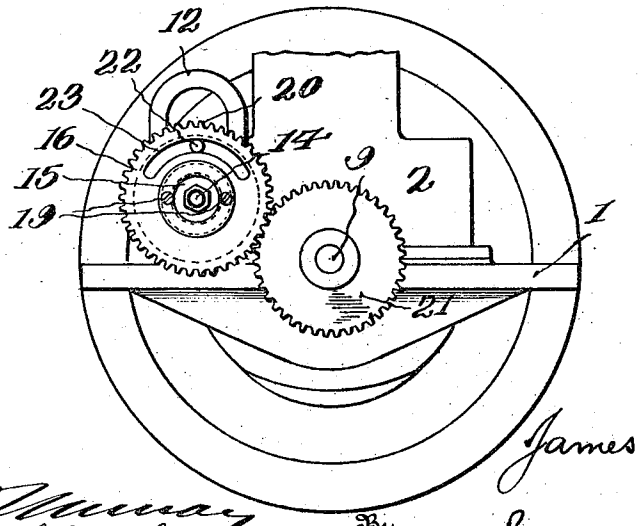


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 3.

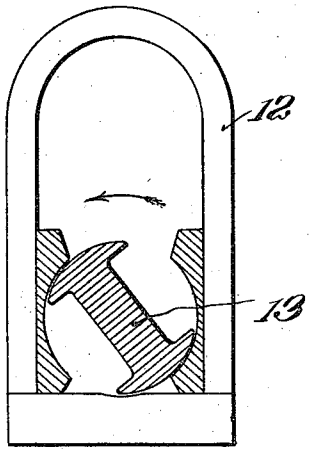


Fig. 4.

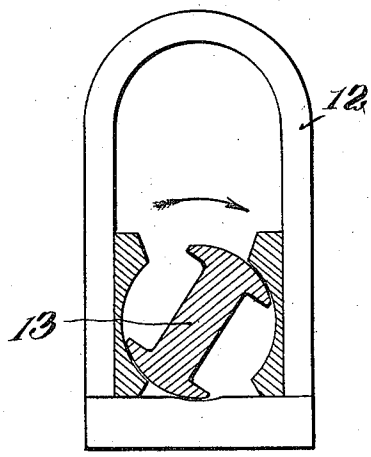
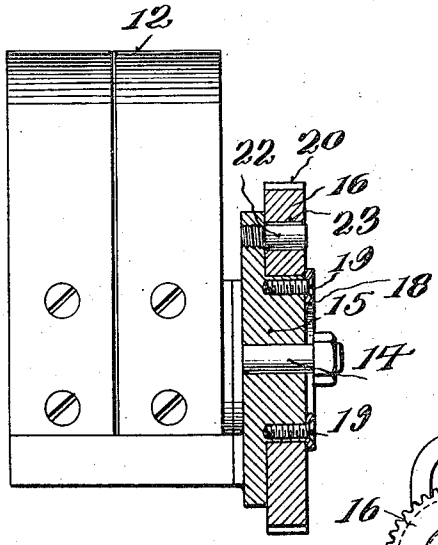


Fig. 5.



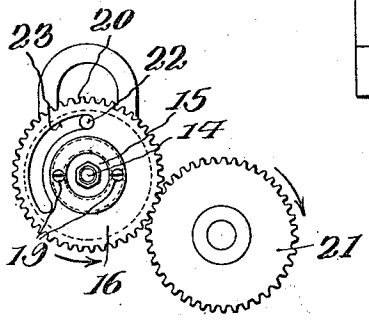


Fig. 6.

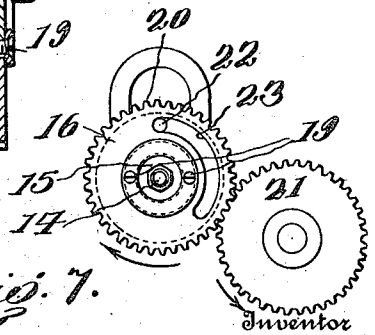


Fig. 7.

Witnesses

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UNITED STATES PATENT OFFICE.

JAMES M. DAYTON, OF TORRINGTON, CONNECTICUT, ASSIGNOR, BY MESNE ASSIGNMENTS, TO THE TORRINGTON COMPANY, OF TORRINGTON, CONNECTICUT, A CORPORATION OF CONNECTICUT.

IGNITION SYSTEM FOR GAS-ENGINES.

1,269,062. Specification of Letters Patent. Patented June 11, 1918.

Application filed April 25, 1914. Serial No. 834,421.

To all whom it may concern:

Be it known that I, JAMES M. DAYTON, a citizen of the United States, residing at Torrington, in the county of Litchfield, State of Connecticut, have invented certain new and useful Improvements in Ignition Systems for Gas-Engines, of which the following is a description, reference being had to the accompanying drawing, and to the figures of reference marked thereon.

The invention relates to new and useful improvements in ignition systems for gas engines, and more particularly to an ignition system for a gas engine, which is capable of being reversed—that is, operated in either direction.

An object of the invention is to provide an ignition system of the above character, wherein a magneto may be used for furnishing the spark for ignition and the magneto is so constructed and operated that it may be driven from the engine shaft and when the engine shaft is reversed still produce a maximum spark in proper timed relation for the firing of the charge in the cylinder.

In the drawings which show by way of illustration one embodiment of the invention—

Figure 1 is a sectional view, showing a reversible gas engine, to which my invention has been applied;

Fig. 2 is an end elevation, showing a part of the gas engine and a magneto with my improved driving connection for operating the magneto from the engine shaft;

Fig. 3 is a sectional view through the magneto, showing diagrammatically the position of the armature at the time of producing a spark for ignition when said armature is turned in clockwise direction;

Fig. 4 is a similar view, showing the position of the armature when said armature is turned in counter-clockwise direction;

Fig. 5 is a view, partly in side elevation and partly in section, showing the magneto and the driving connection therefor;

Fig. 6 is a view, showing in end elevation the driving mechanism for the magneto and the position of the parts when said magneto is driven in clockwise direction; and

Fig. 7 is a similar view, showing the parts in position for driving in counter-clockwise direction.

The invention consists generally in providing a gas engine, which is preferably so constructed that the engine may be operated in either direction merely by the initial turning of the shaft in the direction in which it is desired said shaft shall be rotated by the engine, with an ignition system which will furnish a maximum spark in proper timed relation to the firing of the charge in the cylinder. This ignition system includes a magneto which has a driving connection with the shaft of the engine. The direction of the rotation of the armature of the magneto is therefore reversed when the direction of the rotation of the shaft is reversed. The driving connections between the armature and the engine shaft are so formed that there is sufficient lost motion so that when the direction of rotation is reversed the angular position of the armature shaft relative to the main shaft of the engine will be shifted or varied, so as to bring said armature into position for a maximum spark at the proper time for firing the charge in the cylinder.

Referring more in detail to the drawings, the invention, as herein illustrated, consists of an engine having a supporting base 1, on which is mounted a casing 2, having a cylinder 3 attached thereto. Said cylinder has an exhaust port 4 and an intake port 5. The crank casing is a closed casing and is connected by a port 6 with a carbureter. Reciprocating in the cylinder 3 is a piston 7, which is connected by a piston rod 8 to the main shaft 9. This is the well known three-port gas engine and operates in the following manner.

When the piston is in the position shown in Fig. 1 of the drawings, the gases are being exhausted through the port 4 and a new supply of gases is entering the cylinder through the port 5. A baffle plate 10, carried by the piston, facilitates exhausting the gases and the bringing of the new charge into the cylinder, the new charge driving out the gases. When the piston is moved upward in the cylinder the gases are compressed at the upper end thereof. This upward movement of the piston also uncovers the intake port 6 and the slight vacuum produced in the crank casing by the upper movement of the piston causes the

mixed charge of gas and air to enter the crank casing through said intake port 6. At the upper end of the cylinder is a spark plug 11, which is preferably of the jump-spark type. A spark is furnished to this plug and ignites the compressed charge at the upper end of the cylinder. The expansion of the charge due to the combustion of the gases forces the piston 7 downward for the working stroke of the engine. This downward movement of the piston compresses the gases to a certain extent in the crank casing and when the intake port is opened these gases rush into the cylinder and at the same time the burnt gases are exhausted through the exhaust port 4. The engine is, therefore, the well known two-cycle type, and as the intake and exhaust ports are free from valves, the engine may be operated in either direction, depending upon the initial turning of the main shaft 9. That is to say, if the shaft 9 is turned in a clockwise direction, the engine will continue to rotate in this direction, while if the shaft is turned in a counter-clockwise direction, the engine will then rotate in the opposite direction.

The ignition system for the engine includes a magneto 12. This magneto is of the usual type and includes an armature 13 indicated more or less diagrammatically in Figs. 3 and 4 of the drawings. It is well known that magnetos are designed to run in one direction only, and if turned in the reverse direction, while the magneto would produce a spark of the same efficiency, the time of the maximum spark relative to the rotation of the armature will be changed. This will be obvious from an inspection of Figs. 3 and 4 of the drawings. When the armature is positioned as shown in Fig. 3, and the armature is turning in a counter-clockwise direction, said armature is then in a position to give a retarded but efficient spark for ignition purposes, and from this position to the advance position where the pole tip of the armature leaves the pole tip of the field magnet, a substantial spark may be obtained. When the armature, however, is rotated in the opposite direction, the field for an efficient spark is shifted to the position indicated in Fig. 4. That is to say, the armature is shown positioned in this figure, so as to give a retarded but efficient spark for ignition, and an efficient spark may be obtained during a range of movement from the position shown in this figure to the position where the armature pole tip first leaves the pole tip of the field magnet.

The present invention consists in providing means, whereby the position of the armature may be shifted through an angle which is substantially the angle of movement from the position shown in Fig. 3 to the position shown in Fig. 4 upon the reverse movement of the armature of the magneto. This mechanism, as herein shown, is constructed as follows: The armature shaft, is indicated at 14 Fig. 5. Fixed to this armature shaft is a disk 15. A ring 16 is mounted on this disk 15, and has a bearing thereon at 17. A plate 18 is secured to the disk 15 by screws 19, which holds the ring in place on the disk. This ring is provided with gear teeth 20 which mesh with a gear 21 fixed to the shaft of the engine. The disk 15 is also provided with a pin 22, which is threaded into the disk and extends into a segmental slot 23 formed in the ring 16. This pin forms the sole connection between the disk 15 and the ring 16. A rotation of the ring 16 in the direction of the arrow, shown in Fig. 7, by the rotation of the main shaft of the engine will cause the ring 16 to be turned until the pin 22 engages the end of the slot 23 and then the armature will be rotated with the ring 16. A rotation of the ring 16 in the opposite direction will cause the pin 22 to shift to the other end of the slot 23. The length of this slot is the arc of the angle between the two positions of the armature shown in Figs. 3 and 4.

From the above description, therefore, it will be apparent that when the engine shaft is rotating in a clockwise direction the pin 22 will be positioned in the slot 23, as shown in Fig. 6, and the armature will be rotating in the direction indicated in Fig. 3, and the position of the armature for an efficient spark in firing will be as indicated in this figure. Upon the reversing of the engine, the gear 21 on the engine shaft will turn in the opposite direction, the armature of the magneto will remain at rest until the pin 22 reaches the other end of the slot 23, as shown in Fig. 7. The armature will now rotate in the direction shown in Fig. 4 and the position of the armature relative to the position of the main shaft of the engine has been shifted, so that said armature is in proper position for a maximum spark when the crank of the engine is in the same position for compression as before it was reversed. In other words, the position of the engine shaft is always the same for firing, whether the engine is rotating in one direction or the other and this lost motion in the operating connections for the magneto will shift the armature so that it will also be in position for a maximum spark at the same time as the rotation of the engine shaft, regardless of whether the magneto armature is rotated in one direction or the other.

It is obvious that minor changes in the detail of construction and arrangement of parts may be made without departing from the spirit of the invention as set forth in the appended claims.

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

1. The combination with a reversible gas engine, of an ignition system therefor including a magneto, driving connections between said magneto and the shaft of the engine, said connections comprising means for shifting the timing of the movement of the armature of the magneto when said engine is reversed, whereby a maximum spark may be produced in proper timed relation to the firing of the charge.

2. The combination with a reversible gas engine, of an ignition system therefor including a magneto, driving connections between the magneto and the shaft of the engine, said driving connections including means for automatically controlling the timing of the armature of the magneto relative to the engine shaft, whereby maximum sparks are produced in proper timed relation to the firing of the charge upon the operation of the engine shaft in either direction.

3. The combination with a reversible gas engine, of an ignition system therefor including a magneto, driving connections between said magneto and the shaft of the engine, said connections comprising a disk connected to the armature shaft of the magneto, a member connected to the engine shaft for rotating said disk, and devices connecting said member and disk, said devices permitting said disk to be shifted relative to said member when the direction of rotation of said member is reversed, so that said magneto will give a maximum spark in the same timed relation to the rotation of said member regardless of the direction of rotation of said member.

4. The combination with a reversible gas engine, of an ignition system therefor including a magneto, driving connections between said magneto and the shaft of the engine, a disk fixed to the armature shaft, a gear mounted to rotate freely concentric with the armature shaft, said gear being connected to the shaft of the engine, whereby the same is positively driven thereby, said gear having a slot formed therein and a pin carried by said disk and engaging said slot, said slot being of sufficient length to shift the position of the armature relative to the driving gear therefor when the direction of the magneto is reversed, so as to position said armature for a maximum spark at the same time relative to the rotations of said gear.

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

JAMES M. DAYTON.

Witnesses:
G. E. HAMMANN,
CHARLES M. HIBBARD.

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