

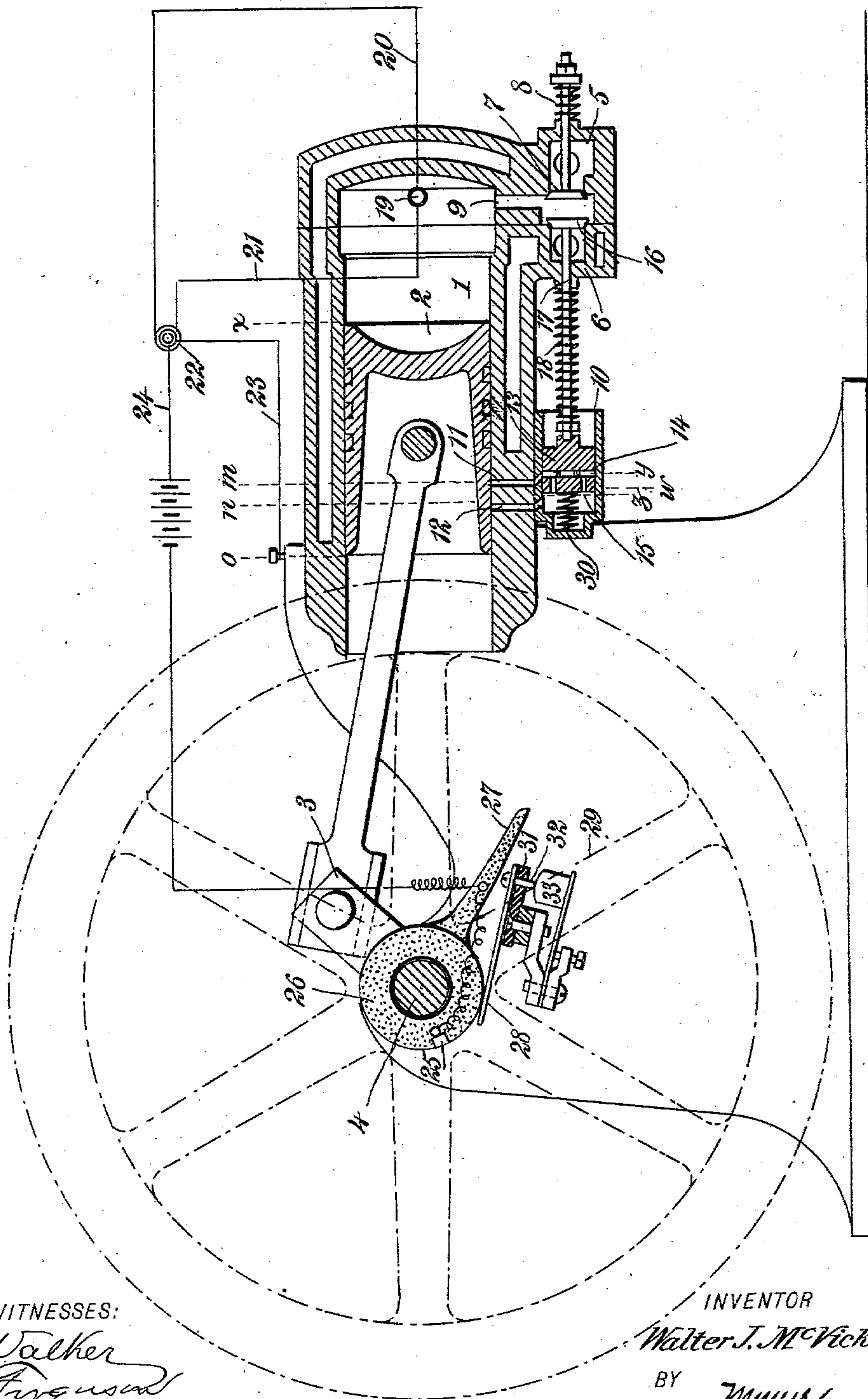
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W. J. McVICKER.
VALVE GEAR FOR EXPLOSIVE ENGINES.

APPLICATION FILED SEPT. 22, 1902.

NO MODEL.



WITNESSES:

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WALTER J. McVICKER, OF ROGERS, NEBRASKA.

VALVE-GEAR FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 743,915, dated November 10, 1903.

Application filed September 22, 1902. Serial No. 124,348. (No model.)

ISSUED

To all whom it may concern:

Be it known that I, WALTER J. McVICKER, a citizen of the United States, and a resident of Rogers, in the county of Colfax and State of Nebraska, have invented new and useful Improvements in Valve-Gear for Explosive-Engines, of which the following is a full, clear, and exact description.

This invention relates to improvements in gas or gasolene engines of the four-stroke cycle-compression type, the object being to provide a simple means for operating the exhaust-valve by the explosion of gas or gasolene vapor in an auxiliary cylinder containing a movable piston, thus dispensing with all gears, cams, eccentrics, &c., and further to provide a means by which the speed of the engine may be exclusively controlled by electricity.

I will describe a valve-gear for explosive-engines embodying my invention and then point out the novel features in the appended claims.

Reference is to be had to the accompanying drawing, forming a part of this specification, in which the figure is a longitudinal section of a gas-engine embodying my invention.

Referring to the drawing, 1 designates the main cylinder, in which the main piston 2 operates, said piston having connection with a crank 3 on the driving-shaft 4. The inlet-chamber is indicated at 5 and the exhaust-chamber at 6. The inlet from the chamber 5 is controlled by a valve 7, held normally against its seat by means of a spring 8. The inlet and exhaust chambers communicate with the main cylinder through the port 9. Attached to the main cylinder is an auxiliary cylinder 10, having ports 11 and 12, communicating with the main cylinder. Operating in the auxiliary cylinder is a piston 13, having an annular port 14 and ports 15 leading therefrom to the rear side of the piston. The exhaust-valve 16 has its stem 17 loosely engaged with the piston 13, and surrounding said stem 17 is a spring 18. The spring 18 bears at one end against an abutment on the stem and at the other end against a wall of the exhaust-chamber.

From a sparking device 19 in the main cylinder wires 20 21 lead to the secondary of an induction-coil 22, and from the primary of

the induction-coil a wire 23 leads to connection with the frame of the engine, and a wire 24 leads to connection with a contact-point 25, seated in a collar 26, of insulating material, arranged around the shaft 4. This collar is provided with a handle 27, by means of which it may be adjusted to cause the sparking at the desired moment. A contact-finger 28 is carried by the fly-wheel 29 and is designed at intervals to engage with the contact 25 to close the circuit and cause the spark.

The operation is as follows: As the main piston moves outward on its suction-stroke, the admission-valve 7 is opened against the resistance of the spring 8 by atmospheric pressure, and an explosive mixture is drawn into the cylinder 1. When the line x of the piston 2 reaches the line m , it has uncovered the passage or port 11, which leads to the auxiliary cylinder and through the piston 13. As the piston 13 is detached from the valve-stem 17, it is free to move inward against the resistance of a spring 30. The said spring 30, it may be here stated, has less resistance or is weaker than the spring 8 for the admission-valve, so that when the line x of the piston 2 moves from m to n the cylinder 10 will be exhausted through the passages or ports 15 and 11 into the main cylinder and the line w of the piston 13 will be moved toward the line z against the resistance of the spring 30. The main piston 2 has completed its suction-stroke when its line x reaches the line n , and the main cylinder 1 now contains an explosive mixture of gas or vapor. Further, the operation may be stated as follows: As the main piston 2 moves from n to m on its compression-stroke, it expels a portion of the explosive mixture in the cylinder 1 through the passages 15 and 11 into the auxiliary cylinder and fills it with an explosive mixture. When the piston 2 completes its compression-stroke, the explosive mixture in the cylinder is ignited by a spark from the plug 19. The expansion of the burning gas moves the main piston outward, and when its line x uncovers the passage 11 the burning gas in the cylinder ignites the explosive mixture in the auxiliary cylinder by coming in contact with it through the passages 11 and 15. The explosion of gas in the auxiliary cylinder now

moves the piston 13 outward against the resistance of the spring 18, and thus opens the exhaust-valve. The main piston does not uncover the passage 12 on its outer stroke, and when the auxiliary piston 13 moves out the passage 15 is disconnected from the passage 11, so that the pressure is sealed in the auxiliary cylinder, and thus the exhaust-valve is held open until this pressure is relieved.

10 The main piston 2 now moves inward on its expelling stroke, and when its line *o* reaches the line *n* it has completed its expelling stroke and uncovered the passage or port 12, which relieves the pressure in the cylinder

15 10 and allows the spring 18 to close the exhaust-valve 16. Thus one cycle of four strokes is completed. The speed is controlled by interrupting the electric current used to ignite the charge, and thus preventing an explosion,

20 as follows: It may be here stated that the contact or brush 28 is mounted on a block 31 of insulating material and carries a contact-point 32 for engaging with a block 33 in electric connection with the fly-wheel. As the

25 contact or brush 28 is moved around the collar 26, it will come in contact with the contact 25, closing the primary to produce the spark at 19.

In case of overspeed the centrifugal force will cause the block 33, which is mounted on a spring-plate, to separate from the contact-point 32, and thus interrupt the primary current, which will prevent an explosion until the speed falls to the normal. The sparking device and governor, however, form no part of the present invention.

It will be noted that the passage 11 is only opened at the outer end of the stroke and the passage 12 is only opened at the inner end and that the piston 13 forms a valvular appliance for holding the pressure in the auxiliary cylinder.

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

1. In an explosive-engine, a main cylinder having inlet and outlet ports, a main piston operating therein, an auxiliary cylinder having port communication with the main cylinder, a piston operating in the auxiliary cylinder,

der, the said piston having an annular port, and ports leading therefrom to the rear of the piston, and a valve for the exhaust having loose connection with the piston in the auxiliary cylinder and operated by the explosion of gas or vapor mixture in said auxiliary cylinder, while one of the ports is closed by the piston in the main cylinder.

2. In a gas-engine, a main cylinder, a main piston operating therein, an inlet-chamber and exhaust-chamber, the said chambers being in port communication with the main cylinder, valves for said chambers, an auxiliary cylinder having two ports communicating with the main cylinder, one rearward of the other, a piston operating in said auxiliary cylinder and having ports in connection with the ports leading to the main cylinder while the main piston is in forward position, and the said main piston operating to cut off the communication when in rearward position, and a stem extended from the exhaust-valve and having loose connection with the piston in the auxiliary cylinder.

3. In a gas-engine, a main cylinder, a main piston operating therein, an inlet-chamber and exhaust-chamber, the said chambers communicating with the main cylinder, an inlet-controlling valve, a spring for holding said valve to its seat, an exhaust-valve, an auxiliary cylinder having two ports communicating with the main cylinder and adapted to be cut off by the main piston, a piston operating in the auxiliary cylinder and having ports normally communicating with the first-named ports, a spring engaging with said piston and having a less resistance than the spring of the inlet-controlling valve, a stem extended from the exhaust-valve and having loose connection with the piston of the auxiliary cylinder, and a spring for holding said exhaust-valve to its seat.

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

WALTER J. McVICKER.

Witnesses:

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