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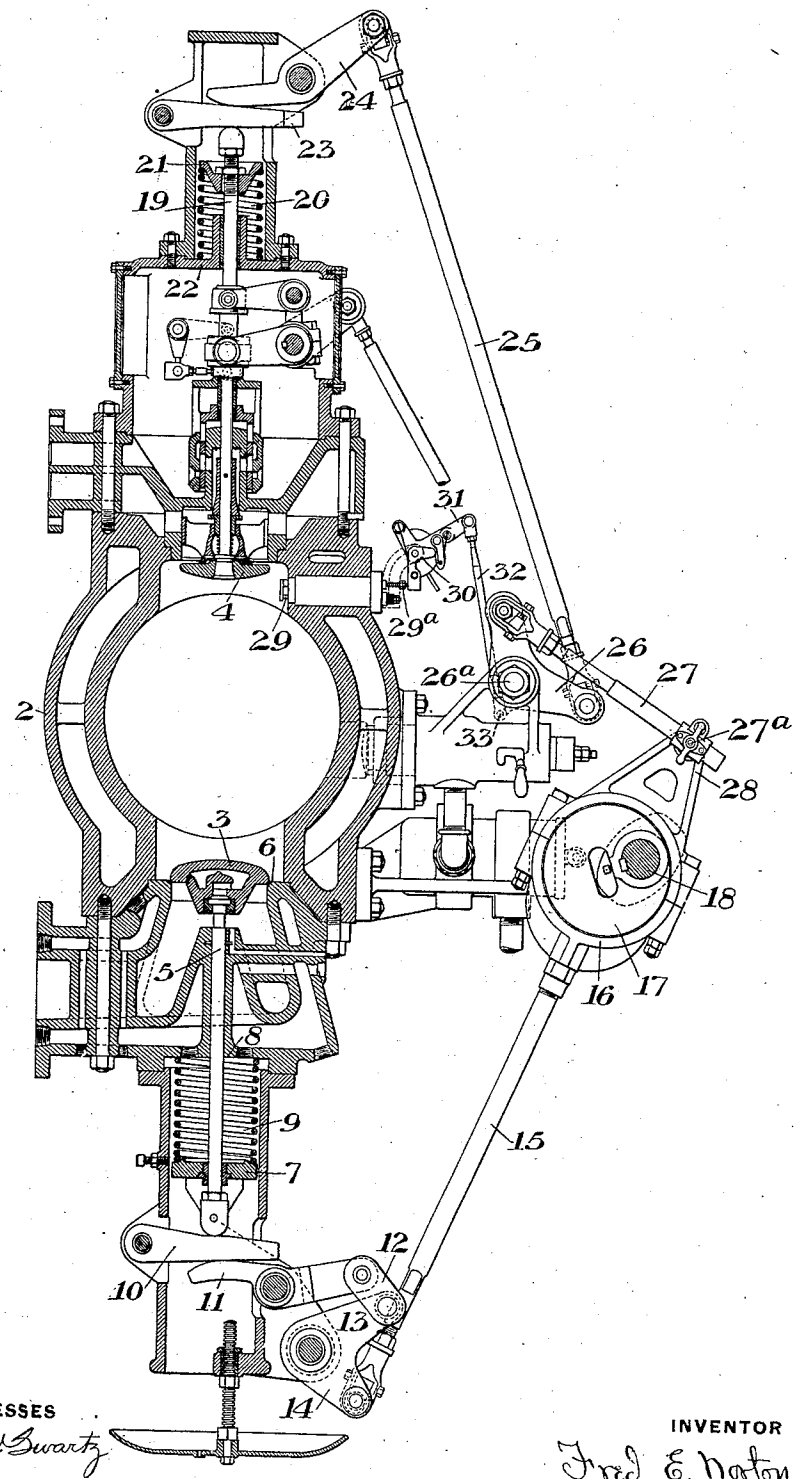
F. E. NORTON.

VALVE GEAR FOR GAS ENGINES.

APPLICATION FILED APR. 11, 1906.



WITNESSES

Warren W. Swartz

R. A. Balderson.

INVENTOR

Fred E. Norton,

by Baldwin & Peyrnes

his Attys.

UNITED STATES PATENT OFFICE.

FRED E. NORTON, OF YOUNGSTOWN, OHIO.

VALVE-GEAR FOR GAS-ENGINES.

No. 884,677. Specification of Letters Patent. Patented April 14, 1908.

Application filed April 11, 1906. Serial No. 311,032.

To all whom it may concern:

Be it known that I, FRED E. NORTON, of Youngstown, Mahoning county, Ohio, have invented a new and useful Improvement in Valve-Gear for Gas-Engines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification, in which the figure shows a sectional elevation of a gas-engine and valve-gear embodying my invention.

The invention relates to an improved valve gear for gas engines, wherein a single eccentric is used to operate both the inlet and outlet valves for one end of the cylinder, and the invention consists in the novel construction, arrangement, and combination of parts, all substantially as hereinafter described and pointed out in the appended claims.

In the drawings, 2 represents the cylinder of the engine, 3 the exhaust valve and 4 the inlet valve. The exhaust valve 3 is carried by the freely moving stem 5, its seat being at 6. Interposed between a head 7 on the stem 5 and a fixed bearing 8 of the engine frame is a spiral spring 9 which normally holds the valve in closed position. The outer end of the stem 5 is engaged by a lever 10 which, in turn, is actuated by one arm of a lever 11 whose other arm is connected by a link 12 with an arm 13 of a bell crank lever, whose other arm 14 is connected by a rod 15 to the eccentric strap 16 of an eccentric 17 on a shaft 18. The shaft 18 is the usual half speed valve gear shaft.

The inlet valve 4 is carried by a stem 19 which is provided with a closing spring 20, seated between a collar 21 and a fixed bearing 22, and which is actuated to open the valve by means of a lever 23. The lever 23 is in turn actuated by a lever 24 connected by a rod 25 with a bell-crank lever 26, the other arm of which is connected by rod 27 to a detaching pin 27^a of an arm 28 of the strap, of the eccentric 17. The position of the arm 28, of the bell-crank center 26^a, and the point of connection between the bell-crank lever 26 and the rod 27 should be substantially as shown in order to secure the proper timing of the operations of the valve 4, and in order to secure a rapid valve action. The relative positions of these parts to the center line of the eccentric rod 15 is fixed by the desired time of opening and closing the inlet and exhaust valves.

The arrangement of the compound lever mechanism for actuating the valve 3 may be varied in detail, but that shown is preferred, as it secures a rapid opening movement of the valve, and a small movement of the levers when the valve is closed, thus diminishing the required throw of the eccentric 17.

For the purpose of adjustment, the eccentric 17 may be revolved about the shaft 18 and the rods 15, 25 and 27 adjusted so as to secure any desired timing for the valves 3 and 4. The shaft 18 should be located substantially as shown and should always revolve in such a direction that its upper portion will turn away from the cylinder, in order to preserve the proper sequence of the valve movements.

The operation of the gear is as follows: The shaft 18 turns to the right (*i. e.*) clockwise, and in the position of the parts shown in the drawing, is just permitting the closing of the exhaust valve 3, while the inlet valve 4 is just opening, the engine crank being on the center, and just about to begin the inlet stroke. Further movement of the eccentric 17 results in the complete closing of the exhaust valve 3, and widely opening the inlet valve 4. When the eccentric has turned about 90 degrees, the inlet valve will close, and for the succeeding 180 degrees, all the valves will be closed. During the remaining 90 degrees of eccentric travel, the exhaust valve will be opened and closed. By proper adjustment of the rods 15 and 25, these relative angles can be increased or diminished to suit varying conditions. The shaft 18 may be placed at either side of the cylinder, but its essential relative location must be preserved substantially as shown.

29 designates a sparker or igniter, which is shown as of the form described and claimed in my copending application, Serial No. 311,034, of even date herewith. The movable contact carrying spindle 29^a of this igniter is actuated by a latch and hammer device 30. This device is in turn actuated by a lever 31 which is connected by a rod 32 to a point, such as 33, on the bell crank lever 36, so that all the functions necessary for a four-cycle engine valve gear are performed by means operated from the single eccentric.

The invention secures all the advantages of the usual cam drive in the way of rapid opening and closing of the valves, and in the facility of adjustment for proper seating of the valves. It also greatly simplifies the construction and operation of the gas engine

by replacing the cumbersome and expensive cams commonly used by a single eccentric of moderate size and cheap construction. The operation of the igniter is greatly simplified, and the same disengaging pin which disengages the inlet valve, automatically throws the corresponding igniter out of action, and conversely, one detaching mechanism throws the whole gear into action when starting the engine.

What I claim is:—

1. In valve gear for four-cycle gas engines, the combination of a shaft, an eccentric thereon, rod and lever connections from the eccentric for operating the exhaust valve, a disengaging pin in the strap of the eccentric, and rod and lever connections from said pin for operating the inlet valve, said pin being detachable from the connections; substantially as described.

2. In a four-cycle gas engine, an eccentric for one set of inlet and outlet valves, one of said valves being driven directly from a rod of said eccentric, and means for operating the other valve from a disengaging pin in the eccentric strap; substantially as described.

3. In a four-cycle gas engine, a single eccentric for one set of inlet and outlet valves, connections for driving one valve directly from a rod of said eccentric, connections for operating the other valve from the strap of the eccentric, an igniter, and connections for operating the igniter from the eccentric; substantially as described.

4. In a four-cycle gas engine, the combination of an inlet valve, an outlet valve, a single eccentric for said valves, connections for operating one valve directly from a rod of said eccentric, detaching connections for operating the other valve from a point in the strap of the eccentric, an igniter, and means for operating the igniter, so connected to a part of the mechanism for operating the inlet valve, that its motion is disengaged simultaneously with the disengagement of the inlet valve motion; substantially as described.

In testimony whereof, I have hereunto set my hand.

FRED E. NORTON.

Witnesses:

REGINALD P. DRYER,

PETER KIRKEVAAG.