

No. 699,014.

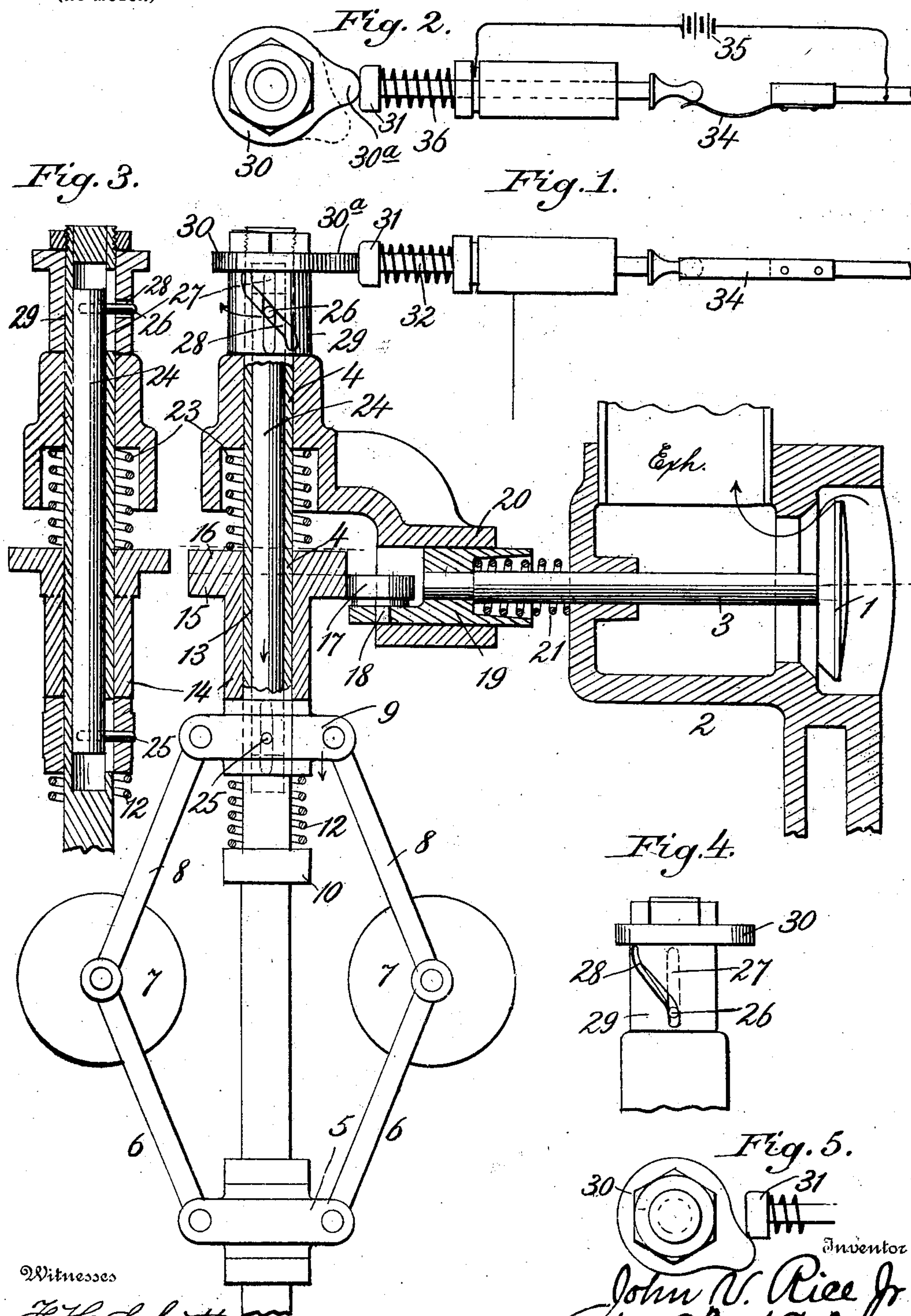
Patented Apr. 29, 1902.

J. V. RICE, JR.

IGNITER FOR EXPLOSIVE ENGINES.

(Application filed Aug. 30, 1897. Renewed Nov. 3, 1900.)

(No Model.)



Witnesses

J. H. Schott  
J. A. Paul

Inventor

John V. Rice Jr.  
per Fred W. Baker.  
Attorney



# UNITED STATES PATENT OFFICE.

JOHN V. RICE, JR., OF EDGEWATER PARK, NEW JERSEY, ASSIGNOR, BY  
MESNE ASSIGNMENTS, TO WILLIAM O. WORTH, OF CHICAGO, ILLINOIS,  
WILLIAM R. DONALDSON, OF LOUISVILLE, KENTUCKY, AND HENRY  
W. KELLOGG, OF BATTLECREEK, MICHIGAN.

## IGNITER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 699,014, dated April 29, 1902.

Application filed August 30, 1897. Renewed November 3, 1900. Serial No. 35,391. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN V. RICE, Jr., a citizen of the United States, residing at Edgewater Park, in the county of Burlington and State of New Jersey, have invented certain new and useful Improvements in Gas-Engines; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to gas-engines; and its object is to provide an improved construction of the same which shall possess superior advantages with respect to efficiency in use.

The invention consists in the novel construction and combination of parts hereinafter fully described and claimed.

In the accompanying drawings, Figure 1 is a longitudinal sectional view, partly in elevation, of a gas-engine governor constructed in accordance with my invention, also showing the exhaust-valve of the engine. Fig. 2 is a plan view. Fig. 3 is a detail longitudinal section taken in a plane at right angles to Fig. 1. Fig. 4 is a detail side elevation of the slotted sleeve and cam for operating the sparking mechanism. Fig. 5 is a plan view of the same.

In the said drawings the reference-numeral 1 designates the exhaust-valve of a gas-engine, 2 the casing thereof, and 3 the stem.

The numeral 4 designates a rotatable governor-rod so connected with some moving part of the engine as to work in unison therewith. This rod is provided with a fixed collar 5, to which are pivoted links or arms 6, also pivoted to the governor-balls 7. Said balls are also provided with pivoted links or arms 8, the other ends of which are pivoted to the collar 9, movable on said rod. The numeral 10 designates a fixed collar on said rod, between which and the movable collar 9 is interposed a coiled spring 12. Said rod 4 from a point a short distance from the collar 10 to the upper end is made hollow, forming a tubular portion 13, in which is located a movable rod, for a purpose hereinafter described. Located above the collar 9 and resting therein is a mov-

able sleeve 14, provided with a cam 15 and a circular disk 16, with which is adapted to engage a wheel or roller 17, journaled to a lug 18 of a movable block 19, working in a recess in a bracket 20, through the upper end of which the rod 4 passes. This block at the opposite end is formed with a recess in which is seated one end of a coiled spring 21, embracing the valve-stem 3, and the other end bearing against the casing 2. Between the said bracket and the disk 16 is a coiled spring 23.

Located in the tubular portion of the rod 4 is a rod 24, connected by a pin 25 with the movable collar 9. The upper end of this rod is provided with a pin 26, passing through a slot 27 in the rod 4 and engaging with a spiral slot 28 in a sleeve 29, rotatable on said rod 4, the construction being such that as said rod 24 is elevated the sleeve 29 will be partially rotated. Secured to the sleeve is a cam 30, which engages with a head 31 of a movable rod 32, which extends into the engine-cylinder and forms one electrode of a sparking mechanism. The other electrode 34 is stationary. These electrodes are connected with an electric battery 35. The numeral 36 designates a coiled spring for throwing the rod 32 outward and breaking the electric circuit when the cam-point 30<sup>a</sup> passes beyond the head 31.

During the operation of the engine the piston on the first outstroke draws a mixture of gas and air into the cylinder. On the return stroke the charge is compressed and just as the crank is passing the back center it is fired, forcing the piston forward. As the piston nears the limit of this second outstroke the disk cam, Fig. 1, opens the exhaust-valve, clearing the cylinder of the spent product, and holds it open during the return stroke. These operations are repeated as long as the speed remains at or below the normal; but should the speed go above normal the governor-weights fly out and draw the collar 9, attached to governor-links, away from the sleeve carrying the cam 15. The spring 23 will now press against the disk 16, tending to force the



disk and cam against the collar 9, but is prevented from moving owing to the disk riding on the side of roller 17 until the cycle is completed and roller 17 is on the high point of the cam, at which time the disk is permitted to slip toward collar 9, and the roller 17 will then be riding on the disk, holding open the exhaust-valve, which will necessarily prevent compression or suction. The exhaust-valve remains open until the speed falls slightly below normal and the weights approach the axis of rotation, when the collar 9 will be pressed against the sleeve 14, compelling the cam 15 to ride back upon the roller 17.

It will be observed that no matter what position the piston may be in as soon as the speed decreases the exhaust-valve will close, and a proportionate amount of gas and air will be drawn in.

I have found that by igniting considerably before the piston reaches the top center on compression that greater speed and power are obtained, and for slower speeds the igniter should be correspondingly later.

The disadvantage of having a positive point of ignition is that at a high speed the power decreases, whereas if it would spark proportionately earlier as the speed increases again in the power of the engine is effected. If it sparks too early, there would be a tendency to reverse direction, and therefore a consequent loss of power. I have therefore provided means whereby the spark is produced before the piston reaches the end of its stroke, the time of sparking being proportioned to the speed of the engine. As the governor-rod 4 increases in speed the rod 24 will be lowered, and through the medium of the pin 28 and spiral slot in the sleeve 29 the latter will be rotated or turned, shifting the cam 30, so that it will operate the movable electrode to make the spark at a point before the piston reaches the end of its stroke proportionate to the speed of the engine.

Having now fully described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a governor for gas-engines, the combination with a tubular governor-rod, of a rod within the same, centrifugally-acting means connected with the inner rod, a sparking device, and a cam that actuates the sparker and is engaged by the aforesaid inner rod for the purpose of shifting said cam, substantially as described.

2. In a governor for gas-engines, the combination with a tubular rod, of a rod within the same, centrifugally-acting means carried by the tubular rod and connected with the inner rod, a sparking device, a rotary actuat-

ing cam therefor, said cam being shiftable by connection with the aforesaid inner rod, and the exhaust-valve and the cam arranged in connection therewith.

3. In a governor for gas-engines, the combination with the tubular governor-rod, the links, the balls, the movable collar, the rod located in said tubular rod, the pin engaging with said collar, the pin at the opposite end of said rod passing through a slot in said rod, the rotatable sleeve having a spiral slot with which said last-mentioned pin engages, the cam on said sleeve, and the spring-actuated electrode, substantially as described.

4. In an engine-governor, the combination with a tubular governor-rod, of a rod within the same, governor means connected with the inner rod, a sparking device, and a cam engaged by the aforesaid inner rod, all arranged to operate so that the spark will be produced at the proper point in the length of the stroke of the piston, substantially as described.

5. In a governor for gas-engines, the combination with the tubular governor-rod, of the centrifugally-acting governor devices, the movable collar, the rod within the tubular rod, said inner rod having a pin engaging the movable collar, the sparking devices, a rotary cam for operating the sparker, said cam being on a slotted sleeve engaged by another pin on the inner rod, all substantially as described.

6. In an engine of the class described, a cylinder, a valve for controlling the supply of fuel for said cylinder, an igniter for said charge of fuel, a speed-responsive device driven by said engine, an internal and external shaft, the internal shaft connected to the governor and adapted to be reciprocated thereby, a device on the external shaft for operating the igniter, and a dog or the like, connected to the internal shaft and extending through the hollow shaft, whereby the said device, or a part thereof may be rotated, when the said internal shaft is reciprocated, substantially as set forth.

7. An internal-combustion motor having a hollow cam-shaft, a sparker-actuating cam loosely mounted thereon, a cam-controlling rod within the hollow shaft, centrifugal weights adapted to actuate the rod as the shaft revolves and means for connecting the rod and sparker-cam.

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

JOHN V. RICE, JR.

Witnesses:

EDMUND WRIGHT, Jr.,  
JOHN H. FRANCK.