D. R. BYRAM.

GAS ENGINE.

APPLICATION FILED MAR. 28, 1913.

1,099,016.

Patented June 2, 1914.

2 SHEETS—SHEET 1.

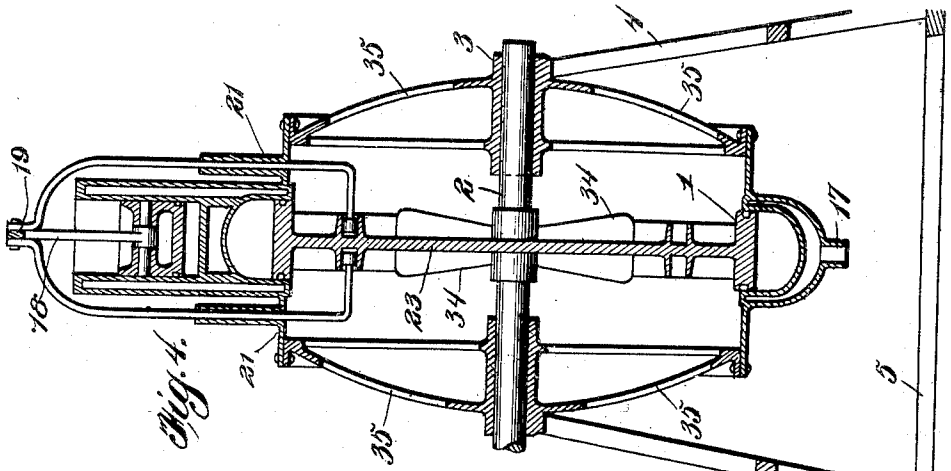


Fig. 4.

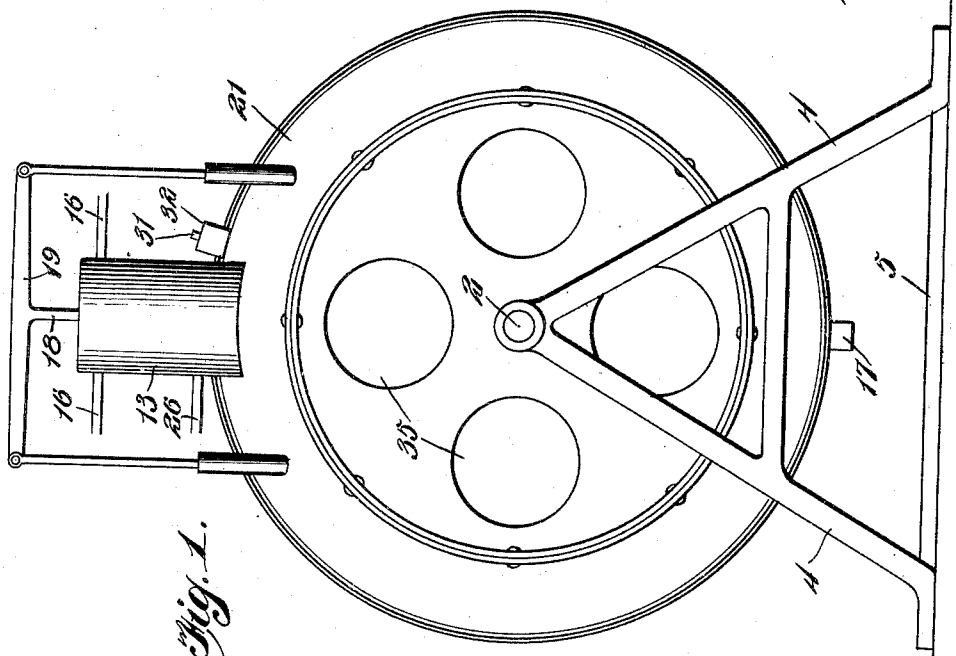


Fig. 1.

Witnesses

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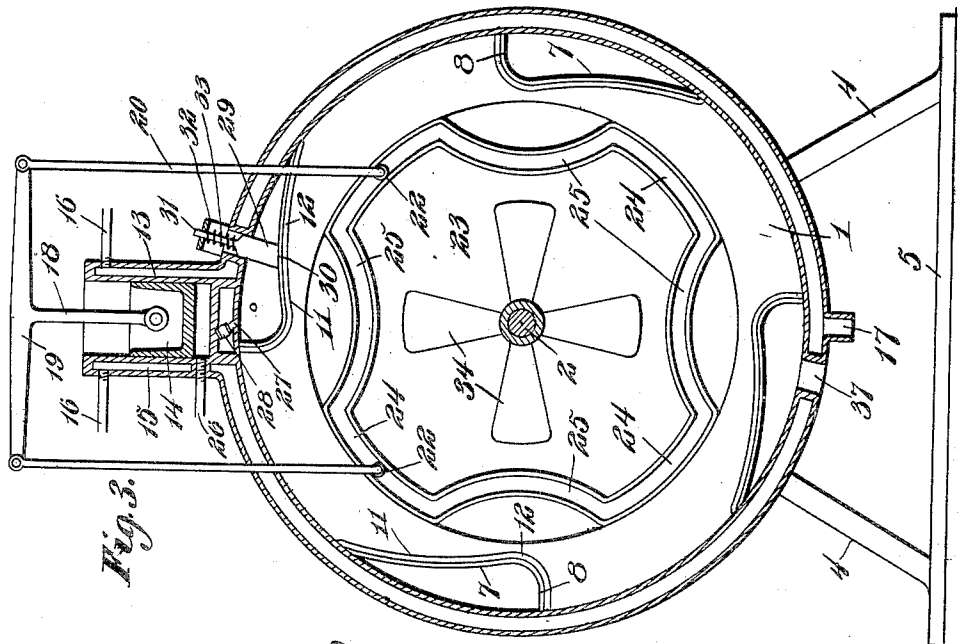


Fig. 3.

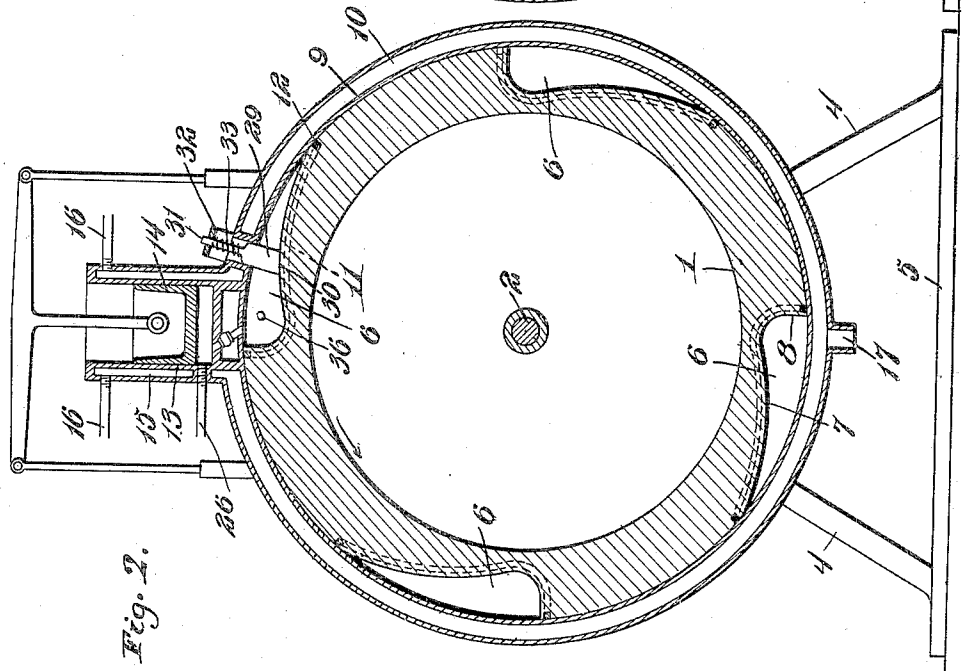


Fig. 2.

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UNITED STATES PATENT OFFICE.

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GAS-ENGINE.

1,099,016. Specification of Letters Patent. Patented June 2, 1914.

Application filed March 28, 1913. Serial No. 757,416.

To all whom it may concern:

Be it known that I, DAVID R. BYRAM, a citizen of the United States, residing at Tupper Lake, in the county of Franklin and State of New York, have invented new and useful Improvements in Gas-Engines, of which the following is a specification.

This invention relates to rotary gas engines, the object in view being to provide an engine of the class described which embodies, in combination with a rotor and casing therefor, a cylinder and reciprocating piston, so associated with the rotor and its casing as to receive and compress the gas and force the same under compression into a plurality of combustion spaces or pockets in the periphery of the rotor, in condition for ignition and expansion.

A further object of the invention is to provide, in connection with the rotor and compressing piston arrangement above referred to, a valve or cut-off so arranged with relation to the rotor, the rotor casing and the compressed gas inlet, that the compressed gas is trapped behind the cut-off, whereby when the gas is ignited and exploded it acts by expansion between said cut off and a part of the surface of the rotor, so as to give an impulse to the rotor, a succession of such impulses being imparted to the rotor in each complete revolution thereof.

A further object of the invention is to provide suitable driving connections between the rotor and compressing piston whereby said piston is automatically reciprocated and properly timed with respect to the rotation of the rotor, for the purpose of forcing gas under compression into the combustion spaces of the rotor.

With the above and other objects in view, the invention consists in the construction, combination and arrangement of parts, as will be hereinafter more fully described, illustrated in the accompanying drawings, and pointed out in the appended claim.

In the drawings: Figure 1 is a front elevation of a rotary gas engine, embodying the present invention. Fig. 2 is a vertical longitudinal section taken about centrally of the motor. Fig. 3 is a vertical longitudinal section through the motor, showing the rotor in side elevation. Fig. 4 is a vertical diametrical section through the motor.

The engine contemplated in this invention comprises a rotor 1 which is of hollow cylindrical formation and supported by a central shaft 2 which extends beyond the opposite sides of the rotor and casing, and is mounted in bearings 3 on a suitable supporting frame, shown for convenience as embodying legs 4, and a base or bed plate 5.

The rotor is provided in the periphery or outer face thereof with a plurality of combustion chambers 6, each of which is substantially wedge-shaped in longitudinal section, embodying a floor or bottom 7 which is inclined with respect to the periphery of the rotor, as clearly shown in Fig. 2, the inclined floor 7 merging gradually into the peripheral face of the rotor at one end, while at the other end it terminates in an impact or pushing face 8, against which the expanding gas acts in imparting an impulse to the rotor, as will hereinafter appear.

The rotor just described is inclosed in a hollow cylindrical casing 9 which lies in close proximity to or in actual contact with the periphery of the rotor, so as to close in the combustion chambers 6, said casing being provided with a surrounding water jacket 10, through which water circulates for the purpose of cooling the engine.

In order to effect a tight non-leaking joint between the rotor and the casing surrounding the same, the rotor is provided in the periphery thereof with a packing groove 11 extending entirely around each combustion chamber, and in said groove is arranged a yielding packing ring 12 which works in close contact with the inner surface of the rotor casing, thereby preventing the leakage of gas from one combustion chamber to another, during the operation of the rotor.

Associated with the rotor casing and secured fixedly thereto, preferably above or at the top of the casing, is a gas compressing cylinder 13, in which is mounted a reciprocatory piston 14, the cylinder 13 being water-jacketed, as shown at 15, and provided with water inlets 16 at opposite sides, by which water is led into and through the jacket 15, said jacket communicating at its lower end with the jacket 10 of the rotor casing, so that the water, after leaving the jacket 15, traverses the jacket 10 and is finally carried off through an outlet nozzle 17 at the bottom of the rotor casing, from

whence it may be passed through a cooling radiator and returned, after being cooled, to the inlets 16, in a manner well understood by those familiar with the art to which this invention appertains.

The piston rod 18 of the piston 14 extends upwardly and carries a cross arm 19, to the opposite extremities of which are attached cam rods 20. These cam rods extend downwardly through oppositely arranged side casing plates 21, and are provided at their lower extremities with antifriction rollers 22 which travel in cam grooves formed in cam plates 23 having a fixed relation to the rotor and driven thereby. Each of said cam grooves embodies a plurality of outwardly extending runs 24, and a corresponding number of inwardly extending runs 25, so that in each revolution of the rotor, the cam rods 20 are moved in the direction of their length, so as to impart a reciprocatory movement to the piston 14, for the purpose of compressing gas which is admitted to the cylinder 13 through an inlet port 26.

A compressed gas inlet passage 27 leads from the inner end of the cylinder 13 inwardly through the rotor casing, as shown in Fig. 2, and within said passage 27 is arranged a check valve 28 facing in a direction which permits the gas to pass in the direction indicated, and which at the same time prevents any gas from returning to the cylinder 13 from the rotor. At one side of the cylinder 13, there is arranged a radially sliding cut-off 29 having an inclined inner edge or surface 30 which rides against the inclined floor 7 of each combustion chamber in the rotor. This cut-off 29 is provided with an outwardly extending stem 31 which passes through a suitable guide 32 and is surrounded by an expansion spring 33 which yieldingly holds the cut-off 29 inwardly against the inclined floor of each combustion chamber successively.

At opposite sides of the rotor, cooling fans 34 are arranged to revolve with the rotor, for the purpose of cooling the parts of the engine within the range thereof, the casing of the engine being provided at any desired number of points with openings 35 to allow the air to enter and leave said casing under the propelling influence of the fans 34.

From the foregoing description, the operation of the engine will be apparent. The gas admitted to the cylinder 13 through the port 26 is compressed by the piston 14 and forced through the passage 27 past the check valve 28 successively into each combustion chamber or pocket in the rotor, and is trapped between the cut-off 29 and the impact wall 8 of the combustion chamber.

A suitable ignition device, such as a spark plug, is located at the point 36, and produces the spark necessary to ignite the compressed gas so trapped, the result being that the gas expands between the cutoff 29 and the impact face 8, and gives an impulse to the rotor in the direction indicated by the arrow in Fig. 2. The burnt gases are carried around by the combustion chambers and finally escape through an exhaust port 37 in the rotor casing.

What is claimed is:

In a rotary gas engine, a cylindrical rotor provided in the peripheral face thereof with a plurality of combustion chambers each embodying an inclined floor which merges into the outer face of the rotor and an impact face substantially radial to the axis of movement of the rotor, said rotor being also provided with cam grooves in its opposite sides, a central shaft on which said rotor is supported, a cylindrical casing inclosing the rotor and lying in close proximity to the periphery thereof, a gas compressing cylinder having a fixed relation to the rotor casing and communicating with the interior of said casing through a compressed gas passage, a reciprocatory piston mounted in said cylinder, a piston rod, a cross arm carried by said piston rod, and a pair of cam rods attached to said cross arm and each forked to comprise two branches which slide through the last named casing and are provided with inturned journals carrying rollers which travel in said cam grooves.

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

DAVID R. BYRAM.

Witnesses:
LOLA ROYS,
JOHN A. CHALMERS.