No. 861,673. PATENTED JULY 30, 1907.

A. N. PARNALL.

GAS ENGINE.

APPLICATION FILED MAY 7, 1906.

2 SHEETS—SHEET 1.

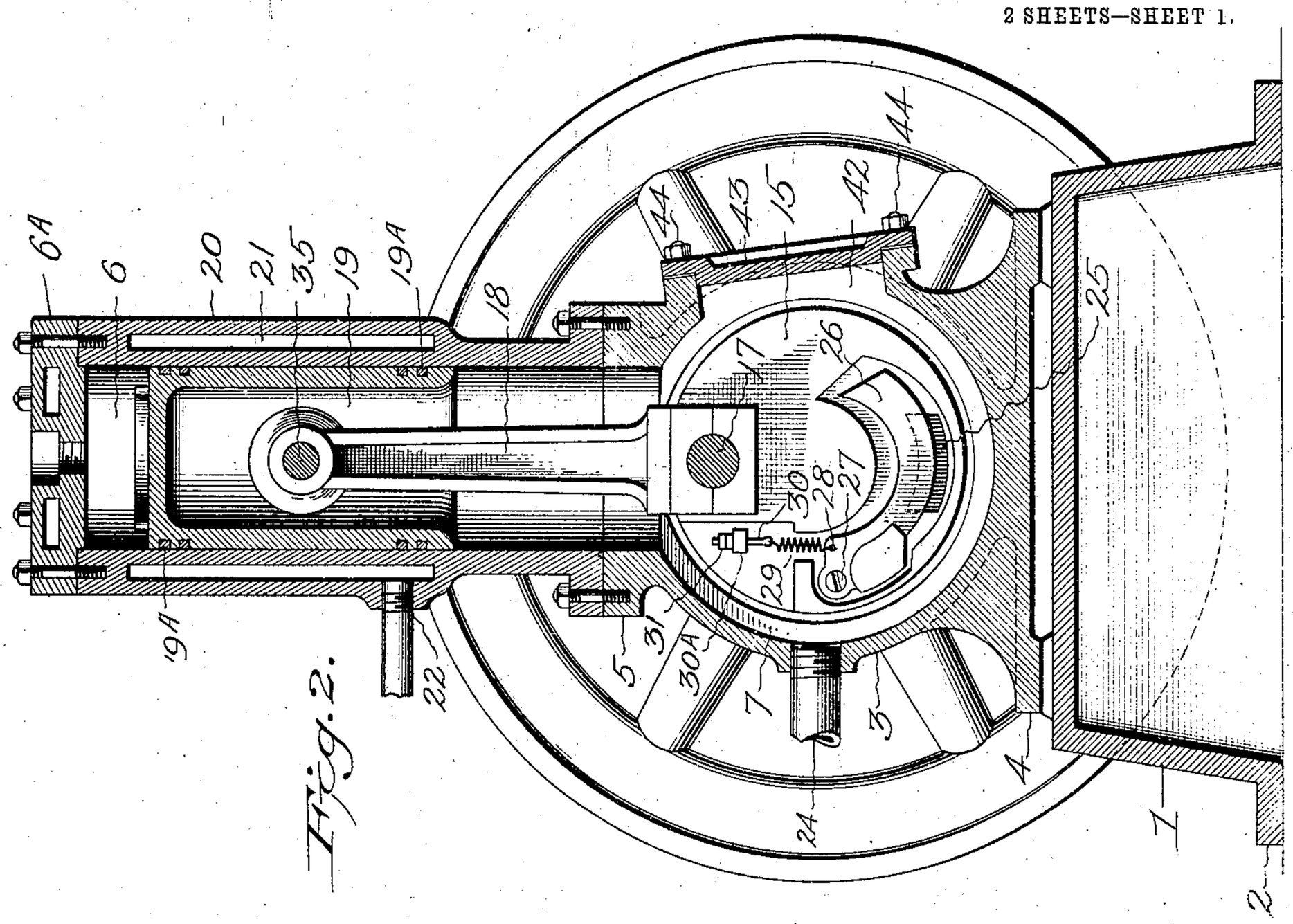

Fig. 2.

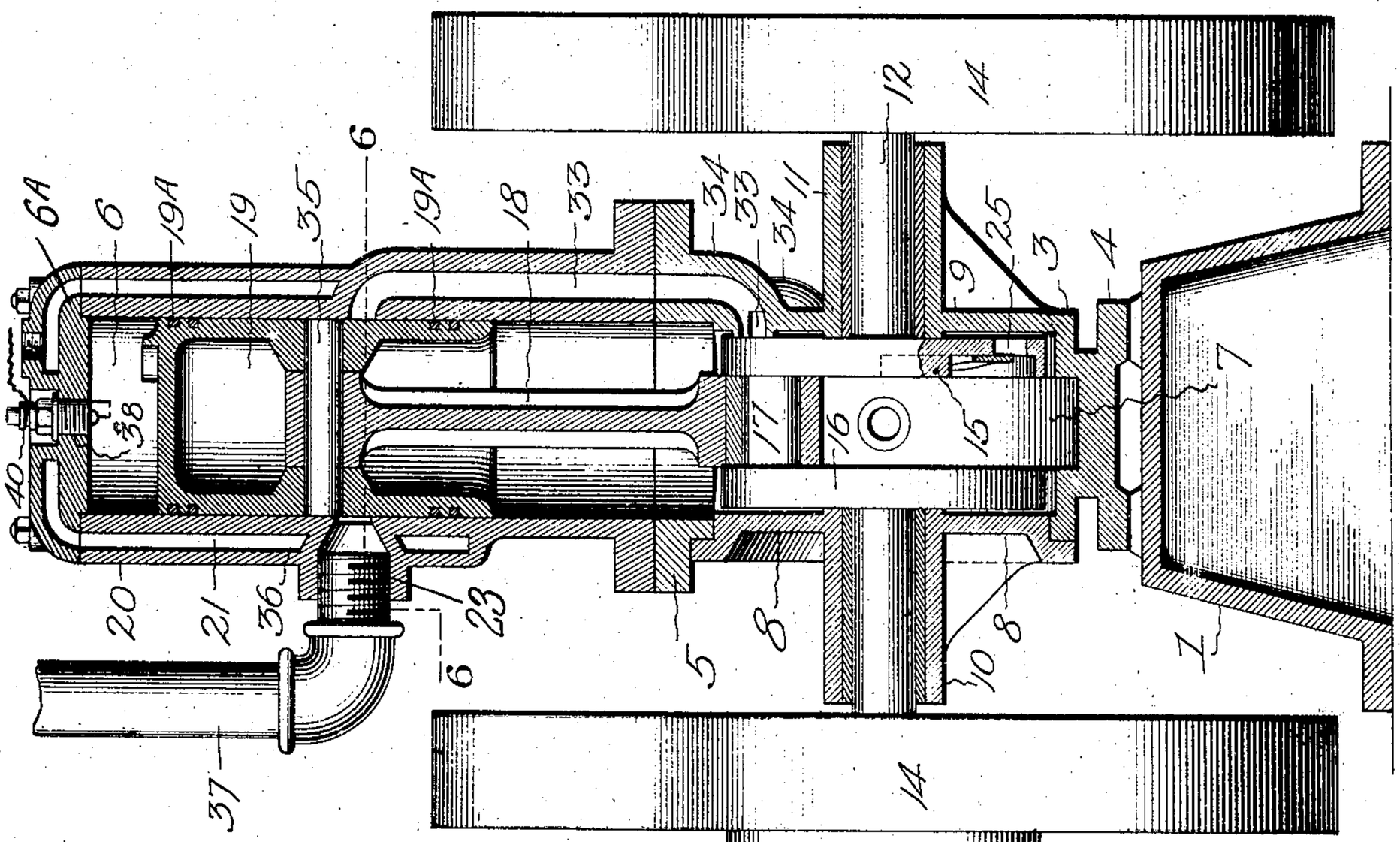

Fig. 1.

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2 SHEETS—SHEET 2.

Fig. 1.

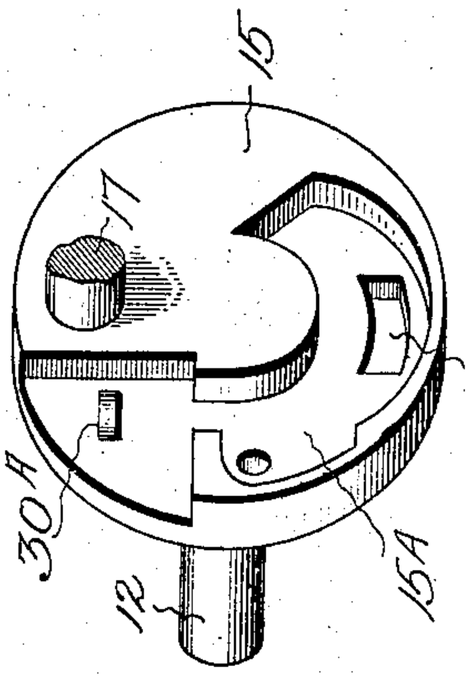


Fig. 2.

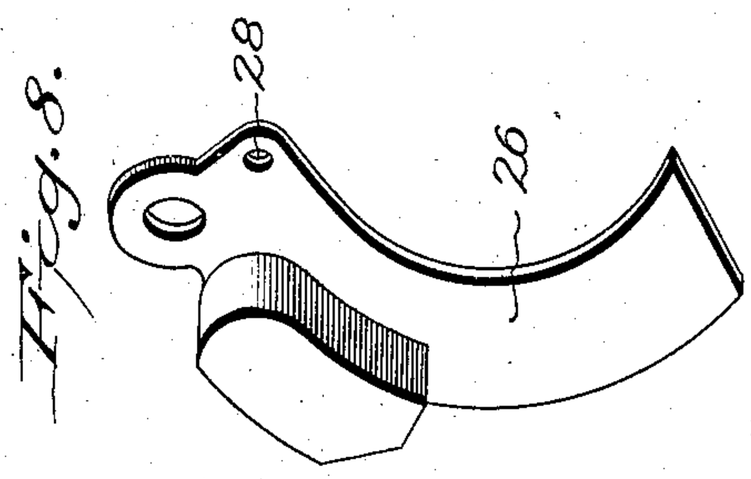


Fig. 6.

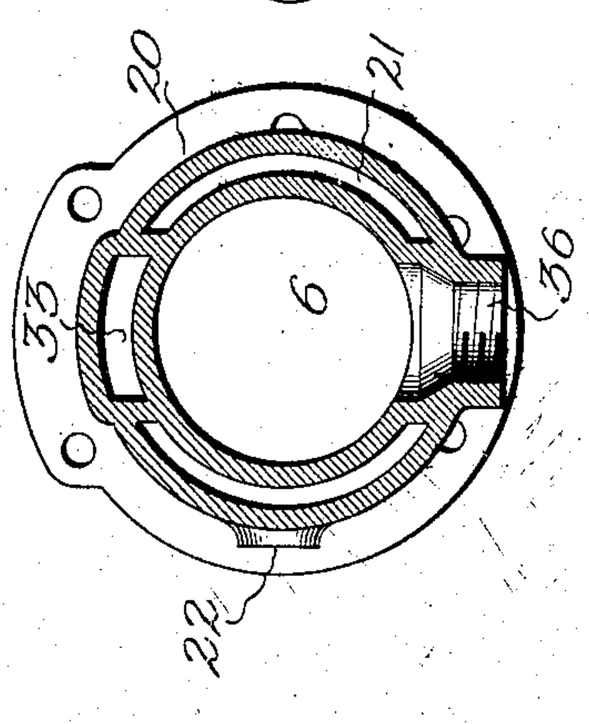


Fig. 4.

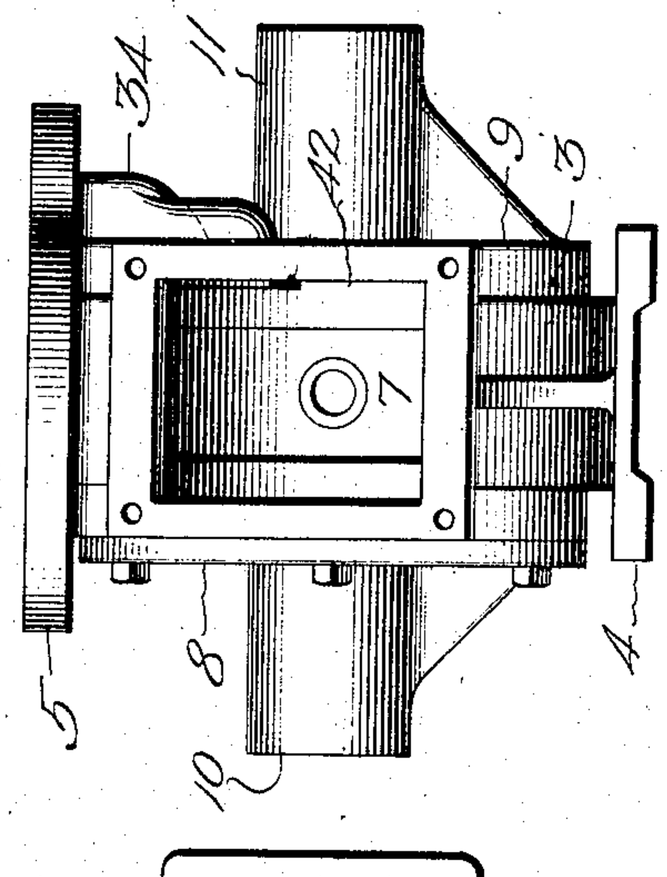


Fig. 5.

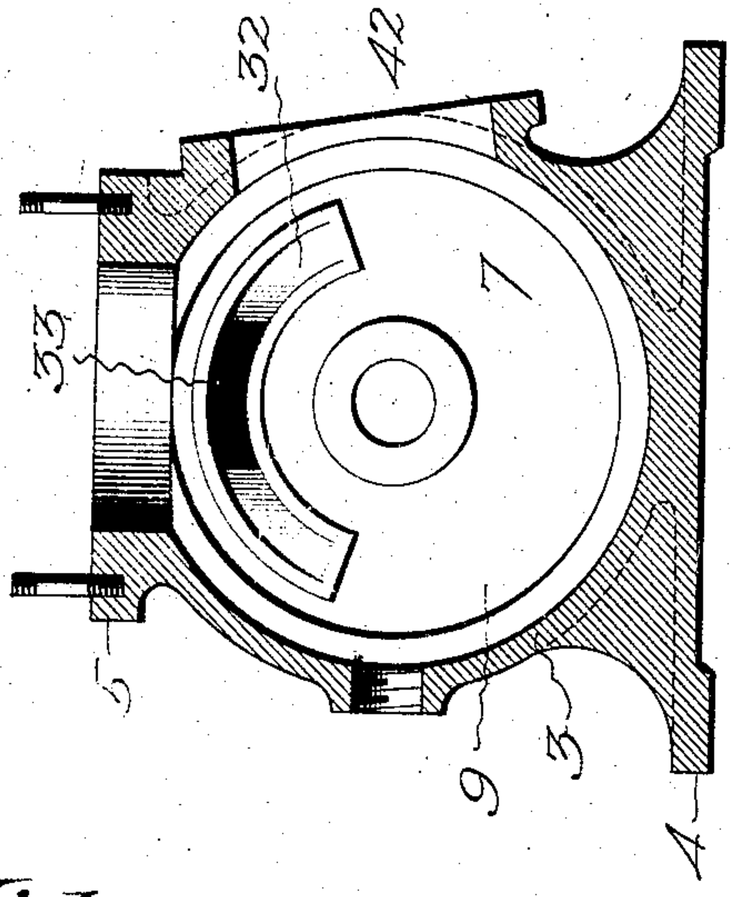
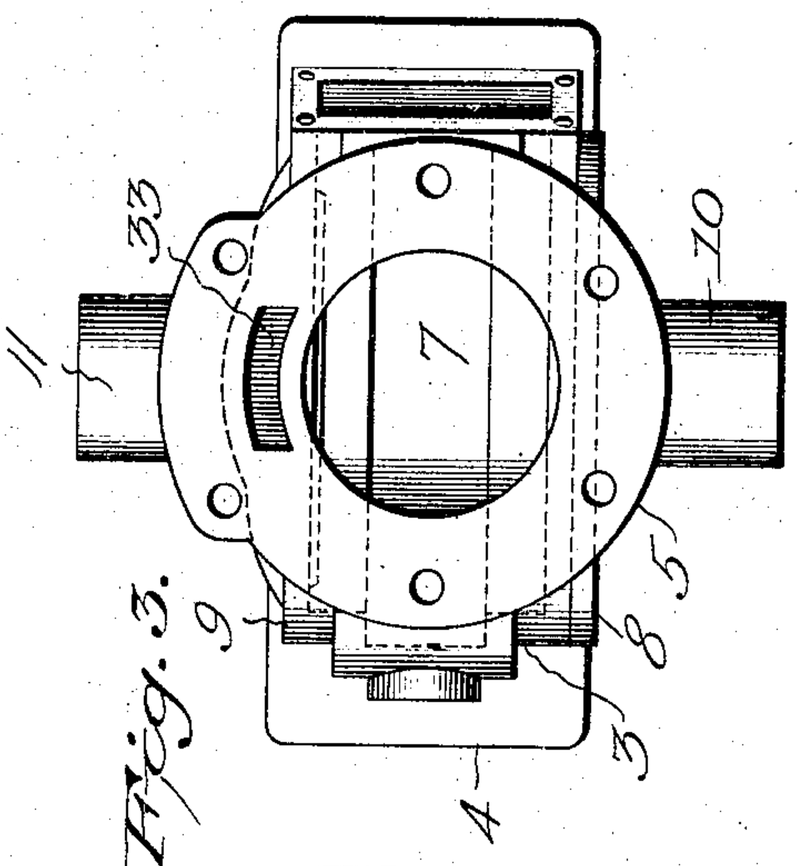


Fig. 3.



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J. Sargent Elliott.

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By H. S. Bailey. Attorney.

UNITED STATES PATENT OFFICE.

ALFRED N. PARNALL, OF FLORENCE, COLORADO.

GAS-ENGINE.

No. 861,673. Specification of Letters Patent. Patented July 30, 1907.

Application filed May 7, 1906. Serial No. 315,598.

To all whom it may concern:

Be it known that I, ALFRED N. PARNALL, a citizen of the United States of America, residing at Florence, county of Fremont, and State of Colorado, have invented a new and useful Gas-Engine, of which the following is a specification.

My invention relates to improvements in gas engines, and the object of my invention is: To provide a gas engine having a gas supply regulating valve which is centrifugally operated in one direction, and spring operated in the other direction, the said valve being adapted to vary the area of a rotating-disk port, which registers with a port leading to the combustion chamber of the engine, so as to control the volume of gas admitted to the chamber and thus govern the speed of the engine.

I attain these objects by the mechanism illustrated in the accompanying drawings, in which:

Figure 1, is a central vertical sectional view of the improved gas engine, taken on the line of the axis of the balance wheels. Fig. 2, is a central, vertical sectional view of the engine, taken on a line at right angles to the line of section of Fig. 1. Fig. 3, is a plan view of the crank chamber, the piston cylinder which is secured upon the upper end of the same being removed. Fig. 4, is a front view of the crank chamber, the cover to the entrance opening being removed. Fig. 5, is a vertical, longitudinal sectional view through the crank chamber, showing the gas-outlet port. Fig. 6, is a horizontal sectional view through the piston cylinder or combustion chamber, on the line 6—6 of Fig. 1, showing the gas inlet and exhaust ports. Fig. 7, is a perspective view of the crank disk having the port which admits the gas to the cylinder port at each revolution of the disk. And Fig. 8, is a view of the centrifugally-operated valve, which regulates the supply of gas to the combustion chamber.

Similar letters of reference refer to similar parts throughout the several views.

Referring to the drawings, the numeral 1, designates the base box of my gas engine. It comprises an inverted hollow box shaped base 1, having foundation foot flanges 2. Upon this base box, I place the crank chamber castings 3, which is provided with base flanges 4, that are bolted to the base box. The upper end of this crank chamber is provided with a marginal flange 5, that supports and is bolted to the lower end of the engine's cylinder 6. The crank chamber casting contains a cylindrical crank chamber 7, the upper end of which is open and connects with the open lower end of the cylinder. The crank chamber cylinder contains two opposite side wall disk shaped portions 8 and 9, through the axial center of which journal bearings 10 and 11, are formed. These journal boxes project from the opposite sides of the crank chamber, and support rotatably a crank shaft 12, which extends through and beyond them, and upon its opposite ends are mounted and secured a pulley and fly wheels 13 and 14 respectively. The crank shaft consists of the shaft end and two crank disks 15 and 16, which are united by a wrist pin 17. The disks are positioned on the inner ends of the shaft close to the side walls of the chamber, and the wrist pin between them receives the lower end of the connecting rod 18, the opposite end of which is connected to a piston 19, which reciprocates in the cylinder. The upper end of the cylinder is water-jacketed, by an outer casing 20, in which a water space 21, is formed around the cylinder between its outer casing and the interior shell of its bore. The upper end of the cylinder is provided with a cylinder head 6A which is also provided with water passages arranged to register with those that surround the cylinder.

A water inlet aperture 22, is made in the head 6A, to which a pipe is threaded, which leads to and is connected to a supply of cold water, and 23 is an outlet aperture to which a pipe is threaded that leads to waste.

The valve mechanism of my improved gas engine is arranged to take its supply of explosive gas into the crank chamber from a carbureter (not shown) which is connected to a pipe 24 that is threaded to an aperture formed in the side of the crank chamber in a position to admit the expansive fluid between the disks, from which it passes through an automatically regulating valve and port formed in one disk and flows to the top of the cylinder above the piston where it is exploded by any suitable electrical spark igniting device in the following manner: The disk 15, is provided with a curved port 25, which extends through it transversely of its axis, and on the inside of the disk in a recess 15A I pivotally hinge one end of a swinging valve 26, by a screw 27. This valve is in the form of a lever, and its opposite end is free to move across the port. It is made wider than the port, so as to fully cover it, and bear on the surface of the disk all around it, and the outer end of this lever valve is made wider than its end adjacent to its pivotal screw, the lever being tapered from its pivotal end portion that covers the end of the port that is adjacent to the pivotal screw of the valve divergingly to its end radially in proportion to its length from its pivotal center so that it will evenly cover the port. I also provide this lever valve with sufficient weight adjacent to its pivotal center to render it susceptible to the centrifugal influence of the particular speed given the disks.

I secure in an aperture 28, of the valve 26, one end of a contraction spring 29, the opposite end of which is secured to one end of an adjustable stud 30, which extends loosely through a lug 30A, on the surface of the disk. The opposite end of this lug is threaded, and provided with nuts 31, which screw up against the surface of the lug, and thereby adjust the tension of

the spring. Directly back of this port and so as to register with it, I form a port 32, in the wall of the crank casing, and I also curve this port concentric to the axis of the crank shaft, and make it enough longer than the port in the disk to allow the port in the disk to feed into it during a rotary travel of the disk of about from a quarter to a half of the disk's rotary movement. From the center of the port 32, I extend a port 33, through the shell of the machine, a rib 34, being provided on the surface of the cylinder for this port. This port extends to about the central portion of the length of the cylinder, where it enters the cylinder.

The piston is a long hollow cylindrical shaped piston, with preferably a set of packing rings 19A, at each end, and the upper end of the connecting rod extends into the piston and is pivotally connected to it by a pin 35, which extends through the piston. At the top of the piston I form a projecting lug, which extends partially around the top of the cylinder head, and is adapted to deflect the explosive mixture to the top of the cylinder.

In the cylinder opposite to the inlet entrance of the port, I form a threaded exhaust outlet 36, to which I thread an exhaust pipe 37.

To the top of the cylinder head, I attach an electric sparking device of any of the preferred types in use, the device illustrated comprising a plug 38, threaded into the center of the cylinder head, through the axle center of which a porcelain or other non-conductive tube is placed, and through this tube I extend and secure a circuit wire, the end of which is extended slightly below the porcelain tube in proximity to a similar wire secured to the bottom of the plug, and to the top of the plug I threadedly secure a binding screw 40, to which I secure the end of another circuit wire, which with the wire passing through the porcelain tube, forms a circuit with an ordinary electric current make and break device (not shown), which is arranged to make the current and thereby cause a spark when the piston reaches the limit of its upward movement, as will be understood.

The operation of my improved gas engine is as follows: The explosive mixture is admitted to the crank chamber from the carbureter through the pipe 24, into the crank chamber between the disks, filling the crank chamber full of gas, and as the disk rotates the valve 26 is actuated by centrifugal force to vary the area of the port 25, and thus regulate the supply of gas to the combustion chamber. The gas passes through the port 25 and into the port 33, when the two ports register at each revolution of the crank shaft. This gas, however, cannot pass into the upper end of the cylinder until the piston has passed the entrance of the cylinder's inlet port, and as the piston makes its downward stroke the explosive in the crank chamber is compressed therein until the piston passes the inlet mouth of the port 33 when the explosive mixture rushes into the cylinder, striking the deflector, which is positioned on the side of the piston adjacent to the inlet port and is directed by the deflector to the upper end of the cylinder. It is compressed there by the upward stroke of the piston until the piston reaches the limit of its stroke, when the circuit of the spark device is made, causing a spark which explodes the gas, and drives the piston downward. Each upward stroke of the piston causes a suction in the crank chamber that draws a sufficient quantity of the explosive gas from the carbureter into the crank chamber to make a charge of sufficient volume to run the engine to its fullest capacity, and as the disks rotate the centrifugal force, which is stronger than the springs, throws the valve out as the speed increases, and diminishes the size of the port 25, thus reducing the volume of gas admitted to the combustion chamber. When the disks reach their normal full speed, the valve stands in a position that closes the port 25 to the extent of about one-half of its area, and if the disks reach a higher speed the centrifugal force causes the valve to move out further, and thereby so reduce the port 25 that only a small volume of gas is admitted to the combustion chamber, which reduces the speed of the engine, and when the speed is thus reduced the spring draws the valve to open the port and admit more gas. Thus the supply of gas is regulated, and the engine thereby caused to run at a uniform speed.

In the side of the crank chamber, I form an opening 42, which I close with a removable cover 43, which is bolted to the casing of the chamber by bolts 44. This opening allows ready access to the disks and the valve lever and valve.

While I have illustrated a preferred construction of my improved gas engine, I do not wish to be limited to it, as changes might be made in it without departing from the spirit of my invention.

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

1. In an explosive engine receiving the explosive charges through the crank case, a valve in the crank case controlling the admission of the explosive mixture to the explosion chamber, and a centrifugal governor controlling the valve mounted upon the crank within the crank case.

2. In a two-cycle explosive engine, a crank disk normally closing the passage from the crank case to the explosion chamber of the engine, a valved port in said crank disk movable to open communication between the crank case and the explosion chamber of the engine, and means for varying the effective aperture of said port in accordance with the speed of the engine.

3. In a two-cycle explosive engine, a crank disk normally closing the passage from the crank case to the explosion chamber of the engine, a valved port in said crank disk movable to open communication between the crank case and the explosion chamber of the engine, and a centrifugal governor carried by said crank disk and constructed to throttle said port in proportion to the speed of the engine.

4. In an explosive engine of the two-cycle type receiving the explosive mixture through the crank case, a disk carried by the crank shaft and normally covering the passage from the crank case to the explosion chamber, a port in said disk movable to open communication between the crank case and the explosion chamber, and a weighted, spring-controlled valve for said port movable to cover said port by centrifugal action and to uncover said port by the action of the spring.

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

ALFRED N. PARNALL.

Witnesses:
G. SARGENT ELLIOTT,
BESSIE THOMPSON.