J. S. STEWART.

ROTARY INTERNAL COMBUSTION ENGINE.

APPLICATION FILED FEB. 16, 1909.

957,631. Patented May 10, 1910.

3 SHEETS—SHEET 1.

Fig. 1.

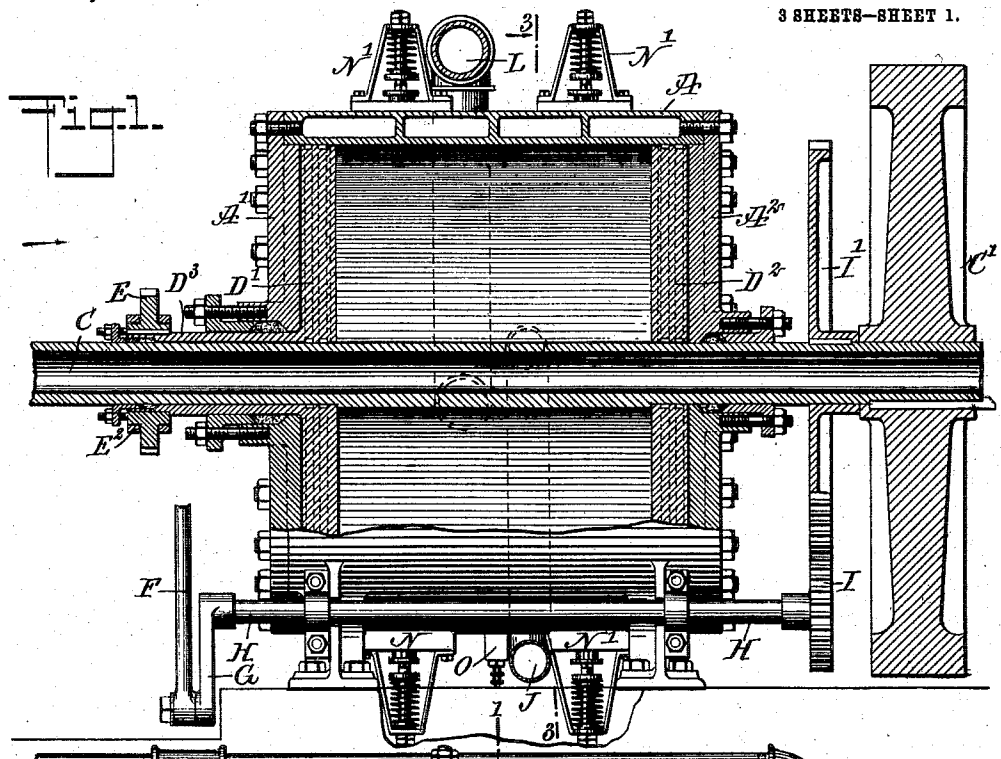
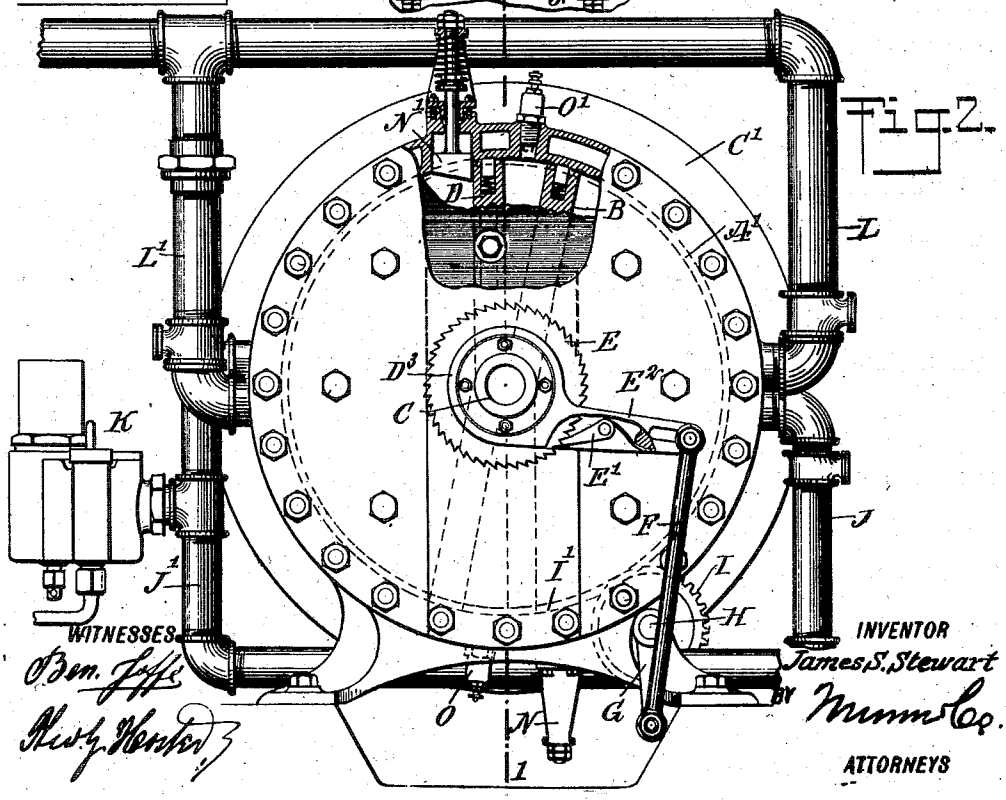



Fig. 2.




WITNESSES

Ben. Jaffe

Kirby Hunter

INVENTOR

James S. Stewart

BY Munn & Co.

ATTORNEYS

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3 SHEETS—SHEET 2.

Fig. 3.

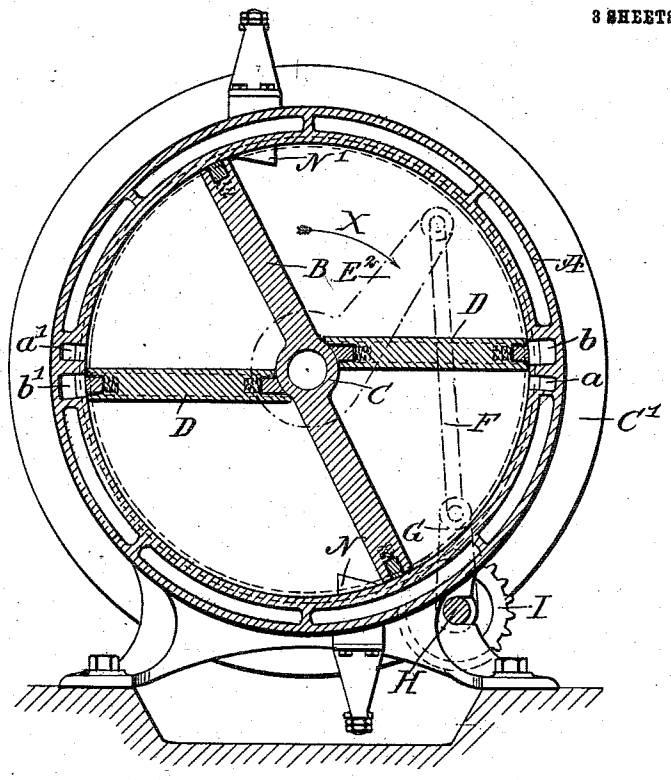



Fig. 4.

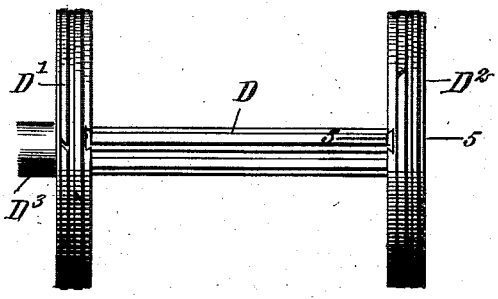
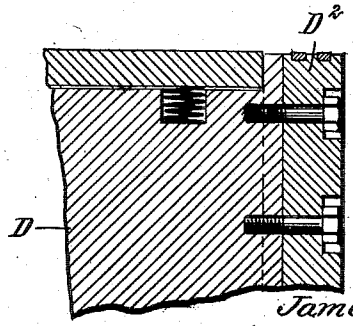



Fig. 5.




WITNESSES

Ben Joffe

Rud. G. Hoster Jr.

INVENTOR

James S. Stewart

BY Munn & Co.

ATTORNEYS

J. S. STEWART.

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3 SHEETS—SHEET 3.

Fig. 7.

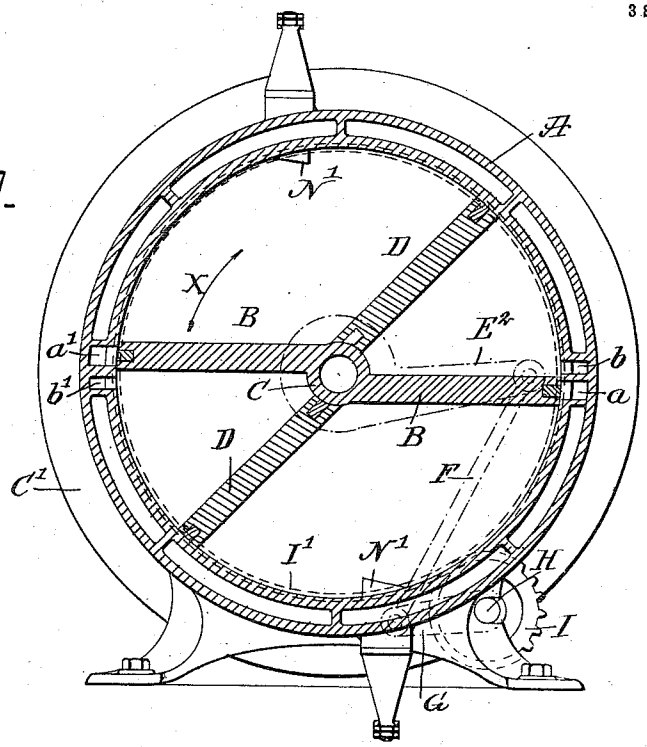
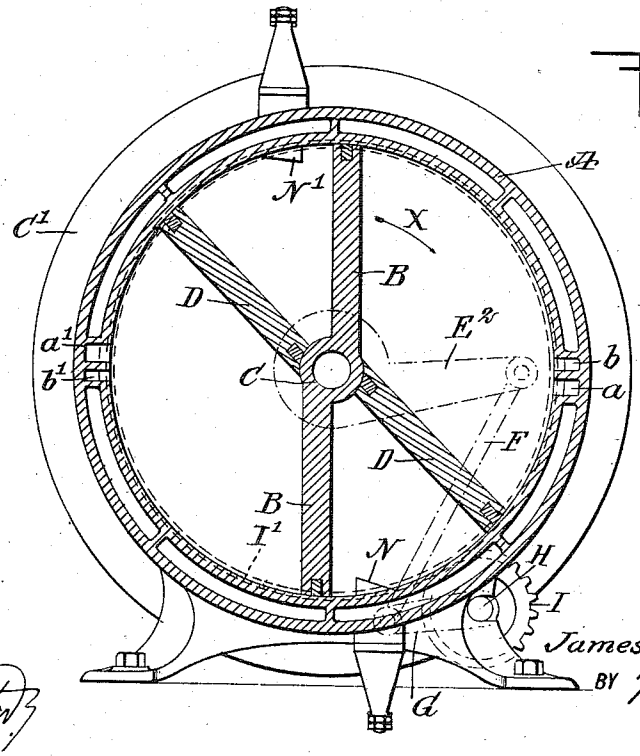



Fig. 6.




WITNESSES

Ben. Jaffé

Rudy. Hoskins

INVENTOR

James S. Stewart

BY Munn & Co.

ATTORNEYS

# UNITED STATES PATENT OFFICE.

JAMES SAMIEL STEWART, OF DIAMONDVILLE, WYOMING.

## ROTARY INTERNAL-COMBUSTION ENGINE.

957,631. Specification of Letters Patent. Patented May 10, 1910.

Application filed February 16, 1909. Serial No. 478,147.

*To all whom it may concern:*

Be it known that I, JAMES S. STEWART, a citizen of the United States, and a resident of Diamondville, in the county of Uinta and State of Wyoming, have invented a new and Improved Rotary Internal-Combustion Engine, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved rotary internal combustion engine, which is simple and durable in construction, composed of comparatively few parts, and not liable easily to get out of order, and arranged to utilize the motive agent to the fullest advantage.

In order to attain the object, use is made of a cylinder, in which rotates continuously a piston, and an abutment rotates intermittently in the cylinder, so that a charge is drawn into the cylinder at the time the abutment is stationary and the piston advances, and the charge is compressed by the abutment following the piston at a higher rate of speed than that of the piston, and the compressed charge is finally ignited to give an impulse to the piston while the abutment is stationary at the time.

A practical embodiment of the invention is represented in the accompanying drawings forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a longitudinal sectional elevation of the improvement on the line 1—1 of Fig. 2; Fig. 2 is an end elevation of the same; Fig. 3 is a cross section of the same on the line 3—3 of Fig. 1 and showing the abutment and piston in position during the suction period; Fig. 4 is a plan view of the abutment; Fig. 5 is an enlarged sectional side elevation of the same on the line 5—5 of Fig. 4; Fig. 6 is a cross section of the improvement showing the piston and abutment in position during the compressing period; and Fig. 7 is a similar view of the same showing the piston and abutment in position during the exhaust period.

In the cylinder A is mounted to rotate continuously a piston B having its diametrically opposite ends in peripheral contact with the inner surface of the cylinder A, and the said piston B is secured or formed on a main shaft C extending through the heads A′, A² of the cylinder, as plainly illustrated in Fig. 1. The shaft C is provided at one outer end with a fly wheel C′ and a pulley or other means (not shown), for transmitting the rotary motion of the shaft to other machinery. The shaft C is also preferably made hollow for circulating a cooling medium through the same. In the cylinder A is mounted to reciprocate intermittently an abutment D having its diametrically opposite ends in contact with the inner surface of the cylinder A, and the said abutment D is secured on annular flanges D′, D² mounted to rotate loosely on the shaft C, the flange D′ having a hub D³ extending through the cylinder head A′ to the outside thereof, as plainly indicated in Figs. 1 and 2. On the outer end of the hub D³ is secured a ratchet wheel E engaged by a spring-pressed pawl E′ fulcrumed on an arm E² mounted to swing loosely on the head of the ratchet wheel E, and the said arm E² is pivotally connected by a pitman F with a crank arm G, secured on one end of a countershaft H, carrying on its other end a pinion I in mesh with a gear wheel I′ secured on the main shaft C. The proportion between the pinion I and the gear wheel I′ is such that the countershaft H makes four revolutions during each revolution of the shaft C, and consequently the pawl and ratchet mechanism connecting the countershaft H with the abutment D imparts an intermittent rotary motion to the abutment D, so that the latter periodically makes a quarter turn, but during its turning movement it travels at a higher rate of speed than the piston B, so that the abutment D approaches the piston B during the movement of the abutment.

The cylinder A is provided in diametrically opposite points with inlet ports *a*, *a′*, and adjacent thereto with exhaust ports *b*, *b′*, and the inlet ports *a*, *a′* are connected by pipes J, J′ with a carbureter K or other means for supplying an explosive mixture to be drawn in, compressed, ignited and burned in the cylinder A, as hereinafter more fully explained. The exhaust ports *b*, *b′* are connected with exhaust pipes L, L′, for conducting the products of combustion to a suitable place of discharge.

The abutment D when in its position of rest during the explosion period, is held against return movement by abutting against spring-pressed latch bolts N, N′, mounted to slide in the wall of the cylinder A, and beveled at their inner ends to allow the piston B

and the abutment D to readily pass the said latch bolts during their forward movement in the direction of the arrow $x$, as indicated in Figs. 3, 6 and 7.

Igniting devices O and O′ of any approved construction are connected with the interior of the cylinder A, somewhat in advance of the latch bolts N, N′, as plainly indicated in Fig. 2.

The piston B as well as the abutment D are provided with suitable packing devices to prevent leakage of the motive agent.

The supply pipes J, J′ are provided with suitable check valves to prevent back firing into the carbureter, and check valves are also arranged in the exhaust pipes L, L′ to prevent the exhaust gases from returning into the cylinder A.

The operation is as follows: When the several parts are in the position illustrated in Fig. 3 then the abutment D is at rest and the advancing piston B causes a suction in the spaces between the piston B and the abutment D, so that explosive charges are drawn into the cylinder A by way of the inlet ports $a$, $a'$. The abutment D during this period of rest closes the exhaust ports $b$, $b$ (see Fig. 3), and after the charges have been drawn in into the cylinder A the abutment D is caused to rotate so as to follow the piston B (see Fig. 6), and as the abutment travels at a higher rate of speed it is evident that the charges between the piston B and the abutment D are compressed, the piston B finally passing the igniting devices O, O′ at the time the abutment D has just passed the latch bolts N, N′ (see Fig. 2), and at this time ignition takes place through the igniting devices O and O′, so that the charges are burned and an impulse is given to the piston B in the direction of the arrow $x$. Return movement of the abutment D is prevented by the latter abutting against the latch bolts N and N′. Now as the piston B advances it finally uncovers the exhaust ports $b$, $b'$ so that the products of combustion can escape from the cylinder A by way of the said uncovered exhaust ports $b$, $b'$, and at this time the abutment D starts on its next rotary motion (see Fig. 7), and in doing so, completely drives out the products of combustion contained in the cylinder through the exhaust ports $b$, $b'$, and the abutment D comes to rest opposite the exhaust ports $b$, $b'$ so as to close the same, as indicated in Fig. 3. As the piston B now advances from the now stationary abutment D it is evident that new charges are drawn into the cylinder A and then the abutment D starts on its next movement, to compress the charges, as above explained, and finally another explosion takes place at the time the piston and the abutment reach the position shown in Fig. 2, and another impulse is given to the piston B.

From the foregoing it will be seen that by the arrangement described the piston B rotates continuously in the cylinder A, while the abutment D rotates intermittently, so that the charges are drawn into the cylinder by the advancing piston, and while the abutment D is in its position of rest then the charges are compressed during the time the abutment is moving and the compressed charges are ignited and burned during the next position of rest of the abutment D, and an exhaust takes place during the next travel of the abutment, to completely drive out all the products of combustion from the cylinder A.

It is understood that when the engine is running and the countershaft H is rotated from the main shaft C, then during the upstroke of the arm $E^2$ of the pawl and ratchet mechanism, the pawl E′ glides over the teeth of the ratchet wheel E and hence the abutment D remains stationary during this time, and when the arm $E^2$ swings downward the pawl E′ carries the ratchet wheel E along, thus giving a quarter turn to the abutment D.

The engine shown and described is simple and durable in construction, and utilizes the motive agent to the fullest advantage, to rotate the main shaft C at a comparatively high rate of speed.

It will be observed from an inspection of Fig. 3, that at the beginning of the suction stroke of the piston B the abutment D is in such position that the link F is in alinement with the crank shaft G, that is the crank shaft is on the dead center, and retains the abutment in fixed position, until a further rotation of the shaft H changes the relative position of the parts. Since the space between the abutment and the piston is in communication with the atmosphere there is no suction exerted on the abutment, and no tendency of the abutment to follow the piston except possibly at the very beginning of the stroke, and it is prevented from such movement at the said beginning by the position of the parts above described, and by the weight of the parts.

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

1. A rotary internal combustion engine, comprising a cylinder having an inlet and an exhaust, a main shaft passing centrally through the cylinder, a revoluble piston in the said cylinder secured on the said shaft, an abutment mounted to rotate intermittently in the said cylinder, a countershaft, gear wheels connecting the said main shaft with the said countershaft, and a pawl and ratchet mechanism connecting the said countershaft with the said abutment for imparting an intermittent rotary motion to the said abutment.

2. A rotary combustion engine comprising a cylinder, a shaft journaled therein, a rotating piston secured to the shaft, a rotating abutment journaled thereon, a connection between the shaft and the abutment for imparting an intermittent motion thereto and at a greater speed than the speed of the piston, whereby to compress the charge, means for igniting the charge when so compressed, and spring latches against which the abutment rests during the ignition of the charge.

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

JAMES SAMIEL STEWART.

Witnesses:

PHILIP SULLIVAN,

HENRY J. PETERSON.