

H. E. OSBORNE.
 ROTARY GAS ENGINE.
 APPLICATION FILED DEC. 21, 1918.

1,350,880.

Patented Aug. 24, 1920.
 3 SHEETS—SHEET 1.

Fig. 1.

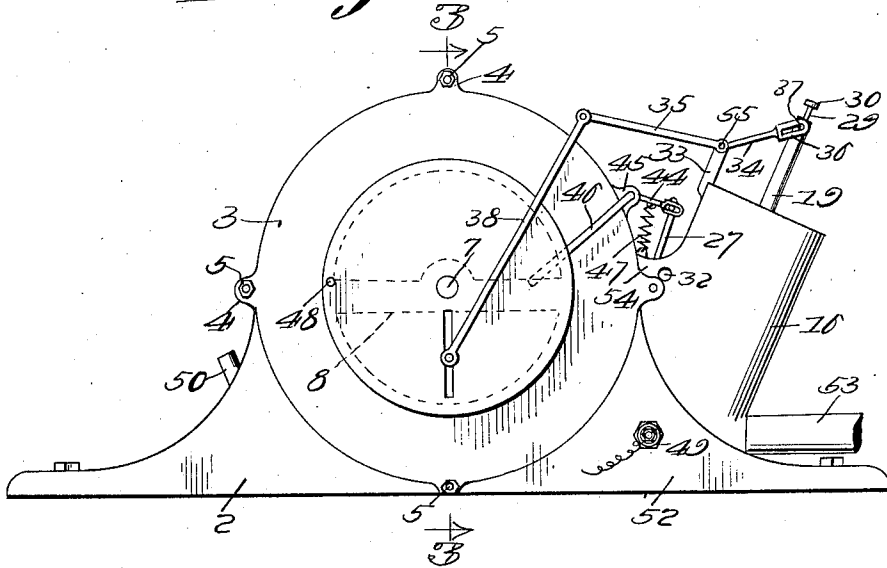
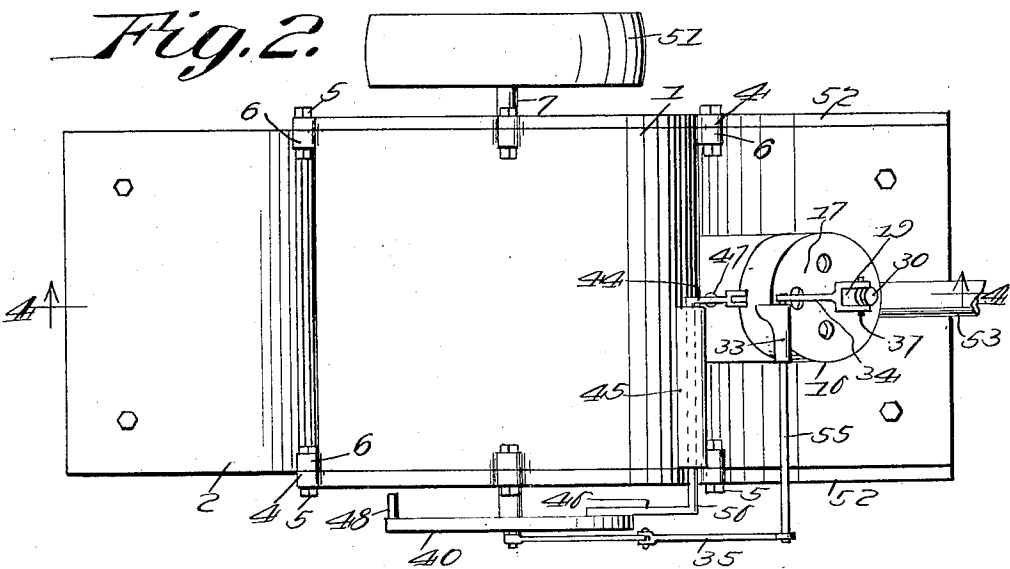


Fig. 2.



Inventor
Harry E. Osborne

By *J. M. T. Albert* Attorney

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 3 SHEETS—SHEET 2.

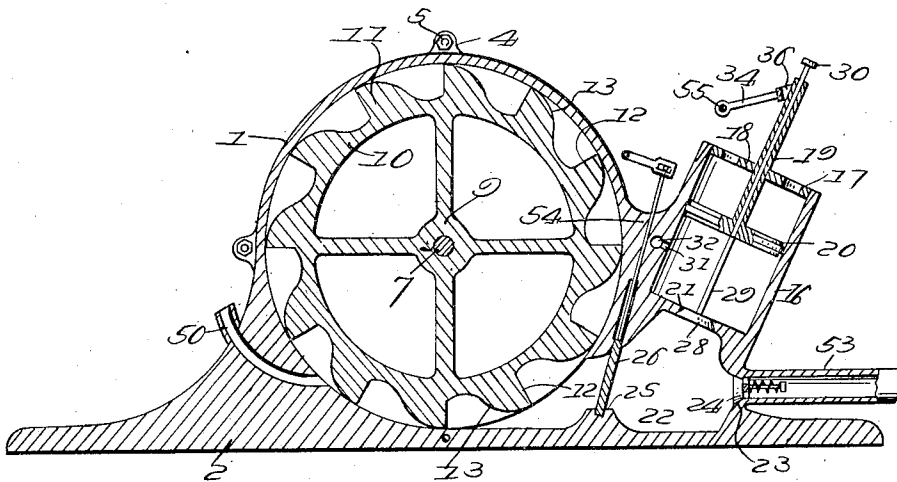
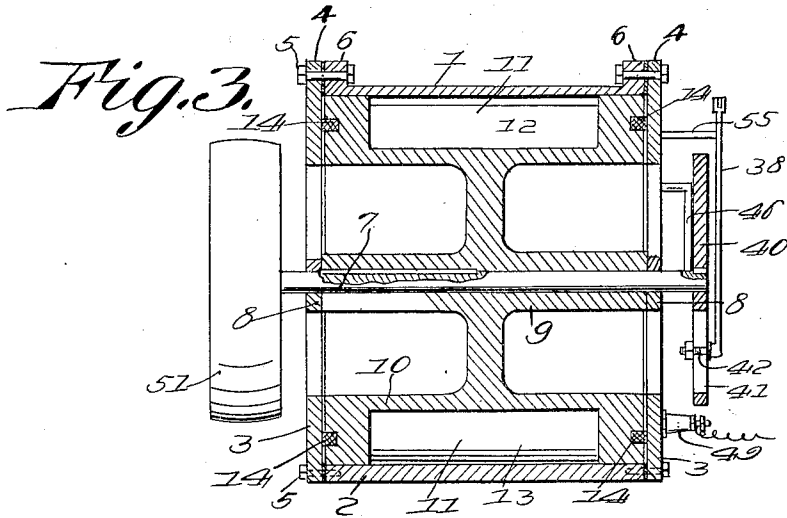


Fig. 4.

Inventor
Harry E. Osborne

By

E. Hume Talbot Attorney

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3 SHEETS—SHEET 3.

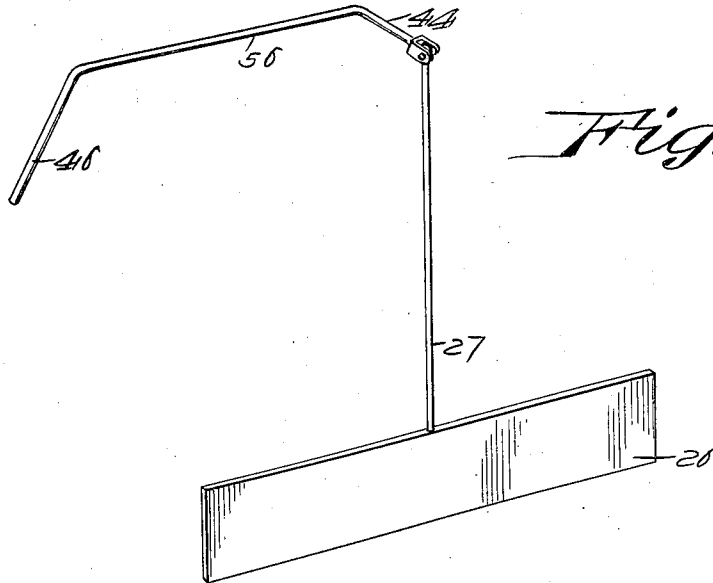


Fig. 5.

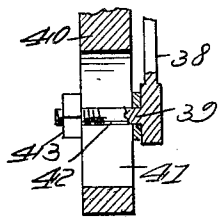


Fig. 6.

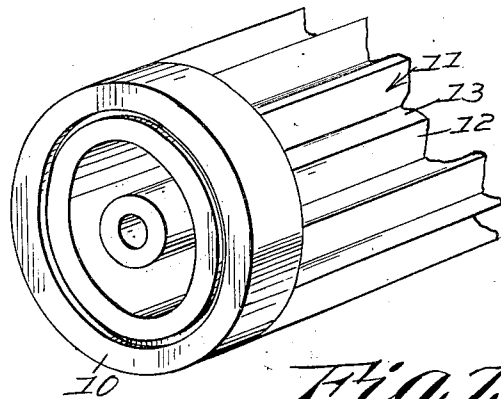


Fig. 7.

Inventor
Harry E. Osborne

By *J. Hume Talbot* Attorney

UNITED STATES PATENT OFFICE.

HARRY E. OSBORNE, OF SPOKANE, WASHINGTON.

ROTARY GAS-ENGINE.

1,350,880.

Specification of Letters Patent. Patented Aug. 24, 1920.

Application filed December 21, 1918. Serial No. 267,795.

To all whom it may concern:

Be it known that I, HARRY E. OSBORNE, a citizen of the United States of America, residing at Spokane, in the county of Spokane and State of Washington, have invented new and useful Improvements in Rotary Gas-Engines, of which the following is a specification.

The principal purpose of the invention is to provide a unique and efficient form of gas engine of the rotary type. The improved engine consists essentially of a stator comprising a casing with detachable ends and a rotor formed with a plurality of peripheral teeth. The stator is formed on one side with a cylinder in which there is longitudinally movable a piston, the latter receiving its motion from the rotor by means operatively connecting it with the rotor. The cylinder with its piston or plunger has means for inducing explosive charges into the improved motor or engine and is provided with further means for liberating the compressed charges at the time of ignition, so that the force of the expanding charges may be applied against the faces of the teeth of the rotor to produce rotation of the latter.

Other and further purposes of the invention are apparent in the following description, wherein it is set forth in detail.

As shown and described, a specific embodiment of the invention is adhered to but to this embodiment the invention is not to be restricted. The right is reserved to make such changes or alterations as the actual reduction to practice may suggest, in so far as such changes or alterations are compatible with the spirit of the subjoined claims. The same numerals of reference designate the same parts throughout the several figures of the drawings, wherein:

Figure 1 is a view in side elevation of the improved motor.

Fig. 2 is a top plan view.

Fig. 3 is a section taken on the line 3—3 of Fig. 1.

Fig. 4 is a sectional view taken on the line 4—4 of Fig. 2.

Fig. 5 is a perspective view of the gate valve and its connections to its operating means.

Fig. 6 is a detail sectional view showing the adjusting means for regulating the stroke of the piston.

Fig. 7 is a perspective view of one end of the rotor.

As shown, the invention comprises a stator of which the casing 1 is a part, the latter being formed integral with the base 2. The end case rings 3 are attached to the casing 1 on either side thereof, the casing having ears 6 and the rings ears 4, both of which are provided with holes so that the bolts 5 may be employed to secure the end case rings to the casing 1.

Mounted for rotary movement in the casing 1 there is a rotor comprising an annular body 10 which is carried by a spider 9 which is secured on the shaft 7, the latter being journaled in bearings formed in transverse members 8 spanning the open spaces as of the end case rings and being formed integral with the latter.

The body portion 10 of the rotor is formed at its outer periphery with the axially disposed teeth 11 formed so as to present radially arranged pressure faces 12 and inclined curvilinear rear faces 13. The thickness of the body portion 10 is equal to or slightly less than the width of the solid portion of the end case rings 3. The solid portion of the two end case rings, therefore, together with the casing and the inner wall of the body portion 10 serves to form a compartment inclosing the teeth 11; and that such compartment may be made gas and airtight, side packing strips 14 are set in the body portion 10 of the rotor on the ends thereof and bear against the inner faces of the body portion of the end case rings 3.

The shaft 7 on which the rotor and its attendant parts are carried extends beyond its bearings on either side of the machine, the extension to one side being designed to receive a pulley 51 or any other desired power transmitting medium suitable for the purpose intended, the extension to the other side being designed to receive the disk member 40, the function of which is made later to appear.

The stator is formed on one side with a diagonally disposed cylinder 16 in which there is longitudinally movable a piston 20, the latter being carried at the lower end of a piston rod 19 slidably engaging a bearing 18 carried at the center of an open cap 17 attached to the upper end of the cylinder.

At the bottom of the cylinder 16 and in the center of the latter there is formed a

port 21 by means of which the cylinder may be placed in communication with a compression chamber 22 formed in the base 2 of the stator and closed on either side of the latter by extension 52 formed with the end case rings 3. The chamber 22 receives and holds the fuel preparatory to the latter's being utilized and to this end there is provided an inlet 53 communicating with the chamber 22 through a port 23 formed adjacent the juncture of the cylinder with the base of the stator. This port 23 is kept normally closed with a spring-seated valve 24 which may be unseated only by a reduction of pressure in the chamber 22 below the pressure existing in the inlet 53.

The chamber 22 communicates with that portion of the stator wherein the body 10 of the rotor is carried, a port 25 being provided for this purpose but being normally closed by a gate-valve 26.

The gate-valve 26 is provided with a stem 27 which is held in a slide bearing formed in the web 54 formed with the stator and connecting the cylinder with the casing 1. This stem 27 is the operating means for the valve 26 and is operatively connected to other mechanism hereinafter described.

The port 21 is arranged with a seat with which the valve 28 may engage, the latter being connected with a valve stem or rod 29 which passes slidably through the piston or plunger rod 19 and, extending beyond the upper end of the latter, receives at the terminus of the said extended end a collar 30. The stem 29 is of such a length that the full movement of the piston 20 and its attendant rod may be had when the valve 28 is sealed. This, of course, means that the stem 29 exceeds the length of the rod 19 by an amount equal to the stroke of the piston 20. The valve 28 is free to drop from its seat upon a reduction of pressure in the chamber 22 below the pressure existing in the cylinder.

The web 54 is drilled transversely providing the opening 32 and communicating with this opening there is an air outlet and inlet 31 communicating with the interior of the cylinder. The purpose of the outlet 31 will be made evident later.

In order that a reciprocating movement may be imparted to the piston 20 there is provided a bearing bracket 33 in which there is carried a rock-shaft 55. This rock-shaft at one end carries a lever 34 having the bifurcated end 36 straddling and pivotally engaging the piston rod 19 at the upper end of the latter by means of pins 37 which are set in the rod on diametrically opposite sides and engage elongated holes formed in the legs of the bifurcated end 36. The rock-shaft 55 also carries an arm 35 which is positioned far enough to one side of the machine to permit its being operatively connected with the disk 40, the latter being the

medium through which the rotary movement of the rotor is transmitted. The disk 40 is formed with a radial disposed slot 41 through which there projects the reduced end 42 of a stud 39. This reduced end 42 is threaded so that it may receive the nut 43, the latter in conjunction with the shoulder resulting from the formation of the reduced end serving as a means for clamping the stud in an axial position on the disk 40. The stud may be adjusted toward or away from the center of the disk by loosening the nut 43 and retightening it after the stud has been moved to the desired position. A link member 38 is pivotally connected with the stud 39 at one end and at the other end pivotally connects with the arm 33, this construction providing for the conversion of the rotary motion of the rotor into the reciprocating movement of the piston 20.

In order that the valve 26 may be opened at the desired time, means is provided for operatively connecting it with the disk 40 and this means comprises a bearing bracket 45 mounted on the web 54 and this bearing bracket supports a rock-shaft 56 on which there is attached an arm 44 having a bifurcated end which straddles and connects with the extreme upper end of the stem 27 in the same manner that the arm 34 connects with the upper end of the piston rod 19. The shaft 56 further carries a second arm 46 designed for wiping engagement with an axially disposed stud 48 carried by the disk 40. A spring 47 tensioned between the arm 44 and the top of the web 54 acts as a medium for yieldingly holding the valve 26 in closed position and when the stud 48 wipes against the arm 46, it rocks the shaft 56 and arm 44 in opposition to the tension of the spring 47.

To provide for the ignition of explosive charges and for the exhausting of the same, a spark plug 49 is provided with its sparking points interior to the chamber 22 and an exhaust outlet 50 is formed in the base 2, opening on the outside of the base and into that space in the stator wherein the body 10 of the rotor is carried.

The parts of the improved motor are so associated and timed relative to each other that, when the piston 20 is at the extreme lower end of its stroke, the pin 48 is rocking the shaft 56 and thereby opening the valve 26.

Let the motor be in operation and be equipped with a timing device for operating the spark plug at the time of opening the valve 26. A charge will have been compressed in the chamber 22 and the piston will be at the bottom of its stroke, the valve 29 being off its seat and hanging in the chamber. Upon the ignition of the charge, it issues through the port 25 and impacts against the pressure faces 12 of the teeth

and leaves the motor through the exhaust outlet 50. The rotor being in motion, however, the stud 48 leaves the arm 46 and thus allows the valve 26 to close, the piston, at this time, starting on its upward movement and carrying the valve 28 with it. The valve 28 is, however, a good distance away from its seat and the upward travel of the piston draws a charge in through the port 24 and this suction continues the drawing in of the charge until the valve 28 is brought near to its seat by the upwardly traveling piston. When close enough to its seat, the valve is forced onto its seat by pressure within the chamber 22 and the intake of fuel into the chamber is stopped. After the piston passes the port 31, air may enter the cylinder below the piston and when the latter begins its downward movement, this air is forced into the chamber 22 to mingle with the fuel therein and create an expansive charge for ignition just prior to the opening of the valve 26 by the stud 48, when the cycle of operations just recited is repeated.

The invention having been described, what is claimed as new and useful is:

1. In an internal combustion engine, a stator, a rotor revolubly mounted in the stator, the stator being formed with a combustion chamber and being further formed with a cylinder in communication with the combustion chamber, a piston movable in the cylinder, means operatively connecting the piston with the rotor, and means carried by the piston for closing communication between the cylinder and the combustion chamber for the useful purpose specified.

2. In an internal combustion engine, a stator, a rotor revolubly mounted in the stator, the stator being formed with a combustion chamber and with a cylinder in communication with the combustion chamber, the cylinder having a port at its lower end to provide for such communication, a floating valve carried by the piston, and designed to close the aforesaid port, and operative connections between the piston and

the rotor so that an explosive charge may be induced into and subsequently compressed in the combustion chamber.

3. In an internal combustion engine, a stator, a rotor revolubly mounted in the stator, the rotor being formed with a plurality of axially disposed teeth having radially disposed pressure faces, the stator being formed with a cylinder and with the combustion chamber in communication with the cylinder and being further formed so as to inclose that portion of the rotor which the teeth are formed, means operatively connected with the rotor whereby the combustion chamber is thrown into communication with that portion of the stator wherein the toothed portion of the rotor is carried, a piston movable in the cylinder, the piston being operatively connected with the rotor, and means carried by the piston whereby communication between the cylinder and the combustion chamber is closed.

4. In an internal combustion engine, a stator, a rotor revolubly mounted in the stator, the rotor being formed with a plurality of axially disposed teeth having radially disposed pressure faces, the stator being formed to inclose that portion of the rotor whereon the teeth are formed, the stator being further formed with a cylinder and with a combustion chamber in communication with the cylinder and in communication with that part of the stator wherein the toothed portion of the rotor is carried, a piston movable in the cylinder and operatively connected with the rotor, a valve controlling communication between the combustion chamber and that portion of the stator wherein the toothed portion of the rotor is carried, the said valve being operatively connected with the rotor, and a valve carried by the piston and arranged for closing communication between the cylinder and the combustion chamber for prescribed intervals of time during the operation of the rotor.

In testimony whereof I affix my signature.
HARRY E. OSBORNE.