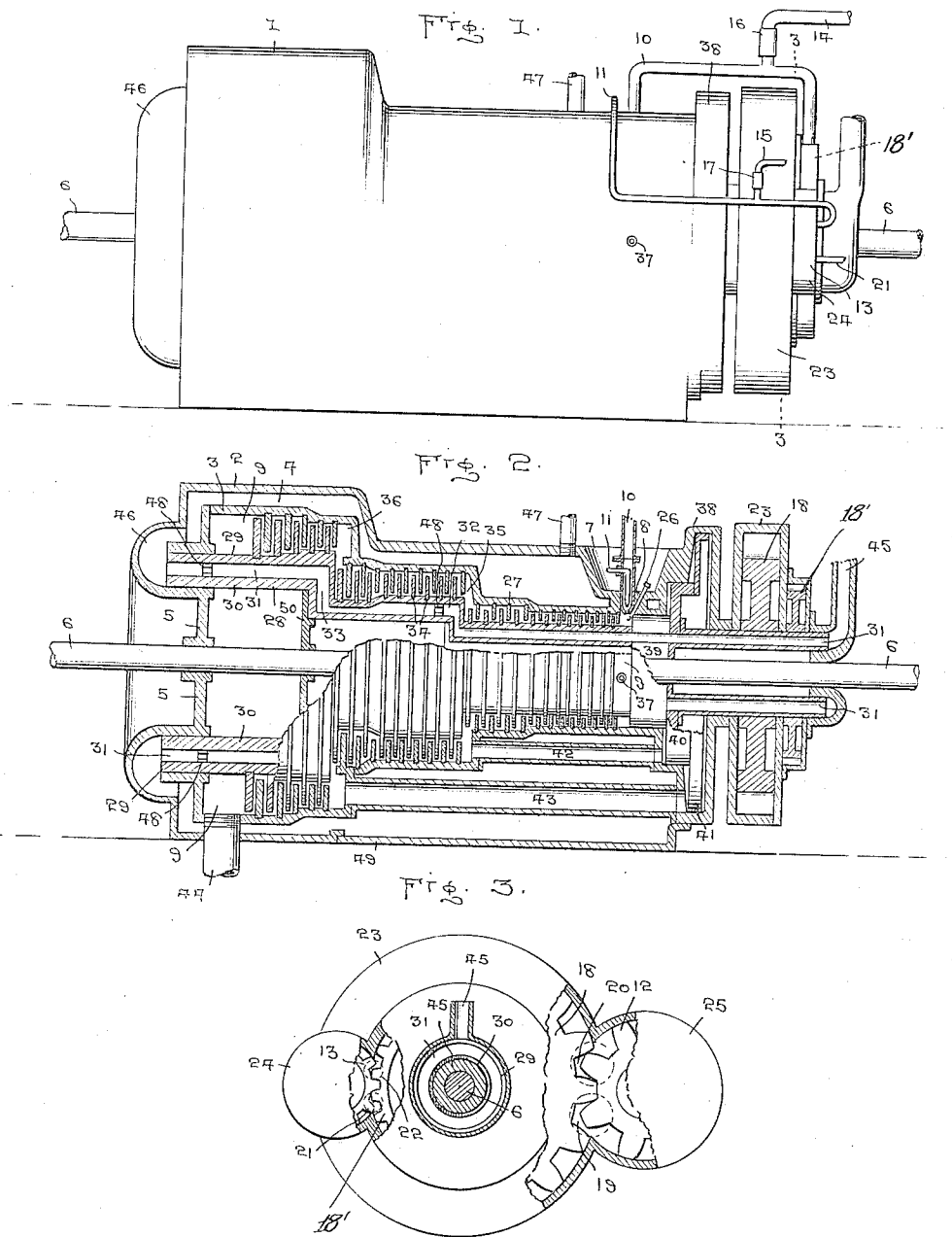


E. M. & J. F. MAXWELL.
GAS TURBINE ENGINE.
APPLICATION FILED JULY 3, 1914.

1,139,696.

Patented May 18, 1915.



Witnesses
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UNITED STATES PATENT OFFICE.

ERASTUS M. MAXWELL AND JAMES F. MAXWELL, OF CARDINAL, VIRGINIA.

GAS TURBINE-ENGINE.

1,139,696.

Specification of Letters Patent.

Patented May 18, 1915.

Application filed July 3, 1914. Serial No. 848,821.

To all whom it may concern:

Be it known that we, ERASTUS M. MAXWELL and JAMES F. MAXWELL, citizens of the United States, residing at Cardinal, in the county of Mathews and State of Virginia, have invented certain new and useful Improvements in Gas Turbine-Engines; and we 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.

Our invention relates to turbine engines of the gas type, and in particular to stationary turbine engines.

The main object of our invention is to provide a device that is highly efficient, compact, and durable.

Another object of our invention is to provide a device that has a double water jacket, a water jacket surrounding both the inner and outer walls of the combustion chamber.

Still another object of our invention is to provide a device whereby the water jacket has successively enlarged sections to allow of the advantage of a pump action under centrifugal force.

Still another object of our invention is to provide a device whereby the end thrust of the explosion is counterbalanced by the used fuel.

A still further object of our invention is to provide a device whereby the molecules of unburned gas are consumed within the combustion chamber.

A still further object of our invention is to provide a device whereby the pressure of air, fuel and steam is automatically regulated as a means of safety.

Other objects and advantages of our invention will be hereinafter more clearly set forth in the specifications and pointed out in the claims.

Similar characters of reference refer to similar parts throughout the drawings, in which,

Figure 1, is a side elevation of our device in assembled formation. Fig. 2, is a sectional view therethrough. Fig. 3, is a sectional view on line 3—3 of Fig. 1.

In Figs. 1 and 2 of the drawings, 1 is the casing surrounding our engine, and formed to include an outer shell 2 and an inner shell 3 forming a chamber 4 therebetween, and said casing is mounted upon a suitable base and has at one end thereof bearing

brackets 5 adapted to support a rotating driving shaft 6. A suitable depression 7 is had in the top portion of the casing having a central aperture 8 therethrough communicating with the combustion chamber 9, and in which is suitably mounted an air supply tube 10 and fuel supply tube 11, said air supply tube 10 feeding air thereto from a rotary air pump 12, and said fuel supply pipe feeding fuel thereto from a rotary supply pump 13, the said supply tubes 10 and 11 having at intermediate points branch tubes, said branch tube 14 of the air supply leading to a suitable storage tank to be used for starting purposes if necessary.

A branch tube 15 from the fuel supply tube leads back to the fuel tank to deliver excess fuel thereto. Suitable safety check valves 16 and 17 of ordinary construction are formed in each of the branch tubes 14 and 15 respectively, and said check valves operate to open the passage way to said branch pipes when the feeding pressure reaches a predetermined point to thereby relieve the pressure of the supply of air and gas when it reaches a dangerous point, this arrangement acting as a safety device.

Suitable driving gears 18 and 18' are rigidly mounted upon the shaft 6 to drive the air and fuel supply pumps, as shown in Fig. 3 of the drawings. An air inlet 19 being had to supply air to my engine, said air being fed to the engine through the pipe 10 from the mouth 20. A fuel supply opening 21 also feeds fuel through the pump 13 and feeds the fuel through the pipe 11 from the mouth 22. A suitable casing 23 incloses the driving gear 18, and likewise, suitable casings 24 and 25 cover the rotary pumps to pump the air and fuel into the engine.

A suitable spark plug 26 is mounted in the depression 7 adjacent to the opening of the mouths of the supply pipes 10 and 11 to fire the hydro-carbon fuel received from said supply pipe. At suitable intervals in the inner wall 3 of the casing 1 are mounted a plurality of blades 27 of ordinary construction. Interior of this double walled outer casing is mounted a double walled drum 28, said double walled drum having an outer wall 29 and an inner wall 30 forming a water chamber 31 therebetween. Said water chamber having a plurality of stepped sections 32 and 33 to be hereinafter described. At suitable intervals in the outer wall 29 are rigidly mounted a plurality of blades

34, said blades alternating between the blades 27 mounted in the outer casing previously noted, and said alternate blades playing in the chamber formed therebetween, said chamber having successively enlarged sections 35 and 36.

A suitable supply nozzle 37 is mounted in the combustion chamber 9 some distance away from the explosion point for the fuel, so that steam can be supplied in said fuel.

The casing 1 has an enlarged portion 38 which incloses a plurality of piston disks 39, and 40, and 41 for a purpose hereinafter explained in detail.

A supply tube 42 is mounted between and communicates from the first stage 35 to the piston disk 40. A second supply tube 43 is mounted between and communicates from the second stage 36 and communicates with the piston disk 41. The fuel is exhausted through the exhaust tube 44 in the usual manner.

A water supply tube 45 is mounted in the drum 28 and feeds water through the inner water chamber 31 through the bend portion 46 of the casing 1 back through the outer water chamber 4 formed in the outer casing 1, the water leaving the casing through the pipe 47. At suitable intervals perforated rings 48 are mounted to retain the outer wall 29 and the inner wall 30 in spaced relationship to each other and yet allow of the passage of the water thereby.

A door or gate 49 is had in the outer casing 1 to allow access to the interior parts of the engine for the purpose of repairs or renewal, etc.

The drum which is rotatably mounted upon the shaft 6, is supported thereon by means of brackets 50, which are rigidly connected to the drum 28 and the shaft 6 to rotate the shaft thereby.

In operation the water supply is fed through the supply tube 45 into the inner water chamber 31, and owing to the fact that said inner water chamber is of enlarged formation allowing of greater diameter toward the end portion thereof, the water is forced forward through centrifugal action around the bend 46 and back through the outer chamber 4, where it is exhausted through the portion 47. Thus it incloses the combustion chamber 9, this arrangement giving a maximum efficiency for cooling purposes.

The combined fuel and air is injected under pressure, from the supply tubes 10 and 11 into the combustion chamber 9 where it is fired by means of a spark plug 26, it is then expanded and passed between the blades 27 and 34 until it has operated upon the extreme blade thereof, when it is exhausted through the exhaust port 44. The end blades of the rotor being of a larger surface than the first blades thereof to take

advantage of the more expanded condition of the fuel and owing to the enlarged condition at 35 and 36, advantage is taken of the centrifugal force to help propel the gas forward. When the gas has been ignited, the spark plug is cut out of action, and the fresh fuel becomes ignited from the ignited fuel within the explosion chamber to thereby keep a continuous firing thereof, the fuel not being fired outside of the combustion chamber for lack of air.

As there is always a forward thrust upon the drum through the impact of the gases upon the blades 34, a counterbalancing effect is had by allowing a portion of the used gases to flow back through the pipes 42 and 43 to impinge against the piston disks 40 and 41, the piston disk 39 having received the initial impact of the explosion gases in the explosion chamber 9. This combustion equalizes the thrust in either direction upon the rotating drum.

Having now described our invention what we claim as new and desire to secure by Letters Patent is:—

1. A gas turbine engine, comprising a double-walled casing in successively enlarged sections, the outer wall being backturned and overlapping the inner wall, and said walls forming a water-chamber therebetween, and a double-walled rotor in successively enlarged sections mounted within said casing, the said rotor sections matching the sections of the casing and the ends of the rotor walls seated between the end of the inner wall of said casing and the backturned portion of the outer wall of said casing, said double walls of said rotor forming a water chamber therebetween directly and continuously communicating with the water chamber in said casing.

2. A turbine gas engine comprising a rotative shaft, a plurality of rotor supports rigidly mounted upon said shaft, a rotor rigidly mounted upon said supports, an auxiliary wall to said rotor forming a water chamber therebetween, a casing to said rotor having one end backturned inside of the end of said rotor with a support attachment loosely mounted upon said shaft, and an interior auxiliary wall to said casing forming a water chamber therebetween, said last mentioned water chamber directly and continuously communicating with said first mentioned water chamber.

3. A gas turbine engine, comprising a rotative shaft, a rotor rigidly mounted upon said shaft and adapted to rotate said shaft having successively enlarged sections, a spaced auxiliary wall to said rotor having corresponding successively enlarged sections forming a water chamber therebetween, said successively enlarged sections adapted to force water forwardly under centrifugal action derived from the rotation of the rotor,

a casing having the end backturned inside of the end of the rotor, and an auxiliary wall to said casing forming a water chamber therebetween, said last mentioned water chamber directly and continuously communicating with said first mentioned water chamber to receive the flow of water therefrom.

4. A turbine gas engine comprising a rigid casing having a rigid internal water chamber, and a rotor having an internal water chamber rotating with said rotor with successively enlarged sections to force water forwardly under centrifugal action, when said rotor is rotated, said water chamber of the rotor directly and continuously communicating with and feeding water to the water chamber of said casing.

5. A turbine gas engine comprising a casing having a water chamber therein, one end of said casing being backturned, a rotative shaft, a rotor mounted upon said shaft within the confines of said casing having an internal water chamber with successively enlarged sections, said water chamber directly and continuously communicating with said water chamber of said casing by means of the backturned end of said casing, and said rotor being in spaced relationship to said

casing, blades arranged upon said rotor in said space, blades arranged upon said casing in said space and alternating with the blades upon the rotor, a combustion chamber communicating with said space, safety controlled supply means to inject fuel into said combustion chamber, safety controlled supply means to inject air into said combustion chamber, safety controlled supply means to inject steam into said combustion chamber, and firing means within said combustion chamber adapted to continuously fire said injected fuel, air and steam, said firing forcing the burned gases by said blades to rotate said rotor, and the rotation of said rotor forcing water from the water chamber in said rotor to the water chamber in said casing through centrifugal action derived from the enlarged sections of the water chamber of the rotor.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

ERASTUS M. MAXWELL.
JAS. F. MAXWELL.

Witnesses:

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Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."