B. H. BLAISDELL.

COMBUSTION CHAMBER.

APPLICATION FILED APR. 7, 1911.

1,008,583. Patented Nov. 14, 1911.

FIG. 1.

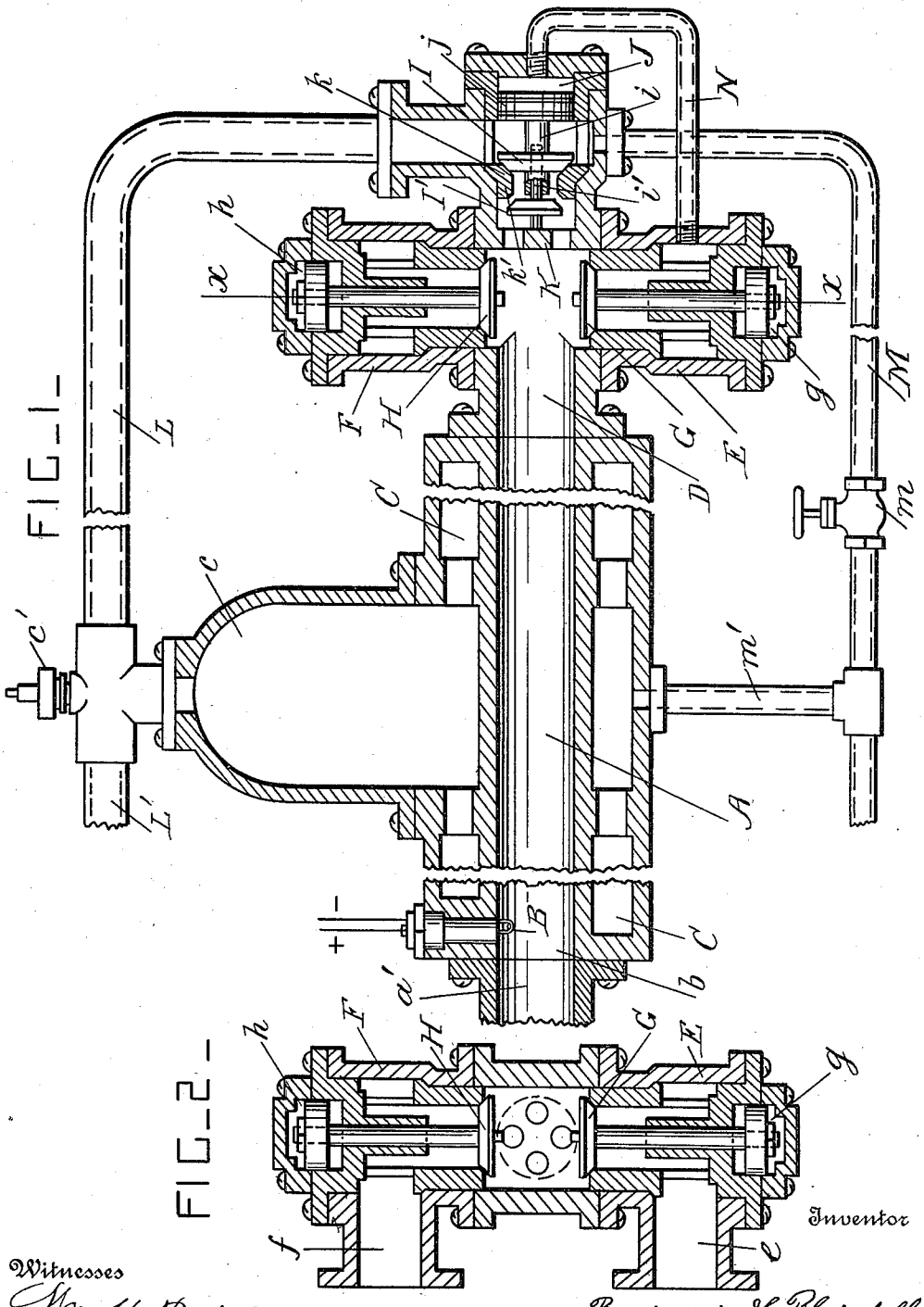

FIG. 2.

Witnesses

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COMBUSTION-CHAMBER.

1,008,583. Specification of Letters Patent. Patented Nov. 14, 1911.

Application filed April 7, 1911. Serial No. 619,556.

To all whom it may concern:

Be it known that I, BENJAMIN H. BLAISDELL, a citizen of the United States, residing at Manila, in the Philippine Islands, have invented certain new and useful Improvements in Combustion-Chambers; and I 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.

This invention relates to combustion chambers for use in connection with gas engines of the turbine type; and it consists in the novel construction and combination of the parts hereinafter fully described and claimed whereby the turbine engine is supplied with pressure fluid to drive it.

In the drawings, Figure 1 is a longitudinal section through a combustion chamber constructed according to this invention. Fig. 2 is a cross-section, taken on the line x—x in Fig. 1.

A is the explosion chamber in which a charge of air and hydrocarbon is ignited. This chamber is relatively very long in proportion to its diameter or width, and a' is a pipe connection at its outlet end for connecting it to the turbine engine.

B is the igniter which is of any approved construction, such as an electric igniter. This igniter is arranged in the chamber A adjacent to its outlet b.

C is a water jacket encircling the combustion chamber and forming a boiler for generating steam. This jacket is provided with a steam dome c, and a safety-valve c'.

D is an inlet cylinder secured to the inlet end of the combustion chamber A at the opposite end from the outlet b.

E is a casing for the air valve provided with an air inlet e, and secured to the underside of the inlet cylinder D.

F is a casing for the fuel valve provided with an inlet f for gas or other hydrocarbon fuel, and secured to the upperside of the inlet cylinder D.

G is the air valve, and H is the gas valve. These valves are preferably puppet valves of any approved construction provided with dash-pots g and h respectively, and arranged inside the casings E and F.

I I′ are two combined valves for steam and water. The rear valve I has a stem i which carries a cushioning piston j which works in an air cylinder J at the rear end of the inlet cylinder D. The valve I is of the same diameter as the piston j and it bears on a seat k. The front valve I′ has a short stem i' which slides in a guide hole in the stem i, and bears against a seat k'. The valves I and I′ close alternately, and when both are open a free passage is provided through their seats.

K is a stop in the inlet cylinder D which prevents the valve I′ from being separated from the valve I.

L is a steam pipe which connects the boiler dome c with the inlet cylinder D behind the valve I, and L′ is a branch for admitting steam to the pipe L, when desired, obtained from a jacket or other similar device heated by the surplus or waste heat of the turbine engine.

M is a pipe for the admission of water to form spray. This pipe is connected to the underside of the inlet cylinder D behind the rear valve I, and it is provided with a regulating valve m, and a branch pipe m' which is connected to the water jacket or boiler C.

Any other approved forms of valve or valve mechanism may be used in carrying out this invention, but puppet valves are preferred as they are less liable to be affected detrimentally by the heat than slide valves.

N is an air pipe which is connected to the air inlet e of the air valve and to the air cylinder J behind the cushioning piston j.

In starting the apparatus air and gas are admitted under pressure to the combustion chamber through their respective valves G and H, their proportion and pressure being regulated by suitable valves which are not shown. The air and gas are compressed to any desirable extent by any approved devices, which are not shown, so that they may flow freely into the combustion chamber and become mixed therein. While the combustible charge is being admitted in this manner to the combustion chamber, the rear valve I is held closed by the air pressure in the cylinder J. The combustible charge passes longitudinally through the combustion chamber and is ignited when it reaches the igniter B adjacent to the outlet of the combustion chamber and at the opposite end thereof from the inlet valves. The pressure rises suddenly in the combustion chamber, and the gas and air valves are closed automatically before any flame can pass rearwardly through them, shock being prevented by

their dash-pots. The valve I′ is also propelled rearwardly and closed, so that the valve I is opened and steam and water are free to pass into the space between the valves I and I′. The pressure thus obtained in the combustion chamber affords a means for driving a turbine gas engine or other similar motor.

When the pressure in the combustion chamber falls by expansion below the pressure of the compressed air in the rear end of the air cylinder J, the steam and water valves I and I′ are moved forwardly, but not suddenly. Steam from the boiler rushes into the combustion chamber carrying with it water from the water pipe in the form of spray. This steam and water drives out the products of combustion from the combustion chamber and assists in driving the turbine engine. The water also cools the turbine engine in a measure, and prevents it from being overheated.

The water valve *m* can be closed, if desired, and steam alone can be used as the scavenging fluid. The explosions or ignitions in the combustion chamber take place intermittently, and at intervals regulated by the requirements of the motor. The valves are all automatic in their action, being operated by the changes in the pressure of the fluid inside the combustion chamber, and not by any valve operating mechanism.

What I claim is:

1. The combination, with a combustion chamber having an inlet for the combustible charge at one end and an outlet for the high-pressure gases at the other end, of means for igniting the charge at the outlet end, and puppet valve mechanism controlling the supply of combustible fluid and arranged at the inlet end, said valve mechanism being operated automatically by the changes in the pressure of the fluid in the said chamber.

2. The combination, with a combustion chamber having an inlet for the combustible charge at one end and an outlet for the high-pressure gases at its other end, of means for igniting the charge at the outlet end, puppet valve mechanism controlling the supply of combustible fluid at the inlet end, said valve mechanism closing automatically when the charge is ignited, a valve for scavenging fluid arranged to work independent of the said puppet valve mechanism, and means for opening the scavenging valve automatically when the pressure has fallen by expansion and before another charge is admitted.

3. The combination, with a combustion chamber having an outlet for the high-pressure gases at one end, of an inlet cylinder secured to the other end of the said chamber, means for igniting the charge at the outlet end of the chamber, automatic valve mechanism for air and fuel connected to the said inlet cylinder, a valve for scavenging fluid provided with a piston and arranged at the rear end portion of the inlet cylinder, and means for admitting compressed air behind the said piston to open the scavenging valve automatically when the pressure in the combustion chamber has fallen by expansion.

4. The combination, with a combustion chamber, of automatic valve mechanism for air and fuel, two combined valves for controlling the admission of scavenging fluid to the said chamber, said two valves being arranged one behind the other, and the front valve being closed automatically with the said valve mechanism, and means for opening the front valve to admit scavenging fluid to the said chamber and for subsequently closing the rear valve to cut off its supply automatically after the pressure in the said chamber has fallen by expansion.

5. The combination, with a combustion chamber, of automatic valve mechanism for air and fuel, two combined valves of unequal area for controlling the admission of scavenging fluid to the said chamber, the smaller of the said two valves being closed automatically with the said valve mechanism, a cylinder for compressed air, and a piston slidable in the said cylinder and operating to open the smaller valve and subsequently to close the larger valve after the pressure in the combustion chamber has fallen by expansion.

6. The combination, with a combustion chamber, of an air valve provided with a supply pipe for admitting air under pressure, a fuel supply valve, valve mechanism for controlling the admission of scavenging fluid to the said chamber, an air cylinder provided with a piston for operating the said valve mechanism, and a pipe connection between the said cylinder and air supply pipe, whereby scavenging fluid is admitted to the said chamber automatically when the pressure in it has fallen below the pressure in the air supply pipe.

In testimony whereof I have affixed my signature in the presence of two witnesses.

BENJAMIN H. BLAISDELL.

Witnesses:
BENITO P. JUAN,
CIPRIANO DE PERALTA.