I. N. REED.

HYDROCARBON GAS TURBINE.

APPLICATION FILED DEC. 6, 1910.

1,021,262.

Patented Mar. 26, 1912.

2 SHEETS—SHEET 1.

Fig. 1.

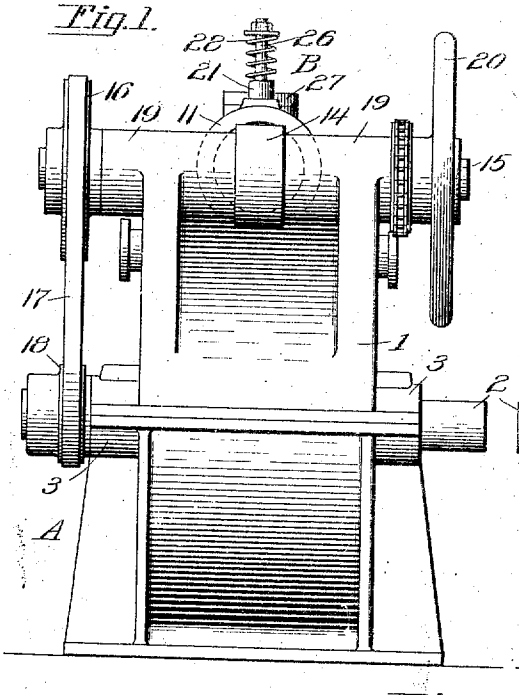


Fig. 3.

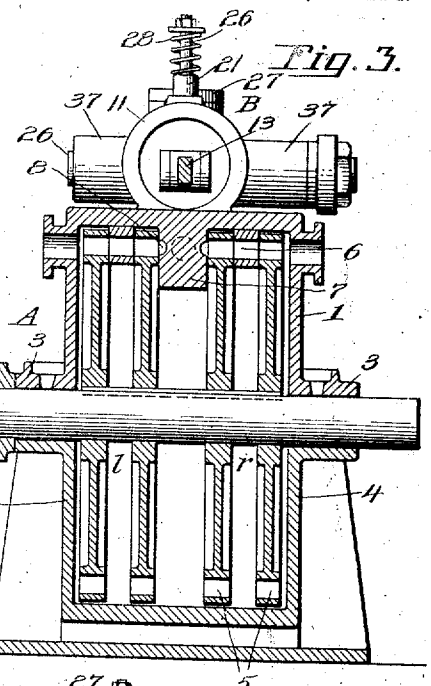
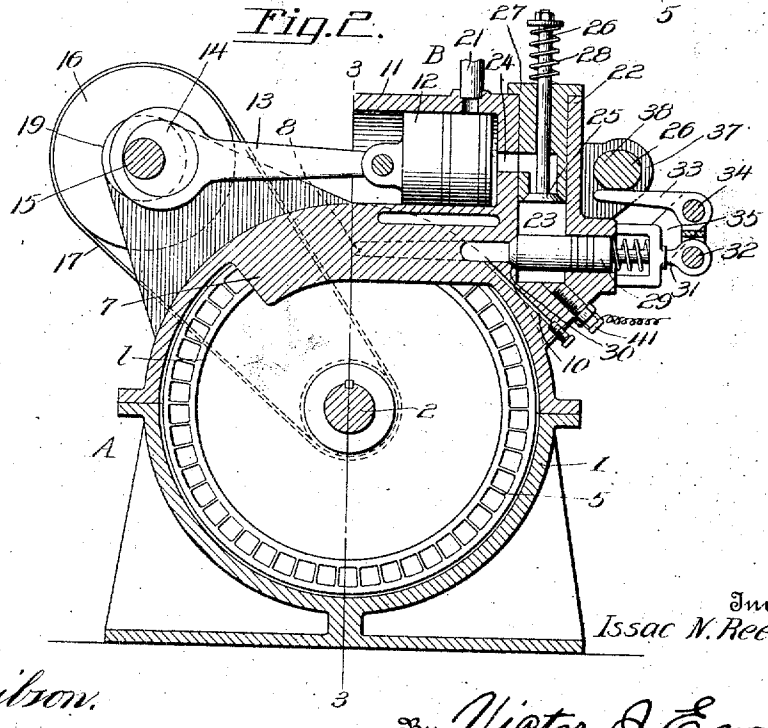


Fig. 2.



Witnesses

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2 SHEETS—SHEET 2.

Fig. 4.

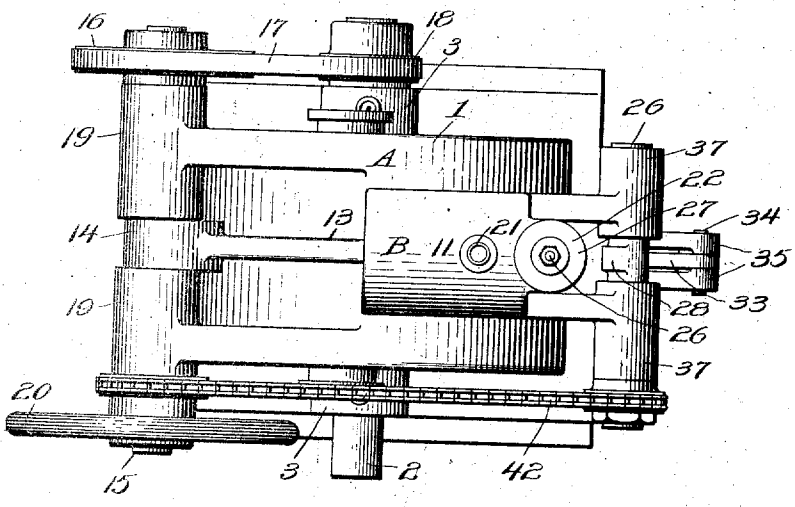
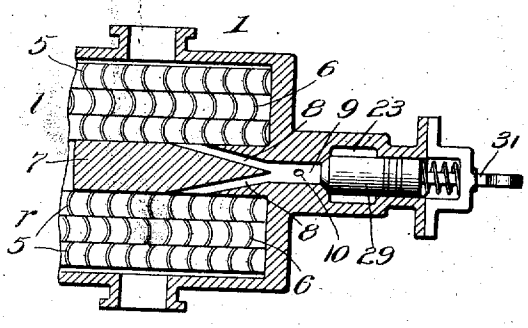


Fig. 5.



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HYDROCARBON-GAS TURBINE.

1,021,262. Specification of Letters Patent. Patented Mar. 26, 1912.

Application filed December 6, 1910. Serial No. 595,873.

To all whom it may concern:

Be it known that I, ISAAC N. REED, a citizen of the United States, residing at Jersey City, in the county of Hudson and State of New Jersey, have invented new and useful Improvements in Hydrocarbon-Gas Turbines, of which the following is a specification.

This invention relates to a rotary engine or turbine of that type in which the motive fluid consists of an exploded charge of carbureted hydro-carbon.

The invention has for one of its objects to improve and simplify the construction and operation of prime movers of this character so as to be comparatively simple and inexpensive to manufacture, reliable and efficient in use, and composed of comparatively few parts.

Another object of the invention is the provision of a novel arrangement of rotary stationary buckets and discharge nozzles, in combination with means for producing a motive fluid of high pressure to be discharged through the nozzles to the buckets.

With these objects in view and others, as will appear as the description proceeds, the invention comprises the various novel features of construction and arrangement of parts which will be more fully described hereinafter and set forth with particularity in the claims appended hereto.

In the accompanying drawings, which illustrate one embodiment of the invention, Figure 1 is an end view of the machine. Fig. 2 is a vertical section taken transversely to the axis of rotation. Fig. 3 is a vertical section on line 3—3, Fig. 2. Fig. 4 is a plan view. Fig. 5 is a detail sectional view of the nozzles showing their relation to the buckets.

Similar reference characters are employed to designate corresponding parts throughout the views.

Referring to the drawings, A designates the turbine, and B, the fluid-producing device mounted on the turbine and operatively related thereto so that the nozzles will receive motive fluid at high pressure.

The turbine A consists of a casing 1 of any approved construction, through which passes a central shaft, the shaft being journaled in bearings 3 at the heads 4 of the casing. Arranged in the casing and mounted on the shaft is a wheel of the double axial flow type, said wheel consisting of two sets of disks *r* and *l* located, respectively, to the right and left of the central transverse plane of the casing, there being shown two disks in each set, but it is to be understood that any desired number of bucket-carrying elements or disks may be provided. On the periphery of each disk are radial buckets 5 of proper curvature, and between adjacent rotating rows of buckets are stationary intermediate buckets 6 that are curved oppositely to the wheel or moving buckets so as to reverse the direction of flow of the motive fluid in its passage from one set of moving buckets to the next adjacent set. The casing is provided with an internal projection or web 7 that is located in the central transverse plane and disposed between the innermost disks on the shaft 2, and in this web are oppositely-inclined discharging devices or nozzles 8 that are disposed at the proper angle with respect to the wheel buckets, the said nozzles being connected with the common throat or passage 9 through which the motive fluid or exploded gases pass to the nozzles. The exploded fluid is discharged intermittently, and being of high temperature, it is desirable to increase the volume of the motive fluid by discharging water or other fluid into the throat 9 at the time the fired gases pass therethrough, and for this purpose a conduit or passage 10 is formed in the wall of the casing to lead into the throat 9, the said conduit being connected with a suitable device (not shown) for discharging a definite amount of water at the proper interval.

The fluid-producing device B consists of a cylinder 11 mounted on the casing or located in any other suitable point, and in this cylinder reciprocates a compression piston 12 that is connected with the pitman 13 which is operated by an eccentric 14, said eccentric being arranged on a shaft 15 that has a wheel 16 connected by a belt or sprocket chain 17 with a wheel or sprocket 18 on the main shaft 2. The eccentric shaft is journaled in bearings 19 formed on the turbine casing, and on this shaft is a hand wheel 20 whereby the eccentric shaft can be turned for operating the compressor or pump piston 12. The cylinder is connected by a pipe 21 with a carbureter or other source of explosive mixture so that when the piston moves forwardly, a charge will be

drawn into the cylinder and subsequently compressed on the inward or rear stroke. In the head 22 of the cylinder is formed an explosion chamber 23 that is connected with the cylinder through a port or passage 24, the said passage being normally closed by a puppet valve 25 which has a stem 26 passing outwardly through a plug 27, there being a spring 28 on the other end of the stem that operates to automatically close the valve between the cylinder and combustion chamber 23. This combustion chamber 23 is adapted to communicate with the throat of the nozzles immediately after the compressed explosive charge in the chamber 23 is ignited, but at other times the communication is interrupted by the piston or follower 29 that moves across the chamber 23 and engages the seat 30 at the receiving end of the nozzle throat 9. The piston valve 29 is provided with a stem 31 which is connected at 32 with a lever or rocker 33, the latter being fulcrumed at 34 in a bearing 35 on the head of the cylinder. At the head of the cylinder is a transverse shaft 26 mounted in bearings 37, and on this shaft is a cam 38 that wipes on the lever 33 in such a manner that the piston valve 29 is moved to open position at the proper instant and then is closed by a spring 30 after the exploded gases have passed into the turbine. The shaft 26 is driven from the shaft 15 by a sprocket chain 42 or equivalent means.

In operation, the supply of liquid fuel to the carbureter is opened and then the hand wheel 20 turned so as to reciprocate the piston 12. During the out-stroke, a charge of mixture is drawn into the cylinder so as to be compressed on the succeeding in-stroke. The compressed gases cause the valve 25 to open for admitting the compressed gases into the combustion chamber 23, the piston valve 29 being closed at this time. The gases in the chamber 23 are now ignited by a spark plug 41 or equivalent device, and the valve 29 opens to permit the exploded gases to pass to the turbine, the force of explosion insuring the closing of the valve 25. While the exploded gases pass through the nozzle, water is injected into the same so as to be converted into steam to increase the volume of the motive fluid. While the motive fluid is discharging to the turbine, the piston 12 moves outwardly to draw in another charge of mixture so that the cycle just described will be repeated and in this way continuous rotation of the turbine wheel maintained.

From the foregoing description, taken in connection with the accompanying drawings, the advantages of the construction and of the method of operation will be readily apparent to those skilled in the art to which the invention appertains, and while I have described the principle of operation of the invention, together with the apparatus which I now consider to be the best embodiment thereof, I desire to have it understood that the apparatus shown is merely illustrative, and that such changes may be made when desired as are within the scope of the claims appended hereto.

Having thus described the invention, what I claim as new, is:—

1. The combination of a turbine including sets of revolving buckets, and oppositely discharging nozzles disposed between the said sets for delivering fluid to both simultaneously, said nozzles having a common throat, with a combustion chamber adjacent the said throat, a valve for closing the throat for interrupting communication between the chamber and nozzles, means for delivering a compressed charge of explosive mixture to the chamber, means for guiding the mixture in the chamber, and means for opening the said valve in timed relation to the ignition of the charge.

2. The combination of a turbine including sets of revolving buckets, and oppositely discharging nozzles disposed between the said sets for delivering fluid to both simultaneously, said nozzles having a common throat, with a combustion chamber adjacent the said throat, a valve for closing the throat for interrupting communication between the chamber and nozzles, means for delivering a compressed charge of explosive mixture to the chamber, means for guiding the mixture in the chamber, means for opening the said valve in timed relation to the ignition of the charge, and means through which liquid is delivered to the throat of the nozzles simultaneously with the passage of the fired gases therethrough.

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

ISAAC N. REED.

Witnesses:

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