

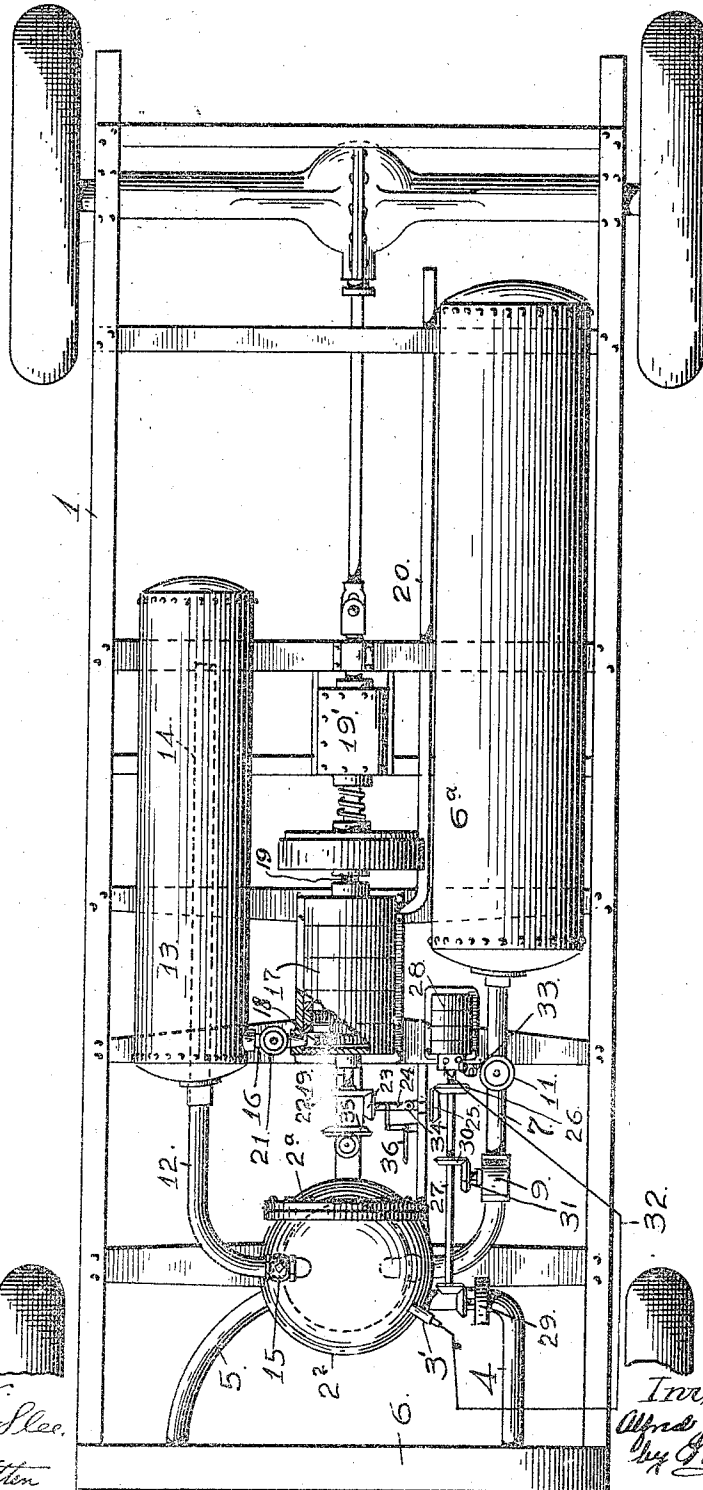
1,165,023.

A. J. RICH, JR.
FLUID ACTUATED ENGINE.
APPLICATION FILED FEB. 27, 1912.

Patented Dec. 21, 1915.
2 SHEETS—SHEET 1.

Fig. 1.

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Fig. 2.

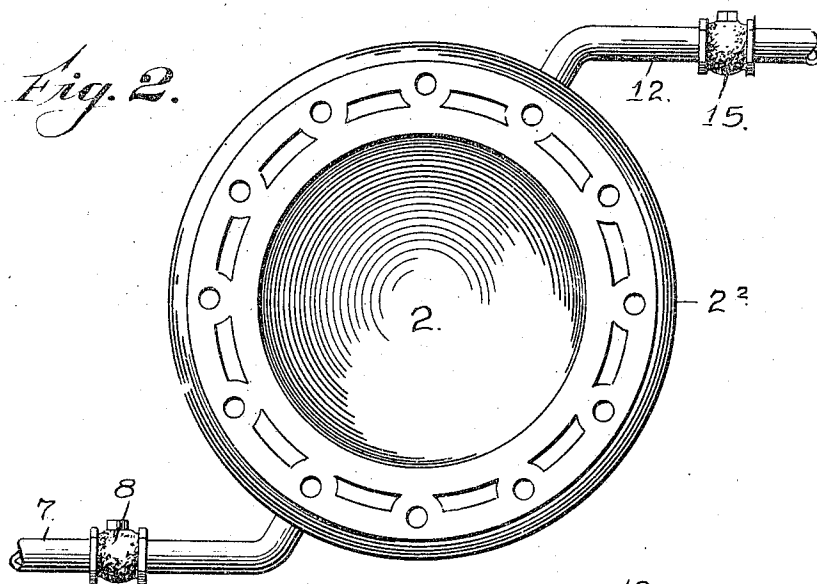


Fig. 3.

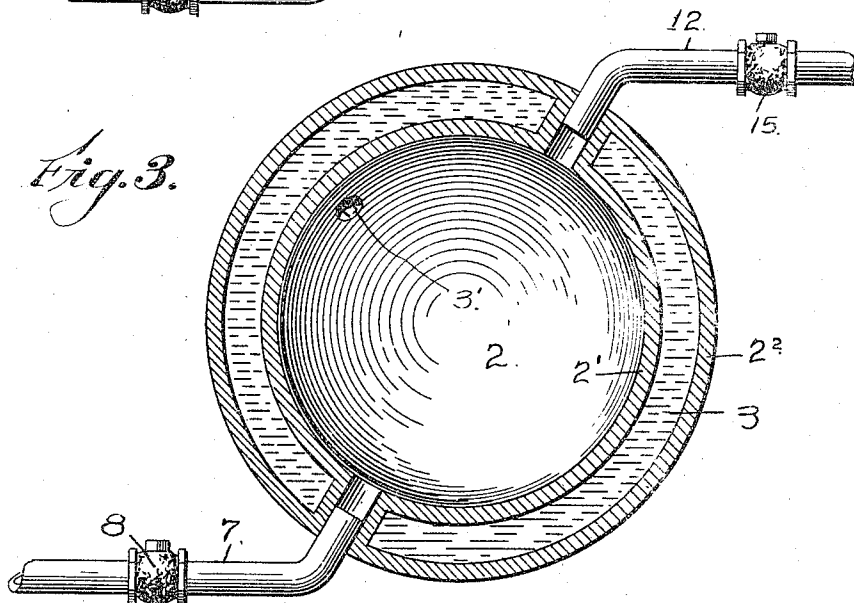
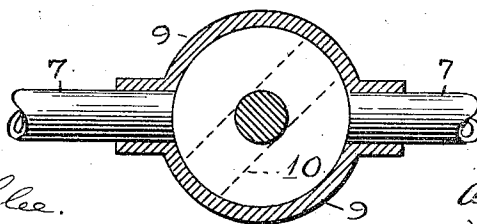


Fig. 4.



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UNITED STATES PATENT OFFICE.

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FLUID-ACTUATED ENGINE.

1,165,623.

Specification of Letters Patent. Patented Dec. 21, 1915.

Application filed February 27, 1912. Serial No. 680,311.

To all whom it may concern:

Be it known that I, ALFRED JOSEPH RICH, Jr., a citizen of the United States, residing in the city and county of San Francisco and State of California, have invented certain new and useful Improvements in Fluid-Actuated Engines, of which the following is a specification.

The hereinafter described invention relates to new and useful improvements in fluid actuated power generating means or engine, and to a type of engine designed for producing great power to operate any suitable machinery, but more particularly adapted for use in propelling automobiles, where an engine of great power and little weight is desired, and the invention has for its principal object to provide an engine of the internal combustion type wherein the exhaust gases from each explosion in the firing chamber are stored in a reservoir or pressure accumulating chamber under compression, and then projected with great propelling force against a suitable vaned wheel or turbine to propel the vehicle.

A further object is to provide an engine of the internal combustion type in which the gas to be exploded is forced into the firing chamber under compression and the expanded gases after the explosion has taken place are forced by their own expansion into a suitable pressure accumulating chamber and stored therein, one explosion after another, until a sufficient pressure has accumulated to drive the car.

Another and important object is to provide an engine of the above character, with a means for varying the volume of the explosive charge which is intermittently admitted into the firing chamber thereof, without increasing or decreasing the timing of the explosion in the combustion chamber.

The invention comprises a cylindrical combustion or firing chamber, provided with the usual water jacket and spark plug, means for intermittently admitting highly explosive gas under pressure into said combustion chamber, valve controlled means operated by the explosion of the gas in said chamber for permitting the expanded gases to escape therefrom into a receiving or accumulating chamber, that said gases may be stored therein under a greater pressure than the explosive pressure thereof, and means for projecting the gases contained in said accumulating chamber under pressure

against a series of turbine blades or vanes mounted on the shaft to be operated.

With the above mentioned and other objects in view, the invention consists in the construction and novel combination of parts hereinafter fully described, illustrated in the accompanying drawings, and pointed out in the claim hereto appended, it being understood that various changes in the form, proportion, size and minor details of construction, within the scope of the claim hereto appended, may be resorted to without departing from the spirit or sacrificing any advantages of the invention.

To comprehend the invention reference should be had to the accompanying sheets of drawings disclosing a complete constructed device for fully carrying out my invention, wherein—

Figure 1 is a top plan view of my improved engine mounted on an automobile frame and disclosing the firing chamber, the supply tank for gas under pressure, the accumulating chamber for receiving the exploded gases from the firing chamber, the housing containing the turbine wheels for transmitting power to the drive shaft, and the connections and timing gears associated with each part. Fig. 2 is a view of the firing chamber disclosing the detachable section thereof and the several pipes or communications leading into said chamber. Fig. 3 is a sectional view of the combustion chamber showing the position of the gas intake, the exhaust, and the spark plug. Fig. 4 is a detail view of the rotary valve in the gas inlet pipe.

Referring more particularly to the drawings, the reference numeral 1 designates a suitable vehicle frame capable of supporting the various parts of my invention and on the forward end of which is mounted a hollow spherical firing chamber 2, surrounded by a suitable cooling or water jacket 3 formed between the walls 2' and 2" thereof, and which is connected by an inlet pipe 4 and an outlet pipe 5, to a cooling radiator 6 mounted on the front of the frame in advance of the firing chamber, the chamber being provided with a removable section or plate 2^a which is secured thereto by suitable bolts and may be removed for the purpose of examining the interior of the chamber. The firing chamber is also provided with a spark plug 3' for firing the charge of gas in said chamber. Gas having

high explosive properties, is supplied under pressure to the interior of the firing chamber 2 from a suitable supply tank or reservoir 6^a by a pipe 7 which enters the firing chamber at a point as disclosed in Fig. 2 of the drawings, the pipe being provided at a point adjacent the firing chamber with a check valve 8 which prevents a back fire from the firing chamber into the pipe.

13 The charge of gas is intermittently admitted into the firing chamber by a disk valve 9, rotatably mounted in the inlet pipe 7 and provided with spaced openings 10 extending therethrough, which alternately register with the opening in the pipe 7, the valve being operated in a hereinafter described manner. The volume of gas admitted into the firing chamber is regulated by a turn plug or other suitable valve 11 arranged within the inlet pipe 7 between the rotary valve 9 and the supply tank 6^a, and operated by a suitable lever, not shown, which preferably extends to the steering wheel of the car.

25 The gases after being admitted into the combustion chamber and exploded in a hereinafter described manner, are forced by their own expansion through a suitable pipe 12 into a storage or accumulating chamber 13, the pipe 12 projecting slightly into the chamber as at 14 and provided near the point of entering the firing chamber with a check valve 15, which prevents the return flow of the expanded gases from the accumulating chamber into the firing chamber.

30 The gases stored in the accumulating chamber 13 flow therefrom through a suitable pipe or connection 16 into the forward end of a turbine casing 17 and discharge against the blades of a suitable turbine wheel 18, keyed to a shaft 19, with sufficient impact to rotate said shaft and transmit power to other parts of the vehicle; the gases after losing their force escape from the rear end of said casing 17 through an exhaust pipe 20. The drive shaft 19 is adapted to be thrown into geared relation with the speed transmission 19' of the machine, to transmit power therethrough to the rear or propelling wheels of the vehicle. The pipe 16 is provided intermediate the chamber 13 and the casing 17 with a suitable hand operated valve or turn plug 21, which is preferably operated from a handle extending to the steering wheel of the car.

50 The gas timing and ignition means operate in the following manner:—Keyed to the forward end of the shaft 19 is a bevel gear 22 which meshes with a gear 23, carried by a shaft 24, on the other end of which is carried a bevel gear 25, which intermeshes with a suitable gear 26 on a shaft 27, which extends longitudinally of the vehicle frame. The shaft 27 is connected at its rear end to the shaft of a magneto 28 and at its forward end to the shaft of a water pump 29, which is positioned in the water inlet pipe 4 which extends from the radiator to the combustion chamber water jacket, the operating of the water pump circulating the water through the water jacket surrounding the firing chamber and the radiator. The shaft 27 is also provided with a bevel gear 30, the teeth of which are adapted to intermesh with suitable gear teeth 31 extending from the periphery of the disk valve 9. A connection 32 extends from the magneto contacts to the spark plug 3', and the magneto also being provided with a ground wire 33 which extends to any suitable part of the vehicle, preferably the frame.

70 The operation of the engine is as follows: The parts being assembled and timed to operate in the following manner, and the accumulating chamber 13 stored with gas, the valve 21 is opened permitting gas under pressure to escape from the chamber through the pipe 16 and to strike against the turbine wheel 18 keyed to the shaft 19, which may be termed the drive shaft of the vehicle, and rotate the same, the rotation of the shaft 19 will, through the gears 22, 23, 25 and 16, rotate the magneto and gas timing shaft 27. The inlet valve 11 is now operated admitting the flow of the explosive gases from the tank 6^a into the pipe 7, and as the disk valve 9 is rotated and the ports 10 therein come in alinement with the opening in the pipe 7, the gas is admitted into the firing chamber 2 through the check valve 8, as soon as the gas is admitted into the combustion chamber and the valve 9 has rotated to a closed position, the timing mechanism of the magneto contacts and a spark issues from the spark plug 3' igniting the charge of gas in the cylinder and the gas by its high explosive qualities actuates the check valve 15 in the outlet pipe 12 and enters the accumulating chamber 13, under a greater expansion force than when admitted into the combustion chamber, this operation continuing and the pressure in the compression chamber maintained at the proper pressure.

100 The drive shaft may at any time be thrown into geared relation with the speed transmission so that power will be transmitted therefrom to the rear or driving wheels of the vehicle.

110 It will be observed that the volume of explosive gas to be admitted into the firing chamber may be regulated by the valve 11, and also that the volume of compressed gas from the accumulating chamber to the turbine wheel may be regulated by the valve 21, as it is desired to either increase or decrease the speed of the engine shaft 19, and transmit more or less power to the drive shaft 19' of the wheel. The valves 11 and 21 may be connected to a foot accelerator and operated simultaneously.

For initial starting the shaft 24 is provided within its length with a universal joint 34 permitting the gear 23 of the shaft 24 to be thrown out of mesh with the gear 22 on shaft 19 and thrown into mesh with a suitable gear 35 adapted to be operated by a suitable hand crank extending near the operator's seat; the shifting of the shaft 24 from one position to the other being accomplished by the operation of the bell crank lever 36 which also extends within easy reach of the operator.

Having thus fully described my improved invention what is claimed as new and desired to be protected by Letters Patent is:—

In an apparatus for the described purpose, the combination with a firing chamber, a storage means for an explosive gas, a connection between the same and the firing chamber, a valve for controlling said connection, means for varying the volume of charge of explosive gas to be admitted to said firing chamber, means within said chamber for exploding said gas under pressure, a pressure accumulating chamber for receiving the expanded gases after being ex-

ploded in said firing chamber, valve controlled communication between the firing chamber and said pressure accumulating chamber, a rotary pressure actuated motor, means for discharging a propelling jet from said pressure accumulating chamber against said rotary motor, and a geared connection between said motor and said first mentioned valve for operating the same to control the admission of the explosive charges into the firing chamber, an initial starting means, and means for disconnecting said geared connection from said rotor and positioning the same in coöperation with said initial starting means, said initial starting means adapted for operating said first mentioned valve and said ignition means for supplying a charge of fuel to the combustion chamber and igniting the same.

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

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