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POWER SYSTEM.

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POWER SYSTEM.

No. 862,375. Specification of Letters Patent. Patented Aug. 6, 1907.

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To all whom it may concern:

Be it known that I, GUSTAV AYRES, a citizen of the United States, residing at Washington, in the District of Columbia, have invented certain new and useful Improvements in Power Systems, of which the following is a specification.

My invention relates to improvements in power systems, and it consists in the constructions, combinations, and arrangements herein described and claimed.

An object of my invention is to provide an improved power system capable of a materially greater radius of operation than is possible with existing systems, and especially adapted for automobile devices, such as torpedoes, vehicles, etc.

A further object of my invention is to provide a compact power system having a high thermodynamic and mechanical efficiency, and constructed to automatically continue in operation with certainty after being once started.

In the accompanying drawings forming a part of this application, and in which similar reference symbols indicate corresponding parts in the several views, Figure 1 is a sectional elevation, taken on the line 1—1 of Fig. 2, illustrating one embodiment of my invention; Fig. 2 is a plan view of the construction shown in Fig. 1; Fig. 3 is a sectional view, on a larger scale, taken on the line 3—3 of Fig. 1; Fig. 4 is a sectional view, on a larger scale, taken on the line 4—4 of Fig. 1; Fig. 5 is a sectional view, on a larger scale, taken on the line 5—5 of Fig. 1, and Fig. 6 is a perspective view, showing the operating valve and the circuit-controlling means carried thereby.

Referring to the drawings, 1 indicates a reservoir for containing a supply of air under pressure. Any suitable form of fluid-pressure motor 2 is positioned within the reservoir and provided with an admission opening 3 for maintaining said motor in free communication with the compressed air supply in the reservoir. After passing through the motor 2, the air is conducted by a pipe 4 to a carbureter 5; said pipe being shown provided with a check valve 6 and with a reducing valve 7.

A pipe 8, provided with a hand-controlled cut-off valve 9, is provided for conducting the carbureted mixture from the carbureter 5 to the casing 10 of a main operating valve 11. The valve 11 is constructed to be actuated in any suitable manner by the motor 2; as by axially securing said valve to the spindle 33 of one of the rotary pistons of the motor. The valve casing 10 is connected by feed pipes 12 and 13 to a plurality of combustion chambers 14 and 15, preferably placed within the reservoir 1; and a supply pipe 16 connects the valve casing with a motor 17. In automobile practice, a turbine type of motor has proven very advantageous, since it combines large power with a minimum of bulk and weight; where a turbine is employed, the supply pipe 16 can terminate in, or lead to, one or more turbine nozzles.

Each combustion chamber is provided with any suitable form of ignition device controlled by the operation of the main operating valve 11. I have illustrated such ignition device constituting a pair of sparking electrodes 18 in each combustion chamber; the electrodes of the several chambers being connected in multiple to one terminal 19 of the secondary circuit of a spark coil 20. Flexible contacts 21 are arranged in series with the several pairs of sparking electrodes, and positioned angularly about the periphery of a cylindrical stud 22 carried by the operating valve 11. The stud 22 carries a sleeve 23 of insulating material, through which extend wings 24 on said stud in position to engage the contacts 21 upon rotation of the stud by the valve 11. The other terminal 25 of the secondary circuit of the spark coil 20 is connected to the valve casing at 26, thereby permitting the secondary circuit to be closed through the valve casing and stud 22 upon rotation of the said stud to bring its wings 24 in engagement successively with the contacts 21. The primary circuit of the spark coil 20 is provided with a pair of terminals 27 and 28, which are insulated at 29 from the valve casing; the contact 28 being shown provided with a resilient arm 30 constructed to normally maintain the circuit open. A ring 31 is secured to the insulating sleeve 23 out of electrical contact with the stud 22, and provided with a series of cam lugs 32 in position to successively engage the resilient arm 30 for closing the primary circuit. The lugs 32 are positioned to make and break the primary circuit during the successive engagement of the wings 24 with the several contacts 21; thereby causing sparking between the electrodes 18 successively in the several combustion chambers.

In the operation of my invention, air is stored under any desired pressure within the reservoir 1, and the carbureter 5 charged with any suitable carbureting material. The hand valve 9 is then opened to permit flow of the compressed air through the motor 2 and past the reducing valve 7 to the carbureter 5. The carbureted mixture is conducted by the pipe 8 from the carbureter 5 to the valve casing 10, from which it will be directed by one of the feed pipes 12 or 13 to the corresponding combustion chamber, the particular chamber receiving such flow depends upon the position of the main valve 11. In the position of the valve shown in Fig. 3, the carbureted mixture is flowing through the feed pipe 12 to the combustion chamber 14, while the combustion chamber 15 is discharging through the pipes 13, 16 to the motor 17. A further rotation of the operating valve 11 and its stud 22 will

cut off the chamber 14 from the supply of carbureted mixture and simultaneously produce sparking of the electrodes 18 in such chamber for igniting the mixture therein. A slight further movement of the operating valve places the chamber 14 in communication with the motor through the pipes 12, 16; and simultaneously cuts off the chamber 15 from said motor and places it in communication with the carbureter for receiving a new charge of mixture therefrom. Through the actuation of the operating valve 11 by the motor 2 throughout the entire operation, the several combustion chambers will be in turn successively placed in communication with the carbureter, be cut off from the carbureter and have their explosive mixture ignited, and be placed in communication with the motor 17. By thus carbureting the compressed air and successively igniting the portion of the resultant mixture in relatively small closed combustion chambers, the energy of the motive fluid is greatly augmented in an efficient manner by the addition of heat thereto at high temperatures.

By placing the combustion chambers within the reservoir 1, the walls of said chambers can be maintained at a temperature within satisfactory practical limits without incident waste of heat; since the heat conducted to the walls of said chambers is absorbed by the compressed air in said reservoir. In constructions where it is advisable to jacket the combustion chambers for preventing loss of heat therethrough, the chamber at which combustion takes place within said chambers must be limited below certain limits for preventing injurious overheating of the chamber's walls. In my improved construction, the combustion in the combustion chambers can be produced at efficiently high temperatures, since the chamber walls are protected from overheating by the conduction of heat therethrough. I have shown a preferred arrangement, in which the combustion chambers and motor 2 are placed in the upper portion of the reservoir 1 for preventing dissemination and diffusion of the heat by convection through the entire mass of air in said reservoir.

From the above description, it will be seen that my invention provides efficient means for augmenting the energy of a motive fluid by adding heat at a high temperature successively to small confined portions of such fluid.

I have illustrated and described a satisfactory and preferred construction, but, obviously, changes could be made within the spirit and scope of my invention.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is:—

1. In a power system, the combination of a series of combustion chambers, carbureting means connected to said chambers, means for conducting a supply of air to said carbureting means, and means controlled by such air supply for distributing the explosive mixture sucessively to said several combustion chambers, substantially as described.

2. In a power system, the combination of a series of combustion chambers, carbureting means connected to said chambers, means for conducting a supply of air to said carbureting means, and a single means actuated by such air supply for distributing the explosive mixture successively to said several combustion chambers, substantially as described.

3. In a power system, the combination of a series of combustion chambers, carbureting means connected to said chambers, means for conducting a supply of air to said carbureting means, means for discharging the products of combustion from said chambers, and means controlled by such air supply for distributing the explosive mixture to said several combustion chambers and actuating said discharge means, substantially as described.

4. In a power system, the combination of a series of combustion chambers, carbureting means connected to said chambers, means for conducting a supply of air to said carbureting means, means for discharging the products of combustion from said chambers, and a single means controlled by such air supply for distributing the explosive mixture to said several combustion chambers and actuating said discharge means, substantially as described.

5. In a power system, the combination of a series of combustion chambers, carbureting means connected to said chambers, means for conducting a supply of air to said carbureting means, means for igniting the explosive mixture in said chambers, means for discharging the products of combustion from said chambers, and means controlled by such air supply for distributing the explosive mixture to said several chambers and for actuating said ignition and discharge means, substantially as described.

6. In a power system, the combination of a series of combustion chambers, means for conducting a supply of explosive mixture thereto, means for igniting the explosive mixture in said chambers, means for discharging the products of combustion from said chambers, and a single means for distributing the explosive mixture to said several chambers and for actuating said ignition and discharge means, substantially as described.

7. In a power system, the combination of a series of combustion chambers, carbureting means connected to said chambers, means for conducting a supply of air to said carbureting means, means for igniting the explosive mixture in said chambers, means for discharging the products of combustion from said chambers, and a single means controlled by such air supply for distributing the explosive mixture to said several chambers and for actuating said ignition and discharge means, substantially as described.

8. In a power system, the combination of a series of combustion chambers, carbureting means connected to said several chambers, means for conducting a supply of air to said carbureting means, and means actuated by such air supply for distributing the carbureted mixture from said carbureting means to said several combustion chambers, substantially as described.

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

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Witnesses:
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