(No Model.)

P. MURRAY, Jr.

GAS ENGINE.

No. 305,465. Patented Sept. 23, 1884.

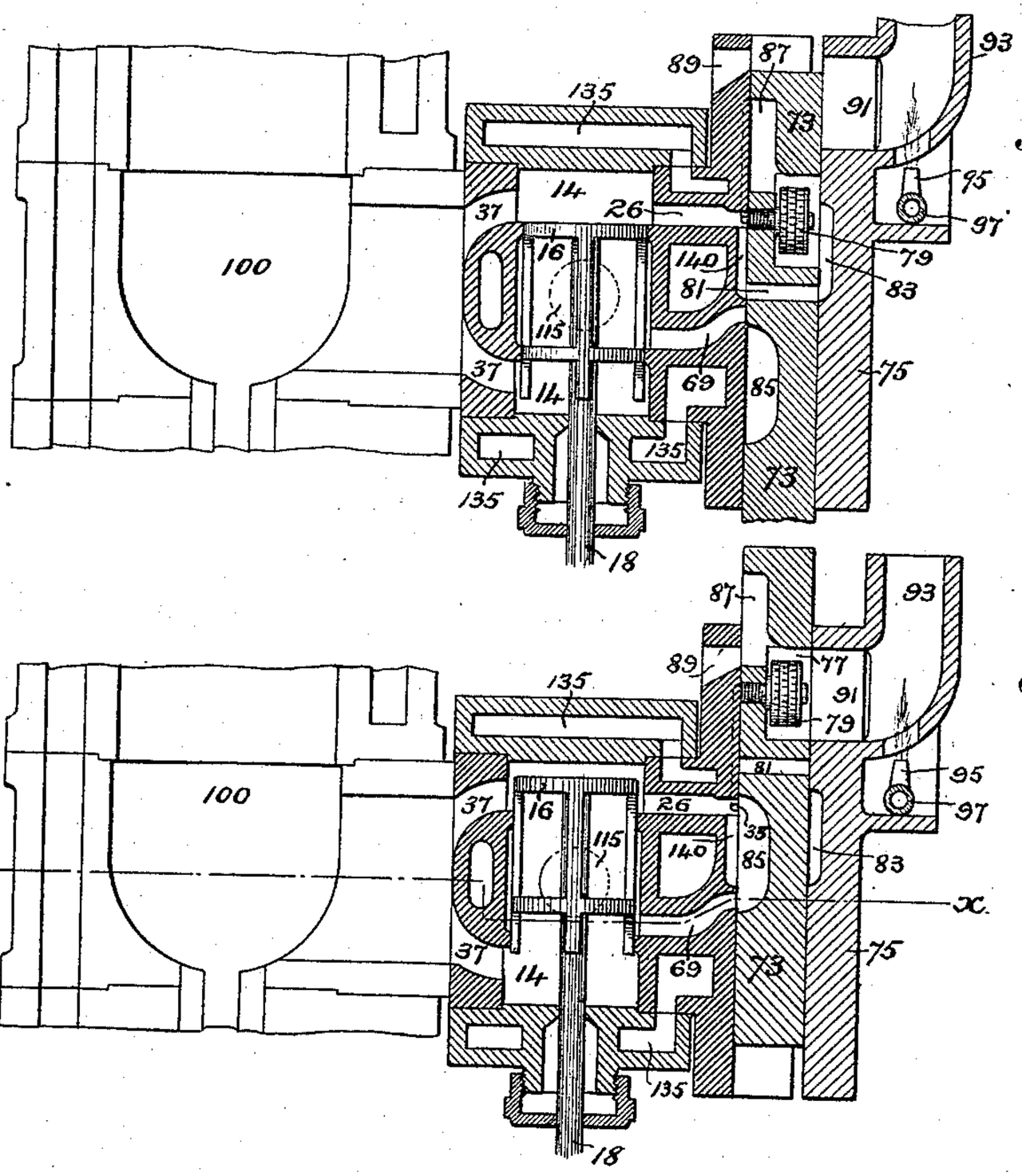

Fig. 1.

Fig. 2.

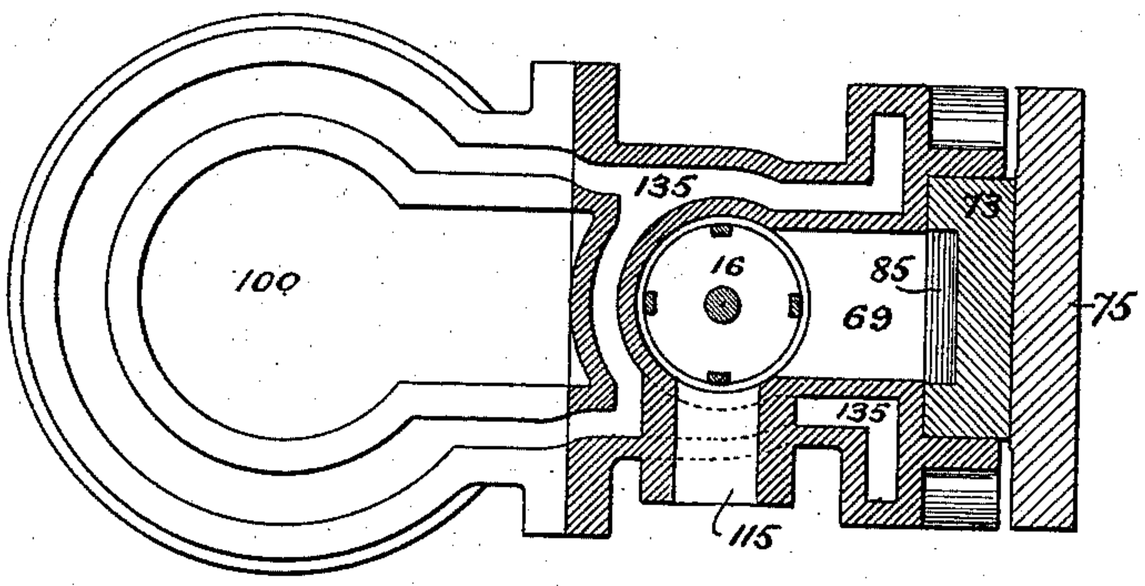

Fig. 3.

Attest;
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UNITED STATES PATENT OFFICE.

PETER MURRAY, JR., OF NEWARK, NEW JERSEY, ASSIGNOR TO THE MURRAY MOTOR MANUFACTURING COMPANY, OF SAME PLACE.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 305,465, dated September 23, 1884.

Application filed January 12, 1884. (No model.)

To all whom it may concern:

Be it known that I, PETER MURRAY, Jr., a citizen of the United States, residing in the city of Newark, county of Essex, and State of New Jersey, have invented certain new and useful Improvements in Gas-Engines, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

In an application for United States Letters Patent filed in the Patent Office on the 27th day of October, 1883, No. 110,192, I have shown and described a gas-engine in which the power-piston is driven by the explosion of charges of mixed gas and air, which are admitted alternately into the opposite ends of the power-cylinder. In this engine the mixed gas and air forming the explosive mixture, instead of being drawn into the cylinder by the piston, flows to the cylinder from a tank or reservoir, in which a sufficient pressure is maintained to cause the mixture to pass into and fill the cylinder upon either side of the piston whenever the induction-valve of that end of the cylinder is opened. The induction and exhaust valves of the power-cylinder, and the ignition-valves for alternately firing the charges admitted into the opposite ends of the cylinder, are operated through suitable connections, and are so timed that the charge of the explosive mixture will be admitted into each end of the cylinder at the time when the piston has nearly or quite reached the limit of its stroke toward the opposite end, and that the charge so admitted will not be fired until the piston has reached the limit of its return-stroke, all of which features are fully illustrated and described in my said application, to which reference is made for a more extended explanation of the same.

The present invention relates to a gas-engine having the general features of construction of that shown in my said former application, and particularly to the induction and ignition valve apparatus thereof. In the organization shown in the present case, as in that shown in my said former application, the ignition-valves are located at the opposite ends of the power-cylinder, and are provided with burners, which are fed from the charges of the explosive mixture, which are admitted into the cylinder, and at the proper times are brought into communication with the firing-ports, so as to explode the charge in the cylinder. In the organization shown in my former application each end of the power-cylinder is provided with two induction-valves, one of which serves to admit the main portion of the charge directly into the cylinder, while the other serves to admit a small portion of the charge through the firing-port, and thus effect the cleaning of said port after each explosion. In said former structure, also, the induction-valves consist of simple disks, which are raised and lowered from and to their seats to admit and exclude the explosive mixture, and are consequently of necessity provided with means for holding them to their seats against the pressure of the explosive mixture in the reservoir.

It is the object of the present invention, among other things, to simplify in certain particulars the construction of the induction-valve apparatus, so as to employ but a single valve at each end of the cylinder, and also to dispense with the springs or other mechanism for holding said valves upon their seats against the pressure of the explosive mixture in the reservoir.

To these ends the invention consists in a valve having certain peculiarities of construction, and in a system of ports and passages arranged to co-operate therewith, all of which will now be fully explained and particularly pointed out.

In the accompanying drawings, Figure 1 is a vertical section of the lower induction and ignition valves, showing, also, the ports and passages which co-operate therewith, the induction-valve being closed, and the ignition-valve in position to fire the charge in the cylinder. Fig. 2 is a like view showing the induction-valve open to admit the charge and the ignition-valve in its raised position, and Fig. 3 is a horizontal section taken upon the line *x x* of Fig. 2.

Only one of the induction and one of the ignition valves are shown in the figures, it being understood that in this case, as in the organization shown in my former application, the valves for the opposite ends of the cylinder are duplicates.

Referring, now, to said figures, the construction and operation of the lower induction and ignition valves will be described, it being understood that said description applies equally well to the upper valves.

In the construction now to be described the ignition-valve 73 is of the same construction and operates in the same manner as in the organization described in my former application, it being arranged to reciprocate between the face of the valve-chamber 14 and a covering-plate, 75, and provided with a recess, 77, in which is located a burner, 79, the tubular stud of which opens into a groove or channel, 35, in the face of the valve-chamber, leading to the firing-port 26. This valve is also provided with recesses 87, which communicate with the recess 77 and ports 89 in the upper portion of the face of the valve-chamber, with a port, 81, which communicates with a recess, 83, in the inner face of the covering-plate 75, and with a recess, 85, which communicates with the firing-port 26, and a port, 69, in the face of the valve-chamber. The plate 75 is provided with a permanent burner, 95, which receives its supply of gas through a pipe, 97, with an opening, 91, through which the flame of said burner is communicated to the burner 79, and with a chimney, 93, for supplying draft to the burner 95, all of which parts are also arranged in the same manner as shown in my said former application.

The power-cylinder 100 is also of the same construction as that shown in my said former application, and it and the valve-chamber are provided with the usual water-space, 135. In the present structure, however, the induction-valve 16, instead of being, as in the structure shown in my former application, a simple disk, which is confined upon its seat against the pressure of the explosive mixture in the reservoir, consists of two disks secured to the valve-rod 18, and so arranged that the induction-pipe 115 opens into the chamber formed between them, thus forming a balanced valve, which is constantly held in equilibrium by the pressure of the explosive mixture in the reservoir and cylinder. In this case, also, the valve-chamber is provided upon its outer face with a channel, 140, which extends downward from the firing-port 26, and bends laterally, so as to communicate with the port 81 in the ignition-valve 73 when the burner 79 is in position to fire the charge, while the port 69, instead of communicating with a passage leading indirectly to the valve-chamber 14, as in the structure shown in my former application, is extended inward, so as to communicate directly with said chamber.

The remaining features of construction which are peculiar to this valve apparatus will now be described, in connection with an explanation of its operation, which is as follows: As the piston of the power-cylinder reaches the limit of its stroke toward the opposite end of the cylinder, the valve 73 will reach its uppermost position, so as to bring the recess 85 into communication with the ports 26 and 69, and at the same time the cam on the main shaft will move the valve 16 from the position shown in Fig. 1 to that shown in Fig. 2, thereby opening communication between the induction-pipe 115 and the upper or main induction-port, 37, and the firing-port 26. The explosive mixture, under the pressure which exists in the reservoir, will then rush into the cylinder from two directions, the larger part passing directly to the cylinder through the upper or main port, 37, while the remainder passes outward through the firing-port 26, and thence through the recess 85, port 69, and the lower or auxiliary port, 37, to the cylinder below the valve 16. The portion of the charge which passes through the port 26 serves, as in the case of the organization shown in my former application, to remove all the remaining products of combustion from the port 26, recess 85, and port 69. As the power-piston commences its return stroke the valve 16 will be moved back to the position shown in Fig. 1, and the valve 73 will commence its downward movement. As the piston reaches the limit of its return-stroke the stud of the burner 79 will arrive opposite the port 26, and at the same time the port 81 will open communication between the channel 140 and the recess 83, as shown in Fig. 1, so that the full pressure of the explosive mixture confined in the cylinder will be communicated simultaneously to both sides of the burner and the charge fired—the same as in the organization described in my said former application.

The patentable features herein shown but not claimed are claimed in my former application, hereinbefore referred to.

What I claim is—

1. The combination, with the balanced valve 16 and ports 37 26, channel 140, and recess 83, of the valve 73, provided with a port, 81, and a burner, 79, located in a recess, 77, substantially as described.

2. The combination, with the balanced valve 16 and ports 26 37, and channel 140, of the valve 73, having a recess, 85, substantially as described.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

PETER MURRAY, JR.

Witnesses:
J. A. HOVEY,
T. H. PALMER.