

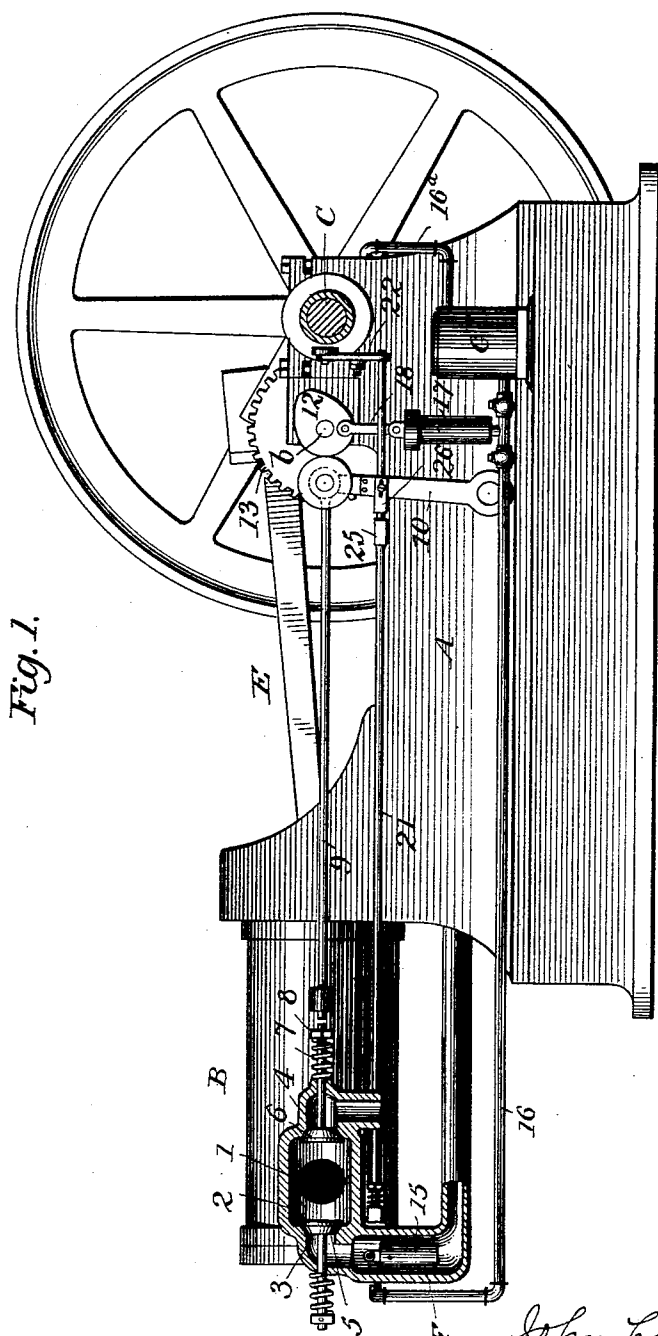
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3 Sheets—Sheet 1.

J. CHARTER, Jr.
GAS ENGINE.

No. 573,762.

Patented Dec. 22, 1896.



Witnesses
J. G. Hinkel
Amos Stevens

Inventor
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(No Model.)

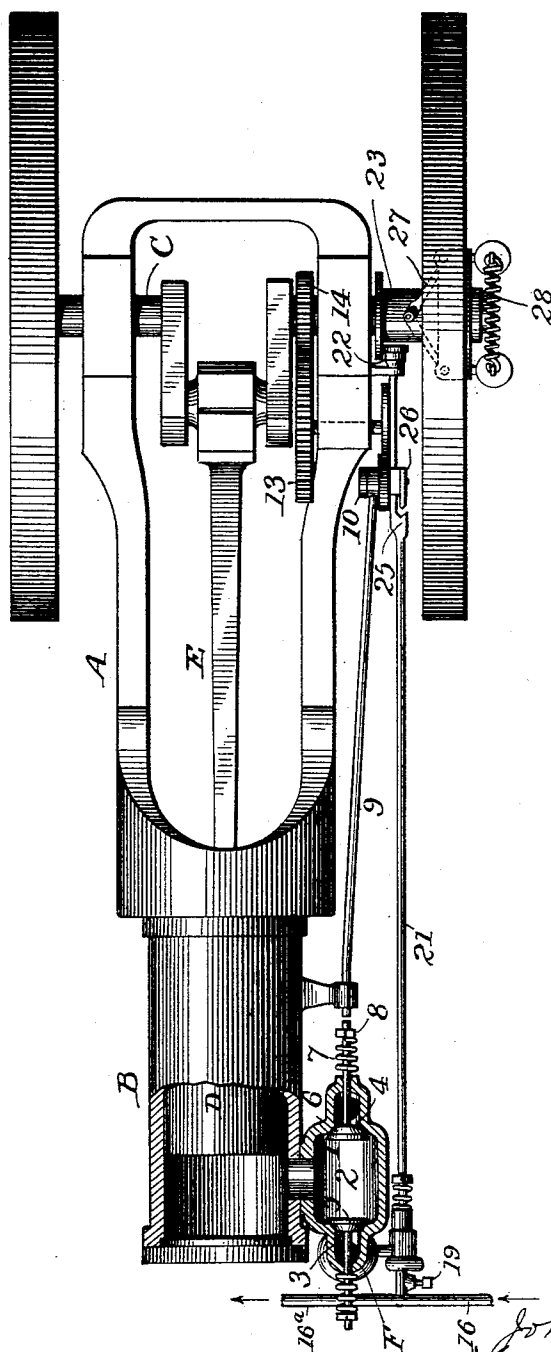
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Fig. 2.



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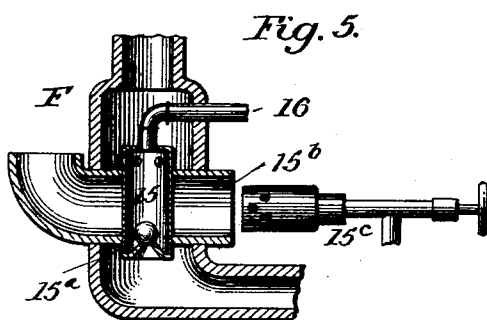
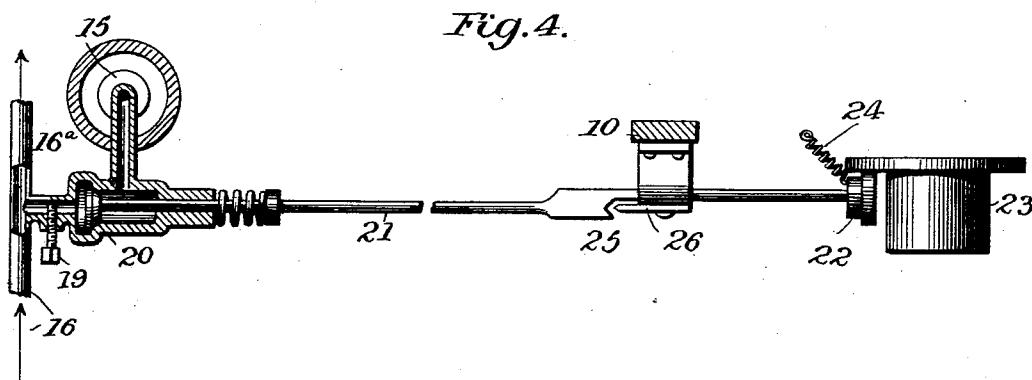
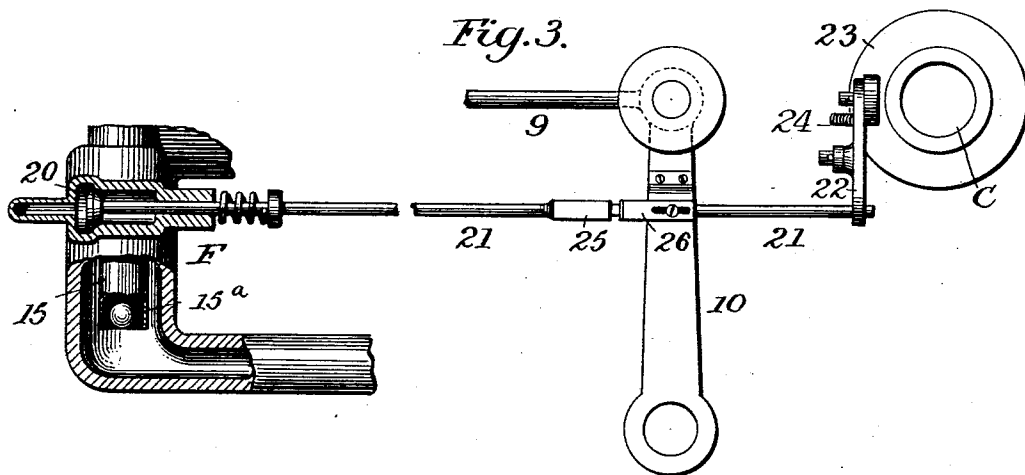
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UNITED STATES PATENT OFFICE.

JOHN CHARTER, JR., OF STERLING, ILLINOIS.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 573,762, dated December 22, 1896.

Application filed May 11, 1896. Serial No. 591,121. (No model.)

To all whom it may concern:

Be it known that I, JOHN CHARTER, JR., a citizen of the United States, residing at Sterling, Whiteside county, State of Illinois, have
5 invented certain new and useful Improvements in Gas-Engines, of which the following is a full, clear, and exact specification.

This invention relates to certain new and useful improvements in gas-engines, and it
10 has for its objects to improve the construction of such engines and to render the various parts thereof more certain and effective in operation and less liable to become disarranged under varying conditions; and with
15 these objects in view the invention consists in the construction, arrangement, and combination of parts hereinafter more particularly referred to.

In the accompanying drawings, forming a
20 part of this specification, and in which like letters and numerals of reference indicate corresponding parts, Figure 1 is a part sectional and part side elevation of the invention. Fig. 2 is a plan view thereof, partly in section. Fig. 3
25 is an enlarged detail vertical sectional view of the mixing devices. Fig. 4 is a horizontal sectional view thereof, and Fig. 5 is a sectional view of a mixing device adapted for the use of heavy oils.

Any suitable frame may be employed to support the working parts of the engine, and the cylinder may be arranged thereon in either a vertical or horizontal position, it being shown
30 in the present instance as horizontally arranged.

A designates the frame of the engine, B the cylinder, and C the crank-shaft connected to the piston D within the cylinder by means of a connecting-rod E. These parts are so constructed and arranged that in operation the
40 piston D on its forward stroke draws a combustible charge, preferably vaporized oil and air combined, into the combustion-chamber, where it is compressed upon the return or
45 back stroke of the piston. The charge is then exploded, causing the piston to move forward and drive the crank-shaft, and upon the next back stroke of the piston the spent gases remaining in the cylinder are expelled previous
50 to a new charge being drawn into the cylinder.

Leading from the rear end of the cylinder is a passage 1, through which the charges pass into and the spent gases pass from the cylinder. This passage communicates with a

valve-chamber 2, provided with inlet and exhaust ports 3 and 4, respectively, controlled
55 by valves 5 6, which valves are held to their seats by means of springs. The inlet-valve is adapted to be opened by the suction created by the piston at each forward stroke, and in
60 order to prevent the simultaneous opening of the exhaust-valve 6 the tension of its spring 7 is stronger than that of the inlet-valve and too great to be overcome by the vacuum
65 created in the cylinder. As it may sometimes be desirable to open this valve simultaneously with the inlet-valve to admit an additional amount of air to the cylinder with the charge, means are provided for varying
70 the tension of the spring 7. In the present instance this means consists of a nut 8, adjustable upon the stem of the valve 6 and forming a bearing for one end of the spring 7, and by adjusting this nut upon the valve-stem the tension of the spring may be less-
75 ened to permit the opening of the exhaust-valve upon the forward movement of the piston, or the tension may be increased to prevent such opening of the valve.

It is essential that the exhaust-valve be
80 opened at each alternate back stroke of the piston to allow the spent gases remaining in the cylinder after an explosion to be discharged, and devices are provided for positively effecting such opening of the valve.
85 As shown, these devices comprise a rod 9, guided on the frame and adapted to bear upon the exhaust-valve stem at one end and connected to a reciprocating lever 10 at its other. This lever is preferably provided at its upper
90 end with a friction-wheel, with which a cam 12, mounted upon an auxiliary shaft *b*, makes contact, the roller being constantly maintained in contact with the cam by the spring 7. Upon the shaft which carries the cam 12 is a
95 gear-wheel 13, meshing with a gear-wheel 14, of half its diameter, upon the crank-shaft. From this it will be apparent that the cam makes one complete rotation to each two rotations of the crank-shaft.

The inlet-port 3 communicates with a mixing-chamber F, which in turn communicates with a source of air-supply, and if desired the air may be heated or compressed, but not
100 to an extent that will cause it to open the inlet-valve 5. Within the mixing-chamber is a combining-receptacle 15, to which the oil is conducted by means of a supply-pipe 16,
105

connected with a reservoir G, the oil being forced through the supply-pipe by means of a pump 17. The piston-rod of the pump is attached to the cam 12 by means of a link 18, and in such manner as will operate the pump by the rotation of the cam. The pipe 16 is connected to a return-pipe 16^a, leading to the reservoir, and is provided with a regulating-valve 19 and with a valve-seat for reception of a valve 20, which is normally held against said seat by means of a spring encircling a valve-rod 21, one end of which constitutes the valve-stem. This rod extends through and is adapted to move in an opening in one end of a centrally-pivoted lever 22. This lever is adapted to be moved in a direction transverse to that in which the rod 21 moves to operate the inlet-valve through the medium of a flanged sleeve 23, sliding upon the crank-shaft. A spring 24 holds a friction-roller of the lever 22 normally in contact with the flange of the sleeve 23. Intermediate of its length the rod 21 is provided with a bearing 25, with which a bearing 26 upon the lever 10 normally makes contact at each backward stroke, such back stroke taking place at each alternate stroke of the piston, as has hereinbefore been mentioned. It will thus be seen that the valve 20 is opened to admit oil to the combining-receptacle while the piston is on its exhaust-stroke. It may sometimes be desirable to vary the length of time which the valve 20 remains open, and to effect this the bearing 26 is made longitudinally adjustable, as shown, and by shifting the bearings nearer to or farther from the other this result may be accomplished, as will be obvious.

The sleeve 23 is automatically shifted upon the crank-shaft by means of a suitable governor. That shown consists of two arms 27 pivoted upon the crank-shaft and carrying balls at their outer ends, which are connected by a spring 28. The inner ends of the arms are provided with slots which receive pins from the sleeve 23. From the above it will be apparent that as long as the bearing 25 upon the rod 21 remains in the path of movement of the bearing 26 the rod will be moved longitudinally to open the inlet-valve 20 at each backward movement of the lever 10. Whenever the engine attains an excessive speed, however, the governor-balls are thrown outward, spreading the arms 27 and causing the sleeve 23 to slide upon the crank-shaft in a direction which will carry the lower end of the lever 22 inward, and through this lever the rod 21 is moved laterally, carrying the bearing 25 out of the path of movement of the bearing 26 to prevent the opening of the inlet-valve, and this position of the parts obtains until the speed of the engine decreases to normal, when the rod 21 is again shifted in order that the bearings may make contact at the next movement of the lever 10.

The upper end of the combining-receptacle 15 is perforated to permit the charge to pass out, and at its lower end it is provided with

a suitable valve, a ball-valve 15^a being shown, which permits the ingress of air into the receptacle to replace that drawn out.

In the use of heavy oils it may be desirable or necessary to heat them, and in order to accomplish this I make use of the construction illustrated in Fig. 5, in which a channel 15^b extends through the mixing-chamber F and surrounds the receptacle 15, and heat from a suitable burner 15^c passes through the channel. In this construction the bottom of the receptacle is conical to prevent the oil from the receptacle dripping through the valve into the air-passage.

What I claim is—

1. In a gas-engine, the combination with the cylinder, of a mixing-chamber communicating therewith, a receptacle within said chamber provided at its upper end with openings and having an inwardly-opening valve at its lower end, and a supply-pipe leading to the receptacle, substantially as described.

2. In a gas-engine, the combination with the cylinder, of a mixing-chamber communicating therewith, a receptacle within said chamber provided with a conical bottom, and at its upper end with openings, a valve in the lower end of said receptacle, and a supply-pipe leading to the receptacle, substantially as described.

3. In a gas-engine, the combination with the cylinder, of a mixing-chamber communicating therewith, a receptacle within said chamber provided at its upper end with openings and at its lower end with a valve, means for heating the receptacle, and a supply-pipe communicating with the receptacle, substantially as described.

4. In a gas-engine, the combination with the cylinder, of a mixing-chamber communicating therewith, a receptacle within the said chamber provided at its upper end with an opening and at its lower end with a valve, a supply-pipe leading to the receptacle, and regulating and inlet valves in the supply-pipe, substantially as described.

5. In a gas-engine, the combination with the cylinder, of a mixing-chamber, a supply-pipe leading thereto, an inlet-valve, a valve-rod connected thereto and provided with a bearing, a reciprocating lever provided with a bearing normally adapted to make contact with the bearing of the valve-rod to move said rod longitudinally upon the exhaust-stroke of the piston, means for reciprocating the lever, and means for automatically moving the rod laterally to carry its bearing out of the path of movement of the bearing upon the reciprocating lever, substantially as described.

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

JOHN CHARTER, JR.

Witnesses:

JOHN CHARTER, Sr.,
C. A. MULLER.