No. 625,839. Patented May 30, 1899.

L. B. DOMAN.

EXPLOSIVE ENGINE.

(Application filed Feb. 4, 1898.)

(No Model.)

Fig. 1.

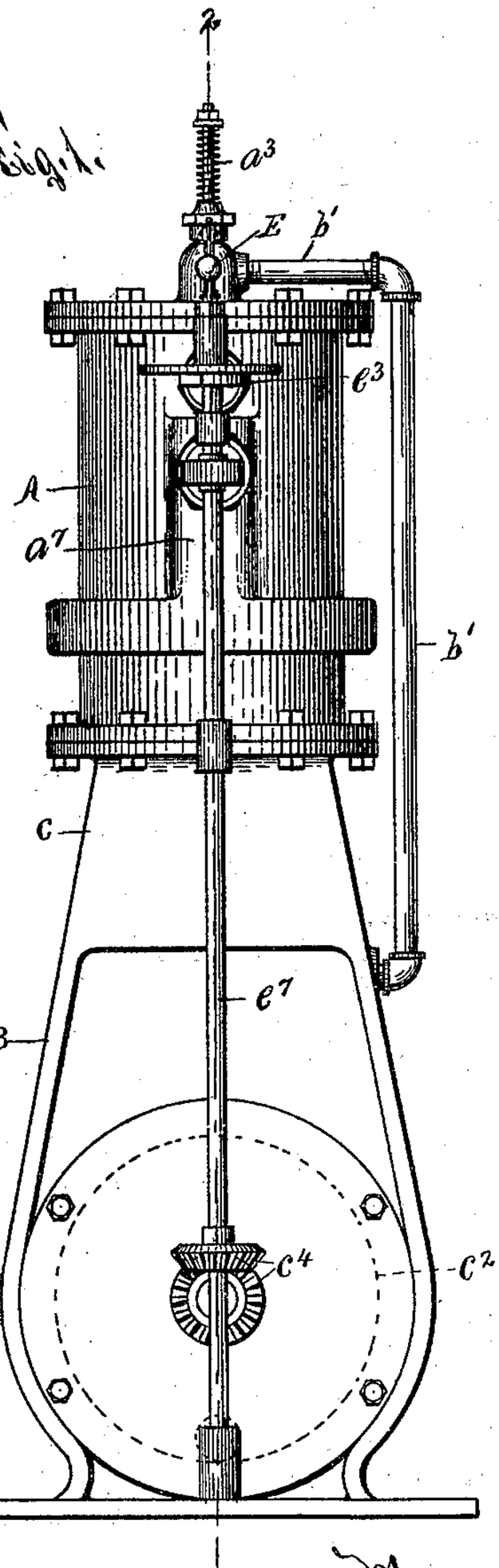


Fig. 2.

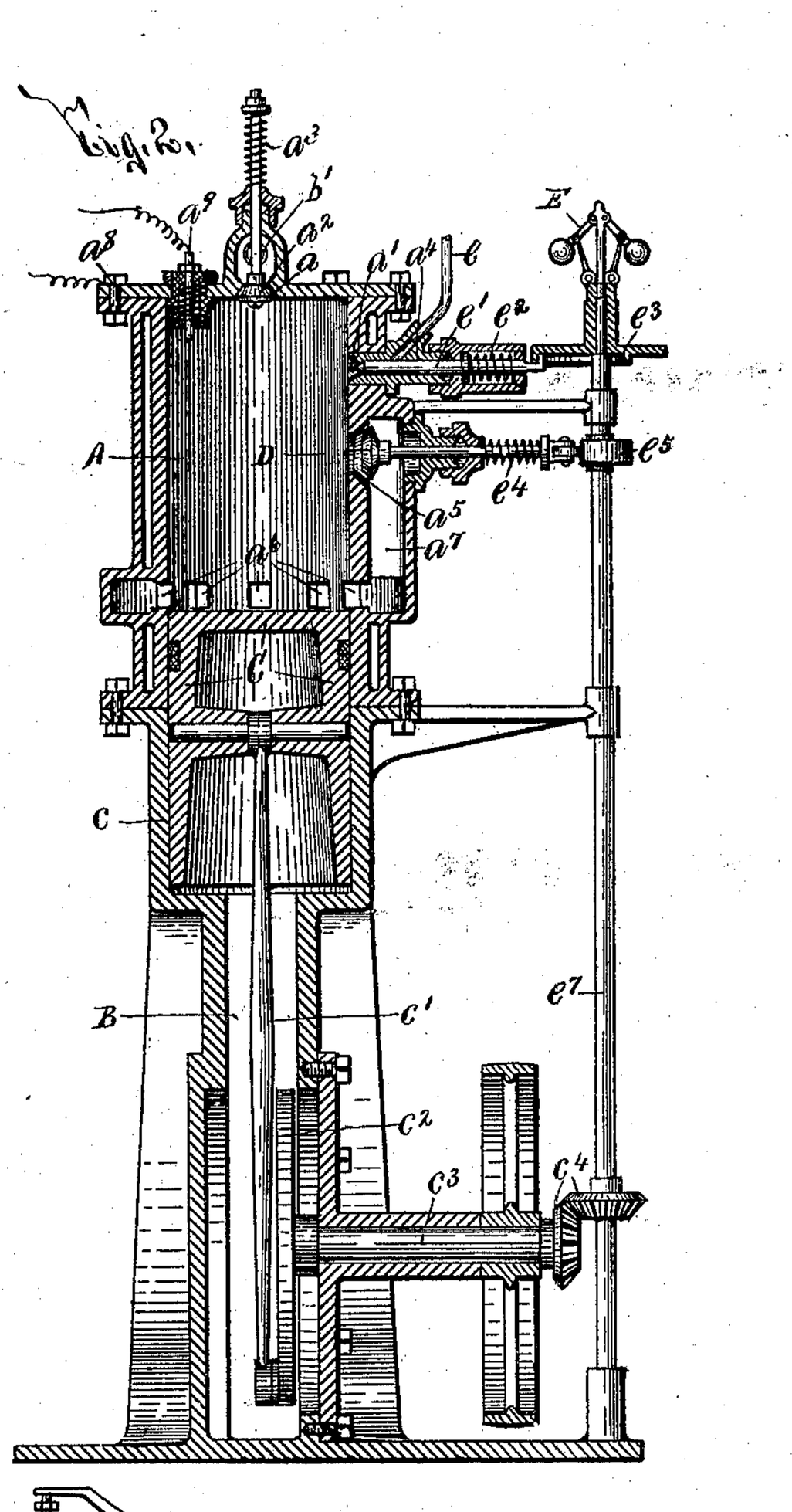
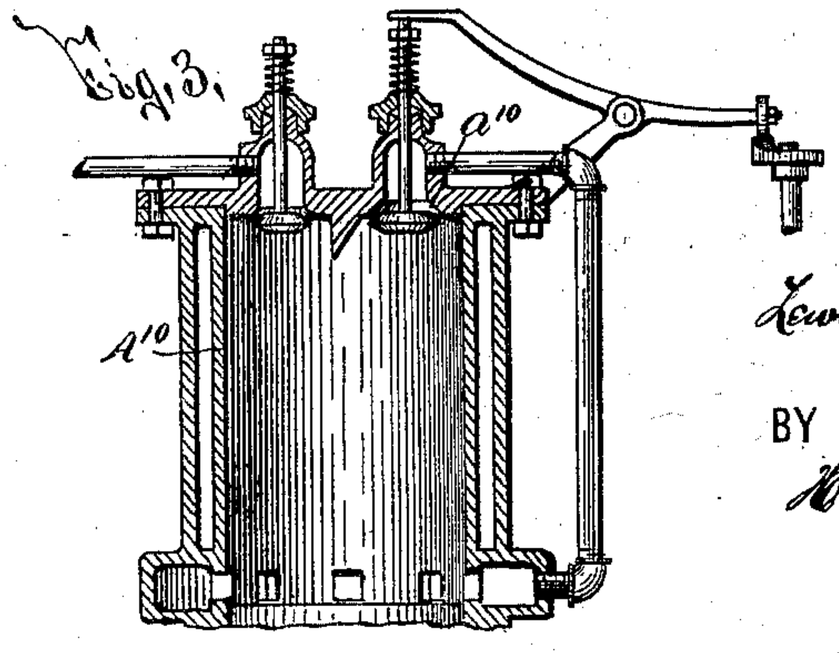


Fig. 3.



WITNESSES:

H. C. Chaces

M. D. Lewis.

INVENTOR

Lewis B. Doman

BY

Keyes & Parsons,

ATTORNEYS,

UNITED STATES PATENT OFFICE.

LEWIS B. DOMAN, OF ELBRIDGE, NEW YORK.

EXPLOSIVE-ENGINE.

SPECIFICATION forming part of Letters Patent No. 625,839, dated May 30, 1899.

Application filed February 4, 1898. Serial No. 669,109. (No model.)

To all whom it may concern.

Be it known that I, LEWIS B. DOMAN, of Elbridge, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Gas-Engines, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

My invention relates to gas-engines, and has for its object the production of a gas-engine which is particularly simple in construction, noiseless in operation, and highly effective in use; and to this end it consists in the combination, construction, and arrangement of the component parts of a gas-engine, as hereinafter fully described, and pointed out in the claims.

In describing this invention reference is had to the accompanying drawings, forming part of this specification, in which like letters indicate corresponding parts in all the views.

Figure 1 is a side elevation of my gas-engine. Fig. 2 is a vertical section taken on line 2 2, Fig. 1. Fig. 3 is a vertical section of the upper portion of a slightly-modified construction of my invention.

As preferably constructed my gas-engine consists of an explosion-chamber A, provided with inlet and outlet ports, a compression-chamber B, connected to the inlet-port of the chamber A, a piston C, movable in the explosion-chamber A and operating to compress air or other fluids in the chamber B during its expansion-stroke, a valve D for controlling the outward passage of fluids from the chamber A, and means for holding the valve D open during a portion of the compression-stroke of the piston C and for holding said valve closed during a greater portion of the expansion-stroke of said piston.

The chambers A B are of any suitable form, size, and construction and are usually arranged one above the other.

The chamber A is preferably provided with an inlet-port a for air and a second inlet-port a' for a suitable fuel, as a gasolene-spray. The inlet-port a is usually formed in the top of the chamber A and is normally closed by a suitable valve a^2, which may be held in its normal position by a spring a^3. The inlet-port a' is generally formed with diverging branches and communicates with an inlet-chamber a^4. A suitable conduit e discharges gasolene or other fuel into the chamber a^4, and a plunger e' is movable in the chamber a^4 for forcing the gasolene in a spray through the diverging branches of the port a'. The plunger e' is operated by any suitable means, as a spring e^2, a rotary cam e^3, and a suitable governor E, which forces the cam e^3 into and out of its operative position.

The chamber A is usually provided with outlet-ports a^5 a^6, arranged at unequal distances from the portion of said chamber in which the air and fuel are compressed, and these ports a^5 a^6 are generally connected by a conduit a^7. The port a^5 is arranged nearest the portion of said chamber A in which the air and fuel are compressed, and the passage of fluids therethrough is preferably controlled by the valve D, which is so actuated that it is open during a portion of the compression-stroke of the piston C and is closed during a greater portion of the expansion-stroke of said piston. The means for actuating the valve D may be of any suitable construction and is here illustrated as a spring e^4 and a came^5. The port a^5 preferably opens from substantially the central portion of the chamber A, but may open from the upper end of said chamber, as illustrated in Fig. 3, in which figure A^{10} represents an explosion-chamber and a^{10} an outlet-port similar to the outlet-port a^5. The port a^6 is arranged slightly above the position assumed by the upper face of the piston C when at the limit of its expansion-stroke, as best seen in Fig. 2, and in the preferable construction of my invention a number of the ports a^6 open in a circular series from the chamber A.

The air and fuel within the chamber A are exploded by any suitable igniter, here illustrated as an electric terminal a^8, connected to the wall of the chamber A, and an electric terminal a^9, insulated from the wall of said chamber and projecting into the path of the upper face of the piston C, so as to be engaged by said piston when the same reaches the limit of its compression-stroke, and thus permit the passage of an electric spark within the explosion-chamber.

The compression-chamber B is supplied with air by a suitable inlet-conduit b and is connected to the inlet-port a of the chamber

A by a conduit b'. It is obvious, however, that the chamber B may be dispensed with and that any other suitable means for supplying air to the chamber A may be substituted.

The piston C is of any desirable form, size, and construction, is movable in a guide-chamber c, forming a continuation of the explosion-chamber A, and is movable successively beyond the ports a^6 a^5. Any suitable means may be used for actuating the piston C, as a connection or pitman c' and a rotary disk c^2, movable in the compression-chamber B. The disk c^2 is usually mounted upon a revoluble shaft c^3, suitably connected, as by bevel-gears c^4, to an upright shaft e^7, which supports the cams e^3 e^5 and the governor E, previously described.

In the operation of my gas-engine the explosion of the air and fuel forces the piston C downwardly past the ports a^5 a^6, and as the piston C descends the exploded gases expand until said piston reaches the ports a^6, whereupon the valve D opens the port a^5 and the expanded gases pass through the ports a^5 a^6 at substantially atmospheric pressure. The downward movement of the piston compresses the air within the chamber B, and said compressed air passes through the conduit b', forces the valve a^2 from its operative position, and enters the chamber A for facilitating the escape of the burned gases from the ports a^5 b^6. During the admission of the air into the chamber A the gasolene-spray is inserted through the inlet-port a'. As the piston C rises it successively passes the ports a^6 a^5, although no compression of the air and fuel is effected by the upward movement of the piston C until the upper face of said piston is substantially alined with the valve D, whereupon said valve closes and prevents additional outward passage through the port a^5. The piston C continues its upward movement after the closing of the valve D, thus compressing the air and fuel within the upper portion of the chamber A and closing the valve a^2, and as said piston reaches the limit of its upward movement or compression-stroke it encounters the terminal a^9 and effects the desired explosion. It therefore follows that the piston C compresses the air and fuel during only a portion of its upward or compression stroke and that the exploded gases are free to expand during a considerably greater portion of the expansion-stroke or downward movement of the piston C.

By constructing my gas-engine so as to operate as described the exploded gases pass therefrom at substantially atmospheric pressure, thus utilizing substantially all of the expansive action of the exploded gases, reducing the noise incidental to the operation of the gas-engine, effectually expelling the exploded gases from the explosion-chamber A, and insuring an explosion of the air and fuel upon each upward movement of the piston C.

The construction and operation of my gas-engine will now be readily understood upon reference to the foregoing description and the accompanying drawings, and it will be readily understood that I do not limit myself to the exact construction and arrangement of the component parts of said engine, since the same may be somewhat varied without departing from the spirit of my invention.

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

1. In a gas-engine, an explosion-chamber, a compression-chamber, an air-inlet port a connected with the explosion-chamber, an automatically-acting valve for controlling the inlet-port, and a piston movable in said explosion-chamber, combined with outlet-ports arranged one in advance of the other, a valve for controlling the outlet-port that is arranged nearest to the inlet-port, an inlet-port for the feed of fuel, a piston for controlling the feed of the fuel, and a rotary shaft provided with suitable means for operating both the outlet-valve and the piston which controls the feed of fuel, substantially as shown.

2. In a gas-engine, an explosion-chamber, an air-inlet port a and outlet-ports which latter ports are arranged one in advance of the other, combined with an inlet-port a' for the fuel, a cylinder into which the fuel is fed, and a piston for forcing the fuel into the explosion-chamber; a feed-pipe connected to the cylinder, and a rotary shaft provided with means for operating the feed-piston whereby the feeding of fuel to the explosion-chamber is controlled, substantially as described.

3. In a gas-engine, an explosion-chamber, an air-inlet port controlled by an automatically-operated valve, outlet-ports arranged one in advance of the other, and a valve for controlling the outlet-port that is arranged nearest to the inlet-port; a feed-inlet, a cylinder connected to said feed-inlet, a piston working in said cylinder, a feed-pipe connected to the cylinder, a piston working in the explosion-chamber, a governor-shaft connected indirectly to the piston in the explosion-chamber, and means connected to the shaft for allowing the outlet-valve to automatically open, and means for forcing the feed-piston inwardly at the same time that the outlet-valve is opened.

In testimony whereof I have hereunto signed my name, in the presence of two attesting witnesses, at Elbridge, in the county of Onondaga, in the State of New York, this 20th day of October, 1897.

LEWIS B. DOMAN.

Witnesses:
A. B. FRAZER,
E. J. KESTER.