

(No Model.)

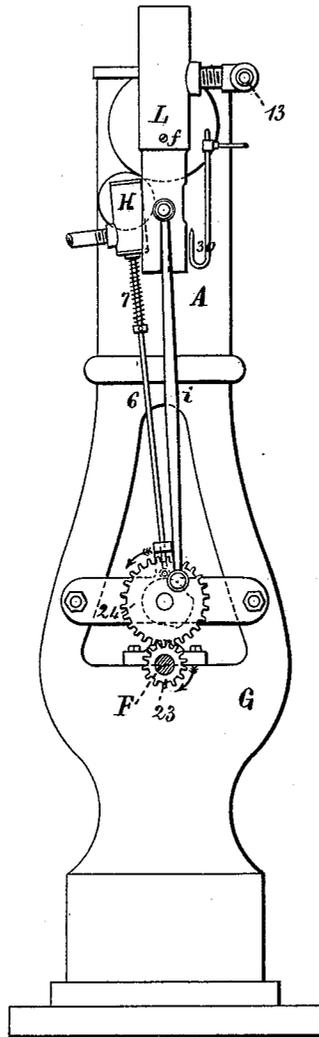
2 Sheets—Sheet 1.

S. LAWSON.
GAS ENGINE.

No. 402,750.

Patented May 7, 1889.

Fig. 1.



Witnesses:
J. Stair
Chas. H. Smith

Inventor:
Samuel Lawson
per Lemuel W. Torrell atty.

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Fig. 2.

Fig. 3.

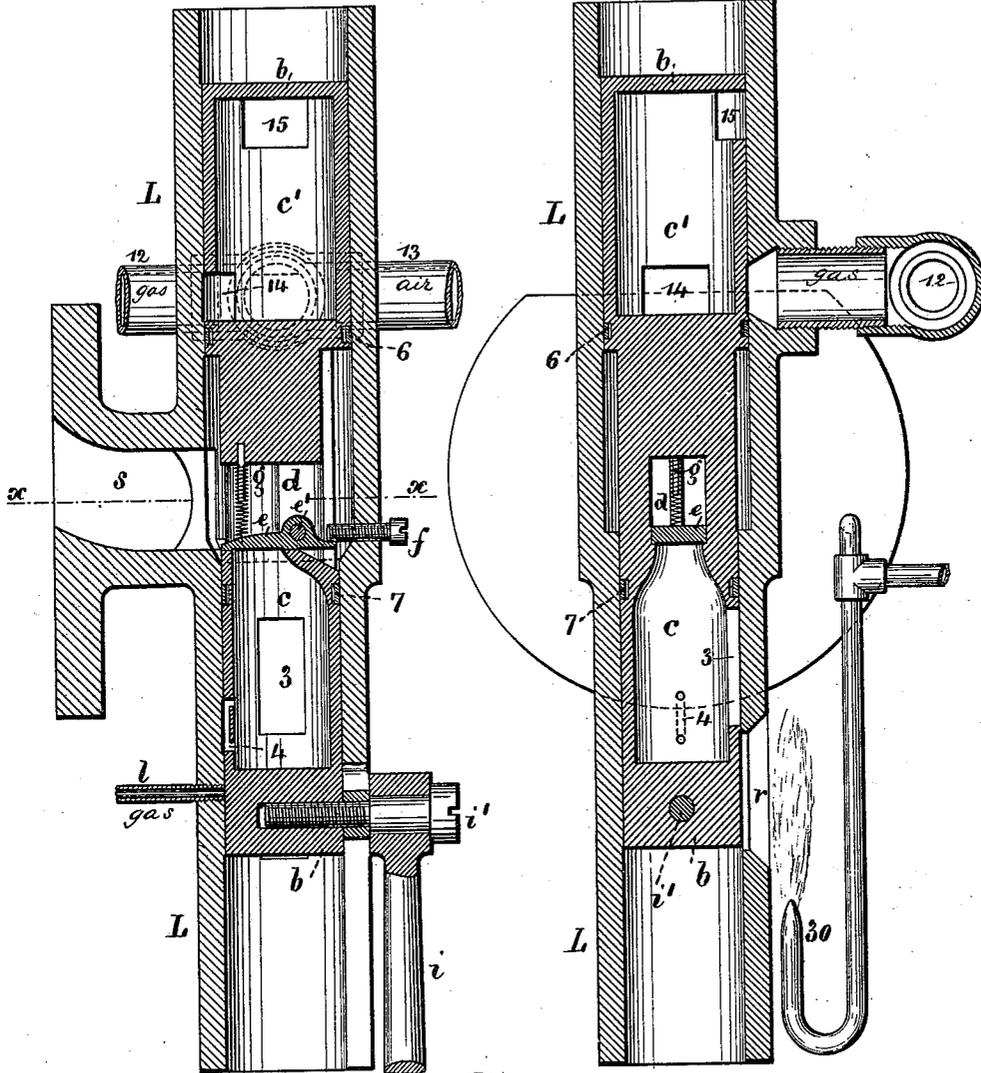
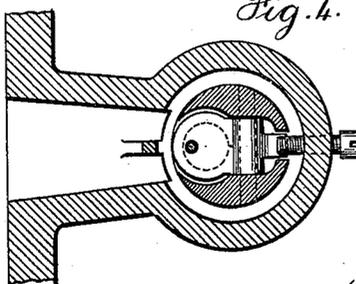


Fig. 4.



Witnesses:
J. Stail
Chas. Smith

Inventor:
Samuel Lawson
per Lemuel W. Lovell

UNITED STATES PATENT OFFICE.

SAMUEL LAWSON, OF NEW YORK, N. Y., ASSIGNOR TO HIMSELF AND ALONZO T. WELCH, OF SAME PLACE.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 402,750, dated May 7, 1889.

Application filed August 4, 1888. Serial No. 281,999. (No model.)

To all whom it may concern:

Be it known that I, SAMUEL LAWSON, of the city, county, and State of New York, have invented an Improvement in Gas-Engines, and the following is declared to be a description of the same.

My present application is one of a series of like date herewith, in which case A forms the principal application and embodies main features of construction common to both, the other cases being B and D, and the serial numbers of A, B, and D being 281,997, 281,998, and 282,000.

My invention relates to improvements that simplify the manufacture of all gas-engines; and the same consists, essentially, in improvements in the valve for admitting the charge of gas and air in highly-explosive quantities within the cylinder and exploding the same, the object of my invention being to insure a uniform admission of regulated quantities of gas and air into the cylinder of the gas-engine, and also to insure and control the action of the igniting-flame by which the charge of gas and air are exploded in operating the engine.

My invention relates to the combination, with a cylinder provided with a water-jacket, a piston, connecting-rod, crank, and main shaft, and exhaust valve and case, of the valve-case of peculiar construction, to which are connected pipes for admitting gas and air within the valve-case, and attached to which is a burner for igniting the gas.

In the drawings, Figure 1 is an elevation of my improved gas-engine. Fig. 2 is a vertical section, in larger size, of the valve-case and valve. Fig. 3 is a vertical section of said valve-case and valve at right angles to Fig. 2, and Fig. 4 is a sectional plan at $x x$ of Fig. 2.

The cylinder A, the main shaft F, the cast standard G, the exhaust valve and case H, and its stem 6 and spring 7 are similar to features having the same letters of reference, as heretofore described in my applications of like date herewith, which applications are marked A and B. The valve-case L is made in one piece and adapted to be connected to the cylinder A, and the same is slotted at its

lower end and provided with ports $r s$ and pipes 12 13, through which gas and air are admitted within the valve-case L.

The tubular chambered valve b within the valve-case is preferably made in one piece, but of varying diameter, the upper portion being slightly larger than the lower portion, and said valve is made with two chambers, $c c'$, and there are ports 3 4 in the lower chamber, c , the upper part of which chamber is bottle-necked, and there are ports 14 15 in the upper chamber, c' , and there are packing-rings 6 7 around the outside of the valve, and the central portion of said valve has an opening at d , above the bottle-neck of the chamber c , and in said opening d there is a clapper-valve, e , pivoted at e' , and there is a spring, g , which is adapted to force the valve e upon its seat, and there is a screw, f , passing through the side of the valve-case L, which screw is adapted to engage the back end of the clapper-valve e , the object of which is to trip and open said valve, and there is a pipe, l , opening through the valve-case, for supplying gas through the port 4 into the chamber c , and the rod i is pivotally connected by a bearing-screw, i' , to the lower end of the valve b , said bearing-screw i' working in the slot in the lower portion of the valve-case, the lower end of the rod i being pivotally connected to and operated by the gear 24, which gear rotates in the direction of the arrow shown in Fig. 1, and at 30 I have shown a burner and its flame for igniting the gas used in the valve.

The operation of the parts is as follows: The rod i , having to finish its upward movement, as will be seen by the position of the gear 24 in Fig. 1, will move the valve b slightly higher and will cause the screw f to trip and open the valve e , so that the burning gas in the chamber c can escape through the port s into the cylinder and ignite the combined air and gas contained therein. The further revolution of the gear 24 carries the rod i downwardly, drawing with it the valve b and allowing the valve e to be closed tightly upon its seat by the spring g , and to be thus held in position. As the valve b descends, the port 4 is brought opposite the pipe l and gas is ad-

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mitted into the chamber *c*, the closed valve *e* preventing its escape. Simultaneously there- with the port 15 is brought opposite the open- ing for gas and air from the pipes 12 13, and 5 combined gas and air passes therefrom through the port 15 into the chamber *c'*, through the port 14 and port *s* into the cylin- der. At the same time the port 3 of the cham- ber *c* is brought opposite the opening *r* in the case L, and the gas contained in said chamber *c* is ignited by the flame of the burner 30. The rod *i* now passes its lowest dead-center, and its return movement by the revolution of the gear 24 raises the rod *i* and the valve *b* 5 and closes the port 3, and also closes the ports 14 and 15, so that there is no communication between the chamber *c* and the supply for air and gas, or between the chambers *c* and the port *s*, and as the arm *i* reaches its highest 10 point the screw *f* trips the valve *e* and allows the burning gas in the chamber *c* to commu- nicate with the combined air and gas in the port *s* and cylinder A and to explode the same, which operation gives an impetus to the pis- 5 ton to operate the engine.

The further downward movement of the arm *i* and piston *b* allows the operation just de- scribed to be repeated.

The movement of the piston in the cylinder 10 A conjointly with the movement of the valve *b* is the same as heretofore described by me in my application marked B, wherein from the position of the parts in the drawings, Figs. 2 and 3, and their operation, as de- scribed, the explosion of the combined air and 5 gas forces the piston down, its upward move- ment exhausting the spent gases, its down- ward movement drawing in the charge of gas

and air, its upward movement compressing the same and the next downward movement 40 being caused by the second explosion, the two-part gear 23 24 timing and compensating these movements.

I claim as my invention—

1. The combination, in a gas-engine, with a 45 valve-case having a port to connect with the cylinder and air and gas supply pipes, of a vertically-sliding tubular valve having upper and lower chambers, *cc'*, and ports 3 4 14 15, a second gas-supply pipe and an ignitor ad- 50 jacent to an opening in the valve-case, and a valve moving with the tubular valve at the top of the lower chamber, and whereby the air and gas for the cylinder are admitted through the upper chamber and ports of the 55 valve and the gas admitted to the lower cham- ber is ignited and passes the central valve to the cylinder, substantially as specified.

2. The combination, with the valve-case L, having a port, *s*, and pipes 12 13 for supplying 60 gas and air, of the valve *b*, having ports and a lower chamber, *c*, and an upper chamber, *c'*, the ports to the upper chamber, *c'*, passing gas and air to the cylinder by the port *s*, a pipe, *l*, for gas, the ports in the chamber *c* ad- 65 mitting the gas and the igniting-flame, and a valve, *e*, pivoted in a central opening in the valve *b*, a spring, *g*, for closing said valve, a screw or equivalent device, *f*, for tripping and opening said valve, and a rod, *i*, by which the 70 valve *b* is moved, substantially as set forth.

Signed by me this 20th day of July, 1888.

SAMUEL LAWSON.

Witnesses:

GEO. T. PINCKNEY,
HAROLD SERRELL.