

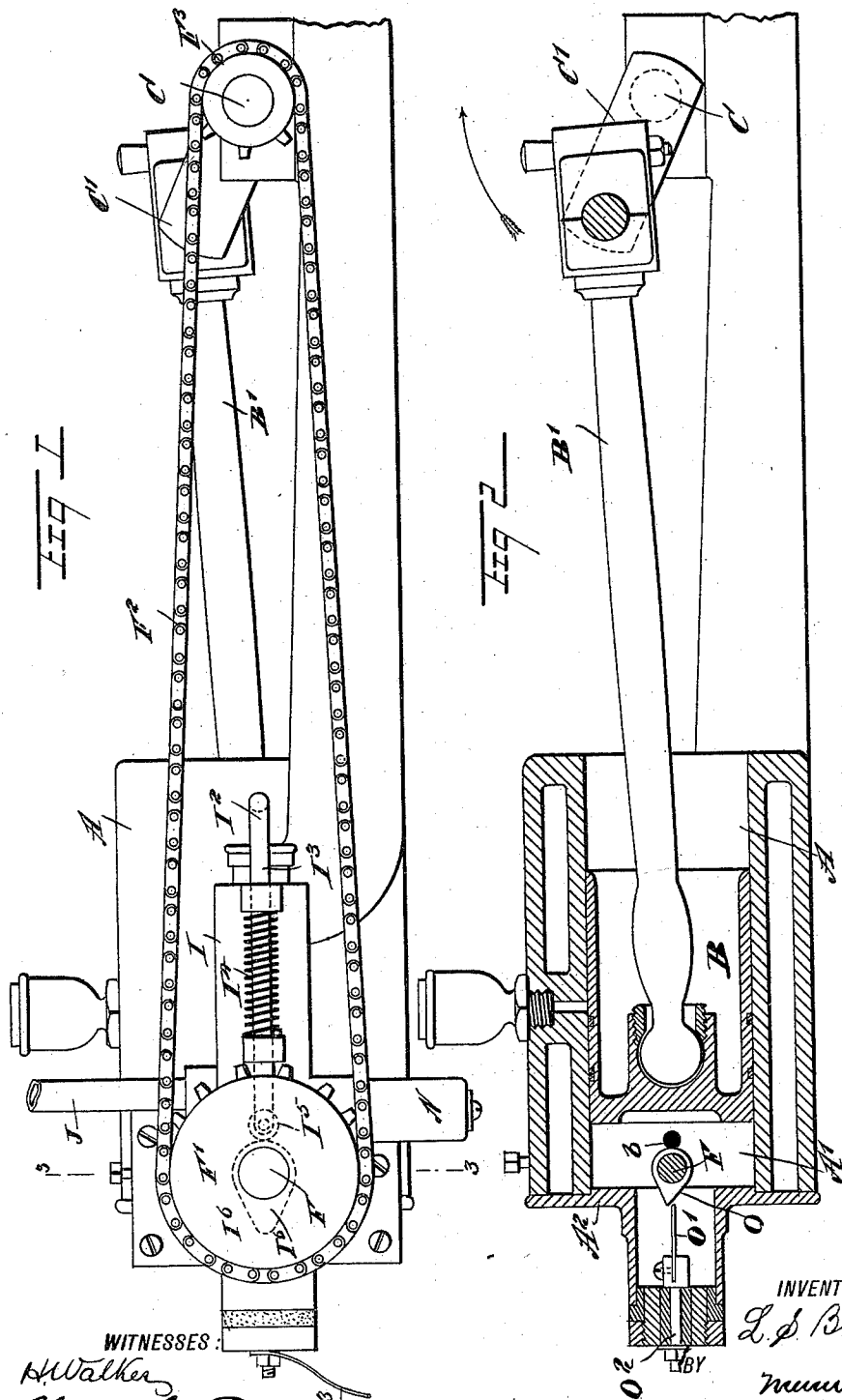
(No Model.)

2 Sheets—Sheet 1.

L. S. BROWN.
GAS ENGINE.

No. 585,504.

Patented June 29, 1897.



WITNESSES:

H. Walker
Geo. J. H. H. H.

INVENTOR

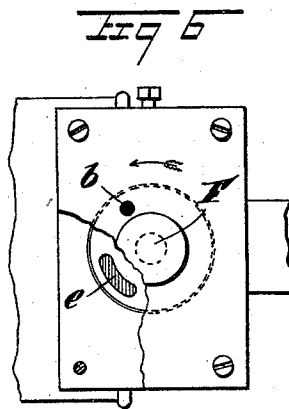
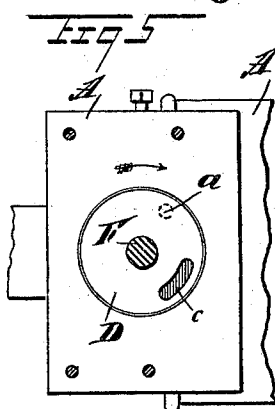
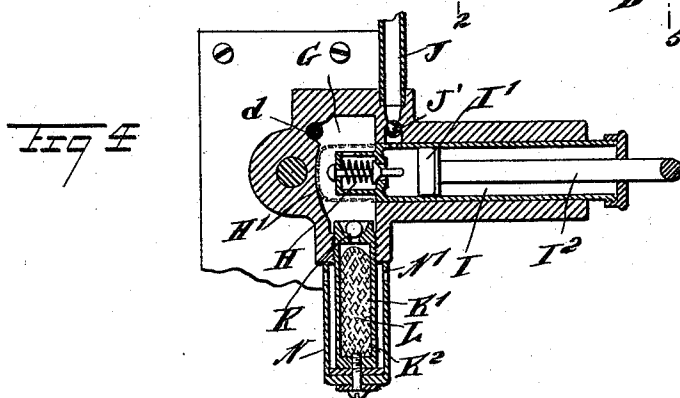
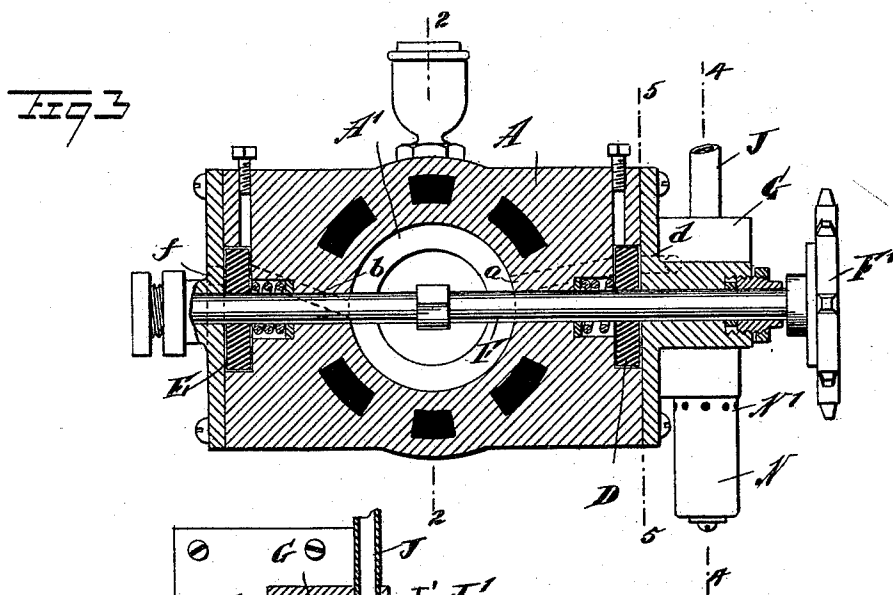
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ATTORNEYS.

2 Sheets—Sheet 2.

No. 585,504.

Patented June 29, 1897.



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UNITED STATES PATENT OFFICE.

LEWIS S. BROWN, OF COLUMBUS, OHIO.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 585,504, dated June 29, 1897.

Application filed October 22, 1896. Serial No. 609,686. (No model.)

To all whom it may concern:

Be it known that I, LEWIS S. BROWN, of Columbus, in the county of Franklin and State of Ohio, have invented a new and Improved Gas-Engine, of which the following is a full, clear, and exact description.

The invention relates to four-period engines; and its object is to provide a new and improved gas or gasoline engine which is simple and durable in construction, very effective in operation, and arranged to insure a proper mixture of air and gas and a positive ignition of the explosive mixture.

The invention consists of certain parts and details and combinations of the same, as will be fully described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the figures.

Figure 1 is a side elevation of the improvement. Fig. 2 is a sectional side elevation of the same on the line 2 2 of Fig. 3. Fig. 3 is a transverse section of the same on the line 3 3 of Fig. 1. Fig. 4 is a sectional side elevation of the air and gas mixing device, the section being taken on the line 4 4 of Fig. 3. Fig. 5 is a sectional side elevation of the inlet-valve and adjacent parts on the line 5 5 of Fig. 3, and Fig. 6 is a rear elevation with parts broken out of the exhaust-valve and connected parts.

The improved gas-engine is provided with a water-jacketed cylinder A, in which operates a piston B, connected by a pitman B' with the crank-arm C' of the main shaft C of the engine. Into the working end A' of the cylinder A lead the oppositely-arranged inlet and exhaust ports *a* and *b*, respectively, controlled by rotary valves D and E, respectively, both secured on a valve-shaft F, mounted to rotate in suitable bearings held on the cylinder A, the said shaft extending transversely through the working end of the cylinder, as indicated in the drawings.

On one outer end of the shaft F is secured a sprocket-wheel F', connected by a sprocket-chain F² with a small sprocket-wheel F³, secured on the main shaft C of the engine, the proportion of the wheels F³ and F' being such that the shaft C makes two revolutions to one revolution of the shaft F. The valve D is

formed with an elongated opening or port *c*, adapted to connect the port *a* with the port *d*, opening into a mixing-chamber G, formed or secured on the cylinder A. This mixing-chamber G is connected by a valve H with a cylinder I, connected with the gas-supply pipe J and containing a piston I', having its piston-rod I² bent back at its outer end to form an arm I³, pressed on by a spring I⁴ and carrying at its free end a friction-roller I⁵, in engagement with a cam I⁶, secured on the valve-shaft F. Thus when the latter is rotated the cam I⁶ pushes the arm I³, the piston-rod I², and piston I' outward, so that gas is drawn into the cylinder I from the pipe J, having an inwardly-opening check-valve J'. The return movement of the piston I' is accomplished by the spring I⁴, and the gas previously drawn into the cylinder I by the said piston passes into the mixing-chamber G past the valve H during the suction period of the engine. The valve H is preferably surrounded by a wire-netting cage H', so that the gases pass in a finely-divided state into the mixing-chamber G.

The mixing-chamber G is also connected by a valve K with an air-tube K', preferably containing a wire-netting L for finely dividing the air, the said tube K' being connected at its lower end by openings K² with an annular space formed by an exterior tube N, screwed or otherwise fastened to the lower end of the air-tube K' and provided at its upper end with openings N'. (See Fig. 4.) The valve K opens upwardly, so that during the suction period of the engine air is drawn in from the outside into the mixing-chamber, the air being finely divided and kept free of dust and other impurities by the netting L. The discharge exhaust-valve E is formed with an elongated opening *e*, adapted to connect the exhaust-port *b* with a port *f*, leading to the atmosphere. The ports *e* and *c* are set in quarter positions, as indicated in Figs. 5 and 6.

The shaft F, within the working chamber A' of the cylinder A, is provided with an electrode O, adapted to engage a flexible electrode O', secured on a rod O², held insulated in the head A² of the cylinder A. The outer end of this rod O² is connected with a wire O³, leading to a battery or other electrical

supply also connected with a part of the cylinder, to form a complete circuit at the time the electrode O engages the electrode O'.

Now it will be seen that when the engine is in operation and the shaft F is rotated then the electrode O at every revolution of the shaft closes the circuit and breaks the same, thereby creating a spark for igniting the explosive mixture contained in the working chamber of the cylinder.

The operation is as follows: When the parts are in the position shown in Fig. 2, and an explosive mixture is contained in the working end A' of the cylinder A, and this mixture is ignited by the spark created by the electrode O moving away from the electrode O', the piston B is sent outward by the explosion to rotate the shaft C, and on the return stroke of the piston the exhaust-valve E has its port *e* in register with the ports *b* and *f*, so that the products of combustion escape to the outer air during this return stroke of the piston. During the return stroke of the piston the cam I⁶ pushes the piston I' outward, so that gas is drawn into the cylinder I, and on the return stroke of the cylinder-piston B the port *b* is closed and the ports *a c d* are connected with each other, so that a suction is produced in the mixing-chamber G, and consequently the valves H and K open to admit gas and air into the mixing-chamber G. The air and gas mixture pass through the ports *d*, *c*, and *a* into the working chamber A', and on the return stroke of the piston B this charge is compressed, as the valve D has cut off the connection between the ports *a* and *b*. When the piston B is on the point of starting on the next forward stroke, the ignition of the explosive mixture takes place and the piston B is again sent outward and the above-described operation is repeated.

During the suction period of the engine

the cylinder I' moves inward by the action of the spring I⁴ to assist in forcing the gas into the mixing-chamber G.

It will be seen that by the arrangement described a proper mixture of the air and gas takes place, and the explosive mixture formed and contained in the working chamber is positively ignited by the spark from the electrodes O and O'.

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

1. An explosive-engine, comprising a cylinder, a shaft mounted to turn in the sides of the cylinder and extending transversely therethrough, valves mounted on said shaft at opposite sides of the cylinder, separate inlet and exhaust ports leading from said valves to the cylinder, an electrode carried by the shaft within the cylinder, a fixed electrode adapted to be engaged by the electrode on the shaft and a driving connection between the engine-shaft and the valve-shaft, substantially as described.

2. An explosive-engine, provided with a valved air-inlet, comprising an air-tube containing a valve opening into the mixing-chamber, a netting contained in the said tube, and an exterior tube surrounding the air-tube and connected therewith by openings, substantially as shown and described.

3. An explosive-engine provided with a mixing-chamber adapted for connection with the fuel-supply, an air-tube containing a valve opening into the mixing-chamber, and another tube surrounding the air-tube and connected therewith by openings, substantially as described.

LEWIS S. BROWN.

Witnesses:

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CHAS. M. JAYNES.