C. S. DUTTON.

GAS ENGINE.

APPLICATION FILED OCT. 22, 1907.

944,235. Patented Dec. 21, 1909.

FIG. 2.

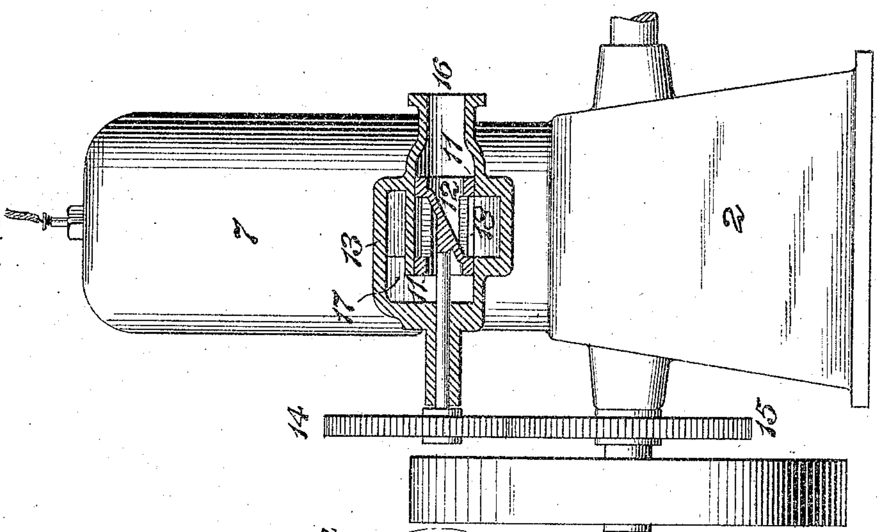


FIG. 1.

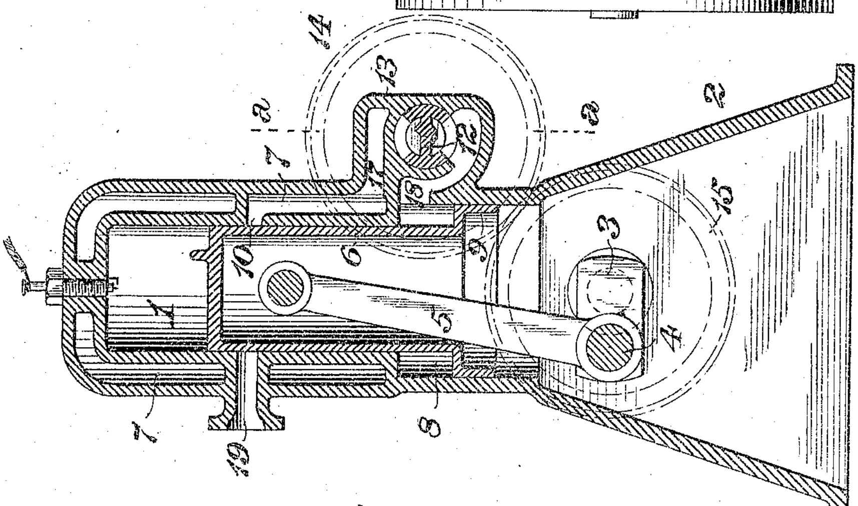
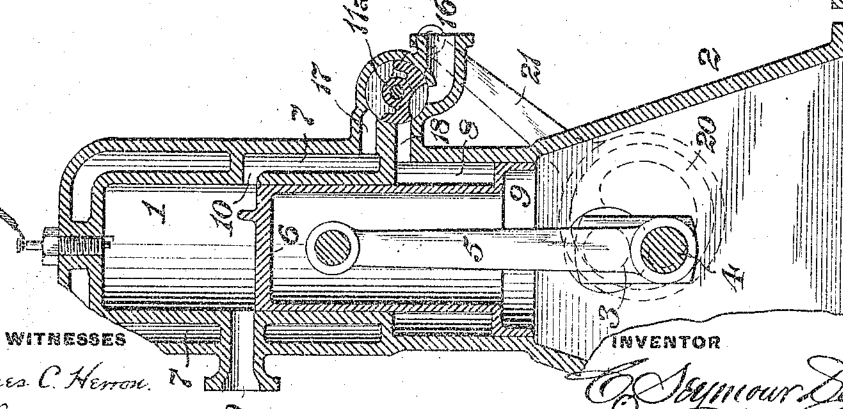


FIG. 3.



WITNESSES

James C. Herron.

S. R. Bell

INVENTOR

C. Seymour Dutton,

by Jno. Howard Bell

Att'y.

UNITED STATES PATENT OFFICE.

CHARLES SEYMOUR DUTTON, OF JERSEY CITY, NEW JERSEY, ASSIGNOR OF ONE-HALF TO H. HERMAN WESTINGHOUSE, OF NEW YORK, N. Y.

GAS-ENGINE.

Specification of Letters Patent. Patented Dec. 21, 1909.

944,235. Application filed October 22, 1907. Serial No. 398,590.

To all whom it may concern:

Be it known that I, CHARLES SEYMOUR DUTTON, of Jersey City, in the county of Hudson and State of New Jersey, have invented a certain new and useful Improvement in Gas-Engines, of which improvement the following is a specification.

My invention relates to gas engines of the two cycle type, in which gas is admitted to the cylinder and ignited at each revolution of the shaft, and its object is to provide means for a positive transfer of combustible mixture from the source of supply to the working cylinder, under all conditions, without the possibility of its return.

To this end, my invention, generally stated, consists in the combination, with a working cylinder, of a pumping mechanism, a combustible mixture reservoir interposed between the working cylinder and pumping mechanism, and two-way valve mechanism controlling the alternate and successive traverse of combustible mixture from the pumping mechanism to the reservoir and from the reservoir to the working cylinder, and preventing continuous communication between the pumping mechanism and the working cylinder.

The improvement claimed is hereinafter fully set forth.

In the accompanying drawings: Figure 1 is a vertical transverse central section through a gas engine illustrating an embodiment of my invention; Fig. 2, a side view, partly in section on the line *a a* of Fig. 1; and, Fig. 3, a vertical transverse central section, showing a modification in the structural detail of the valve mechanism.

In the practice of my invention, referring first to Figs. 1 and 2, I provide a casing inclosing a working cylinder, 1, which is formed upon, or fixed above, a crank case, 2, in which is journaled a main or crank shaft, 3, the crank pin, 4, of which is coupled, by a connecting rod, 5, to a piston, 6, fitted to reciprocate in the working cylinder in the ordinary manner. A combustible mixture is forced to a reservoir, 7, and thence to the upper end of the working cylinder, by a pumping mechanism, which, instead of using a closed crank case to form a pump as in ordinary practice, comprises an auxiliary or pumping cylinder, 8, and a piston, 9, reciprocating therein, the auxiliary cylinder being preferably, as shown, formed by a lower extension, of enlarged diameter, of the working cylinder, 1, and the auxiliary piston being made integral with the piston, 6, of the working cylinder, but of enlarged diameter, in correspondence with that of the auxiliary cylinder, 8. The reservoir, 7, is, in this instance, in the form of an annular chamber surrounding the working cylinder, 1, and communicating therewith by a port 10, and is of sufficient capacity, relatively to the auxiliary cylinder, 8, to prevent any considerable amount of compression.

Communication between the pumping mechanism and the reservoir, 7, is controlled by a valve mechanism comprising, in the instance shown, a continuously rotating valve, 11, 12, which is fitted in a casing, 13, on one side of the gas reservoir, and actuating devices for said valve, in this case spur gears, 14, 15, through which it is rotated by the crank shaft. If preferred, sprocket wheels and a connecting chain, or a linkage system, may be substituted for the gearing shown. A combustible mixture inlet, 16, is formed on one end of the valve casing, 13, and the opposite end of the casing communicates, through a port, 17, with the reservoir, 7. The valve is composed of two annular heads, 11, fitting truly in the casing, and an inclined partition or web, 12, extending from one head to the other. A port, 18, leads from the auxiliary cylinder, 8, to the space between the heads, 11, of the valve, which, in its rotation, establishes a continuous passage for gas from the inlet, 16, to the auxiliary cylinder, 8, through the body of the valve and the port, 18, during the explosion or working stroke of the engine. The port, 10, through which the reservoir communicates with the working cylinder, is controlled by a suitable valve, the piston, 6, of the working cylinder being preferably, as in the instance shown, utilized to perform the function of a valve for said port, in addition to its ordinary and normal function.

In operation, combustible mixture is admitted from the inlet, 16, to the auxiliary or pumping cylinder, 8, by the valve, 11, 12, during the explosion or working stroke, as above explained, and is cut off from said cylinder by the valve, at the end of this stroke. Near the beginning of the return

stroke, and just after the port, 10, has been closed by the piston, the valve establishes communication from the auxiliary or pumping cylinder, 8, through the port, 18, the body of the valve, and the port, 17, to the reservoir, 7. At the beginning of the next stroke, the cycle of operations above described is repeated. Near the end of the explosion stroke, after the exhaust port, 19, has been opened, the piston, 6, acting as a valve, uncovers the port, 10, allowing the combustible mixture inclosed in the reservoir, 7, to pass into the working cylinder. The port, 10, is closed soon after the beginning of the return stroke, the compression of the combustible mixture being thereafter effected wholly by the return stroke of the piston, and not being in any manner due to the action of the pumping mechanism. During the periods in which communication is established between the pumping cylinder and the reservoir, the port, 10, is closed, and whenever this port is open, communication between the pumping cylinder and reservoir is closed by the valve, 11, 12.

Fig. 3 illustrates a structural modification in which a rocking or vibratory slide valve, 11^a, actuated by an eccentric, 20, and eccentric rod, 21, is substituted for the continuously rotating valve, 11, 12, shown in Figs. 1 and 2. The action of this valve, in alternately establishing and cutting off communication between the pumping cylinder and the reservoir, is similar to that of the valve first described, and it will be obvious to those skilled in gas engine construction that a straight faced slide or piston valve, or a pair of puppet valves, may be used to perform the same function without departure from the spirit of my invention.

I claim as my invention and desire to secure by Letters Patent:

1. The combination, in a single gas engine casing, of a working cylinder, a pumping cylinder formed in the casing, a combustible mixture reservoir communicating with the working cylinder and pumping cylinder, and a valve for controlling communication between the pumping cylinder and reservoir and arranged to be opened during the compression in the pumping and working cylinders; whereby is controlled the alternate and successive traverse of combustible mixture from the pumping cylinder to the reservoir and from the reservoir to the working cylinder and preventing continuous communication between the pumping cylinder and the working cylinder.

2. The combination, in a single gas engine casing, of a working cylinder, a pumping cylinder formed in the casing, a combustible mixture reservoir communicating with the working cylinder and pumping cylinder, a continuously operating valve controlling communication between the pumping cylinder and reservoir and arranged to be opened during the compression in the pumping and working cylinders; whereby is controlled the traverse of combustible mixture from the pumping cylinder to the reservoir, and from the reservoir to the working cylinder and preventing continuous communication between the pumping cylinder and the working cylinder.

3. The combination, in a single gas engine casing, of a working cylinder, a pumping cylinder formed in the casing, a combustible mixture reservoir communicating with the working cylinder and pumping cylinder and surrounding said working cylinder, a valve controlling communication between the pumping cylinder and reservoir and arranged to be opened during the compression in the pumping and working cylinders, and mechanism for continuously rotating said valve.

4. The combination, in a single gas engine casing, of a working cylinder, a piston reciprocating therein and coupled to a crank shaft, a pumping cylinder of greater diameter than the working cylinder and located in line axially therewith and formed in the casing, a piston fitting said pumping cylinder and fixed to the piston of the working cylinder, a combustible mixture reservoir surrounding the working cylinder, a port or passage leading from the combustible mixture reservoir to the working cylinder, in position to be opened and closed by the piston of the latter, a port connecting the combustible mixture reservoir to the pumping cylinder, a valve for controlling communication between pumping cylinder and reservoir and arranged to be opened during the compression in the pumping and working cylinders, and mechanism for actuating said valve from the crank shaft.

C. SEYMOUR DUTTON.

Witnesses:
J. SNOWDEN BELL,
ROBT. S. KEARNEY.