(No Model.)

E. BÉNIER.

GAS ENGINE.

No. 247,741. Patented Oct. 4, 1881.

Fig. 2.

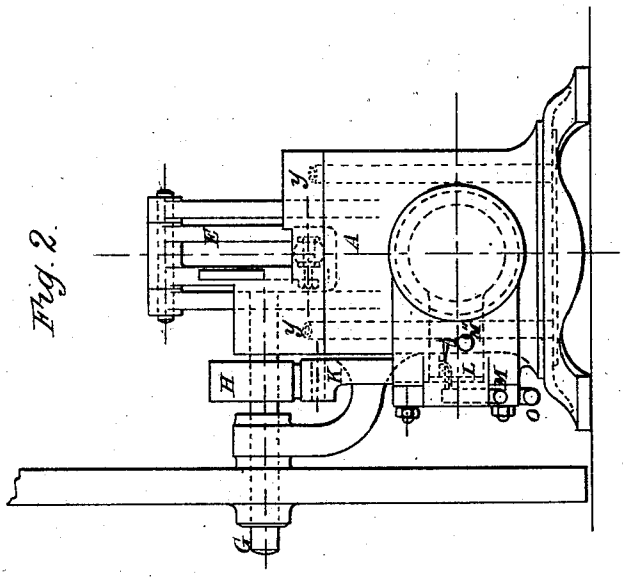


Fig. 1.

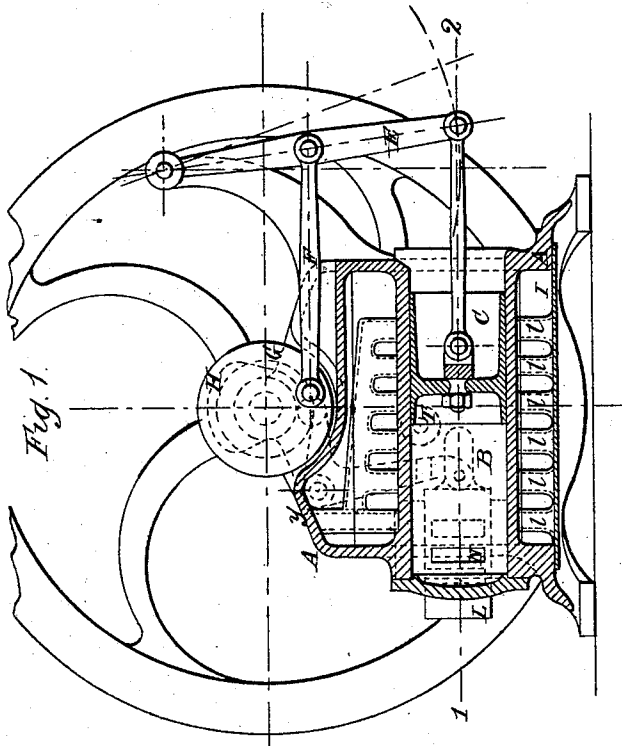
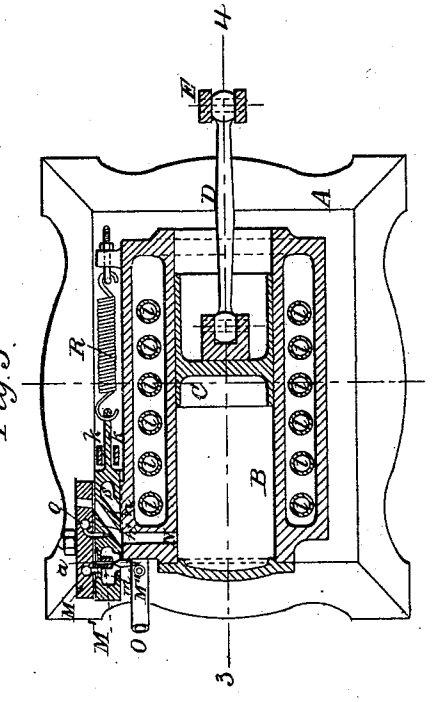


Fig. 3.



Witnesses.
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Edouard Bénier. Inventor.
by John J. Halsted.
his Atty.

N. PETERS. Photo-Lithographer. Washington, D. C.

UNITED STATES PATENT OFFICE.

EDOUARD BÉNIER, OF PARIS, FRANCE.

GAS-ENGINE.

SPECIFICATION forming part of Letters Patent No. 247,741, dated October 4, 1881.

Application filed June 17, 1881. (No model.)

To all whom it may concern:

Be it known that I, EDOUARD BÉNIER, a citizen of the Republic of France, residing at Paris, have invented new and useful Improvements in Gas-Engines, of which the following is a specification.

My invention relates to improvements in gas-engines, and is represented in the accompanying drawings, in which—

Figure 1 is a longitudinal section on the line 3 4. Fig. 2 is an end view of the engine. Fig. 3 is a sectional plan on line 1 2.

The machine is constructed of a cast-iron frame, A, cast with an explosion-cylinder, B, in which moves a piston, C, which operates a connecting-rod, D, acting on the extremity of a lever, E, which transmits the motive power to the crank-shaft G by means of a connecting-rod, F. A cam, H, by means of the lever K, moves a distributing and igniting slide-valve, which is constantly drawn backward by means of a spiral spring, R, as soon as the cam ceases to push it forward. An india-rubber stopper, T, serves as a buffer to the lever K, in order to deaden the shock on the cam H at the end of the stroke of the slide-valve.

The cylinder B is surrounded with water in the closed jacket formed by the interior of the frame and the iron plate I, which carries the tubes *i*, closed at the side next the water, but the interior being in communication with the open air at the top and bottom. The combustion of the gas in the cylinder heating the water which surrounds the said cylinder, the air contained in the tubes *i* becomes heated and ascends, so as to escape through the openings Y of the frame. It is there replaced by cold air coming through the base of the frame, which, in its turn, becomes heated. A constant draft is thus produced. The air, in becoming heated, absorbs a certain quantity of caloric from the water, and such quantity is sufficient to prevent the water from boiling and evaporating. There is therefore no need to renew it, and it is this special construction of apparatus which forms the basis of my invention.

The operation of the machine is as follows: The piston C, in the first half of its stroke from left to right, draws in a mixture of air and gas or combustible vapor through the openings N of the frame and through the openings *n* and *n'* of the slide-valve L, which are in communication during this part of the stroke. The one, *n*, is the air-inlet port, the other, *n'*, is the inlet-port for the gas (or vapors) drawn along by the tube *o*, such gas (or vapors) by means of several small holes suitably mixing with the air before entering the cylinder. When the piston C has reached the half of its stroke the cam H moves the slide-valve L, which carries a small igniting-burner, M'. Communication between the opening N and the ports *n* and *n'* is stopped; but the opening N is instantly put into communication with the burner M', which ignites the mixture and produces the explosion, so as to push the motive piston during the other half of the stroke. In its return-stroke the piston drives the burned gases through the opening S of the slide-valve L, which is then opposite the opening N. The small igniting-burner M', after each explosion and during the escape of the products of combustion, is reignited at the permanent light M''. The burner M' is fed during its stroke for igniting the explosive mixture, first, during the first half of its stroke by the special pipe M, and, secondly, during the second half of its stroke by the pipe O, which also furnishes the stroke to the cylinder. At the moment of the explosion the burner M' is in communication with the pipe O, and the burned gas which is forced by the explosion in this burner comes into the tube O, whence it is drawn with pure gas by the following stroke of the piston in such a manner that there is no inflammable mixture immediately against the piston, a cushion of air being thus formed which much lessens the violence of the shocks.

The alternate communication of the burner M' with the pipes M and O is effected by means of a small channel in the slide-valve L, arranged in such a manner that in leaving the pipe M it comes opposite the pipe O. This arrangement allows of a rapid and regular ignition with very small burners, and the engine admits of using any gas or combustible vapors of any kind.

Having thus described my invention, what I claim is—

1. The described method of cooling the water surrounding the cylinder by the arrange-

ment hereinbefore described and shown, by utilizing the passage of the exterior air passing through the water heated close to the cylinder, substantially as set forth.

2. The combination of a permanent burner, M″, an intermittent burner, M′, a slide-valve provided with a channel, *a*, and pipes M and O, all constructed and arranged substantially as shown and set forth.

3. In combination, the cylinder B, having a surrounding jacket, tubes *i*, openings Y and N, valve L *n n′* S, tube O, and burner M′, substantially as shown and described.

E. BÉNIER.

Witnesses:
LAMONT,
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