

(No Model.)

A. W. SCHLEICHER & P. A. N. WINAND.
GAS AND HYDROCARBON ENGINE.

No. 434,609.

Patented Aug. 19, 1890.

Fig. 1.

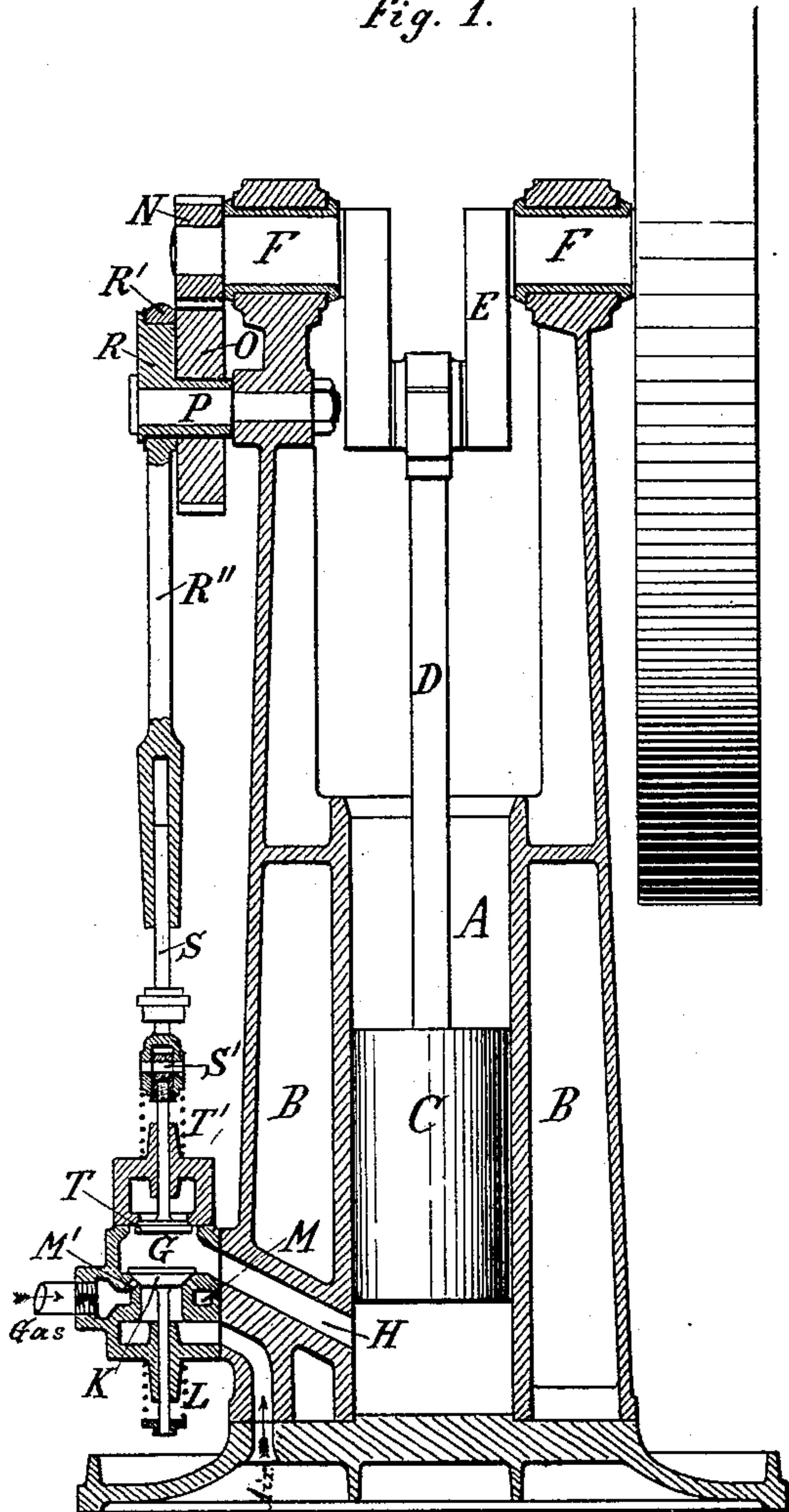
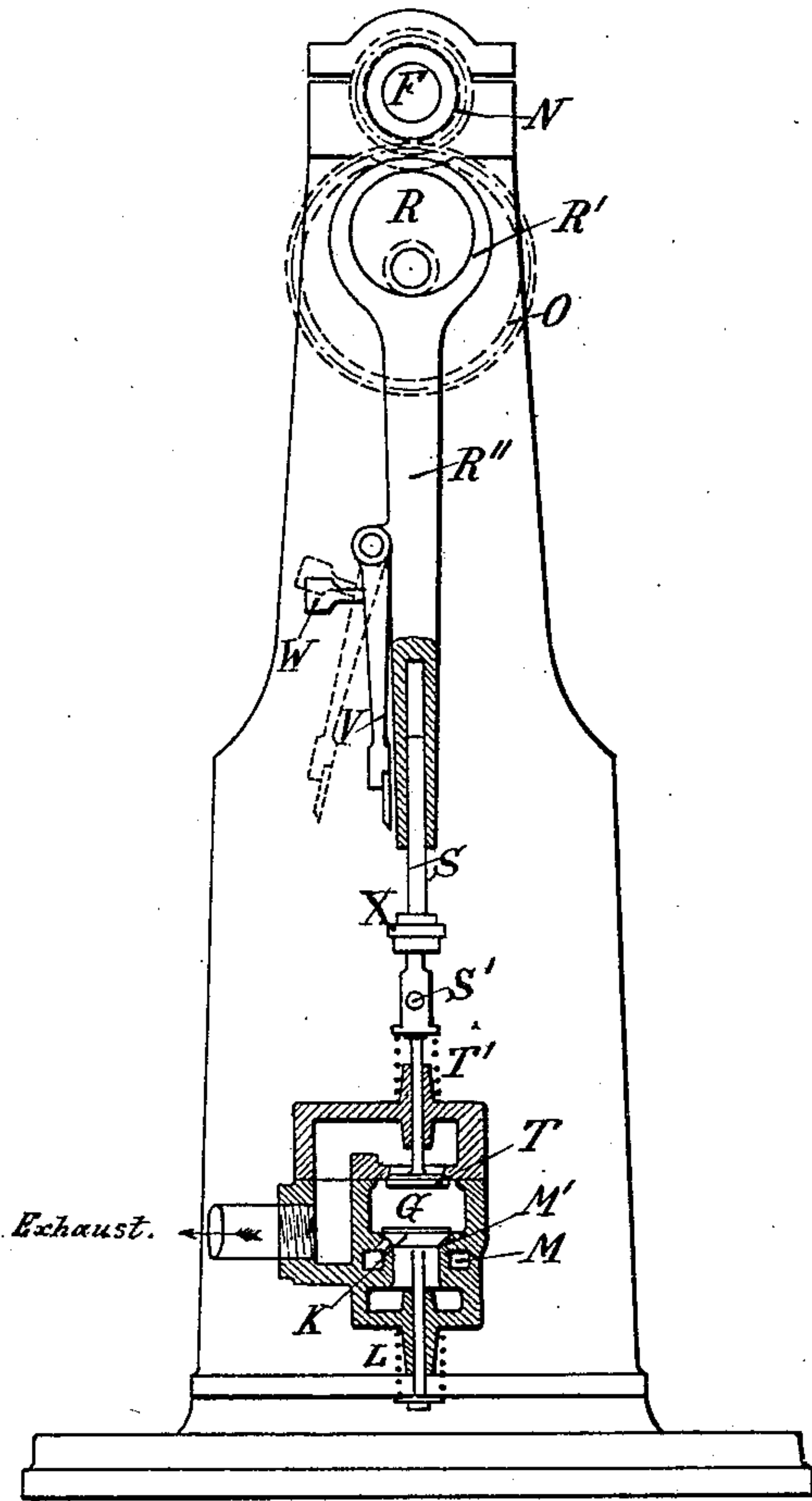


Fig. 2.



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GAS AND HYDROCARBON ENGINE.

SPECIFICATION forming part of Letters Patent No. 434,609, dated August 19, 1890.

Application filed July 16, 1889. Serial No. 317,678. (No model.)

To all whom it may concern:

Be it known that we, ADOLPHUS W. SCHLEICHER, a citizen of the United States, residing at the city of Philadelphia, in the State of Pennsylvania, and PAUL A. N. WINAND, a subject of the King of Belgium, but residing at present in said city of Philadelphia, have invented certain new and useful Improvements in Gas-Motor Engines, of which the following is a specification.

The object of our invention is to provide an engine in which the admission of air and combustible gas, as well as the governing of the speed of the engine, shall be automatic, the governing being effected by the opening or not opening, as the case may be, of the exhaust-valve by and through a connection between said exhaust-valve and the crank-shaft through intermediate mechanism hereinafter described, and the automatic opening and closing of the inlet-valve being effected through differential pressures acting upon it, the whole being constructed so as to accomplish the most efficient work and uniform speed with fewer and simpler working parts than any gas-motor engine heretofore constructed. In the special structure hereinafter described, and shown in the drawings annexed to our specification, it will be seen that both the inlet and outlet or exhaust valves open into one and the same chamber, which communicates by a single port or channel with the working-cylinder, and this perhaps is the simplest, and therefore the best, design or construction in which our invention can be embodied; but it is not essential to our invention that the inlet and outlet valves should open into or communicate with one and the same chamber so long as the other features of our invention are preserved.

Referring to the drawings, Figure 1 represents a vertical section of the engine on a plane parallel with the axis of the crank-shaft. Fig. 2 represents a side elevation and section of some of the exhaust mechanism.

A is the cylinder, which is provided with a water-jacket B.

C is the piston; D, the connecting-rod; E, the crank, and F the crank-shaft mounted in bearings in the upper end of the frame,

which may be cast with the cylinder, as shown in the drawings.

The valve-chamber above referred to is shown at G, and the port for the admission of the combustible mixture to the working-cylinder is shown at H, which is also the channel from which the products of combustion after the ignition of the combustible mixture escape from the cylinder through the exhaust-valve when the latter is open.

The inlet-valve for the admission of the gas and air is shown at K, and is arranged to open upwardly into the chamber G, and is held to its seat by gravity and a spring L, acting upon the lower end of its stem, the latter being provided with an adjusting-nut to regulate the tension of the spring.

M M' are small ports, through which the combustible mixture—gas and air—enters the valve-chamber G, and through the channel H into the cylinder A as soon as the outstroke of the piston has proceeded far enough to cause such vacuum in the cylinder, and consequently such reduction of internal pressure upon the inlet-valve K as that the outer atmospheric pressure upon said valve shall be sufficient to overcome its weight and lift it from its seat, the said valve being closed of course the moment the piston begins its instroke, its operation being thus wholly automatic through differential pressures exerted upon it.

It may be remarked here that the operation of an engine constructed conformably to the drawings is such as that, first, gas and air are drawn into the cylinder during the outstroke of the piston; then, second, the same are compressed by an instroke of the piston; then, third, the piston is driven out by the explosion resulting from the ignition of the combustible mixture, which gives such an impulse to the fly-wheel as to cause an instroke of the piston, a portion of the products of combustion being expelled through the exhaust-valve in a manner now to be explained.

Upon an extension of the crank-shaft is a gear-wheel N, which engages with another gear-wheel O of twice its size, the latter being supported upon a stud extending from the frame at P, so that the motion of the wheel

O is as one to two compared with that of the driving-wheel N.

On the outer face of the wheel O is an eccentric wheel R, which opens the exhaust-valve at the proper time by means of the strap R' and the rod R''. In the lower end of the rod R'' is a longitudinal hole or opening in which the piston-rod S works, the lower end of which piston-rod is pivoted to the upper end of the exhaust-valve stem at S'.

The exhaust-valve T is a puppet-valve, and is so arranged that in order to be opened it must be pressed down into the chamber G, and it is held against its seat by a spring T', which surrounds its stem. This—that is to say, its opening—is accomplished by a pendulum-governor V, pivoted to the rod R'', which is moved up and down by the eccentric R.

At the upper end of the governor V is a weight W, extending out at a right angle to the pendulum, so that when the downward movement of the rod R'' is rapid, or greater than the normal speed of the engine, the weight W will cause the pendulum to be swung out, as indicated by the dotted line, Fig. 2, and the exhaust-valve will not be opened; but when this outward motion of the pendulum does not occur the latter will move on down with the rod R'', and the lower end of the pendulum will engage with the notch X at the lower end of the rod or piston S, and thus press down and open the exhaust-valve T; hence the exhaust-valve is the governing agent for determining the speed of the engine, for the reason that if the exhaust-valve is not opened the gases in the cylinder cannot escape and the internal pressure of the gases upon the inlet-valve K will prevent said valve from opening, and consequently until the speed of the engine is so reduced as to permit the pendulum to open the exhaust-valve in the manner already explained no fresh additional supply of combustible mixture can enter the cylinder and no further impulse be imparted to the engine.

The device for igniting the combustible mixture of gas and air may be attached to the chamber G, or at any point or part of the structure adjacent to the entrance of the port H, and almost any form of many well-known

igniting devices employing either a flame or an electric spark (which devices need not be explained here) may be applied.

We are aware of attempts to regulate the speed of engines by acting upon their exhaust, either by throttling it to create a resistance, or varying the length of time during which it is kept open, or varying the area of opening. We are also aware of the employment of pendulum-governors—such as described in United States Letters Patent No. 370,258, granted to Henry P. Holt and Francis W. Crossley, September 20, 1887—in which the regulation or governing of the engine is effected by means of a connection between the governing device and the inlet-valve. The regulation of the valves—both the exhaust-valve and the inlet-valve, and consequently the governing of an engine according to our invention—differs from either of the classes to which we have referred and from all others with which we are acquainted.

Having thus described our invention, what we claim, and desire to secure by Letters Patent, is—

1. In a gas-motor engine, the combination, with an inlet-valve the opening and closing of which are effected by differential pressures, of an exhaust-valve, an operating-rod, a sliding connection between the exhaust-valve and the operating-rod, and a governing device moving with the operating-rod and adapted to act positively upon the exhaust-valve, so as to open it the same definite distance or to not act upon it at all, according as may be the speed of the engine, substantially as set forth.

2. A governor for gas-motor engines, consisting of the eccentric-rod R, rod R'', piston-rod S, pivoted to the stem of the exhaust-valve, pendulum V, weight W, and notch or projection X on the rod S, all arranged and combined to operate as hereinbefore set forth.

In witness whereof we have hereunto subscribed our names in the presence of two witnesses.

ADOLPHUS W. SCHLEICHER.
PAUL A. N. WINAND.

Witnesses:

HOWARD G. SMITH,
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