(No Model.)

E. KÖRTING.

AUTOMATIC VALVE AND IGNITOR FOR GAS ENGINES.

No. 418,029. Patented Dec. 24, 1889.

Fig. 1.

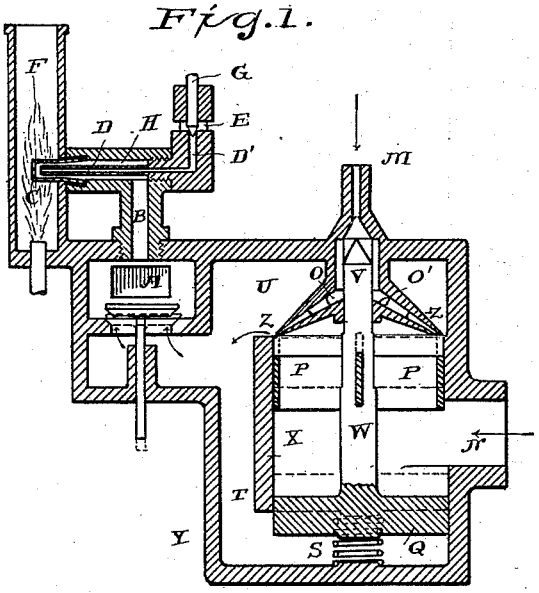


Fig. 2.

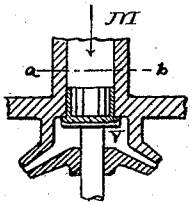


Fig. 3

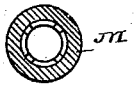


Fig. 4.

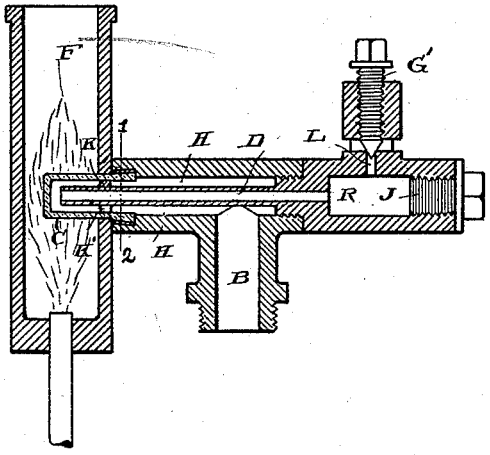
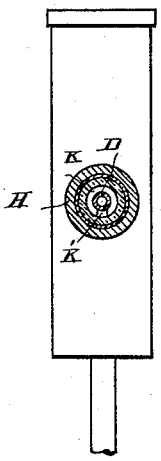


Fig. 5.



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UNITED STATES PATENT OFFICE.

ERNST KORTING, OF HANOVER, PRUSSIA, GERMANY, ASSIGNOR TO THE KORTING GAS ENGINE COMPANY, (LIMITED,) OF NEW YORK, N. Y.

AUTOMATIC VALVE AND IGNITOR FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 418,029, dated December 24, 1889.

Application filed April 1, 1889. Serial No. 305,620. (No model.) Patented in Switzerland May 8, 1888, No. 808; in France May 12, 1888, No. 194,590, and in Belgium May 12, 1888.

To all whom it may concern:

Be it known that I, ERNST KORTING, a subject of the King of Prussia and Emperor of Germany, residing at Hanover, in the Kingdom of Prussia, Germany, have invented certain new and useful Improvements in Automatic Valves and Ignitors for Gas-Engines, (for which I have obtained a patent in France, numbered 194,590, granted May 12, 1888; in Belgium, May 12, 1888, and in Switzerland, No. 808, granted May 8, 1888;) and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention consists in the automatic valve and ignitor for gas-engines, hereinafter to be described and claimed.

In the drawings, Figure 1 is a sectional view showing the general arrangement of the valve and ignitor. Fig. 2 is a detail view showing a modification of the gas-inlet valve. Fig. 3 is a horizontal section on line A B of Fig. 2. Fig. 4 is a sectional view showing a modified form of the ignitor. Fig. 5 is a section on line 1 2 of Fig. 4.

My invention is intended to be applied to gas-engines of the general type illustrated in a prior patent granted to me July 27, 1886, No. 346,374, and in subsequent patents issued to me. In this type of engine the piston, first, draws in the charge; second, compresses it; third, combustion takes place, and, fourth, the burned gases are discharged.

The invention herein to be described and illustrated is designed to automatically control the admission of the charge of combustible gases to the engine-cylinder and the automatic ignition thereof at the proper moment.

In the drawings like reference-letters denote like parts throughout.

In Fig. 1, N represents the air-inlet, and M the gas or oil inlet. Y is the valve-casing. X is a cylindrical casing within the main casing Y, and in it the valve-stem W slides up and down, carrying the piston Q and the ring-shaped valve P. The end of the valve-stem W is ground to a conical point V, which abuts against a corresponding conical valve-seat, and thereby closes the gas or oil inlet M. As the gas or oil enters through the inlet M, it passes on to the annular chamber O, formed by the flaring sides O′ and Z, and is compelled to issue through the narrow circular slit Z′ left between the parts O′ and Z.

The interior U of the valve-casing is connected with the cylinder of the gas-engine (not shown) by the passage-way A. Communication between the chamber U and the passage-way A is controlled by a check-valve W′. When the piston of the engine is drawing in the charge, it produces a partial vacuum in the passage-way A, which lifts the check-valve W′ and produces a similar partial vacuum in the valve-chamber U and the passage-way T, connected therewith. In consequence the atmospheric pressure on the upper side of the piston Q compresses the spring S, lowers the valve-stem W, and lowers the valves V and P from their respective seats. Consequently the gas or oil entering through the passage M passes on through the chamber O and through the narrow slit Z′. At that point the oil or gas meets the current of air rushing on to the passage-way A, as shown by the arrow, and is vaporized or intimately commingled with the said current of air, thereby forming the combustible charge, which is drawn into the engine-cylinder through the passage-way A. When the engine-piston begins to compress the said charge, the check-valve W′ is closed. An equilibrium of pressures is established on the two sides of the piston Q, and the spring S forces the valves V and P up to their seats, thereby shutting off all further admission of air and of oil or gas.

When petroleum or other hydrocarbon oil is to be used, I employ the form of valve V shown in Fig. 1. When a gas is to be used, I employ the form of valve V having a gage, as shown in Figs. 2 and 3.

The igniting portion of my device is connected to that previously described by a passage-way B. This passage-way terminates in a chamber H, which is closed by a cap C of any refractory material, such as porcelain or lava. Passing through the chamber H and projecting into the cap C is a slender tube D, which communicates with an out-

let D′, which is closed by a valve G, which may be lowered upon the valve-seat E. The cap C is kept in a state of incandescence by a jet of flame F.

The valve G, as above described, forms simply one modification of my invention, the preferred form of which is shown in Fig. 4. The tube D communicates with a chamber R, which may be adjusted to greater or less capacity by the screw-plug J. This chamber R has an outlet L, which may be more or less restricted by the pointed valve G′, which may be screwed up or down, and thereby open or close the orifice L.

The operation of the automatic inlet-valve has been heretofore described. That of the automatic ignitor is as follows: During the first part of the period of compression of the charge in the engine-cylinder the passage-way B, the chamber H, and tube D are filled with the incombustible gases resulting from the combustion of the previous charge. When these have been driven out by the stream of combustible gases forced out of the engine-cylinder by the compression produced therein, the heat of the incandescent chamber formed by the interior of the porcelain cap C ignites the said combustible gases; but the combustion is not transmitted back through the passages B and A to the engine-cylinder, because the speed of the stream of gases flowing through the narrow passages of the chamber H is greater than that at which combustion is transmitted through the said gases. If the velocity of this stream of gas is sufficiently checked, the combustion will be transmitted back to the cylinder of the engine and the desired explosion will be there produced. This checking of the speed of the stream of gas may be accomplished, as shown in Fig. 1, by the valve G, which is automatically operated by the engine through the agency of a crank or eccentric or any other well-known means. In my preferred construction, however, as shown in Fig. 4, the velocity of the said stream of gases is checked by the back-pressure generated by the accumulation of gas in the intermediate chamber R. The period at which a sufficient back-pressure to accomplish this shall be produced in the intermediate chamber R is dependent upon the capacity of said chamber or upon the readiness with which the gases can escape from it through a given outlet, or upon both. I have therefore provided a screw-plug J, by which the capacity of the chamber R can be adjusted, and also the screw-valve G′, by which the outlet L may be more or less restricted. A proper adjustment of the plug J and the valve G′ will result in the generation of the proper amount of back-pressure in the chamber R at the proper time, so that the combustion going on within the cap C will be transmitted to the charge in the engine-cylinder and the combustion of the latter begun just as the crank passes the dead-point.

In order to insure the necessary speed of the current of gases sufficient to prevent the premature transmission of combustion to the charge in the engine-cylinder, I place the collar K, having the small perforations K′, about the tube D, as shown in Figs. 4 and 5.

The cap C may be cemented into the chamber H or otherwise attached to the metal portions of the engine, so as to prevent leakage.

The peculiar advantage of my arrangement of air and gas valves and passages, as shown in Fig. 1, lies in the fact that the incoming current of gas or combustible fluid passing down through the annular chamber O and out at the narrow circular slit Z′ is delivered therefrom in the form of a thin film, against which the air that comes in through the induction-passages N and X, which latter is concentric with the circular slit Z′, strikes at right angles as it rushes over the annular valve P, also in the form of a comparatively thin layer. This conduces to the most effective intermixture of the air and gas if gas is used, or to the most complete vaporization of the oil if oil is used, and to the effective intermixture of said vapor with the air.

Having therefore described my invention, what I claim as new, and desire to protect by Letters Patent, is—

1. In a gas or vapor engine, the combination of the main valve-casing, which has one orifice for the admission of combustible gas or fluid and another for the admission of air, a valve for closing the gas or fluid inlet, and a valve for closing the air-inlet, both mounted upon a common valve-stem, together with a piston, also mounted on the said valve-stem and operated by the varying pressures on its opposite sides, substantially as described.

2. In a gas or vapor engine, the combination of the main valve-casing, which has one orifice for the admission of combustible gas or fluid and another for the admission of air, a valve for closing the air-inlet and another for closing the gas or fluid inlet, both mounted on a common valve-stem, together with a piston which operates said valve-stem through the varying pressures of the gases within the valve-casing, and the spring which acts on the stem, substantially as described.

3. In a gas or vapor engine, the combination of the induction-passage for combustible gas or fluid, terminating in an annular chamber and a narrow circular slit, together with an air-induction passage concentric with the circular slit and opposite thereto, substantially as described.

4. In a gas or vapor engine, the combination of a cap which is formed of refractory material and which has its interior communicating with the engine-cylinder, together with a small tube which extends nearly the entire length of the interior of the cap and which furnishes an outlet from the interior of the cap to the outer air, and means for heating said cap, substantially as described.

5. In a gas or vapor engine, the combination of a cap which is formed of refractory

material and which has its interior communicating with the engine-cylinder, the small tube which extends nearly the entire length of the interior of the cap and which furnishes an outlet from the interior of the cap to the outer air, together with a valve for controlling said outlet, and means for heating the cap, substantially as described.

6. In a gas or vapor engine, the combination of a cap which is formed of refractory material and which has its interior communicating with the engine-cylinder, the tube which extends nearly the entire length of the interior of the cap and which furnishes an outlet from the interior of the cap to the outer air, and the intermediate chamber through which said outlet is obtained, together with means for heating the cap, substantially as described.

7. In a gas or vapor engine, the combination of a cap which is formed of refractory material and which has its interior communicating with the engine-cylinder, the tube which furnishes an outlet from the interior of the cap to the outer air, and the intermediate chamber of adjustable capacity through which said outlet is obtained, together with means for heating the cap, substantially as described.

8. In a gas or vapor engine, the combination of a cap which is formed of refractory material and which has its interior communicating with the engine-cylinder, the tube which furnishes an outlet from the interior of the cap to the outer air, and the intermediate chamber of adjustable capacity through which said outlet is obtained, together with a valve for controlling said outlet, and means for heating the cap, substantially as described.

9. In a gas or vapor engine, a cap formed of refractory material, a small tube which furnishes an outlet from the interior of the cap, and a collar which surrounds the said tube and fills the space between it and the sides of the cap, together with the small perforation through said collar, which furnishes an inlet to the interior of the cap, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ERNST KORTING.

Witnesses:

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JOH: KRACKE.