

(No Model.)

G. E. HOYT.

IGNITING APPARATUS FOR GAS OR EXPLOSIVE ENGINES.

No. 561,890.

Patented June 9, 1896.

Fig. 1.

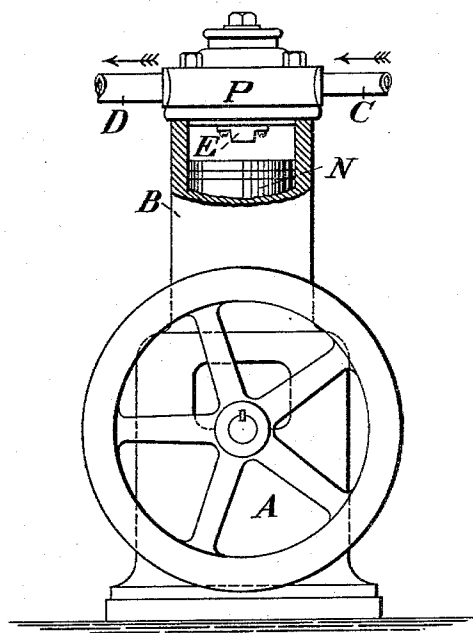


Fig. 2.

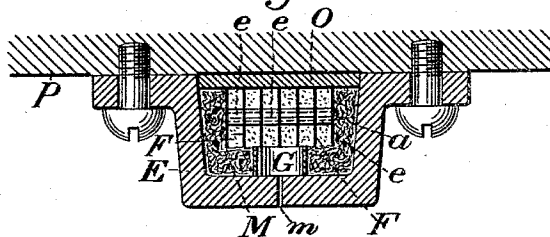
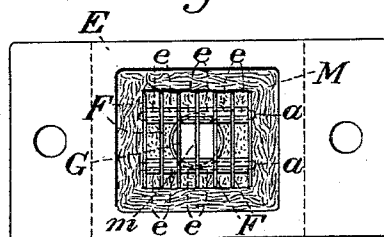


Fig. 3.



Witnesses:

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UNITED STATES PATENT OFFICE.

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IGNITING APPARATUS FOR GAS OR EXPLOSIVE ENGINES.

SPECIFICATION forming part of Letters Patent No. 561,890, dated June 9, 1896.

Application filed September 16, 1893. Serial No. 485,688. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. HOYT, a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented certain new and useful Improvements in Igniting Apparatus for Gas or Explosive Engines; and I hereby declare the following specification and drawings therewith to be a full description and explanation of my invention.

My improvements relate to a method and apparatus for igniting the explosive charges in gas or vapor engines, especially to apparatus for that purpose, the mode of operating being the same as set forth in my application for Letters Patent, Serial No. 397,047, filed June 22, 1881, for improvement in igniting apparatus for gas-engines, but by means of different and more simple apparatus.

My present improvements consist in maintaining within the gas-engine cylinder or combustion-chamber of such engines a continuously-heated or incandescent substance of a refractory nature, preferably platinum, inclosed in a retort or chamber, to which the gases to be ignited are admitted by means of a small aperture, offering such resistance to the pressure and flow of the gas as to cause such velocity thereof that the flame will not follow back and ignite the main body of gas in the engine until the pressure and consequent high velocity of the gases through the aperture ceases or is reversed, no valves of any kind being employed or necessary.

The object of my invention is to determine the point of ignition in gas or vapor engines by relative pressure in the cylinder or combustion-chamber of the engine and the igniting chamber or retort and independent of ultimate pressure in the engine-cylinder without mechanical indication or control of the igniting apparatus and definitely in respect to position of the piston and crank, utilizing the heat of the explosive gases to maintain the required temperature of the igniting substance employed.

I am aware that the charges in explosive engines have been ignited by means of tubes containing refractory materials heated by the gases of combustion; but such tubes afforded free communication with the confined gas in the engine-cylinders, and ignition followed

when the inflammable gas had by compression reached a certain heated portion of the tube. Consequently the point of ignition was dependent upon the ultimate pressure or compression in the engine-cylinder.

I am also aware that analogous means of ignition have been employed with the aid of valves or ports having a controlling action; but in my combination the period of ignition is a function of the flow of the gases uncontrolled by anything except by a varying pressure.

In my invention the length or distance the gas flows into the igniting tube or chamber containing the heated refractory substance is immaterial, because communication thereto is by means of a small aperture so retarding the inflow of the gas as to cause a high velocity thereof and preventing the flame from following back until the flow of gas ceases or is reversed, so the point of ignition is not dependent upon the degree of pressure, but will take place when the piston has reached the required position whether the pressure be more or less. To restate this, which is a matter of some complexity and relates to phenomena that cannot be observed, in igniting-tubes depending on the distance to which the gas to be ignited flows into them the point of ignition depends absolutely on the degree of pressure, while in my invention the point of ignition does not depend upon the degree of pressure in either the engine-cylinder or igniting tube or chamber, but upon the relative pressure between the two, as will be shown by the drawings herewith, in which—

Figure 1 is an elevation of a common gas-engine provided with my improved igniting apparatus. Fig. 2 is an enlarged view in section of the igniting apparatus. Fig. 3 is a plan view taken on top of Fig. 2 with a portion of the refractory filling removed.

Similar letters of reference indicate like parts in the different figures of the drawings.

A is a common vertical gas or vapor engine operating on what is called the "two-cycle" system, explosion and compression taking place at alternate revolutions of the engine. B is the cylinder, C an inlet-pipe for gas, and D an exhaust-pipe for burned or spent gases.

E is the igniting apparatus, consisting of a

strong metal chamber or retort open at the top and bolted against the cylinder-head, as shown in Fig. 1.

The chamber or retort E can be attached to the piston, the walls of the cylinder, or in any position within the latter so it will be exposed to the exploding charges of gas and the heat thereof.

The cavity in the chamber or retort E contains several thin bars or plates F, of platinum or other refractory metal, joined by rivets *a*, and a distance-piece *e*, so as to form a kind of grating, which is surrounded by a filling of asbestos or other refractory substance M, leaving beneath the bars or plates F a small cavity G to permit the intruding gas to come in contact with these bars or plates in the following manner:

Communicating between the interior of the chamber or retort E and gases in the cylinder B is a small perforation *m*, which is made of such diameter that the cavity G and interstices in the chamber E will be filled with gas as fast as compression takes place in the engine-cylinder, and the intruding velocity through this aperture *m* is such that the flame does not follow back or ignition take place until the piston N has reached its highest position and compression has ceased and there is an equilibrium of pressure in the chamber or retort E and the cylinder B, in which it is placed. The size of this perforation *m* can be varied in small degree without changing the result—that is, the degree of retardation offered to the intruding gases does not call for such nicety of adjustment as to impair the practical value of the invention. This aperture *m* is commonly made one-sixteenth of an inch or less in diameter.

Over the top of the plates F and packing M, I place a plate O, made of some refractory material, such as fire-clay, asbestos, or tile. This plate O can be taken out to place, remove, or inspect the plates F without disturbing the filling M.

The rate of compression in the cylinder B, which corresponds to the angular movement of the engine-crank, diminishing rapidly toward the extreme, produces ignition with great regularity and in accordance with conditions that are not easily determinable, because the operations are instantaneous, concealed and not observable.

In operating with my improved igniting apparatus the engine is first started by any of the well-known means of igniting, a heated tube or electric spark, or the plates F can be heated by an electric current.

When the heat in the cylinder, by reason of the explosions, has increased to its normal state, or before when the plates F become highly heated because of their conductivity, the main member E of the igniting apparatus remains at a much lower temperature, its heat passing off by induction to the cylinder B or combustion-chamber P, which is commonly cooled by circulating water. As soon as the plates F are heated to the required point the supplementary means of igniting is cut off and the engine goes on performing its own functions in this respect automatically, as hereinbefore explained.

Having thus explained the nature and objects of my invention, what I claim as new is—

1. In a gas or vapor engine, an automatic igniting retort or chamber placed in the engine-cylinder or combustion-chamber without external communication, plates or pieces of platinum or other suitable conducting material therein, spacing-pieces between said plates, a bolt passing through said plates and spacing-pieces, refractory material partially surrounding said plates, a cavity beneath these bars or plates to permit the intruding gas to come in contact with the same, and an aperture communicating between the plates and the engine-cylinder.

2. In a gas or vapor engine, an automatic igniting retort or chamber placed in the engine-cylinder or combustion-chamber, a series of igniting-plates occupying the central portion of said chamber, spacing-blocks between said plates, a bolt passing through said plates and blocks so as to form a grating, refractory material partially surrounding the grating, a removable plate over said grating, a cavity below the grating, and an aperture connecting the engine-cylinder with the chamber or retort.

In testimony whereof I have hereunto affixed my signature in the presence of two witnesses.

GEORGE E. HOYT.

Witnesses:

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