

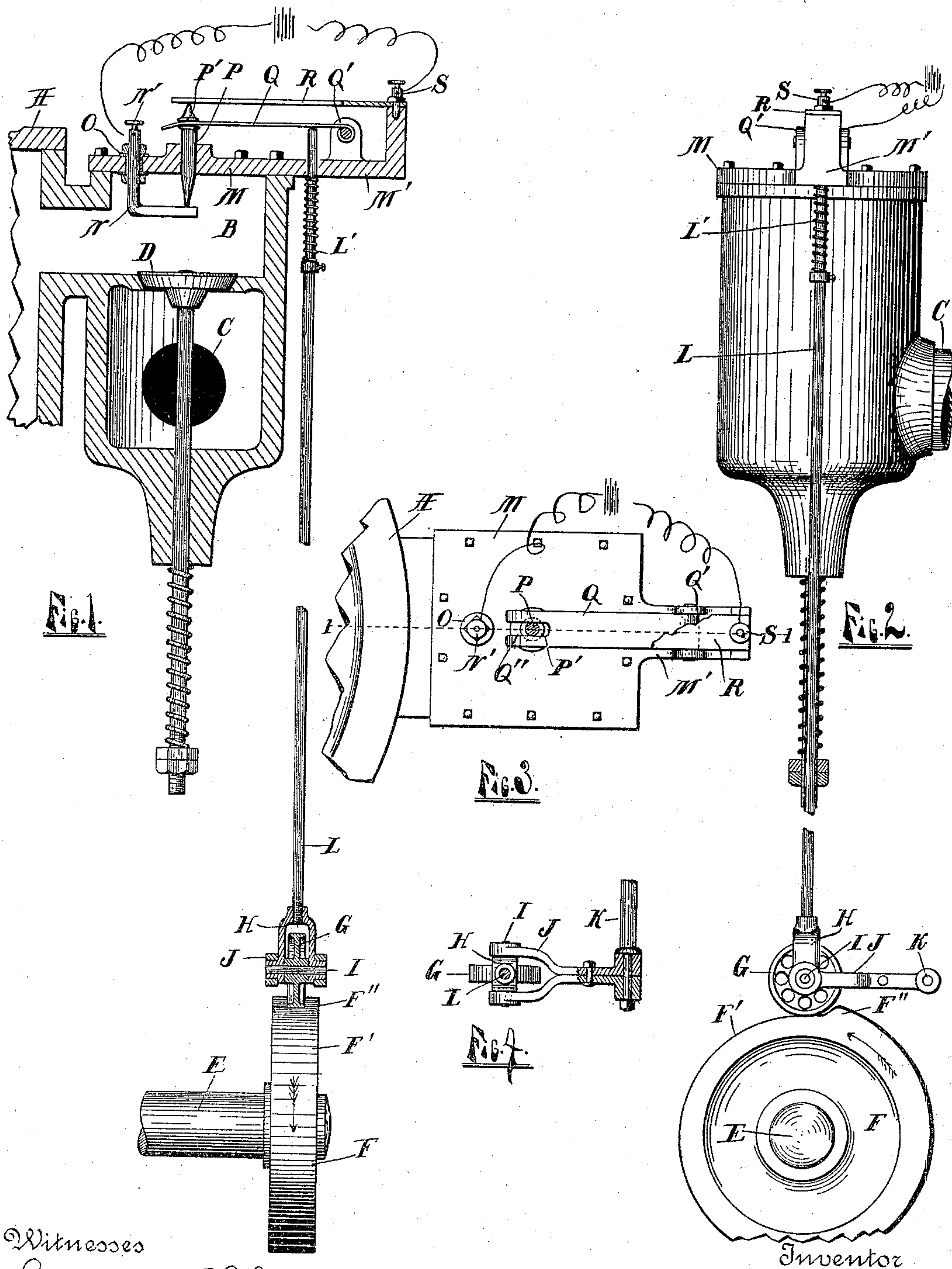
No. 607,992.

Patented July 26, 1898.

R. B. HAIN.  
IGNITER FOR GAS ENGINES.

(Application filed Apr. 8, 1896.)

(No Model.)



Witnesses

Edw. K. Shaw.  
Lois Moulton

Ralph B. Hain.

By Attorney

Moulton & Henders



# UNITED STATES PATENT OFFICE.

RALPH B. HAIN, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO THE MONITOR VAPOR ENGINE AND POWER COMPANY, OF SAME PLACE.

## IGNITER FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 607,992, dated July 26, 1898.

Application filed April 8, 1896. Serial No. 586,741. (No model.)

*To all whom it may concern:*

Be it known that I, RALPH B. HAIN, a citizen of the United States, residing at Grand Rapids, in the county of Kent and State of Michigan, have invented certain new and useful Improvements in Igniters for Combustible-Vapor Engines; 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 relates to improvements in an igniter for combustible-vapor engines; and its object is to provide the same with certain new and useful features hereinafter more fully described, and particularly pointed out in the claims, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical section on the line 1 1 of Fig. 3 of a device embodying my invention; Fig. 2, an elevation of the same; Fig. 3, a plan view of the same, and Fig. 4 a detail of the divided yoke-arm.

Like letters refer to like parts in all of the figures.

A represents a portion of the cylinder of the engine; B, the firing-chamber, opening into said cylinder; C, the intake-passage for the charge; D, the intake-check; E, a portion of the crank-shaft of the engine.

F is a cam-wheel to operate the movable electrode and provided with an eccentric portion of its surface F' for gradually closing the circuit and an abrupt shoulder F'' for suddenly breaking said circuit. G is a wheel traversing the surface of said cam and having an axle I journaled in the arms of a yoke H on the end of the longitudinally-movable rod L.

J is a longitudinally-divided yoke-arm having its parts secured by a suitable bolt and pivoted at one end to the stud K, fixed upon any part of the engine-frame. Said divided yoke has its movable end embracing the yoke H and journaled upon the outside of the bearings of the axle I and concentric therewith. This arm J extends in the plane of the cam-wheel and at substantially a tangent therewith, whereby the wheel G is kept in place upon the cam-wheel F and free to rise and fall in traversing its surface. Surrounding the rod L is a coiled spring L' to force said rod toward the cam F and hold the wheel G in contact with the same.

M is a cap removably attached to the chamber B and overhanging the same at M', through which overhanging portion said rod L passes.

N is a fixed electrode, preferably L-shaped, extending within the chamber B and passing through the cap M, being provided with a binding-post N' at its outer end and insulated from the cap N by any suitable material O.

P is a movable electrode consisting of a cylindrical body passing through said cap and longitudinally movable therein, engaging the fixed electrode N at its inner end, and provided near its outer end with a groove P', which groove is engaged by the forked end Q'' of an arm Q, which arm is pivoted at its other end Q' and engaged near said pivot by the end of the rod L.

R is a spring having one end engaging the outer end of the electrode P and secured at the other end to the projecting portion of the cap M', which provides a fixed support therefor by means of the binding-post S', to which post is attached one end of any suitable electric circuit, the other end of said circuit being secured to the binding-post N'.

The operation of my device is as follows: The cam-wheel F turns in the direction indicated by the arrows and is so adjusted on the shaft that the shoulder F'' will suddenly raise the wheel G, rod L, arm Q, and electrode P at the proper time, producing a spark by breaking the circuit and thus firing the charge in the chamber B. This movement being positive will always occur on time. The eccentric surface F' of the cam then permits the wheel G to return gradually, thus restoring the contact of the electrodes P and M without hammering and marring the point of the electrode P.

It is difficult to maintain electrical contact in parts exposed to heat and consequent corrosion. The same is true of moving parts that require to be oiled. I avoid this difficulty by taking the current through the spring R, having a sliding contact with the outer end of the electrode P, at a distance from the fire and requiring no oiling, the sliding movement being just sufficient to keep the parts



free from corrosion and worn bright. By the described construction the parts are also rendered easily accessible. By turning the spring R to one side the electrode P can be removed  
 5 from the cap and again replaced, the forked end Q'' of the arm Q being readily disengaged from the groove P'. By removing the cap-screws the cap M is readily detached from the balance of the structure, the valve D then  
 10 being readily accessible for removal or repairing, as is also the fixed electrode N.

Having thus described my invention, what I claim is—

1. In a combustible-vapor engine, the combination with the electrodes, one of which is  
 15 fixed and the other movable longitudinally toward and from the same, of a spring, forming part of the electric circuit and bearing at one end upon the outer end of the movable  
 20 electrode, said spring being secured to a fixed part of the engine and operating to press said movable electrode yieldingly toward the fixed electrode and sliding thereupon, for the purpose specified, an arm pivoted at one extrem-  
 25 ity to a fixed part of the engine and having its other end secured to said movable electrode, and a longitudinally-movable rod engaging said arm between the pivot thereof and the movable electrode and operating the  
 30 same to break the circuit, substantially as described.

2. In an igniter for combustible-vapor engines, a fixed electrode, and a movable electrode having a groove near its outer end, a  
 35 spring engaging the outer end of said electrode, a pivoted arm engaging said groove, a rod engaging said arm, and a cam-wheel and spring operating said rod, substantially as described.

40 3. In an igniter for combustible-vapor engines, an insulated electrode extending through the cap of the combustion-chamber,

a longitudinally-movable electrode extending through said cap, and having an annular groove near its outer end, a pivoted arm, hav- 45 ing a forked end engaging said groove, and a spring engaging the end of said movable electrode, and movable laterally to disengage the same, substantially as described.

4. In an igniter for combustible-vapor en- 50 gines, in combination with a combustion-chamber, an intake-passage beneath the same, an intake-valve in the bottom of said chamber, a removable cap on the top of said chamber, a fixed insulated electrode in said cap, a 55 longitudinally-movable electrode in said cap, and a spring engaging the end of said movable electrode and laterally movable to disengage the same, a pivoted arm having a forked end engaging a groove in said elec- 60 trode, whereby said parts are readily detached, substantially as described.

5. In a combustible-vapor engine, a combustion-chamber, an intake-valve in the bottom of the same, a cap closing the top of the 65 same, a fixed insulated electrode passing through said cap, and having a binding-post, a longitudinally-movable electrode passing through said cap, a pivoted arm engaging a groove in the movable electrode, a spring en- 70 gaging the outer end of said electrode, and slidable thereon, a binding-post securing said spring, an electric circuit connected to said posts, a rod engaging the pivoted arm and a cam-wheel to operate said rod, and having a 75 shoulder to suddenly open the circuit, substantially as described.

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

RALPH B. HAIN.

Witnesses:

LUTHER V. MOULTON,  
 LEWIS E. FLANDERS.