

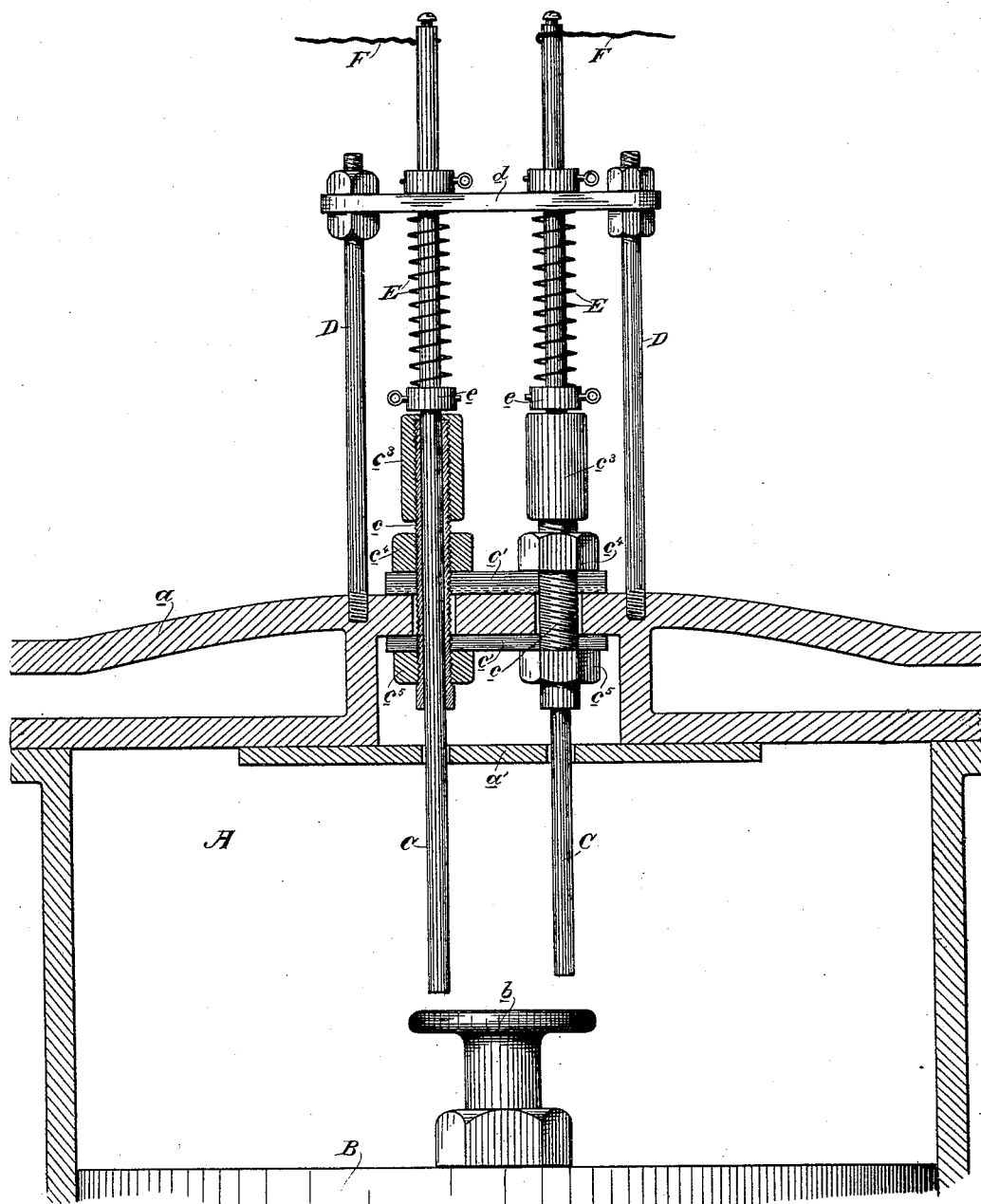
(No Model.)

F. E. TREMPER & J. W. EISENHUTH.

ELECTRIC POLE IN GAS OR VAPOR EXPLOSIVE ENGINES.

No. 454,238.

Patented June 16, 1891.



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# UNITED STATES PATENT OFFICE.

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## ELECTRIC POLE IN GAS OR VAPOR EXPLOSIVE ENGINES.

SPECIFICATION forming part of Letters Patent No. 454,238, dated June 16, 1891.

Application filed July 31, 1890. Serial No. 360,597. (No model.)

*To all whom it may concern:*

Be it known that we, FRANK ELLSWORTH TREMPER and JOHN WASHINGTON EISENHUTH, both citizens of the United States, residing in the city and county of San Francisco, State of California, have invented a new and useful Improvement in Explosive Engines; and we hereby declare the following to be a full, clear, and exact description of the same.

Our invention consists in the novel construction and arrangement of the electrodes hereinafter fully described, and specifically pointed out in the claims, and by which the electric spark is made for exploding the charge of gas within the cylinder.

The object of our invention is to provide simple, effective, and durable electrodes for this class of engines.

Referring to the accompanying drawing for a more complete explanation of our invention, the figure is a sectional view of one end of the cylinder and of one of the electrodes, the other electrode being shown in elevation.

A is the end of the cylinder, having a head *a*, both cylinder and head being water-jacketed, as shown.

B is the piston working within the cylinder.

C are the electrodes. These are mounted as follows: Around the electrode is fitted a sleeve *c*, of metal, such as brass. Where this sleeve passes through the head of the cylinder it does not touch it, but is guided by a bar *c'*, of insulating material, above and below.

Upon the outer end of the sleeve *c* is a stuffing-box *c<sup>3</sup>*, below which is a nut *c<sup>4</sup>*, which lies against the insulating-bar *c'*. Around the inner end of the metal sleeve *c* is screwed a nut *c<sup>5</sup>*, which presses up against the inner insulating-bar *c'*. The inner end of the electrode passes freely through an interior plate *a'* without touching it, which said plate serves as a guard to prevent the heat from reaching the bearings above. The outer end of the electrode is guided by the cross-head *d* of a frame-work D, which said cross-head is of hard insulating material.

E are springs, one for each electrode. The inner ends of these springs bear against col-

lars *e*, secured on the electrodes, and their outer ends bear against the cross-head *d* of the guide-frame D. These springs keep the electrodes projected to their normal limit within the body of the cylinder.

In operation the piston may come in contact directly with the inner ends of the electrodes; but it is preferable to use an arm *b*, secured to the piston, and which is the means of forming contact with the electrodes.

Though both electrodes may be made of the same length, one electrode may be made slightly longer than the other, as shown, so that the separation of the arm *b* from the electrodes shall not take place simultaneously, but successively.

F represents the circuit-wires extending to the electrodes. When the arm *b* of the piston is not in contact with the electrodes C, the electric circuit is open; but when the contact takes place the circuit is closed, and as the arm *b* withdraws from the electrodes a spark is produced, which fires the gases within the cylinder. These electrodes, it will be seen, are rigid bars or rods, and are much more advantageous than the usual form of elastic or spring electrodes, which soon wear out and have their temper destroyed; but the necessary yielding of our rigid electrodes before the stroke of the piston is obtained by the springs E, which control the sliding of the electrodes, allows them to yield and throws them back to place as soon as the pressure upon them is relieved. Thus we are enabled to use a very durable form of electrodes operated upon by the piston or a part connected therewith and effect their necessary yielding before the stroke of the piston. The manner of mounting them is simple and convenient, permitting their ready removal and insertion.

It will be seen that a single electrode such as C can be used by making the piston and cylinder part of the circuit and constituting the other electrode. Gravity may return the electrodes; but the springs insure their action.

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

1. In an explosive engine, sliding rigid rods

projecting into the cylinder in the path of the piston and forming electrodes, and means for controlling the sliding movements of the rods, substantially as herein described.

5 2. In an explosive engine, sliding rigid rods of unequal lengths forming electrodes, said rods projecting into the cylinder and in the path of the piston, whereby contact is made with the latter, and means for projecting the  
10 rods to their normal limit within the body of the cylinder, substantially as herein described.

3. In an explosive engine, and in combination with its cylinder and reciprocating piston, the electrodes C, consisting of sliding  
15 rigid rods passing into and insulated from the cylinder and into the path of the piston, said rods forming electrodes, and a spring for each rod for controlling its sliding movement, substantially as herein described.

20 4. In an explosive engine, the cylinder and its reciprocating piston, in combination with

the sliding rigid rods forming electrodes passing through and insulated from the cylinder-head and extending into the path of the piston, and the springs on the outer ends of the electrode-rods for controlling their sliding movement, substantially as herein described. 25

5. In an explosive engine, and in combination with its cylinder and reciprocating piston, the sliding rigid electrode-rods projecting into the cylinder and path of the piston, one of said rods being longer than the other, and the springs for controlling the sliding movement of the rods, substantially as herein described. 30

In witness whereof we have hereunto set our hands. 35

FRANK ELLSWORTH TREMPER.  
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Witnesses:

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