(No Model.)

C. WHITE & A. R. MIDDLETON.

IGNITER FOR GAS ENGINES.

No. 588,917. Patented Aug. 24, 1897.

Fig. 1.

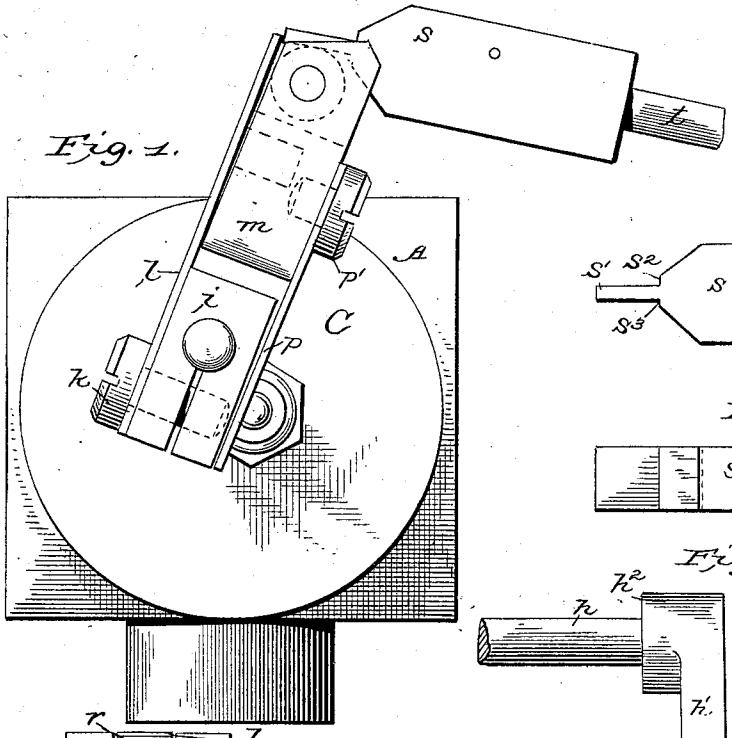


Fig. 3.

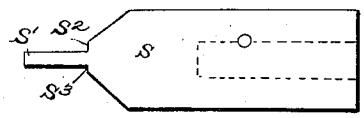


Fig. 4.

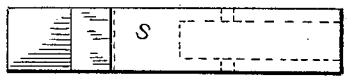


Fig. 5.

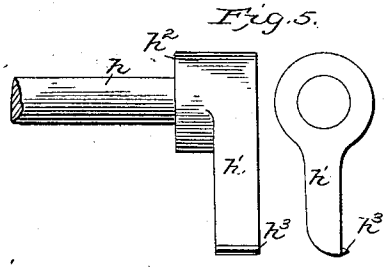
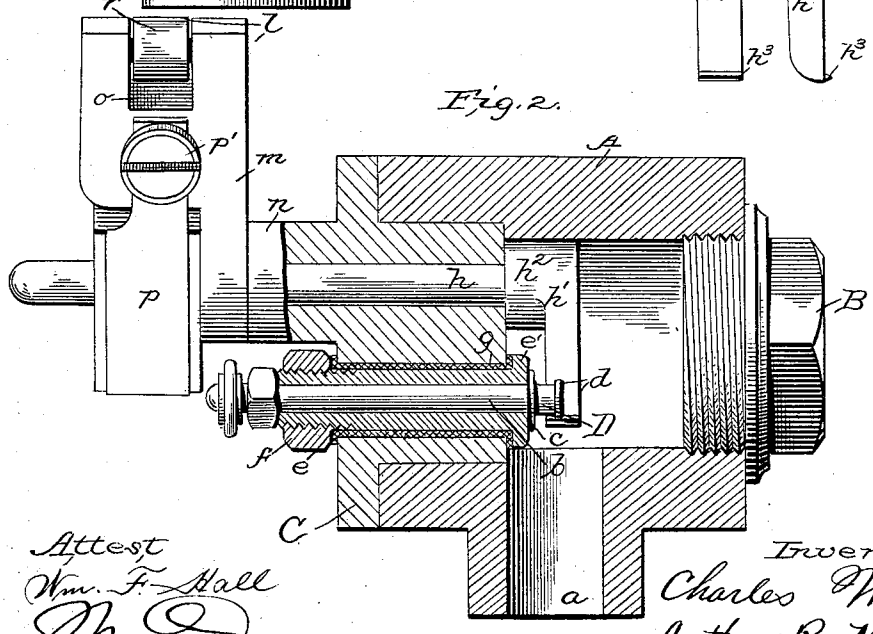


Fig. 2.



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CHARLES WHITE AND ARTHUR R. MIDDLETON, OF BALTIMORE, MARYLAND.

IGNITER FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 588,917, dated August 24, 1897.

Application filed April 11, 1895. Serial No. 545,286. (No model.)

To all whom it may concern:

Be it known that we, CHARLES WHITE and ARTHUR R. MIDDLETON, citizens of the United States, residing at Baltimore, in the State of Maryland, have invented certain new and useful Improvements in Igniters for Gas-Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

Our invention relates to gas-engines, and particularly to an igniter and to that class known as "electric" igniters, in which the charge of explosive mixture is ignited by the formation of an arc between the electrodes of the igniter.

Our invention is shown as particularly adapted for use in connection with the gas-engine known as the "White and Middleton;" but it is obvious that the igniter may be adapted for use with any other known or improved form of engine, and we do not limit ourselves as to its use to any particular type of engine.

The invention consists, broadly, of a movable and a stationary electrode with operating means for the movable electrode, and a spring extension interposed between the electrode and the operating means, said spring being distended in the closing of the circuit, and when released its retractile force instantly separates the electrodes, with the result that the arc formed between the points of contact is very large and effective, and at the same time the separation of the points is so instantaneous as to cause the arc to be formed between the electrodes, and thus there is very little of the destructive action on the electrodes ordinarily caused when the separation is not so quick.

The invention further consists in the particular arrangement and construction of the parts and also includes the construction and arrangement of the stationary electrode, by means of which the electrode is easily removable and capable of ready adjustment without the removal of or interference with the insulation which ordinarily surrounds the electrode.

Many other important details will be hereinafter described and particularly claimed.

In the accompanying drawings, Figure 1 is an end elevation of the igniter. Fig. 2 is a sectional view taken at right angles to Fig. 1. Figs. 3 and 4 are detail views of the operating-slide. Fig. 5 is detail view of the movable electrode.

In the figures the casing which incloses the electrodes is shown at A and communicates with the combustion-chamber of the engine through a passage *a*. A screw-threaded cap B closes an opening in one end of the casing, this opening being provided in order that the operation of the electrodes may be readily observed and in order further that the electrodes may be readily removed or adjusted. A cap C closes the opening in the casing and forms the wall thereof. This cap also serves to form bearings for the stems of the electrodes, which pass through this cap and are held therein.

The stationary electrode D consists of a stem *b*, having a shoulder *c* at one end and terminating in a head *d*, which is composed of a ring of platinum, forming a projecting flange on the extreme end of the stem. This stem is fitted accurately within a sleeve *e* and is held to the sleeve by a nut, and to remove the electrode from the sleeve it is only necessary to remove the nut and slip the electrode from the sleeve through the opening in the wall of the casing. The sleeve *e* has a flanged end *e'* larger than the opening through which the sleeve passes, and the sleeve is held securely in place by means of a nut *f* engaging the threaded end of the sleeve where it projects through the casing. Between the sleeve and the casing insulation *g* is placed, which extends beneath the head *e'* at one end and beneath the inner face of the nut *f* at the other end. It will thus be seen that the electrode with its sleeve can be readily removed for any purpose and adjusted without disturbing the insulation, this being a very important point.

The movable electrode comprises a stem *h*, which extends through a bearing in the cap C, and upon the inner end of this stem an arm *h'* is secured through a hub h^2, and on the end of this arm is secured a contact-piece h^3, preferably composed of platinum or other suitable metal. This forms the contact-piece and is adapted to engage and contact with the platinum ring *e* of the stationary electrode. The oscillation of the stem *h* makes

and breaks the circuit between the points of contact of the electrodes, it being understood that the proper connections are made by suitable wiring to complete the electric circuit with a battery on the contact of the two electrodes. The stem *h* projects through a bracket forming a part of or secured to the cap C, and a split block *i* is fitted to the stem embracing the same, a set-screw *k* clamping the split portions of the block together beneath the stem. This block is thus held firmly to the stem, and secured to the block by the same screw *k* is a spring extension *l*, made of a flat piece of metal. The bracket *m* projects upwardly from the cap C from an extension *n* thereof, the said bracket overhanging the block *i*. This bracket has a bifurcated upper end, as at *o*, and the parallel faces of the bracket are inclined to the vertical line of the casing. The spring extension *l* lies against the inclined face of the bracket, with its upper end projecting into line with the opening between the walls of the bracket.

To the bracket upon its rear face is secured a spring-plate *p* by a set-screw *p'*, and the free end of this spring extends down in rear of the block *i*, there being a little free movement of the block by reason of the intervening space between it and the spring before the spring is acted upon in the movement of the block.

In operation, it being understood that normally the electrodes are separated and out of contact, pressure is applied to the upper end of the spring extension *l*, which immediately, by a slight movement of the block turning the stem *h*, brings the arm *h'* into contact with the stationary electrode, and the further action is to distend or compress the spring extension *l* to a predetermined extent when the operating device is tripped to release the spring extension, when the retractile power of the spring exerts itself, with the effect of instantly separating the electrodes and causing the formation of the arc between them, and this instantaneous action has the effect of increasing the size of the arc and at the same time to diminish the wear on the contact-points by reason of the fact that the arc is formed intermediate of the points and not in direct contact with one or the other. The retractile action of the spring extension *l* is aided by the tension of the spring *p*, bearing against the opposite side of the block *i*, and, further than this, the spring *p* prevents any tendency of the block *i* to oscillate by reason of jarring or any like action.

Between the walls of the bracket *m* we journal a roller *r*, and this serves as a bearing and guide for a slide *s*, which has a swivel connection with a slide-rod *t*, operated from any suitable part of the machine. This slide *s* has a tongue *s'*, of a reduced thickness, arranged centrally of the slide, and in rear of this tongue are shoulders s^2 s^3 of a different height, the slide being inclined from these shoulders to the upper and lower faces thereof. The projecting tongue *s'* bears upon the roller *r* and is adapted to come in contact with the end of the spring extension *l*, and when this spring extension has been sufficiently distended or compressed the shouldered incline rides up on the roller *r*, releasing the end of the extension *l* from the tongue *s'*, which permits the retractile action of the spring. The slide is swiveled to its operating-rod, so that it may be turned to present one of its faces in starting the engine and to present the opposite face s^2 while the engine is running, thus giving a later or earlier explosion, as may be desired.

We claim—

1. An electric igniter comprising a movable electrode, a spring extension thereof, means for moving said electrode through the extension and a supplemental spring for returning said electrode to normal position, substantially as described.

2. An electric igniter comprising a movable electrode, and operating means therefor consisting of a slide and operating connections, said slide having a plurality of operating-faces of different shape adapted to actuate the electrode earlier or later, substantially as described.

3. An electric igniter consisting of a stationary electrode, a movable electrode, a block rigidly secured to said electrode and a spring extension secured to said block and projecting therefrom into the path of operating means, substantially as described.

4. An electric igniter consisting of a stationary electrode, a movable electrode, a block connected to said movable electrode, a spring extension secured to said block and projecting into the path of the operating means and a supplemental spring engaging the block to aid in returning the electrode to normal position, substantially as described.

5. In an electric igniter, a casing, electrodes, an extension connected with one of the electrodes, a bifurcated bracket in front of said extension, the end of the extension being in line with the bifurcation and operating means for actuating the extension, substantially as described.

6. In an electric igniter, a casing, electrodes, an extension connected with one of the electrodes, a bifurcated bracket in front of said spring, a roller carried by said bracket and a slide with operating means for actuating the extension, substantially as described.

7. In an electric igniter, a movable electrode, an extension connected therewith and a reversible slide for operating said extension having a plurality of operating-faces, substantially as described.

8. In an electric igniter, a movable electrode, an extension thereof, a bearing in advance of said extension and a slide having a tongue engaging the extension and an inclined shouldered portion in rear thereof, substantially as described.

9. In an electric igniter, a movable electrode, an extension thereof, a bearing in advance of said extension and a reversible slide having a central tongue and inclined shouldered portions in rear thereof at top and bottom, said shoulders varying in extent to actuate the electrode earlier or later, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

CHARLES WHITE.
ARTHUR R. MIDDLETON.

Witnesses:
R. LEE SLADE,
JOHN T. CORCORAN.