A. F. CLARKE.

ELECTRIC IGNITER OR BREAKER FOR GAS ENGINES.

APPLICATION FILED AUG. 24, 1908.

954,168. Patented Apr. 5, 1910.

2 SHEETS—SHEET 1.

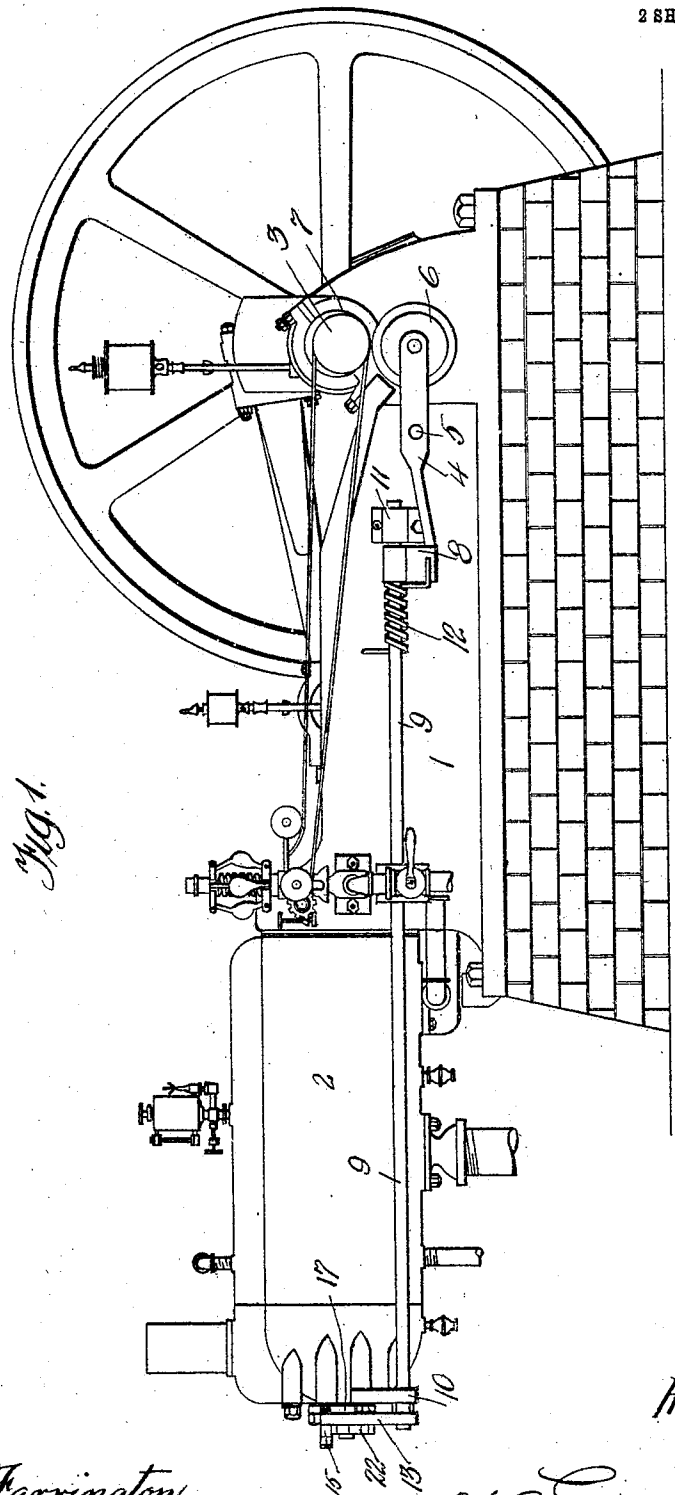

Fig. 1.

Witnesses

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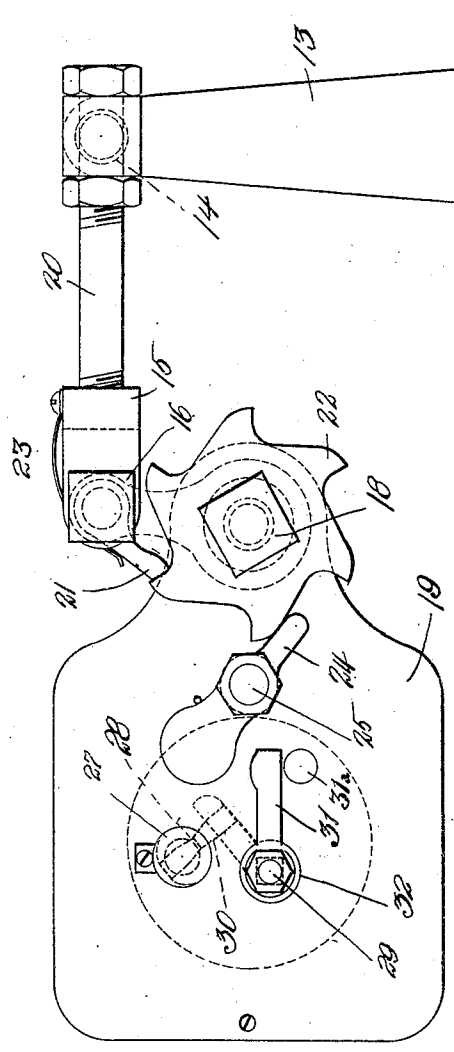

Fig. 2.

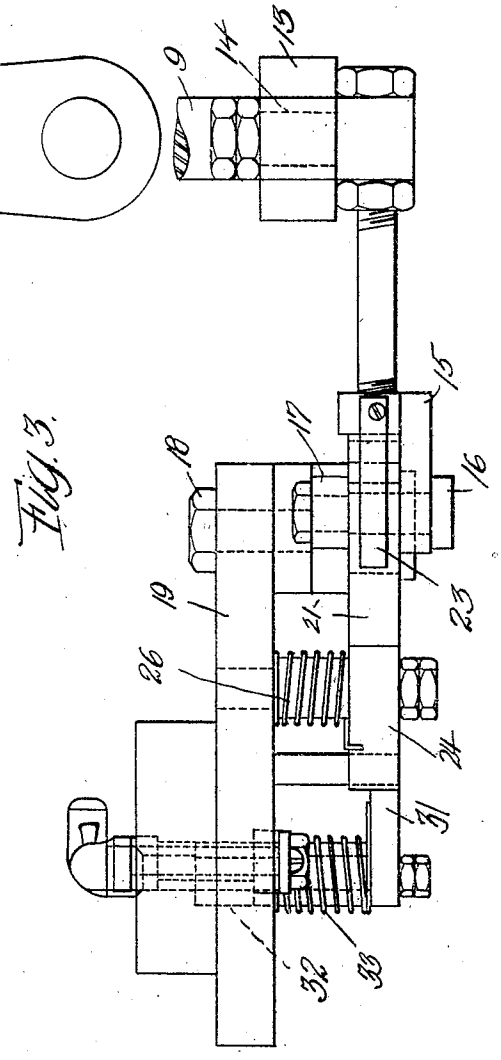

Fig. 3.

Witnesses

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UNITED STATES PATENT OFFICE.

ARTHUR F. CLARKE, OF BUTLER, PENNSYLVANIA.

ELECTRIC IGNITER OR BREAKER FOR GAS-ENGINES.

954,168. Specification of Letters Patent. Patented Apr. 5, 1910.

Application filed August 24, 1908. Serial No. 449,889.

To all whom it may concern:

Be it known that I, ARTHUR F. CLARKE, a citizen of the United States of America, residing at Butler, in the county of Butler and State of Pennsylvania, have invented certain new and useful Improvements in Electric Igniters or Breakers for Gas-Engines, of which the following is a specification, reference being had therein to the accompanying drawing.

This invention relates to electric igniters or breakers for gas engines, and the primary object of my invention is the provision of positive and reliable means in connection with a gas engine and the contacts thereof for producing a large spark for igniting gas in the engine cylinder.

Another object of this invention is to provide a novel mechanism for producing a spark between two contact points, such mechanism adjusting itself to the wearing of the points, whereby ample breaking effect is obtained from the time the points are new until worn out.

With the above and other objects in view, the invention consists in the novel construction, combination and arrangement of parts to be hereinafter described and claimed.

Referring to the drawings: Figure 1 is a side elevation of a gas engine equipped with my electric igniter, Fig. 2 is an elevation of the igniter, and Fig. 3 is a plan of the same.

In the accompanying drawings, I have illustrated a gas engine of a conventional form comprising a frame 1, a cylinder 2, a driven shaft 3, and other parts common to a gas engine.

The igniter mechanism used in connection with the engine, comprises a lever 4 pivotally connected to the frame 1, as at 5. The forward end of the lever 4 is provided with a revoluble wheel 6 adapted to engage a cam 7 carried by the driven shaft 3. The rear end of the lever 4 is normally engaged by an arm 8 mounted upon a longitudinal rock shaft 9 journaled in brackets 10 and 11, carried by the cylinder 2 and the frame 1 respectively.

Encircling the rock shaft 9 adjacent to the arm 8 is located a coil spring 12 having one end thereof engaging the frame 1 and the opposite end the arm 8. This spring normally holds the arm 8 in engagement with the lever 4, while said lever is oscillated by the cam 7 of the engine.

The rear end of the rock shaft 9 is provided with a crank 13 and pivotally connected to the end of said crank, as at 14, is a rod 20 adapted to be reciprocated by a rocking movement of the shaft 9. The end of the rod 20 is provided with a head 15, which is pivotally attached by a pin 16 to a rock arm 17 pivotally attached by a bolt 18 to a plate 19.

Pivotally mounted upon the pin 16 between the head 15 and the upper end of the rock arm 17 is a pawl 21. This pawl is normally held in engagement with a ratchet wheel 22 revolubly mounted upon the bolt 18 of the plate 19. A flat spring 23 secured to the head 15 retains the pawl 21 in engagement with the ratchet wheel 22.

The teeth of the ratchet wheel 22 are adapted to successively engage a hammer 24 fulcrumed upon a stud bolt 25 carried by the plate 19. One end of the hammer 24 is retained in engagement with the ratchet wheel 22 when a tooth of the latter is bearing against said end by a coil spring 26 encircling the stud bolt 25, one end of said spring being fixed to said plate, while the opposite end thereof is bent to engage the hammer 24.

The plate 19 supports a fixed electrode or pole 27 having one end thereof provided with a contact point 28. Arranged in the plate 19 is a movable electrode or pole 29 having the end thereof provided with a contact point 30 and the outer end thereof provided with an arm 31 adapted to be engaged and shifted by the hammer 24. Movement in one direction of the arm 31 is arrested by a stop 31^a secured to the plate 19. Located upon the sleeve 32 of the movable electrode or pole is a coil spring 33 having one end thereof connected to the plate 19, and the opposite end thereof connected to the arm 31, said spring tending to move the rocking electrode in a manner to provide contact of the contact points of the electrodes. The spring 26 is of greater power than spring 33, so that whenever contact is made between the hammer 24 and arm 31, the preponderance of pressure of spring 26 will cause said arm 31 to move in a direction to separate the electrodes, the movement in this direction being limited by a stop 31^a located in the path of movement of the arm 31, the normal position of the parts being with arm 31 held in contact with stop 31^a by the hammer 24.

Operation: When a pivotal movement is imparted to the shaft 9 by the oscillating

lever 4 and eccentric cam 7, the rod 20 will be reciprocated by the crank 13, the reciprocations of the rod 20 providing intermittent movements of the ratchet wheel 22 by pawl 21.

Referring more particularly to the particular effect of the movements of the wheel 22, the successive action of the several parts will be described, it being assumed that the parts are in their normal position with the arm 31 in contact with stop 31ª, the outer end of the hammer 24 having just been released from one of the cam surfaces of wheel 22. As the wheel 22 begins its succeeding movement, a cam surface thereof will cause the hammer 24 to move on its pivot and against the tension of spring 26, thereby raising the inner end of the hammer and permitting the arm 31 to move toward the contacting position of the electrodes, the spring 33 causing the arm 31 to contact with the hammer, during this movement, until electrode contact is had, further movement of the hammer carrying it out of contact with and away from the arm 31. As will be readily understood, the shape of the cam tooth provides for a gradual movement of the hammer in this direction, thereby permitting the rocking electrode to make its contact relatively gentle to prevent damaging the contact points, this gradual movement of the hammer also providing a gradually-increasing tension on spring 26 and eliminating liability of damaging the spring.

When the movement of the wheel 22 causes the operating cam-tooth to reach a point where further movement will release the outer end of the hammer, the pressure-tension of spring 26 has reached its maximum, so that when such release is had, the hammer is given a quick movement in the opposite direction by the spring pressure, which movement brings the inner end of the hammer into contact with the arm 31 and causes the latter to be carried to the normal position, separating the contact points with rapidity in a manner to disrupt the circuit and thereby provide a spark of high calorific power, this disrupting action being due to the hammer-blow of the hammer on the arm 31.

As will be understood, the greatest force of the pressure of spring 26 is exerted on arm 31 when contact is first made between the hammer and arm, the further movement of the hammer being with decreasing pressure which is resisted by the increasing pressure of spring 33, so that the contact of arm 31 with its top 31ª is made with a somewhat cushioned effect, thereby tending to prevent damaging the parts.

As above pointed out, the contacting of the electrodes is by a gradual movement of the rocking electrode, thereby eliminating liability of upsetting or otherwise damaging the contact-points. And while it is not possible to prevent a wearing away of such points during successive operations, this wearing away effect is automatically overcome by the fact that the actual position of the end of arm 31 in the electrode-contacting position within reasonable limits is practically immaterial, the inner end of the hammer having a path of movement which will be intersected by the arm 31 at any point within such limits, so that the same gentle contact is made regardless of the change in position of the arm 31 by reason of wear of contact points.

I reserve the right to use my sparking mechanism in connection with engines of various types.

While in the drawings forming a part of this application there are illustrated the preferred embodiments of my invention, it is obvious that the same can be varied or changed as to shape, proportion and manner of assemblage without departing from the spirit of the invention.

Having now described my invention what I claim as new, is:—

1. In an ignition device for gas engines, the combination of a frame, a cylinder carried thereby, and a driven cam supported by said frame, of a pivotally mounted lever carried by said frame, a revoluble wheel carried by said lever and adapted to engage said cam to oscillate said lever, a rock shaft supported by said cylinder and said frame, a spring-pressed arm mounted upon said rock shaft and normally held in engagement with said lever, a crank carried by said rock shaft at the end of said cylinder, a rod reciprocated by said crank, a head carried by said rod, a plate supported by said cylinder, an arm pivotally supported by said plate and connecting with said head, a ratchet wheel revolubly supported by said plate, a spring-pressed pawl carried by said head and adapted to intermittently move said ratchet wheel, a spring-pressed hammer pivotally supported by said plate and normally engaged by said ratchet wheel, a fixed electrode carried by said plate and extending into said cylinder, a contact point carried by the inner end of said electrode, a movable electrode arranged in said plate and having one end thereof provided with a contact point and its other end provided with an arm adapted to be impinged by said hammer, and means in connection with said movable electrode for normally holding the contact point thereof in engagement with the contact point of said fixed electrode.

2. In an ignition device for gas engines, the combination of a frame, a cylinder carried thereby, and a driven cam supported by said frame, of a pivotally mounted lever carried by said frame, a revoluble wheel carried by said lever and adapted to engage said

cam to oscillate said lever, a rock shaft supported by said cylinder and said frame, a spring-pressed arm mounted upon said rock shaft and normally held in engagement with said lever, a crank carried by said rock shaft at the end of said cylinder, a rod reciprocated by said crank, a head carried by said rod, a plate supported by said cylinder, a ratchet wheel revolubly supported by said plate, a spring-pressed pawl carried by said head and adapted to intermittently move said ratchet wheel, a spring-pressed hammer pivotally supported by said plate and normally engaged by said ratchet wheel, a fixed electrode carried by said plate and extending into said cylinder, a contact point carried by the inner end of said electrode, a movable electrode arranged in said plate and having its inner end thereof provided with a contact point and its outer end provided with an arm adapted to be engaged by said hammer to shift the movable electrodes to separate the contact points, and means in connection with said movable electrode for normally holding the contact point in engagement with the contact point of said fixed electrode.

3. In an ignition device for engines, a fixed electrode, a pivotally-mounted rod having each of its ends provided with an arm, the inner arm carrying an electrode coöperating with the fixed electrode, a tension member for placing said rod under an electrode-closing tension, a pivotally-mounted element, a spring in contact with said element and adapted to place the latter under tension, said element and the outer arm of said rod having paths of movement intersecting one another at a point intermediate the points of pivotal mounting of said rod and element, said element normally retaining said electrodes separated by contact pressure exerted on said arm, and means including a rotatable cam-wheel in contact with said element for temporarily removing said element out of contact with said arm, the release of the element from said latter means providing a hammer blow to said arm to separate the electrodes.

4. In an ignition device for engines, a fixed electrode, a pivotally-mounted rod having each of its ends provided with an arm, the inner arm carrying an electrode coöperating with the fixed electrode, a spring carried by said rod for placing said rod under an electrode-closing tension, a pivotally-mounted element, a spring in contact with said element and adapted to place the latter under tension, said element and the outer arm of said rod having paths of movement intersecting one another at a point intermediate the points of pivotal mounting of said rod and element, said element normally retaining said electrodes separated by contact pressure exerted on said arm, and means including a rotatable cam-wheel in contact with said element for temporarily removing said element out of contact with said arm, the release of the element from said latter means providing a hammer blow to said arm to separate the electrodes.

5. In an ignition device for engines, a fixed electrode, a pivotally-mounted rod having each of its ends provided with an arm, the inner arm carrying an electrode coöperating with the fixed electrode, a tension member for placing said rod under an electrode-closing tension, a pivotally-mounted element, a spring in contact with said element and adapted to place the latter under tension, said element and the outer arm of said rod having paths of movement intersecting one another at a point intermediate the points of pivotal mounting of said rod and element, said element normally retaining said electrodes separated by contact pressure exerted on said arm, and means for temporarily removing said element out of contact with said arm, the release of the element from said latter means providing a hammer blow to said arm to separate the electrodes, said means comprising a wheel having successively-arranged peripheral cams adapted to successively engage said element to provide a gradual movement thereof in one direction, and a reciprocating pawl for actuating said wheel step-by-step.

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

ARTHUR F. CLARKE.

Witnesses:
K. D. CONNELLY,
W. L. SCHENCK.