

No. 648,520.

Patented May 1, 1900.

J. A. OSTENBERG.
CIRCUIT BREAKER FOR GAS ENGINES.

(Application filed Nov. 6, 1897.)

(No Model.)

2 Sheets—Sheet 1.

Fig. 1,

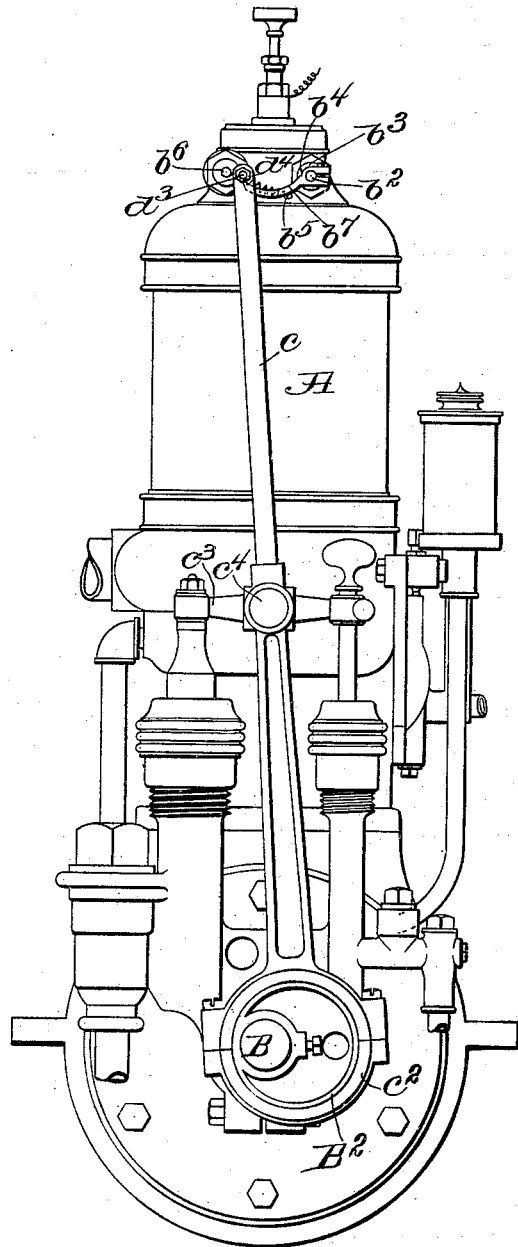


Fig. 2,

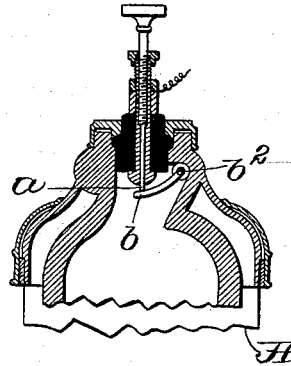


Fig. 5,

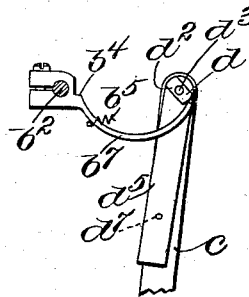
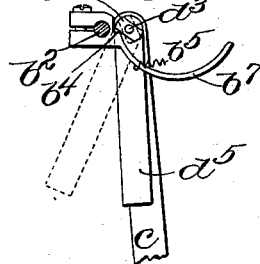


Fig. 6,



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Fig. 3,

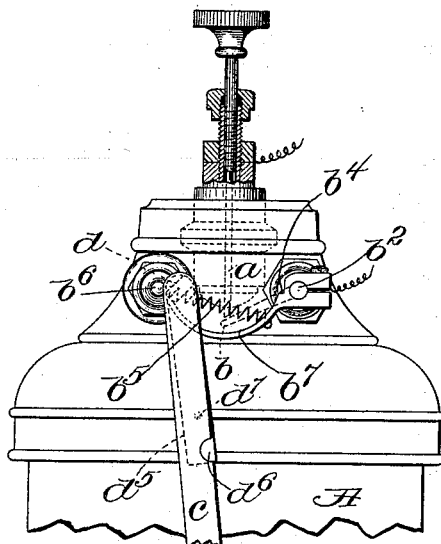
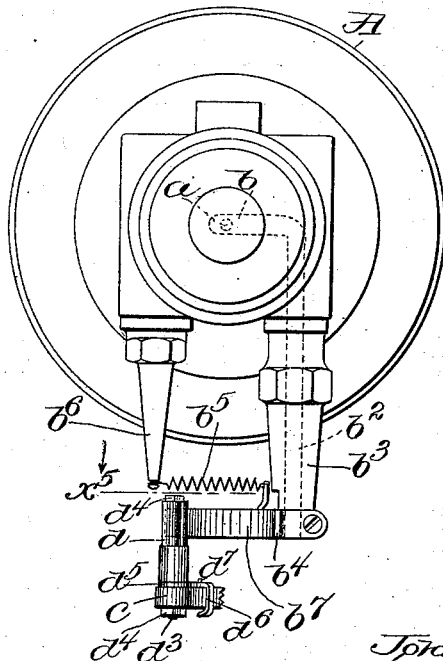


Fig. 4,



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UNITED STATES PATENT OFFICE.

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CIRCUIT-BREAKER FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 648,520, dated May 1, 1900.

Application filed November 6, 1897. Serial No. 657,635. (No model.)

To all whom it may concern:

Be it known that I, JOHN A. OSTENBERG, of Westminster, county of Windham, and State of Vermont, have invented an Improvement in Circuit-Breakers for Gas-Engines, of which the following description, in connection with the accompanying drawings, is a specification, like letters on the drawings representing like parts.

10 The present invention relates to a circuit-breaker, and is embodied in a circuit-breaker especially adapted for use as an igniting device for explosion-engines.

15 In accordance with the invention the separable terminals which produce the spark are normally yieldingly held in contact with each other as by a weight or spring and are provided with an actuating device for separating the same in order to produce a spark. The said actuating device is arranged to first separate the terminals and in its continued movement to control the restoration thereof, so that it is practicable to separate and restore the terminals at any rate of movement thereof
25 which may be desired.

30 In circuit-breakers which are intended for the production of a spark it is desirable that the terminals should be separated to a considerable extent with a rapid and sudden movement to produce the spark, it being further desirable, however, that they should be restored with a gradual movement in order not to come together with a shock, which in the operation of a gas-engine, for example, soon wears out the terminals, so that they have to be renewed. These ends can be accomplished in accordance with the present invention by so arranging the terminals with relation to the actuating device that they are
40 separated to the maximum extent during a comparatively-short part of the movement of the actuating device and are restored as gradually as may be desired under the subsequent control of the actuating device in accordance with the invention.

45 The invention is herein shown as applied to a gas-engine, which forms the subject of another application filed by me June 1, 1897, Serial No. 638,941, and while igniting devices embodying the essential features of the

present invention may obviously be used with any explosion-engine the invention will be described as applied to the particular engine aforesaid. In this engine the actuating device for the igniter is arranged to travel, as
55 will be hereinafter described, in a curved path, and to adapt the igniter to the peculiar movement of the actuator the movable terminal thereof is herein shown as mounted on a rock-shaft extending through a wall of the explosion-chamber, the said rock-shaft having a lever-arm extending into or across the path of travel of the said actuator. The said lever-arm is provided with a shoulder which is near the rock-shaft, upon which the lever
65 is mounted and which is substantially transverse to the path of the the actuating device aforesaid. As the said actuating device passes the rock-shaft, therefore, it will engage the said shoulder substantially at a right angle thereto and rock the shaft upon which the lever and terminal are mounted until the edge of the shoulder, which travels on an arc, meets the path of the actuator, the rapidity of movement of the terminal depending upon
75 the distance of the part of the shoulder which is first engaged from the axis on which the terminal moves. The said lever-arm is further provided with a supplemental engaging surface beyond the shoulder, along which the actuating device travels, the terminal being provided with restoring means, such as a spring, but being controlled in its movement in response thereto by the engagement of the supplemental engaging surface with the actuator, the said supplemental surface being
85 so shaped with relation to the path of movement of the actuator that the terminal will come in contact with its mate before said surface is left by the actuator, thus insuring a comparatively slow and gradual movement.

Figure 1 is a side elevation of a gas-engine having the igniting device which forms the subject of the present invention applied thereto. Fig. 2 is a vertical section through
95 the explosion-chamber of the said engine, showing the fixed and movable terminals of the igniting device. Fig. 3 is an enlarged view of the igniter shown in Fig. 1; Fig. 4, a top plan view of the same; Fig. 5, a sectional
100

elevation on line x^5 of Fig. 4 looking in the direction of the arrow, and Fig. 6 is a similar view showing the parts in another position.

The igniting device which forms the subject of the invention comprises, essentially, the terminals a and b within the explosion-chamber at the end of the cylinder A of the engine, the terminal a being shown as fixed and the terminal b as movable and the actuating device c adapted, as will be hereinafter described, to break the circuit through the agency of the terminals. As herein shown, the said actuator comprises an arm provided at one end with an engaging projection d to cooperate with the movable terminal of the circuit-breaker and at its opposite end with an eccentric-strap c^2 , cooperating with an eccentric B^2 on the shaft B of the engine. The said arm c is connected at an intermediate point with a cross-head c^3 by a pivotal connection c^4 , the said cross-head being adapted to move vertically in suitable guides, the said guides being herein shown as consisting of the reciprocating members of a water and gasoline pump, respectively, as described in my prior application above referred to. In the rotation of the shaft B , therefore, it will be seen that the engaging projection d of the actuating device will travel in a curved path, the igniting device forming the subject of the invention being shown as arranged and adapted to be operated by an actuating device traveling in this way, although such specific arrangement of the actuating device is not essential to the invention.

In order that the movement of the engaging projection d may at the proper time cause the separation of the terminals a and b , the latter is shown as mounted on a rock-shaft b^2 , which extends through the wall of the explosion-chamber, being herein shown as having a bearing in a projection b^3 , properly secured to the outside wall of the explosion-chamber. It is obvious, therefore, that if the said shaft is rocked in its bearing in the proper direction it will move the terminal b , which projects from the axis of said shaft, away from the terminal a , so as to break the circuit and produce a spark. To produce such a movement of the rock-shaft, the said shaft is provided with a radial projection or shoulder b^4 , projecting therefrom into the path of the engaging projection d of the actuator, the said shoulder being near the rock-shaft, so as to constitute a short lever-arm, by the movement of which the terminal b is caused to move a considerable distance away from the terminal a . The said rock-shaft is shown as normally held in such a position as to maintain the circuit closed by means of a spring b^5 , connected at one end to the projection from said rock-shaft on which the shoulder b^4 is formed and at the other end to a fixed portion of the engine, such as a projection b^6 , which may be secured to the cylinder for the purpose. In the travel of the engag-

ing portion d , therefore, it is obvious that the said engaging portion as it passes the rock-shaft will strike the shoulder b^4 , rocking the shaft until the said projection d rides over the edge of the shoulder, at which time the terminals are separated to their fullest extent.

The tendency of the spring b^5 is to restore the terminals to their normal position, and in order to control such restoration and prevent the said spring from snapping the terminals together the projection on which the shoulder b^4 is formed is provided with a supplemental engaging portion b^7 , which is shaped to follow the path of the engaging portion d , being herein shown as curved, so that the said engaging portion d travels along the projection b^7 until the two terminals are in contact with each other. The two terminals therefore will be gradually drawn together by the stress of the spring controlled by the engagement of the projection d with the arm or projection b^7 and will be in contact before the projection has passed out of engagement with the arm.

In igniting devices for use in gas-engines it is desirable that the spark should occur a little later with relation to the cycle of operations of the engine when the same is being started than is the case when full speed is attained. To this end the projection d , which engages with the shoulder b^4 , is in accordance with the present invention capable of being shifted with relation to the actuator c , whereby it is carried, so that while the said actuator moves in its usual way the projection d will be caused to engage the shoulder and produce the spark at a somewhat-later period in the cycle of operations. To accomplish this, the projection d is herein shown as elongated or oval in cross-section, the upper end d^2 of said oval being adapted to engage the shoulder b^4 . The said projection is shown as mounted on a spindle d^3 , extending through the end of the arm c , and secured, as by nuts d^4 , so that the projection d is capable of pivotal movement on the said spindle. Connected to the said projection d is an arm d^5 , having a thumb-piece d^6 and an opening adapted to cooperate with a projection or stop d^7 upon the actuator-arm c , the said arm d^5 normally standing, as shown, adjacent to the actuator-arm and held in position with relation thereto by means of the stop d^7 . If, however, the said arm is disengaged and swung away from the actuator c , it is obvious that the projection d will be turned so that the engaging portion d^2 thereof will be moved to the rear with relation to the path of its movement and will consequently engage the shoulder b^4 at a later period than the normal period in the cycle of operations. As soon as the engine has reached speed, however, the operator can readily restore the parts to their normal position by moving the arm d^5 to its original position.

It is not intended to limit the invention to

the specific construction herein shown and described, since obvious modifications may be made without departing from the invention.

5 I claim—

1. A circuit-breaker comprising a fixed terminal; a movable terminal provided with an engaging portion; means for yieldingly holding said movable terminal in contact with
10 the fixed terminal; and a traveling actuator adapted to engage said engaging portion and by its first engagement to quickly separate the terminals, the path of said actuator being such that the actuator remains in engagement
15 and controls the return movement of said movable terminal so as to permit the gradual restoration thereof, the terminal being substantially wholly restored before the actuator is out of engagement.

2. A circuit-breaker comprising a fixed terminal, a movable terminal consisting of a finger projecting radially from a rock-shaft, means for yieldingly holding said movable terminal in contact with the fixed terminal,
25 an arm or projection connected with said rock-shaft, and a traveling actuator arranged to initially engage said arm at a point near said rock-shaft and to travel along in engagement with said arm, the path of movement
30 of said actuator being such as to permit the gradual restoration of said arm to its normal position, as set forth.

3. The herein-described circuit-breaker or igniting device which comprises a fixed terminal, a movable terminal, an actuator for
35 said movable terminal, an engaging portion of said movable terminal projecting across the path of said actuator, and a supplemental engaging portion, the surface of said engaging portion and the path of said actuating device approaching each other in the direction
40 of movement of the latter, substantially as described.

4. The herein-described circuit-breaker which comprises a stationary electric terminal, a movable terminal normally in contact
45 therewith, an actuator for said movable terminal, an engaging portion of said movable terminal in the path of said actuator, and a supplemental engaging portion adjacent to the main engaging portion and adapted to be
50 engaged by said actuator in the return movement of the movable terminal until said movable terminal is substantially restored to contact with said stationary terminal, substantially as described.

5. An igniting device for gas-engines comprising a stationary electric terminal within the cylinder or explosion-chamber of the engine, a movable terminal normally in contact
60 therewith, an actuator for said movable terminal, an engaging portion of said movable terminal in the path of the said actuator, a supplemental engaging portion adjacent to the main engaging portion and adapted to be
65 the main engaging portion and adapted to be

engaged by said actuator in the return movement of the movable terminal until said movable terminal is substantially restored to contact with said stationary terminal, operating
70 means for producing a continuous movement of said actuator, and a device for shifting the position of said actuator with relation to such operating means, substantially as described.

6. In an igniting device for gas-engines, the combination with a stationary terminal within the cylinder or explosion-chamber of the engine, of a movable terminal normally in contact therewith but adapted to be moved therefrom to break the circuit and cause a
75 spark, a rock-shaft or pivotal support for said movable terminal, an arm secured to said rock-shaft, an engaging device for said arm adapted to be moved along a curved path, a shoulder on said arm extending into said path, and an extension of said arm beyond said
80 shoulder curved to substantially conform to the path in which the engaging projection travels, substantially as and for the purpose described.

7. In an igniting device for a gas-engine, the combination with a stationary terminal within the cylinder of the engine, of a movable terminal comprising a pivotally-supported arm adapted to be swung on its pivot to and from said stationary terminal, an operating-
85 arm connected to and pivoted coaxially with said terminal arm, a lever provided at one end with an eccentric-strap adapted to cooperate with an eccentric on the main shaft of the engine, a projection at the other end of
90 said lever adapted during the movement thereof to engage said operating-arm for the igniting device, a guide pivotally connected to said lever and adapted to move in a rectilinear direction whereby the end of said lever
95 which carries the engaging portion is caused to move in a curved path, a shoulder on the arm which operates the igniting device near the pivotal axis thereof and in the path of the said projection, and a curved portion of said
100 arm beyond said shoulder, substantially as and for the purpose described.

8. In an igniting device for gas-engines, the combination with a circuit-breaker having a fixed terminal within the cylinder of the engine, of a movable terminal mounted on a
105 rock-shaft in a wall of said cylinder, an arm secured to said rock-shaft outside of the said cylinder, a lever provided at one end with an eccentric adapted to cooperate with an eccentric on the main shaft of the engine, an engaging device at the opposite end of said lever adapted to engage said arm, a guide or cross-head for said lever whereby the said engaging projection is adapted to travel on a
110 curved path, a shoulder on said arm extending into the path of travel of said projection and adapted to be engaged thereby to rock the said rock-shaft to separate the electric terminals, a curved engaging portion on said
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arm beyond the said shoulder in the path of travel of said projection to permit the gradual return movement thereof, a restoring-spring for said arm, and means for shifting
5 the position of the engaging projection with relation to said lever, substantially as and for the purpose described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

JOHN A. OSTENBERG.

Witnesses:

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NANCY P. FORD.