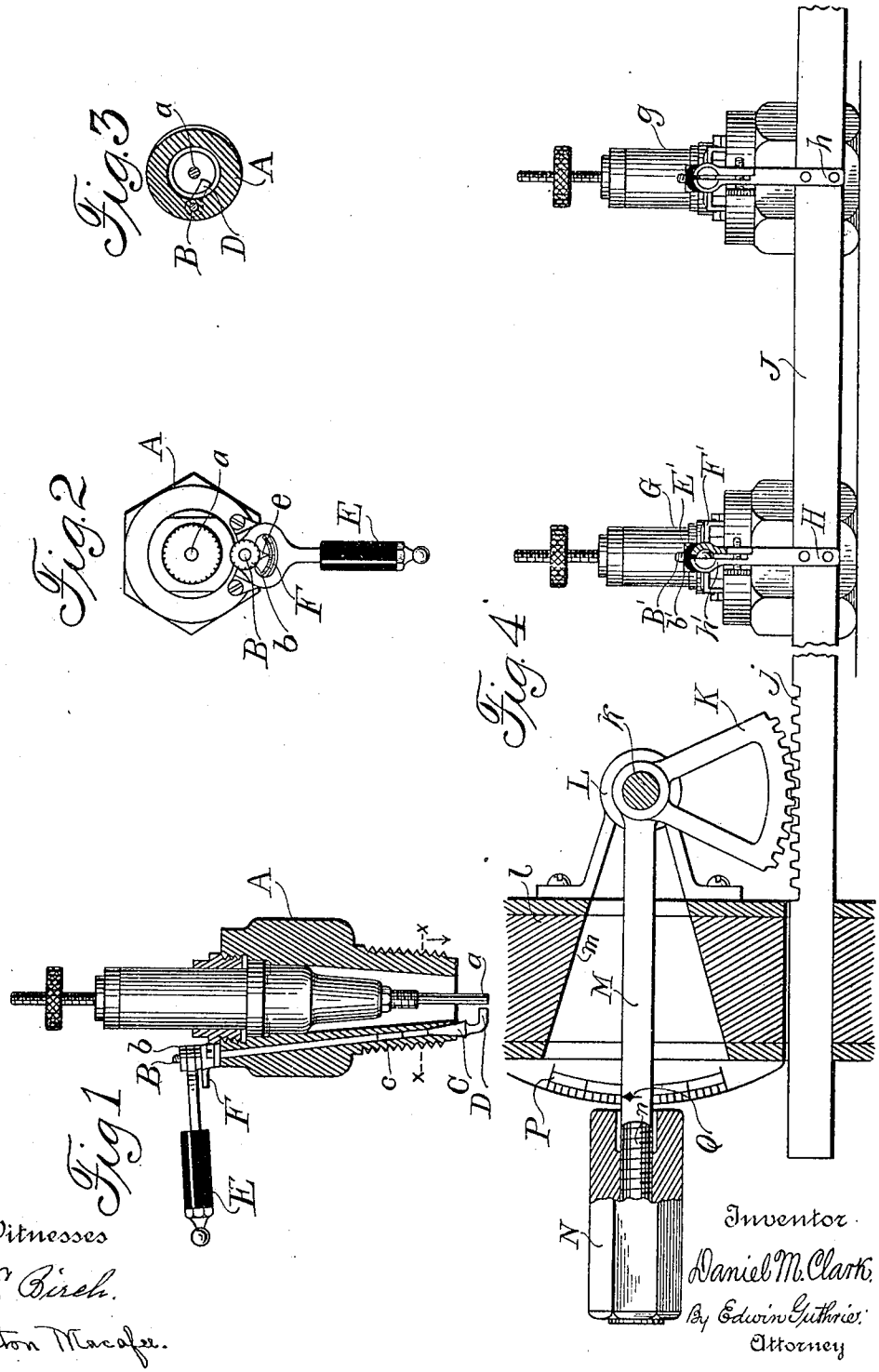
D. M. CLARK.

ADJUSTABLE ELECTRODE SPARK PLUG.

APPLICATION FILED MAY 7, 1915. RENEWED NOV. 10, 1917.

1,256,201. Patented Feb. 12, 1918.



NORRIS PETERS, INC., LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

DANIEL M. CLARK, OF JAMESBURG, NEW JERSEY.

ADJUSTABLE-ELECTRODE SPARK-PLUG.

1,256,201. Specification of Letters Patent. Patented Feb. 12, 1918.

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To all whom it may concern:

Be it known that I, DANIEL M. CLARK, a citizen of the United States, residing at Jamesburg, in the county of Middlesex and State of New Jersey, have invented certain new and useful Improvements in Adjustable-Electrode Spark-Plugs, of which the following is a specification.

This invention relates to adjustable electrode sparkplugs, wherein the width of the spark gap may be varied, and has for its object the production of a jump spark plug comprising parts of special construction and arrangement and having one movable and one stationary electrode. The movable electrode is arranged to be turned into a wiping contact with the stationary electrode whereby both are cleared of any carbon deposit. In addition, sparkplugs constructed in accordance with this invention are furnished with a handle provided with an indicator or pointer and attached to the movable or revoluble electrode so that when the handle is moved to turn the electrode the indicator is correspondingly moved. A suitable scale is arranged adjacently or upon the plug in position to be pointed to or swept by the indicator. Thus, the distance moved by the revoluble electrode with relation to the stationary electrode, which distance is the spark gap, may be pointed out upon the scale by the indicator. It is also an object of this invention to provide a number of sparkplugs each having a movable and a stationary electrode, and to construct means for actuating all the movable electrodes and to indicate the spark gap upon a scale supported near the handle. It is also an object of this invention to produce means for releasably securing in any given position the parts employed to move the movable electrodes, which may be accomplished by fixing the handle in its position through the agency of the devices hereinafter specified, so that the adjustment of the electrodes being once made it will not be changed under ordinary service conditions until further adjustment is deemed necessary.

The construction and arrangements of the parts of this invention are illustrated in the accompanying drawings of which Figure 1 represents a vertical section of the body portion and a side view of the other parts assembled. Fig. 2 is a top plan view. Fig. 3 is a cross-section on the horizontal broken line x—x of Fig. 1. Fig. 4 is a side view, partly in vertical section, showing the means for operating the movable electrodes of more than one sparkplug, with the devices for indicating the spark gap and for securing the members in position after they have been adjusted.

In the drawings, and throughout the description the same letter is used to refer to the same part.

Considering the drawings, the sparkplug has the metallic body portion A, and a central stationary insulated electrode a. There is provided a revoluble electrode B having at its lower end a conical gas check C, and the electrode is rotatively movable in a passage c extending lengthwise through the wall of the body A. The lower end of the movable electrode is marked D and it is bent as shown and constructed to be turned into a wiping contact with the end of the stationary electrode, as best shown in Fig. 3.

The passage c as shown extends lengthwise through the wall of the body A, which is the external metallic body. In all the sparkplugs of this character with which this applicant is acquainted, the adjustable electrode passes through the porcelain, and, the porcelain forms the central member of the plug. It is necessary to hook or otherwise connect the conducting wire to the central electrode, and in the repeated adjustments, connecting and disconnecting the wire, and the necessary movements of the movable electrode to keep the electrodes free from carbon deposits, the porcelain insulator is especially likely to be broken. By boring the passage c through the metallic wall of the body A, the body is not materially weakened, and cannot be broken by any amount of rough handling. Furthermore, by passing the movable electrode through and in metallic contact with the body and, therefore, with the engine or "ground", as that term is employed, the outer end of the movable electrode is most conveniently placed for adjusting the electrodes of several plugs together by a connection from the dash as described herein.

An insulating handle E is secured to the movable electrode by means of a nut b, and the handle is provided with an indicator or pointer e arranged above and intended to

move over the scale F that is secured externally upon the body portion. The handle is substantially horizontal and the scale is positioned accordingly. As shown, the passage *c* in the wall of the body portion, and, consequently, the attitude of the electrode B is necessarily slightly inclined.

In Fig. 4, this invention is illustrated as comprising more than one sparkplug. The sparkplugs G and *g* are connected by the posts H and *h* with a rack bar J having the toothed portion or rack *j*. The connections are of like construction for each sparkplug. Thus, the post H has a clamp *h'* that engages the rounded end of the handle E'. The handle E' is in all respects similar in structure to the handle E, best shown in Fig. 2, and it is provided with an indicator such as the indicator *e*, but not shown. The scale F' is alike in its form and arrangement with the scale F. The movable electrode B' of the sparkplug G is secured to the handle E' by means of the nut *b'*. Whatever the number of sparkplugs employed, they may each have the handle with the indicator and the scale, or the indicator and scale may be omitted upon each sparkplug when there are a number of sparkplugs, and the scale member and indicator may be otherwise disposed as explained below.

The rack bar H is caused to move back and forth by the engagement of the rack *j* and the toothed sector K on the transverse short shaft *k*, which is mounted in the bearings L supported by the dashboard *l*. A handle M, passing through and operating in a slot *m* in the board, has one of its ends connected with the shaft *k*, and the other end is provided with a handpiece N that is threaded internally and engages the like threaded end *n* of the handle. The handle sweeps a scale P borne by the board, and an indicating arrowhead Q or the like may be placed upon the handle to point to the scale.

In the operation of this invention, assuming each sparkplug to be constructed as shown in Fig. 1, Fig. 2 and Fig. 3, it is believed to be made out by the foregoing description that when the movable electrode is turned by the handle E, its bent end D will rub against the end of the stationary electrode *a*, and this may be done a sufficient number of times to fully clear the electrodes of carbon deposit. It is also believed to be apparent that the movement of the electrode corresponds to the movement of the indicator *e* over the scale F, and the distance of one electrode from the other may be determined by considering the position of the indicator with respect to the scale F.

When there are more than one sparkplug, and the devices shown in Fig. 4 are employed, the spark gap is indicated upon the scale P, and, the handle M being placed as desired to suitably separate the electrodes of the plugs, its position may be fixed by turning the screw-threaded handpiece into contact with the scale P. Where a number of plugs are used and the movable electrodes thereof are operated together, it is necessary for the operator to know the extent of the sparkgaps with certainty, and he must be able to secure the parts firmly after adjustment. The position of the handle M upon scale P plainly indicates the size of the sparkgaps, and by screwing up the handpiece N firmly, the sparkgaps cannot be varied by the vibrations of the engine or movements of the vehicle. A number of changes in the precise construction and arrangement of the parts illustrated would naturally suggest themselves to a mechanician familiar with electrical ignition systems and devices, and it is not intended to narrowly confine this invention to the forms and members as set forth.

Having now described this invention, and explained the mode of its operation, what I claim is:—

1. In adjustable electrode sparkplugs, the combination with a series of sparkplugs each having a freely movable electrode by the movement of which the sparking distance between the ends of the electrodes may be varied, of means connected with the said movable electrodes of all the sparkplugs for moving said electrodes thereby adjusting the spark gaps between the ends of the electrodes from a distance, a scale arranged at a distance from the said sparkplugs, a member connected with the said electrodes-adjusting means and arranged to sweep the said scale, and releasable means for securing the member at any point upon the scale thereby holding the said electrodes-adjusting means in a desired position.

2. In adjustable electrode sparkplugs, the combination with a series of sparkplugs each having a freely movable electrode by the movement of which the sparking distance between the electrodes may be varied, means connected with the said movable electrodes of all the sparkplugs for moving the said electrodes thereby adjusting the spark gaps between the ends of the electrodes from a distance, devices arranged at a distance from the sparkplugs for indicating the extent of movement of the said electrodes-adjusting means, and securing means arranged adjacent to the said indicating devices for releasably securing the said devices and electrodes-adjusting means in a desired position.

3. In adjustable electrode sparkplugs, the combination with a hollow metallic body portion, of an insulated stationary electrode arranged centrally within the said body, a movable electrode having a conical gas check near its lower end, the said metallic body having a passage extending lengthwise

through its wall and having its lower portion formed to fit the said conical gas check, the said movable electrode occupying the said passage and being arranged to turn on its own axis therein, the said electrode having a lower end below the said gas check constructed to be moved horizontally toward or from the lower end of the stationary electrode, and means located exteriorly and connected with the top of the movable electrode for turning the electrode and for securing the same in any position.

In testimony whereof I affix my signature.

DANIEL M. CLARK.