No. 817,104. PATENTED APR. 3, 1906.

A. R. CURTIS.

IGNITER FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED APR. 10, 1905.

Fig. 1.

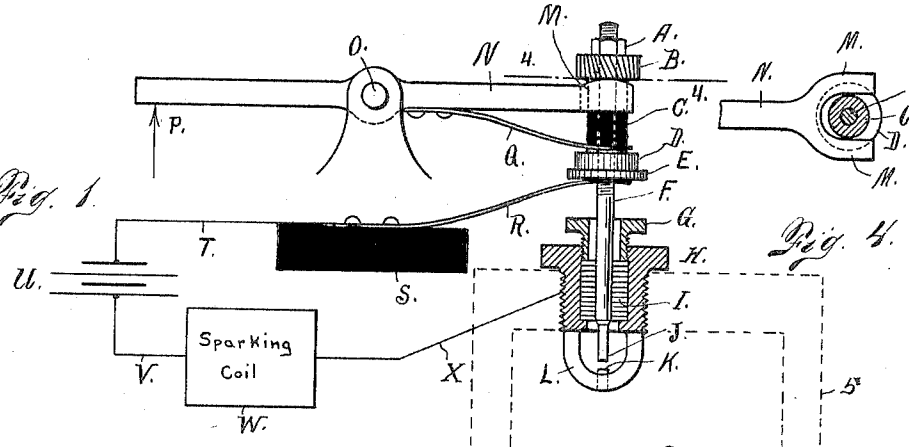


Fig. 4.

Fig. 2.

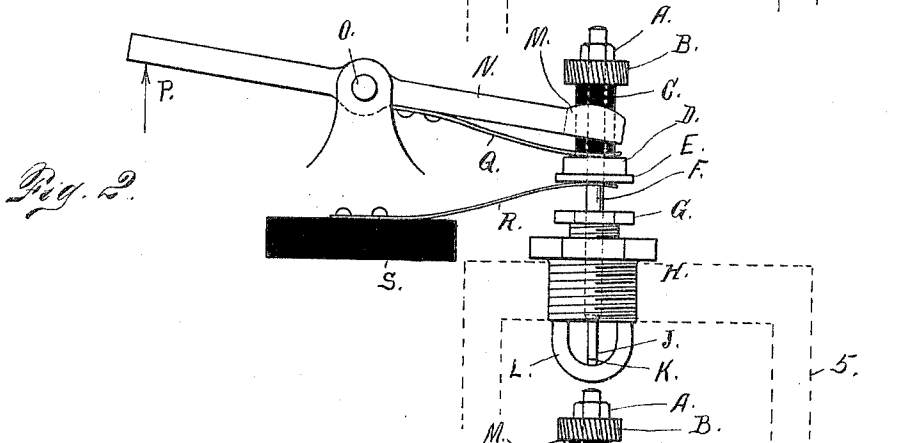
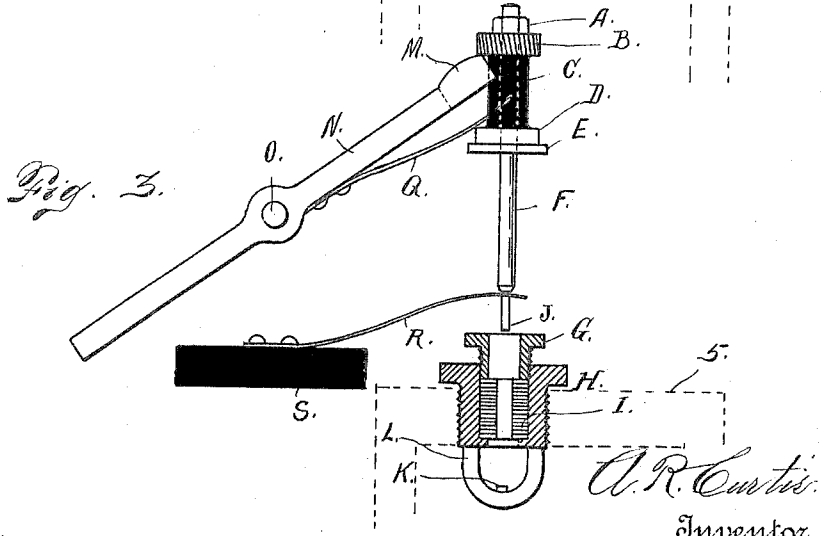


Fig. 3.



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ARTHUR R. CURTIS, OF GOLDEN, COLORADO.

IGNITER FOR INTERNAL-COMBUSTION ENGINES.

No. 817,104. Specification of Letters Patent. Patented April 3, 1906.

Application filed April 10, 1905. Serial No. 254,866.

To all whom it may concern:

Be it known that I, ARTHUR R. CURTIS, a citizen of the United States, residing at Golden, in the county of Jefferson and State of Colorado, have invented certain new and useful Improvements in Igniters for Internal-Combustion Engines; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the characters of reference marked thereon, which form a part of this specification.

My invention relates to improvements in igniting devices or means for producing an electric spark or arc for the purpose of igniting the explosive fluid in the cylinder of an explosive or internal-combustion engine. My improved device is of the type in which the electric spark is produced by the abrupt separation of two points between which at the instant of separation an electric current is passed. The more sudden the separation the better the spark in igniters of this class. In order to get a very abrupt separation or break between the contact-points of the electrodes, the mass of the parts moved should be as small as possible. The conditions of use are such that the parts extending within the cylinder are exposed to very high temperatures and to the deposit of matter, which in time destroys their usefulness, so that it is highly desirable to be able to easily examine or replace such parts without disturbing the adjustment of parts which have been accurately assembled for proper working. Again, it is important that the parts composing the igniter device should be small in size and of the simplest possible shape in order that they may be easily replaced and at a small cost.

Having indicated the function of my improved device and the type or class to which it belongs, I will proceed to describe the same in detail, reference being made to the accompanying drawings, in which is illustrated an embodiment thereof.

In the drawings, Figure 1 is an elevation, partly in section, illustrating my improved device, the electric circuit for producing the spark being diagrammatically indicated. In this view the electrodes or contact-points are separated or in the normal position. Fig. 2 is a similar view showing the electrodes in contact and with the other parts in corresponding positions. In this view all the parts are in elevation and the circuit is omitted. Fig. 3 is a view illustrating the mechanism partly in section and illustrating the manner of removing the plunger from the body of the device. Fig. 4 is a section taken on the line 4 4, Fig. 1.

The same reference characters indicate the same parts in all the views.

Let H designate the body or fixed part of the igniter, the same being exteriorly threaded to screw into a correspondingly-threaded opening in the cylinder 5 of an explosive or internal-combustion engine. This body portion H is chambered to form a receptacle for a packing I, which, together with the nut G, threaded in the body part, forms a stuffing-box through which the plunger F passes. The chamber in the part H is partly closed at the bottom to form a stop or support for the packing material at the extremity opposite from the nut G. The opening at the bottom of this chamber and also through the nut G, where the plunger passes, is sufficiently large to insulate the plunger from the body of the device. The packing material in the stuffing-box keeps the plunger properly centered and causes it to move in the straight line as the sparking circuit is made and broken.

The lower extremity of the plunger F is provided with an electrode or sparking point J, adapted to engage a similar electrode or sparking point K, mounted above a yoke L, formed on the lower extremity of the body H. The upper portion of the plunger F is threaded, and screwed thereon is a metal washer E. Above this washer and also threaded on the plunger is an insulating-spool C, whose upper portion or head B is preferably knurled to facilitate the turning of the plunger for the purpose of cleaning the electrodes or contact-points. Above the spool C and engaging the head B thereof a lock-nut A is screwed upon the plunger. By adjusting the nut, the spool, and the washer on the plunger the position of the electrode J with reference to the electrode K or the arcing-space between these elements may be regulated at will.

Mounted on a stationary support and forming a part of the mechanism is a lever N, fulcrumed at O and provided with a forked extremity M, adapted to straddle the reduced part of the insulating-spool between the heads B and D. Attached to this lever N is a spring Q, whose free extremity is also forked to straddle the reduced part of the spool ad-

jacent the lower head D thereof. A comparatively weak spring R is connected with a stationary insulating-block S. This spring R is bifurcated to straddle the plunger F below the washer E and is of sufficient strength to maintain the contact-points or electrodes J and K normally separated.

Let U designate a suitable electric source as a battery. From one pole of this battery a wire or conductor T leads to the spring R. From the other pole of the battery a conductor V leads to a sparking coil W. From this coil a conductor X leads to the body part H of the device. It must be understood that when the device is in use the body part will be screwed into a threaded opening formed in the extremity of the cylinder 5, where the explosive mixture is to be compressed. By virtue of this arrangement the electrodes or contact-points J and K will be located within the cylinder or explosive-chamber. It has not been thought necessary to show the cylinder with which the igniter mechanism is connected except in dotted lines, since engines of this character are so common that it is believed the use and operation of the device will be understood with sufficient clearness without further illustration. It should also be understood that any suitable mechanism may be employed to act upon the lever N in order to bring the sparking electrodes into contact or engagement.

If it be now assumed that the parts are in the position shown in Fig. 1, if force is applied to the lever N at P on the side of the fulcrum O opposite from its forked arm the lever will be thrown to the position shown in Fig. 2, and the pressure of the spring Q, acting on the spool and in opposition to the weaker spring R, will throw the plunger downwardly and cause its electrode J to engage the electrode K. It will be observed that the springs Q and R are both placed under tension by this act. Now as the pressure or force applied to the lever N at P is released or ceases to act the recoil of the springs Q and R, the spring Q being the principal force, will act to throw the lever upwardly to its normal position, whereby the forked extremity of the lever will act by a blow upon the upper extremity D of the insulating-spool, causing a quick or instantaneous separation of the electrodes or points J and K, thus producing an efficient spark for the purpose stated. The spring Q, while forcing the lever toward the upper extremity of the spool, simultaneously performs the further function of holding the electrodes in contact until the instant the lever delivers the blow which separates the contacts.

In tracing the path of the electric current when the electrodes are in contact reference will be made to Fig. 1. The current may be said to pass from one pole of the battery through the conductor V, the sparking coil W, the conductor X to the body H of the device, thence through the electrode K to the electrode J, through the plunger F to the washer E, and thence through the spring R and the conductor T to the other pole of the source, completing the circuit.

Having thus described my invention, what I claim is—

1. In an igniting device for explosive or internal-combustion engines, the combination of two electrodes, one stationary and the other movable, the movable electrode consisting of a plunger, connections for passing the electric current through the electrodes when they are in contact, a weak spring acting on one electrode to normally separate the electrodes, and an electrode-actuating lever, a second spring mounted on the lever and through which the latter acts to close the electrodes, the last-named spring also acting on the lever to effect a separation of the electrodes and simultaneously reacting on an electrode to hold the two electrodes in contact until the instant of separation.

2. In a device of the class described, the combination of a stationary body part carrying an electrode, a plunger passing through the body part and insulated therefrom, the said plunger carrying the other electrode or contact-point, an electric circuit in which the electrodes are located, a weak spring acting on one electrode to normally separate the electrodes, an electrode-actuating lever, a second spring mounted on the lever and through which the latter acts to close the electrodes, the last-named spring also acting on the lever to effect a separation of the electrodes and simultaneously reacting on an electrode to hold the two electrodes in contact until the instant of separation.

3. An igniter for explosive or internal-combustion engines, including two electrodes, one stationary and the other movable, an electric circuit in which the electrodes are located, the movable electrode being mounted to permit both longitudinal and rotary movement, a weak spring acting on one electrode to normally separate the electrodes, an electrode-actuating lever, a second spring mounted on the lever and through which the latter acts to close the electrodes, the last-named spring also acting on the lever to effect a separation of the electrodes and simultaneously reacting on an electrode to hold the two electrodes in contact until the instant of separation.

4. An igniter comprising two electrodes, one stationary and the other movable, a spool mounted on one electrode, a lever adapted to engage one head of the spool, a spring mounted on the lever and adapted to engage the other head of the spool whereby as the lever is actuated, it acts through the spring to bring the electrodes into engagement, the spring also acting on the lever to separate the

electrodes and simultaneously reacting on one electrode to hold the electrodes in contact until the instant of separation.

5. In an igniter, the combination of two electrodes suitably mounted, one electrode protruding beyond the cylinder with which the igniter is connected, the protruding electrode being adjustable to regulate the arcing-space between the electrodes, and accessible outside of the cylinder for purposes of adjustment, a weak spring acting on one electrode to normally separate the electrodes, an electrode-actuating lever, a second spring mounted on the lever and through which the latter acts to close the electrodes, the last-named spring also acting on the lever to effect a separation of the electrodes and simultaneously reacting on an electrode to hold the two electrodes in contact until the instant of separation.

6. The combination of two electrodes, a weak spring acting on one electrode to normally separate the electrodes, an electrode-actuating lever, a second spring mounted on the lever and through which the latter acts to close the electrodes, the last-named spring also acting on the lever to effect a separation of the electrodes and simultaneously reacting on an electrode to hold the two electrodes in contact until the instant of separation.

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

ARTHUR R. CURTIS.

Witnesses:

DENA NELSON,

A. J. O'BRIEN.