

No. 735,997.

PATENTED AUG. 11, 1903.

J. D. McFARLAND, JR.

IGNITING ATTACHMENT FOR EXPLOSIVE ENGINES.

APPLICATION FILED DEC. 12, 1901.

NO MODEL.

Fig. 1.

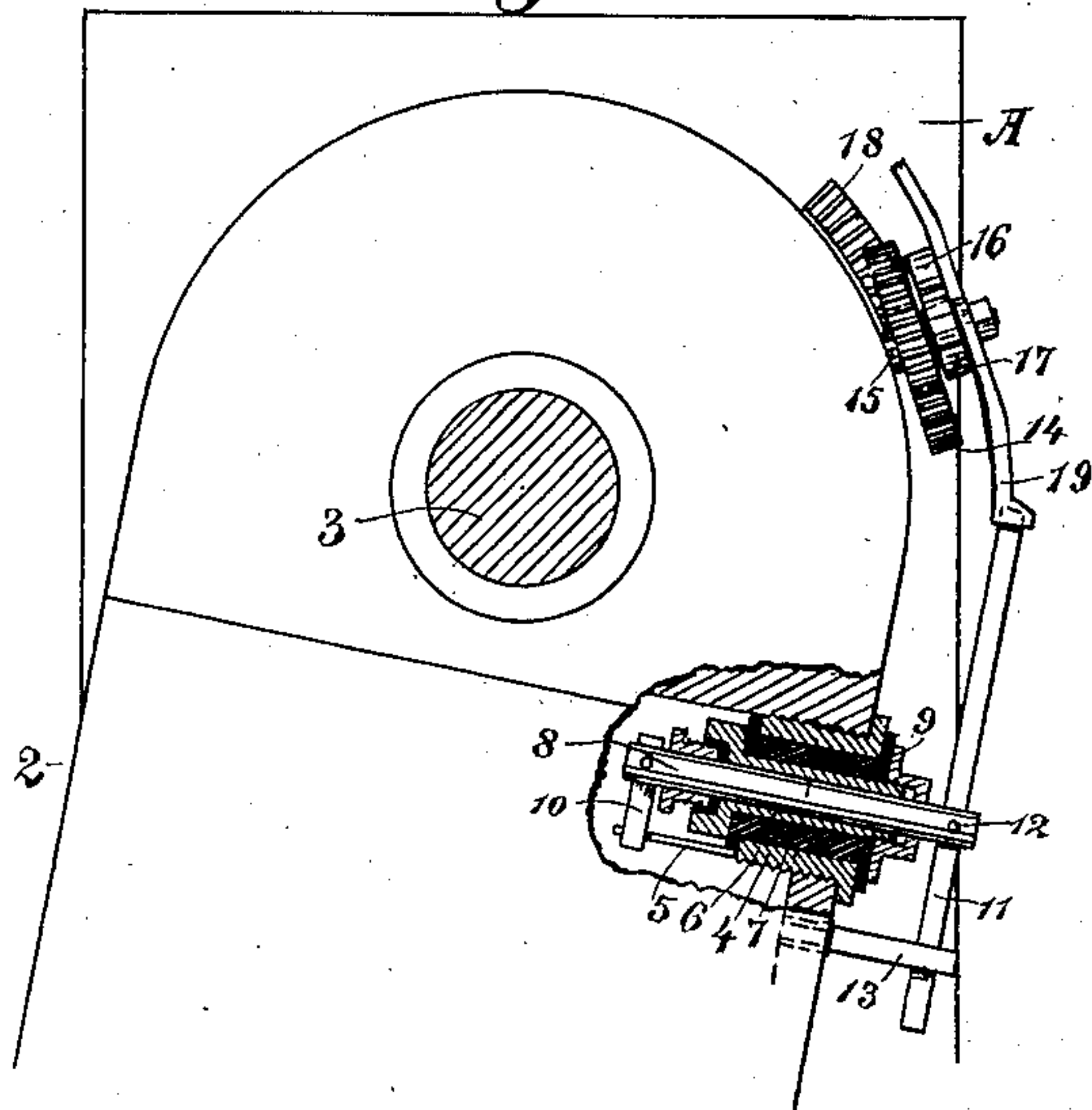


Fig. 2.

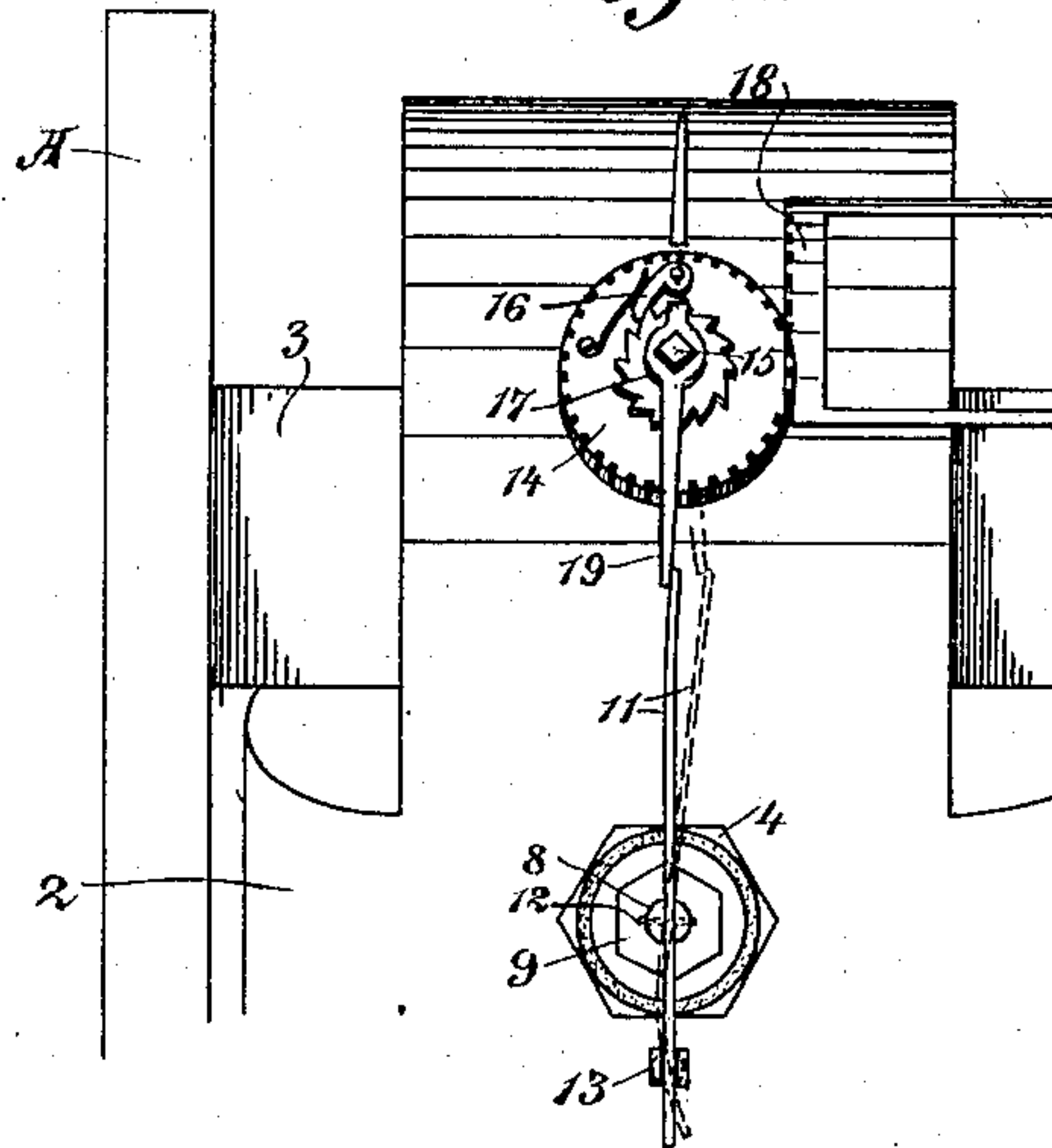


Fig. 3.

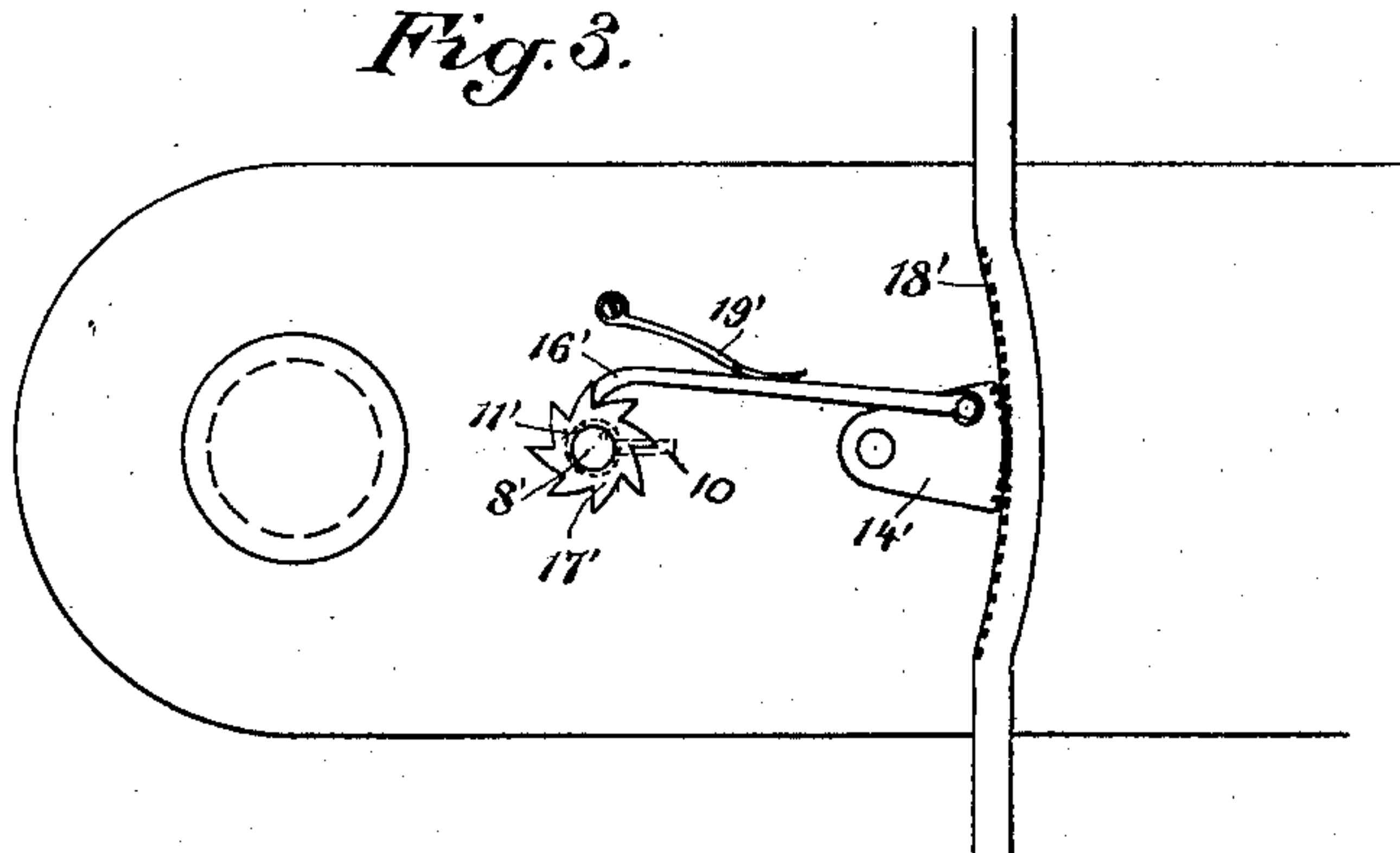
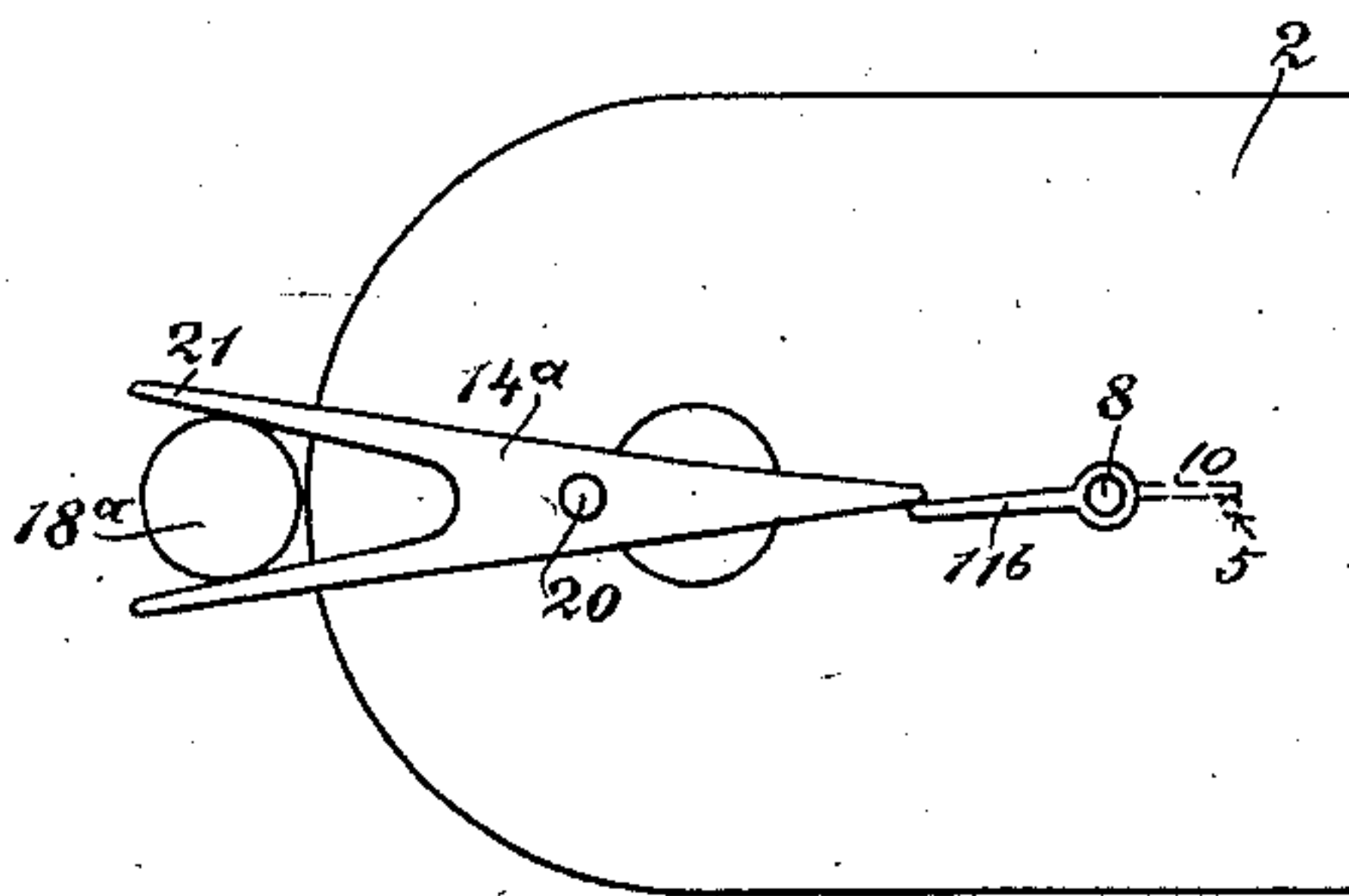


Fig. 4.



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UNITED STATES PATENT OFFICE.

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IGNITING ATTACHMENT FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 735,997, dated August 11, 1903.

Application filed December 12, 1901. Serial No. 85,605. (No model.)

To all whom it may concern:

Be it known that I, JAMES D. MCFARLAND, Jr., a citizen of the United States, residing in the city and county of San Francisco, State of California, have invented an Improvement in Sparking Igniters for Explosive-Engines; and I hereby declare the following to be a full, clear, and exact description of the same.

My invention relates to improvements in electric igniting devices for gas-engines which employ an explosive mixture. One of its objects is to afford a simple durable igniter of positive action that is particularly applicable for use with engines of the oscillating-cylinder type.

It is another object of my invention to utilize the oscillatory movement of the cylinder to effect the electrical contact within the cylinder necessary to cause the explosion which gives the impulse to the piston.

A further object is to provide a "sparker" that can be readily detached from the cylinder in case the electrodes become faulty in any respect.

While my device is designed mainly for oscillating engines, it may be readily adapted to engines of other forms.

It consists, essentially, of a plug inserted into the wall of a cylinder and having its inner end projecting within the combustion-chamber thereof, said end carrying two electrodes, one of which is movable to or from the other upon a rotatable spindle, said spindle extending exterior to the cylinder, and means whereby said spindle may be actuated at proper intervals to effect the discharge. The means for accomplishing this movement of the spindle includes a stationary rack-bar, an oscillating segment or pinion engaging the latter and carried on the cylinder, and connections between the pinion or segment whereby the spindle is moved intermittently.

My invention also comprises details which will be more fully set forth hereinafter, having reference to the accompanying drawings, in which—

Figure 1 is a front view of an oscillating cylinder, showing the attachment. Fig. 2 is a view at right angles to it. Figs. 3 and 4 are modifications for operating the device.

A represents the frame of an engine in which the cylinder 2 is hung at its outer end, as at 3. The piston-rod is connected with a shaft, (not here shown,) and the cylinder oscillates about the pivot 3 as the shaft revolves. At a suitable place in the cylinder a plug 4 is inserted, and its inner end projects within the ignition-chamber. This plug is an essential element of my invention. On its inner end is a fixed electrode 5. A sleeve 6 extends axially through the plug and is insulated from the electrode 5 by means of a suitable packing 7. A spindle 8 passes through the sleeve and has one end projecting within and the other without the cylinder. A tight joint between the parts is formed by means of suitable bushings 9. An arm 10 is carried on the inner end of the spindle, which forms the second electrode and is adapted to contact with the electrode 5 when the spindle is oscillated. The two terminals are suitably connected to a battery, and the rapid breaking of the circuit as these terminals are separated causes a spark which occasions the ignition and explosion of the gas within the chamber. A spring 11 serves to keep the terminals normally out of contact with each other. As here shown, this spring consists of a flexible strip of spring metal secured intermediate of its ends to the spindle, as at 12, and having one end supported but slidable in a standard 13. The other end of this spring forms an arm by which the spindle may be moved sufficiently to cause the electrodes to contact. When the arm is released, the electrodes fly apart by reason of the other end of the spring being held at 17. As the plug is screw-threaded in the cylinder-wall, it is but the work of a moment to remove it in case anything is wrong with the electrodes or it is desired to replace the sparker at any time. The spring being on the outside of the cylinder is not subject to the deteriorating effects of the burning gases.

The device is compact and durable and as so far described is applicable for use with explosive-engines of any type.

I have shown in Figs. 1, 2, 3, and 4 three modes of effecting the proper intermittent movement of the spindle where used with os-

cillating engines. In the first instance a pinion 14 is mounted loosely upon a short shaft 15, carried upon the cylinder. This pinion carries a pawl 16, which engages a ratchet 17, secured to a sleeve which is turnable upon the shaft 15, so that the pinion and ratchet are independently movable of each other when revolved in one direction, but are turned together when revolved in the other direction. The periphery of the pinion is toothed and adapted to engage a rack-bar 18, secured upon the frame of the engine. This rack-bar is curved in conformity with the arc described by the pinion during the oscillation of the cylinder, and the pinion and bar always remain in engagement. As the cylinder swings in one direction the pinion, through the pawl 16, will cause the ratchet to make the same relative part of a revolution that it does, but on the return movement of the pawl will slip over the ratchet and the latter remain stationary. In other words, the pinion has constant oscillatory movement, while the ratchet has a direct but intermittent forward movement. The movement of the ratchet is transmitted to the spindle by means of an arm or arms 19, secured on the ratchet and engaging at proper intervals the spring-arm 11.

In operation if the cylinder is of the four-cycle type and the ratchet makes a half-turn with each alternate oscillation of the cylinder there would be but one arm; if of two-cycle type and the ratchet makes but a quarter-turn there would be four arms, and so on. In all cases the timing would be such as to rotate the spindle and cause the spark at the right moment.

In Fig. 3 a rack-bar 18' is disposed at the side of the cylinder, and a pinion or segment 14' is pivoted upon the cylinder, engages the bar, and is rocked according as the cylinder oscillates. In this case the ratchet-wheel 17' may be fixed directly upon the spindle. A pawl 16' is pivoted on the segment and is held against the ratchet by means of a spring 19'. A suitable spring 11' serves to act upon the spindle so as to keep the electrodes normally separated. This spring is in the form of a small coil-spring interposed between the ratchet and cylinder and is shown in Fig. 3 by dotted lines. On each alternate oscillation of the cylinder the ratchet is actuated to cause a discharge, and consequently this form of device is suitable only for a two-cycle engine. However, it is obvious that by combining the elements shown in Figs. 1, 2, and 3, the igniter could easily be adapted to a four-cycle engine.

In Fig. 4 is shown a simplification of my invention adapted to a two-cycle engine. 14^a is a lever pivoted intermediate of its end, as at 20, and carried upon the cylinder. The arc of its movement is concentric with the pivot of the cylinder. One end of this lever

is forked, as at 21, and this fork engages a pin 18^a upon the frame of the engine. The other end of the lever is movable in the path of the spring-arm 11^b. As the cylinder oscillates the lever is made to engage and slip by the spring-arm at each oscillation; but the circuit is only broken at each alternate oscillation, causing in the case of a two-cycle engine a discharge at the proper interval.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination with an oscillating-cylinder engine, of a plug adapted to be inserted into the cylinder, electrodes carried by said plug, an oscillating member upon the cylinder, a stationary member engaging said oscillating member and connections between said oscillating member and one of said electrodes whereby the latter may be moved intermittently to contact with the other electrode.

2. The combination with an oscillating-cylinder engine of an oscillating member, a stationary rack-bar with which said member engages, electrodes extending within the ignition-chamber, one of said electrodes being movable and extending exterior to the cylinder and means by which said movable electrode may be intermittently actuated by the movement of said oscillating member.

3. The combination with an oscillating-cylinder engine of a toothed pivoted member upon the cylinder, means by which said member may be rocked in correspondence to the oscillation of the cylinder, an oscillating electrode having one end entering the ignition-chamber and the other extending outside the cylinder, a second electrode with which the first is adapted to contact, means by which the two electrodes are held normally out of contact, and connecting means between the rotatable electrode and the aforesaid rocking member whereby the contact of the electrodes is effected at the proper intervals.

4. The combination with an oscillating-cylinder engine, of a stationary rack-bar, an oscillating member carried on the cylinder and engaging said bar, a ratchet turnable independently of said oscillating member, means whereby the latter and ratchet may be driven in the same direction on alternate oscillations of the cylinder, one or more arms upon said ratchet, electrodes extending within the cylinder and one of said electrodes movable and adapted to extend into the path of said arms.

5. The combination in an oscillating-cylinder engine of a segmental rack-bar, an oscillating member engaging said bar and operable by the oscillation of the cylinder, a rotatable member, means whereby the oscillatory movement of the first member is converted into an intermittent forward move-

ment of the second member and a projection on the second member extending into the path of igniting means.

5 6. The combination in an oscillating-cylinder engine of a stationary member, an engaging oscillating member on the cylinder, electrodes extending within the cylinder, one of said electrodes movable and having a projection exterior to said cylinder, and connec-

tions between said projection and the afore- 10
said oscillating member whereby the contact of the electrodes is effected.

In witness whereof I have hereunto set my hand.

JAMES D. MCFARLAND, JR.

Witnesses:

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JESSIE C. BRODIE.