

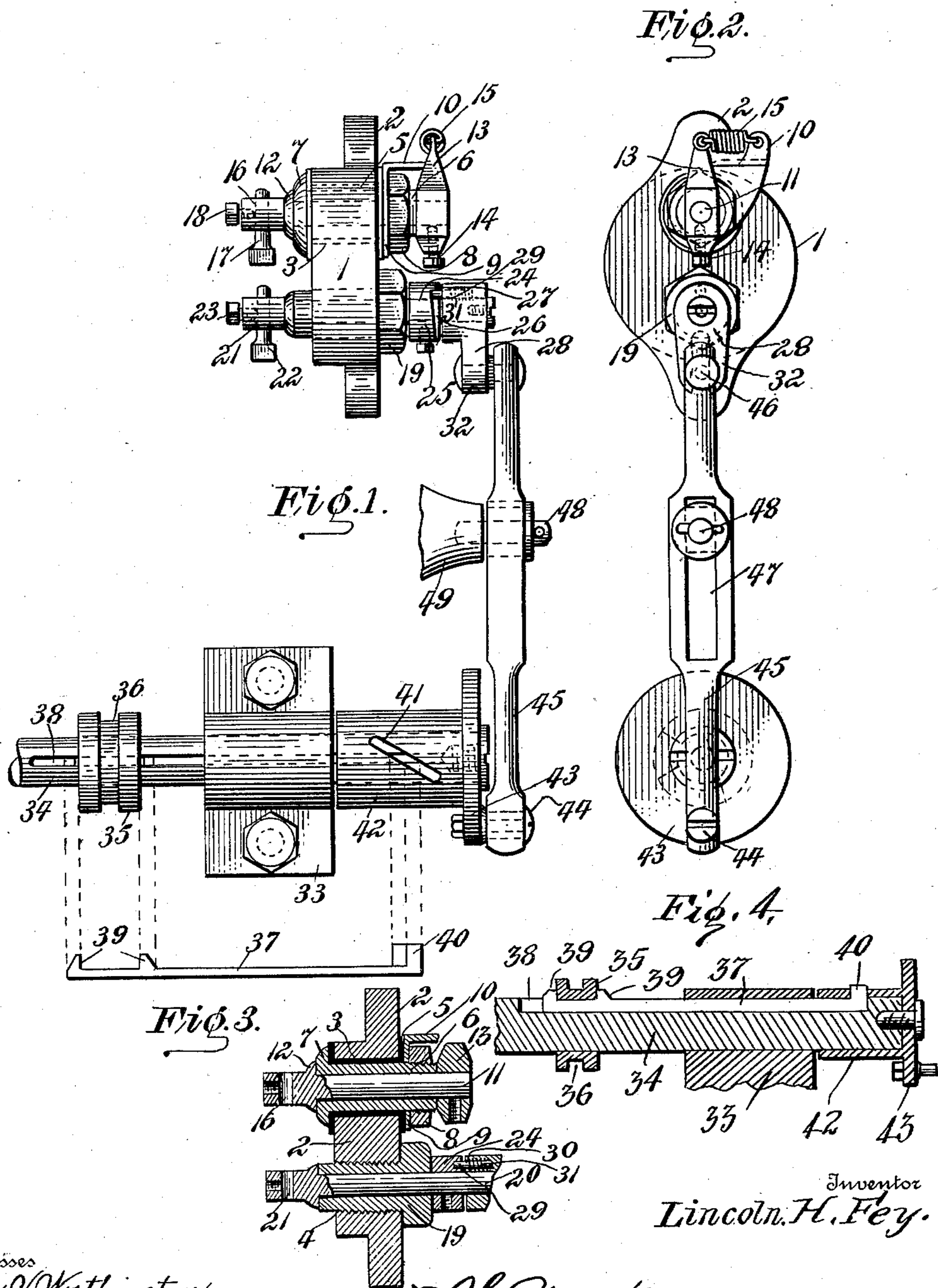
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L. H. FEY.  
SPARKING APPARATUS FOR EXPLOSIVE ENGINES.

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NO MODEL.



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# UNITED STATES PATENT OFFICE.

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## SPARKING APPARATUS FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 752,832, dated February 23, 1904.

Application filed February 19, 1903. Serial No. 144,161. (No model.)

*To all whom it may concern:*

Be it known that I, LINCOLN HENRY FEY, a citizen of the United States, residing at Northfield, in the county of Rice and State of Minnesota, have invented certain new and useful Improvements in Sparking Apparatus for Explosive-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.

My invention is an improved sparking apparatus for explosive-engines, the object of my invention being to provide an apparatus of this character in which the electrodes are adjustable one with relation to the other and may be so timed as to produce a spark at any time required to suit the conditions of operation of the engine, a further object of my invention being to provide improved means for actuating the electrodes, a further object of my invention being to provide improved means for appropriately timing the operation of the electrodes, and a further object of my invention being to effect improvements in the construction of the electrodes and the elements which carry them, whereby said electrodes are rendered adjustable each independently of the other.

With these and other objects in view my invention consists in the construction and combination of devices hereinafter described and claimed.

In the accompanying drawings, Figure 1 is a side elevation of a sparking apparatus embodying my improvements, showing the elements thereof appropriately assembled for co-operation. Fig. 2 is an end elevation of the same. Fig. 3 is a detail sectional view. Fig. 4 is a detail sectional view taken on the plane intersecting the center of the shaft 34 and showing the sliding key, collar, and angularly-shiftable sleeve.

In the embodiment of my invention here shown I provide a base 1, which is adapted to be attached to the cylinder-head of an explosive-engine by means of an overhanging flange 2, with which the base is provided, and suitable screws or studs (not here shown) which coact with the said flange. In practice a

suitable gasket will be placed between the flanged portion of the base and the cylinder-head. This base 1 is provided with an opening 3 and an opening 4, the latter being screw-threaded. In the opening 3 is an insulating-bushing 5. A cylinder-sleeve 6 extends through said insulated bushing, is provided on its inner end with a head 7, and on its outer end is screwed a clamping-nut 8. A washer 9 has an opening through which the sleeve 6 extends, and the said washer is clamped between the outer end of the insulating-bushing and the nut 8 and is provided with an arm 10, the said arm being eccentrically disposed with reference to the said sleeve. An oscillating conducting-shaft 11 has its bearing in the sleeve 6, is provided near its inner end with a flange-head 12, which bears against the inner end of the sleeve 6, and is provided at its outer end with a rock-arm 13, the same being here shown as secured thereto by a set-screw 14. A coiled retractile spring 15 connects the oscillating arm 13 with the arm 10. Near the inner end of the oscillating shaft 11 is a transverse opening 16, in which is placed a radially-disposed longitudinally-adjustable electrode 17, which may be either of the form here shown or of any other suitable form, and the same is adjustably secured in the opening 16 by a set-screw 18.

In the threaded opening 4 is a cylindrical screw-sleeve 19. The latter forms the bearing for a revoluble conducting-shaft 20, which is provided near its inner end with an opening 21, in which is placed a radially-adjustable electrode 22, here shown as similar in construction to the electrode 17 and adjustably secured by a set-screw 23.

A set-collar 24 is secured on the outwardly-projecting portion of the revoluble shaft 20 by a set-screw 25, and the said set-screw is provided on its outer side with a ratchet-slot 26, which extends almost entirely around the same, the said set-collar being further provided with a shoulder 27 coincident with and forming an interruption in said ratchet-slot. A crank 28 is revoluble on the outer end of the said shaft 20. The said crank carries a dog 29, which is here shown as a pin movable longitudinally in an opening 30, with

which the crank is provided. In the inner end of the said opening and engaging the inner end of the said pin is a spring 31, the function of which is to normally press the pin 5 outwardly to engage the same with the ratchet-slot of the set-collar 24. The crank 28 has an arm 32.

In the bearing 33, which is adapted to be secured on one side of the cylinder of the engine, is journaled a shaft 34, which is disposed parallel with the cylinder and which in practice is geared to the crank-shaft of the engine, so that it is driven thereby. In a four-cycle motor this shaft is geared to make 15 one revolution to two revolutions of the motor crank-shaft, and the said shaft 34 has a sliding collar 35, having a circumferential angular groove 36, adapted to be engaged by a suitable shaft-lever whereby the said collar 20 may be moved. The said collar engages a longitudinally-movable shifting key 37, which operates and is located in a longitudinal slot 38 in one side of the shaft 34, said shifting key being here shown as provided with studs 25 39, which bear on opposite sides of said shifting collar 35, and the said shifting collar is provided at its outer end with an outstanding cam-stud 40, having diagonally-disposed opposite faces. The said cam-studs move in a 30 diagonally-disposed cam-slot 41, with which an adjusting-sleeve 42 is provided, the said adjusting-sleeve being mounted on the shaft 34 and connected thereto for angular adjustment thereon. The said adjusting-sleeve 42 35 has a crank 43, here shown as a wheel or disk and provided with a wrist-pin 44. To the latter is pivoted one end of a pitman 45. The opposite end of said pitman is pivotally connected to the crank-arm 32 by a wrist-pin 46. 40 That portion of the pitman intermediate its ends is provided with an elongated slot 47, which engages a fulcrum or pivot 48, the latter being here shown as carried by a suitable bracket 49, which is adapted to be secured to 45 the cylinder-head.

It will be understood from the foregoing that when the engine is in operation the shaft 34 is rotated and rotary motion is imparted to the shaft 20, which carries the electrode 92, 50 by means of the cranks and the pitman. The plane of revolution of the electrode 22 overlaps that of the electrode 17, and hence at each rotation of the electrode 22 the same engages the electrode 17, thereby causing the latter to 55 be turned in one direction while the electrode 22 is in engagement therewith and effecting a sliding contact between the said electrode 22 and the electrode 17 and completing the electric circuit. As the electrode 22 moves past 60 and disengages the electrode 17 the circuit is interrupted and a spark is produced, which spark is utilized in igniting the explosive charge in the explosive-chamber of the engine. The duration of the mutual engagement and

sliding contact of the electrodes may be varied 65 by appropriately adjusting the electrodes by the means herein shown and described. By appropriately shifting the collar 35, and thereby effecting appropriate angular adjustment 70 of the crank carried by the adjusting-sleeve 42, the times of the explosion occasioned by the ignition of the charge by the sparking apparatus may be varied to suit the conditions of the operation of the engine.

From the foregoing description, taken in 75 connection with the accompanying drawings, the construction and operation of the invention will be readily understood without requiring a more extended explanation.

I do not desire to limit myself to the construction and combination of devices herein 80 shown and described, as it is evident that modifications may be made therein without departing from the spirit of my invention and within the scope of the appended claims. 85

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

1. In sparking apparatus for explosive-engines, the combination of the oscillating electrode 90 spring-pressed in one direction, an electrode revoluble in the path of the oscillating electrode, a crank, a pawl-and-ratchet connection between the crank and the revoluble electrode, a revoluble power-shaft, a sleeve 95 revoluble thereby, shiftable angularly thereon and having a crank, and the lever-pitman slidable on its fulcrum and connecting the cranks together, substantially as described.

2. A sparking apparatus comprising a base 100 adapted for attachment to the cylinder-head of an explosive-engine and to extend through the opening therein, a screw-sleeve, an insulating-bushing in and extending through said base, a sleeve 6 extending through the bushing and 105 having a head at its inner end, a washer on the outer side of the base and on the said sleeve 6 and having an arm, a nut screwed on said sleeve and bearing against the washer, an oscillatory shaft journaled in the sleeve 6, having a radially-disposed electrode at its inner end and an arm at its outer end, a spring connecting said arm to the arm of the washer to 110 move the said electrode in one direction, a revoluble shaft journaled in the screw-sleeve and having a radially-disposed electrode at its inner end, adapted to engage and effect a sliding contact with the oscillatory electrode, and means including an element on the outer end 115 of the revoluble shaft to drive the latter, substantially as described. 120

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

LINCOLN HENRY FEY.

Witnesses:

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