No. 824,245. PATENTED JUNE 26, 1906.

C. M. HUEY.

SPARKING IGNITER.

APPLICATION FILED JUNE 24, 1904.

Fig. 2.

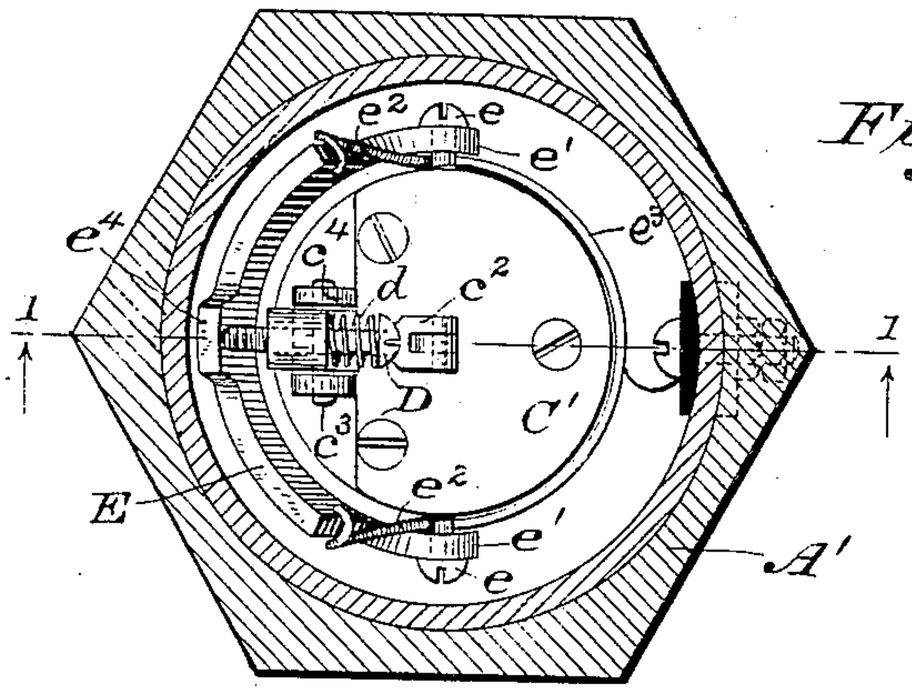

Fig. 1.

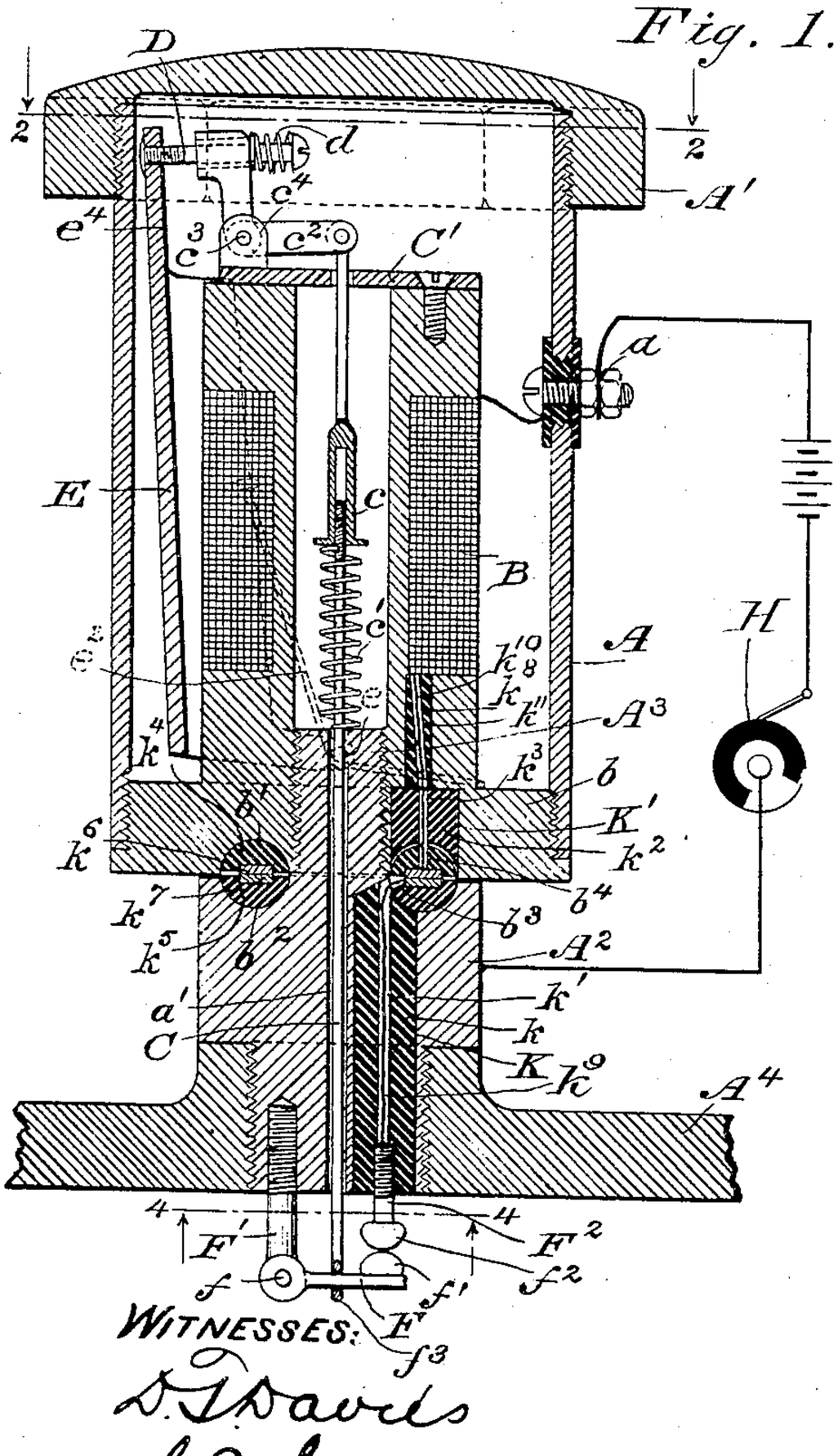

Fig. 3.

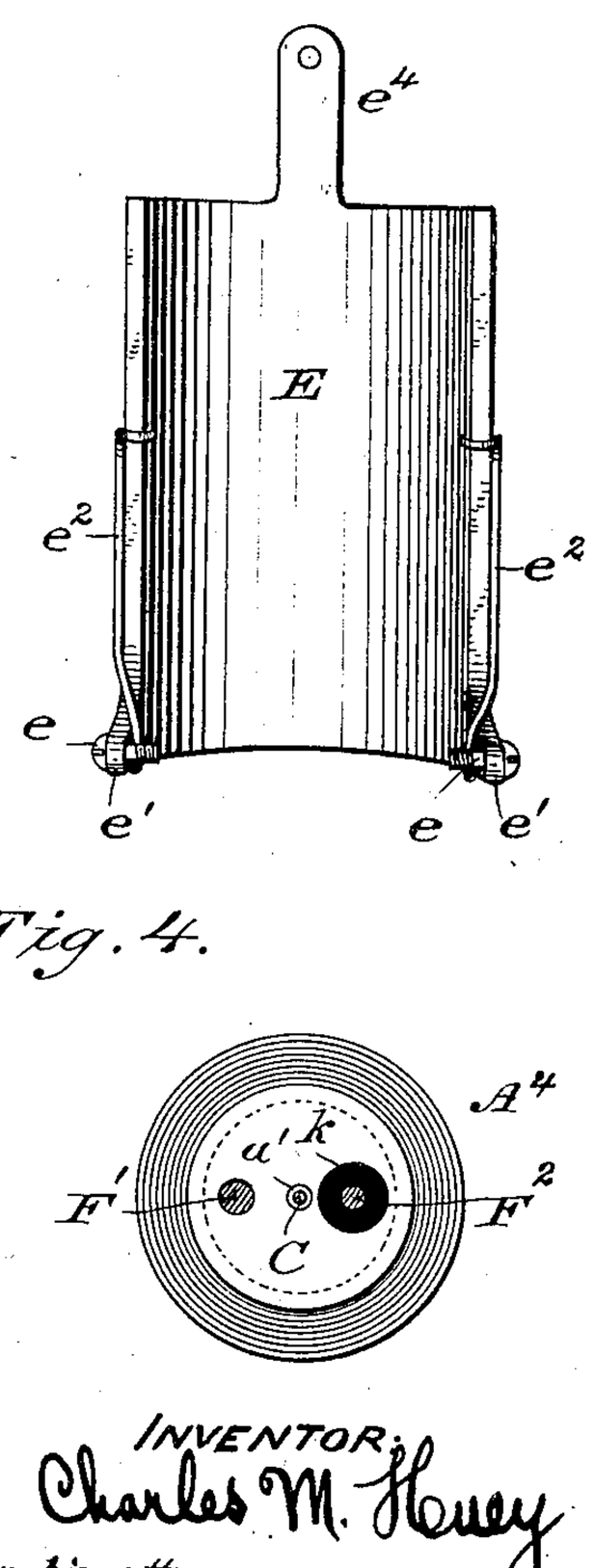

Fig. 4.

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SPARKING IGNITER.

No. 824,245. Specification of Letters Patent. Patented June 26, 1906.

Application filed June 24, 1904. Serial No. 213,980.

To all whom it may concern:

Be it known that I, CHARLES M. HUEY, a citizen of the United States, and a resident of Cleveland, county of Cuyahoga, and State of Ohio, have invented a new and useful Improvement in Sparking Igniters, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle so as to distinguish it from other inventions.

My invention relates to electrical ignition devices, and particularly to that class of such devices in which the parts thereof are readily replaceable and also interchangeable upon different machines; and it consists of means hereinafter fully described.

The annexed drawings and the following description set forth in detail certain mechanism embodying the invention, such disclosed means constituting but one of various mechanical forms in which the principle of the invention may be used.

In said annexed drawings, Figure 1 represents a central vertical sectional view of my improved igniter. Fig. 2 represents a horizontal section of the same, taken upon the plane indicated by the line 2 2, Fig. 1. Fig. 3 represents a front view of the armature-plate; and Fig. 4 represents a horizontal section taken upon the plane indicated by the line 4 4, Fig. 1.

In my improved igniter an outer protecting gas-proof casing A is provided, having a hexagonal-shaped cover A′, adapted to be dirt and gas proof and yet allow of easy access to the working parts of the device. The gas-tight casing enables the igniter to be used under water and in similar submerged places. A core or spool B is contained within the casing, is internally screw-threaded at its lower end, and adapted to receive an externally screw-threaded portion A^3 of a plug A^2, which latter is screwed into the cylinder-head, as shown. The plug A^2 has a central bore a', which receives a vertically-movable drill-rod or bronze rod C, which projects into the cylinder from such plug A^2 and extends centrally up through the core B and projects from the same through a plate C′, suitably secured at the top thereof, as shown. This drill-rod C is preferably made of non-magnetic material, so that it will not grip when the core B is magnetized, and is adjustable within the core at *c*, the adjustability being secured by breaking the rod at *c* into two parts and threading one part into the other. The inner part may be threaded into the other part a greater or less amount, as is desired, from the outside of the core by operating the upper part of the drill-rod after breaking its connection with a rocker-arm c^2, to be hereinafter more fully described. A suitable spring *c′* is provided between a shoulder upon one of the parts of the drill-rod C at *c* and the top of the plug A^2, which spring operates to normally hold the drill-rod C in its uppermost position.

Suitably pivoted to the top of the drill-rod C is a rocker-arm c^2, comprising a right-angular piece pivotally mounted within its right angle at c^3 upon the plate C′ and receiving at its top a pin D, which is screw-threaded at its outer end for a purpose hereinafter described. A spring *d* upon the pin D, disposed between the head of the same and the rocker-arm c^2, acts as a cushion to take up any jar that might be occasioned when the device is operated, as will be hereinafter fully described. The plate C′ is provided with two upwardly-projecting ears c^4, which receive a pin passing through the rocker-arm c^2 at c^3 to secure the rocker-arm pivotally to the plate C′. An armature E is securely fastened to the core B by short pins or screws *e*, passing through suitable ears *e′*, and is normally held out of contact with the core B by means of a wire e^3, passing around the core B, as shown in Fig. 2, and comprising springs e^2. These springs e^2 are ends of the wire e^3, pass around pins *e* and extend rearwardly along the lateral edges of the armature E, and at their tops are bent forwardly and crooked so as to engage said lateral edges of the armature, exert a pressure thereon, and normally hold same out of contact with the core B. These springs e^2 are made of phosphor-bronze or other suitable non-magnetic material which will withstand a great heat. The springs may, however, be made of magnetic material, if desired, and suitable non-magnetic washers provided on the pins *e e*.

The length of the springs e^2 and the amount with which they are bent forwardly and crooked may be varied in order to vary the force which they exert on the armature E. The springs *e* exactly center the armature E relatively to the core B and enable it to

strike said core correctly when attracted thereby. The lower part of the armature E is held only a short distance comparatively from the core B, is first attracted by said core, and then assists in pulling the upper part in toward the core. The armature is positioned a comparatively large distance vertically from the flange b of the core B in order that said flange may not attract it and cause it to hang, so that it would not be easily and readily pulled inwardly at the top. The main portion of the armature is of substantially the same height as the core B and at its top is provided with an upwardly-extending tongue e^4, which has a threaded bore adapted to receive the threaded end of the pin D, which may be threaded into the armature a greater or less amount to vary the distance at which the armature is held away from the core B.

The drill-rod C receives at its lower end a transversely-located conductor F, which passes through a small ring f^3, connected to the drill-rod, within which it is loosely supported and in which it has a limited sliding movement when the drill-rod C is operated, thereby enabling the conductor F to move relatively to the rod C. This relative movement of the conductor F and rod C enables the contact-electrodes f' f^2 (hereinafter described) to be kept in alinement and prevents their being thrown around at an angle to each other when the rod C is operated. The conductor F is provided at one end with a suitable contact-electrode f', adapted to form one of the electrodes between which the spark passes to cause the desired ignition. At its other end said arm F is pivoted in the outer end of a conductor F', screwed into the plug A^2. The plug A^2 is provided with a large bore K, laterally of its center and extending up through the main portion of the same. This bore is filled with suitable insulating material k, which has a small central bore k', as shown. The lower flange b of the core B is provided with a similar bore K,' laterally of its center and also laterally of the bore K. Suitable insulation k^2 with a bore k^3 is provided for the bore K' similarly to the bore K. The bottom of the spool-flange b and the top of the main portion of the plug A^2 are provided with similar registering annular coves b' b^2, filled with suitable insulating material k^4 k^5, the cove b' completely intersecting the bore K' and the cove b^2 incompletely intersecting the bore K. The insulating material in the coves b' and b^2 is provided with small perforations b^3 b^4, respectively, to allow of the passage therethrough of the conducting-wires k^{10} and k^9, respectively, as shown. The bores k' and k^3 receive the conducting-wires k^9 and k^{10}, as shown, and bore k^3 registers with a bore k^8, provided with suitable insulating material k^{11} and adapted to form a passage for the wire k^{10} from the winding of the core B. The central bore k' in the insulating material K is enlarged at its lower portion and receives a conductor F^2, provided at its outer end with a contact-electrode f^2, adapted to form the second of the electrodes, between which the spark passes. The conducting-wire k^9 is connected to the conductor F^2. The insulating-bushings k^4 k^5 are semicircular, grooved in their lateral centers, and reversely placed with respect to each other, so as to form an annular tubular bushing in the registering coves b' b^2. Within the grooves in the lateral centers of this bushing are provided thin juxtaposed copper rings k^6 k^7, as shown. The conducting-wires k^9 and k^{10} are connected to the rings k^7 and k^6, respectively, and the current passes from one ring to the other at any of the contacting points upon their juxtaposed surfaces. Said rings are completely surrounded by the annular cylinder of insulating material formed by the insulation k^4 and k^5, and thereby all short-circuiting is effectively prevented. A binding-post a is secured to the casing A and connected with one of the poles of the source of electricity.

The operation of the device, which will be easily understood from the foregoing description, is as follows: The core B is magnetized by the current passing around it in the winding, as shown, and attracts the armature E, the upper end of which carries inwardly with it the pin D, which actuates the lower end of the arm c^2 downwardly and causes the drill-rod C to carry the contact-electrode f' away from contact-electrode f^2 and produces a spark. This breaks the circuit, which causes the core to release the armature, and the contact-electrodes f' and f^2 are again brought into juxtaposition. It will be noted that the spring d protects the device from any jar when the armature flies back to its normally outer position away from the core B. The sparking is very rapid, there being produced about seventy-five sparks a second, producing a substantially continuous spark about the size of an ordinary match-head. It will be noted that there are three ways of adjusting the armature so as to secure variation in the strength and duration of the spark, which are respectively the adjustable joint at c on the drill-rod C, the adjustability of the outer end of the pin D within the armature E, and the variation of the tension of the springs e^2. The adjustability of the rod C also enables the contact-electrodes f' and f^2 to be drawn more closely together when they have become worn. By means of this plurality of adjustments the force with which the armature E is held away from the core B can be nicely and accurately secured as is desired, it being readily understood that the farther the armature is held normally from the core the larger will be the spark that is obtained. The center of the three holes in the bottom of

the plug which receive the conductor F′, the drill-rod C, and the conductor F² lie in a straight line in the same vertical plane, thereby producing a more effective device than those devices in which one of the outer holes necessarily lies off the center to allow for the operation of the eccentric hammers which are usually utilized. By providing the annular copper disks k^6 k^7 an accurate adjustment in a horizontal plane does not necessarily have to be effected between the screw-threaded portions of the plug A² and the core B, for contact at a plurality of points will always be effected between these disks, because of the large contacting area with which they are provided, and it will make no difference in what vertical plane any part of either of the disks falls when the core B and the plug A² have been accurately screwed together, for there will always be plenty of contact between the disks to satisfactorily conduct the current.

All of the parts of my device are interchangeable and can be used upon different machines to which it is desired to attach them. Also each part is easy of access, so that if it becomes worn or if for any other reason it is desired to replace it with a new part this may be done with very little difficulty. Exterior to the igniter there is shown a diagram of one suitable form of a circuit making and breaking device, as represented at H.

Because of the few parts of the device which it is necessary to operate in order to produce a spark and because of the ease with which these parts are actuated a decidedly less amperage is required than in other devices with which I am acquainted, and the saving of the cost of two or three batteries is effected.

Other modes of applying the principle of my invention may be employed instead of the one explained, change being made as regards the mechanism herein disclosed, provided the means stated by any of the following claims or the equivalent of such stated means be employed.

I therefore particularly point out and distinctly claim as my invention—

1. In a sparking igniter, the combination of a casing; a core; an armature; a plug connecting the core and the cylinder-head; a contact-electrode secured to said plug and insulated therefrom; circuit connections; a rod carrying a second contact-electrode; means connecting said rod and one end of said armature; and a spring intermediate of said core and the other end of said armature and constructed to bear against the lateral edges of the latter, said spring thus centering the armature relatively to the core and holding the same normally out of contact with said core.

2. In a sparking igniter, the combination of a casing; a core; an armature; a plug connecting the core and a cylinder-head; a contact-electrode secured to said plug; circuit connections; a two-piece rod carrying a second contact-electrode; and three independent groups of means for adjusting the force with which the armature is held out of contact with the core, comprising, first, an adjustable spring intermediate of said armature and core; secondly, a pin having threaded engagement with the armature and connected to said rod; and thirdly, means for adjusting one piece of said rod within the other piece thus making the rod's length capable of being varied.

3. In a sparking igniter, the combination of a casing; a core; an armature; a plug connecting the core and a cylinder-head; a contact-electrode secured to said plug; circuit connections; a rod comprising two pieces one adjustable with the other, thus making the rod's length capable of being varied; a second contact-electrode carried by said rod; a rocker-arm pivoted to the core and connected to said rod; a pin threaded into the armature and connecting the latter with said rocker-arm; a spring upon said rod and adapted to bear against one piece of the same to hold the armature out of contact with the core; and a second spring passing around the core, and provided with two bent ends adapted to bear against the lateral edges of the armature, said second spring thus centering the latter relatively to the core and holding the same normally out of contact with the core.

Signed by me this 21st day of June, 1904.

CHARLES M. HUEY.

Attest:
D. T. DAVIES,
G. W. SAYWELL.