No. 675,557. Patented June 4, 1901.

W. H. COTTON.

ELECTRIC IGNITER FOR EXPLOSIVE ENGINES.

(Application filed May 21, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.

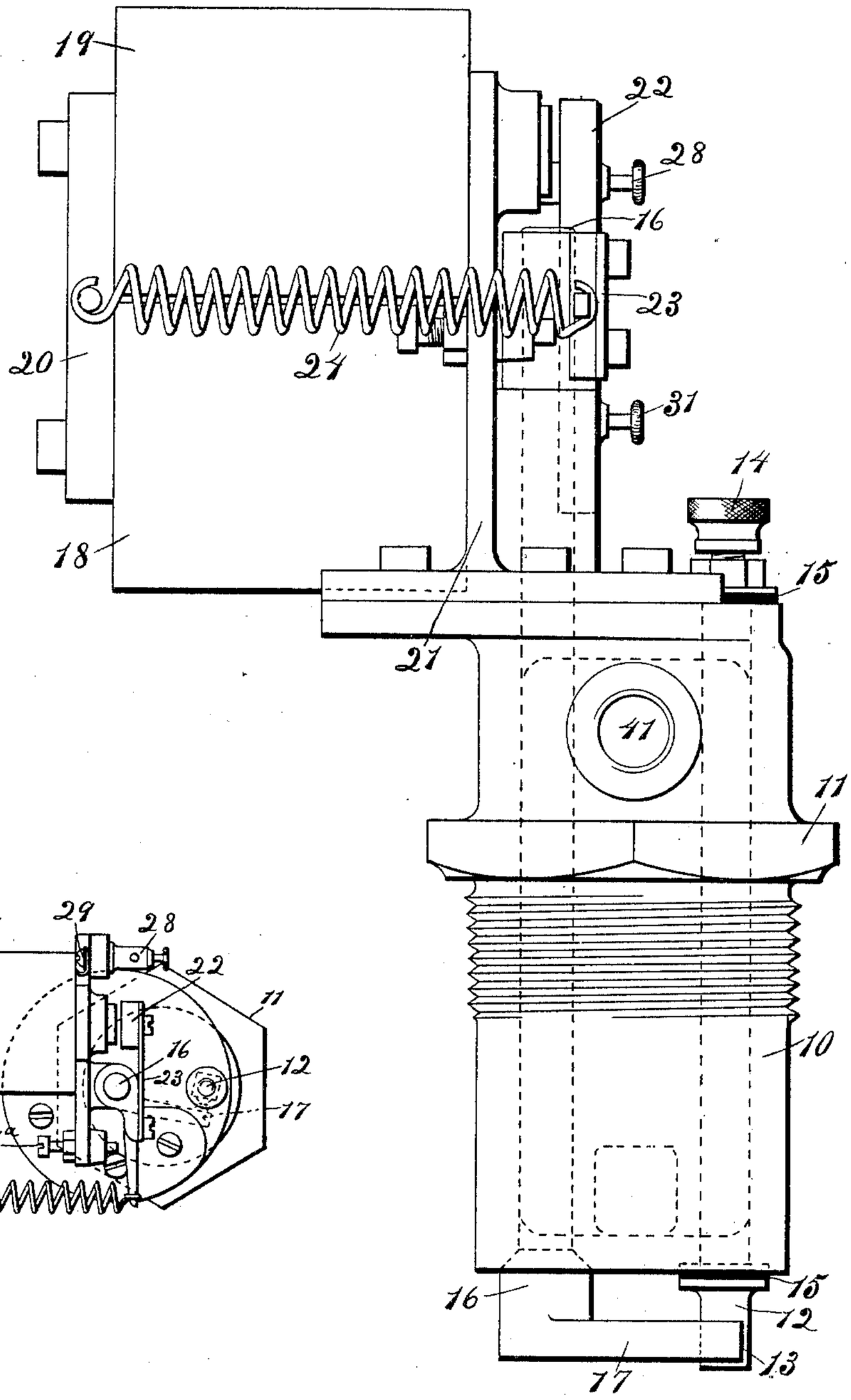

Fig. 3.

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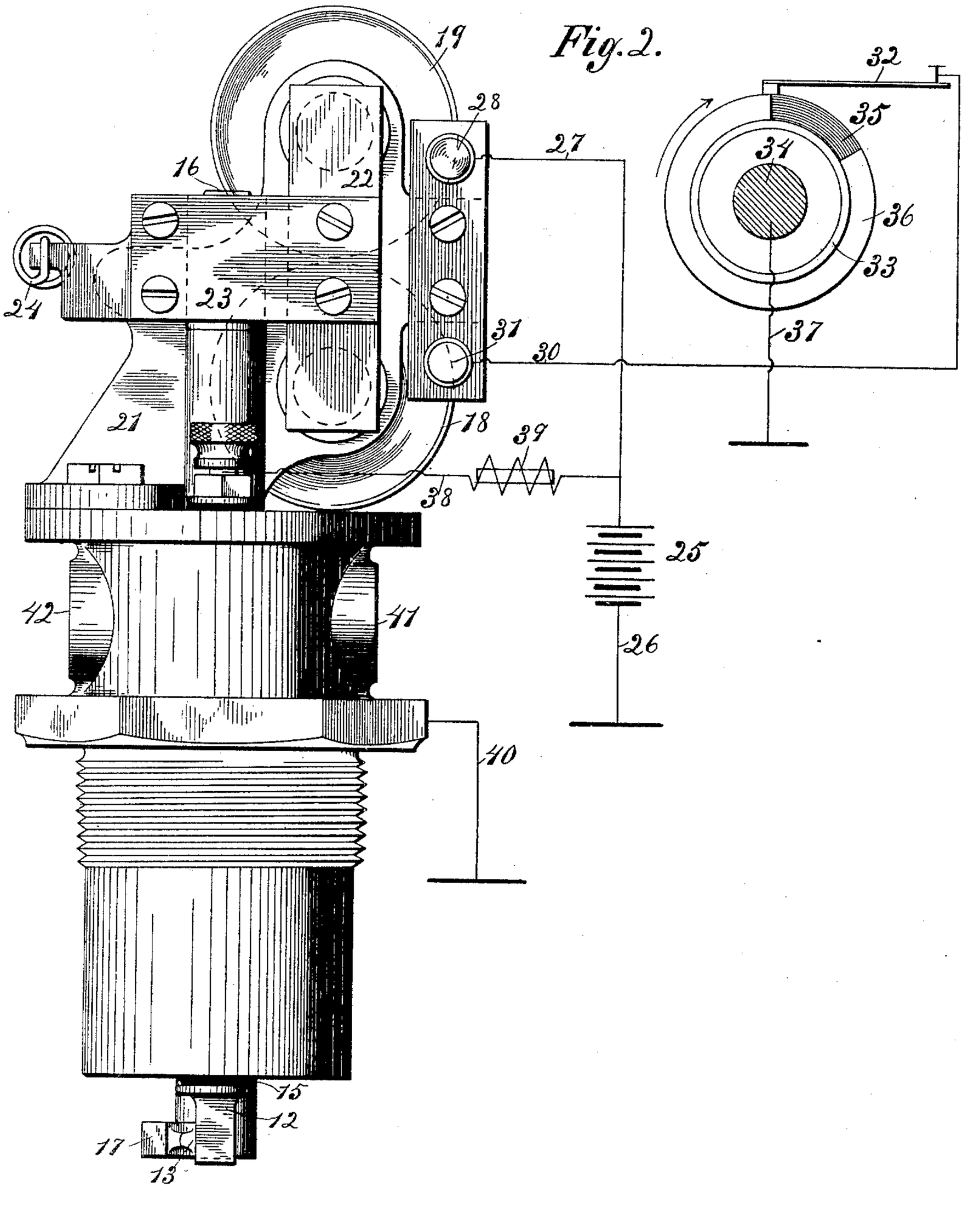
Fig. 2.



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ELECTRIC IGNITER FOR EXPLOSIVE-ENGINES.

SPECIFICATION forming part of Letters Patent No. 675,557, dated June 4, 1901.

Application filed May 21, 1900. Serial No. 17,474. (No model.)

To all whom it may concern:

Be it known that I, WALTER H. COTTON, a citizen of the United States, and a resident of Chicago, county of Cook, and State of Illinois, have invented a certain new and useful Improvement in Electric Igniters, of which the following is a specification and which is illustrated in the accompanying drawings, forming a part thereof.

This invention relates to that type of electric igniters for gas-engines in which the sparking-points are controlled by an electromagnet, the objects of the invention being to provide means for securing a single strong spark and with precision as to time, and to generally simplify and improve this type of igniters. These objects are attained in the construction hereinafter fully described, which is illustrated in the accompanying drawings, in which—

Figures 1 and 2 are side elevations of the igniter viewed from points ninety degrees apart, the circuit and circuit-breaker being conventionally shown in Fig. 2. Fig. 3 is a plan view of the igniter.

A circular plug 10 forms the base of the igniter and is adapted to be set through the walls of a gas-engine cylinder, preferably being secured therein by screw-threads and having a polygonal flange 11 to receive a wrench. This plug may be chambered and provided with ports, such as 41, for the admission of a cooling fluid; but this feature is not herein claimed.

A fixed post 12 extends longitudinally through the plug 10, both of its ends projecting, its inner end constituting one of the electrodes and its outer end carrying a binding-nut 14 for securing one of the terminals of the electric circuit. This post is insulated from the plug 10, as shown at 15 15. A rock-shaft 16 also extends longitudinally through the plug and projects therefrom at both ends, its inner end being provided with lateral arm 17, adapted for contact with the electrode 13 and itself forming one of the electrodes.

An electromagnet comprising a pair of spools 18 and 19, united at their rearward ends by a cross-bar 20, is supported by a bracket 21, secured to the outer end of the plug 10. The armature 22 of the electromagnet is fixed to the outer end of the rock-shaft 16, and its shank 23 is sufficiently thin so that it is somewhat flexible and is elastic. The armature 22 and arm 17 are so disposed relatively upon the shaft 16 that when the one is away from the poles of the magnet the other is separated from the electrode 13, a suitable spring 24 being provided for retracting the armature and arm and an adjustable stop 24ª limiting their movement under the influence of the spring. The attraction of the armature to the poles of the magnet throws the arm 17 against the electrode 13, and the contact of these parts occurs before the armature has reached the electromagnet-poles, so that the further advance of the armature flexes its shank.

The generator-circuits and the circuit-breaker are conveniently shown. The generator is indicated at 25. At 26 is indicated the grounded branch of the electric circuit, and at 27 the service branch leading to the electromagnet and being connected therewith through the medium of the binding-post 28, to which one terminal of the coil of the electromagnet is attached at 29. The other terminal of the coil of the electromagnet leads to the binding-post 31, and from thence the circuit is continued, as represented at 30, to a brush 32, bearing upon a commutator 33, mounted upon a rotatable shaft 34. The grounded segment of the commutator is represented at 35 and its non-conducting segment at 36, the ground-wire of the commutator being indicated at 37.

A shunt-circuit or branch 38 of the line 27 leads from the latter to the outer end of the post 12 and is secured thereto by means of the binding-nut 14. An induction or sparking coil (indicated at 39) is incorporated into the branch or shunt-circuit 38. The grounding of this branch or shunt is indicated at 40, the circuit being continued through the post 12, the shaft 16, and the plug 10.

When the brush 32 is in contact with the non-conducting segment 36 of the commutator, the circuit of the generator 25 is broken, the electromagnet is dead, and the armature 22 and arm 17 are in their retracted position. When as the shaft 34 rotates the grounded segment 35 of the commutator is brought under the brush 32, the circuit to the line 27,

the electromagnet, and the line 30 is closed. The electromagnet being energized, the armature is attracted to its poles and the arm 17 is brought into contact with the electrode 13, the shank 23 of the electromagnet being flexed and brought to spring tension, as hereinbefore described. The contact of the two electrodes closes the branch or shunt circuit 38, which takes the major part of the current, discharging it through the ground-wire or its equivalent 40. Enough of the current, however, traverses the coil of the electromagnet to energize the latter sufficiently to hold the armature 22, and to this end the spools 18 and 19 are made of considerable size. As soon as the ground-segment 35 of the commutator passes beyond the brush 32 the main or controlling circuit is abruptly opened. The armature 22 springs away from the poles of the electromagnet under the influence, primarily, of the elasticity of its shank, its movement being continued by the retractile spring 24, supplemented by the momentum of the armature itself. This movement of the armature is exceedingly quick and results in a quick or snap break of the contact of the two electrodes. The spark developed between the electrodes as thus operated is enlarged and intensified by the counter-current induced by the action of the induction or sparking coil 39, thereby insuring the ignition of the gases in the engine-cylinder.

I claim as my invention—

1. In an electric igniter, in combination, a generator, a circuit leading therefrom, an electromagnet incorporated into such circuit, a circuit-breaker, a branch or shunt circuit leading from the first-named circuit, an induction-coil incorporated into the branch or shunt circuit, a pair of spring-separated electrodes in the branch or shunt circuit, and means actuated by the electromagnet for closing the electrodes against the resistance of the spring.

2. In an electric igniter, in combination, a generator, a branching circuit connected therewith, an electromagnet and a circuit-breaker in one branch of the circuit, a pair of spring-separated electrodes in the other branch of the circuit, and connection between the armature of the electromagnet and one of the electrodes whereby the electrodes are brought together by the electromagnet.

3. In an electric igniter, in combination, a generator, a branching circuit leading therefrom, a pair of spring-separated electrodes in one branch of the circuit, an electromagnet and a circuit-breaker in the other branch of the circuit, the armature of the electromagnet having a spring-stem, connection between such armature and one of the electrodes whereby the electrodes are closed by the electromagnet, the parts being so disposed that the electrodes meet before the armature reaches the pole of the electromagnet.

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