No. 647,946. Patented Apr. 24, 1900.

W. H. COTTON.

ELECTRIC IGNITER FOR GAS ENGINES.

(Application filed June 26, 1899.)

(No Model.)

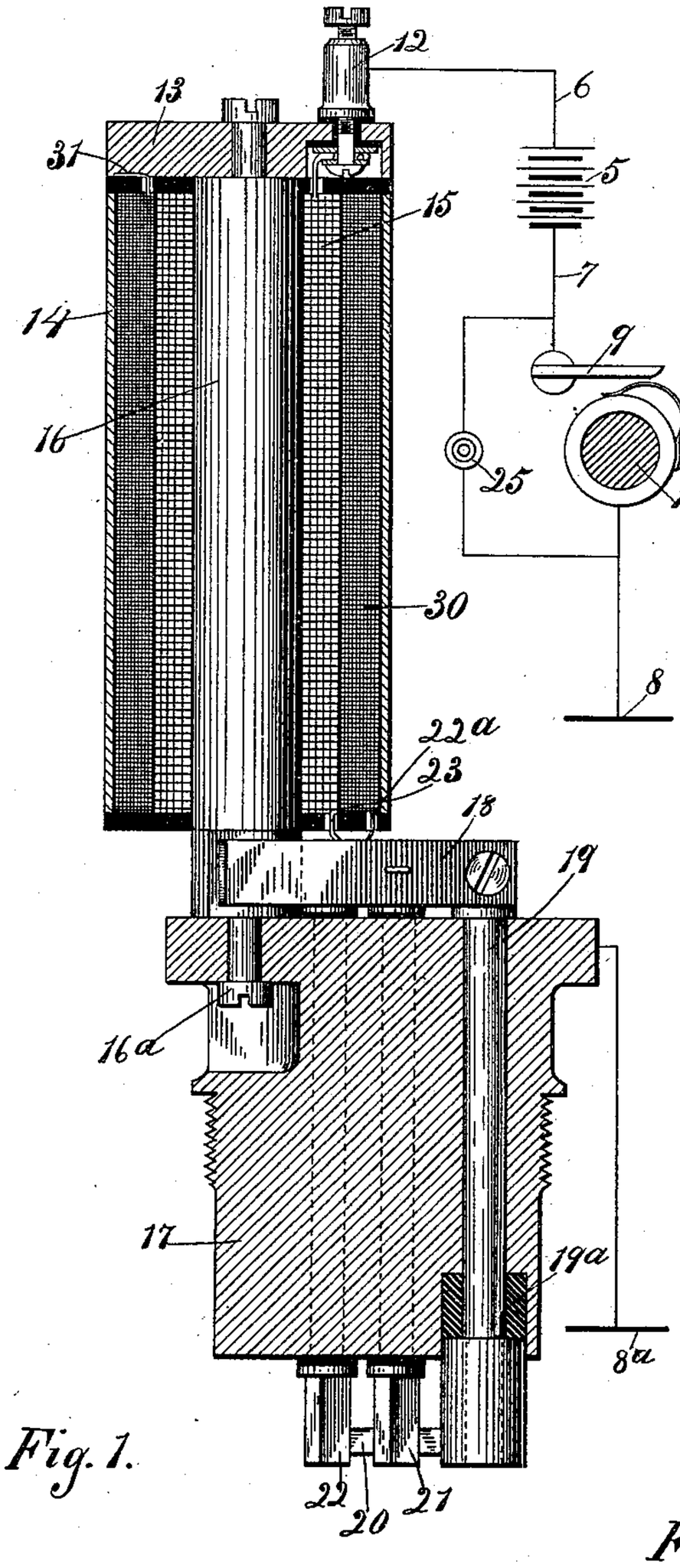


Fig. 1.

Fig. 2.

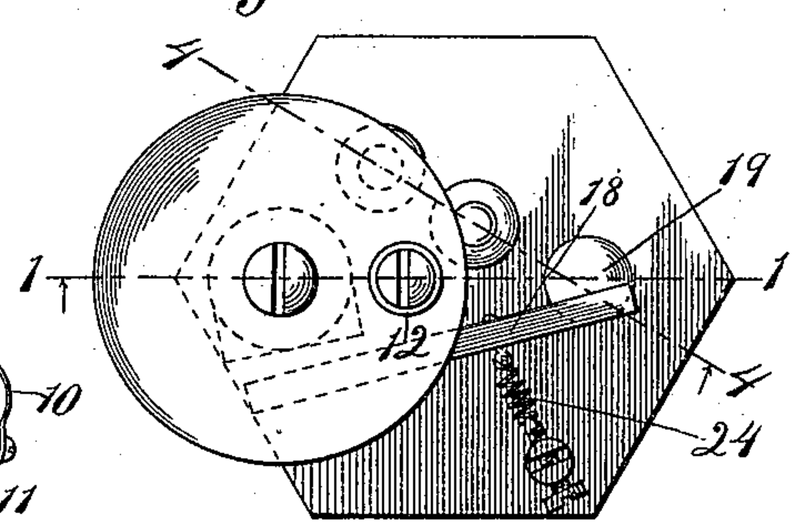
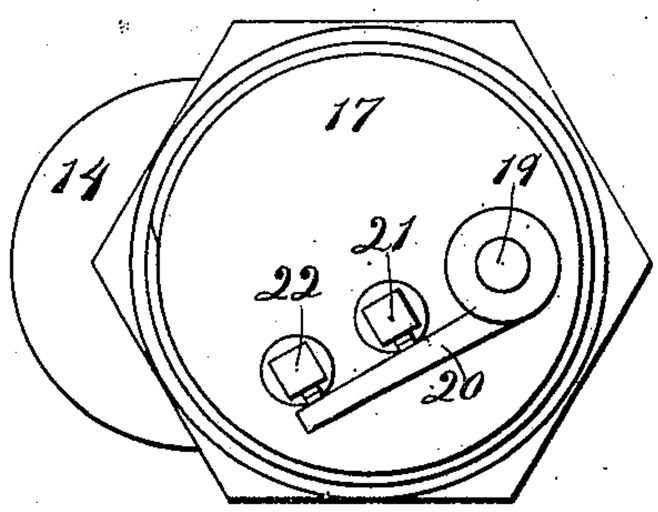


Fig. 3.



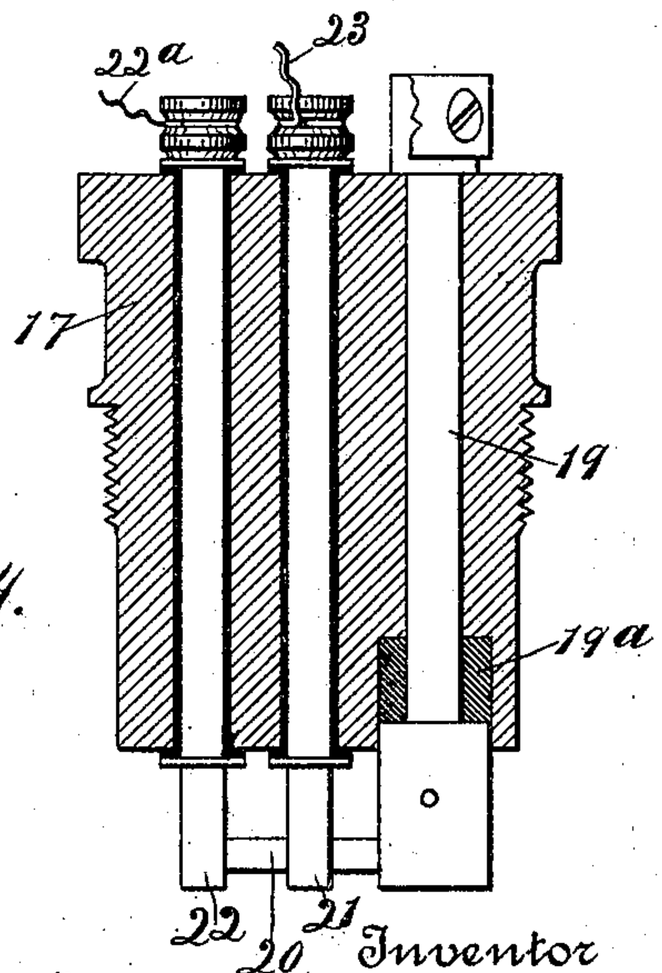


Fig. 4.

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ELECTRIC IGNITER FOR GAS-ENGINES.

SPECIFICATION forming part of Letters Patent No. 647,946, dated April 24, 1900.

Application filed June 26, 1899. Serial No. 721,856. (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 certain new and useful Improvements in Electric Igniters for Gas-Engines, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

This invention relates to that class of igniters for gas-engines in which there is employed a pair of electrodes located within the explosion-chamber of the engine, and between which an electric spark is caused to pass for the purpose of igniting the explosive charge.

The objects of the invention are to provide for the automatic magneto-electric control of the circuit so as to produce the spark or sparks at the desired intervals, to provide means whereby the current employed for controlling the electrodes is also employed in producing the sparks, to provide means for producing within the cylinder of an engine at regular intervals a spark or succession of sparks from a secondary coil, to provide means for developing sparks between the terminals of both the primary and secondary circuits and a single coacting electrode, to provide manually-controlled means for electrically igniting the starting charge of an engine by means of an electric spark, and generally to provide improved means for accomplishing electric ignition. These several objects are accomplished by means of the mechanism hereinafter fully described, and which is illustrated in the accompanying drawings, in which—

Figure 1 is a longitudinal central section of the igniter, the electric circuit and parts of the engine being conventionally shown. Fig. 2 is a view of the outer end of the sparking device. Fig. 3 is a view of the inner end of the same, and Fig. 4 is a longitudinal section of the plug through which the several members of the electric circuits enter the engine.

I represent in the drawings, in the usual conventional manner, a source of electric energy at 5 and the two branches 6 and 7 of the circuit leading therefrom, one of them being connected with the igniting device and the other leading to the ground, as indicated at 8. In the branch 7 of the electric circuit there is interposed a circuit-breaker comprising the brush 9, which may be fixed, a contact-cam 10, which is shown as a spring for wiping the brush, and a shaft 11, which in practice will be a shaft of the engine for carrying the cam 10. The circuit 6 leads to a binding-post 12, mounted upon the end cap 13 of an electromagnet 14, and this circuit forms the primary coil 15 of the electromagnet, being wound upon the core 16 of the magnet, which is secured by means of a screw 16^a to a plug 17 of non-magnetic material, which is adapted to be fixed into a suitable aperture in the walls of the gas-engine cylinder.

The vibrating armature 18 is provided for the electromagnet, being carried by an oscillating shaft 19, journaled within the plug 17 and extending entirely through the same. The vibrating electrode 20 projects laterally from the inner end of the shaft 19 and coöperates with the posts 21 22, extending entirely through and fixed in but insulated from the plug 17, one of these posts, 21, forming a part of the primary circuit, the terminal 23 of the primary coil 15 being connected with the end thereof, the other post, 22, forming a part of the secondary circuit 30 of the electromagnet, one terminal of which is connected with this post, as shown at 22^a, its other terminal 31 being in contact with the cap 13, the ends being grounded through this cap, the core 16, the plug 17, and the engine. The engine not being shown in the drawings, I represent, conventionally, the grounding of this as well as the primary circuit at 8^a.

The armature 18 is held normally out of contact with the pole of the electromagnet by means of a spring 24 of this armature and the electrode 20, both of which are carried by the shaft 19, as already stated, and are so disposed that by the action of the spring 24 the electrode 20 is thrown against the contact-points of the posts 21 22.

The shaft 19 is provided with enlarged ends, as shown, so as to prevent its longitudinal movement, and as a detail of construction I prefer to counterbore the inner end of

the aperture through which this shaft passes and fill in this counterbored portion with graphite, as shown at 19ª, thereby better providing for a perpetual lubrication of the shaft, the graphite also serving as an effectual packing to prevent the escape of any part of the explosive charge.

I also provide a circuit-breaking mechanism, such as an ordinary push-button 25, in a shunt-circuit forming a branch of the member 7, this shunt switching around the circuit-breaking mechanism heretofore described. By this means the primary circuit can be manually closed for the purpose of igniting the initial charge in starting the engine.

The operation of the device is as follows: The engine having been started by an explosion caused by the use of the push-button 25, the circuit will be closed at regular intervals by the contact of the cam 10 with the brush 9, and of course this contact will be so timed as to insure the explosion at the desired point in the cycle of the engine. The duration of contact between the brush and the cam may be determined by the form of parts, and, as will be presently seen, a succession of sparks is developed between the electrodes so long as the circuit remains closed by the contact of the cam and brush. The energizing of the electromagnet by the closing of the circuit results in the attraction of the armature 18 and consequent rupture of the circuit by the separation of the electrode 20 from the electrode 21, a spark being of course developed between these two electrodes. At the same instant a spark is also developed between the electrode 20 and the electrode 21 of the secondary circuit, and by properly winding the secondary coil of the electromagnet a spark of high electromotive force may be secured therefrom. Upon the breaking of the circuit by the separation of the electrodes the spring 24 immediately closes it again and the sparking operation is repeated.

By the employment of a secondary circuit with its high electromotive force, and especially by the employment therewith also of the primary circuit for the purpose of producing the sparks necessary in ignition, I am able to develop a much higher temperature than when the primary circuit is relied upon, and hence ignition of the charge is much more certain even though an inferior quality of gas be employed. By throwing a succession of sparks I also provide another safeguard against the missing of explosives should the charge not be of uniform richness.

I claim as my invention—

1. In a gas-engine igniter, in combination, an electric circuit, an electromagnet in such circuit and having a secondary coil, a pair of relatively-movable electrodes in the circuit of the secondary coil, such electrodes being controlled by the electromagnet.

2. In a gas-engine igniter, in combination, an electric circuit, an electromagnet in such circuit and having a secondary coil, a pair of relatively-movable electrodes in the circuit of the secondary coil, such electrodes being controlled by the electromagnet, and a circuit-breaker in such electric circuit, and being adapted to be mechanically actuated by the engine to which the device is applied.

3. In a gas-engine igniter, in combination, an electric circuit, an electromagnet in such circuit and having a secondary coil, a pair of relatively-movable electrodes in the electric circuit and controlled by the electromagnet, an electrode in series with the secondary coil and coöperating with one of said first-named electrodes, and a circuit-breaker in the said electric circuit and adapted to be controlled by the engine to which the device is applied.

4. In a gas-engine igniter, in combination, an electric circuit, a circuit-breaker therein and adapted to be actuated by the engine, a non-magnetic plug adapted to be placed in the wall of a gas-engine, an electromagnet mounted on the plug, and having a secondary coil, two fixed rods extending through the plug and being insulated therefrom, each of said rods being electrically connected with one of the coils of the electromagnet, an oscillating shaft extending through the plug, a spring-retracted armature fixed on such shaft for coöperating with the electrode, and a contact-piece fixed at the opposite end of the shaft and contacting with the two rods when the armature is retracted.

5. In an electric igniter, in combination, a primary circuit, an electromagnet in the primary circuit and having a secondary coil, a vibrating armature forming a part of the primary circuit, a pair of relatively-movable electrodes in the secondary circuit, and means whereby the armature controls the movements of the electrodes of the secondary circuit.

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Witnesses:
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