No. 837,597. PATENTED DEC. 4, 1906.

R. VARLEY.

AUTOMATIC CIRCUIT CONTROLLER.

APPLICATION FILED APR. 22, 1905.

Fig. 1.

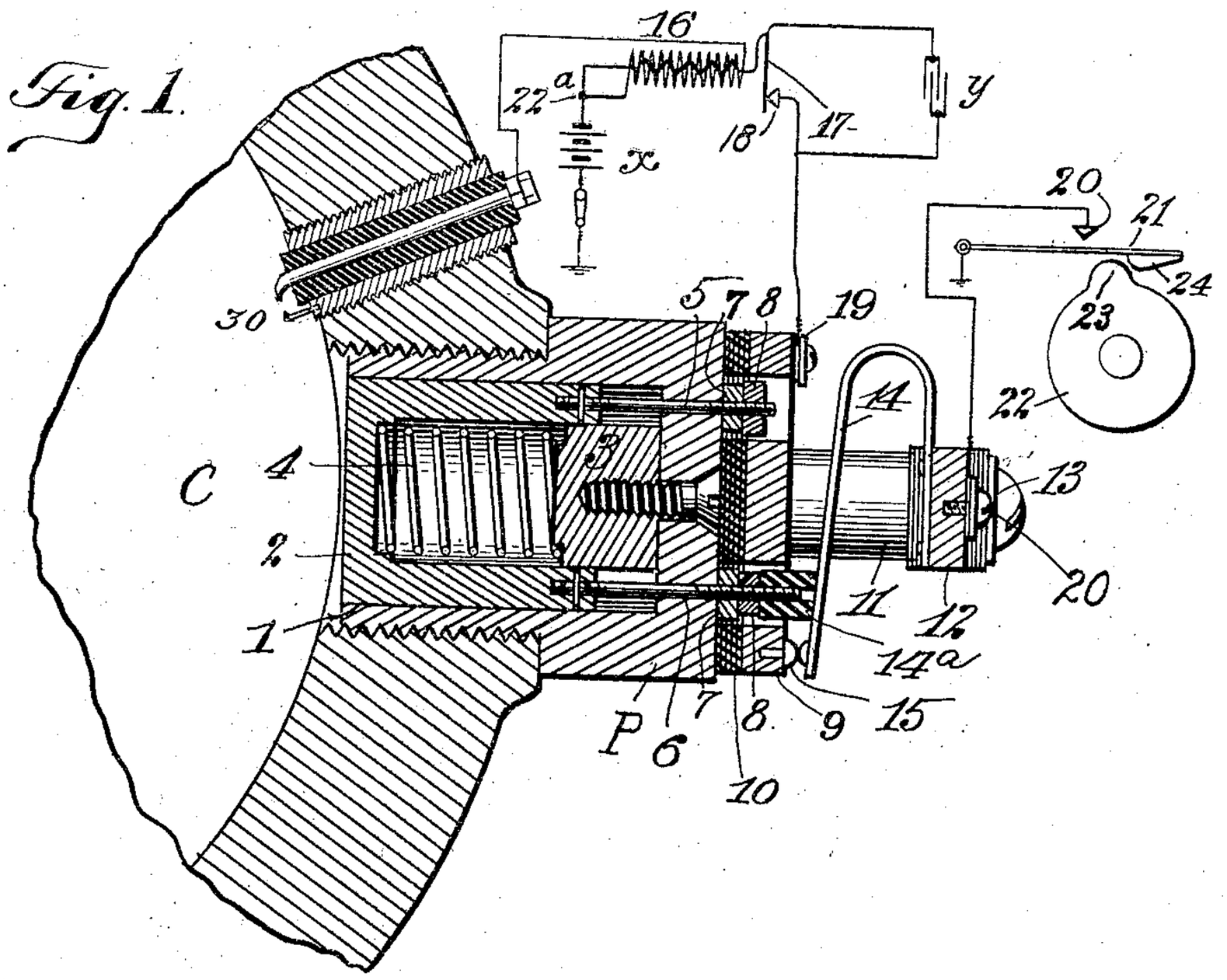


Fig. 2.

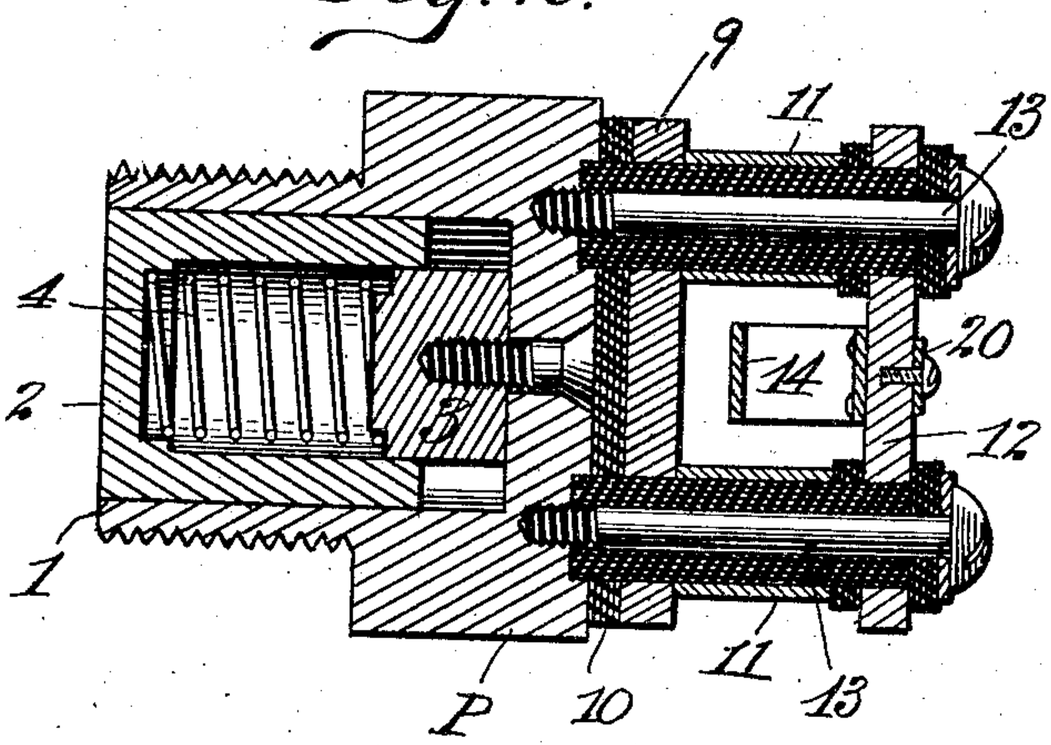
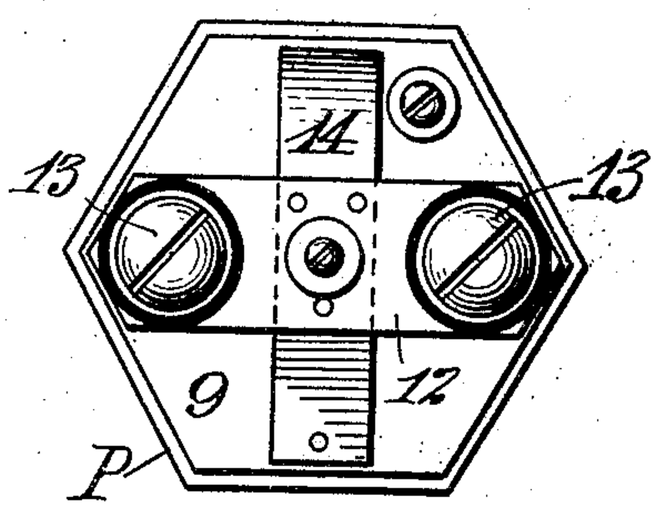


Fig. 3.



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UNITED STATES PATENT OFFICE.

RICHARD VARLEY, OF ENGLEWOOD, NEW JERSEY, ASSIGNOR TO THE AUTOCOIL COMPANY, A CORPORATION OF NEW JERSEY.

AUTOMATIC CIRCUIT-CONTROLLER.

No. 837,597. Specification of Letters Patent. Patented Dec. 4, 1906.

Application filed April 22, 1905. Serial No. 256,922.

To all whom it may concern:

Be it known that I, RICHARD VARLEY, a citizen of the United States, residing at Englewood, in the county of Bergen and State of New Jersey, have invented certain new and useful Improvements in Automatic Circuit-Controllers, of which the following is a full, clear, and exact description.

This invention relates to ignition systems for explosion-engines, the primary object being to provide circuit-controlling devices and means for actuating the same, whereby the consumption of current from a battery will take place only for such period as is necessary to ignite the charge.

In ordinary systems where a cam or other device on the engine-shaft closes the primary circuit of an induction-coil at the instant when the charge is to be ignited the said cam and the device upon which it acts, owing to mechanical inaccuracies due to improper construction or operation or to wear of the parts, sometimes prolongs the period of closure more than is necessary to ignite the charge, and it being obvious that the occurrence of sparks at the ignition-plug after the charge is once ignited is useless and results in a waste of battery-power the present invention provides means whereby the explosion of the charge will automatically and directly act to open the primary ignition-circuit, notwithstanding the fact that it may still be closed at the point where the cam is in operation.

My invention comprises means, automatically operated by the explosion of the charge, for opening the primary circuit immediately after the ignition of the charge of the engine.

In the accompanying drawings, Figure 1 is a central vertical longitudinal section of the device constituting my invention as applied to the explosion-chamber of a gas-engine. Fig. 2 is a central longitudinal section of the plug at right angles to Fig. 1, and Fig. 3 is an end elevation of the plug.

P is a plug, which is threaded, in the wall of the explosion-chamber C, said plug having an axial opening 1 therein which communicates with said explosion-chamber.

Within the opening of the plug is mounted a piston 2. The inner end of the piston has an axial opening which fits around a lug 3, projecting from the bottom of the opening 1. The piston is pressed inwardly by a coiled spring 4, located within the piston between the projection 3 and the end wall of the piston, normally holding the outer surface thereof flush with the end of its inclosing plug.

The inner end of the piston 2 has rods 5 6 secured thereto, said rods projecting through the end wall of the plug P. Said rods each have nuts 7 8 threaded on their projecting ends, whereby the inward movement of the rods, and consequently of the piston, is limited.

The exterior wall of the plug P has a cap 9 placed thereover, separated from the plug by insulating material 10, said insulating material having openings therein for the nuts 7 8.

The cap 9 has two hollow standards 11 11 projecting therefrom. A cross-bar 12 is secured to said standards by bolts 13, which also serve to bind the standard to the cap 9 and said cap to the plug. The cross-bar, the standard, and the bolts 13 are insulated from each other, as is fully shown in Fig. 2. The cross-bar 12 has secured thereto a spring 14, the free end of which normally engages with a contact-point 15 on the cap 9. Said spring also contacts with the insulated end 14^a of the rod 6.

Coöperating with the plug P is a primary circuit of an induction-coil, which when closed may be traced as follows: from the ground through the battery x, the primary of the induction-coil 16, the vibrator or armature 17 and its contact-point 18, the binding-post 19 on the cap 9, the contact-point 15 on said cap, the spring 14, the cross-bar 12, the binding-post 20 thereon, the contact-point 20′, the spring 21, and from thence to ground. The usual condenser y is arranged in a circuit around the vibrator 17.

One end of the secondary circuit may be grounded by connecting it to the primary circuit, as at 22^a, the other end thereof passing to a sparking plug (shown conventionally at 30) within the explosion-chamber c, which sparking plug is supposed to have one terminal insulated and the other grounded, as usual.

The spring 21 is normally out of contact with its contact-point 20′, thus causing a break in the circuit. Said break is periodically closed in the usual manner by a cam 22, affixed to the driving-shaft of the engine, when the projecting tooth 23 of said cam engages with a lug 24 on the spring 21, thus

raising the spring and closing the circuit at this point.

When the circuit is closed in the above-described manner, the vibrating armature 17 is attracted by its electromagnet and the circuit at this point alternately opened and closed by the vibration of said armature, thereby producing a volley of sparks between the terminals of the sparking plug of the secondary circuit. These sparks cause an explosion of the gas within the explosion-chamber, the force of which operates the piston 2 and causes the end 14^a of the rod 6 to project against the spring 14 and forcing said spring from out of contact with the point 15, thereby producing a break in the circuit at this point.

The duration of the pressure in the engine-cylinder due to the explosion is sufficient to hold the circuit open at the point 15 during the time the cam projection 23 dwells on the lug 24. The piston is forced back in position by the spring 4 when the force of the explosion is spent, thus permitting the spring 14 to close the circuit at the point 15, and thereby preparing the primary circuit for another closure at the point 20′.

Since the circuit is normally closed at the point 15, it is apparent that when it is also closed at the point 20′ by the cam 22 sparks will be produced between the terminals of the secondary circuit. When the charge is ignited by said sparks, the force of the explosion opens the circuit at the point 15, it being understood that the spring 4 is of sufficient power to resist the pressure of the gas before it is fired.

In circuit-controllers in common use it is found difficult to provide a controller that will close the circuit only when a current is needed. With my invention, if the circuit is still closed at the time of the explosion of the charge it is automatically opened thereby independently of the circuit-closer. The flow of the current in the primary circuit is thus automatically controlled in such manner that the battery is consumed only long enough to ignite the charge. The battery *x*, therefore, is never uselessly employed, and its life is greatly prolonged.

Having described my invention, I claim—

1. A circuit-controller for explosion-engines comprising two circuit-altering devices adapted to operate upon the same circuit, one of which devices is directly and automatically opened by the force of the explosion at the instant of such explosion and held open thereby during the period that the other device is closed.

2. A circuit-controller for explosion-engines, comprising two circuit-altering devices adapted to operate upon the same circuit, means subjected to the interior pressures of the cylinder for opening one of said devices by the force of the explosion at the instant of such explosion and for holding the same open during the period that the other device is closed.

3. A circuit-controlling device for explosion-engines, comprising in combination with the explosion-chamber of the engine, a plug having an axial opening therein communicating with said chamber, a piston mounted in said opening, a movable device forming part of the primary circuit of an induction-coil, said device being controlled by the movement of said piston.

4. A circuit-controlling device for explosion-engines comprising, in combination with the explosion-chamber of the engine, a plug having an axial opening therein, a piston mounted within said opening, means for limiting the movement of the piston, a projection on said piston extending through the outer end of the plug, a movable device forming part of the primary circuit of an induction-coil and engaging with said projecting end of the piston, and adapted to be actuated by the movement of the piston upon the explosion of the charge within the explosion-chamber.

5. In an ignition system for explosion-engines, the combination with the engine-cylinder and its piston of a circuit-controlling device comprising a circuit-closer and a circuit-opener, and means independent of the engine-piston and directly operated by the explosion of the charge for automatically actuating said circuit-opener.

6. In an ignition system, for explosion-engines, the combination with the engine-cylinder and its piston of an electric circuit, a circuit-maker and a circuit-breaker therein, and means independent of the engine-piston, whereby the force of the explosion produced by the circuit-maker will actuate the circuit-breaker.

In witness whereof I subscribe my signature in the presence of two witnesses.

RICHARD VARLEY.

Witnesses:

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