E. Q. WILLIAMS.

ELECTRIC IGNITING SYSTEM.

APPLICATION FILED AUG. 24, 1906.

907,929. Patented Dec. 29, 1908.

Fig. 1.

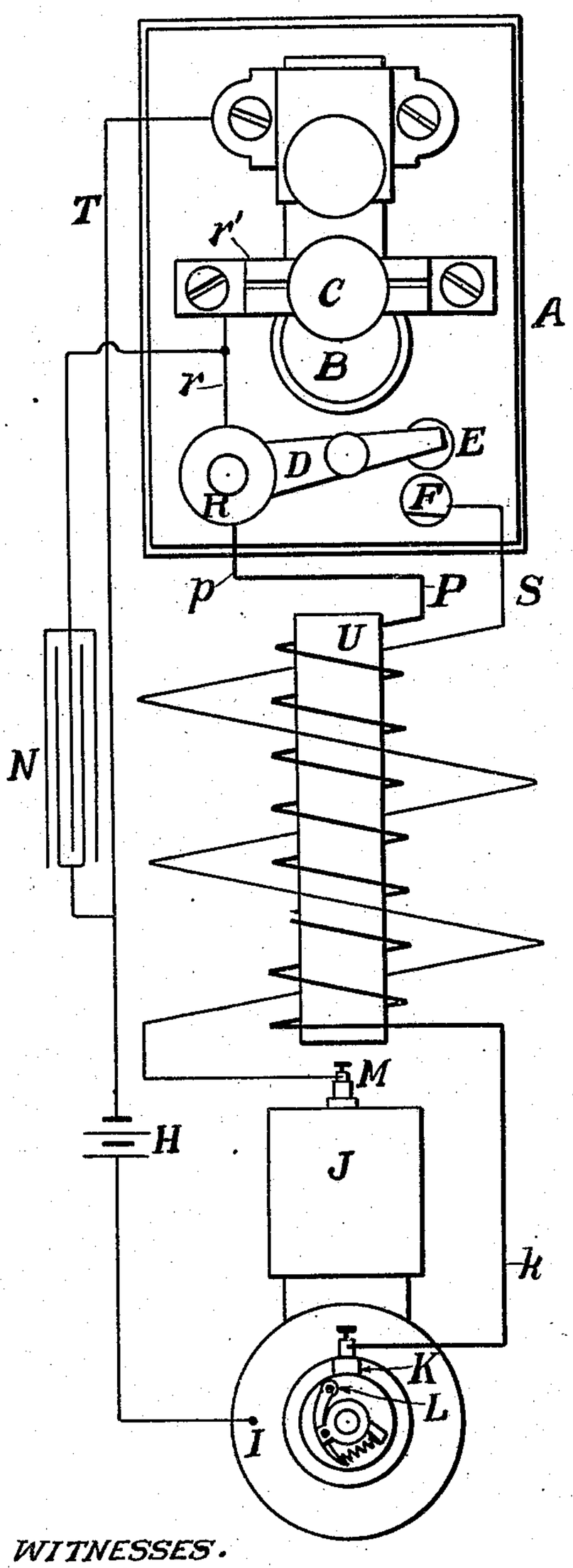
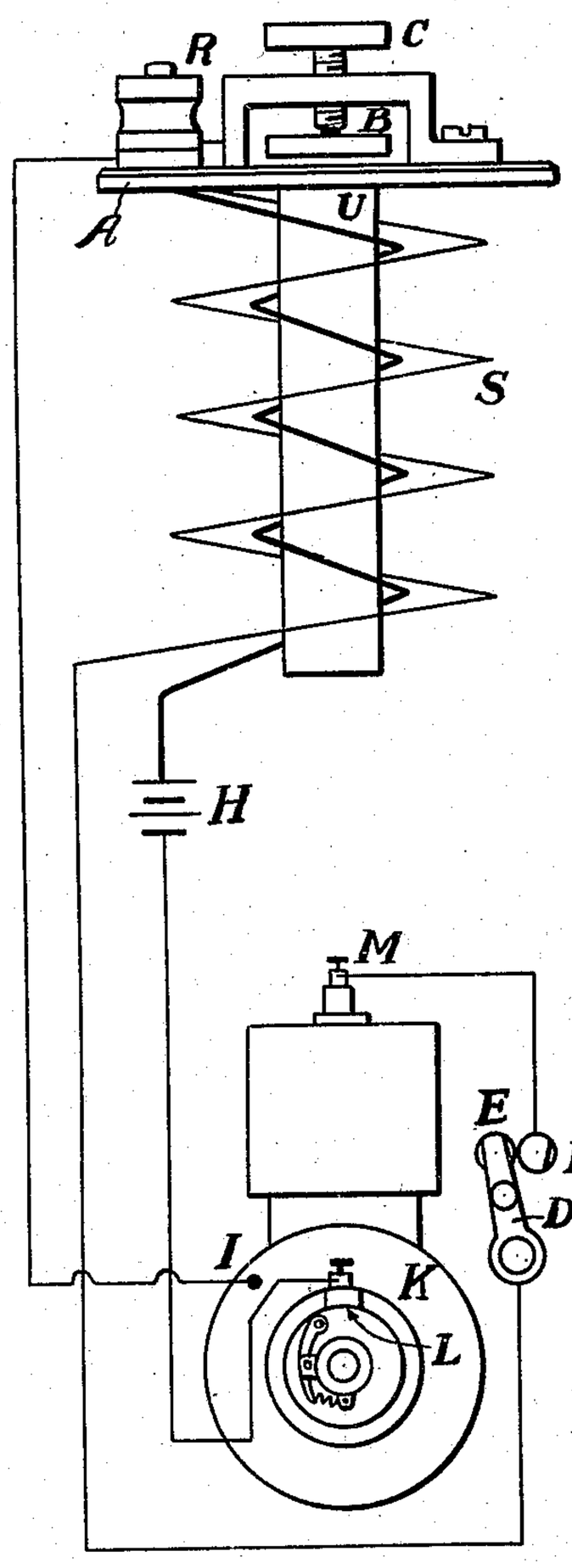


Fig. 2.



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ELECTRIC IGNITING SYSTEM.

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Application filed August 24, 1906. Serial No. 331,887.

To all whom it may concern:

Be it known that I, EDWARD Q. WILLIAMS, of Syracuse, in the county of Onondaga, in the State of New York, have invented new and useful Improvements in Electric Igniting Systems, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to certain improvements in electric igniting systems for vapor engines and analogous uses where an electric spark is used for the ignition of an explosive mixture and is usually associated with an induction coil in the sparking circuit of the gas engine. In the operation of this class of engines, various more or less delicate mechanisms, such as the spark coil and spark plug, carbureter or mixer and circuit make and break device are employed, all of which are active in the production and ignition of the explosive mixture, and are co-dependent one upon the other in obtaining the degree of working efficiency required of the engine, and it therefore follows that if any one of these mechanisms fails to perform its function the efficient operation of the engine is seriously impaired. These mechanisms are usually constructed and assembled in compact form in the machine and it is frequently difficult to determine which mechanism is at fault in case the engine fails to perform its function with the degree of efficiency required, and it is not uncommon for even the skilled attendant to overhaul several of these mechanisms before the trouble is located.

The essential object of my present invention is to provide means whereby the attendant may more readily locate any defect in the harmonious action of said mechanisms in order that such defect may be expeditiously removed without disturbing other parts.

The spark coil and its adjuncts, such as the vibrator or automatic circuit breaker is perhaps the most expensive and difficult of adjustment and when once constructed and adjusted to produce the desired spark should not be tampered with unless it is absolutely certain that the fault lies in some part of its mechanism.

The essential object therefore of my present invention is to avoid as far as practicable any interference with or overhauling of this particular mechanism by providing a gap and circuit closer in the sparking circuit where it is readily accessible and visible to the attendant so that by breaking the circuit at the gap he may readily determine by the spark, or absence of such spark at the gap whether or not the spark coil is performing its function satisfactorily without disconnecting or otherwise disarranging any of its parts.

If the spark is normal at the gap it is evidence that the coil is in perfect working condition, and that the fault, if any, lies either in the spark plug or some of the other mechanisms, thereby materially reducing the time and labor of locating the fault, and saving in a measure, the overhauling of the parts which are not at fault.

Figure 1 is a diagrammatic view of an electric igniting circuit shown as applied to a gas engine, the spark coil being shown diagrammatically, and the vibrator, with my improved spark tester, being shown in plan as mounted upon the head of the spark coil. Fig. 2 is a diagrammatic view of an electric igniting circuit in which the current tester is similar to that shown in Fig. 1, except that it is separate from the head of the spark coil.

It will be observed that in each of these modifications the igniting circuit is broken and provided with contact terminals at the gap and that a suitable circuit closer is employed to open and close the igniting circuit at such gap so that under normal working conditions the circuit is completed through the testing switch, but may be temporarily broken when testing to determine whether or not the spark coil is in perfect working order sufficient to produce a spark across said gap.

The usual method of testing may be termed an "audible" test; that is, the attendant depends upon the audible explosions, or absence of such explosions in the cylinder of the engine which requires a trained ear, particularly in the use of multiple cylinder engines, because the numerous sounds which accompany the action of the various mechanisms frequently mislead the attendant into the belief that the fault lies in the spark coil, when in reality it may be in the spark plug, carbureter or some other mechanism necessary to produce the proper explosion, and for this reason I have introduced the spark gap into the igniting circuit where it is readily accessible and visible.

In Fig. 1 of the drawings, I have shown a vibrator plate —A— of insulating material carrying an ordinary vibrating armature

—B— and its adjusting screw —C— which are electrically connected by wires —T— to a source of electric energy, as a battery —H—, and to a primary winding —P— of a spark coil having a core —U— and secondary winding —S—. The battery —H— is connected by wire —I— to the frame of a gas engine —J— which forms, as usual, an electric connection with a revolving contact terminal —L— of a circuit closer having a fixed terminal —K— connected by a wire —*k*— to one end of the primary coil —P. The other end of said primary coil is electrically connected by wire —*p*— to a binding post —R—, which in turn, is electrically connected by a wire —*r*— and metal frame *r'*— to the adjusting screw —C—, thereby completing the primary circuit.

The secondary winding —S— of the spark coil is electrically connected in the usual manner to a spark plug —M— of the gas engine —J—, except that the secondary circuit is broken at some convenient easily accessible place to form a spark gap, and in Fig. 1 I have shown such a break with terminals —E— and —F— slightly separated to form a spark gap, said terminals being in this instance, mounted upon an insulator head —A— of the spark coil, and are associated with a switch lever —D— which is mounted on the binding post —R— and is electrically connected in the secondary circuit and adapted to be moved into and out of contact with the terminals —E— and —F— for the purpose of testing the efficiency of the spark coil.

When the lever —D— is in contact with the terminal —F— the secondary circuit is complete without a break except at the terminals of the spark plug. When it is desired to test the efficiency of the spark coil, said switch lever is thrown into contact with the terminal —E— which is at this time electrically connected in the sparking circuit, leaving a spark testing gap between the terminals —E— and —F— whereby the attendant may readily determine by visual inspection whether or not the spark coil is performing its function with the required degree of efficiency. If so, it indicates that the fault, if any, lies in some of the other mechanisms, whereupon the switch lever —D— may be returned to its normal position in contact with the terminal —F—, or it may be left in contact with the terminal —E— without materially affecting the current energy at the spark plug.

In Fig. 2 I have shown a pair of terminals —E— and —F— spaced apart forming a gap in the igniting circuit, and a switch lever —D—, all of which parts are similar to those shown in Fig. 1, except that they are not mounted on the plate or head —A— of the spark coil and may be located in any convenient available place in proximity to or remote from said plate, but serve the same purpose and operate in the same manner as the similar tester shown in Fig. 1.

In the operation for testing for faulty action in the operation of the engine, a gap is established in the igniting circuit by throwing the switch —D— from the terminal —F— into contact with the terminal —E—, whereupon if the spark coil is performing its function with the required degree of efficiency, it is made visually apparent by a spark at the gap between the terminals —E— and —F—, indicating that the fault is in some of the other mechanisms, whereas, if the fault is in the spark coil, it will be similarly indicated by the absence or weakness of the spark at such gap. If the test is satisfactorily made and the trouble located the switch —D— may be returned to contact with the terminal —F— to re-close the igniting circuit, although as previously stated, the switch may be left in contact with the terminal —E— without materially affecting the current strength of the spark at the plug terminals.

What I claim is:

1. In combination with a spark coil, a spark plug in circuit with the secondary winding of the spark coil, terminals spaced apart forming an intervening spark gap, one of which is in circuit with the secondary winding of said coil, a switch member in electrical connection with the primary winding and in circuit with the secondary winding of the spark coil and movable alternately into and out of contact with either of said terminals whereby the secondary circuit may be opened and closed at will to test the condition of the spark coil.

2. In combination with a gas engine, a spark coil, spark terminals in the cylinder of the gas engine and in circuit with the secondary winding of the spark coil, additional spark terminals also in said secondary circuit, and a switch member in said circuit movable into and out of contact with either of said terminals to open and close said circuit to test the condition of the coil during the action of the engine.

3. In a spark testing device for electric igniting systems, a spark coil having spark terminals thereon spaced apart forming an intervening spark gap, one of said terminals being electrically connected to the secondary winding of the coil, and a switch member in said circuit and also mounted upon the coil and movable into and out of contact with either of said terminals.

4. In an electric igniting system for vapor engines, a spark coil, a spark plug in the secondary circuit of said coil, and means including a switch and contact terminals mounted on the coil, said terminals being placed apart forming an intervening spark gap, and the switch being movable into and out of contact with either of said terminals

for testing the condition of the coil while the engine is in action.

5. In combination with a jump spark coil, of terminals in circuit with the secondary winding of the spark coil and spaced apart forming an intervening spark gap, and an electric switch in said circuit movable into and out of contact with either of said terminals.

In witness whereof I have hereunto set my hand this 17th day of August 1906.

EDWARD Q. WILLIAMS.

Witnesses:
H. E. CHASE,
M. M. NOTT.