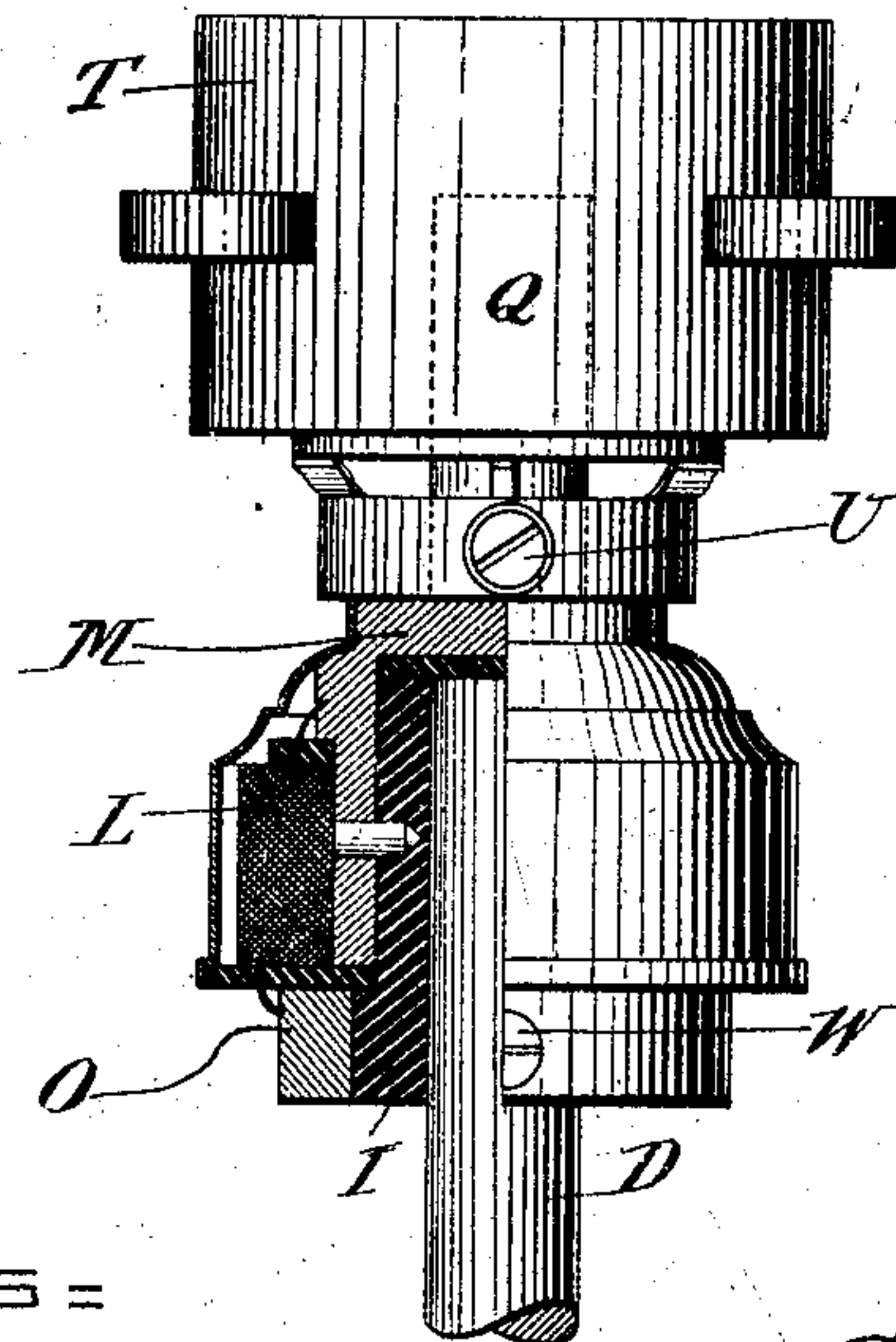
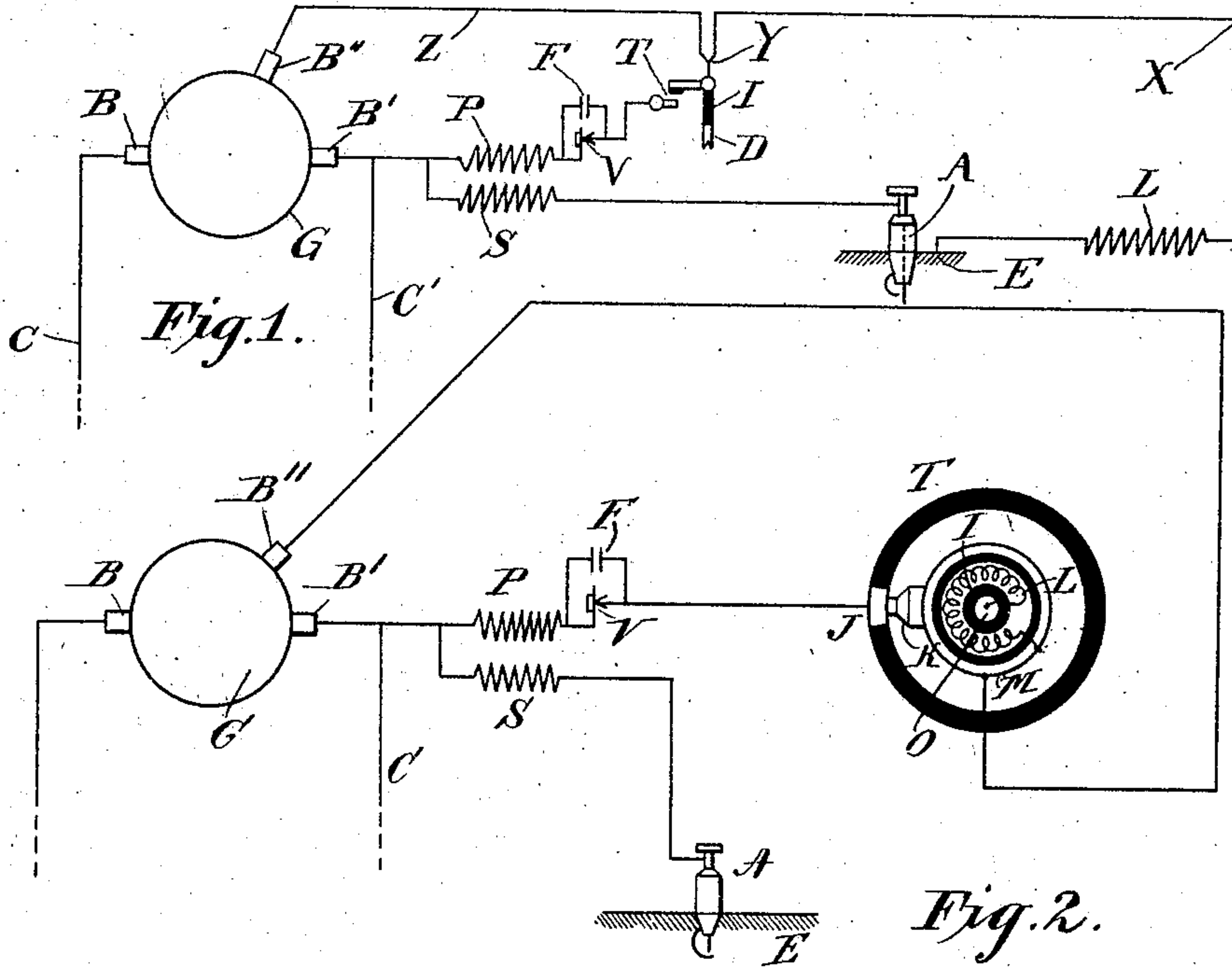


E. M. TORMIN.  
IGNITION SYSTEM FOR GAS ENGINE DYNAMO SETS.  
APPLICATION FILED MAR. 29, 1910.

994,288.

Patented June 6, 1911.



WITNESSES=

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# UNITED STATES PATENT OFFICE.

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## IGNITION SYSTEM FOR GAS-ENGINE DYNAMO SETS.

994,288.

Specification of Letters Patent.

Patented June 6, 1911.

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*To all whom it may concern:*

Be it known that I, EGMONT M. TORMIN, a subject of the Emperor of Germany, and a resident of Newton Center, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Ignition Systems for Gas-Engine Dynamo Sets, of which the following is a specification.

Heretofore it has been the practice to employ a magneto-generator to energize the ignition devices of gas-engines which are employed to drive electric generators, such magneto-generators being driven by the engine. This arrangement, however, is objectionable because of increased first cost and cost of maintenance, the life of the magneto-generator being limited.

It is therefore the object of the present invention to provide a simplified ignition system in which the magneto-generator heretofore employed is eliminated and the current for energizing the sparking-apparatus is obtained directly from the electric-generator which is mounted on the shaft of the gas-engine or otherwise driven thereby.

In carrying out my invention, I find it desirable in cases where the windings of the spark coil are conductively connected, to provide a protective resistance to prevent the short-circuiting of the armature through the engine-frame in the event of one of the generator leads becoming grounded, and to provide other means whereby the generator cannot become short-circuited through the timer under similar conditions. It is also desirable that said protective resistance be arranged in a member which serves as a coupling between the timer and the shaft which drives the same so that it cannot readily be removed.

In the drawings which accompany and form a part of this specification, I have shown in diagram several examples of apparatus and circuit arrangements whereby the foregoing objects have been realized in practice; but it will be understood that various modifications may be made both in the apparatus and circuit arrangements without departing from the principle of my invention.

Figure 1 is a diagram showing one embodiment of my improved ignition system

in which the primary and secondary of the spark-coil are conductively connected. Fig. 2 is a diagram showing the preferred form of my invention, and Fig. 3 is an elevation, partly in section, of one form of protective device.

In the drawings which I have selected for illustrating my invention, A represents a spark-plug, one terminal of which is grounded in the usual manner on the gas-engine cylinder E. In Fig. 1 the spark-plug is connected with the secondary S of the spark-coil and said secondary is conductively connected to the primary P. The spark-coil and spark-plug constitute the spark-producing apparatus, and the circuit through the same is completed through the vibrator V, timer T and protective device L, which as shown may be a high resistance.

For diverting a portion of the current of the generator G to the spark-producing apparatus, I prefer to employ an auxiliary brush B'' so related to one of the usual brushes as B' and adjustable with respect thereto, that any small difference of potential desired, for example, six volts, will be developed across the terminals of said brushes B', B'', and to connect the primary of the spark-coil and the timer in series with said brushes. The main brushes B, B' of the generator are connected respectively to the external circuit C, C'.

Inasmuch as the timer in the usual ignition systems, which are energized by magneto-generators or other sources of current independent of the generator driven by the gas-engine, is grounded on the gas-engine, it follows that in the arrangement shown in Fig. 1 the generator will be short-circuited through a timer so grounded if one of the leads C C' to the external circuit becomes grounded. Accordingly it is desirable in my system to insulate the timer from the engine, and this may be done in any suitable manner, as indicated in Fig. 1 by the insulation I interposed between the timer and the shaft D on which it is mounted.

In that embodiment of my invention shown in Fig. 1, the function of the protective resistance L is to prevent injury to the armature windings of the generator in the event of one of the leads C C' becoming grounded. If the protective resistance I



were not employed and the lead C should become grounded, an excessive rise of current would occur in the circuit B, C, E, X, Y, Z, B'' B; and should the lead C' become grounded under similar conditions, such excessive rise of current would occur in the circuit B' C' E, X, Y, Z, B'' B'. The path of the secondary current in Fig. 1 is from one terminal of the secondary S to A, the spark-gap of the plug, E, L, X, Y and thence back to the other terminal of the secondary by two paths, one of which is the path Y T F V P to S and the other path Y Z B'' B' to S. Should the L X Y circuit between the spark-plug and the timer become opened, as for instance by the removal of the resistance L, the insulation of the generator would be subjected to the full potential of the secondary S resulting in the breakdown of the same. This will be readily understood when it is noted that the generator frame, journals, armature shaft, and armature core are all in metallic contact with the engine frame and the engine cylinder. The latter, represented at E, is conductively connected through the spark-plug with one terminal of the secondary coil S. The other terminal of the secondary coil S is conductively connected to the armature winding through the brush B'. Thus between the armature core and the armature winding there would exist (were the circuit L X Y opened) a very high potential (such for example as 20,000 volts) with the result that the insulation of the armature winding, which is interposed between said winding and core, would be ruptured. The circuit L X Y connects E with the other terminal of the secondary coil S through the timer and the low-resistance primary (the path Y T F V P, about referred to) and through a portion of the armature winding (the path Y Z B'' B', above referred to) and thus closes the otherwise open circuit of the secondary, thereby preventing the excessive rise of pressure across the generator insulation. Accordingly, as shown in Figs. 2 and 3, I prefer to so arrange the protective resistance L that it cannot readily be removed to open said circuit. In the present case the timer T is secured in any suitable manner as by the screw U to the stud Q of a member herein shown as a casing which supports the protective resistance L and which in turn is secured to the shaft D by the screw W. The insulating bushing I is interposed between the shaft D and the member which carries the resistance L. The terminals of said resistance are connected respectively to the portion M of the casing and to the ring O, and the latter is electrically connected to the shaft D by the screw W which passes through the insulation I and contacts with said shaft. For simplicity the timer is

shown in Fig. 2 as having only one stationary contact J. The moving contact K is in electrical connection with the stud Q, and the part M, so that the circuit through the primary may be traced from the brush B' through primary P, vibrator V, contacts J, K, casing M, and back to the dynamo by way of the brush B''. The circuit of the secondary S, which includes the spark-plug A, is completed through the engine to the shaft D, ring O, high resistance protective resistance L, and casing M.

It will be noted that while a user of the apparatus might disconnect or short-circuit the resistance L in the simple arrangement shown in Fig. 1, the said resistance could not readily be removed in the arrangement shown in Figs. 2 and 3. Should the casing M, which carries the high resistance protective device and which serves as a coupling between the timer and the shaft which drives the same, be removed, and the timer placed directly on said shaft, the resulting arrangement would be identical with that shown in Fig. 1 if the circuit L X Y were removed and the insulation I eliminated. In other words, such removal of the coupling and the protective resistance contained therein would produce a system the defects of which it is the object of my invention to overcome.

I claim:

1. In an ignition system for a gas-engine dynamo set, a spark-producing apparatus for the gas-engine, said spark-producing apparatus comprising a spark plug, a timer, a shaft driven by the engine for driving said timer, a dynamo, means for diverting a portion of the current from said dynamo to energize said spark-producing apparatus, a protective resistance connected in the circuit of said spark-producing apparatus between said spark plug and timer, and a member carrying said protective resistance and serving as a coupling between said timer and said shaft.

2. In an ignition system for a gas-engine dynamo set, a spark-producing apparatus for the gas-engine, said spark-producing apparatus comprising a spark plug, a timer, a shaft driven by the engine for driving said timer, a protective resistance connected in the circuit of said spark-producing apparatus between said spark plug and timer, and a member carrying said protective resistance and serving as a coupling between said timer and said shaft.

3. In an ignition system for a gas-engine dynamo set, a spark-producing apparatus for the gas-engine, said spark-producing apparatus comprising a spark plug, a timer, a shaft driven by the engine for driving said timer, a protective resistance connected in the circuit of said spark-producing apparatus between said spark plug and timer, and



a member inclosing said protective resistance and serving as a coupling between said timer and said shaft.

4. In an ignition system for a gas-engine dynamo set, a member connected and arranged to serve as a coupling between a gas-engine-timer and the shaft of the engine which drives such timer, said member being provided with means for insulating the same from such shaft, means whereby a timer may be secured to said member, and a circuit-protective resistance carried by said member.

5. In an ignition system for a gas-engine dynamo set, a member connected and arranged to serve as a coupling between a gas-engine-timer and the shaft of the engine which drives such timer, said member being provided with means for insulating the same from such shaft, means whereby a timer may be secured to said member, and a circuit protective resistance inclosed within said member.

6. In an ignition system for a gas-engine dynamo set, a timer, an engine-driven shaft for driving said timer, a member connected and arranged to serve as a coupling between said timer and shaft, said member being provided with means for insulating the same from said shaft, means whereby said timer may be secured to said member, and a circuit-protective resistance carried by said member.

7. In an ignition system for a gas-engine dynamo set, a timer, an engine-driven shaft for driving said timer, a member connected and arranged to serve as a coupling between said timer and shaft, said member being provided with means for insulating the same from said shaft, means whereby said timer may be secured to said member, and a circuit-protective resistance inclosed within said member.

8. In an ignition system for a gas-engine

dynamo set, a spark-producing apparatus for the gas-engine, said spark-producing apparatus comprising a spark-plug, a timer, a shaft driven by the engine for driving said timer, a dynamo, means for diverting a portion of the current from said dynamo to energize said spark-producing apparatus, a protective resistance connected in the circuit of said spark-producing apparatus between said spark-plug and dynamo and a member carrying said protective resistance and serving as a coupling between said timer and said shaft.

9. In an ignition system for a gas-engine dynamo set, a spark-producing apparatus for the gas-engine, said spark-producing apparatus comprising a spark-plug, a timer, a shaft driven by the engine for driving said timer, a protective resistance connected in the circuit of said spark-producing apparatus between said spark-plug and dynamo, and a member carrying said protective resistance and serving as a coupling between said timer and said shaft.

10. In an ignition system for a gas-engine dynamo set, a spark-producing apparatus for the gas-engine, said spark-producing apparatus comprising a spark-plug, a timer, a shaft driven by the engine for driving said timer, a protective resistance connected in the circuit of said spark-producing apparatus between said spark-plug and dynamo, and a member inclosing said protective resistance and serving as a coupling between said timer and said shaft.

In testimony whereof, I have hereunto subscribed my name this 21st day of March, 1910.

EGMONT MAX TORMIN.

Witnesses:

E. B. TOMLINSON,  
GEO. K. WOODWORTH.