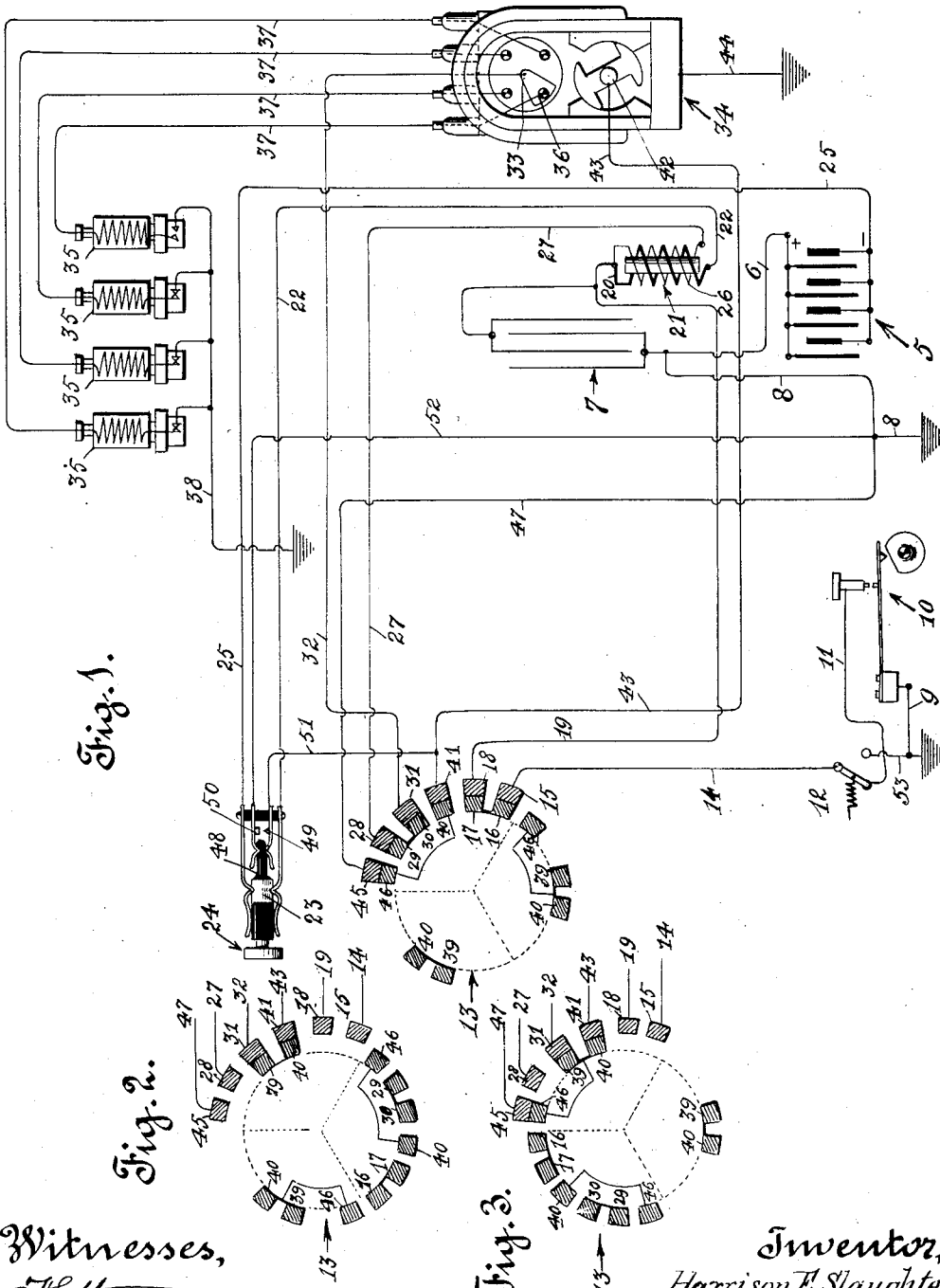


H. E. SLAUGHTER.
 STARTING SYSTEM FOR GAS ENGINES.
 APPLICATION FILED MAY 3, 1909.

999,894.

Patented Aug. 8, 1911.



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STARTING SYSTEM FOR GAS-ENGINES.

999,894.

Specification of Letters Patent.

Patented Aug. 8, 1911.

Application filed May 3, 1909. Serial No. 493,455.

To all whom it may concern:

Be it known that I, HARRISON E. SLAUGHTER, a citizen of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Starting System for Gas-Engines, of which the following is a specification.

My invention relates to a starting and auxiliary sparking system for gas engines equipped with magnetically operated make-and-break ignition plugs used in connection with a low tension magneto, and is capable of application to gas engines in general, but is especially advantageous when applied to automobile engines.

The object of this invention is to provide a simple and economic means other than manual for starting a gas engine provided with a low tension magneto system of ignition, and to keep the same running in case the magneto should be thrown out of commission.

I accomplish this object by means of the system herein described, and shown in the accompanying drawings, in which:—

Figure 1— is a diagrammatical representation of my auxiliary starting system. Fig. 2— is a diagram showing the position of controller when an engine is running on the magneto. Fig. 3— is a diagram of the controller when positioned for stopping the motor.

In the practice of my invention I make use of the current flowing from the secondary, or other battery, through a primary winding on a suitable coil which, when broken, sets up an induced current in the secondary winding of said coil of such voltage that when passed through the magnetic circuit, it will produce an arc sufficient to explode a charge of gas in some one of the engine cylinders. My invention resides in the novel arrangement of the circuits and electrical apparatus through which said current passes. These circuits I will now set forth in detail.

Referring more particularly to the drawing numeral 5 designates a source of auxiliary electrical energy which may be either a secondary battery, charged from the magneto if expedient, or an ordinary voltaic battery. From the positive pole of battery 5 leads a line conductor 6 to a condenser 7. At condenser 7 a grounded line 8 branches from line 6. A current passes from the

positive pole of battery 5 through lines 6 and 8 to ground, returning therefrom through line conductor 9 to the interrupter 10, and thence through line conductor 11 to a switch 12 which is normally closed. Should it happen that the contacts on the interrupter 10 should not be together, switch 12 is made to contact with auxiliary ground line 53, thus insuring a closed circuit for starting, that will hereinafter be more fully set forth. The current is controlled by a suitable controller 13. When the controller has been placed in the position indicated in Fig. 1, it will be seen that the current passes through line conductor 14 to contact 15, thence to contact point 16, over to contact point 17 and from there to contact spring 18. From contact 18 the current passes through line conductor 19 to condenser 7, and then flows through primary winding 20 of step-up coil 21 to, and through, line conductor 22 to a brass sleeve 23 on plug 24. Plug 24 will be described more fully hereinafter. From sleeve 23 the current passes by way of line conductor 25 to the negative pole of battery 5.

When it is desired to start the engine the switch 12 is operated to break the above described circuit. As hereinbefore noted, if the contacts on the interrupter are not together, the switch 12 is thrown to contact with auxiliary ground line 53, and from this position is operated to break the circuit. The breaking of the circuit in conjunction with the action of condenser 7 causes a secondary current to be induced in the secondary winding 26 of coil 21. This induced current is of proper voltage for use in the magnetic plugs of the magneto circuit. It may be here noted that my auxiliary system is designed to be operated with low tension magnetic plugs such as are used in the Bosch system of low tension magnetic ignition.

I will now describe the circuit of the induced current. It leaves the coil through line conductor 27 and flows to contact spring 28, thence through connecting contacts 29 and 30 on the controller 13 to contact spring 31. From contact 31 it flows by way of line conductor 32 to the central terminal 33 of the magneto 34, from which it is distributed to some one of the magnetic plugs 35 of the engine cylinders through a distributor arm 36 and the line 37 corresponding with that plug. From the

plug the current flows to ground (the frame of the machine in case of an automobile engine) by way of ground line 38, returning by way of ground line 8 to the positive pole of the battery. The current leaves at the negative pole of the battery, and passes by way of conductor 25 to brass sleeve 23, thence through line 22 and primary winding 20 of coil 21, there closing on itself.

The induced current causes a spark in some one of the magnetic plugs, as hereinbefore stated, and sets the piston of the corresponding cylinder in motion. It is evident that as the interrupter 10 is driven by the engine, it will periodically interrupt the primary circuit, thus causing the secondary current to flow to the distributing arm 36 where it is distributed as above noted. The interrupter is so geared that it breaks the primary current just as the edge of the distributing arm 36 engages some one of the contact points of the lines leading to the plugs. This operation will continue as long as the engine rotates, for since the timer arm is gear driven, as is common in machines of this type, said arm will cause each plug to receive the current in proper firing order.

While the engine is still running the controller is turned to cut out the auxiliary circuit. This is accomplished by turning the controller to the position indicated in Fig. 2, thus causing the contacts 39 and 40 on the controller barrel to engage contact springs 31 and 41, respectively. It will be seen that this action renders the battery or auxiliary current no longer active, as contact pieces 16 and 17 will no longer engage with contact springs 15 and 18. The magneto current then passes from the terminal cap 42 of the magneto through line conductor 43 to, and through, contacts 41, 40, 39 and 31, returning to distributing arm 36 by way of line 32. From the distributing arm 36 the current is distributed to the several plugs in the same order as indicated with the induced current, but returning to the magneto by way of ground line 44.

When it is desired to stop the motor the controller is turned so that it occupies the position indicated in Fig. 3. In this position the contact springs 41, 31 and 45 are short circuited by contacts 40, 39 and 46, respectively, on the controller barrel, said contacts 39, 40 and 46 being metallica lly connected. This will allow the current generated in the magneto to flow to ground through line 47, then back to the magneto through line 44, this being the easiest path, as practically no current flows through line 32, consequently the motor stops.

If desired, the motor may be stopped while the controller is in either position by withdrawing plug 24, which will break the circuits by removing the brass sleeve 23

from the contacts in lines 22 and 25 so that they will engage the insulation 48 at the end of plug 24 and thus break the battery circuit. The contacts on lines 22 and 25 are so proportioned that they will not come together should plug 24 become completely withdrawn. Said plug is of such dimensions that when removed sufficiently will cause the contacts on lines 22 and 25 to disengage sleeve 24, the contacts 49 and 50 will come together of their own tension which will permanently ground the magneto circuit through 51 and 52, respectively.

Since it will be impossible to start the motor on either the auxiliary or the magneto system without insertion of the plug 24, it will be seen that I have combined with my auxiliary system of ignition, a most effective means for virtually locking an automobile, or other engine, for the plug may be removed when the engine is left. It will also be noted that when starting or running on the battery that the magneto is grounded to contact springs 41 and 45 and controller contact pieces 40 and 46, respectively. This does away with any serious risk of voltage that might occur in the magneto while running idle.

Having described my invention what I claim as new and desire to secure by Letters Patent is:—

1. A low tension starting system for explosion engines, comprising a low tension magneto, an electromagnetic spark plug, a battery, a step up coil for said battery to produce an induced auxiliary current having a secondary winding connected with said spark plug, a magneto circuit passing through said spark plug and said magneto, an auxiliary battery circuit passing through said step up coil and said battery, a hand switch in said last circuit for opening said battery circuit to produce an induced current through said coil for actuating said spark plug, and a controller for controlling the circuits.

2. A low tension starting system for explosion engines comprising a low tension magneto, an electromagnetic spark plug, a battery, a step up coil for said battery to produce an induced auxiliary current having a secondary winding connected with said spark plug, a magneto circuit passing through said spark plug and said magneto, an auxiliary battery circuit passing through said step up coil and said battery, a hand switch in said battery circuit for opening the same to induce an auxiliary current in said coil, an interrupter coöperating with said battery circuit and adapted to be thrown into said battery circuit by said switch, and a controller for controlling the circuits.

3. A low tension starting system for explosion engines comprising a low tension

magneto, an electromagnetic spark plug, a battery, a step up coil for said battery to produce an auxiliary induced current, having a secondary winding connecting with
 5 said spark plug, a magneto circuit passing through said spark plug and said magneto, an auxiliary battery circuit passing through said step up coil and said battery, a hand operated switch lever, an interrupter, a contact
 10 in connection with said interrupter and cooperating with said hand operated switch lever to close the auxiliary circuit through said interrupter, a second contact cooperating
 15 with said hand operated switch lever to close the battery circuit, a distributor device in connection with said magneto cooperating with said interrupter, and a controller for controlling the circuits.

4. A low tension starting system for explosion engines comprising a low tension
 20 magneto, an electromagnetic spark plug, a battery, a step up coil for said battery to produce an auxiliary induced current, having a secondary winding connecting with said

spark plug, a magneto circuit passing through 25
 said spark plug and said magneto, an auxiliary battery circuit passing through said step up coil and said battery, a hand operated switch lever, an interrupter, a contact
 30 in connection with said interrupter and cooperating with said hand operated switch lever to close the auxiliary circuit through said interrupter, a second contact cooperating
 35 with said hand operated switch lever to close the battery circuit to cut out said interrupter, a distributor device in connection with said magneto cooperating with said interrupter, a condenser in connection with
 40 said battery circuit for reinforcing the induced current, and a controller for controlling the circuits.

In witness that I claim the foregoing I have hereunto subscribed my name this 27th day of April, 1909.

H. E. SLAUGHTER.

Witnesses:

T. L. MEAD, Jr.,
 EDMUND A. STRAUSE.