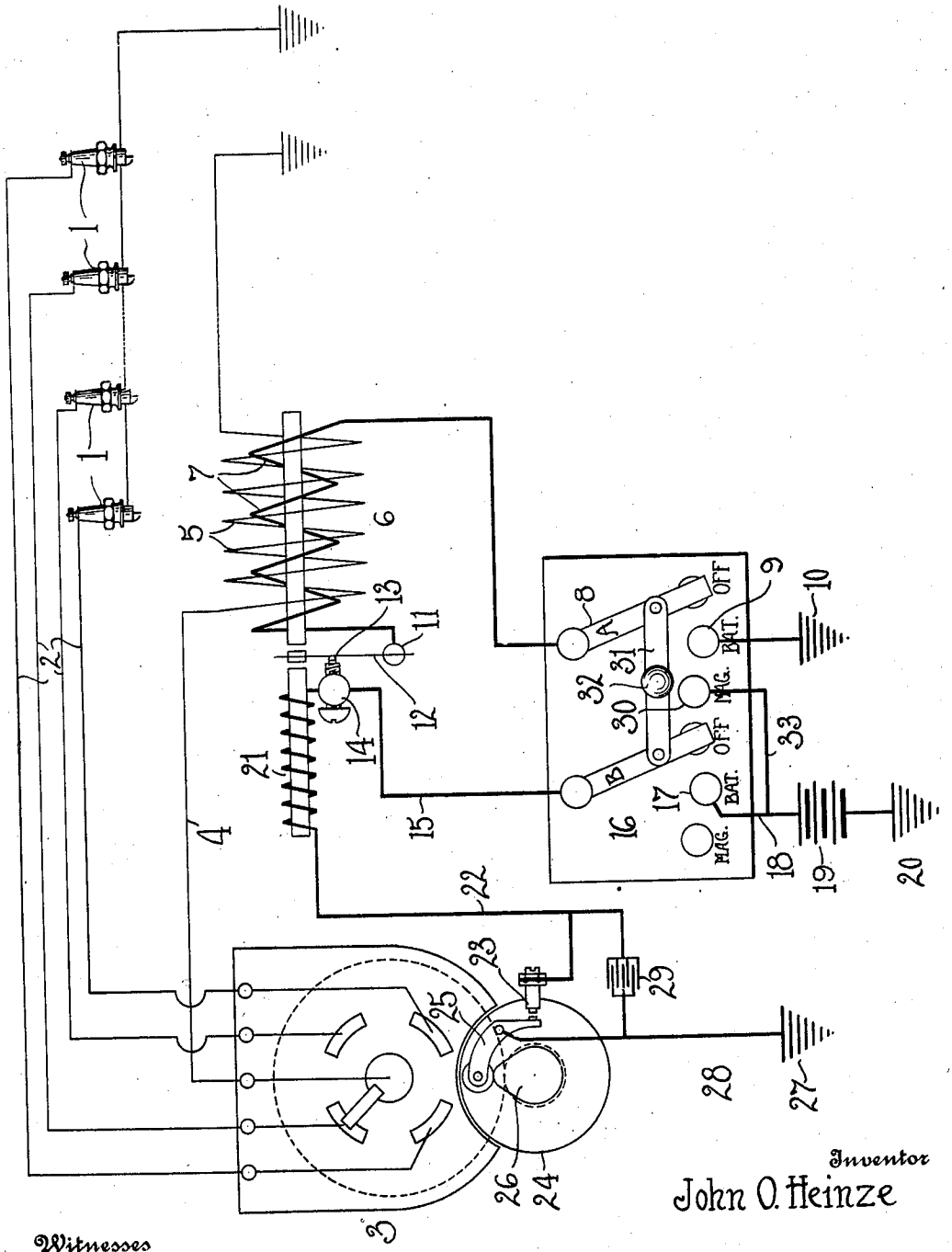
J. O. HEINZE.

IGNITION SYSTEM FOR INTERNAL COMBUSTION ENGINES.

APPLICATION FILED MAY 22, 1914.

1,122,001.

Patented Dec. 22, 1914.



Witnesses
Arthur F. Draper
Chas. W. Stauffiger

Inventor
John O. Heinze

By Carlton & Hadden
Attorneys

UNITED STATES PATENT OFFICE.

JOHN O. HEINZE, OF DETROIT, MICHIGAN.

IGNITION SYSTEM FOR INTERNAL-COMBUSTION ENGINES.

1,122,001. Specification of Letters Patent. Patented Dec. 22, 1914.

Application filed May 22, 1914. Serial No. 840,369.

To all whom it may concern:

Be it known that I, JOHN O. HEINZE, a citizen of the United States of America, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Ignition Systems for Internal-Combustion Engines, of which the following is a specification, reference being had therein to the accompanying drawings.

When an internal combustion engine is not running, the compression in the firing cylinder is usually low and the charge does not readily ignite. It is therefore found to be advantageous to cause a number of igniting sparks in rapid succession to insure ignition, and this is usually accomplished by means of a vibrator. It is also advantageous to provide means for producing an intermittent single spark after the engine is running, the vibrator being cut out to make it inoperative. The making and breaking of the circuit causes a movement of the vibrator while it is electrically inoperative and a constant buzzing sound and wear of the contact points results.

The object of this invention is to provide an electrical ignition system having an interrupter and a vibrator which vibrator may be rendered inoperative and to provide such a system with means whereby when the vibrator is electrically inoperative it will be automatically held to prevent wear of the parts and buzzing.

With this and other objects in view the invention consists in the construction and arrangement of parts, all as hereinafter more fully described and set forth in the appended claims, reference being had to the accompanying drawing, in which the figure is a diagrammatic view illustrating the invention.

The several spark plugs of an internal combustion engine are indicated at 1 and these sparking devices are connected by wires 2 with the usual distributer 3 which in turn is connected by a wire 4 with the secondary winding 5 of a spark coil 6, the other end of the secondary winding being grounded. The primary winding 7 of the coil 6 is connected at one end with a switch arm 8 adapted to engage a contact 9 and electrically connect the primary winding of the coil with the ground as indicated at 10. The other end of the primary winding of the coil 6 is connected to the post 11 of a flexible vibrating arm 12 having a contact 13 which normally engages a like contact on a post 14 which is connected by a wire 15 with a switch arm 16 similar to the arm 8. The arm 16 is adapted to be swung into engagement with the contact 17 and this contact is connected by a wire 18 with a battery 19 or other source of electrical energy having its opposite terminal grounded, as at 20.

The vibrator arm 12 extends with its free end a short distance from the end of the spark coil 6 and arranged in longitudinal alinement with the spark coil and at the opposite side of the vibrator, is an electromagnet 21 having one end of its winding connected to the post 14 and the other end of its winding connected by a wire 22 with a contact 23 of a circuit breaker 24 having the usual pivoted arm 25 carrying a contact to engage the member 23 and operated by means of a cam 26 to open and close the circuit from the electromagnet 21 to the ground at 27 through the wire 22 and said contacts and a wire 28 which is connected to the arm 25 of the circuit breaker. The usual condenser 29 is connected across between the wires 22 and 28.

An extra contact 30 for the switch arm 8 is so placed that said arm may be swung into contact therewith, the arm 16 being simultaneously swung out of contact with the contact member 17 to open the circuit through the wires 15 and 18, this simultaneous swinging of the switch arms being accomplished through the ordinary insulated connecting bar 31 provided with a handle 32 for operating the switch. The contact 30 is connected to the battery 19 by means of a wire 33 or said wire may lead to a magneto or other suitable source of electrical energy.

When the arm 8 is swung into engagement with the contact 9 and the arm 16 into engagement with the contact 17, current will pass from the battery through the arm 16 to the post 14 where it will divide, provided the circuit from the electromagnet 21 to the ground is closed by the circuit breaker 24, and part of the current will pass through the magnet 21, wire 22 and contacts of the circuit breaker 24 to the ground. The other part of the current will pass from the post 14 through the vibrator arm 12 owing to the fact that said arm is normally in contact

with the post, and will then pass through the primary winding of the spark coil and through the switch arm 8 to the ground, energizing the coil.

As long as the contacts of the circuit breaker are closed, part of the current will flow through the electromagnet 21 and part through the spark coil, thus energizing both, but as the electromagnet is arranged to exert a greater attractive force upon the vibrator than does the coil, the vibrator will be held in contact with the post. As soon as the circuit of the electromagnet is broken by the circuit breaker, all the current will pass by way of the vibrator through the primary winding of the spark coil and a rapid vibration of the arm 12 will be set up, thus inducing currents in the secondary winding and producing a multiplicity of sparks at the sparking terminals of the spark plugs for the purpose of insuring ignition in starting the engine.

As soon as the engine is started and there is no further necessity for producing a multiplicity of sparks, the switch arm 8 is swung into engagement with the contact 30 and the shunt circuit from the battery to the post 14 is opened by simultaneously swinging the arm 16 out of engagement with the contact 17. Current then flows through the wire 33 from the battery or other source of electrical energy and through the arm 8 to the primary winding of the spark coil. The opposite end of the primary being connected to the vibrator arm, the current flows through said arm and contacts 13 to the post 14 and electromagnet 21 to the ground by way of the wire 22, circuit breaker 24, and wire 28. In passing through this circuit, the spark coil and electromagnet are both energized and as before, the electromagnet exerts a stronger pull on the vibrator arm than does the spark coil, thus holding said arm firmly against the post 14. When the circuit is broken by the circuit breaker, there is therefore no tendency of the arm to vibrate and a single spark ignition is provided by the action of the interrupter or circuit breaker 24.

A very simple ignition system is thus secured in which sparks are produced by a vibrator for starting purposes and a single spark ignition secured by a shifting of the switch which also cuts out the vibrator and causes the same to be automatically held against vibration while the single spark ignition is being used.

A magneto may be connected up by means of the wire 33 in the usual manner so that battery current will be used in starting and magneto current supplied for running the engine.

Obviously, other changes may be made in the construction and arrangement of parts without departing from the spirit of my invention and I do not therefore limit myself to the particular construction or arrangement shown.

Having thus fully described my invention what I claim is:

1. In an ignition system for internal combustion engines, the combination of an electric circuit, a vibrator, and a spark coil arranged in series in said circuit, a source of electrical energy for the circuit, and electromagnetic means for holding the vibrator from vibrating with the circuit closed thereby to give a single spark upon the breaking of the circuit by the interrupter.

2. In an ignition system for internal combustion engines, the combination of an electric circuit, an interrupter, a vibrator and a spark coil arranged in series in said circuit, a source of electrical energy for the circuit, electromagnetic means for holding the vibrator from vibrating with the circuit closed, and means for intermittently deënergizing the electro-magnetic means to permit the vibrator to open the circuit.

3. In an ignition system for internal combustion engines, the combination of an electrical circuit, a source of electrical energy for said circuit, a spark coil for said circuit, a vibrator arranged to be magnetically operated by said coil, and electro-magnetic means to act magnetically upon said vibrator in opposition to said coil.

4. In an ignition system for internal combustion engines, the combination of an electric circuit, a source of electrical energy in said circuit, a spark coil in said circuit, a vibrator arranged to be magnetically operated by said coil, electro-magnetic means in said circuit to act magnetically upon said vibrator in opposition to said coil, and an interrupter to break the circuit of the electro-magnetic means and permit the vibrator to vibrate.

5. In an ignition system for internal combustion engines, an electrical circuit including a source of electrical energy, and a spark coil, an interrupter in said circuit, a vibrator in the circuit, a shunt circuit around the vibrator and coil, and means for alternately connecting the circuit and the shunt circuit with the source of electrical energy.

6. In an ignition system for internal combustion engines, the combination of an interrupter, a vibrator, and a spark coil arranged in series, a source of electrical energy, and means for short circuiting the interrupter and simultaneously grounding the coil, said means being also adapted to connect said coil with the source of electrical energy and to open the short circuit.

7. In an ignition system for internal combustion engines, the combination of a spark coil having a primary and a secondary winding, a distributer to which the secondary winding is connected, a series of spark-

ing devices electrically connected to the distributer, a source of electrical energy, an electrical circuit including the primary winding of the spark coil, a mechanical interrupter for said circuit, a vibrator in said circuit, a shunt circuit around the vibrator and coil, and means for connecting the shunt circuit with the source of electrical energy and simultaneously grounding the circuit of the coil, said means being also adapted to open the shunt circuits and simultaneously connect the circuit of the coil with a source of electrical energy.

8. In an ignition system for internal combustion engines, the combination of an electrical circuit including a source of electrical energy, a spark coil, an electromagnet, a vibrator between the coil and magnet and a mechanical interrupter in the circuit, and means for short circuiting the magnet and grounding the coil.

9. In an ignition system for internal combustion engines, the combination with a spark coil having a primary and secondary winding and an igniter electrically connected with the secondary winding, of an electrical circuit including the primary winding of the coil, a source of electrical energy for said circuit, an interrupter for said circuit, an electro-magnet in the circuit, a vibrator between the electro-magnet and coil, a shunt circuit around the vibrator and coil, means for connecting the shunt circuit with the source of electrical energy and grounding the primary of the coil, said means being adapted to open the shunt circuit and connect the primary with a source of electrical energy.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN O. HEINZE.

Witnesses:

LEWIS E. FLANDERS,

G. E. MCGRANN.