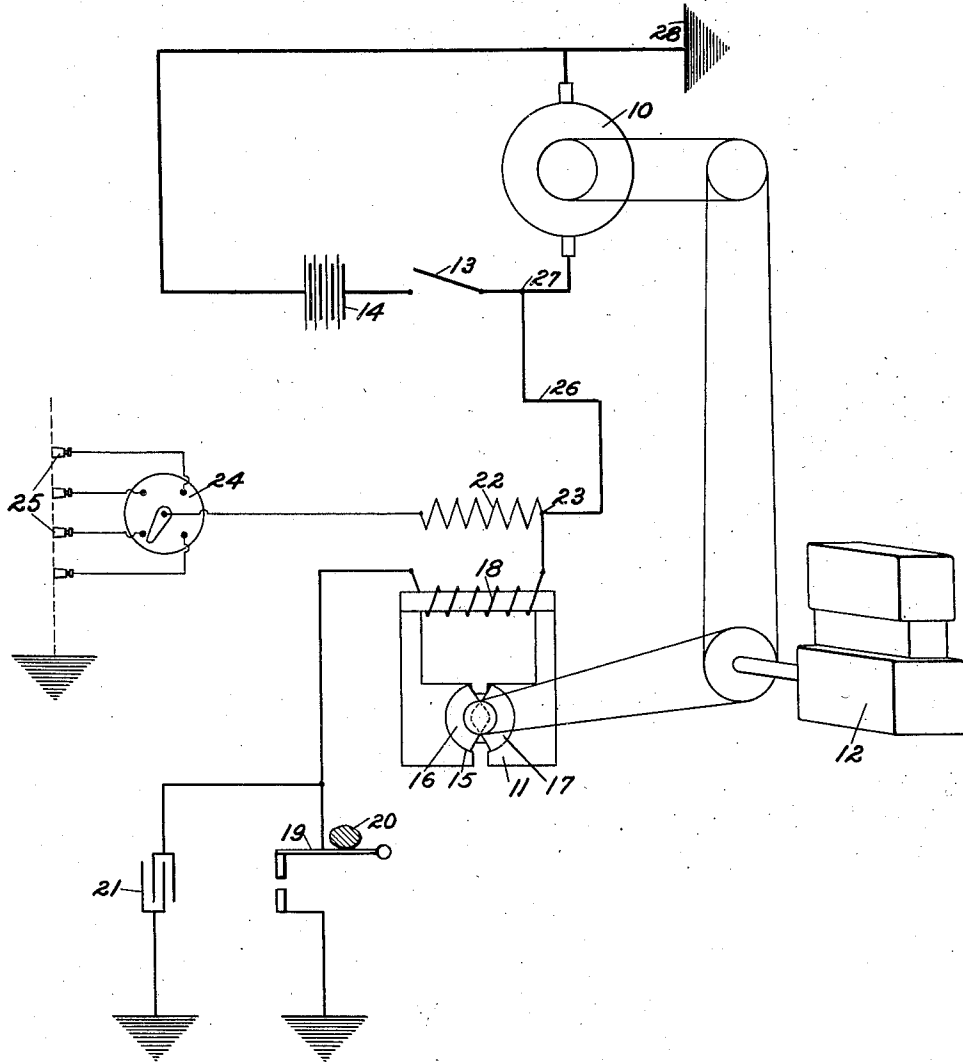


H. T. DUKET.
IGNITION SYSTEM.
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1,416,802.

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IGNITION SYSTEM.

1,416,802.

Specification of Letters Patent.

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To all whom it may concern:

Be it known that I, HENRY T. DUKET, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, have invented certain new and useful Improvements in Ignition Systems, of which I declare the following to be a full, clear, and exact description.

This invention relates to ignition and starting apparatus for automobiles, and particularly to such apparatus as includes an electric starting motor, a storage battery and a magneto generator.

In magneto ignition, the magneto electric generator is ordinarily geared to the engine shaft. In consequence, the rotary speed of the magneto and resultant spark intensity is dependent upon the engine speed and as a result for slow engine speeds such as occur at starting, the spark intensity is relatively low. The present invention has for its object to provide means whereby the ignition spark is intensified above its normal value during the process of starting.

The invention contemplates the provision of means whereby the battery current which normally flows in the starter-motor circuit when the engine is being started, is shunted through the magneto thereby largely increasing the field flux thereof.

An additional object considered is to provide means whereby the battery current is conducted into the magneto circuit without commutation.

The above objects, and other objects comprehended within this invention, will become apparent in the subsequent detailed description.

In the accompanying drawing the figure shows a diagrammatic view of the invention. The starting motor 10 and the magneto 11 are shown operatively connected with the engine 12. The motor is included in a storage battery circuit wherein is provided a switch 13 and a storage battery 14.

The magneto 11 is preferably of the high tension inductor type employing a rotor 15 without windings.

This rotor consists of two polarized magnetic members 16 and 17 connected by non-magnetic material, which induce an alternat-

ing E. M. F. in the primary 18. An interrupter 19, adjusted to break the primary circuit when the current is at its maximum value, is placed in this circuit and grounded as shown. It is operated by a revolving cam 20 geared to the magneto rotor 15. A condenser 21 is shunted around the interrupter 19 and both are grounded. The secondary coil 22 of the magneto field is grounded on the primary at 23 and is connected to the distributor 24 where electrical connection is made with the spark plugs 25 in the various cylinders.

The starting motor and magneto, as described to this point, form independent operative units. My invention consists in connecting these independent units in such a manner that a third independent unit is formed. This I accomplish by connecting by means of a wire 26, the primary circuit of the magneto as at 23 to the starting motor circuit at a point 27, between the switch 13 and the motor 28. To complete the primary circuit the opposite side of the motor is preferably grounded as at 28.

The operation of this system follows:

When the starting switch is closed, the starting motor is set in operation, which turns over the engine and rotates and magneto armature at a relatively low speed. Simultaneously the battery voltage is impressed on the magneto primary winding which on the actuation of the interrupter causes a more intense spark in the cylinders. When the engine is in operation by its own power and the battery circuit is opened, the magneto will have attained a speed of rotation effective for proper ignition, the primary circuit being grounded at this time through the starting motor.

As already stated the magneto current is alternating and it therefore will be cumulative with battery current for one direction only. But the initial magneto current is so small relative to the battery current, that its alternations will not materially modify the battery current. In the event that the magneto attains such a speed under the starting motor power that its current strength generated approaches that of the battery, there will be alternative intense sparking which

will still be very efficacious in starting the engine ignition.

I am aware that duplex systems of ignition have been in use with the revolving coil type of magneto. But in such cases it became necessary to commutate the direct current to alternating current within the magneto armature in order to permit building up of magneto current. In the means I have described, duplex ignition is provided in which commutation is unnecessary.

Variations of my preferred arrangement may occur to those skilled in this art and it is therefore my intention to cover such modifications as may be comprehended within the scope of the claims hereto appended.

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

1. In combination, a starting system for an internal combustion engine including a battery and a switch therefor, an ignition system for said engine including a magneto having a winding and an interrupter and means independent of said switch for connecting said winding and said interrupter with said starting system in a series circuit whereby when said starting switch is closed current may flow from the battery to the magneto and interrupter.

2. In combination, a starting system for an internal combustion engine including a battery and a switch in series therewith, an ignition system for said engine including a magneto having a winding and an interrupter and means independent of said switch for connecting said winding and said interrupter in series to said starting system such that the starting switch controls the battery discharge through both the starting and the ignition system.

3. In combination, a starting system for an internal combustion engine including a battery, a dynamo-electric machine and a starting switch therefor, an ignition system for said engine comprising primary and secondary windings and an interrupter, means for connecting said primary winding and said interrupter directly through said dynamo electric machine to form a complete series circuit independent of said switch.

4. In combination, a starting system for an internal combustion engine including a motor, a battery and a controlling switch, an ignition system for said engine including a magneto having a winding and an interrupter, and means independent of said switch for connecting said interrupter in circuit with said winding and with said starting system whereby the flow of battery current through said winding is interrupted by said interrupter when starting.

5. In combination, an electric starting system for an internal combustion engine comprising a battery and a starting motor,

an ignition system for said engine comprising a magneto and an interrupter normally connected across said motor, and a starting switch for closing a circuit between said battery and said motor.

6. In combination, a battery, a starting motor for an internal combustion engine in circuit therewith, an ignition system for said engine comprising a magneto having an interrupter, means electrically connecting said ignition system directly across said motor and a single switch for controlling the flow of current from said battery to said motor and to said magneto.

7. In combination a starting system for an internal combustion engine comprising a battery, a motor and a starting switch in circuit therewith, an ignition system for said engine comprising a magneto and circuit connections independent of said starting switch between said ignition system and said starting system, said starting switch controlling the flow of battery current to both the motor and the magneto.

8. In combination, a starting system for an internal combustion engine including a battery, a motor and a starting switch with connections therebetween, a magneto comprising a coil and an interrupter adapted to be driven by and to supply ignition current to said engine and means for permanently connecting said coil and interrupter in series across said motor so that the magneto will be assisted by the battery during the starting of the engine.

9. In combination, an electric starting system including a battery, a motor, and a switch and an ignition system including a magneto permanently connected across said motor.

10. In combination, a starting motor adapted to be connected to a source of energy for starting an internal combustion engine, a magneto adapted to be driven by and to supply ignition current to said engine and means for permanently connecting said magneto across said motor.

11. In combination, an internal combustion engine, a starting motor operatively connected thereto, a storage battery and a controlling switch in circuit with said motor, a magneto adapted to be driven by said engine and to furnish ignition current thereto, said magneto having a primary winding and an interrupter, one terminal of each being connected together, and circuit connections independent of said switch between the other terminal of said winding and one terminal of said motor and between the other terminal of said interrupter and the other terminal of said motor whereby when said motor is energized to start the engine energy is also taken from the battery to assist the magneto.

12. In combination, a starting system for

an internal combustion engine including a battery, a dynamo-electric machine and a controlling switch therefor, an ignition system for said engine comprising primary and 5 secondary windings and an interrupter and means independent of said switch for connecting said ignition system in a closed series circuit with the dynamo-electric machine whereby when said switch is closed both said dynamo-electric machine and said 10 ignition system are energized by said battery.

In testimony whereof I affix my signature.

HENRY T. DUKET.