G. W. WACKER.

ELECTRICAL SYSTEM FOR MOTOR VEHICLES.

APPLICATION FILED NOV. 12, 1917.

1,269,344. Patented June 11, 1918.

Fig. 1.

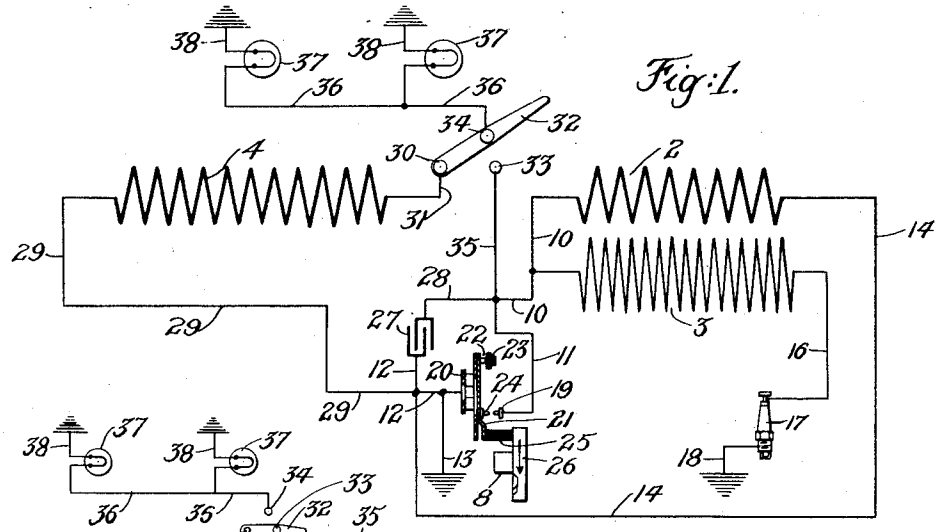
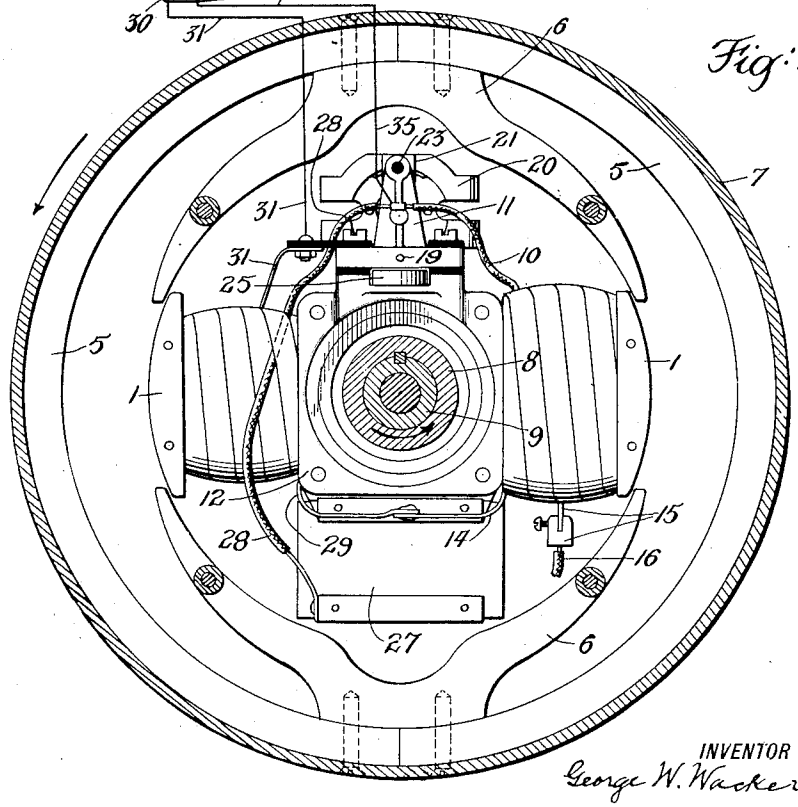


Fig. 2.



INVENTOR

George W. Wacker

BY

Williams & Pritchard

ATTORNEYS

UNITED STATES PATENT OFFICE.

GEORGE W. WACKER, OF RUTHERFORD, NEW JERSEY, ASSIGNOR TO NATIONAL CARBON COMPANY INC., OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

ELECTRICAL SYSTEM FOR MOTOR-VEHICLES.

1,269,344. Specification of Letters Patent. Patented June 11, 1918.

Application filed November 12, 1917. Serial No. 201,689.

To all whom it may concern:

Be it known that I, GEORGE W. WACKER, a citizen of the United States, residing at Rutherford, county of Bergen, State of New Jersey, have invented a certain new and useful Improvement in Electrical Systems for Motor-Vehicles, of which the following is a specification, reference being had therein to the accompanying drawings, forming part thereof.

My invention relates to electrical systems for use upon motor vehicles, for effecting ignition in their internal combustion engines and for lighting purposes, and my present invention includes or is a further development of my patented invention, Patent No. 1,224,244, of May 1, 1917, for magneto. The principal object of my invention is to provide an electrical system in which a magneto of the fly-wheel type can be efficiently employed both for ignition and for lighting purposes. Other more particular objects and advantages of my invention will hereinafter appear.

My above noted patent discloses a magneto armature having a primary winding forming a primary coil, a secondary winding forming a high tension coil, and also a separate or independent winding forming a supplemental reinforcing coil for the primary coil, for augmenting the inductive effect upon the secondary coil. When the engine is running slowly, as in starting, I have found this supplemental reinforcing coil to be very advantageous, but after the engine has attained its higher normal running speed, I have found that the magneto will operate efficiently for ignition purposes without this reinforcing coil. According to my present invention I provide for employing such a separate coil as a reinforcing coil during the starting of the engine and until it has attained its normal high speed, and under normal running conditions of the engine I provide for employing this separate coil for lighting purposes. My present invention includes in combination such a separate armature coil adapted to serve as a reinforcing coil for the usual primary armature coil and also to be employed for providing illumination, according to the conditions which may prevail. My invention also includes features of construction and combinations of parts, as will appear from the following description.

I shall now describe the electrical system illustrated in the accompanying drawings as an embodiment of my invention, and shall thereafter point out my invention in claims.

Figure 1 is a diagram of the circuits.

Fig. 2 is an elevation of the magneto with the rim, hub and shaft of the fly-wheel, together with other parts, in vertical section, and illustrates, partly in diagram, the wiring connections of the circuits.

The electrical system embodying my invention illustrated in the accompanying drawings includes an electric generator which is a magneto of the fly-wheel type, comprising a stationary magnetizable armature core 1, having thereon at one end a usual primary coil 2, and a usual secondary high tension coil 3 in inductive relation with the primary coil 2, the primary coil or primary winding 2 being composed, as is usual, of a comparatively few turns of large or coarse wire, and the secondary coil 3 being composed, as is usual, of a large number of turns of fine wire wound in the usual way upon or over the primary winding 2. Upon the other end of the armature core 1 there is a separate and independent winding or coil 4 composed of large or coarse wire similar to the primary coil 2, and in fact, the same kind of wire may be employed for the primary coil 2 and for the independent coil 4, and the independent coil 4 may have as many turns of wire as conditions may require, and is shown diagrammatically in Fig. 1 as having a larger number of turns than the primary coil 2.

In the magneto construction illustrated in the drawings, the armature core 1, having thereon the primary coil 2, secondary coil 3, and independent coil 4, is surrounded by a rotative magnetic field provided by two semicircular permanent magnets 5 forming together a circular or ring-shaped magnet provided at the inner side with two oppositely arranged pole pieces 6. The magnets 5 are carried by a non-magnetic shell 7 forming part of a fly-wheel having a hub 8 fixed upon a rotative shaft 9. It is to be noted in this connection that the magnetizable armature core 1 extends or projects at opposite sides of the rotative shaft 9 forming the axis of rotation of the rotative field, the primary coil 2 and secondary coil 3 being located on the armature core 1 at one side of this shaft 9, and the separate or independent coil 4

being located on the other end of the armature core 1 at the opposite side of the shaft 9. The location of the independent coil 4 in separated or segregated relation to the secondary high tension coil 3 provides for the utilization of this independent coil 4 for an independent purpose, such, for example, as to supply current to a lighting circuit or lamp circuit, and also provides for the use or utilization of this separate and independent coil 4 as a supplemental or reinforcing coil for strengthening or augmenting the inductive effect of the primary coil 2 in its inductive relation to the secondary coil 3, as is fully disclosed in my above mentioned Patent, No. 1,224,244 of May 1st, 1917, for magneto.

In the construction illustrated in the drawings, one end of the winding of the primary coil 2 is connected by means of a conductor 10 to a conductive connector piece or contact post 11, which in Fig. 1 is diagrammatically indicated merely as an electrical conductor represented by a line. The electrically conductive post 11 is mounted upon and insulated from an electrically conductive stationary armature frame 12, which in Fig. 1 is diagrammatically represented by a line 12 to indicate a conductive part having a ground connection 12 to the frame of the vehicle. The other terminal of the primary coil 2 is connected by means of a conductor 14 to the grounded armature frame 12. One end of the high tension secondary coil 3 is connected to the conductor 10 between the primary coil 2 and the conductive contact post 11 without being exposed or brought to the outside of the armature, and the other end of this high tension secondary coil 3 is brought to the outside of the armature windings through a connecting device 15 forming the subject of my Patent No. 1,224,246 of May 1, 1917, for high tension coil, and is connected by means of a conducting wire 16 to one terminal of a usual spark plug 17 forming a spark gap, as is well known, and the other terminal of which has a grounded connection 18.

A circuit breaker of any suitable construction may be interposed between the conductive connector piece or contact post 11 and the grounded armature frame 12. The circuit breaker illustrated in part in the accompanying drawings forms the subject of my Patent No. 1,224,245 of May 1, 1917, for magneto, and will now be briefly but sufficiently described for present purposes. A stationary contact stud 19 is mounted upon and in electrical connection with the insulated connector piece 11. A sheet metal circuit-closing or contact-making push spring 20 is mounted upon and is in electrical connection with the electrically conductive armature frame 12. This circuit-closing or contact-making spring 20 carries a contact-breaking lever bar 21, which at its upper end is provided with a fulcrum pin 22 which rests upon a fulcrum block or bearing 23 of insulating material carried by the contact post 11. Near its lower end the lever bar 21 carries a contact stud 24, which is movable with the lever bar 21, and cooperates with the stationary contact stud 19. The lower projecting end of the circuit-breaking lever bar 21 is shown as offset away from the circuit-closing spring 20, and this offset end of the lever bar 21 is coöperative with a cam roller 25 of suitable insulating material, such as vulcanized fiber. The cam roller 25 is loosely contained in a slot in the armature frame 12, adjacent to the face of the contact post 11. At one side the cam roller 25 is engageable with the adjacent end of the lever bar 21, and at the other side the cam roller 25 is adapted to be engaged and operated by a rotating cam 26, which is carried by the fly-wheel hub 8 and which has as appears in Fig. 1, a depressed cam surface for permitting the spring 20 to close the circuit and keep it closed for a short period, and a raised cam surface for separating the movable contact stud 24 from the stationary contact stud 19, for breaking the circuit and holding it open for a longer period. The contact terminals 19 and 24 of the circuit breaker are shunted in the usual manner by a spark-absorbing condenser 27, one side or one of the terminals of which is grounded upon the armature frame 12 and the other side or terminal of which is shown as connected by means of a wire 28 to the conductive contact post 11.

One end or terminal of the separate or segregated coil 4 is grounded on the armature frame 12 through a conductor 29. The other end or terminal of the independent coil 4 is connected to and controlled by a circuit controller, which is shown as a two-way switch having a terminal 30 to which the end of the winding of the segregated coil 4 is connected by means of a conductor 31, and upon which is pivoted a manually operable switch lever 32, which is adapted to engage either one or the other of two separated contact terminals 33 and 34. One of these terminals 33, shown in the drawings as the lower one of the two, is connected by means of a wire 35 to the insulated connector piece or contact post 11. A conductor 36 of a lighting circuit or lamp circuit is connected to the other switch terminal 34, and this lamp circuit is shown as containing two incandescent electric lamps 37, shown as arranged in parallel and having ground connections 38.

It will now be evident that by operating the switch lever 32, the independent or segregated coil 4 may be connected in a circuit with the primary coil 2 and secondary high tension coil 3, to the exclusion of the

lamps 37 of the lighting circuit 36, as appears in Fig. 2 of the drawings; or this independent coil 4 may be connected in a circuit with the incandescent lamps 37 to the exclusion of the primary and secondary magneto coils 2 and 3, as appears in Fig. 1 of the drawings. It is to be understood of course that the circuit connections of the coils are such that the independent coil 4 will at all times coöperate with or act in harmony with the primary coil 2 in its inductive effect, and not in opposition thereto.

When the switch lever 32 engages the lower switch terminal 33, the independent coil 4 then acts as a supplemental or reinforcing coil for the primary coil 2, in the same manner as is described in my hereinbefore mentioned Patent, No. 1,224,244, of May 1, 1917, for magneto. When thus connected, the primary coil 2 and the independent coil 4, acting as a supplemental reinforcing coil for the primary coil 2, are both grounded to the machine and connected in parallel with each other jointly to deliver current through the contact terminals 19 and 24 of the circuit breaker, and also by a current path leading through the high tension coil 3 and the spark plug 17. The sign relations of the several coils are such, that when the circuit breaker is opened, the secondary E. M. F. of the high tension coil 3 is co-directional with the joint E. M. F. of self-induction in the connected coils 2 and 4, so that these potentials are effectually added to produce a jump spark at the spark plug 17.

The separate or independent coil 4 is thus employed to reinforce the inductive effect of the primary coil 2 during the operation of starting the internal combustion engine and until such engine has attained its normal high speed of operation. The electrical system of my present invention is intended more particularly to be employed upon comparatively small and light motor vehicles, which may be described as being of what may be generally termed the motorcycle type; and without the separate coil 4 acting as a reinforcing coil for the primary magneto coil 2, the starting operation would be much more difficult, requiring that the vehicle be pushed faster and farther along the ground in order to effect the starting of its engine. However, what may be termed the boosting effect of the coil 4 results in the efficient operation of the magneto at a low speed, thereby making the starting operation easy. After the engine has started and has attained its normal running speed, then the employment of the independent coil 4 as a reinforcing coil for the primary coil 2 may be dispensed with, as at such higher speed of operation of the magneto, the primary coil 2 alone has been found to be effective in producing the ignition spark in the spark plug 17. Under such normal running conditions, in case lights are needed, the switch lever 32 may be moved to engage with the upper switch terminal 34, and the coil 4 will then act independently to deliver current through the grounded lighting circuit or lamp circuit 36 and incandescent lamps 37, so that thereby both ignition and lighting are effected under normal running conditions of the engine and vehicle.

It is obvious that various modifications may be made in the construction shown in the drawings and above particularly described within the principle and scope of my invention.

I claim:

1. An electrical system for motor vehicles comprising a magneto armature core, primary and secondary coils disposed thereon in inductive relation to each other, a circuit breaker, a common connection conductively uniting one terminal of the circuit breaker and one terminal of each of said coils, ground leads for the opposite terminals of said coils and circuit breaker, a spark gap in said ground lead for the secondary coil, a separate and independent coil on the core out of connection with the other coils, a lighting circuit, a ground lead for one terminal of said independent coil, a circuit controller for connecting the other terminal of said independent coil to one terminal of the lighting circuit or to said common connection at will, and a ground connection for the other terminal of the lighting circuit.

2. An electrical system for motor vehicles having, in combination, a primary armature coil, a secondary coil in inductive relation with the primary coil, a separate and independent armature coil, a lighting circuit, a circuit controller for connecting said independent coil in the lighting circuit or in circuit with the primary coil for reinforcing the inductive effect of the primary coil, a spark gap in the circuit of the secondary coil, and a circuit breaker in the circuit of the primary coil.

3. An electrical system for motor vehicles having, in combination, an armature core, a primary winding on the core, a secondary winding on the core in inductive relation with the primary winding, an independent winding on the core at another place separate from the primary and secondary windings, a spark gap in the circuit of the secondary winding, a circuit breaker in the circuit of the primary winding, a lighting circuit, and a circuit controller for connecting the said independent winding in the lighting circuit or in circuit with the primary winding as may be desired.

4. An electrical system for motor vehicles comprising a magnetic field and an armature core mounted for relative rotation with

the armature core projecting to opposite sides of the axis of rotation, a primary winding on one end of the core at one side of said axis, a secondary winding on the same end of the core as the primary winding, a separate and independent winding on the other end of the core at the other side of said axis, a spark gap in the circuit of the secondary winding, a circuit breaker in the circuit of the primary winding, a lighting circuit, and a circuit controller for connecting said independent coil in the lighting circuit or in the circuit of the primary winding as may be desired.

5. An electrical system for motor vehicles having, in combination, a primary armature coil, a secondary coil in inductive relation with the primary coil, a spark plug to which one terminal of the secondary coil is connected, a circuit breaker to which one terminal of the primary coil and the other terminal of the secondary coil are connected, an independent armature coil, a lighting circuit, and a circuit controller for connecting one of the terminals of said independent coil to the lighting circuit or to the circuit breaker as may be desired.

6. An electrical system for motor vehicles having, in combination, a primary armature coil, a secondary coil in inductive relation with the primary coil, a separate and independent armature coil, means for independently utilizing the current delivered by said independent coil, a circuit controller for connecting said independent coil in circuit with said means or in circuit with the primary coil for reinforcing the inductive effect of the latter, and means for utilizing the high tension current delivered by the secondary coil.

In testimony whereof, I have affixed my signature to this specification.

GEORGE W. WACKER.