April 13, 1926. 1,580,860

J. SCHURCH

ELECTRIC VEHICLE

Filed April 10, 1922

Fig. 1.

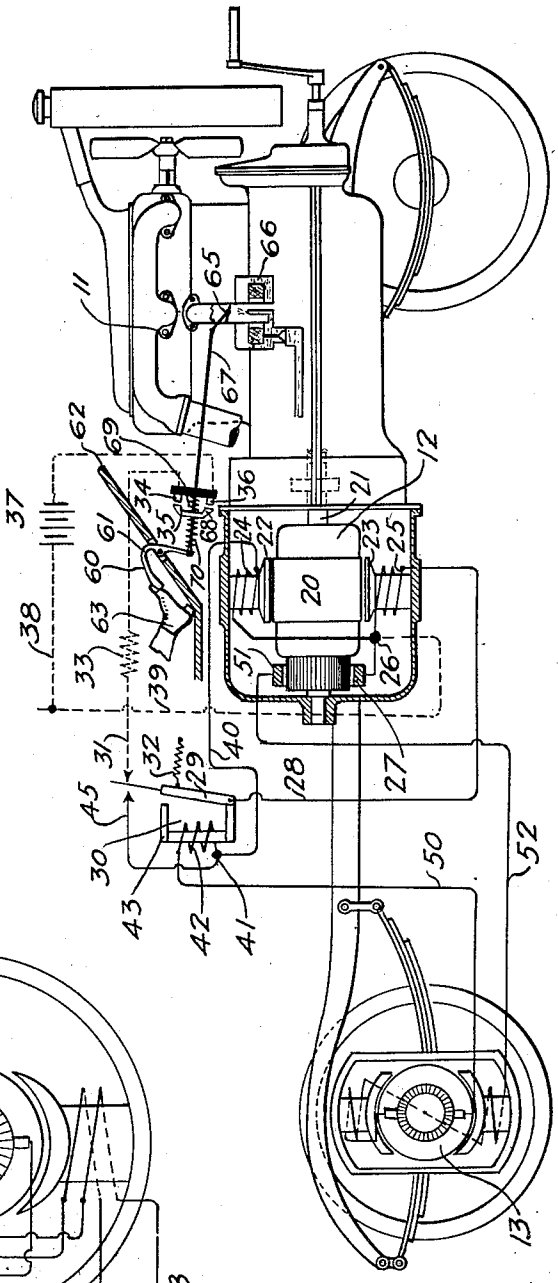
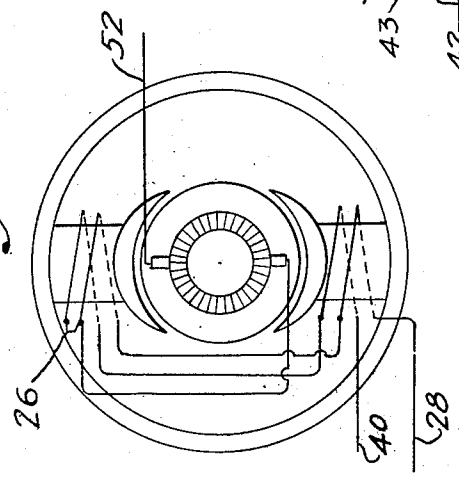


Fig. 2.



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Patented Apr. 13, 1926. 1,580,860

UNITED STATES PATENT OFFICE.

JACOB SCHURCH, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO WILLIAM H. HEISE, OF LOS ANGELES, CALIFORNIA.

ELECTRIC VEHICLE.

Application filed April 10, 1922. Serial No. 551,215.

To all whom it may concern:

Be it known that I, JACOB SCHURCH, 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 Improvement in Electric Vehicles, of which the following is a specification.

My invention relates to electric vehicles and is particularly applicable to a vehicle which is provided with a generator driven by an internal combustion engine, or other prime mover.

The principal object of my invention is to provide means in such a combination for insuring the proper operation of the generator.

In constructing generators for this purposes, it is highly important that they should be of light weight, which necessitates the use of steel which will not retain any considerable residual magnetism. As a result, it is often impossible to make the generator build up its magnetism properly in starting, and it is an object of my invention to provide means to insure the proper excitation of the generator at all times.

Further objects and advantages will be set forth more in detail hereinafter.

Referring to the drawings, which are for illustrative purposes only,

Fig. 1 is a diagrammatic view of the apparatus used in the practice of my invention.

Fig. 2 is a diagram of an alternative method of connecting the generator windings.

In the form of my invention illustrated in the drawing, I show an automobile provided with an internal combustion engine 11, driving a direct current generator 12 which, in turn, supplies energy for driving a direct current motor attached to the rear axle or preferably to two current motors, each of which drives one of the rear wheels.

In the form of my invention shown, the armature 20 of the generator is carried on a shaft 21 driven by the engine 11, the armature rotating inside of pole-pieces 22 and 23, which are provided with field coils or windings 24 and 25. One terminal of each of the field windings 24 and 25 is connected to a common point 26, to which one of the brushes 27 of the generator is also connected. The other terminal of the field coil 25 is connected through a wire 28 with the moving arm 29 of a relay 30, this relay normally making contact with the wire 31 due to the tension of the spring 32. The wire 31 is connected through a resistance 33 with one contact 34 of a pedal switch 35, the other contact 36 of said switch being connected to a battery 37; the other pole of the battery 37 is connected through a wire 38 and a wire 39, with the common point 26. One terminal of the coil 24 is connected through a wire 40 with a common point 41 to which a winding 42, carried on the magnetic circuit 43 of the relay, is connected. The other terminal of the winding 42 is connected to a wire 50. The other brush 51, of the generator, is connected to a wire 52. The wires 50 and 52 supply energy to the motor 13, the motor 13 being an ordinary direct current series motor need not therefore be described. The common point 41 is connected to a wire 45. The pedal switch 35 is connected to the ordinary gasoline throttle pedal 60 which is pivoted at 61 in the floor 62 of the automobile in a position to be operated by the foot 63 of the user. This pedal 60 operates the throttle valve 65 of the carburetor 66 of the engine through the rod 65. A moving contact 68 is insulated from, and slides on, this rod, being carried between two compression springs 69 and 70. When the pedal 60 is pushed down, it opens the throttle of the engine and the member 68 closes the circuit between the members 34 and 36. The pedal can then be pushed through a further distance due to the spring 70, during which time the circuit between the members 34 and 36 is maintained.

The method of operation of my invention is as follows:

With the automobile at rest, the parts are in the position shown, and the circuit from the battery is interrupted between the contacts 34 and 36. Whenever the pedal 60 is pushed down, which must be done to operate the engine 11, a circuit is established between the contacts 34 and 36 by the member 38, and current flows from the battery to the contact 36 through the member 68 to the contact 34, through the resistance 33 and the wire 31 to the moving arm 29 of the relay 30, and through the wire 28 and the field coil 25 to the common point 26, which is connected through the wires 39 and 38 to the other terminal of the battery 37. This energizes the field coil 25 from the

battery 37 through the resistance 33, the amount of excitation being controlled by the value of the resistance 33. The flow of current from the battery 37 through the field coil 25 provides the initial excitation of the generator field so that as soon as the armature 20 starts to turn over, voltage is generated between the brushes 27 and 51. This excitation and the corresponding voltage is low until such time as the generator reaches such a speed as to cause the predetermined current to flow from the brush 51, and the wire 52 through the motor 13 to the wire 50 and through the coil 42 of the relay 30 and the wire 40 to the field 24 and through this field to the common point 26 and the brush 27. Whenever the amount of current flowing to the motor reaches this predetermined value, which may be small, the relay 30 operates breaking the connection between the wire 28 and the wire 31 and establishing a connection between the wire 28 and the wire 45. This disconnects the field 25 from the battery 37, connecting it in multiple with the field 24, so that it is energized by the current flowing to the motor 13. The apparatus then operates quite independent of the pedal 60, so long as any considerable current is supplied to the motor 13. In the event that the current to the motor 13 ceases, which happens whenever the automobile is stopped, the relay 30 releases and restores the connections to their original condition.

In Fig. 2, I have shown a generator in which the fields are wound on the same pole-piece, the various parts being numbered to correspond with the diagram in Fig. 1. If the generator is wound in accordance with Fig. 2, one of the windings on the pole-piece may be of a very large number of turns so that the resistance 33 can be dispensed with. In either case, the apparatus is so arranged that whenever the throttle of the internal combustion engine is opened to a slight degree, the battery 37 is connected to provide excitation for the generator, this excitation continuing until such a time as the current rises sufficiently to operate the relay 30 which disconnects the battery from the generator.

I claim as my invention:

1. The combination of: a prime mover; a generator driven by said prime mover; means receiving the product of said generator; a power circuit for delivering such generator product to said receiving means; a controller for controlling the speed of said prime mover; a field winding forming part of said generator; an external source of electric current for energizing said field winding; and means arranged to disconnect said field winding from the power circuit of the generator and to connect said field with said external source.

2. The combination of: a prime mover; a generator driven by said prime mover; means receiving the product of said generator; a power circuit for delivering such generator product to said receiving means; a controller for controlling the speed of said prime mover; a field winding forming part of said generator; an external source of electric current for energizing said field winding; a feed circuit for said external source, said circuit having a control switch therein; and means arranged to disconnect said field winding from the power circuit of the generator and to connect said field with said feed circuit when the flow of energy in said power circuit drops below a predetermined minimum.

In testimony whereof, I have hereunto set my hand at Los Angeles, California, this 3rd day of April, 1922.

JACOB SCHURCH.