H. J. EBY.

ENGINE STARTER.

APPLICATION FILED FEB. 9, 1917.

1,290,940.

Patented Jan. 14, 1919.

Fig. 1.

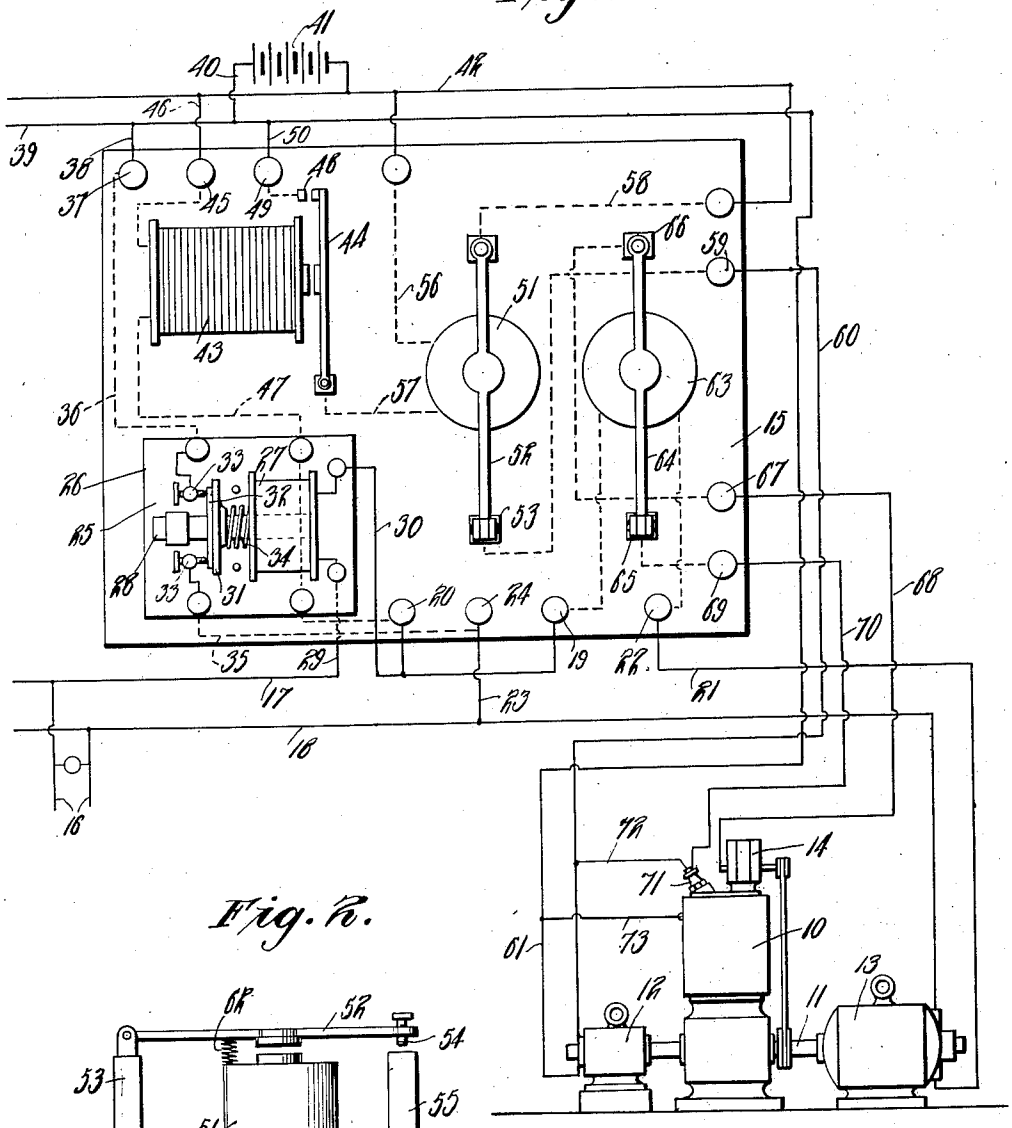


Fig. 2.

INVENTOR

Harry J. Eby

WITNESSES

W. C. Fielding

Wm. Seaman

BY *Richard B. Owen.*

ATTORNEY

UNITED STATES PATENT OFFICE.

HARRY J. EBY, OF ELEELE, TERRITORY OF HAWAII.

ENGINE-STARTER.

1,290,940. Specification of Letters Patent. Patented Jan. 14, 1919.

Application filed February 9, 1917. Serial No. 147,687.

To all whom it may concern:

Be it known that I, HARRY J. EBY, a citizen of the United States, residing at Eleele, in the county of Kauai and Territory of Hawaii, have invented certain new and useful Improvements in Engine-Starters, of which the following is a specification.

This invention has relation to electric generating plants of small capacity such as those employed in private residences, and including a generator for actuation by an internal combustion engine, and the present invention has for an object to provide a device whereby the engine may be started and current consequently generated when any light switch in the house circuit is closed.

Another object of the invention is to provide in a device of the character above described, means whereby current from a constant source of supply may be furnished to the ignition element of the internal combustion engine during starting thereof and for switching off said ignition current when the engine has become started and in turn permitting the ignition to be supplied from the magneto.

A still further object of the invention, is to provide a device of the character above described, having means whereby when the last light switch in the house circuit has been opened, it will operate to automatically cause the internal combustion engine to stop running and thereby cut off any further supply from the generator.

In addition to the foregoing my invention comprehends improvements in the details of construction and arrangement of the parts to be hereinafter more fully described and particularly set forth in the appended claims.

In the accompanying drawings in which similar and corresponding parts are designated by the same characters of reference throughout the several views in which they appear;

Figure 1, is a diagrammatic view illustrating the elements of a device constructed after the manner of my invention in circuit with an electric lighting plant of conventional type and,

Fig. 2, is a view in side elevation of one of the relays employed in my device.

With reference to the drawings, 10 indicates, an internal combustion engine provided with a crank shaft 11 to the opposite ends of which a starting motor 12 and generator 13 are coupled for rotation. The internal combustion engine may be provided with a magneto 14 adapted to be actuated through the medium of any driving connection from the crank shaft of the engine. These are the elements of a portable electric lighting plant, as heretofore employed and as stated above it is the object of my invention to enable any one in the house in which this plant is established to cause the actuation of the generator automatically immediately upon closing any of the light switches in the house circuit.

To this end, I provide a device, or a series of devices, mounted upon a base 15 and suitably connected to the house circuit and to the elements of the electric lighting plant in a manner to be shortly noted. The main leads of the house circuit indicated at 16 are connected across the bus bars 17 and 18, the bus bar 17 being connected at two points to a binding post 19 and a binding post 20 mounted upon the base of the apparatus. The bus bar 18 is connected to the generator 13 and the return lead of said generator is connected to a bus bar 21 which leads into a bus bar which leads into a binding post 22 also mounted upon the base. The bus bar 18 is also connected through the medium of a conductor 23 to a binding post 24 on the base.

Mounted upon the base is a battery cut-off relay indicated generally at 25, and which comprises a separate base 26, having mounted thereupon a solenoid 27 through which a core 28 is guided for reciprocation. Upon reference to Fig. 1 of the drawings it will be noted that the terminals of the solenoid are connected in series, through the medium of conductors 29 and 30 with the bus bar 17. The core 28 carries a bar of insulation 31 provided with a metallic plate 32 adapted to be connected across the ends of adjustable contacts 33 mounted upon the base 26, and a spring 34 is encircled about the core with a view to normally retaining the plate 32 in contact with the contacts 33. One of said contacts 33 is placed in communication with the binding post 24 through the medium of a conductor 35, and the opposite contact plate 33 is connected through the medium of a conductor 36 to a binding post 37 which is in turn connected through the medium of a conductor 38 to a supply conductor 39 to which one terminal 40 of a storage battery 41 or other source of constant current supply is connected. The op-

posite terminal of the storage battery 41 is connected to a second supply conductor 42.

Mounted upon the base 15 and preferably adjacent the battery cut-off relay just described is a starting relay actuator comprising an electro-magnet 43 and a pivoted armature 44 adapted to be attracted thereby. One terminal of the magnet 43 is connected to a binding post 45 which in turn is connected to the supply conductor 42 through the medium of a conductor 46, while the other terminal 47 of the electro-magnet is in communication with the binding post 20 heretofore described. A contact 48 is mounted upon the base adjacent the free end of the armature 44 so as to be contacted thereby when said armature is attracted by its magnet, said contact point being placed in communication with a binding post 49, mounted upon the base which post is in turn connected through the medium of a short conductor 50 to the supply conductor 39.

Also mounted upon the base 15 at substantially an intermediate point thereof is an electro-magnet 51 disposed in a vertical plane adapted to attract a horizontally disposed armature 52 adapted for oscillation in a vertical plane at one end upon a post 53 and having at its opposite end an adjustable contact point 54 adapted to contact a post 55. One terminal of the magnet 51, which terminal is indicated at 56 in communication with the supply conductors 42, while the other terminal 57 is in communication with the above mentioned armature 44 of the starting relay actuator. The post 55 of the relay last described is connected through the medium of a conductor 58 with the supply conductor 42, while the post 53 upon which the armature is mounted is placed in communication with a binding post 59, said post being in turn placed in communication with one brush of the starting motor 12 through the medium of a conductor 60. The opposite brush of the starting motor is connected through the medium of a conductor 61 to the supply conductor 39 of the storage battery 41. A spring or other resilient element 62 may be placed beneath the armature 52 to normally retain the contacts 54 and 55 out of engagement.

I also provide upon the base 15 what I term a magneto relay which is constructed in a fashion identical with that of the relay just described and in a similar manner comprises an electro-magnet 63 and a coacting armature 64 mounted for oscillation upon a post 65. The opposite end of the armature is adapted to contact a post 66 which in this instance is placed in communication with a binding post 67, said post being in turn placed in communication through the medium of a conductor 68 with the magneto 14 mentioned above. The armature 64 may be placed in communication with a binding post 69 mounted upon the base which binding post is adapted to be connected through the medium of a conductor 70, with the spark plug 71 of the internal combustion engine. The spark plug is also connected through the medium of a lead 72 to the above mentioned conductor 60, while the frame of the internal combustion engine is grounded through the medium of a conductor 73 to the conductor 61 which leads to the starting motor.

To start the internal combustion engine, in order that current may be generated, it is but necessary to close any lighting switch in the house circuit fed by the leads 16 whereupon current from the terminal 40 of the bracket 41 will enter the binding post 37 through the medium of the conductors 38 and 39 and along the conductor 36 to one of the binding posts 33 of the battery cut-off relay. Owing to the fact that the contacts 33 are normally connected through the medium of the plate 32, current traverses said plates and enters the opposite contact points 33, thence traversing the conductor 35 to the binding post 24 thereby the current may enter the bus bar 18 through the conductor 23, and from said bus bar to one of the leads 16 of the house circuit. After the current has passed through the lamp whose switch has been closed, the current returns through the opposite lead 16 to the bus bar 17 from which it enters the binding post 20 and thence travels through the conductor 47 to the electro-magnet 43 of the starting relay actuator. The current after energizing the magnet 43 leaves the same by means of its terminal connected to the binding post 45 thereby the current enters the conductor 46 and returns to the battery through the supply conductor 42.

In this manner the magnet 43 is energized whereby the armature 44 thereof is attracted and engaged upon the contact point 48 located adjacent thereto. The result of this engagement is that a circuit is established whereby the current from the battery 41 and the binding post 49 traverses the point of connection between the contact point 48 and the armature 44, and passes from said armature, through the conductor 57 to the electro-magnet 51 of the motor starting relay, the current leaving the electro-magnet through the conductor 56 whereupon it returns to the battery through the conductor 42. Owing to the energization of the electro-magnet 51, its armature 52 is attracted thereby contacting the points 54 and 55. Owing to such contact, current from the supply wire 39 is permitted to enter the conductor 61 whereby it is conveyed to the starting motor 12 returning from said motor through the conductor 60 to the binding post 59 and from said binding post to the post 53 of the relay just mentioned, traversing the arma-

ture 52 and passing across the contact points 54 and 55 to the conductor 58 from which it returns to the battery through the return conductor 42.

Thus, the starting motor 12 is energized and a portion of the energizing current is conveyed through the medium of the conductors 72 and 73 to the spark plug 71 of the internal combustion engine. Obviously, the internal combustion engine will be set in motion and the generator will be rapidly speeded up to the point of normal current supply.

The internal combustion engine having thus been set in motion it is obviously necessary for all practical purposes to cut off further current supply to the motor, and it may be also advisable to change the source of ignition from the storage battery 41 to the magneto 14. This action automatically takes place in the following manner: As mentioned above the electro-magnet 63 of the magneto relay is in a series with the bus bars which are in turn connected to the generator 13. As a result of this connection the electro-magnet 63 is caused to be energized as the current of the generator builds up whereupon the armature 64 thereof is attracted whereby contact is made between the armature and the post 66 disposed under the free end of said armature. As a result of such engagement, current which is supplied by the magneto is led through the conductor 68 to the binding post 67 and thence to the post 66. The current traverses the point of junction located thereat, and traverses the armature 64 to the post 65 from which it enters the binding post 69 and thence travels over the conductor 70 returning to the magneto through the medium of the spark plug 71, one of the terminals of which is grounded to the engine frame in a well known manner, the magneto frame being likewise grounded upon the engine frame. In this manner generator current is applied to the spark plug.

It is now necessary to cut off the source of the battery current to the main leads of the house circuit as the generator is now in operation. To that end the solenoid 27 of the battery cut off device is provided and is in series with the bus bar 17. Said solenoid will thus become energized to a degree sufficient to overcome the tension of the spring 34 whereby the plate 32 will be withdrawn from engagement with the contacts 33 thereby disestablishing the continuity of the circuit which includes the battery 41 and the main leads, which circuit had been previously established by closing one of the light switches. The plant is presumed to be now in full operation and current will be continually supplied as long as one of the lights in the house circuit remains illuminated or a switch in the circuit remains closed. To stop operation of the plant, it is but necessary to open this remaining switch whereupon the current supplied to the electromagnet 63 of the magneto relay is immediately interrupted. As a result thereof the armature 64 of said magnet is disengaged from the contact 66 through the medium of a spring (not shown) whereupon the magneto current supplied to the internal combustion engine is interrupted with the result that the engine immediately stops operation. Also, as the energization of the solenoids 27 of the battery cut off is interrupted the spring 34 will engage the bar 31 to the left until the plate 32 contacts and connects the contact 33 whereupon the storage battery 41 will be again thrown in to the house circuit whereupon the circuit through the battery can be again completed provided a lighting switch or the like is closed in the manner previously described.

While I have illustrated and described my invention with some degree of particularity I realize that in practice various alterations thereover may be made and I therefore desire to reserve the right and privilege of changing the form of the details of construction, or otherwise altering the arrangement of the correlated parts without departing from the spirit of the invention or the scope of the appended claims.

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

1. In an electric plant, translating devices, including switches, an internal combustion engine, ignition apparatus for the engine, generating means driven by the engine for supplying energy to the translating devices and to the ignition apparatus, a motor for starting the engine, a battery, a circuit containing the battery, the translating devices and a relay coil, a switch for normally closing said circuit, whereby when a light switch is closed, the relay coil will be energized, a relay switch arranged to be closed when the relay coil is energized and thereby place the battery in circuit with the starting motor and the ignition apparatus, and means operable by current from said generating means for opening said normally closed switch and thereby deënergizing said relay coil, to disconnect the battery from the starting motor and from the ignition apparatus, and for connecting said ignition apparatus in circuit with said generating means.

2. In an electric plant, including a generator and an internal combustion engine for driving the same, a motor for starting the engine, and a magneto driven by said engine, the combination therewith of an automatic starting mechanism including a circuit containing a battery and a relay in circuit with the house circuit, a spring held

switch for normally closing said circuit whereby when a light switch is closed the relay may be energized, a relay energizable by actuation of said first mentioned relay for placing the battery in circuit with the starting motor whereby the engine may be started and battery energy supplied to the ignition system of the engine, a relay operable by the generator current for opening said spring held switch to disconnect the battery from the starting motor, and a relay also operable by the generator current for automatically connecting the magneto current to the ignition system of the engine.

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

HARRY J. EBY.

Witnesses:
JANET HASTIE,
GEO. B. LELWITH.