W. W. BUCHER

AUTOMATIC ELECTRIC LIGHTING UNIT

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Patent Drawing
To all whom it may concern:

Be it known that WILLIAM W. BUCHER, citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, has invented certain new and useful Improvements in Automatic Electric-Lighting Units, of which the following is a specification.

This invention relates to improvements in automatic electric generating units.

The purpose of this invention is to provide an electric generating plant which, among other features uses an internal combustion engine and connected dynamo for delivering current at a standard, commonly used high voltage (such as 110 volts) to the usual service mains when needed; to also provide a system that temporarily causes current from a small low-voltage battery to flow into the high-voltage service mains through the current-using device, on account of which device a demand for high voltage current is made, and in addition to also pass through an automatic control which causes low voltage current from the battery to start the engine and dynamo; to make provision that when the engine and dynamo are in operation the low voltage battery will be automatically disconnected from the service mains and the standard voltage dynamo connected thereto; to make provision that the low-voltage control current flowing temporarily on the service mains also causes the ignition system of the engine to become operative; to make provision that when the demand for current on the service mains ceases the ignition system is made inoperative, but so long as the demand continues the ignition system is maintained operative by the high voltage current which supplies such demand; to make provision that when there is no longer any need for current on the service mains these mains are automatically disconnected from the standard voltage dynamo and transferred to the low voltage battery ready for the repetition of the cycle whenever another demand for current on such mains arises; and to provide a fuel control operated by the governor of the engine, adapted to maintain a steady speed and resultant uniformity of voltage on the mains under extreme variations of load.

With these and other ends in view the accompanying drawing illustrates such instances of adaptation as will disclose the fundamentally broad features which underlie the invention, without limiting the invention to the specific details shown.

Fig. 1 is a diagrammatic view showing some of the related features such as the engine, dynamo and starter in plan, while the relation of the governor, to the switch 16—16'; the relay 11, magneto control 34; and the main line switch 42 are in elevation.

Fig. 2 is a diagrammatic view instancing the starting relation of the switching features of Fig. 1.

A suitable internal combustion engine 1 has a shaft 2 connected to a standard voltage dynamo 4 through a speed reducing gear 3 or may if desired be directly connected in any well known way. The armature shaft of the dynamo 4 is mechanically connected with the engine at one end through the speed changer 3 exemplified in the drawing. At the other end the armature shaft is connected with the starter 5 also known as a generator-motor. The dynamo 4 may have the usual shunt field circuit 47 controlled by the usual rheostat 10. Other types of dynamos, having different voltage characteristics may be used as desired.

The expression standard or normal high voltage is understood to mean, any voltage in common usage adapted to serve standard accessories, in contradistinction to other voltages which require specially adapted current consuming devices for use therewith.

The dynamo 4 supplies current at a standard voltage to service mains 38 and 41 when the system is in full operation. This current traverses the lines 48 and 49 between the dynamo and the governor controlled switch 16—16' and between this switch and main line switch 42 over lines 50 and 51, thus reaching the service mains 38 and 41.

In a system of this type it is desirable and important to have the same directly responsive as near as possible, so that the engine may be automatically set into motion by the mere act of turning on a single standard high-voltage lamp or any electrical accessory of related voltage and still avoid the use of a large storage battery, which for standard voltage requirements would have to consist of at least 55 cells. The initial cost and upkeep of this large
number of calls, unavoidably becomes a pressing item. This large outlay is avoided in this system and any loss in efficiency due to the standard high voltage dynamo supplying only a few lamps at times as against using its entire output at other times is more than overbalanced thereby.

When the necessity arises for supplying current to standard voltage accessories, such as lamps, heaters, vacuum cleaners, washing machines, etc., the system is started by simply turning on a switch 39 controlling a single lamp 40 or other device. The movement of switch 39 connects the two leads 38 and 41 of the service mains which closes a low-voltage battery circuit, or sentinel circuit, that permits a low-voltage current at about 24 volts to flow from battery 9 onto the service mains through the accessory and return. This current flowing only during the time the system is being started passes from battery 9 over lines 57, 53, terminal 18, blade 16, line 51, switch 42, service line 41, accessory 40, switch 39, service line 38, switch 42, line 50, ignition control magnet 34, blade 16, line 52, terminal 46, the magnets of relay 11, terminal 43 and line 56 to the battery.

The flow of this low-voltage current through the high-voltage service mains accomplishes the starting of the system, because by means thereof the ignition is made operative by switch 34-32 and simultaneously the required heavy current necessary to crank the engine is made available by the operation of relay 11.

Relay 11 is operated by causing the low-voltage current coming over the high-voltage service mains to energize its magnet so as to attract armature 12, attached to post 14. This closes another circuit at 13 over which a small control current from a portion of the battery 9 will flow to energize the magnet 61 to close switch 6 and thereby supply the required heavy amperage current to set the starter 5 into action to rotate the dynamo 4 and engine 1. This starting control current flows from the battery over line 57, terminal 44, post 14, armature 12, contact 13, ground 55, terminal 45, line 68, magnet 61 and line 60 back to the battery.

The starting current flows from the battery to switch 6, lines 62 to and from the starter 5, again to the switch 6 and through its switch member, returning over line 59 to the battery. This current is controlled by any type of switch which simply closes the circuit between the battery and the starter 5 when it is actuated by the movable core 7 and its connecting stem 8, or the magnet may move the blade of any well known type of switch against gravity or other form of retracting means utilized in the prior art.

The switch 16—16' through the control of engine governor 25 when the engine comes to speed shifts the blades 16—16' from the low voltage battery circuit terminals 17 and 18 to the dynamo terminals 19 and 20. This switch is operated by a link 21 that is connected to an insulating bar 15 which is pivotally secured to blades 16—16'. The other end of the link is connected to the long arm 22 reaching from the governor 26 to a fulcrum 35 on which the arm is pivoted. A short arm projecting from arm 22 at about its fulcrum, carries a counter weight 37 by means of which the interconnected parts may be balanced to secure greater sensitivity of action. This is supplemented by a dash pot 36 in which a connection from the arm that carries weight 37 functions, to prevent "over running" or "hunting".

The governor 25 has its sliding sleeve attached to the lever 22 in such relation to the fixed pivotal point of the governor ball links as to change the switch blades 16—16' from the low voltage battery circuit to the high-voltage service mains whenever the balls have moved outwardly a predetermined distance. As this governor connection to lever 22 is well known and old in the art it is not shown in detail. The governor arm 22 is also connected by link 23 to the fuel supply whether at the carbureter 24 or otherwise being immaterial so as to thereby control the fuel intake into the engine according to the variations of load on the mains 38 and 41 thus keeping the voltage on such mains free from excessive variation.

Current from the dynamo 4 also operates ignition control coil 34 in line 50 to keep the magneto 26 operative when such current is being delivered to the service mains 38 and 41 while the system is in full operation. When the load is entirely removed from the mains by opening all the switches 39, this coil is inactive which permits the pivoted armature lever 32 to be pulled away from the coil by a spring 33 and cause the lever 92 to close a ground circuit 30 of the magneto 26 at 31, short circuiting the primary 27 thus depriving the secondary 28 and spark plug connections 29 of current. This coil 34 therefore cooperates in starting, continuing and stopping the operation of the system.

It is of course immaterial how the battery is recharged. For the purpose of this application the broad features herein set forth are not dependent on or subsidiary to whatsoever expedients may be used to accomplish and control the accumulation of current in the battery.

From the description of this system it will be apparent that the maximum convenience is secured in its use, without large initial costs and undue operating charges.
through the employment of extremely simple expedients in a way not hitherto utilized, thereby securing results of extreme practical, hygienic, aesthetic and commercial value.

It is to be noted that the term low-voltage used herein is not limited to 24 volts as under certain conditions the responsiveness of the relay 11 or any equivalent thereof of may be made so sensitive that the very weak current flowing through a standard volt small wattage lamp at even six volts as used to actuate the starter 5 will be sufficient to operate the relay and bring the starter into operation.

What I claim as new and desire to secure by Letters Patent is:

1. In electric generating systems, a normal or standard high voltage generator, an internal combustion engine adapted to drive the generator, a low voltage storage battery, electric starting means operable from said battery, high voltage service mains, means for temporarily admitting the low voltage current onto such mains to control the initiatory steps of the starting means, and subsequently complete the starting of the engine by such means from the same source of low voltage current.

2. In electric generating systems, a high voltage generator, service mains leading therefrom, current consuming devices on said mains, an internal combustion engine for driving the generator, a low voltage sentinel circuit including the service mains, and a low voltage engine starting circuit controlled thereby.

3. In a farm lighting plant having normal or high voltage service mains and a generator-driving-engine provided with electrical starting means, a low voltage battery, means for connecting the battery in circuit with the mains when the engine is idle, and means in said circuit for connecting the battery in circuit with the starting means when demand is made on the mains.

4. In a farm lighting plant having an engine driven generator for supplying normal or high voltage service mains, an engine starting means comprising a low voltage battery, a motor, means connecting the battery in circuit with the mains when the generator is idle, and means in said circuit actuated by the closing of a service switch between the mains for connecting the battery in circuit with the motor to start the engine.

5. A starter for engine operated generator plants supplying mains with normal or high voltage, comprising a low voltage storage battery, a starting motor, means for temporarily placing the low voltage battery on the high voltage service mains, and means operated by the battery on such mains for connecting the battery with the starting motor upon the occurrence of a demand on the mains.

6. In electric generating systems, a normal or standard high voltage generator, an internal combustion engine adapted to drive the generator, a low voltage storage battery, electric starting means operable from said battery, high voltage service mains, means for temporarily admitting the low voltage battery current onto such mains to control the initiatory steps of the starting means, and subsequently complete the starting of the engine by such starting means from the same source of low voltage current.

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

WILLIAM W. BUCHER.

Witnesses:

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