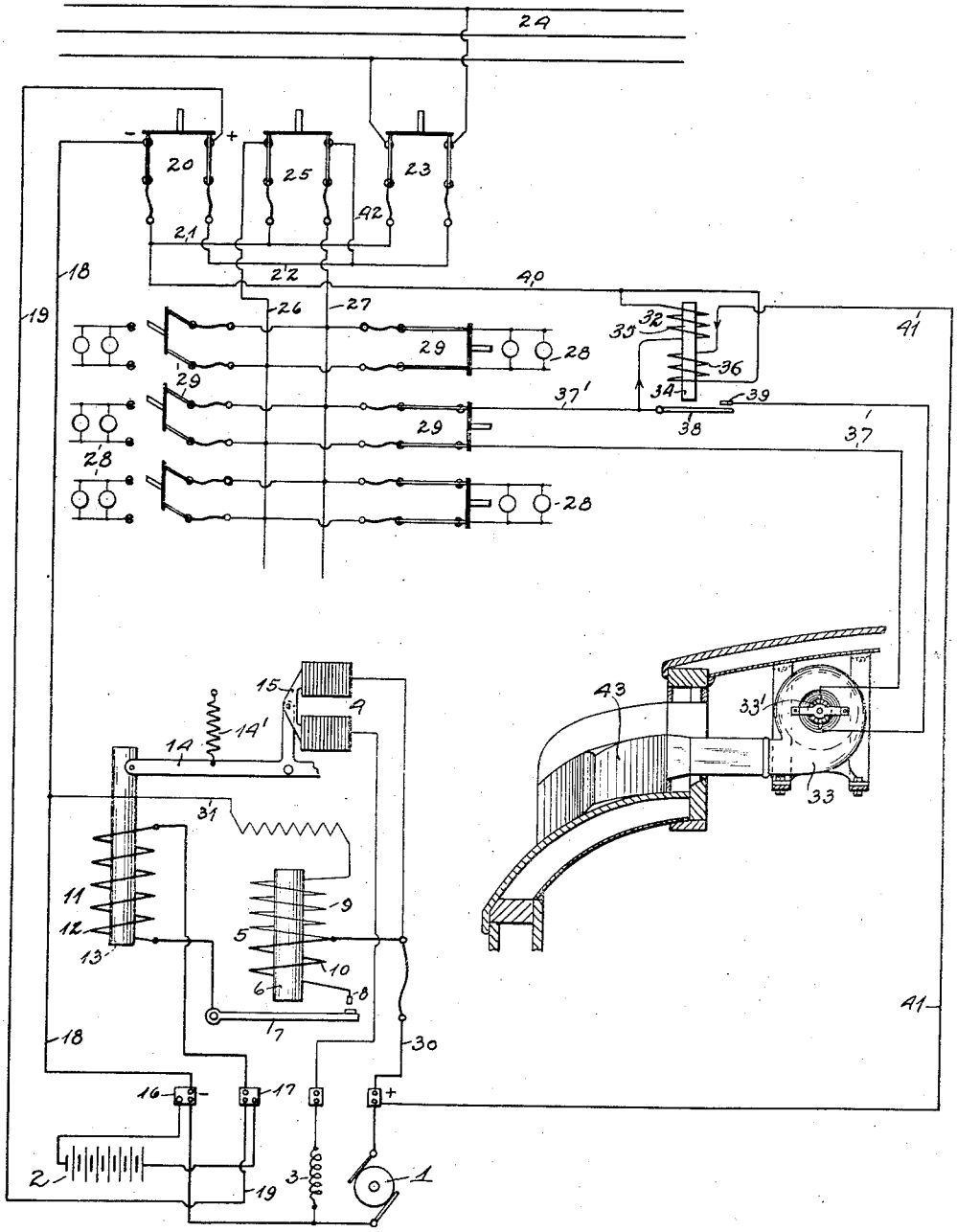
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ELECTRICAL SWITCH MECHANISM.

APPLICATION FILED FEB. 16, 1913.

1,091,012. Patented Mar. 24, 1914



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ELECTRICAL SWITCH MECHANISM.

1,091,012. Specification of Letters Patent. Patented Mar. 24, 1914.

Application filed February 15, 1913. Serial No. 748,540.

To all whom it may concern:

Be it known that I, ROBERT W. PACHALY, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Electrical Switch Mechanism, of which the following is a specification.

My invention relates to electrical switch mechanism to be used particularly with ventilating systems for railway cars in which electrically driven ventilating devices are automatically controlled.

Under the present practice of ventilating railway cars, ventilating devices are applied which will effectively ventilate the cars during running of the train, for example ventilators such as described and claimed in Patent No. 874,320, issued December 17, 1907, to Thomas H. Garland. Although such ventilators will most efficiently and satisfactorily ventilate cars when the train is in motion, they fail to provide for ventilation when the train is standing in a station or at other times when the train is at rest or is running at very slow speed. To provide for ventilating cars when the train is at rest the installation of additional ventilating mechanism was necessary and fans or blowers have been installed, see for example the application of Thomas H. Garland, Serial No. 677,074, filed February 12, 1912, in which a blower has its outlet connected with the inlet of a ventilator, the blower being electrically driven and manually switched into circuit whenever the train is not moving for any length of time. The operation of the fan or blower depends however upon a manual operation, namely, the turning of an electrical switch. The train operators, however, will forget to switch in the blowers or fans and the cars then become quite uncomfortable, the lack of circulation allowing the accumulation of heat, and in the dining car the kitchen smoke, gases and smell will penetrate into the dining room and will add to the discomfort.

The main object of my invention is therefore to provide means for automatically effecting operation of the fans or blowers when the train comes to rest or the movement thereof is so slow that the ventilators will not operate sufficiently to effect efficient ventilation, and to automatically disconnect the blowers or fans as soon as the train again starts and reaches a speed at which the ventilators will operate efficiently.

In railway trains electrical circuits are usually provided for supplying current for illuminating devices, such circuits being fed by storage battery when the train is running slow or is at rest, and fed from a generator when the train is in motion above a certain speed, the generator being usually driven from an axle. Electro-magnetic means are provided for automatically connecting the generator for service when the train reaches a certain or so-called critical speed, and for disconnecting the generator service when the train is running below such speed. When the train is running above the critical speed the batteries are re-charged by current from the generator, and when the train is running below critical speed the batteries will be fully charged to efficiently assume full control of current supply for the train circuits. My invention contemplates the association of electro-magnetically controlled switch mechanism for the blower or fan circuits with the battery and generator circuits of the train lighting system. More in detail such electro-magnetic switch mechanism comprises an electro-magnet having two windings applied differentially to a core, one winding adapted for connection with the battery circuit, and the other connected directly with the generator, the winding connected with the battery being effective to energize the electro-magnet to control the switch mechanism to close the blower or fan circuit when the battery has control of the train circuit current supply, and the other winding receiving current flow from the generator when the generator is in control of the train circuit current supply and then effecting counter energization in the electro-magnet device so that this device is sufficiently deënergized to effect opening of the blower or fan circuit.

The various features of my invention are clearly illustrated on the accompanying drawings in which the figure shows diagrammatically the train lighting circuits together with the battery and generator and electro-magnetic controlling devices, and associated therewith my improved electro-magnetic mechanism for automatically controlling the circuit for an electrically driven ventilating device.

My improved electro-magnetic controlling mechanism for the blower or fan circuit may be used in association with any train current supply system in which a generator and storage batteries are utilized. In the drawing I have shown the essential parts of well known train current supply systems. In such systems a dynamo 1 is geared to an axle of the train to be driven when the train is running, and a storage battery 2 is provided which is charged by the dynamo when the train is running and which supplies electrical energy for the lighting system when the train is moving below critical speed or is at rest. The dynamo is of the shunt type, the circuit of the field winding 3 including a well known carbon resistance 4 in the form of carbon disks whose resistance varies with the compression of the disks against each other. The electro-magnetic main switch 5 comprises the electro-magnet 6, armature 7 and contact 8, the electro-magnet having the two windings 9 and 10. A regulator solenoid 11 comprises a winding 12 and the core 13, which core is connected with one end of lever 14 whose other end is pivoted to the yoke 15 which engages with one end of the carbon resistance 4.

The battery terminal blocks 16 and 17 are connected by conductors 18 and 19 with the contacts of switch 20. From this switch conductors 21 and 22 connect with one end of switch 23 whose other end is connected with the train circuit 24. Switch 25 is interposed between the conductors 21 and 22 and the supply conductors 26 and 27 for the various train current supply circuits 28 whose connection is controlled by switches 29.

The operation of the system is as follows: When the train is at rest or is running below critical speed, the battery 2 supplies the current for the various electrical circuits. When the train is started, the dynamo armature begins to revolve and current flows through the field circuit which includes the field winding 3 and resistance 4 and the voltage is built up which causes current flow from the positive terminal of the dynamo through conductor 30 through winding 9 of the main switch, conductors 31 and 18 to the negative terminal of the dynamo. The winding 9 will not however cause sufficient energization until the train moves above critical speed, the armature 7 being then attracted and brought into engagement with contact 8 so that circuit will be closed through the holding winding 10 of the main switch, this circuit being from the positive terminal of the dynamo through conductor 30, winding 10, contact 8, armature 7, winding 12, terminal 17, conductor 19 to the battery switch 20 and then through conductor 18 back to the negative terminal of the dynamo. If the battery switch 20 and the service switch 25 are closed, the generated current will be delivered to the lighting circuits. The output of the dynamo is kept at the desired amount regardless of the speed at which the armature is revolving, for when the current has risen to the desired output the solenoid 11 becomes effective to exert downward pull on the lever 14 against the upward pull of the spring 14′ on said lever and the pressure frame 15 is withdrawn to release the carbon disks of the resistance 4 so that the pressure between said disks is lessened and the resistance in the field circuit increased, the dynamo being thus accurately regulated and its current out-put controlled. When the train slows up and the dynamo is not driven at great enough speed to generate sufficient current through winding 10 to hold the armature 7, this armature drops and the dynamo is disconnected so that, as soon as the train runs below critical speed, the dynamo becomes inoperative and the battery assumes control of the current supply.

Describing now the mechanism and arrangement for automatically controlling the connection and disconnection of auxiliary electrical ventilating devices, electro-magnetic mechanism 32 is provided for controlling the circuit for the electrical ventilating device such as the blower 33. This electro-magnetic device comprises a core 34 on which are the two windings 35 and 36. The circuit 37 for the blower is adapted for connection with the current supply conductors 26 and 27 by one of the switches 29 and one limb of this blower circuit is controlled by a switch whose movable member is an armature 38 controlled by the core 34. When the core is sufficiently energized the armature is raised to engage the contact 39 and to close the blower circuit. One terminal of winding 35 connects with the armature 38 and the other terminal is connected to conductor 40 extending from the negative side of the battery switch 20. One terminal of winding 36 is also connected with this conductor 40 and the other terminal of the winding is connected by conductor 41 with the positive terminal of the dynamo. When the train is at rest or is running below critical speed during which the current delivered by the dynamo is very little, the battery is sending current through winding 35, the circuit being from the positive pole of battery switch 20 through conductors 22 and 42 and one side of switch 25 to supply conductor 27, through section 37′ of the blower circuit, winding 35, and conductor 40 back to the negative side of switch 20. The core 34 will then be sufficiently energized by the winding 35 to attract armature 38 against contact 39 to close the circuit 37 so that the blower will operate. When the train is at rest there will be no current flow through

the winding 36 and while the train is running, but below critical speed, current will flow from the dynamo through the winding 36 and in opposition to the current flow through winding 35. However, the energization caused by winding 35 will not be entirely counter-acted by current flow through winding 36 until the train has reached critical speed. As soon as such critical speed is reached, the energization by winding 36 will entirely neutralize the energization by winding 35 and the armature 38 is released and the blower circuit opened. The neutralizing dynamo circuit is from the positive terminal of the dynamo through conductor 41, winding 36, conductor 40, through one side of switch 20, and through conductor 18 back to the negative terminal of the dynamo.

Where fans, blowers or other auxiliary electrically driven ventilating devices are employed in connection with ventilating devices effective only upon running of the train, the auxiliary ventilating devices will be effective only during such time as the train is not running sufficiently fast to enable the main ventilating devices to efficiently ventilate, the auxiliary devices being entirely automatically connected for service to maintain ventilation, and automatically disconnected from service as soon as the main ventilators are again able to effect proper ventilation. The auxiliary ventilating device which I have shown is in the form of a centrifugal blower 33 driven by the electric motor 33′. This blower is shown associated with a main ventilator 43 in a manner as described in the co-pending application of Thomas H. Garland before referred to, the blower outlet extending into the suction inlet end of the ventilator. When the train is standing still the blower is in operation, and when the train starts the ventilator begins to act and its suction or ventilating effect increases as the train gains in speed. As soon as the speed is reached at which the ventilator is alone well able to take care of ventilation, the blower is disconnected by the electro-magnetic mechanism 32 which has become deënergized by the current from the dynamo.

It is evident that the electro-magnetic mechanism 32 could be utilized to control any form of electrically driven mechanism whether it be a blower, an ordinary fan, or other ventilating mechanism.

I do not desire to be limited to the exact construction, arrangement and operation shown and described except as specified in the claims which are as follows:

I claim—

1. In an electrical system for railway trains, the combination of a current supply circuit, a dynamo operated by the train when in motion to supply current to said circuit, a battery for supplying current to said circuit when the train is at rest, an electrical device having a circuit adapted for connection with said supply circuit, a switch for controlling said electrical device circuit, an electro-magnet for controlling said switch, two windings for said electro-magnet one winding being connected to receive current from said battery to cause energization to effect closure of said switch and the second winding being connected directly with said dynamo and wound in opposition to said first winding whereby when said dynamo is operated by the train when moving the energization by said first winding will be counter-acted and said electro-magnet deënergized to allow opening of said switch and thereby disconnection of said electrical device from circuit.

2. In an electrical system for railway trains, the combination of a main supply circuit, a battery connected with said main circuit, a dynamo operated by the train when in motion, means for effecting electrical connection of said dynamo with said main circuit when the train has reached a predetermined speed, an electrically driven device and a circuit therefor for effecting connection thereof with the main circuit and thereby with said battery, an electro-magnet device having an armature for controlling the continuity of said electrical device circuit, a winding for said electro-magnet connected with said battery for energizing said electro-magnet to cause its armature to close said electrical device circuit when the train is running below said predetermined speed, a second winding for said electro-magnet, and a circuit directly connecting said dynamo with said second winding and for causing current flow through said second winding in opposition to the current flow through said first winding when the train starts, said windings being so proportioned that said second winding will entirely neutralize said first winding when the train reaches said predetermined speed whereby said armature will be released and said electrical device circuit opened.

3. In an electrical system for railway trains, the combination of a main supply circuit, a battery permanently connected with said supply circuit, a dynamo connected to be driven by the train when in motion, electro-magnetic means for effecting connection of said dynamo with said main circuit when the train reaches a predetermined speed and the voltage generated by said dynamo becomes equal to or greater than the battery voltage whereby said main circuit will be fed from said dynamo and said battery charged, an electrical device and a circuit for connecting said device with said main circuit, an electro-magnetic switch mechanism having an armature for

controlling the continuity of said electrical device circuit, a winding for said electro-magnetic switch mechanism connected with said main circuit to receive current flow from the battery before the dynamo becomes effective and to thereby attract the armature to close the electrical device circuit, a second winding for said electro-magnetic switch mechanism, and a circuit for connecting said second winding directly with the dynamo and independently of said main circuit, said windings being differentially applied so that current flow from the dynamo through said second winding will act in opposition to the current flow through the first winding and said windings being proportioned so that the energizing effect of the first winding will be completely neutralized when the train reaches said predetermined speed.

4. In an electrical system for railway trains, the combination of one source of current for supplying current when the train is at rest, a second source of current operative only when the train is in motion, an electrical device, a circuit connecting said electrical device with said first source, electro-magnetic switch mechanism for controlling said circuit, a winding for said electro-magnetic switch mechanism connected with said first source to energize said switch mechanism to close said circuit, and a second winding for said electro-magnetic switch connected with said second source and receiving current from said second source in the direction to effect counter-energization of said electro-magnet switch device and complete neutralization thereof when the train reaches a certain speed whereby said electrical device circuit is opened.

5. In an electrical system for railway trains, the combination of an electrical device, a source of current, an electro-magnetic switch device for controlling the connection of said electrical device with said source, said electro-magnet device having two differentially applied windings, one of said windings being connected with said source to effect energization to cause closure of the electrical device circuit, and a second source of current controlled by the train in running and connected with the second winding whereby said electro-magnetic switch device is deënergized to cause opening of the electrical device circuit when said second source of current is set in operation by the moving train.

6. In an electrical system for railway trains, the combination of an electrically driven device, a source of current, an electro-magnetic switch device for controlling the connection of said electrical device with said source, said electro-magnetic switch having two differentially applied windings, one of said windings being connected with said source to effect energization to cause closure of the electrical device circuit, and a second source of current controlled by the train in running and connected with the second winding whereby said electro-magnetic switch is deënergized to cause opening of the device circuit when said second source of current is set in operation by the moving train.

7. In an electrical system, the combination of an electrically driven device, a source of current, an electro-magnetic switch for controlling the connection of said device with said source, said electro-magnetic switch having two differentially applied windings one of which is connected with said source to effect energization to cause closure of the electrical device circuit, and a second source of current adapted for connection with the other winding to effect deënergization of said electro-magnetic switch and thereby disconnection of the electrical device from said first mentioned source.

In witness whereof, I hereunto subscribe my name this 13th day of February, A. D., 1913.

ROBERT W. PACHALY.

Witnesses:
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