No. 682,220. Patented Sept. 10, 1901.

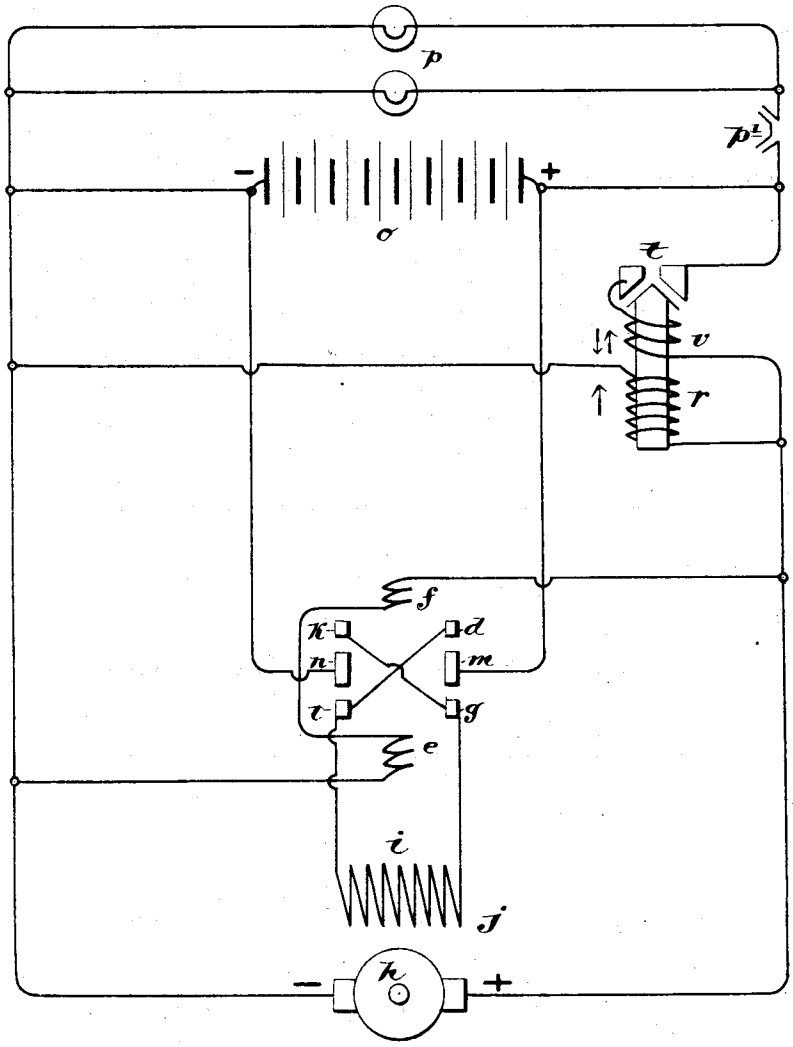
M. MOSKOWITZ.

AUTOMATIC REVERSING SWITCH.

(Application filed Sept. 27, 1900.)

(No Model.) 2 Sheets—Sheet 1.

Fig. 1.



WITNESSES

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Fig. 4.

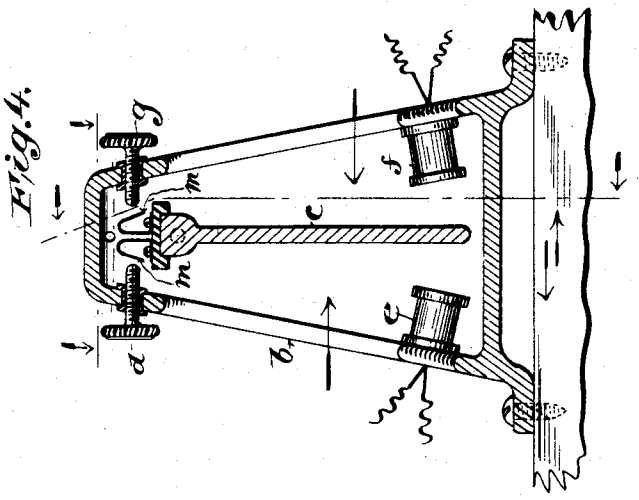


Fig. 2.

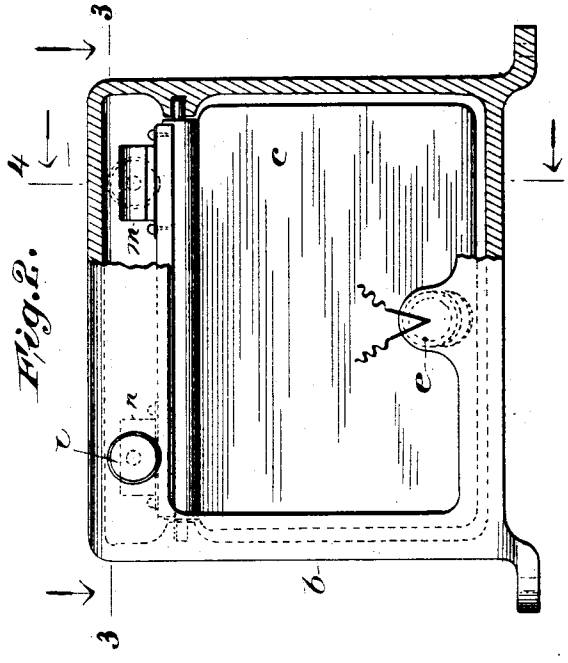
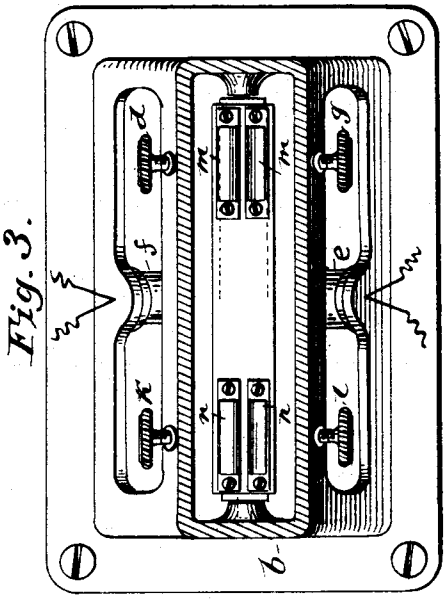


Fig. 3.



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UNITED STATES PATENT OFFICE.

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AUTOMATIC REVERSING-SWITCH.

SPECIFICATION forming part of Letters Patent No. 682,220, dated September 10, 1901.

Application filed September 27, 1900. Serial No. 31,225. (No model.)

To all whom it may concern:

Be it known that I, MORRIS MOSKOWITZ, electrical engineer, of the city and State of New York, (whose post-office address is New Kirk avenue and Twenty-second street, Brooklyn, New York,) have invented certain new and useful Improvements in Automatic Reversing-Switches for Electric Systems, of which the following is a specification illustrated by accompanying drawings.

The invention is particularly adapted for light and power systems for railway-cars, vessels, and vehicles, in which the generator is driven from a revolving shaft that varies in speed of revolution. Usually a storage battery is incorporated in such systems, so that it may produce power when the generator is not being driven at sufficient speed. The invention is by no means limited to such use, but is of special value therefor.

The object of the invention is to effect the proper reversing of the generator connections, so that it will always supply current in the right direction in whichever direction the vehicle or driving-shaft may be run, and to accomplish this result in a manner that is free from objectionable sparking and certain other defects heretofore generally present in such systems.

The reversing-switch is operated by the force of the air or wind caused by the motion of the vehicle. For use in a steamer or other boat the movement of the water might be utilized in place of air.

Briefly stated, the invention contemplates a vane or diaphragm that is forced back by the resistance of the air or wind when the vehicle moves in either direction, and this vane or partition controls the reversing-switch, which preferably reverses the field-magnet of the generator when no current is flowing through either the field or armature coils.

The accompanying drawings illustrate a preferred embodiment of the invention.

Figure 1 is a diagram of the connections for a lighting system for a railway-car or other vehicle embodying the invention. Fig. 2 shows the switch mechanism in elevation as seen looking along the line of travel of the vehicle. Fig. 3 is a plan view, with the top of the box or frame cut off in section on the plane 3 3 of Fig. 2; and Fig. 4 is a section on the plane 4 4 of Fig. 3.

The armature of the generator is marked h and the field-coils i. One terminal of the field-coils i is connected to the contacts of the reversing-switch l and d, and the other is connected to the contacts g and k. The two movable contacts m and n of the switch which are carried and actuated by the wind-vane, as will be presently described, are connected to the respective terminals of the battery o. The lamp-circuit or work-circuit is indicated by p, provided with a switch p'. At s is an electromagnetically-actuated switch-contact which closes the circuit between the generator and the storage battery at the two fixed contacts t. This movable switch-contact is actuated by the two coils u and r, one being in a main line of the generator and the other in a shunt across. Magnets e and f are provided for holding the vane against accidental displacement after the proper connections have been made and the generator is running.

Turning now to Figs. 2, 3, and 4, the details of the wind-operated reversing-switch are seen. A movable vane or partition c, of iron, is hung or pivoted within the open-sided iron box b, so as to swing pendulum-like as the wind strikes it from one side or the other. This box is preferably mounted on the center of the car-roof in such a manner that the open sides of the box shall face endwise of the car, and the broad surfaces of the vane or partition c will be exposed to the air-pressure or wind-pressure produced by the movement of the car. Upon the vane or partition c are mounted spring-contacts m and n, insulated from each other and connected to the respective terminals of the storage battery o. The fixed contacts d, g, k, and l are secured in the walls of the box b in insulating-bushings and are connected to the two ends of the steel magnet-coil l, as in the diagram Fig. 1. Electromagnets e and f, connected as shown in the diagram, are placed at either side of the box in position to magnetize and hold the vane when it has once come in contact with either of the magnets while they are energized.

The action of the apparatus is as follows: The coil *r* is designed to actuate the solenoid and close the circuit at *t* only when the generator has attained sufficient speed to overcome the electromotive force of the storage battery. When the car or vehicle first starts and before it has attained this speed, the wind acting on the vane *c* makes contact in the proper direction—as, for example, between the contacts *m* and *n* and the fixed contacts *g* and *l*. Thereupon the battery sends currents through the field-coils *i* and excites the field of the generator. Instantly the current begins to flow from the generator through the coils *e* and *f*, one of which now holds the vane *c* against possible displacement and maintains the electrical contact. Current also flows from the generator through the coil *r*, and as soon as the generator has attained sufficient speed, and consequently a sufficient electromotive force, the solenoid-core rises and makes contact at *t*, connecting the generator in circuit with the battery and the lamps. The coil *u* is so wound that the current passing through it in the normal direction acts upon the solenoid-coil in the same direction as the coil *r*. Now supposing the speed of the car slows up, so that the generator no longer produces the necessary electromotive force, it follows that the storage battery will begin to discharge through the coil *u*, reversing the current in it. This coil *u* is so wound that a comparatively slight current through it in this reversed direction will be greater in effect than the effect of the coil *r* and will draw down the solenoid-core, breaking circuit at *t*. As soon as the rotation of the generator stops or reverses the magnet *e* or *f* releases the vane *c*, breaking circuit at *l* and *g* and saving waste of current when the car is at rest. If now the car is run in the opposite direction, the wind striking the vane will bring the contacts *m* and *n* against *k* and *d*, respectively, and excite the field of the generator in the opposite direction—that is to say, in the right direction for charging the battery when sufficient speed shall be attained.

From the foregoing it will be seen that in whichever direction the car be started and run the generator field-coils will be energized in the direction required in the system, and when the proper speed has been attained the circuit will be closed at *t*. Thus the invention obviates the necessity of a reversing-switch in the armature-circuit of the generator, and the reversal of connections takes place without relying on the generation of any current.

I am of course aware that the system may be widely modified in the matter of connections and details to apply it to various uses.

What I claim, however, as the characteristic features are the following:

1. In combination with a generator subject to changes in speed and direction of rotation, means for exciting the field-magnet thereof, a reversing-switch for the field-magnet connections and wind-actuated means for operating the said switch, substantially as set forth.

2. In combination with a generator subject to changes in speed and direction of rotation, a storage battery connected to be charged by the generator, connections for exciting the field-magnet coil of the generator from the said battery, a reversing-switch for the said field-magnet coils and automatic means for actuating said switch, substantially as set forth.

3. In combination with a generator subject to changes in speed and direction of rotation, means for exciting the field-magnet thereof, a reversing-switch for the field-magnet connections and wind-actuated means for operating the said switch, an electrically-actuated circuit-controlling switch having one of its coils connected in shunt to the generator and another coil in the main circuit from the generator, substantially as set forth.

4. In combination with a storage battery, and a generator subject to reversals, and a circuit therefor, a fluid-actuated electric switch for the generator having a movable vane or diaphragm and switch-contacts controlled thereby, substantially as set forth.

5. In combination in a wind or fluid actuated electric switch, a box or case having open sides to admit the wind or fluid pressure, a pivotally-mounted vane within the said box, electromagnets for holding the said vane, stationary switch-contacts, and movable switch-contacts actuated by the said vane, substantially as set forth.

6. In combination with a generator subject to changes in speed, a circuit and switch therefor, and a wind-actuated means for operating the said switch, substantially as set forth.

Signed this 26th day of September, 1900.

MORRIS MOSKOWITZ.

Witnesses:
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HAROLD BINNEY.