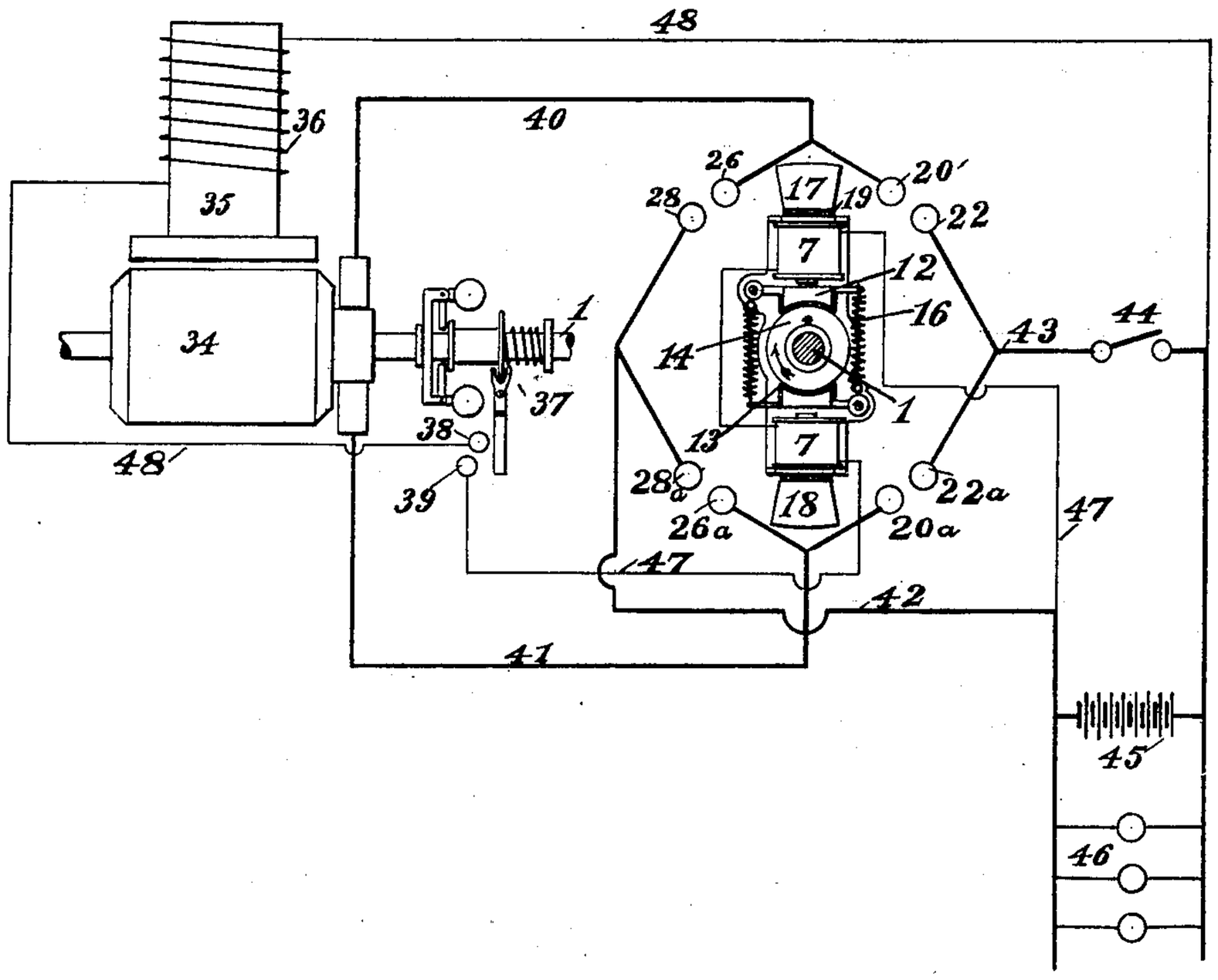
No. 627,326. Patented June 20, 1899.

J. L. CREVELING.

ELECTRIC LIGHTING SYSTEM FOR CARS.

(Application filed Apr. 10, 1899.)

(No Model.)



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ELECTRIC-LIGHTING SYSTEM FOR CARS.

SPECIFICATION forming part of Letters Patent No. 627,326, dated June 20, 1899.

Application filed April 10, 1899. Serial No. 712,410. (No model.)

To all whom it may concern:

Be it known that I, JOHN L. CREVELING, a citizen of the United States, residing in New York, county of New York, State of New York, have invented a new and useful Improvement in Electric-Lighting Systems for Cars, as set forth in the following specification and drawing, forming a part thereof.

My invention pertains to a system of lighting cars by electricity generated by power taken from some rotating member the motion of which is dependent upon the motion of the car—as, for example, the car-axle.

To maintain the lights while the car is standing still or while running at a speed too low to cause the generator to give the proper voltage, I have employed a storage battery or accumulator, and it therefore becomes necessary that the current supplied to the mains shall be of uniform polarity and not reverse with the reversal of direction of motion of the car, as would be the case ordinarily. To reverse the dynamo-terminals to correspond to the direction of rotation of its armature, I have employed a switch or pole-changer operated by friction and moving in one way or the other, according to the direction of rotation of the armature; and my invention comprehends means whereby the said frictional contact shall be broken as soon as the armature-shaft reaches a certain speed, thus avoiding all excessive and unnecessary wear upon the contact parts.

In the drawing, which is a diagrammatic view of an electric-lighting system comprising my invention, 1 represents the armature-shaft of the dynamo and is shown both in side elevation and in end section and both views considered as a continuation of the same shaft in order to more clearly show the operation of the various parts attached thereto. Upon the shaft 1 is secured the pulley or disk 14, and upon any suitable support and having the same center as the shaft 1 is mounted any suitable rocking frame, carrying the magnets 7 and the armatures 12, pivotally supported and normally held in contact with the disk 14, as by the spring 16, the contact-faces of the armatures being provided with the leather shoes 13. Upon the extremities of the rocking frame are mounted the knives or contact-pieces 17 and 18, insulated therefrom, as by the blocks 19, of any suitable material. The contacts 20 and 22, 26^a and 28^a, 20^a and 22^a, and 26 and 28 are so disposed that when the rocking frame is revolved into one of its extreme positions, as determined by suitable stops, (not shown,) the piece 17 causes electrical connection between 20 and 22 and the piece 18 causes connection between 26^a and 28^a, and when revolved into the other extreme position the piece 17 causes connection between 26 and 28 and the piece 18 between 20^a and 22^a. Thus it is obvious that if the springs 16 have the proper tension the pairs of contacts which will be electrically connected will depend upon the direction of rotation of the armature, and thus the connections between the armature and the mains may be reversed to correspond with the direction of rotation of the armature, and that if the proper current then be supplied to the magnets 7 they may be caused to attract the armatures 12, thus separating the contact-surfaces and avoiding all unnecessary wear.

34 represents the armature of the generator, which is caused to revolve with the shaft 1 by the motion of the train.

35 represents the core of the field-magnet of the generator, and 36 the field-energizing coil.

37 is a switch, which may be of any desired construction, adapted to cause electrical connection between the terminals 38 and 39 when the armature-shaft reaches a certain desired speed and to cause said connection to be broken when the armature is revolving below this speed or at rest, a switch operated by centrifugal force being shown by way of example.

40 denotes one of the dynamo-terminals and is connected to the members 20 and 26. 41 is the other dynamo-terminal and is connected to 20^a and 26^a.

42 is one of the battery-mains and connects 28 and 28^a with one pole of the battery 45, while the wire 43 connects 22 and 22^a with the switch 44, which when closed connects the wire 43 with the opposite pole of the battery.

46 indicates lamps or other translating devices supplied by the battery and generator. The wire 47 leads from one pole of the battery to the coils of the pole-changer and

thence to the switch-channel 39. From the terminal 38 the wire 48 leads to the field-coil 36 and thence to the opposite pole of the battery.

The practical operation of my improved system is substantially as follows: With the car standing, and consequently the dynamo-armature at rest, we will consider the switches in the various positions shown in the drawing. Now if the car start in such direction as to cause the armature-shaft 1 to revolve in the direction indicated by the arrow in the figure the frictional contact between the shoes 13 and the disk 14 will cause the arms to be swung in the direction of rotation, thus causing the switch to take a position causing electrical connection between the pair of connections 20 and 22 and between the pair 26^a and 28^a. Should the speed still remain very low, the disk 14 would merely revolve in contact with the shoes 13; but if the speed increase until reaching the speed at which the centrifugal switch is adjusted to operate this switch would cause the connection between 38 and 39 to be made, and current from the storage battery 45 would flow through the wire 48, coil 36, switch 37 38 39, wire 47, and magnets 7, returning to the opposite side of the battery, and thus excite the dynamo-field and cause the magnets 7 to attract the armatures 12, breaking the frictional contact between the shoes 13 and disk 14, and thus avoiding all wear, which would be excessive if the contact remained for any length of time while the armature was revolving at a high speed. With the armature revolving in the direction just taken and the exciting-current as mentioned we will assume that the wire 40 is the positive terminal and that 41 is the negative terminal of the generator. Therefore if the speed be sufficient to cause the electromotive force of the generator to be above that of the battery the generator will supply current to the battery and lamps upon the closing of the switch 44, and this will continue as long as the dynamo is driven at the proper speed.

In the drawing I have merely indicated the switch 44, as this switch forms no part of my present invention. It is obvious that any switch that could be made to close the circuit when the electromotive force of the generator exceeds that of the battery and open the circuit when the electromotive force falls below that of the battery might be used, a form which I have found applicable being shown in my application for Letters Patent upon electric switches filed January 18, 1899, Serial No. 702,504.

If the speed of the generator fall until the switch 37 opens, which of course it must before the direction of rotation can reverse, the opening of the switch will avoid all loss of current by flowing through the field-coils and will also allow the springs 16 to bring the shoes 13 in contact with the disk 14. Should the speed now increase or the car stop and start again in the same direction, the operation can be determined from the above. Should the direction of rotation reverse, the frictional contact between shoes 13 and disk 14 would cause the arms to revolve until connection was made between 26 and 28 and between 20^a and 22^a, and if sufficient speed be reached to close the switch 37 the current will flow from the battery through the field-coil and bobbins 7 as before, causing 40 in this case to be the negative and 41 the positive terminal of the generator. The current flowing through the coils 7 will lift the armatures 12, as before, breaking the frictional contact. If the electromotive force of the generator be above that of the battery and if switch 44 be closed, current will flow from the generator to the battery and lamps in the same direction as before, the connections between the dynamo-terminals and the battery-mains being reversed to correspond with the reversal of rotation of the armature.

I do not wish in any way to limit myself to the particular construction as shown in the above-mentioned drawing, which is given merely as an example of one form of apparatus embodying my invention and which may be the subject of considerable alteration without departing from the principle of the invention.

Having thus described my improvements, what I consider novel, and wish to secure by Letters Patent, is as set forth in the following claims:

1. The combination of a dynamo and its armature driven from a reversible source of motion and a rotating member subject to reversal with the source of motion, with a pole-changing switch operated by frictional contact with the said rotating member, and electromagnetic means for breaking said frictional contact, substantially as set forth.

2. An electric-lighting system for cars comprising a dynamo driven by power derived from the motion of the car, an electric switch adapted to reverse the connections between the generator and the mains upon its movement from one position to another, said movement being caused by frictional contact with a movable member, the motion of which is dependent upon the direction of motion of the car, and electromagnetic means for breaking said frictional contact, substantially as set forth.

3. The combination of a dynamo and its armature driven from a reversible source of motion and a movable member deriving motion from said source, with an electric switch adapted to reverse the connections between the generator and the mains upon reversal of direction of rotation of the armature, said switch being operated by frictional contact between one or more of its members and the said movable member, and electromagnetic means for breaking the frictional contact, substantially as set forth.

4. In an electric-lighting system for cars,

a dynamo driven by power taken from the car-axle and having its direction of rotation dependent upon the direction of rotation of the axle in combination with a pole-changing switch operated by frictional contact with a movable member, the direction of motion of which depends upon the direction of rotation of the axle, and electromagnetic means whereby said frictional contact may be broken, substantially as set forth.

5. An electric-lighting system for cars comprising electric lamps, a storage battery and a generator driven by power derived from the motion of the car, a circuit containing the generator and the battery, a switch in said circuit adapted to reverse the connections between the generator and the battery upon reversal of direction of motion of the car, said switch operated by frictional contact with a movable member, the direction of motion of which reverses with that of the car, electromagnetic mechanism for breaking the frictional contact upon completion of a derived circuit through the coils of said mechanism and means for completing said circuit when the dynamo reaches a predetermined speed, substantially as set forth.

In testimony of all which I have hereunto subscribed my name.

JOHN L. CREVELING.

Witnesses:
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