(No Model.)

W. F. RICHARDS.

ELECTRIC LIGHTING SYSTEM FOR RAILWAY CARS.

No. 604,081. Patented May 17, 1898.

Fig. 1.

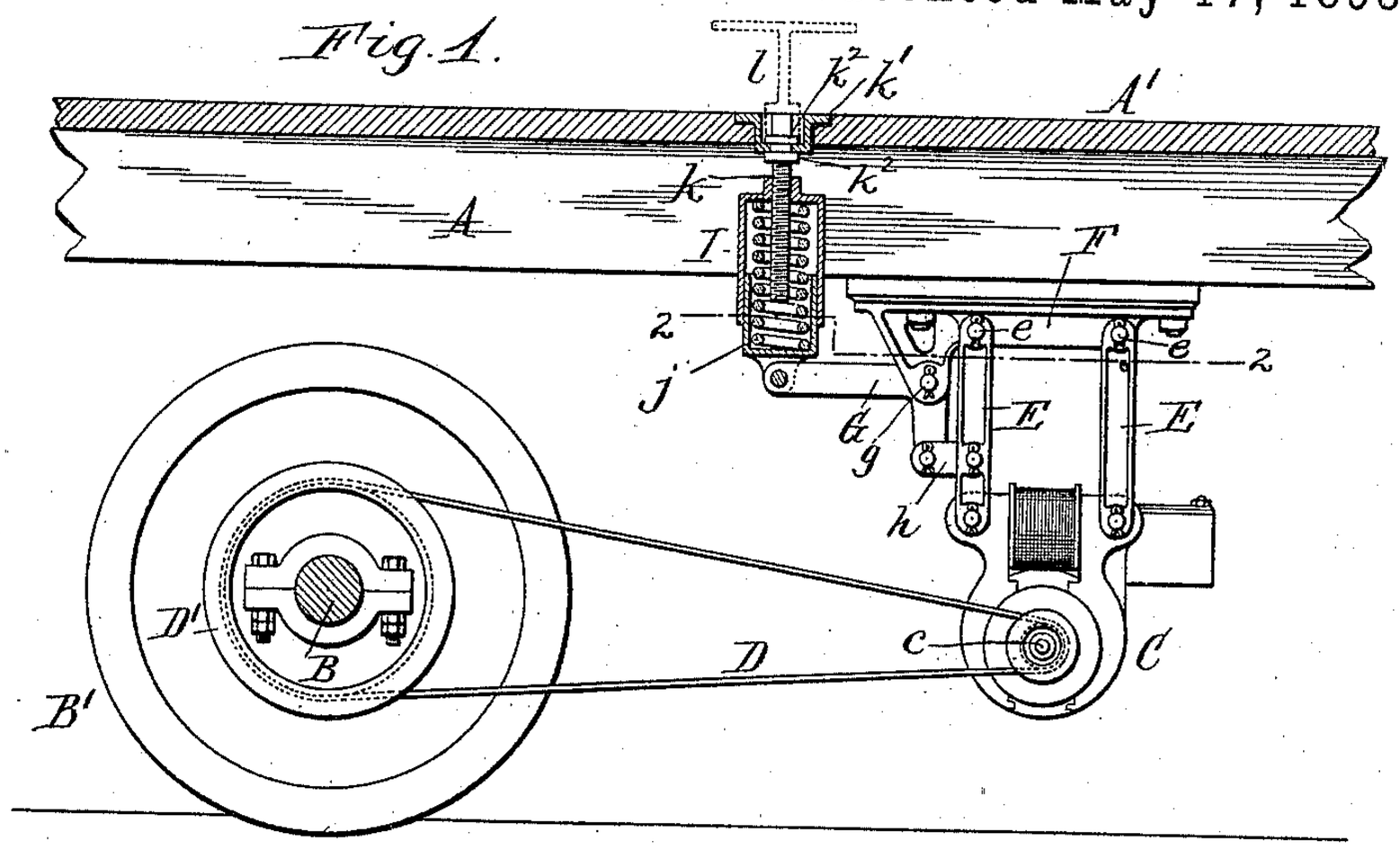


Fig. 2.

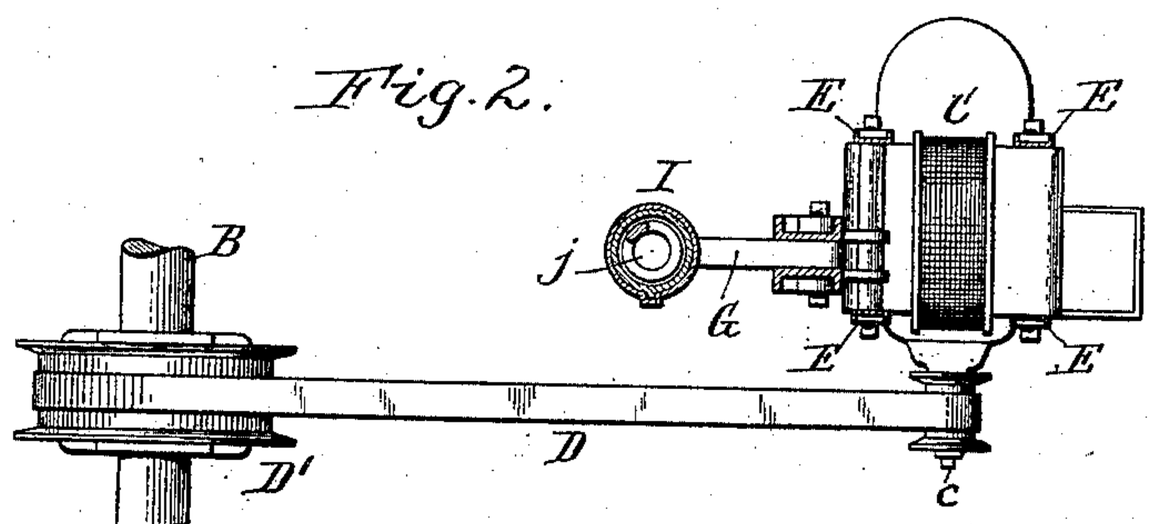
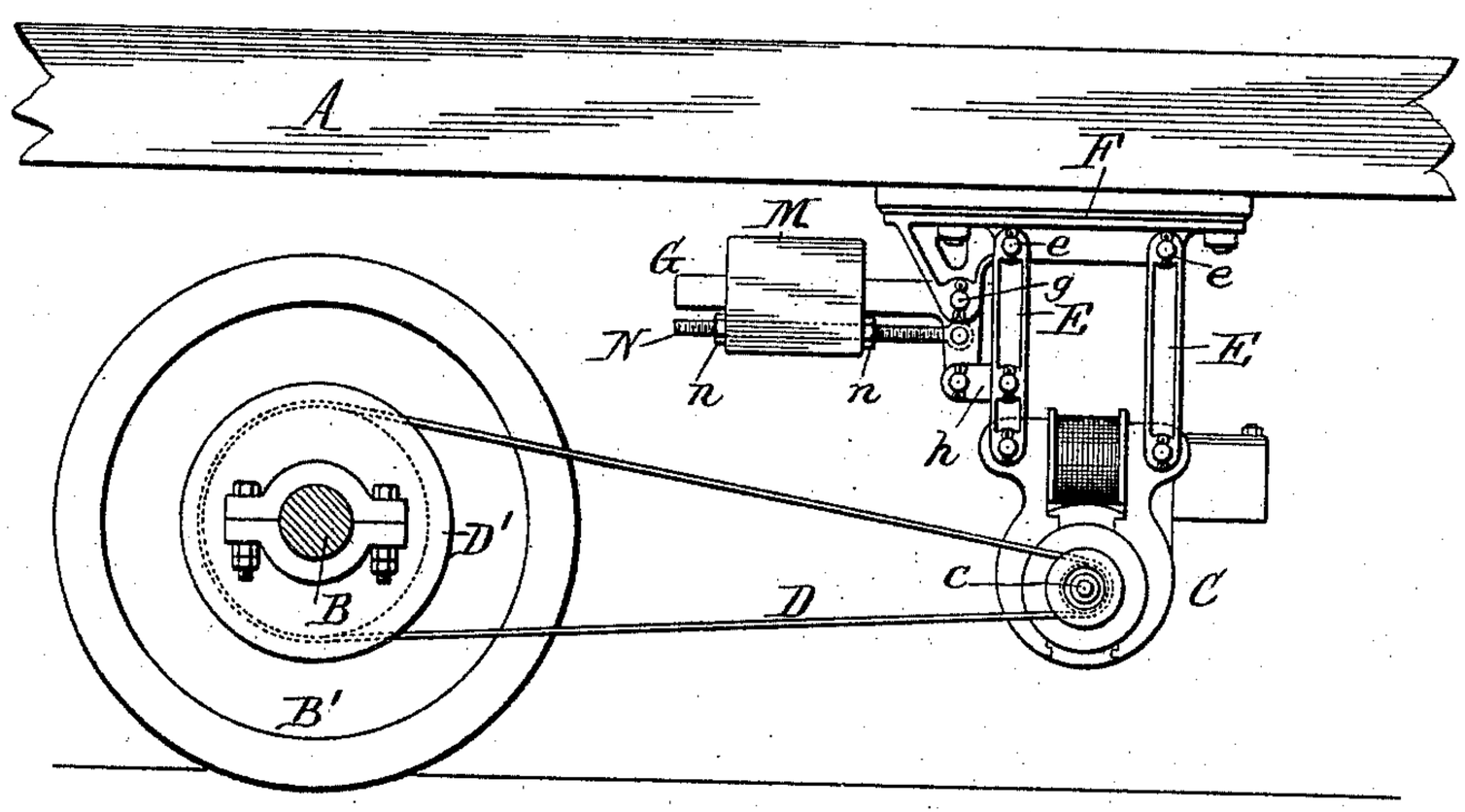


Fig. 3.



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ELECTRIC-LIGHTING SYSTEM FOR RAILWAY-CARS.

SPECIFICATION forming part of Letters Patent No. 604,081, dated May 17, 1898.

Application filed September 16, 1897. Serial No. 651,840. (No model.)

To all whom it may concern:

Be it known that I, WILLARD F. RICHARDS, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented a new and useful Improvement in Electric-Lighting Systems for Railway-Cars, of which the following is a specification.

This invention relates to an electric-lighting apparatus for railroad-cars in which the dynamo is driven from the car-axle by a belt and the dynamo is movable toward and from the driving-axle, so that the belt slips when the speed of the driving-axle exceeds that which is necessary to properly drive the dynamo, thereby neutralizing such excess of speed and maintaining a practically uniform normal speed of the dynamo. An apparatus of this general character is described and shown in the application for patent of Preston and Gill, filed February 25, 1895, Serial No. 539,618. In this apparatus the dynamo is suspended on one side of its center of gravity and the overhanging weight of the dynamo is utilized for tightening the belt. This one-sided suspension of the dynamo answers well when the dynamo is comparatively small, but is unsuitable for large dynamos such as are required for furnishing sufficient candle-power to illuminate satisfactorily coaches and chair and sleeping cars of the size ordinarily used on American railroads.

One of the objects of my invention is to regulate the adhesion of the driving-belt automatically, but irrespective of the weight of the dynamo, so that a large output of current can be secured without rendering the dynamo exceedingly heavy and bulky.

Another object of my invention is to check the vibrations of the dynamo in coupling the cars and in starting and stopping. In coupling cars provided with the usual automatic car-couplings and spring-buffers or yielding platform extensions the cars must be brought together with sufficient force to overcome the resistance of the spring-buffers and permit the couplings to interlock. When these cars are equipped with an electric-lighting system employing a movable dynamo, the concussion incident to coupling causes the dynamo to move from its position of rest toward the car-axle from which it is driven, thereby loosening the belt and rendering it liable to run off, while on swinging back to its former position the dynamo-pulley forcibly strikes the bight of the driving-belt, straining the belt and rendering the same liable to stretch or break.

Further objects of the invention are to provide an efficient adjusting device for increasing or diminishing the pressure against the dynamo and consequently the output of the same and to suspend the dynamo in such manner as to keep its shaft parallel with the car-axle.

In the accompanying drawings, Figure 1 is a sectional side elevation of a dynamo suspended from a car-frame and provided with my improvement. Fig. 2 is a horizontal section in line 2 2, Fig. 1. Fig. 3 is a sectional side elevation showing a modified construction of the invention.

Like letters of reference refer to like parts in the several figures.

A is the car-frame; A′, the floor of the car; B one of the car-axles, and B′ one of the wheels mounted thereon.

C is the dynamo suspended from the car-frame, *c* the armature-shaft having the driving-pulley *c*′, and D the driving-belt running around the pulley of the armature-shaft and a pulley D′, secured to the car-axle.

E represents parallel suspension links or hangers which connect the dynamo with a base-plate F, secured to the under side of the car-frame, and which are pivoted to this plate and the dynamo by transverse pins *e*, so as to permit the dynamo to vibrate toward and from the car-axle. Four of such links are preferably employed, two on each side of the dynamo, one pair being attached to the upper front corners of the dynamo and the other pair to its upper rear corners. These links are of uniform length, so as to cause the dynamo to remain level in all positions thereof instead of assuming an inclined or diagonal position, as is the case when the same is suspended on one side of its center. This construction permits the use of a multipolar dynamo, or one of oblong form arranged with its greatest dimension horizontally, without danger of its striking obstructions on the track, which would be liable to occur if such a dy-

namo were suspended only at one end. By suspending the dynamo at its four corners in this manner the same is prevented from twisting and disturbing the parallelism of the armature-shaft with reference to the car-axle.

In order to tighten the belt D sufficiently to drive the dynamo from the car-axle under normal conditions, a tension device is employed, which preferably is also arranged to act as a resistance for opposing or checking the forward swing of the dynamo caused by the shock of the cars in coupling the same. In the construction shown in Figs. 1 and 2 of the drawings this tension device consists of an elbow-lever G, pivoted by a transverse fulcrum-pin *g* to a bracket of the base-plate F and having its short depending arm connected with the front pair of links or hangers E by links *h*, while its long horizontal arm is attached to the lower section of a telescopic cylinder I. This cylinder is arranged on the front side of the dynamo underneath the car-floor and contains an upright spring or cushion *j*, which bears against the heads of the cylinder-sections and resists the upward movement of the lower section on the upper section, thereby offering a yielding resistance to the upward swing of the long arm of the elbow-lever G and checking the forward vibration of the suspended dynamo.

k is a vertical screw whereby the upper section of the cylinder I is adjusted vertically on the lower section for changing the tension of the spring *j*. This adjusting-screw engages in a screw-threaded opening formed in the upper head of the cylinder and is journaled near its upper end in a bearing *k'*, arranged in the floor of the car. The screw is free to turn in this bearing, but is held against vertical or endwise movement therein by collars k^2, formed on the same above and below the bearing, as shown in Fig. 1, so that upon turning the screw in one or the other direction the upper cylinder-section is adjusted up or down on the lower section and the tension of the spring *j* increased or diminished accordingly. The upper cylinder-section, while free to slide vertically on the lower section, is held against turning by a vertical rib or feather formed on one of the sections and engaging in a corresponding groove in the other section or by any other suitable means. The adjusting-screw preferably extends upwardly through the car-floor, so that it can be operated from the inside of the car, and for this purpose its upper end is made square or flat-sided to receive a corresponding detachable wrench *l*, which latter is shown by dotted lines in Fig. 1.

The spring acts upon the dynamo and presses the same away from the driving-axle, thereby tightening the belt. The motion of the car-axle is transmitted to the dynamo-shaft by the belt and the pulleys in the proportion of their diameters, leaving ordinary slip out of consideration, until the car has reached the normal speed for which the spring-pressure has been adjusted and at which the dynamo produces the desired output—for instance, a speed of twenty-five miles an hour. As the speed of the car increases beyond this speed the increased friction of the belt pulls the dynamo toward the driving-axle, and this loosens the belt correspondingly, causing a slippage of the belt, which neutralizes the increase in speed and retains the speed of the dynamo-shaft practically at the normal rate, although the speed of the car may far exceed this speed. The linear movement of the dynamo toward and from its driving-axle does not exceed a fraction of an inch, so that the tension of the spring is not materially affected by this movement. The speed and output of the dynamo are thus regulated automatically and independent of the weight of the dynamo, which can be made as small as circumstances will permit, since the spring-pressure supplies the force by which the output of the dynamo is determined. By increasing this spring-pressure the output is correspondingly increased.

In coupling cars provided with this lighting apparatus the oscillations of the dynamo are reduced to a minimum, as the movement of the dynamo is restrained in one direction by the driving-belt and in the opposite direction by the spring-pressure. The latter holds the dynamo-pulley snugly in the bight of the belt and prevents the pulley from leaving the belt to such an extent that the belt can run off or can be injured by the pulley striking the belt on resuming its normal position.

The upper arm of the elbow-lever G is preferably considerably longer than its lower arm—say twice as long, as shown. By thus proportioning the arms of the lever the tension device has an advantageous leverage in adjusting the tension of the driving-belt, while the dynamo, on the other hand, has an unfavorable leverage over the tension device in swinging forward from the shock of the cars in coupling.

The conducting-wires, switches, and other accessories of the car-lighting system are not shown in the drawings, as they form no part of my invention.

In the modification of my improvement shown in Fig. 3 a weight M is substituted for the telescopic cylinder I and tension-spring *j* of the first-described construction. This weight is arranged to slide on the upper long arm of the tension-lever and is adjusted thereon for regulating the tension of the driving-belt by screw-nuts *h*, mounted on a screw N and bearing against opposite ends of the weight. This screw is attached at its inner end to the vertical arm of the elbow-lever and passes through a smooth opening formed in the weight. In this case the tension of the driving-belt is varied by adjusting the weight toward or from the fulcrum of the elbow-lever.

I claim as my invention—

1. The combination with the car, the driv-

ing-axle provided with a pulley, the dynamo provided with a pulley and capable of movement toward and from the driving-axle in a substantially horizontal direction, and a driving-belt applied to said pulleys, of a pressure device attached to the car and pressing the dynamo away from the driving-axle, whereby the pressure is applied to the belt for producing the desired normal speed of the dynamo-shaft irrespective of the weight of the dynamo, while the latter is moved toward the axle when the speed of the latter increases above that which produces the desired normal speed of the dynamo, causing a slip of the belt which neutralizes the excess of speed of the axle, substantially as set forth.

2. The combination with the car, the driving-axle provided with a pulley, the dynamo provided with a pulley, and the driving-belt, of front and rear links by which the dynamo is suspended from the car and rendered capable of moving lengthwise of the car in a horizontal position, and a pressure device attached to the car and pressing the dynamo away from the axle, substantially as set forth.

3. The combination with the car, the driving-axle provided with a pulley, the dynamo provided with a pulley, and a driving-belt, of front and rear links by which the dynamo is suspended from the car and rendered capable of movement lengthwise of the car in a horizontal position, an elbow-lever pivoted on the car and acting with its short arm upon the dynamo, and a pressure-spring attached to the car and connected with the long arm of said lever, substantially as set forth.

4. The combination with the car, the driving-axle provided with a pulley, the dynamo provided with a pulley and capable of movement toward and from the driving-axle, of a lever having one arm connected with the dynamo, a telescopic cylinder having one of its sections connected with the other arm of said lever, a pressure-spring arranged in said cylinder, and an adjusting-screw connected with the other section of said cylinder, substantially as set forth.

Witness my hand this 9th day of September, 1897.

WILLARD F. RICHARDS.

Witnesses:
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KATHRYN ELMORE.