(No Model.) 3 Sheets—Sheet 1.

A. L. RUTTER.

ELECTRIC ELEVATED RAILWAY.

No. 489,330. Patented Jan. 3, 1893.

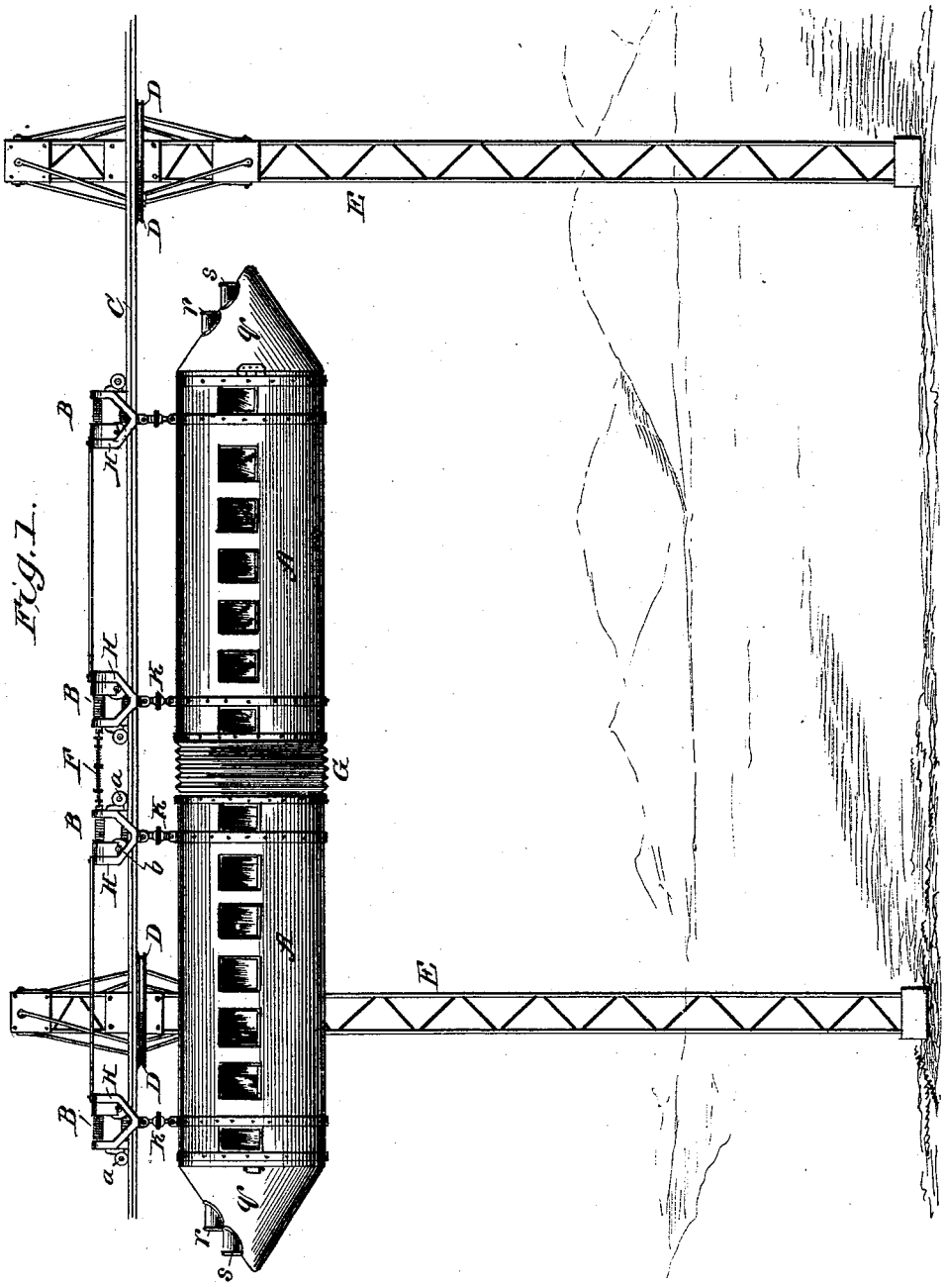

Fig. 1.

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Fig. 2.

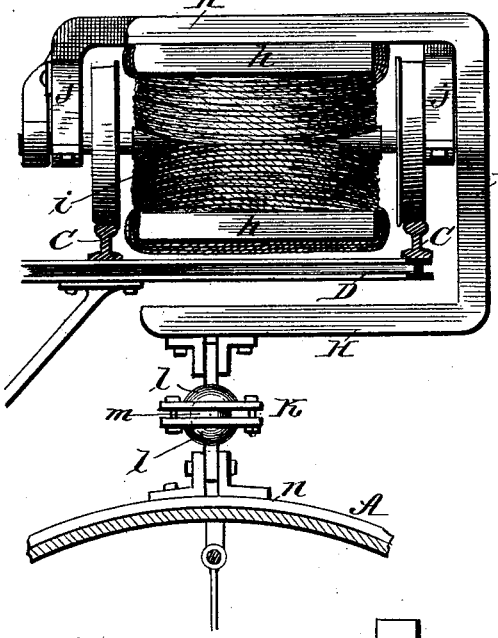

Fig. 3.

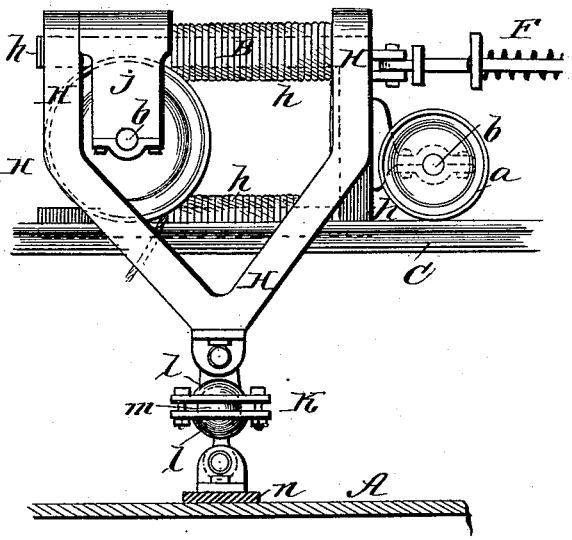

Fig. 4.

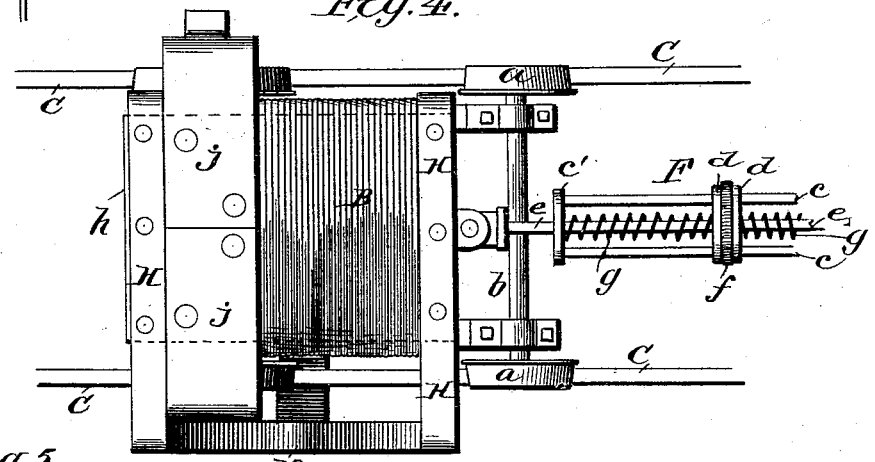

Fig. 5.

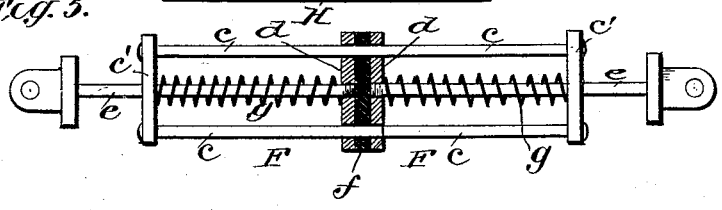

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Fig. 6.

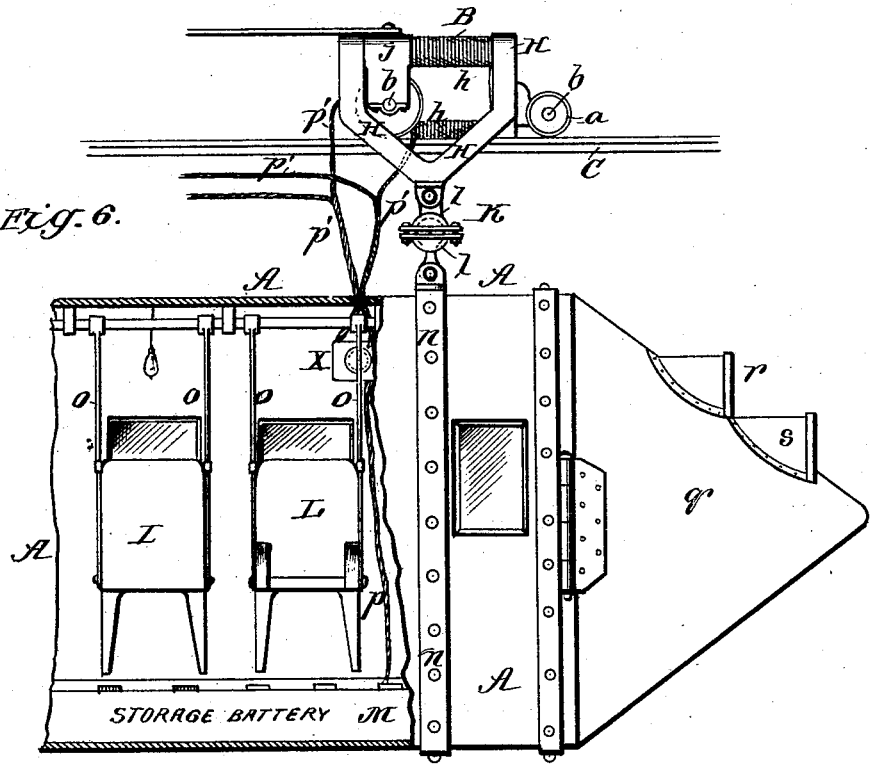
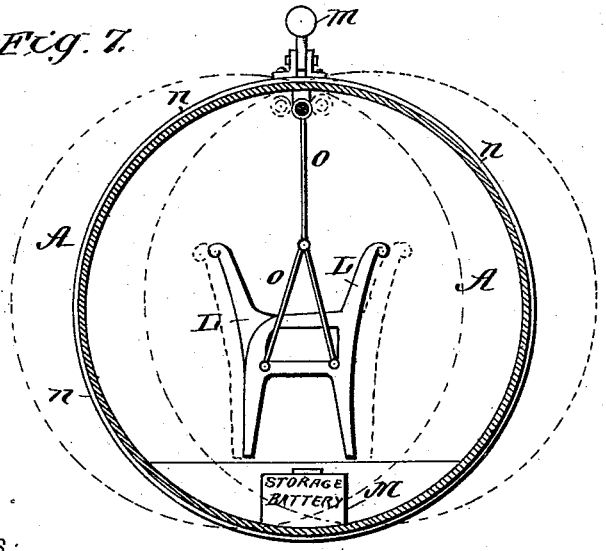


Fig. 7.



WITNESSES:
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INVENTOR:
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UNITED STATES PATENT OFFICE.

ANDREW L. RUTTER, OF WASHINGTON, DISTRICT OF COLUMBIA.

ELECTRIC ELEVATED RAILWAY.

SPECIFICATION forming part of Letters Patent No. 489,330, dated January 3, 1893.

Application filed February 20, 1892. Serial No. 422,280. (No model.)

To all whom it may concern:

Be it known that I, ANDREW L. RUTTER, residing at Washington, in the District of Columbia, have made a new and useful Improvement in Electric Elevated-Railway Systems, of which the following is a specification.

That type of elevated railways in which the cars are suspended beneath the track, from wheeled trucks running on the latter, has superiority, in respect to safety, speed, and economy of construction. I have devised improvements in this class of railways, more particularly in those in which the means for propelling the suspended cars is an electric motor running on the track.

In my invention, the motors derive electricity from a source of supply located in the cars themselves, and for this purpose I prefer to employ a storage battery.

The cars are cylindrical, or approximately cylindrical, in form, and have a conical end. Each is suspended, by a jointed coupling, from yokes attached to the wheeled motors mounted on the track above, so that the requisite freedom of lateral motion is obtained. To further promote the safety and comfort of the passengers, the seats are suspended movably from the roofs of the cars so as to swing laterally, independently of the bodies of the cars, and thus enable the passengers to maintain their position with the least possible disturbance from the lateral oscillations of the cars. The couplings between the two pairs of motors of contiguous cars are so constructed as to enable them to yield to tension and resist thrust, elastically. The motors themselves are constructed with special reference to the highest requirements of service, as will be hereinafter explained. Two double rail tracks are employed, the same being supported on the ends of horizontal arms projecting from vertical posts or pillars. The latter may in practice be set between the tracks of two surface roads, so that each elevated track is directly over one of such surface roads, whereby trains may move in opposite directions, simultaneously, on both roads.

In the accompanying drawings—(three sheets)—Figure 1 is a side view showing electric motors mounted upon an elevated track, and cars suspended therefrom according to my invention. Fig. 2 is end view (enlarged) of a motor connected with a car. Fig. 3 is a side view (enlarged) of a motor and the universal coupling between it and a car. Fig. 4 is a top plan view (enlarged) of the motor. Fig. 5 is a side view (enlarged) of the elastic coupling applied between the motors. Fig. 6 is partly a side view and partly a sectional side view (enlarged) of a portion of a car suspended from the motor. Fig. 7 is a cross sectional view (enlarged) of a car.

In carrying out my invention, the cars A, (Fig. 1) are suspended from electric motors, B, that travel on pairs of rails C C, supported by the crossed horizontal arms D of vertical posts or columns E, which—in practice—may stand between the tracks of two parallel surface roads. There is a pair of motors B, for each car, and the same are provided with two sets of wheels *a* and axles *b*, (Figs. 2, 3, 4,) to adapt them to run on the parallel rails, C, that compose each elevated track. The double track permits cars, A, to be run in opposite directions simultaneously.

The two motors employed for each car are rigidly connected, but the pairs of motors B B, of contiguous cars A, A are connected elastically, that is to say, by a compensating or self-adjusting coupling F, (Figs. 1, 4, 5,) which is adapted to yield to both tension and thrust. As shown in detail in Fig. 5, this coupling is constructed as follows.—The parallel rods *c c*, and the plates or cross bars *c′ c′* to which their ends are attached, form a rigid rectangular frame. Two cross heads, *d*, *d*, slide on the rods, *c c*, and are rigidly connected to the coupling rods, *e*, *e*, whose enlarged heads are pivoted to opposite motors, as shown in Figs. 1 and 4. A thick rubber disk or plate *f* is supported on the middle portion of the frame *c c′*, and the sliding cross heads *d d* are held normally pressed against the opposite sides of this disk *f*, by means of springs *g*, that are coiled about the coupling rods *e e*, between the cross heads *d*, and cross bars *c′ c′*. It is apparent, that when two motors connected by this coupling F, tend to pull apart or separate, such movement will apply tension to the rods *e e*, and be resisted by the springs *g*, since they will then be compressed between the cross bars *c′ c′* and sliding cross heads *d d*. On the other hand, the coupling, F, resists thrust and acts as a buf-

fer, since the sliding cross-heads, *d*, *d*, are forced against the elastic plate, *f*, with more or less pressure whenever the motors tend to approach each other. Thus the coupling relieves the shock that would otherwise be transmitted to the cars by a sudden start or stop and also permits the necessary movement of the motors in passing around curves. It is to be noted in this connection that the adjacent ends of two cars, A, A, have a flexible connecting portion G, (Fig. 1) similar to that now employed on "vestibule" trains. This flexible connection is complementary to the elastic coupling F, between the motors B B, in that it permits like freedom of movement of the cars, A, A, as to each other.

In constructing the motors B, I adopt in general, the well known Siemens type, its main frame, *h*, whose horizontal arms are wound with wire to form the field magnets, being arranged horizontally and placed as low between the rails C C, as practicable. One of the axles *b* of the track wheels *a* has its bearings in brackets secured to the closed end of the magnet frame *h*, and the other axle *b*, (Figs. 2, 3,) is arranged transversely between the arms of the magnet, and constitutes the axis of the revolving armature *i*. The bearings of this axle are in the pendent ends of a yoke *j*, which passes over the upper arm of the magnet frame *h*, and is suitably secured to it by screw bolts. By this manner of arranging the magnet frame and axle bearings the center of gravity of the motor is brought as low as practicable, so that lateral oscillation while running is correspondingly slight.

The means for suspending the car, A, from the motor B, is a bifurcated iron yoke H (Figs. 2 and 3), the upper horizontal arms of which extend transversely across and are bolted on the upper arm of the magnet frame, *h*, while the lower parallel arm extends underneath the rails, C, C, to a point beyond the median longitudinal line of the track, as shown in Fig. 2. The car, A, being suspended from the inner ends of such arms of two yokes, it is apparent that more of the load carried by a motor, B, is imposed on its inner than its outer wheels, thus promoting security in running. The construction of the motor and arrangement of its parts, taken together with this manner of constructing the suspension yoke, is simple and economical of material as well as strong and durable.

The coupling, K, which connects each car, A, to a yoke, H, is so constructed as to permit free movement of the car both laterally and longitudinally. That is to say, the coupling, K, has a ball-and-socket joint, which is constructed as shown in Figs. 2 and 3, the socket proper being formed of two concave plates, *l*, bolted together, and having a pivotal connection with the yoke, H, while the ball, *m*, that is held and works in the socket, has a pendent stem which is similarly pivoted to the iron band, *n*, that encircles the car. This universal coupling permits free and independent motion of the car, which aids in avoiding sudden shocks in starting or stopping, as well as allows the cars to swing independent of the motor, in passing around curves or under the action of a strong side wind. To still further promote safety of the train and comfort of the passengers, I suspend the car seats L, (Figs. 6, 7,) by means of rods *o*, that are pivoted to the roof of the car, interiorly, so as to swing crosswise of the latter. The lower ends of these rods *o*, are bifurcated and bolted to the sides of the seats L. Each seat is preferably adapted for but one person, and faces in a direction opposite its neighbor, in order to facilitate conversation between passengers. It will be apparent that the provision for lateral movement of the seats, L, supplements that of the car proper, A, relative to its point of suspension, so that the passengers experience scarcely any annoyance or discomfort from the swaying of the car while running.

The storage battery M, (Figs. 6, 7,) for supplying electricity to the motors B, is arranged on the bottom of the car A, and beneath the seats L. This arrangement brings the center of gravity as low as practicable, and also utilizes space that would otherwise be useless.

I do not propose in this instance to detail the peculiar electrical switch mechanism which I employ intermediately of the battery and the motor for governing the application of the electric current to the latter and also to the lights in the car. It will suffice to state that any suitable switch may be used, and will be located at X, on the side of the car near each end thereof. Suitable insulated conductors *p* (Fig. 6) extend from the battery to this switch and thence others *p'* go to the two motors of each car—as represented diagrammatically. The details of this arrangement will be readily understood and carried out by those skilled in the art.

One end *q* of each car is made conical (Fig. 6) to overcome atmospheric resistance to the motion of the train as much as practicable, and windows *r* for observation and others *s* for display of colored signal lights are provided in the upper side of such conical end. The latter (*q*) is hinged at one side to adapt it to serve as a door for ingress and egress of passengers.

At each train station, a platform will extend out directly under the track rails, and as nearly flush with them as practicable, in order to permit passengers to enter or alight from the cars with convenience and safety.

Instead of the magnet frame *h* being constructed integrally as shown, it may be divided lengthwise, so that it will be two separate pieces, but still wound with the same wire.

Having thus described my invention, what I claim and desire to secure by Letters Patent is:

1. In an elevated railway system, the com-

bination with the motor magnet frame *h*, arranged horizontally with one arm over the other, of the forked yoke whose two upper arms extend across and are secured in parallel position on the end portions of the upper arms of said magnet frame, the single lower arm of such yoke extending beneath the magnet frame midway between its ends, the armature shaft and motor axle provided with transporting wheels and arranged as shown and the yoke *j* in which the said shaft and axle has its bearings, and the pair of transporting wheels *a a* and their axle having bearings attached to the head of the motor frame, all as shown and described.

2. In an elevated railway system, the combination with double-wheeled motors or carriers B, B, adapted for running on an elevated track, and a car arranged beneath said carriers and track, of the universal-joint coupling which suspends the car from the carriers and allows it a limited independent movement both longitudinally and laterally, as specified.

3. In an elevated railway system, the combination with the wheeled motor carriers, adapted to run on an elevated track, and a car arranged beneath them, of the ball-and-socket coupling K and the pivotal or hinged connection between such coupling and the carrier and car, as shown and described.

4. In an elevated railway system, the combination with the two-railed track, and the motor mounted thereon, of the U yoke whose upper portion extends over and is secured to the frame of said motor, its lower horizontal arm extending beneath the track and beyond its median longitudinal line and the car coupled to the inner end of such lower arm, as and for the purpose specified.

5. In an elevated railway system, the combination with the cars, a jointed suspending device or support therefor, the wheeled motors B running on the elevated track, and the elastic connection between said motors, the same being adapted to resist both tension and thrust, elastically, as shown and described.

6. In an elevated railway system, the combination with motors supporting adjoining cars, of the elastic coupling device having a jointed attachment to said motors and adapted to yield to both tension and thrust, as shown and described.

7. In an elevated railway system, the combination with motors and an elastic device which couples them, of cars suspended from said motors and an elastic "vestibule" connected between them, as shown and described.

8. In an elevated railway system, the combination with a wheeled carrier mounted on an elevated track, a car suspended therefrom by a jointed coupling which permits a lateral swing, and seats suspended from the roof of the car and adapted to swing independently, as shown and described.

9. In an elevated railway system, the combination with the suspended car adapted to swing laterally, of seats which are suspended within the same side by side, and face in opposite directions, as shown and described.

ANDREW L. RUTTER.

Witnesses:
WERNER GUESS,
AMOS W. HART.