(No Model.)

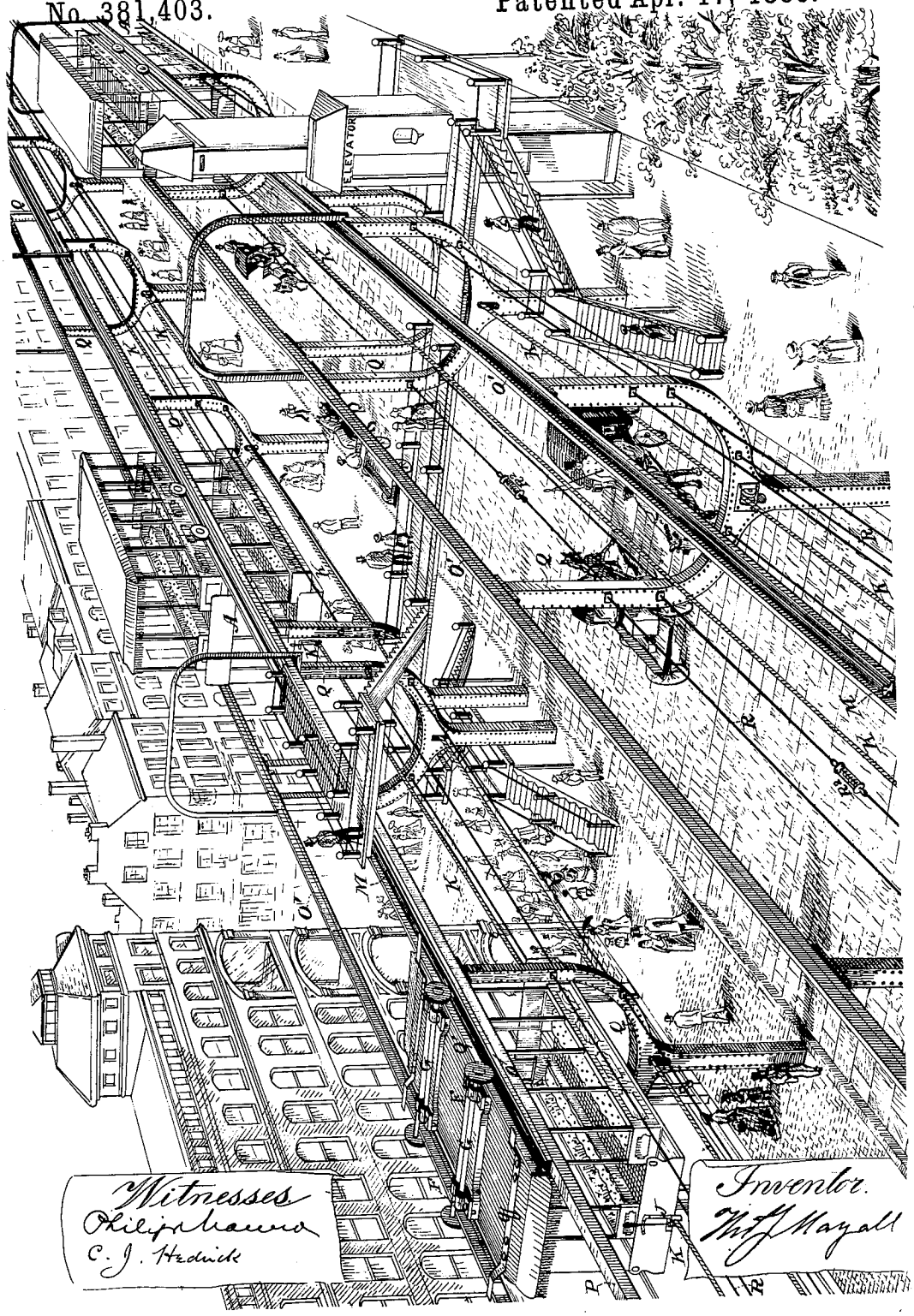
3 Sheets—Sheet 1.

T. J. MAYALL, Dec'd.

L. A. MAYALL, Executrix.

ELEVATED RAILWAY.

No. 381,403. Patented Apr. 17, 1888.



Witnesses
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(No Model.) 3 Sheets—Sheet 2.

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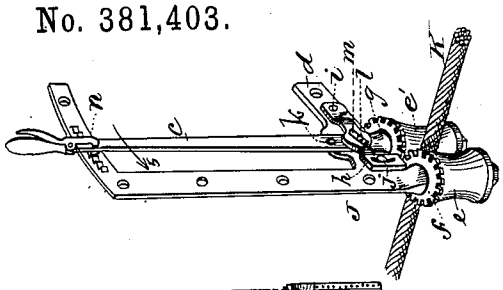


Fig. 5.

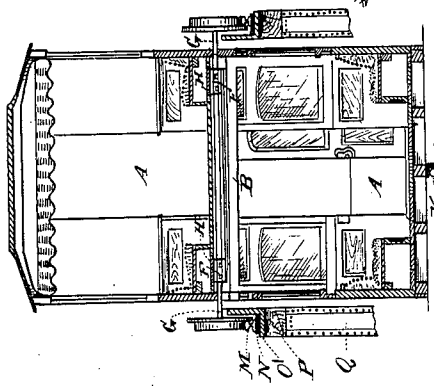


Fig. 4.

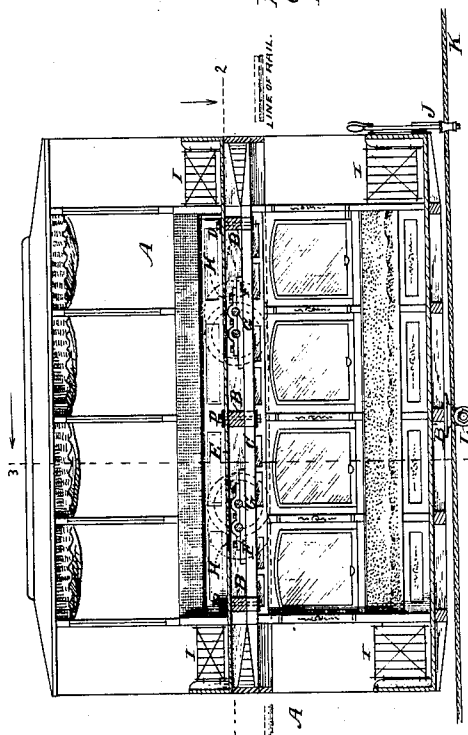


Fig. 2.

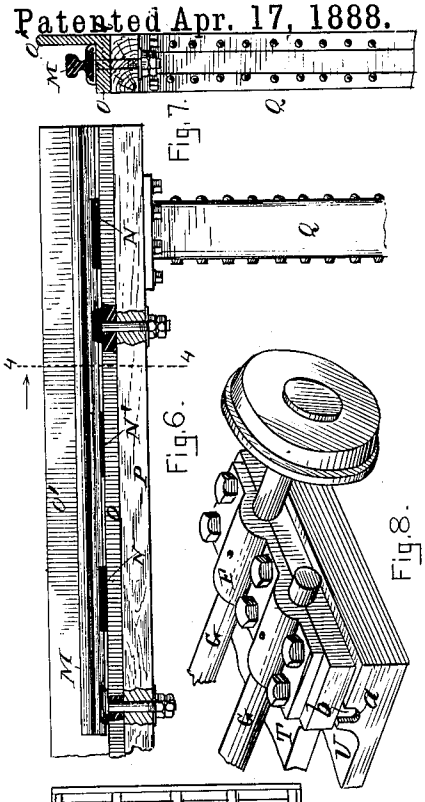


Fig. 6.

Fig. 7.

Fig. 8.

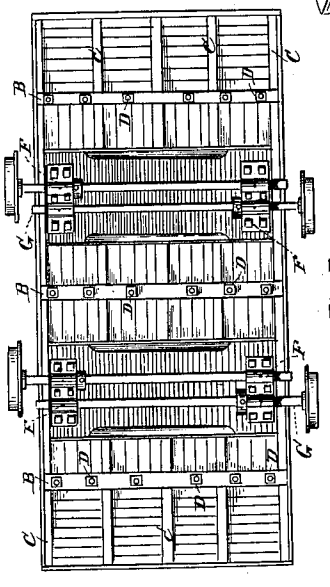


Fig. 3.

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ELEVATED RAILWAY.

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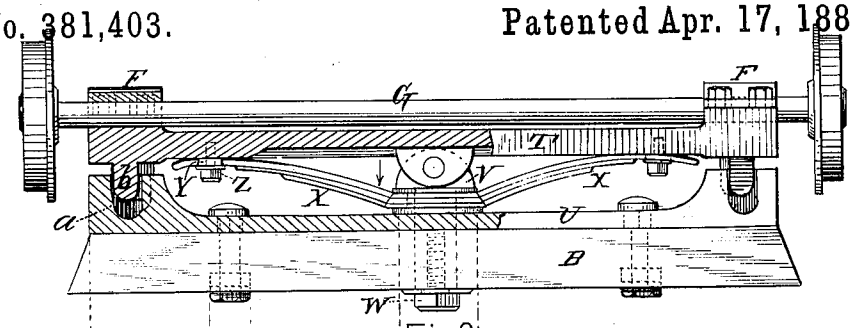


Fig. 9.

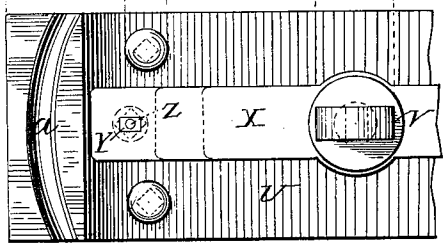


Fig. 10.

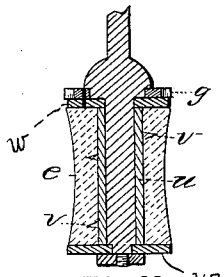


Fig. 11.

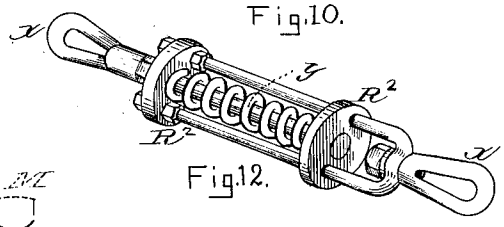


Fig. 12.

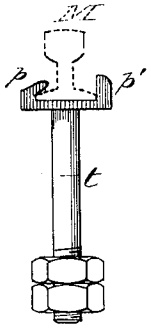


Fig. 13.

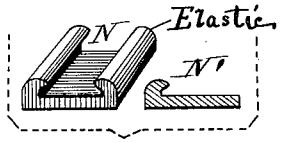


Fig. 14.

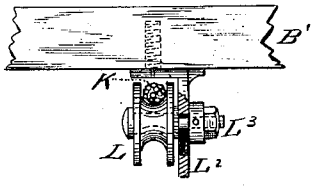


Fig. 15.

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UNITED STATES PATENT OFFICE.

THOMAS J. MAYALL, OF READING, MASSACHUSETTS; LUCY A. MAYALL EXECUTRIX OF SAID THOMAS J. MAYALL, DECEASED.

ELEVATED RAILWAY.

SPECIFICATION forming part of Letters Patent No. 381,403, dated April 17, 1888.

Application filed June 14, 1887. Serial No. 241,252. (No model.)

To all whom it may concern:

Be it known that I, THOMAS J. MAYALL, a citizen of the United States, residing at Reading, in the county of Middlesex and State of Massachusetts, have invented a new and useful Improvement in Elevated Railways, of which the following, taken in connection with the accompanying drawings, is a specification.

My invention appertains to an improved system of rapid transit on elevated ways for the conveyance, preferably, of passenger traffic from cities to their outlying districts and from adjacent suburban villages to points within city limits, affording a convenient, rapid, secure, and inexpensive transportation.

To accomplish the object of my invention I employ a system of double tracks, securely upheld each upon a single line of supports constructed of iron angle-plates securely riveted and trussed; or they may be laid upon wooden posts and beams properly framed and braced. Said rail-supports are bifurcated above the ground to avoid obstruction to vehicles or pedestrian travel and to prevent obstructing the streets or shading the residences contiguous to lines of road. The bases of these posts or supports are preferably embedded along the curves of the foot-walks to secure contiguity to the principal business-houses, which I design to utilize as temporary way-stations to accommodate the trade patronage to these particular resorts, for which purpose platforms will connect the road-bed with said stores, wherein it is designed to apportion sufficient space or an apartment for the arrival and departure of said patrons, which may be further accessible by means of elevators whose actuating power is obtained from the cable, which is the motive power I employ to convey my cars. The manner of transmitting the motion of said cable, with the mechanism employed therefor to raise these elevated lifts, together with mechanism for closing the gates to passages leading thereto, I reserve for a future application for a patent and need not further describe herein. I also design to construct at desirable intervals a series of platforms accessible by easy flights of steps, supplemented, also, by (street) elevators to reach said cars. These features—notably the connections with prominent business-houses—would be of course particularly applicable to the largest cities through which my elevated road might pass, while all such connecting-platforms would be guarded by gates automatically opened and closed by and upon the arrival and departure of the cars, thus securing greater immunity from accident than without this precaution. To overcome resistance and facilitate the passage around curves, I construct double journal-boxes, which receive the axles of the car-wheels, each of which rotates independently to prevent wedging, and also attains a greater degree of adhesion with the rail than could ordinarily be maintained when the rotation of the wheels is in unison. The bed-plate upholding the journal-boxes is provided at each end with projecting guides of semicircular form, which enter correspondingly-depressed ways in a secondary plate firmly bolted to the car-top, which permit a rotary movement of the journal bed-plate prescribed by bolts or studs projecting from said secondary plate when the car is turning curves, while the oscillatory movement of said car is provided for by a half-elliptic spring interposed between said plates, which are detachably secured at their centers by a swivel-bolt, which also movably secures said spring. The Y-shaped supports before mentioned have this particular conformation, in connection with the powerful tie-rods uniting the same, whose tensile strength unitedly in sections is sufficient to uphold the cars in case of derailment or breakage of axles. As an additional safeguard, transverse bars capable of sustaining the weight of a loaded car are secured at each end in the case of a single car to the top of the same, the ends projecting slightly over and in juxtaposition to the rail-guard. In the matter of a double car they would occupy an intermediate chamber between the floor of the upper and the top or deck of the lower car. Should an emergency occur whereby these supporting-bars act in their capacity, it is designed that the friction between the bar ends and said guard will bring the cars gradually to a stop, the clutch-connection between the car and the cable being previously severed. The rail-guard previously alluded to is a right-angle iron supported upon the rail-beam, upon the horizontal arm of which the rail rests, both rail and guard

being securely attached by bolts of novel construction passing through said beam. The employment of this rail-guard and its position between the truck and car-body assures safety from derailment. In the matter of rail-laying I provide at frequent intervals between the bottom of said rails and the contiguous floor of the guard-rail chairs or packing of an elastic nature, which to a great extent reduces the noisy compact of the wheel with the rail and diminishes the recoil through its elasticity. Practically my cable moving the cars consists of an endless belt actuated at one or both ends of the plant over drums rotated by gears to attain a maximum speed of about fifteen miles per hour and driven by suitable machinery, (not herein illustrated,) the two lines of cable being placed vertically and situated within the Y-shaped supports, the lower length of the cable being supported over friction-pulleys placed therein at the junction of the arms supporting the rail-bed. A grip or clutch of novel design establishes connection at one end and under the control of the conductor. For the convenience of passengers, a modified construction of clutch, operated through a connecting rod or cord passing through the car and individually operated without the intervention of the road employé, could be introduced.

To permit the contraction or expansion longitudinally of such parts of my construction as require a degree of variable rigidity, I employ a novel combination of follower-plates and swivel-joints, which I place in needed positions upon the tie-rods, while, to obviate the transverse spread of the track, spanner-trusses are raised alternately over the supports, which, in addition to the strength they impart, may be further utilized to uphold wires for telegraphic and telephonic transmission.

A further exemplification of my invention, with specific references to its construction and operation, will be ascertained by due reference to the annexed drawings, wherein—

Figure 1 is a diagraphical view illustrating without detail the appearance and application of my improved system of elevated cable-roads as practically laid down within city limits. Fig. 2 exhibits a vertical longitudinal section of a double car, Fig. 3 being a plan of the top of the pendent car on the dotted line 2 2, and Fig. 4 a transverse section of the same on the dotted line 3 3, Fig. 2. Fig. 5 shows a view of the cable-clutch. Fig. 6 is an outside elevation, partly in section, of the rail-bed and its support, Fig. 7 being a transverse section of the same on dotted line 4 4, Fig. 6. Fig. 8 illustrates in perspective the duplex journal-boxes, independent axles, and truck. Fig. 9 designates a side elevation of the truck-bolster in half-section. Fig. 10 is a top plan of the bed-plate to exhibit the depressed way or slot and construction of the spring. Fig. 11 illustrates the gripping-wheel of the clutch in longitudinal section. Fig. 12 is a perspective of the spring-actuated follower-plate and swivel. Fig. 13 is a side elevation of the bolt confining the rail to its bed. Fig. 14 embraces views of the elastic chair, showing the difference in construction. Fig. 15 is a front elevation of the pendent adjustable sheave.

Corresponding letters designate the same features throughout the several views thereof, referring to which—

A designates a double car, uniting a smoking, luggage, and general passenger vehicle, framed in a manner to embody strength with economy.

B represents the cross-beams of the upper car, strongly bolted to the longitudinal roof-beams C of the lower car, as at D. Within the inclosed area formed between the flooring E and said roof-beams C are located the double journal-boxes F, independent axles G, truck-bolster, and attendant devices composing the running-gear. Hatches H give access to said gear for repairs, oiling, &c., while gates I insure the safe occupation of the car-platforms. The clutch J for actuating the car by establishing connection with the moving cable K will be observed at one end of the car, Fig. 2, while it is shown in detail in Figs. 5 and 11. Beneath said car, attached centrally, is located a suspended wheel, L, to facilitate the passage and connection of said cable with the car. In Fig. 4 the car is suspended upon the rails M, which rest upon the elastic packing N, upheld by the angle-iron O, integrally forming a part of the rail-guard O′, these several parts resting upon wooden beams P, elevated upon the Y-shaped supports Q. (Best exhibited in Figs. 6 and 7.)

Tie-rods R, Fig. 1, impart stability to the entire structure, whereon spring-actuated follower-plates R^2, with swivel terminal links x, compensate for the expansion of material throughout the construction.

In Fig. 13 is exhibited the structure of the bolt T, confining the rail and guard to the beam. In laying rails said bolts are dropped into their respective sockets, previously formed through the angle rail-guard and beams, and secured thereto by nuts, as shown in Fig. 6. The yoked head of the bolt then receives said rail M, after which the vertical side p of the bolt, Fig. 13, is reflexed, to bear upon the flange of the rail, which is thereby securely confined. The elastic packing N is also molded to conform to the design of the foot of said rail, (which in the present instance is of the American or H pattern,) and preferably introduced beneath the rail before it is confined to the bed.

The elastic chairs N, Figs. 4 and 14, are preferably made of a vulcanized compound of rubber and sulphate of antimony. Should there be necessity for the insertion of such packing after the rail is confined, I provide half-sections N, (exhibited in Fig. 14,) which can be inserted in position between said rail and its guard O, which latter retains it in position. The upper and lower plates, forming the truck-bolster, are designated as T and U, respectively, and are centrally pivotally united

by swivel-bolt V to the transverse beam B of the car. Said bolt also confines the half-elliptic spring X; thence passing through said beam is locked thereto by the re-entering screw W. Said spring has longitudinal slots Y at its extreme ends to receive tap-bolts Z, entering the under side of the bed-plate supporting the journals. That the rotation of said plates and the spring may be simultaneous, the reactionary power of the latter assists in preserving the equilibrium of the car. Elliptical slots *a* in the plate U contiguous to the truck admit the ways *b* and assure stability in rounding the road-curves.

The manipulation of my cable-clutch J, attached to one end of the car, is as follows: The hand-lever *c* is pivotally attached to the arm *d*, to which latter is also attached the stub-shaft on which the friction-rolls *e* rotate. The other roll, *e'*, is carried by the lever *c*. Notched disks *f* and *g* are keyed to said rolls, which rest continually against the cable K and rotate when the car is at rest. The locking-lever *h* is pivoted to arm *d* at *i*, its opposite end being adapted to engage the teeth of disks *f* and *g*, and so lock the rolls and hold them stationary. A pin, *j*, projecting through a slot in said lever *h*, limits its movement, and a pin, *l*, carried by the lever *c*, works in a cam slot, *m*, in said lever *h*, and throws the lever into and out of engagement with disks *f* and *g*, according as lever *c* is moved to the right or left. In starting the car the lever *c* is moved to the right, thereby pressing the roll *e'* more tightly against the cable. The same movement depresses locking-lever *h*, which enters notches in disks *f* and *g*, and so holds the rolls stationary with the cable firmly gripped between them. To stop the car, lever *c* is moved in the direction of arrow 5, slightly relaxing the grip of the rolls *e e'* and lifting the locking-lever *h*, so that the rolls can rotate freely. A rack and spring-catch, *n*, keeps the lever *c* in any desired position.

In Fig. 11 *u* indicates a metallic bushing surrounding the stud-shaft supporting said friction-roll, which, for the purpose of greater adhesion, may have radial projections, as at *v*, around which the rubber would be molded and vulcanized. Metal disks or washers *w* protect the ends of said rolls from the attrition of the surrounding parts. The construction of the swivel and follower-plate will be observed in Fig. 12 in its application. The swivel-links *x x* are intermediately connected with the tie-rods united to the rail-support and tightened by nuts and washers, the spring *y* permitting expansion in the construction.

q, Fig. 1, designates the transverse safety-bars projecting over the rail-guard O, upon which it rests in case of derailment, to suspend the car. A friction-wheel, L, to confine the cable near the car-bottom, is adjustably secured in slotted angle-plate L^2 by a shouldered axial screw and nuts, L^3, as illustrated in Fig. 15.

Having described the construction and operation of my invention, I desire to secure by Letters Patent of the United States, and claim—

1. In an improved elevated railway, the aggregate devices composing an elevated rail-bed, to wit: the vertical right-angle rail-guard O', whose base forms the track-bed O, the elastic chairs N N, having a depressed bed to receive the rail, and the clutch-bolts *t*, provided with reflexed and upright gripping-lugs *p p'*, in combination with a perforated rail-support, P, and bifurcated rail-supports Q, substantially as and for the purpose specified.

2. In an improved elevated railway, the double car A, having an intermediate chamber between the floor of the elevated story and the deck of the suspended story to receive the duplex axles G, the bolster-plates T and U, and the spring X, with their necessary adjunctive bolt and screws arranged to coact with an elevated rail-bed, as herein described.

3. In combination with an elevated-railway carriage, the clutch J, adapted to continuously bind the cable K by duplex friction-rolls which rotate with the motion imparted therefrom when the car is at rest, the momentum of said car being established by the inertia of said friction-rolls secured through the medium of notched disks *f* and *g*, confining or releasing said rolls by action of a locking-lever, *h*, having an inclined slot, *m*, whereby it is moved by the oscillating lever *c*, substantially as described.

4. In combination with a single or double constructed car having its truck equidistant from floor to roof, the pendent adjustable sheave L, the slotted supporting-frame L^2, and holding-nuts L^3, adapted to loosely confine the cable K, to facilitate its connections with the car and to prevent undue oscillation of said cable, as explained.

5. In an elevated railway, the combination, with the carriage A and rail-guard O, of the transverse supporting-bars *q*, designed to uphold said carriage in case of derailment, substantially as specified.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, on this 14th day of June, A. D. 1887.

THOS. J. MAYALL.

Witnesses:
PHILIP MAURO,
C. J. HEDRICK.