(No Model.) 3 Sheets—Sheet 1.

W. F. SHERMAN.

ELEVATED AUTOMATIC RAILWAY.

No. 260,617. Patented July 4, 1882.

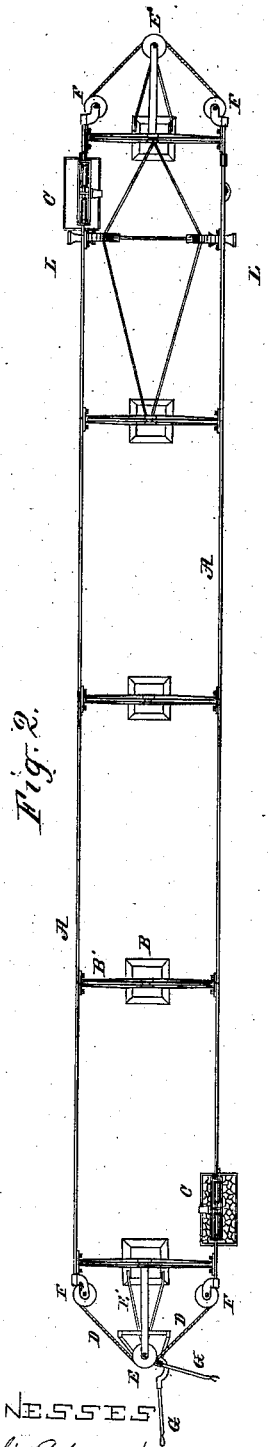

Fig. 2.

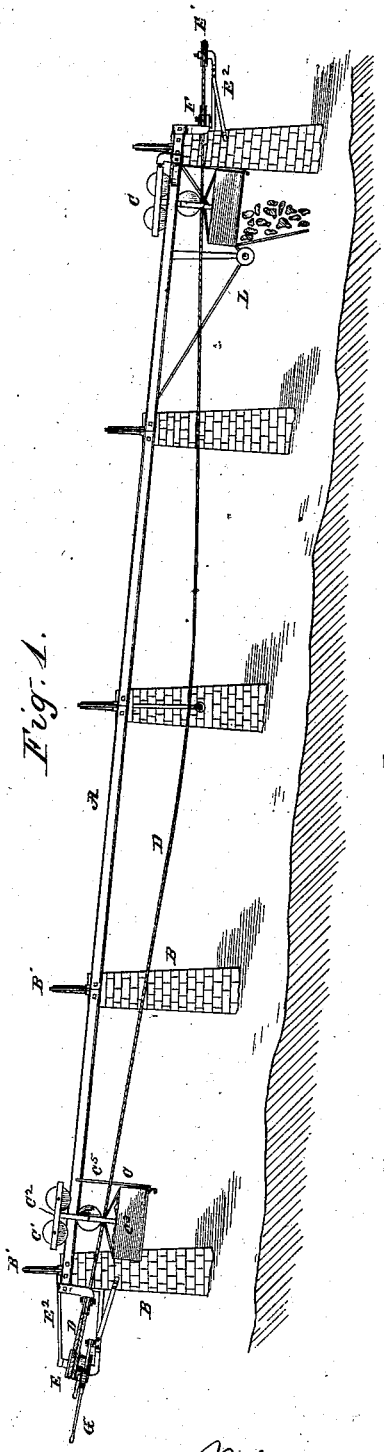

Fig. 1.

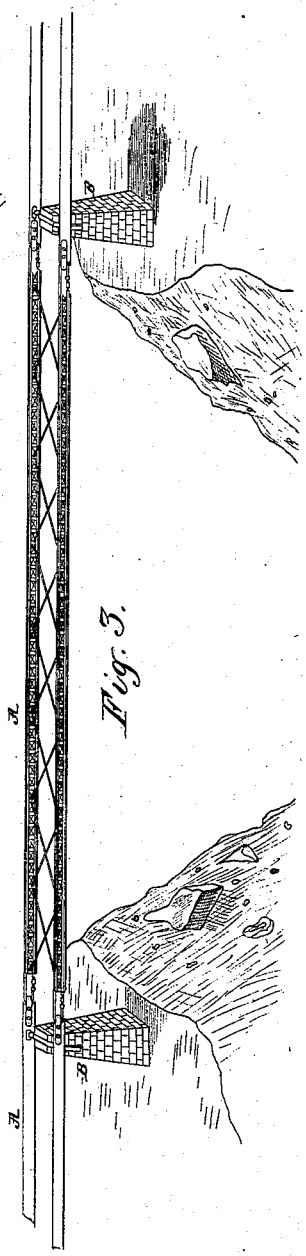

Fig. 3.

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(No Model.) 3 Sheets—Sheet 2.

W. F. SHERMAN.

ELEVATED AUTOMATIC RAILWAY.

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Fig. 4.

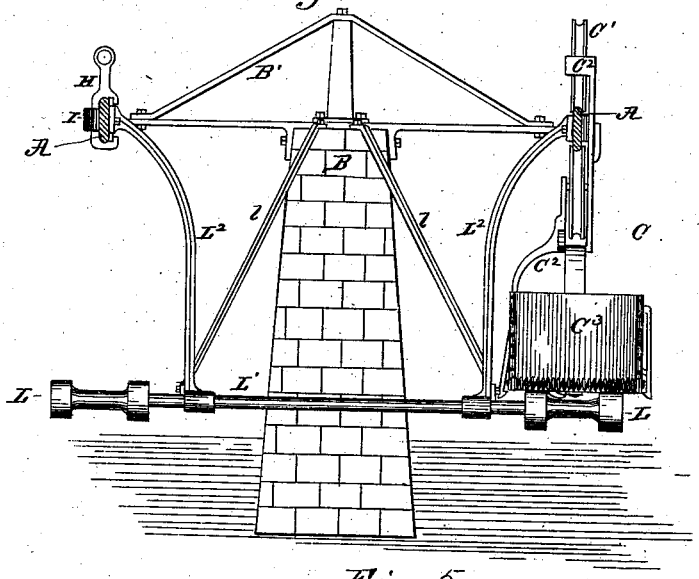

Fig. 5.

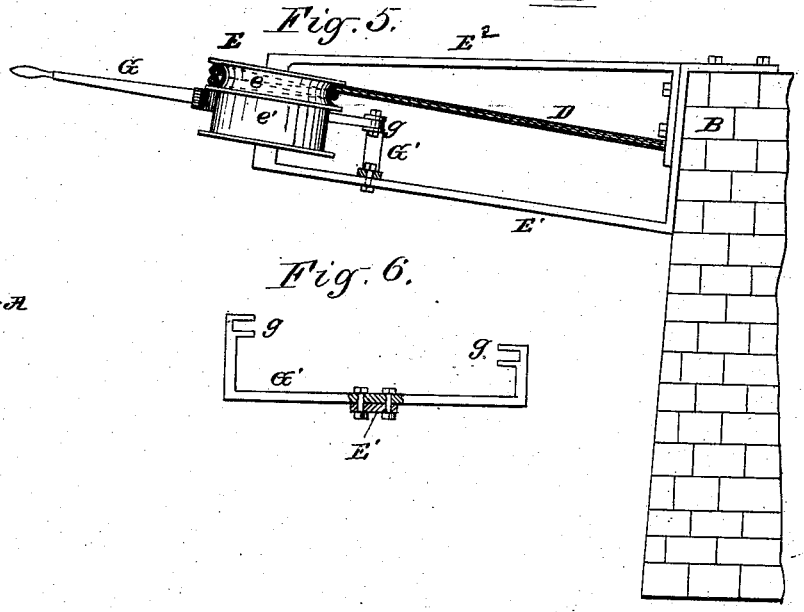

Fig. 7.

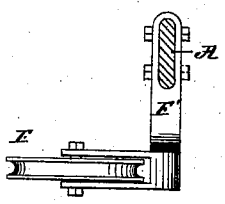

Fig. 6.

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(No Model.) 3 Sheets—Sheet 3.

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ELEVATED AUTOMATIC RAILWAY.

No. 260,617. Patented July 4, 1882.

Fig. 9.

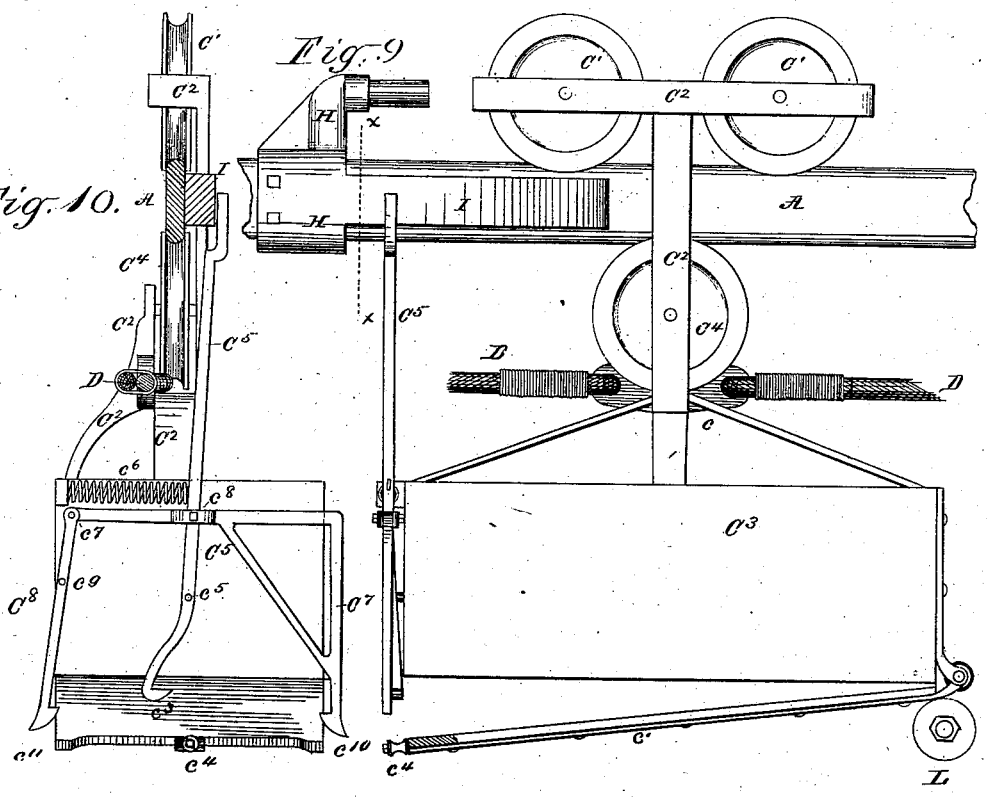


Fig. 10.

Fig. 8.

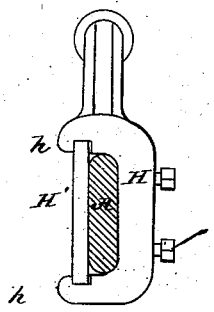
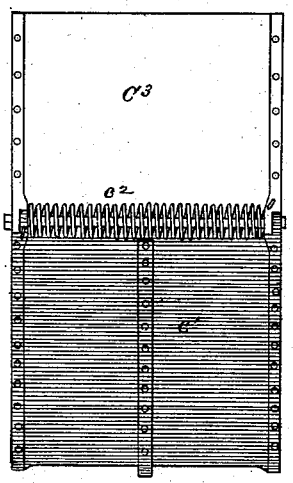


Fig. 11.



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UNITED STATES PATENT OFFICE.

WILLIAM F. SHERMAN, OF CHICAGO, ILLINOIS.

ELEVATED AUTOMATIC RAILWAY.

SPECIFICATION forming part of Letters Patent No. 260,617, dated July 4, 1882.

Application filed November 5, 1881. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM F. SHERMAN, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Elevated Automatic Railways; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to elevated reciprocating cable-railways wherein cars are connected by cables, forming therewith an endless belt, which is reciprocated to carry the cars back and forth simultaneously in opposite directions.

The invention more directly relates to features of construction in the track, to devices for operating and controlling the cable, to the construction of the car with reference to the elevated track-rail, and also with reference to opening and closing the same, and to means forming part of the fixed structure for opening and closing the car and for arresting the same, and to other matters, as will hereinafter appear.

It consists in the several features of construction and combinations of parts, substantially as hereinafter described, and pointed out in the claims.

In the drawings, Figure 1 is a side elevation of the general structure embodying my invention, showing the tracks inclined. Fig. 2 is a top view or plan of the structure shown in Fig. 1. Fig. 3 is a perspective view taken from an elevation of a long span wherein the tracks are level and are of a peculiar construction, which will be referred to hereinafter. Fig. 4 is a vertical transverse section of the track-structure near L L of Fig. 2, enlarged. Fig. 5 is a side elevation, enlarged, of the cable-support seen at the left-hand end of Fig. 1. Fig. 6 is a view of the fulcrum-support for the brake-levers. Fig. 7 is an elevation of the lateral guide-pulley and bracket secured to the track-rail, shown in section. Fig. 8 is an end view of the bumper or stop for the arrest of the car secured to the track-rail, which is shown in section. Fig. 9 is a side elevation of a car mounted on the track and shown in relation to the opening and closing and arresting devices. Fig. 10 is an end view of the car and section of the track and car-opening cam secured to the track through *x x* of Fig. 9. Fig. 11 is a rear end view of the car-body.

Like letters of reference in the drawings indicate like parts in all figures thereof.

A A are two elevated tracks, usually, but not necessarily, parallel and in the same plane, and preferably inclined toward the point of delivery whenever the situation will permit of this arrangement.

B B are supports for the track, which supports may be of masonry, wooden posts, or other character adapted for the purpose.

B′ B′ are brackets or cross-bars which, at their opposite ends, sustain the tracks A A outside the supports B.

C C are cars suspended one from each track A by means of its wheels C′ C′.

D is a continuous cable, fastened to both cars and supported at the ends of the structure by pulleys E and E′.

F F are lateral guide-pulleys, which hold and guide the cable in line with the several tracks.

G G are brake-levers arranged to bear on an extension, *e′*, of the pulley E.

H is a bumper or stop fixed to the track for the arrest of the car.

I is a cam, also attached to the track, to throw the lever by which the car is opened to discharge its contents, or held when closed.

J J are rollers, supported from the piers or posts B and extending outward beneath the cable and clear of the cars to sustain the cable when it sags.

L L are two rollers or other form of supports, arranged near the unloading end of the railway for the purpose of taking the load of the car when the latch-lever thereof is thrown, or for closing the drop-bottom of the car after the load has been discharged and has begun its return.

The track-rails A, as shown in Figs. 1, 2, and 9, and in the various sectional figures of the drawings, are of flat iron bars, set with edges up and down, and have said edges rounded to better retain the opposite grooved wheels of the car C, which run thereon. Said track-rails are fastened to the supporting-brackets B′ by their inner faces, so as to leave the edges pro-

jecting, in order that the inner flanges of the wheels may encounter no obstruction, and so, also, as to allow the car-frame to pass at the outside of the rail.

The cars C consist of the iron frame C^2, arranged to clear the outside of the track A, the two upper or riding wheels, C′, one or more lower steadying-wheels, C^4, mounted therein, and a box or body, C^3, suspended from the frame. The vertical suspending portion of the frame C^2 is connected with the cable D in any suitable manner to be drawn thereby, as by the fixed eye-block *c*, Fig. 9. The cable D is supported at the ends of the track by pulleys E and E′, and the cars are arranged thereon so as to pass each other midway of said track.

The general purpose of the railway is to transport material from one end of the structure to the other, each car running back and forward from end to end thereof while the other is running in an opposite direction. Ordinarily the cars run one way loaded and return empty, and the cable will generally be operated from that end of the track at which the cars are loaded.

In order to obviate the necessity for manual management at the opposite end of the run, devices are provided in the car and locally at said remote extremity of the track, whereby the cars may be automatically discharged and subsequently closed, ready to be again loaded. For this purpose the car-box C^3 is provided with a bottom, *c*′, which is hinged to the rear end of the body, as plainly shown in Fig. 9.

At the front end of the car-body is located a central vertical lever, C^5, pivoted to the body at c^5, extending upward in proximity with the track A, and provided at its lower end with the hook c^3. (All best shown in Fig. 10.) To engage the hook c^3 the hinged bottom *c*′ is provided with the projection c^4, preferably a small roller mounted on a stout projecting spindle. The lever C^5 is arranged to swing the hook c^3 out from under the projection c^4 when the upper end of said lever is thrown outward from the track A, and to automatically actuate the lever to disengage the hook and release the bottom *c*′ a cam, I, is provided, being secured to the outer face of the track A at the proper point for the purpose.

In order to facilitate the movement of the lever C^5 when the car is loaded, rollers L L are located in suitable position to take the weight of the car at the time when the lever strikes the cam I. Said rollers are indicated in their general position relative to the cam in Figs. 2 and 9, but will be best understood from Fig. 4. They are here shown mounted on a transverse shaft, L′, sustained by suspending-arms L^2, secured to the track-rails, and braced or guyed by the rods *l*, to hold them steadily in place. The rollers are cut away centrally to clear the lever-hook c^3, and are hung at such height as to readily allow the car to run upon them without great shock or concussion. Generally the roller should be so located and arranged as to be beneath the middle of the car at the moment the cam I strikes the lever C^5; but this is not strictly essential. On passing the roller L the car-bottom falls and the load is discharged. The cam I is preferably prolonged, as shown in Fig. 9, to retain the lever thrown while the car-bottom is down, a spring, c^6, being provided to retract the lever when the latter, on its return, escapes the cam. The roller L will operate in some degree to retard the car, and the bumper H, arranged to strike the frame C^2, will arrest it, if not perfectly controlled, through the cable and brakes at the opposite end of the track. When the car in starting upon its return trip again strikes the roller L the bottom is lifted and sustained until the lever C^5 escapes the cam, and by its hook c^3 again engages the projection c^4 of the car-bottom thus applied. In order to prevent shock and facilitate the rise of the depending bottom *c*′ upon the roller L when returning, a spring, c^2, Fig. 11, is provided about the hinge-rod of said bottom, which lifts the latter into an inclined position as soon as released of its load.

For the purpose of insuring the support of the car-bottom against failure on the part of the hook c^3 to catch or to hold the projection c^4, two other and lower hooks, c^{10} and c^{11}, are provided, as seen in Fig. 10. The arms C^7 and C^8, having these hooks, are connected pivotally with the body C^3, with each other, and with the lever C^5 at c^9, c^7, and c^8, respectively, and they are arranged to be drawn inward beneath the projections on the corners of the bottom. (Indicated in Fig. 10.) Should the hook c^3 fail to catch or hold, the side hooks are likely to do so, and thus sustain the bottom nearly closed, and to thereby prevent said bottom from striking the rollers J J or doing other damage from being allowed to fall or hang.

The cam I is shown as being part of the same casting with the bumper H, but may be separate and held in any suitable manner. The bumper H and cam I are preferably secured movably to the track without bolting. A suitable construction is shown for this purpose in Fig. 8, in which H is the main casting, having a broad recess on its inner face to set over the track A, and provided with the longitudinal grooves *h h*, which receive the edges of the broad key H′.

In a low-hanging or suspended car, like that described, it is necessary to prevent the same from swinging sidewise. This purpose is effected in the construction shown by means of the lower grooved wheels, G^4, which are fitted to and proximate the track A. Said track being deep or made of broad rail, as shown, there is sufficient distance between the two bearing faces or flanges of the opposite wheel-treads to give the purchase required for the purpose stated.

For the proper control of the cable D, the pulley E, at the loading end of the track, is provided with a sufficiently-broad groove, *e*, to

receive a double turn or lap of the cable, and also with a cylindric extension, e', (which may be of relatively-larger diameter than here shown,) to receive the bearing-faces of the brakes G. For greater convenience, two brake-levers are provided, bearing on opposite sides of the cylinder e' and separately operable. Said levers are fulcrumed at g' to a cross-frame piece, G', Fig. 6, or otherwise. In the case of inclined tracks wherein the lower end is at the delivery-point the gravity of the loaded car will be the propelling power, and, in proportion to the violence of the decline, it will be necessary to restrain the same by operation of the brake-lever G or equivalent means. As the approach of the returning empty car furnishes a substantial indication to the operator of the position of the outgoing car, the latter may generally be slackened or arrested without shock or disaster by means of the brake-levers under his control.

In the case of a horizontal track, or of a track inclining upward toward the point of delivery, extraneous power may be applied through either supporting-pulley E or E', and the brake is, for obvious reasons, preferably applied to that pulley through which the power is imparted.

The pulleys F, for laterally supporting the cable in the line of the tracks, are shown as being horizontal and mounted in curved brackets F', secured movably to the track-rails A; but they may be otherwise sustained, if more convenient.

The devices described are obviously applicable to suspension-railways of any degree of inclination. If the incline is great, however, two wheels, C^4, may be applied beneath the rail instead of one, as shown, by means of a second transverse frame-piece, like and parallel with that in which the upper wheels, C', are mounted, and the two transverse parts may be connected with each other and with the car-body by any suitable bracing needful to strength.

For crossing wide ravines and similar situations, I have devised a form of trussed cable-rail, (indistinctly shown in Fig. 3;) but such construction forms the subject of separate application for patent, and will not be here explained.

I wish it understood that I do not limit myself to the precise features of construction above described, since many modifications thereof are obvious. Thus the support L may, for example, in some instances be a slide upon which the car may run, in which case it will be very slightly inclined upward in the direction in which the loaded car moves, so that the latter may mount the same without shock.

In place of a spring, c^2, to partially raise the hinged bottom c' of the car, a counterpoise may be employed for this purpose, and such spring or counterpoise may operate to wholly lift the car-bottom, so that it may be engaged by the hook c^3 when relieved of its load. The counterpoise is less desirable, however, on account of its weight. In any case the roller L is useful to take the load, as stated, and also, if the spring be used, to insure the closing of the car in case the spring should break or weaken.

Instead of locating the spring c^2 for closing, or partially closing, the bottom c' at the hinge, as shown, said spring may be arranged to connect the side of the car-body with the edge of the bottom, and, if preferred, the bottom may be provided with vertical sides rising outside the body, so as to form a trough for the better discharge of the contents.

In those situations where the tracks are required to be near each other, the pulleys E and E' may give the proper spread to the cables and the supplemental pulleys F be dispensed with.

In giving the tracks a lateral curve, as will often be found necessary in mountainous mining districts, lateral horizontal guide-pulleys will be required to be located at intervals along the course to direct the cable. On the outwardly-curved side of the structure such pulleys may be sustained by simple brackets from the piers or track. On the inwardly-curved sides they may be supported by curved hangers secured to the rail or brackets B and reaching beneath or above, or both above and beneath the car, to sustain the pulleys outside the course of the cable.

If preferred, a separate structure may be employed to sustain the guide-pulleys on the inner curve.

I claim as my invention—

1. In an elevated railway, the combination, with the vertically-broad elevated track A, of the suspended car C, having upper and lower grooved wheels fitted to the edges of the track, substantially as described, and for the purposes stated.

2. In an elevated-railway carrying-structure, a car provided with a hinged bottom and with mechanism for detachably holding the bottom closed, combined with automatic mechanism for closing the bottom after the load is discharged, substantially as described.

3. In an elevated-railway carrying-structure, the combination, with a car having a hinged falling bottom and provided with a detachable automatic catch for supporting the bottom, of a stationary roller, L, or its equivalent, arranged in position to take the weight of the car, and means for releasing the catch which supports the bottom, arranged to act while the weight is upon the roller, substantially as described.

4. In combination with the elevated track A and a cam, I, the suspended car C, having the hinged bottom c', provided with a projection, c^4, and having the hooked lever C^5 arranged to engage said projection and to strike the cam, substantially as and for the purposes stated.

5. In the hinged bottomed car having the vibrating spring-actuated hooked lever C^5 arranged to engage the car-bottom, the combi-

nation, with said lever, of the supplemental levers C^7 and C^8, provided with hooks depending below said lever C^5 and connected therewith, substantially as and for the purposes set forth.

6. In an elevated-railway carrying-structure, the suspended car having a hinged bottom and detachable fastening for the same, and a spring, c^2, or its equivalent, arranged to raise the car-bottom after the load has been discharged, substantially as described.

7. In combination with the track A, and with the frame of the suspended car C, the adjustable and removable bumper H, secured to the track, substantially as and for the purposes set forth.

8. The bumper described, consisting of the casting H, recessed to set over the rails, and provided with grooves *h h*, combined with the broad key H′, whereby the bumper may be detachably held to the rail, substantially as described.

9. In the structure described, the combination, with the suspended car having a hinged bottom and a locking-lever, C^5, of the cam I, fixed to the track-rail, substantially as described, and for the purposes set forth.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

WILLIAM F. SHERMAN.

Witnesses:
M. E. DAYTON,
JESSE COX, Jr.