(No Model.) 2 Sheets—Sheet 1.

C. CARR.

RAILWAY SYSTEM.

No. 500,992. Patented July 4, 1893.

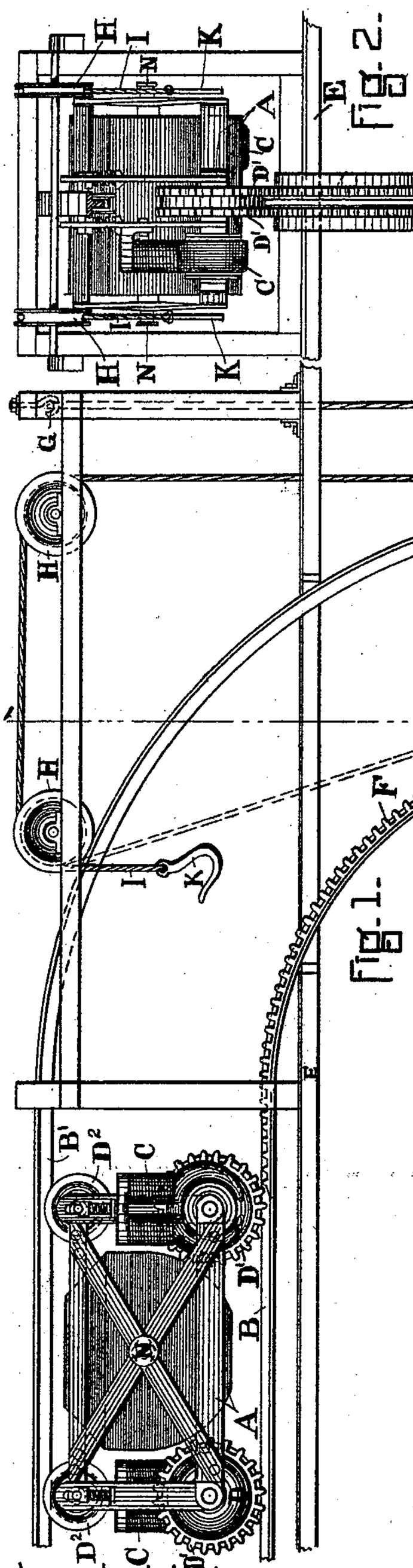

Fig. 2.

Fig. 1.

Fig. 3.

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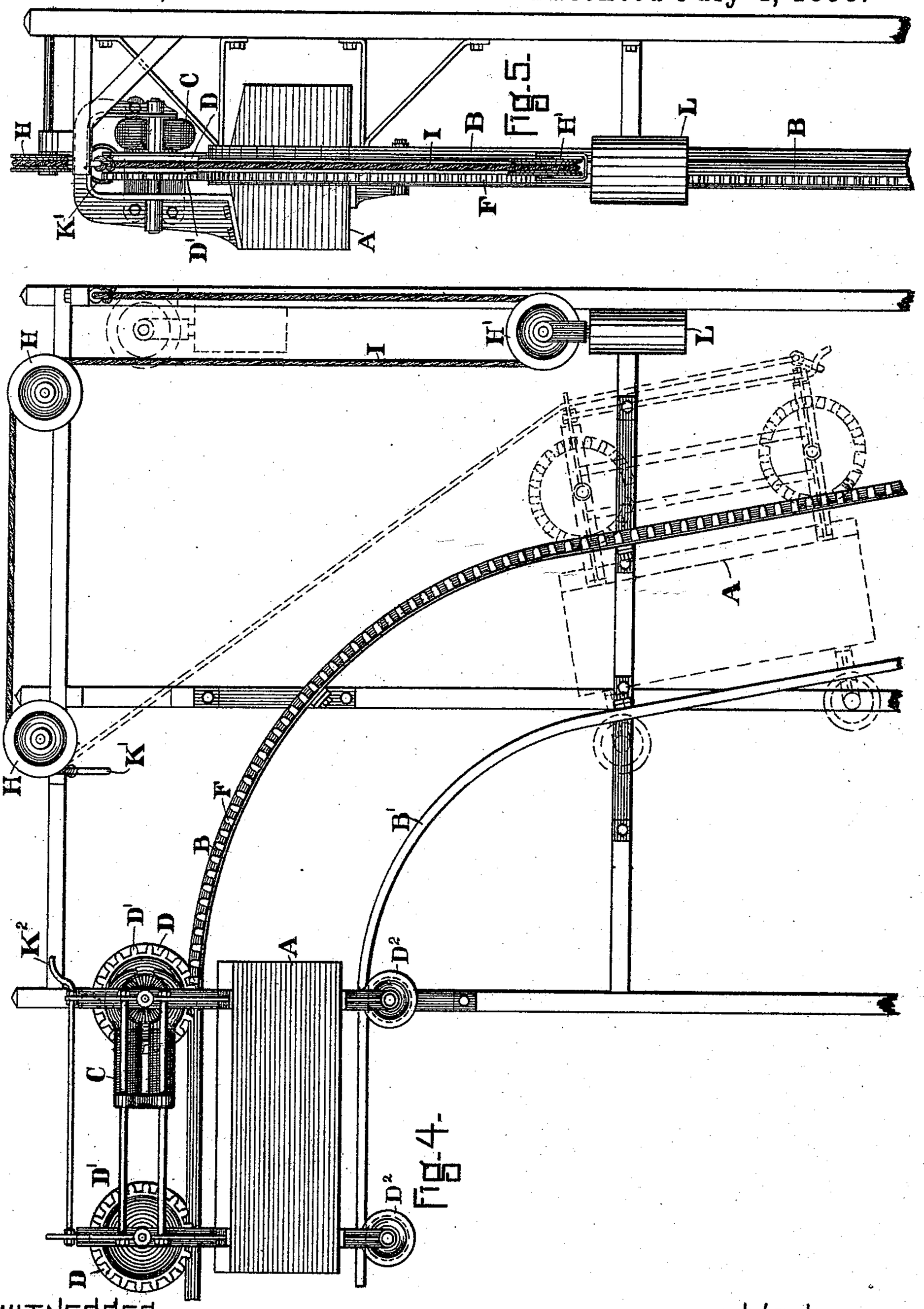

Fig. 5.

Fig. 4.

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UNITED STATES PATENT OFFICE.

CHARLES CARR, OF BOSTON, MASSACHUSETTS.

RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 500,992, dated July 4, 1893.

Application filed August 12, 1892. Serial No. 442,901. (No model.)

To all whom it may concern:

Be it known that I, CHARLES CARR, a citizen of the United States, residing at Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Railway Systems, of which the following, together with the accompanying drawings, having reference-letters herein referred to, is a full and exact description.

My invention relates to improved methods of controlling the movements of cars during the ascent or descent of vertical, inclined or vertically curved sections of the track.

With reference to the drawings:—Figure 1, is a side elevation of a railway system in which my improvements are embodied. Fig. 2 is a sectional end elevation of the same, the section being taken at line 1, 1, in Fig. 1. Fig. 3 is a plan view of the car shown in Figs. 1 and 2. Fig. 4 is a side elevation of a second system in which my improvements are embodied. Fig. 5 is an end elevation of the same.

The essential features of my invention are first the introduction, into a railway having two rails, in the same vertical plane, of an auxiliary rack-rail and a driving gear attached to the car, whereby the cars may be made to ascend or descend vertical or approximately vertical sections of the track;—second the application of a counterbalancing device at such sections, whereby the weight of the car may be made to have little or no effect upon the ascent or descent of such sections of the track.

In the system illustrated by Figs. 1, 2 and 3 the two rails, B and B′, are supported in the same vertical plane by any suitable overhead structure and the cars, A, run entirely within the space inclosed by the rails and their supporting structure. In this case the lower rail, B, is the supporting and the upper rail, B′, is a steadying or guiding rail. The car, A, has double flanged driving wheels, D.

In the systems shown in Figs. 4 and 5, the supporting rail, B, is the upper one, and the lower rail, B′, is the steadying rail. In this system the body of the car, A, is shown as running between the rails, though it is plain that it might be supported above or suspended below the track. As in the other system the cars have driving wheels, D, running on the supporting rail and guide wheels, D^2, running on the under side of the guiding rail.

In either system the rails at the horizontal sections of the track may be wire ropes or other flexible rails. As will be seen later my improvements are not confined in application to these two systems.

In either system I place one or more auxiliary rack-rails, F, beside the supporting rail, B, at all sections of the track that are not horizontal or approximately so. In Figs. 1 and 2 I have shown a rack-rail, F, on either side of rail, B, while in Figs. 4 and 5, the rack-rail is on but one side of rail B. Either arrangement may be employed as the case demands.

I have shown, in both cases, the driving wheels, D, as having the driving gears, D′, constructed thereon or as forming in one system (the first) both flanges and in the other but one flange of wheels D.

When the car is upon a vertical or inclined section of the track, these gears, D′, mesh with the rack F, so that if sufficient power is applied to the driving wheels the car can be made to ascend or descend the track regardless of grades. This rack and gear device for enabling a car to climb grades is not in itself new, but as heretofore used the inclination of of the track could be but slight, while with a system having two rails in the same vertical plane it is obvious that the cars may be made to ascend a vertical or approximately vertical section of track.

The construction of the cars may be varied to suit the requirements of the case. In Figs. 1, 2 and 3 the car body is shown as hung upon trunnions, N, so that it always remains horizontal. The driving gears, D′, as is apparent might be independently pivoted to the frame of the car and driven by gear, belt or other connection to the motor or to the driving wheels.

The cars are shown as supplied with electromotors, but other power may be used as is desired.

As the weight of the car would otherwise seriously affect the speed and action on the inclined and vertical sections of the track, I have found it desirable to introduce at such sections a device which shall automatically

couple to the car and hold it in approximate or perfect balance, as regards weight, while it is upon these sections of the track and shall automatically release said car on its return to a horizontal section of the track. Numerous devices may be employed to accomplish this end, but I have shown but one.

Located above and adjacent to the inclined and vertical sections of the track is an arrangement of rope and pulleys with a traveling weight. In this the sheaves (or pulleys), H, are fixed to the overhead structure of the track and a rope, I, runs over these, on one end of the rope (that nearest the horizontal section of track) is a hook, K, as in Fig. 1 or a ring or loop, K′, as in Fig. 4, the use of whch will appear presently. The other end of the rope after passing through a loose or traveling sheave, H′, to which a weight, L, is suspended, is secured to the framework of the track. This arrangement will be readily understood from the drawings as will the operation of it. The use of the hook or loop upon the rope is, obviously, to catch hold of some projecting part of the car as it approaches and to remain thus coupled, while the car proceeds, drawing the rope after it, thus raising the weight, L. In Figs. 1, 2 and 3 the car is provided with projecting trunnions or studs, N, which, as the car advances toward the descending section of the track, run into the open side of hooks, K, hanging in their path, thus automatically coupling the car to its counterbalance. In Figs. 4 and 5 the loop or ring, K′, upon the rope, and the projecting rod or stud, K^2, upon the car, act together in a similar manner, either arrangement serving the purpose required. It is obvious that the weight, L, may be made to overbalance or just balance or only partially balance the weight of the car. In either of the first two contingencies the motors on the car will be required to exert a slight force in descending, but in the case of only partial balance the preponderance of weight in the car will be sufficient to carry the car down the descent. In the first case, overbalance, no power will be required from the motors to raise the car, but in case of exact or only partial balance work will be required of the motors. In any case the motors need be only of sufficient capacity to propel the car upon a horizontal track, while without this counterbalancing device a much larger motor would be required in order to ascend the grade sections of track. As is obvious many variations of this counterbalancing feature and its intermittent attachment to the car, may be constructed without departing from the spirit of the invention.

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

1. In a railway system in which the track consists of two rails secured in the same vertical plane and which has horizontal and inclined or vertical sections, with curved connecting sections and in which the motor-cars run supported by one and steadied by the other rail, the combination of said track, cars, the driving wheels of said cars, gears connected to and driven by said wheels, with an auxiliary rack-rail located at the curved, inclined or vertical sections of the track and with which the said gears mesh, all substantially as and for the purpose herein set forth.

2. In a railway system in which the track consists of two rails secured in the same vertical plane and which has horizontal and inclined or vertical sections with curved connecting sections, the combination of said track, motor-cars running thereon, the driving wheels of said cars, gears connected to and driven by said driving wheels, auxiliary rack-rails located at the curved, inclined or vertical sections of the track and with which the said gears mesh, and a counterbalancing device, so located and arranged that as a car enters a curved, vertical or inclined section of the track it is automatically caught and held in balance or approximate balance during its descent or ascent of the said grade sections of track, all substantially as and for the purpose herein set forth.

3. The combination of the track, consisting of rails B and B′ and rack-rail F, motor-cars running thereon, gears meshing with the rack-rail F and connected to and driven by the driving wheels of said motor-cars, said driving wheels, studs, projecting from said cars to engage hooks suspended in the paths of said studs, said hooks, ropes by which said hooks are suspended, sheaves over which the said ropes run, and weights on said ropes, all operating together substantially as and for the purposes herein set forth.

4. The combination of rails B, B′, car A, motor C, wheels D, gears D′ connected to and driven by said wheels D, rack-rail F with which said gears mesh, studs projecting from the car, rope I with hook to engage the said studs, said hook, weight L on said rope, sheaves H over which the said rope runs, all operating together substantially as and for the purposes set forth.

5. In a railway the cars of which are subject to propulsion through relatively short ascending and descending sections, from level to steep grades, and also to vertical movements and for the purposes of an auxiliary safety car supporting, lowering and lifting device or attachment, the combination of the studs attached to the cars, the catch-hooks, the cables to which said catch-hooks are attached, the supporting and guiding sheaves for said cables and balance weights, all operating together substantially as set forth.

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