(No Model.) 2 Sheets—Sheet 1.

# J. P. F. KUHLMANN.

## RAILWAY SYSTEM.

No. 486,719. Patented Nov. 22, 1892.

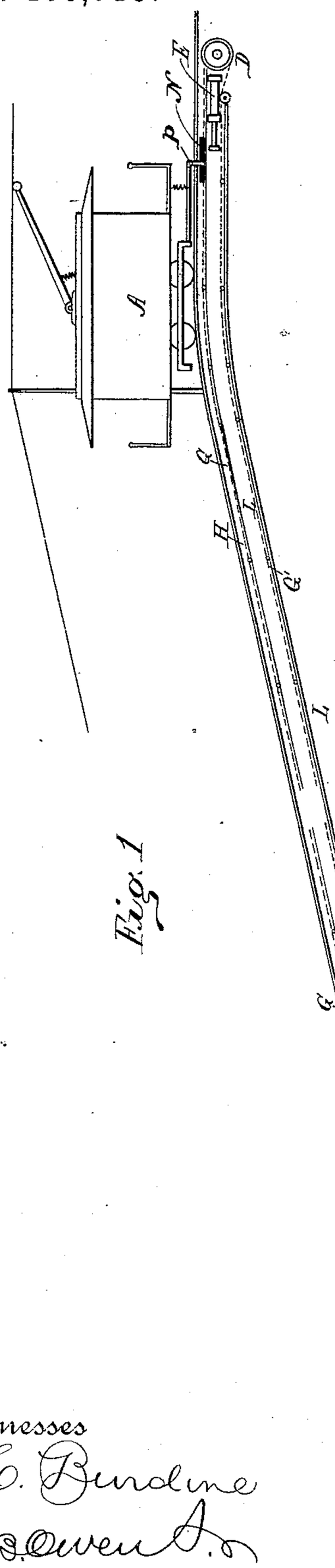

Fig. 1

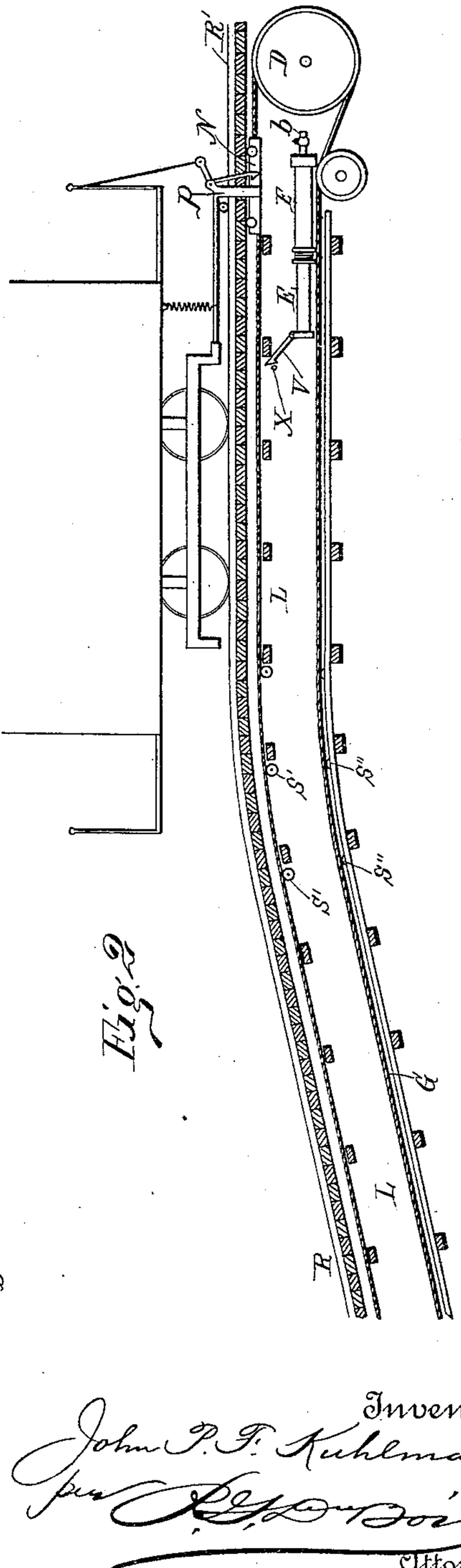

Fig. 2

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(No Model.) 2 Sheets—Sheet 2.

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## RAILWAY SYSTEM.

No. 486,719. Patented Nov. 22, 1892.

Fig. 3

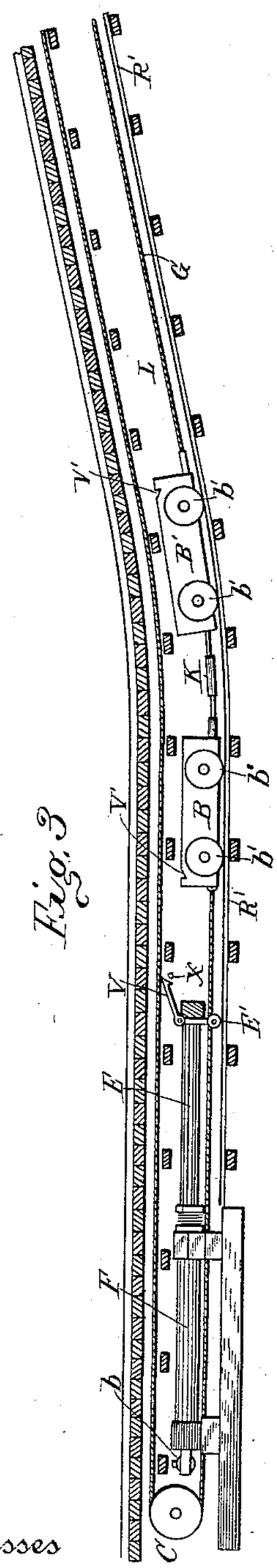



Fig. 4

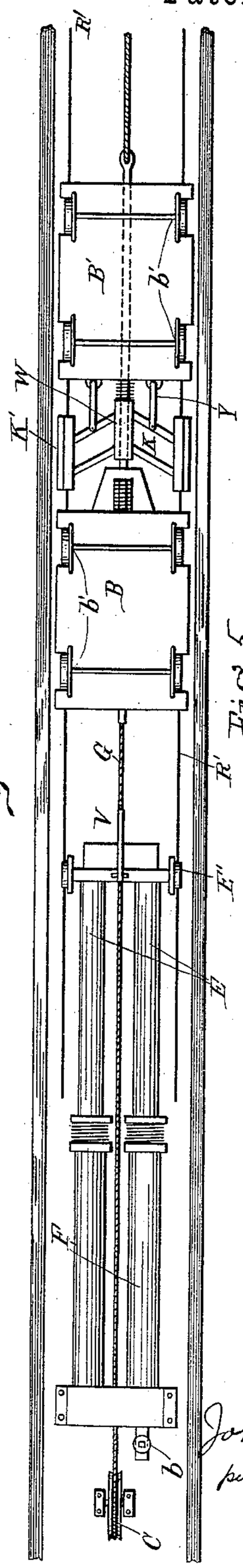
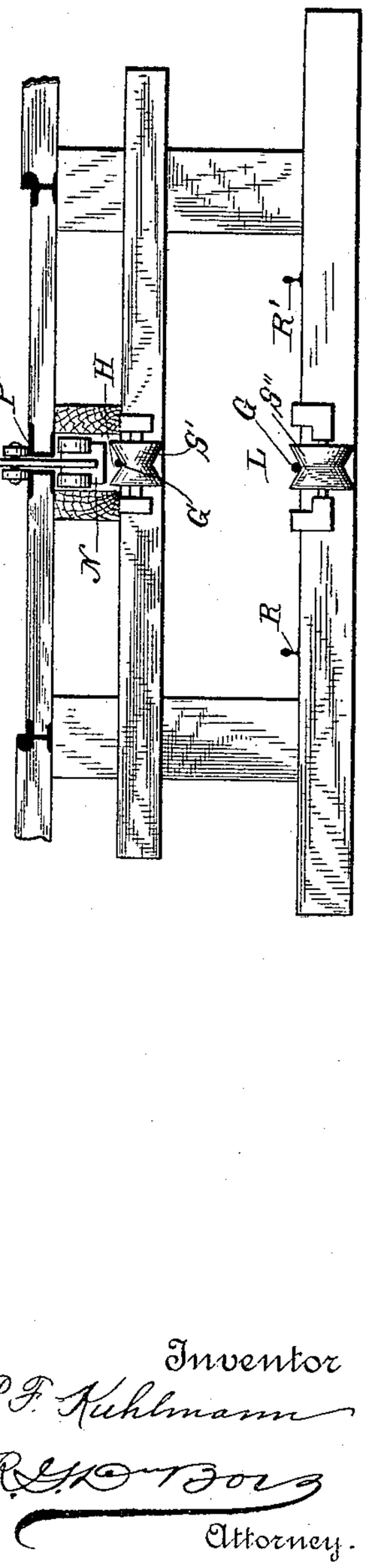



Fig. 5.

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# UNITED STATES PATENT OFFICE.

JOHN P. F. KUHLMANN, OF SEATTLE, WASHINGTON.

## RAILWAY SYSTEM.

SPECIFICATION forming part of Letters Patent No. 486,719, dated November 22, 1892.

Application filed November 16, 1891. Serial No. 412,112. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN P. F. KUHLMANN, a subject of the Emperor of Germany, residing at Seattle, in the county of King and State of Washington, have invented certain new and useful Improvements in Railway Systems; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to that class of tramways in which devices are employed to regulate the speed of cars in ascending or descending grades; and my object is to produce superior means for accomplishing such purpose.

With this object in view my invention consists in the peculiar features and combinations of parts more fully described herein after, and pointed out in the claims.

In the accompanying drawings, Figure 1 represents a view in elevation of my improvement as applied to an ordinary street-railway system; Fig. 2, an enlarged longitudinal section of one end of the conduit, showing the car about to descend a grade; Fig. 3, an enlarged longitudinal section of the lower end of the conduit, showing the position of the weight when the car is in the location shown in the preceding figure; Fig. 4, a plan view of Fig. 3; Fig. 5, a cross-section through the conduit.

The reference-letter L represents an underground conduit, in which rolling weights B B′ travel. A wire cable G′ is located in the conduit and runs over the drums D and C and pulleys $s'$ $s''$. To this cable the weights B B′ are attached. The weights are supported on trucks $b'$, which travel on rails R′, situated in the conduit. Cushioning-buffers for the weights are situated in each end of the conduit and consist of fixed air-cylinders F and plungers or pistons E, which fit in said air-cylinders and are adapted to be actuated by the weights B B′ when they arrive at either end of the conduit, whereby sudden jar due to the concussion is greatly reduced. Check-valves $b$ are located at the rear end of the cylinders and serve to regulate the quantity of air expelled from them, thus regulating the resistance presented to the pistons when struck by the weights. The pistons are drawn out by means of gravity-pawls V, which drop into notches V′ in the sides of the weights and are made to engage them by means of the bars $x$ as soon as the pistons are completely drawn out. The pistons are provided with casters E′, adapted to travel on the rails R′. (Seen more clearly in Fig. 4.) A suitable gripping device is employed, in which N represents the gripper and $p'$ the connecting-rod, which runs in the longitudinal slot P′ in the center of the conduit.

The operation of my device may be traced as follows: When the car is attached to the cable by gripper N and is about to descend a grade, the weights and cushions are in the position shown in Fig. 1. The gravitating pawl V being in engagment with the notch V′ in the weights as the car pulls on the cable the weights begin to ascend, carrying with them the pistons E and allowing the cylinders to fill with air, which was driven out when the weights pushed the pistons in. As the pistons are drawn outward in the cylinders, the inclined nose of the pawls engage the pin or bar $x$, which is located across the conduit at each end, thus disengaging the weights and plungers and leaving the cushions adjusted to be used as the weights descend again. As the car continues down the grade the force of the ascending weights tend to counterbalance the momentum, which it would necessarily acquire. When the car reaches the bottom of the grade, the weights have been drawn to the top and are resting on the level which is formed for them and engaging the hereinbefore-described cushioning device, where they are left and remain until a second car arrives at the foot of the incline, which, as before, connects with the cable and starts the weight down the grade and brings the force of the weight into play to assist in pulling the car upgrade. A brake K is located between the weights and serves to further insure the automatic and effective operation of the device. If the weights begin to descend the grade too fast, the upper weight B′ pushes on the drawbar W, which in turn pushes the inner ends of the toggle-links Y downward, thereby forcing the shoes K′ in engagement with the side of the conduit and checking the speed of the weights and all that is actuated by them.

When the weight B′ ceases to push on the toggle-links, the brake is released. By this arrangement it is evident that a perfectly automatic and effective device is produced.

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

1. In a railway system, the combination, with an inclined track, of a closed conduit located below the surface of the ground and extending along the track, a cable in the conduit, and a counterbalancing-weight located in the conduit and permanently attached to the cable, substantially as described.

2. In a railway system, the combination of a conduit, a cable in said conduit, a weight attached to and moving with the cable, and cushioning devices located at each end of the conduit, substantially as specified.

3. In a railway system, a cable traveling in a conduit, a weight attached to and moving with said cable, and a brake for actuating the speed of the weight, in combination with a gripper for connecting the car to the cable, as and for the purpose set forth.

4. In a railway system, a cable, a weight attached to and movable with said cable, a brake for checking the speed of the weights, consisting of one or more laterally-movable brake-shoes, toggle-links actuating the same, and a draw-bar attached to the weight for applying the power to the toggle-links, in combination with a gripper for connecting the cable to the car, as set forth.

5. In a railway system, a cable, a weight attached to and movable with said cable, a track upon which the weights mounted on trucks are adapted to travel, and a cushioning device located at each end of the conduit, in combination with a gripper for connecting the car to the cable, as and for the purpose set forth.

6. In a railway system, a cable located within a conduit, weights attached to and movable with said cable, one or more cushioning devices located in the conduit and operating in conjunction with the weights, said devices consisting of a fixed air-cylinder, a piston working therein, a pawl located on the forward or free end of the same and adapted to engage and hold the weight, means for disengaging the same, and a check-valve located on the air-cylinder for regulating the ingress or egress of air, in combination with a gripper for connecting the car and cable, as and for the purpose set forth,

In testimony whereof I affix my signature in presence of two witnesses.

JOHN P. F. KUHLMANN.

Witnesses:

GEO. H. KING,

ARTHUR I. FONDA.