(No Model.)

A. J. B. BERGER.

ELEVATED ROPE CARRYING SYSTEM OR ENDLESS RAILWAY.

No. 261,296. Patented July 18, 1882.

Fig. 1.

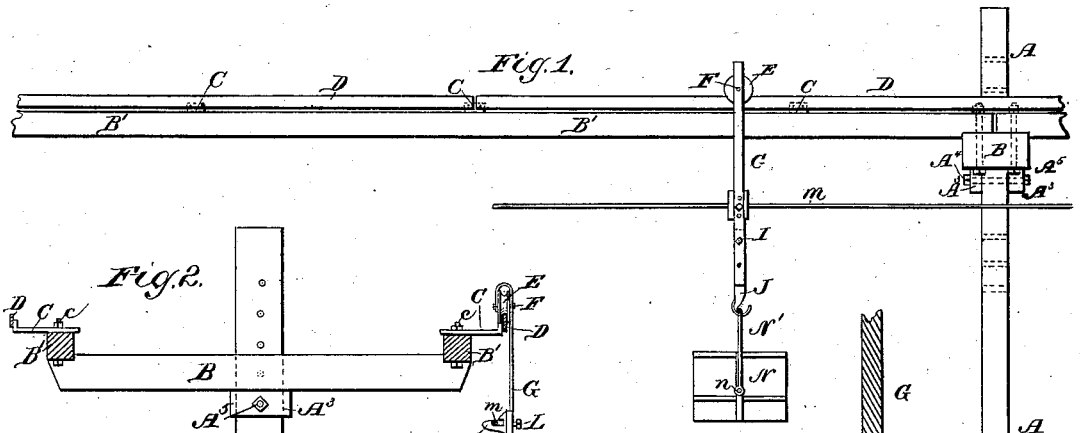


Fig. 2.

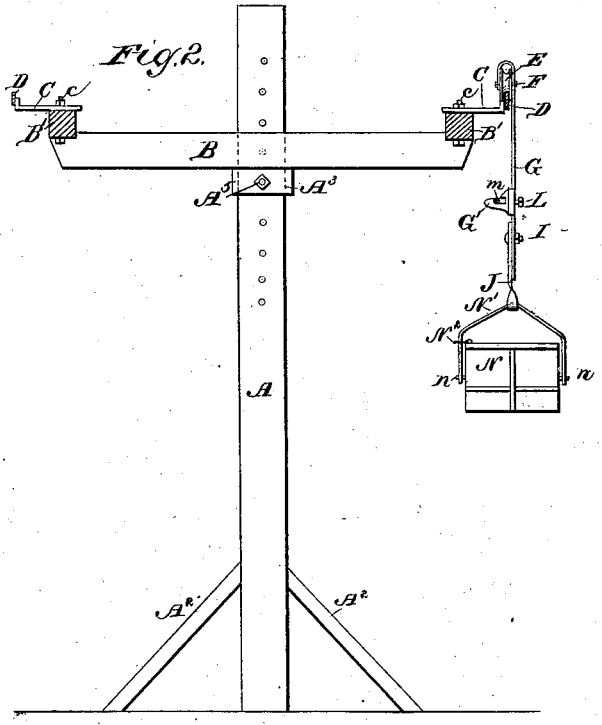


Fig. 5.

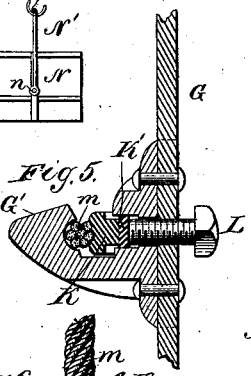


Fig. 6.

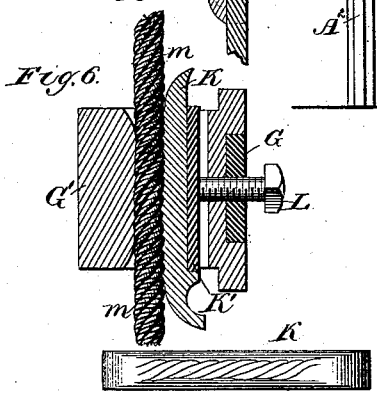


Fig. 3.

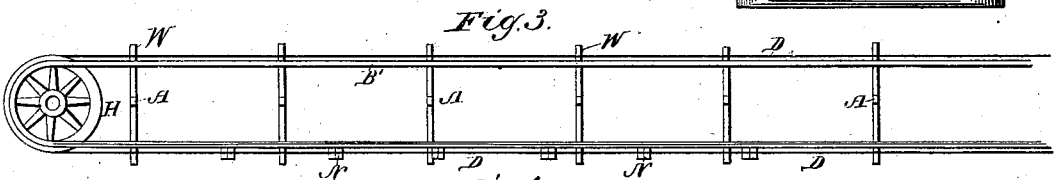
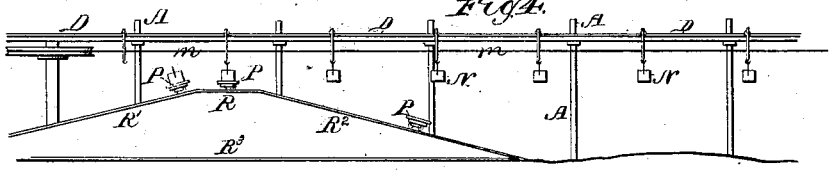


Fig. 4.



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UNITED STATES PATENT OFFICE.

AMBROSE J. B. BERGER, OF EASTON, PENNSYLVANIA.

ELEVATED ROPE CARRYING SYSTEM OR ENDLESS RAILWAY.

SPECIFICATION forming part of Letters Patent No. 261,296, dated July 18, 1882.

Application filed June 6, 1881. (No model.)

To all whom it may concern:

Be it known that I, AMBROSE J. B. BERGER, of Easton, in the county of Northampton and State of Pennsylvania, have invented certain new and useful Improvements relating to Elevated Carrying Systems or Endless Railways, of which the following is a specification.

A traversing-sheave which supports each load runs on a rigid rail composed of a plate of sufficiently stout iron held on edge at a proper elevation. The rail is held on overhanging arms extending out from a stringer of timber. (The timbers in my experiments are six (6) inches square, supported on T-pieces or cross-pieces on my posts.) The traversing-cord, which may be a wire rope of small diameter, (in my experiments about a half-inch in diameter,) is attached to the parts pendent from the several pulleys by a screw-clamp which takes a firm hold of the rope, but allows it to be connected and disconnected with slight labor or delay. It also provides for the curvature which the parts are required to assume when the road makes a sharp bend laterally by being wound partially around a horizontal wheel or pulley. I employ a hook at the base of the pendant or strap depending from each pulley, which hook may be reversed in position, and may be swung or tilted to facilitate the engagement and disengagement of the bucket. I employ inclined tracks at the stations to facilitate the engagement and disengagement of the buckets. The latter in my experiments each weighed loaded about four hundred (400) pounds. The inclines are moderate, and the buckets may be readily manipulated by the strength of a man applied directly. I avoid automatic machinery. I provide for adjusting the entire track laterally with facility at certain points. I provide for adjusting the height of the railway up and down. Both these adjustments are liable to be required, either at the loading or unloading stations, or both.

The following is a description of what I consider the best means of carrying out the invention.

The accompanying drawings form a part of this specification.

Figure 1 is a side view of one of the posts and its connections. Fig. 2 is a transverse section of Fig. 1. Fig. 3 is a plan view on a smaller scale. Fig. 4 is a side elevation on a corresponding scale. Fig. 5 is a vertical section of the clamping device on the pendant. Fig. 6 is a horizontal section of the same.

Similar letters of reference indicate like parts in all the figures.

A A are posts which are planted at intervals along the line and firmly support the track and its load. The posts A are provided with the braces A^2 at the base, when desired. The posts A are supported by simply planting in a sufficient hole in the earth, and steadying, if necessary, by two or more inclined braces A^2 the lower ends of which latter are planted in or on the earth.

B is a T-piece, of timber or other suitable material, which is mortised to receive the upper end of a post on which it may be adjusted up and down, fitting closely.

A^3 A^3 are adjustable brackets, held at the required level by a screw-bolt, A^4, and nut A^5. Holes are provided, or may be made as required, at different intervals in the post A, and by taking off the nut A^5 and removing the bolt A^4 the brackets A^3 may be shifted up or down and secured firmly anew, thus supporting the cross-piece or T-piece B at a higher or lower level.

B B′ are stringers, of wood or other suitable material, bolted on the ends, respectively, of the cross-pieces B.

C C are lateral arms, of wrought-iron or other material, secured by bolts *c* and bent upward at right angles at their outer ends.

D D are flat bars of iron, mounted on edge and riveted or otherwise reliably secured to the outer ends of the arms C to serve as rails.

Over the main portion of the route all these parts may be permanently secured, and the provisions for adjustment vertically and laterally may be omitted; but at the termini, and at one or more other points serving as loading and unloading stations, the adjustments are important.

E E are sheaves grooved on their peripheries to traverse on the lines of bars D. F is a pin which connects each to the pendant G, which latter is provided with means for clamping to the rope *m*, and with a pivot-bolt, I, connecting it to a swinging hook, J. On removing an ordinary nut and jam-nut the bolt I may

be temporarily removed and the hook J reversed in position. In either position the hook J swings freely on the bolt I as a center.

H is a large sheave or wheel turning on a vertical axis at one end of the line. The rope *m* applies half around on this in being transferred from one to the other of the two lines of tracks. There may be a correspondingly-curved rail above, which carries the sheaves E and supports the weight. It will be understood that there is a corresponding wheel at the other end of the route, and that power is applied to one, while the other is left to turn freely.

The wire rope *m* is clamped firmly between a lip, G′, and a pressure-piece, K, introduced in the clamp. The concave face, which is pressed against the wire rope, is grooved spirally to accommodate the spiral position of the strands. The material for this pressure-piece K may be malleable cast-iron. I propose in practice to cast it straight, and let it acquire the proper bend under the lateral strain imparted by the rope *m* in turning angles. A screw, L, tapped through G, acts on the pressure-piece K through a rigid steel shoe or backing-piece, K′. To detach the pendant G and its connections from the rope *m*, it is sufficient to unscrew L, and remove first the backing-piece K′ and then the cheek or bearing piece K. It will be understood that when any of the pendants G are removed others should be introduced in their places, as otherwise the rope *m* will sag. I propose to keep the wire rope or other traversing-cord *m* in continual motion at a slow walk, or about two (2) miles per hour. This speed is sufficient for a successful transporting business in the mountainous and almost inaccessible districts, where this system of carrying is mainly available, and is not so great as to prevent the convenient attaching and detaching of the buckets by the attendants in passing the terminal stations or one or more intermediate stations. At the slow rate of traversing employed light buckets can be seized and unhooked by an ordinary man by direct application of his strength. The buckets N, each having trunnions *n* and a bail, N′, with a locking-catch, N^2, may be adapted to be easily tilted or dumped, in which case they should be thus emptied and then taken off light. In order to seize the full buckets conveniently, the hooks J should be applied so as to traverse point foremost. Thus situated they may be brought in contact with the bail of a bucket and engaged without difficulty.

The stations should have a length of one hundred (100) feet or more of platform. A small railroad-track runs horizontally under the rope *m* for perhaps half this distance, and then declines near each end. There is a switch to allow it to be traversed back again to the point of departure after each traverse over the elevated and level part. This horizontal and inclined railway, arranged as shown, facilitates the loading and unloading. Under ordinary circumstances the bucket N is pushed along by an attendant on a small platform-car, P, which runs on the level track R at a proper elevation under the rope *m*. The inclined portions of the track at each end are marked $R' R^2$. The horizontal track alongside is marked R^3.

The cars may stand any length of time on the lower track, R^3, without being affected. When the operator wishes to engage one of the buckets with one of the hooks J he pushes the car or truck P, carrying the bucket, up the incline R′, and holds it at the junction of that incline with the elevated horizontal part R. When the hook J comes along it engages the bail of the bucket, drags the car along the level portion of the track R, and allows it to descend on the incline R^2. The several cars may be thus treated in succession while another attendant takes off the empty buckets and loads them upon the cars or otherwise puts them in the hands of the proper parties to be refilled. To disengage a bucket it is first emptied by tilting it on its trunnions *n*. After the ore or other contents have been dropped and the bucket righted it is easy to lift it off from its hook by strength directly applied; but if for any reason it shall be difficult to do this, or it shall be necessary to disengage a loaded bucket, it is only required to have an empty car in the proper position to receive the bucket as it approaches, and the bucket in its continuous movement received from the rope *m* drags the car up the incline, and the entire weight of the bucket and its contents is rested on the car, leaving the hook J free from strain. In this condition the hook may be tilted up by turning it on its axis I, and thus the loaded bucket removed. The buckets may be handled, either loaded or unloaded, with great facility by this means. It will be observed that this loading and unloading of buckets on the hook J is different from the engaging and releasing of the rope *m* with the pendant G. The latter operation, performed by the screw L, need not occur except at long intervals. The loading of the buckets N occurs at one end of the route at every round trip.

I attach much importance to the fact that the inner surfaces of my rope-clamp G K are rounded to correspond to the surface of the wire rope *m*, or a little greater radius, and especially that they are spirally grooved to suit the strands of the rope. The grooving fits closely and strongly in the rope, and takes a very reliable hold without necessitating a severe crushing strain on the rope. It is not important that the contact-pieces K be smoothly finished. It may be preferable for most reasons to have them slightly rough. I attain the form in my experiments by imitating the rope used and preparing the patterns therefrom, and leaving the castings as they come from the sand.

In the use of the device the grip is always tightened or relaxed while both the rope and the clamp are at rest, and the grooves in the

clamp can be exactly fitted to the corresponding depressions in the rope.

As a matter of safety, the attendant in oiling the sheave each day may apply his wrench to the screw, and insure that all the slack is taken up and that the grip is secure. This may be done while the line is in motion.

Modifications may be made in the details. I can increase the stiffness of the bar D by increasing the depth, as also the thickness. Parts of the invention may be used without the whole.

I have represented the loaded side as trussed and the light side as untrussed. I can, for short spans, dispense entirely with the trussing. I can truss under instead of over the timber B. In the latter case a tie-rod of iron held down by a block in the middle will be sufficient.

I can dispense with the rails on the inclined and horizontal tracks R R′ R² R³, and, using plain wheels on the trucks P, can guide them by hand, pushing or hauling them on smooth platforms or planks.

I can dispense with the arms or brackets C, and properly change the form of the rails D to secure them directly upon the stringers B′. Care must be taken to correspondingly modify the form of the pendant G, and to properly arrange at all points to avoid contact. I much prefer the rail D in the form shown, held out on the arms C.

I have referred above to a curvature of the pressure-piece K, which I sometimes term a "key." This is only important in passing around angles or quick bends in the road, which is accomplished by the aid of large horizontal wheels, as will be understood. The slight bend required may be introduced in the manufacture or allowed to be assumed afterward, as convenience may dictate.

I can groove spirally both the key or pressure-piece K and the lip G′, so that when the clamp is applied the rope *m* will be compressed between the two spirally-grooved surfaces; or I can spirally groove only one of the faces and leave the other smooth. I have in my experiment spirally grooved the piece K and left the inner face of the lip G′ smoothly concave without grooves. Both have the natural skin of the casting, but the ends of the bearing-surfaces, or both, are countersunk or enlarged and smoothly finished to accommodate the bend of the rope.

I claim as my invention—

1. In combination with one or more elevated rails, D, and sheaves E, and their connections moved by a rope, *m*, the inclined ways R′ R², and horizontal platform R and car P, adapted to aid in engaging and disengaging buckets N, as herein specified.

2. In an elevated carrying system, the tilting hook J, in combination with the pivot-bolt I, and arranged to support suitable buckets, with capacity for not only being tilted, but also for being reversed in position, as herein specified.

3. The clamping-piece K, spirally grooved on its interior to match the rope *m*, in combination with such rope, and with the rails D, screw L, bucket N, sheave E, pin F, and pendant G, as herein specified.

4. The rail D, in combination with the arms C and longitudinal timber B′, supported on the T-pieces B of an elevated carrying-structure, and adapted to serve with a rope, *m*, and pendants G, sheaves E, and buckets N, as herein specified.

5. In a rope railway, the adjustable T-piece B for vertical adjustment, in combination with the posts A, endless rope *m*, and carrying-buckets N, to allow the path of the buckets to be varied, as herein specified.

6. The elevated railway described, having two single lines of rigid stringers, B′, connected at the ends of the road, supported at intervals, each with a single rail D thereon, in combination with a series of grooved sheaves, E, running on said rails, and supporting-pendants G and buckets N, and with the endless rope *m*, connected to said pendants, and with the end pulleys, H, all arranged to operate substantially as herein specified.

In testimony whereof I have hereunto set my hand, at New York city, New York, this 3d day of June, 1881, in the presence of two subscribing witnesses.

A. J. B. BERGER.

Witnesses:

THOMAS D. STETSON,

CHARLES C. STETSON.