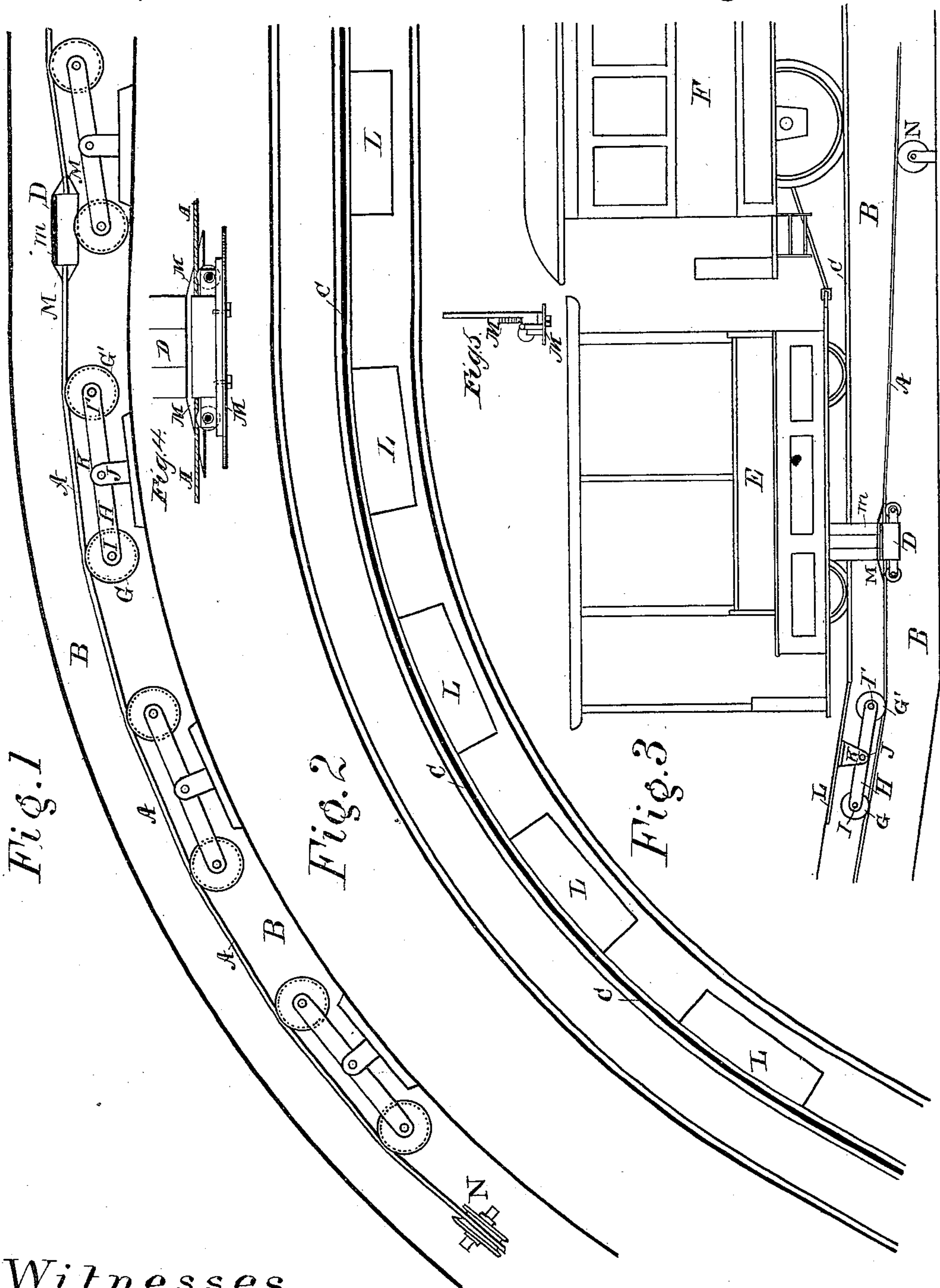


(No Model.)

J. B. LOW.  
WIRE ROPE RAILWAY.

No. 246,523.

Patented Aug. 30, 1881.



Witnesses  
Charles Monmonier  
Robert Münch..

Inventor  
Joel B. Low  
per George Parady  
Atty.



# UNITED STATES PATENT OFFICE.

JOEL B. LOW, OF SAN FRANCISCO, CALIFORNIA, ASSIGNOR OF ONE-HALF  
TO ABRAHAM K. GRIM, OF SAME PLACE.

## WIRE-ROPE RAILWAY.

SPECIFICATION forming part of Letters Patent No. 246,523, dated August 30, 1881.

Application filed December 16, 1880. (No model.)

*To all whom it may concern:*

Be it known that I, JOEL B. LOW, of the city and county of San Francisco, State of California, have invented a new and useful Improvement in Wire-Rope Railroads, of which the following is a specification.

My improvement relates to the manner of providing for guiding the wire rope around a curve or sharp angle, so as not to interfere with the free passage of the gripping device past the guides; and it consists in one or more pairs of guides and compensating pulleys revolving on axles set upon the ends of certain swiveling bars which swivel upon fixed pivots passing through their centers, which pulleys, by their combination with proper carrying pulleys and shoes upon the gripe, yield automatically as the gripping device makes contact with them consecutively, while in pairs they firmly and unyieldingly support the rope at equidistant points in the curve.

There are two occasions upon which curves occur in railroads: first, when the line diverges on the horizontal plane, as when the line passes through streets running at angles to each other; secondly, when the line diverges on the vertical plane, as when sudden changes of grade occur. The principle and effect of my device as I apply it on both these occasions are the same, though, of course, in one case the pulleys are set to revolve horizontally and in the other vertically.

In the accompanying drawings, Figure 1 is a sectional plan of an underground ropeway in which four pairs of my swiveling pulley-guides are shown guiding the rope around a horizontal curve. Fig. 2 is a street plan of same road, showing removable covers, giving access to pulleys for purpose of oiling, &c. Fig. 3 shows sectional elevation of a ropeway with sharp change in grade, and one pair of my pulleys placed at intersection of the two grades, exemplifying a vertical curve. Figs. 4 and 5 are, respectively, front and end views of a detached detail, showing how the beveled-ended shoe M is applied to both bottom and sides of a gripe to operate my pulleys, both on vertical and horizontal curves.

In all the figures like letters of reference refer to like parts.

The better to appreciate the object of my device, I will first describe the present difficulties in rope-railroads.

Ordinarily the wire rope is placed below the ground in a tube or channel-way. This tube has a slot, through which the shank of the gripe passes upward and connects with the dummy, which drags the car behind it. Now, when the jaws of the gripe pass along through the tube they must necessarily avoid contact with all rigidly-set carrying-wheels, or damage would occur; hence it has been the practice to place the carrying-wheels entirely below the plane through which the gripe-jaws move, and the "depression-pulleys," so called, used at the intersection of varying grades, as in Fig. 3, entirely above the same plane, so that under no circumstances can contact occur between gripe-jaws and pulleys. Of course, the depression-pulleys at intersection of an up-grade with level ground cannot project above the road-bed, so the conditions imposed have heretofore necessitated these pulleys being made exceedingly small, their size being limited to less than the space between the top of gripe-jaws and under side of covering-plate in road-bed. Seldom are these pulleys over six inches in diameter. Now when it is immaterial whether the gripe-jaws strike the depression-pulleys or not, when these pulleys may encroach upon the path in which the gripe-jaws move, they being arranged to be gently pushed aside without shock as the gripe passes by, then they may be increased in size and great advantage in their operation accrue.

Again, some gripping devices have jaws opening horizontally in such a manner as to allow the rope to be drawn upward entirely out of the gripping-jaws when the strain on the rope has a direction angling upward from the line of travel of the gripe. As, for instance, suppose the rope suddenly ascends a steep grade, and the dummy with gripe attached is still upon level ground, on such occasions the strain on the rope will tend to draw it out from between the jaws if these jaws open horizontally. Now, if these jaws be opened at such a place in the road the rope will fly out, and there will be no way to get it back again between the jaws, except the dummy with the



attached gripe be backed on the road until that part of the rope is reached which is sufficiently sagged down to insert between the jaws again. Of course, this does not occur in some  
5 gripes, where one of the jaws is above the rope, always holding it from flying upward.

Again, where the old-style rigid depression-pulleys are used at intersecting grades, which pulleys must set above the line of travel of  
10 gripe-jaws, there has been found to be great wear both of rope and upper jaw from running the rope through the jaws when the car temporarily stops at the point of intersection consequent upon the upward strain of the rope  
15 due to the angle the rope forms with the line of travel of the gripe. I avoid this trouble with my device, for I do not set the depression-pulleys above the line of travel of the gripe, but, if anything, a little below it, or at least low  
20 enough to keep the rope always traveling upon a line coincident with the line of travel of the gripe.

Again, heretofore, in turning horizontal curves, there has been no means of guiding  
25 the rope which did not necessitate its release from the gripe, and therefore the car had to be run around the curve by other power than that the rope furnished, and if the car should be stopped upon or near the curve it might  
30 not be easy to move it again without unloading it of its passengers. Now, with my device, I pass around such curves with perfect ease, retaining the rope in the gripe, and I may stop and go ahead at any part of the curve without  
35 difficulty.

In the accompanying drawings, A is the wire rope. B is the channel-way. C is the slot through which the shank of gripe D passes to connect with dummy E, which dummy drags  
40 the car F behind it. G G' are my guide-pulleys. H is the swiveling bar, upon each end of which these pulleys are placed, revolving on pins I I'. J is the pin or axle which carries the swiveling bar. K is the bracket-piece  
45 which carries the pin J. It is made fast to timbers set in road-bed or to the cover L, as the conditions of the case may require.

In Fig. 1 I show the last pair of pulleys in the set just at the moment the gripe is passing.

It will be necessary to provide upon all gripes operating on roads using my device a wedge-shaped guard, as at M, Figs. 1 and 3, or the  
50 jaws of the gripe, when used to push aside the pulleys, should have tapered ends, so that there will be no shock on striking. A bit of rubber or other elastic material may be used to receive the shock if it is found in practice to be needed. The arrangement of this matter may be left to the discretion of the con-  
55 structor.

It will be observed in Fig. 1 that the shank of the gripe *m* is offset from the jaws, so that it may freely pass by the depression-pulleys, as in Fig. 3. Nearly all gripes are so constructed.

N N are the carrying-wheels which support  
65 the rope, which will, of course, be set a suitable distance from the first and last of the guide-wheels G. The gripe has to pass over these carrying-wheels N, and ordinarily they may be  
70 set several feet away from the guide-wheels and below the path of the gripe; but in some cases it may be found necessary to bring these carriers N close to the guide-wheels and to allow them to enter the path of the gripe, so as  
75 to hold the rope at a proper height. When this is done it must be arranged that the gripe as it passes shall slightly depress them out of its path. I do not think, however, that any  
80 carriers, except the ordinary ones, are necessary. Much will depend on the conditions under which the invention is applied.

It is an easy matter to select from the numerous styles of depression-pulleys. At present I have no choice, not having had occasion  
85 to use other than the ordinary rigid carrier, as in Fig. 3.

I may here mention that in a horizontal curve I can easily double the number of guide-pulleys in the same space by placing one swivel-  
90 ing bar over another, making the end pulleys of all the bars stand intermediate with the two pulleys of the opposing bar; but as I do not think this will be necessary I will not further elaborate my description of this, for any one  
95 conversant with the subject will easily understand the construction.

What I claim as my invention, and desire to secure by Letters Patent, is as follows:

1. In rope railways, the sets of pulleys G G', (arranged equidistant apart to bear against the  
100 side of a horizontal rope, so as to retain it approximately in a horizontal curved line, the said pulleys being revolved on vertical pins I I', projecting from swinging levers H, vibrated  
105 on stationary pins J,) in combination with the carrying-pulleys N, revolving vertically before and after the curve, and the beveled-ended shoe M, attached to the gripe as a means of passing and supporting the rope around a curve  
110 while permitting the easy passage around said curve of any suitable gripping device, substantially as described.

2. In rope railways, the set of two or any greater even number of guide-pulleys, G G',  
115 when set to revolve above the rope upon pins I I', secured upon opposite ends of swinging bar H, in combination with the beveled shoe M upon gripe D, as a means of depressing the rope at a vertical angle or curve while permit-  
120 ting an easy passage of the gripping device, substantially as and for the purpose herein described.

JOEL B. LOW.

Witnesses:

AUGUST E. GANS,  
GEO. PARDY.