A. S. HALLIDIE.

ENDLESS-ROPE TRACTION RAILWAYS.

No. 195,505. Patented Sept. 25, 1877.

Fig. 1

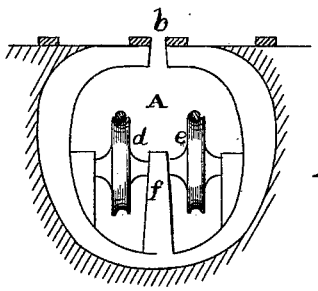


Fig. 2

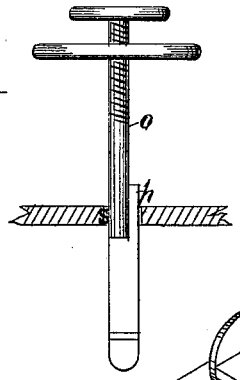
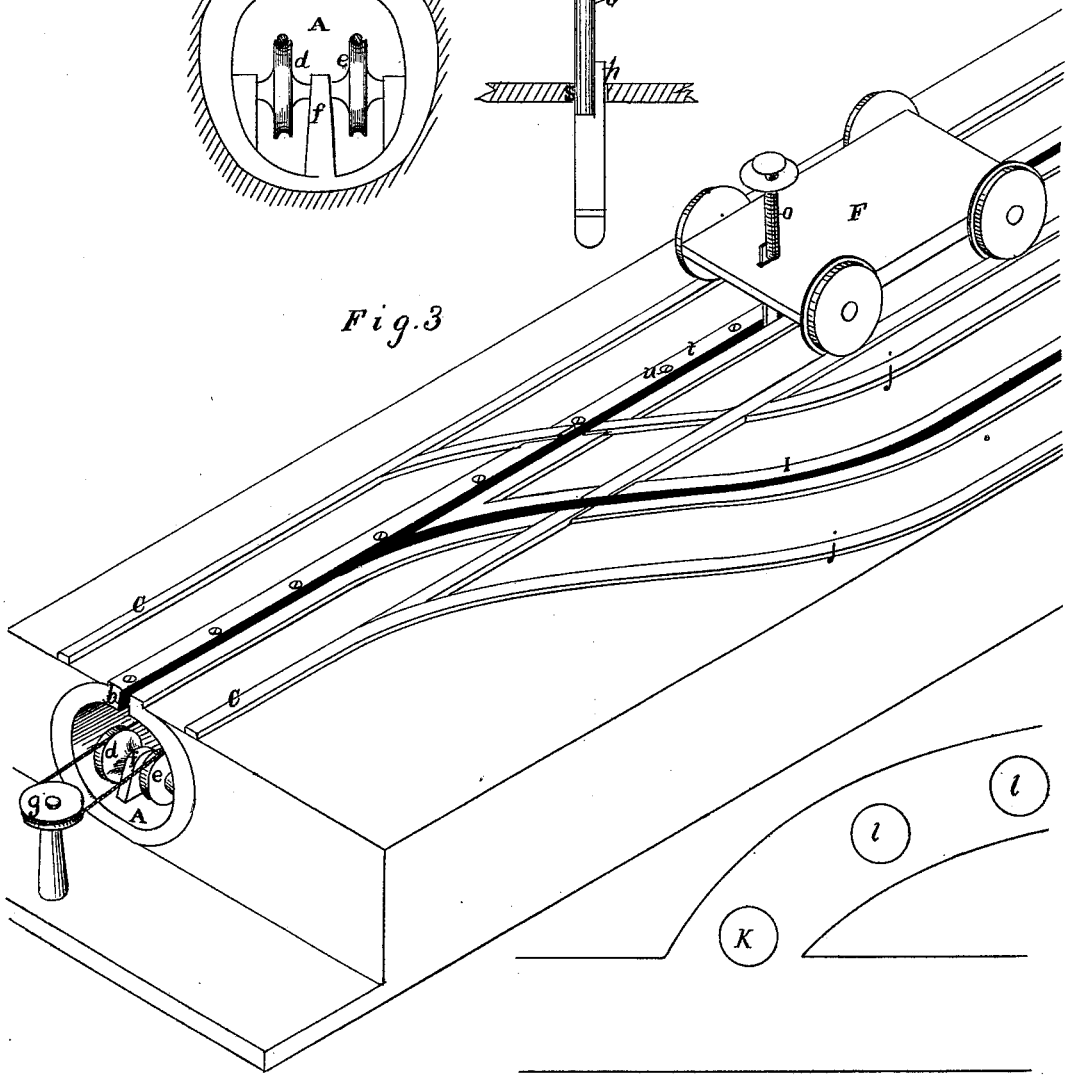


Fig. 3



Witnesses

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ANDREW S. HALLIDIE, OF SAN FRANCISCO, CALIFORNIA.

IMPROVEMENT IN ENDLESS-ROPE TRACTION-RAILWAYS.

Specification forming part of Letters Patent No. **195,505**, dated September 25, 1877; application filed April 9, 1877.

To all whom it may concern:

Be it known that I, ANDREW S. HALLIDIE, of the city and county of San Francisco and State of California, have invented an Improvement in Endless-Rope Traction-Railways; and I do hereby declare the following to be a full, clear, and exact description thereof, reference being had to the accompanying drawings.

My invention consists in mounting and operating an endless rope or cable so that it will travel in both directions simultaneously, inside of a single underground slotted tube or tunnel, in combination with a single railway-track with a double line of pulleys, and one or more turnout-tracks or sidings with vertical and horizontal pulleys, by means of which I am able to propel cars in opposite directions, or in the same direction at the same time, upon the same track.

It also consists in constructing the griping device which connects the cars with the traveling rope, so that it can be turned half around to connect with either branch of the moving rope or cable without lifting it from the tube or detaching it from the car.

My invention also includes an arrangement for adjusting the width of the slot in which the griper moves.

Heretofore this system of car-propulsion has only been used in connection with a double line of tracks, and the propelling-rope was made to pass in one direction through the tube of one track, and in an opposite direction through the tube of the other track, so that the cars could move in one direction only on each track. My present invention, however, enables me to do away with one track, and, by employing sidings at proper intervals, maintain the travel of the cars in both directions upon a single track.

Referring to the accompanying drawings, Figure 1 is a section of the tube, showing pulleys. Fig. 2 is a view of the griping-bar. Fig. 3 is a perspective view of my track.

A represents an underground tube or tunnel, with which communication from above is made through the longitudinal slot *b*. *c c* are two railway-tracks, upon which cars F or other vehicles are intended to be moved by the traction of an endless rope or cable, D, which is mounted inside of the tube, and driven by a stationary engine located at one end of the track or tube. The slot *b* is constructed directly above the center of the tube A, and midway between the tracks *c c*, and a griping device connects the car with the traveling rope. Inside of the tube A I construct two independent lines of pulleys, represented by the pulleys *d e*, Fig. 1. One line of pulleys, *d*, is mounted on one side of the slot *b*, while the other line, *e*, is mounted on the opposite side. These pulleys are supported in the ordinary way by standards *f*, which extend upward from the bottom of the tube; or they may be supported in any other convenient manner. At each end of the tube I mount a single horizontal pulley, *g*, one of which is a driving-pulley, and this pulley is connected with the engine which furnishes the power. The endless rope or cable D passes through the tube and around the horizontal pulleys *g*, so that one half of it will be supported by the line of pulleys *d* on one side of the slot, and the other half will be supported by the line of pulleys *e* on the opposite side of the slot. The rope or cable will then travel in both directions through the same tube.

At intervals along the track, wherever it is desired to allow the cars going in opposite directions to pass each other, I construct a branch tube, I, and side tracks *j j*, both of which connect with the tube A and main track C C, in the usual manner of connecting sidings with main tracks. At each junction of the main tube and branch or side tube, I mount a pulley, K, at such an angle that it will hold the rope or cable, and allow it to be diverted from the main tube into the branch tube without dropping down. I also mount, inside of the branch tube, as many horizontal pulleys *l l* as may be required, so that the rope will bear against these outside edges in its passage through the branch tube and back into the main tube. The tension upon the rope will keep the rope in the grooves in the edges of the pulleys.

The enlarged slot formed by the divergence of the branch slot from the main slot at each end of the siding I close by means of the

switch-rail, which is represented and claimed in the Letters Patent No. 179,016, which were issued to me on the 20th day of June, 1876.

It will be evident that I can by this arrangement propel cars in either or both directions along the same track by connecting the griper with either side of the rope. To enable me to make this connection readily without lifting the griper from the tube or detaching it from the car, I make the stem O of the griper cylindrical or tubular, where it passes through the floor of the car or dummy, and secure one or more ribs, *p*, longitudinally upon it. These ribs extend upward along the stem as far as they will ever be required for holding the griper steady while it is grasping and handling the rope; but by dropping the rope from the griper and lowering the stem until the rib passes through the floor of the car the entire griping device can be turned so as to connect with the opposite side of the rope, and then lifted again to its proper position. The hole in the bottom of the car through which the stem passes I provide with slots S for the ribs to fit and move in, and the position of these slots corresponds with the position in which the griper is to be held when it is connected with the rope.

I am thus able to maintain a complete line of travel in both directions upon a single track.

Beside saving the expense of constructing a double track and double tubes, this device of railway is especially valuable for propelling street-cars in cities, because a single slot in the middle of a street will be less objectionable than two slots, one on each side of the middle of the street. The sidings can be made at street-crossings, or at other points where a sufficient width of street can be obtained.

Another improvement which I have made in this class of railways relates to an arrangement for regulating the width of the slot *b*, which is as follows: Along each outside edge of the slot I secure a metallic strip, *t*. These strips I secure in place by means of screws *u u*, which pass through holes in the strips which are elongated transversely. By slightly loosening these screws the strips can be adjusted to or from each other, as required, in order to regulate the width of the slot.

I am aware that bearing-pulleys have been used in tubes for sustaining the rope at points where the line of direction has been changed vertically, and such I do not claim as my invention; but

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

1. The combination, with the underground slotted tube or tunnel A, with its double line of pulleys *d e*, rope D, and end pulleys *g*, of the tube or siding I, pulley K, and horizontal pulleys *l l*, substantially as and for the purpose described.

2. The car F, provided with a reversible griper, in combination with the underground slotted tube A, in which an endless rope or cable, D, is arranged to traverse in opposite directions, substantially as and for the purpose described.

3. A griping device for connecting cars with an endless traveling rope, provided with the cylindrical or tubular stem O, and longitudinal rib or ribs *h*, in combination with a corresponding opening in the car-floor, substantially as and for the purpose described.

4. The underground slotted tube or tunnel A, provided with adjustable strips *t t* for regulating the width of the slot, substantially as above described.

In witness whereof I have hereunto set my hand and seal.

A. S. HALLIDIE. [L. S.]

Witnesses:
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