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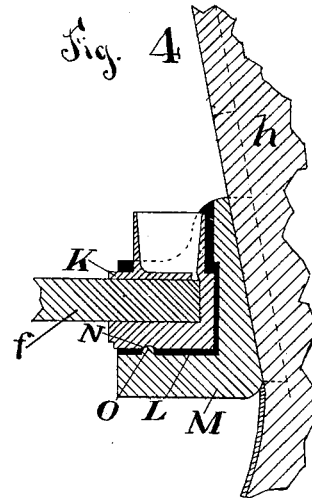
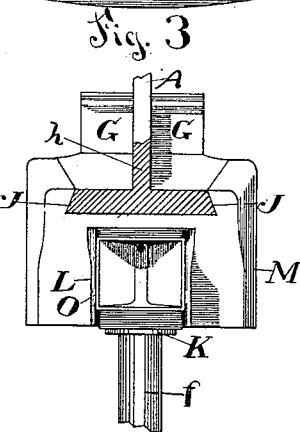
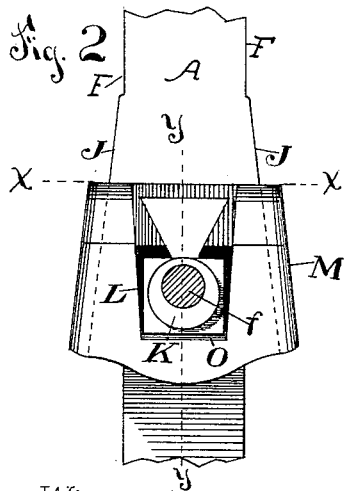
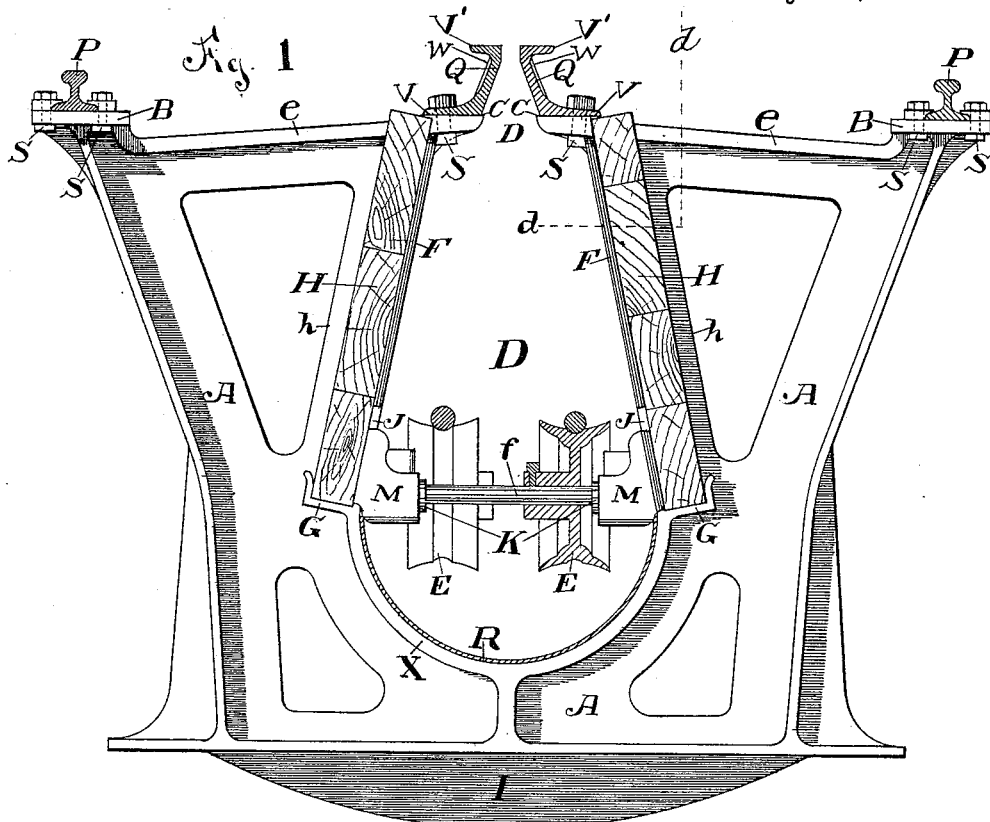
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F. W. WOOD & J. FOWLER.

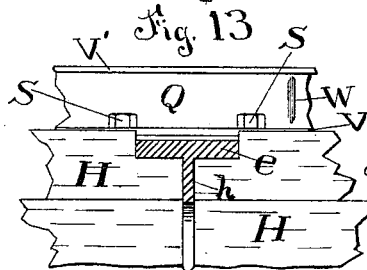
CONSTRUCTION OF RAILWAYS.

No. 386,732.

Patented July 24, 1888.



Witnesses,  
A. C. Cameron,  
Edgemoor.



Inventors,  
Fred W. Wood,  
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by  
Hazard & Townsend,  
their attys.

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3 Sheets—Sheet 2.

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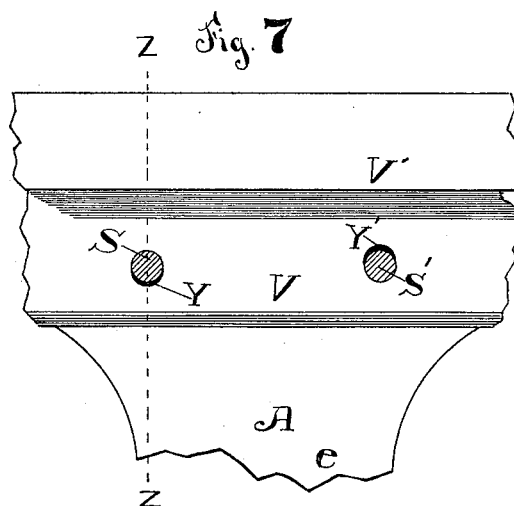
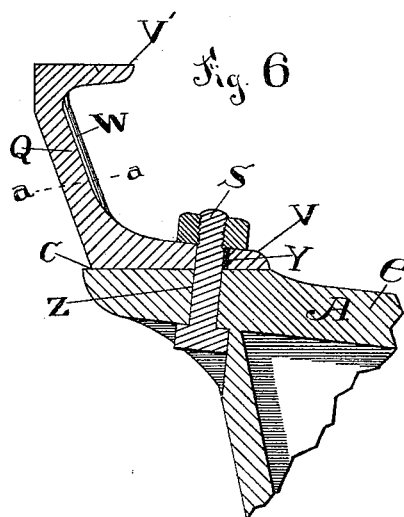
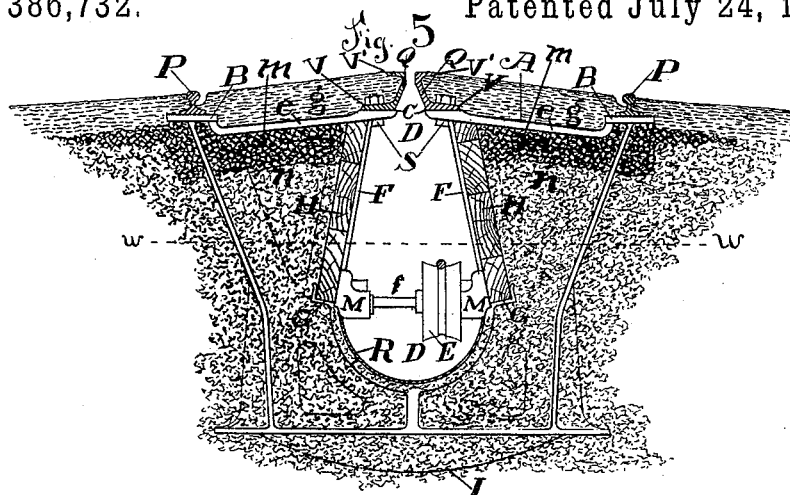
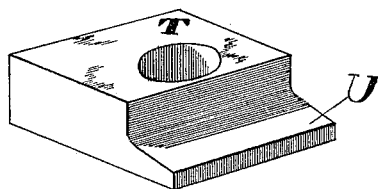


Fig. 8



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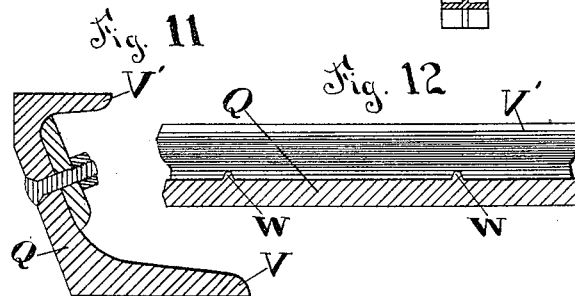
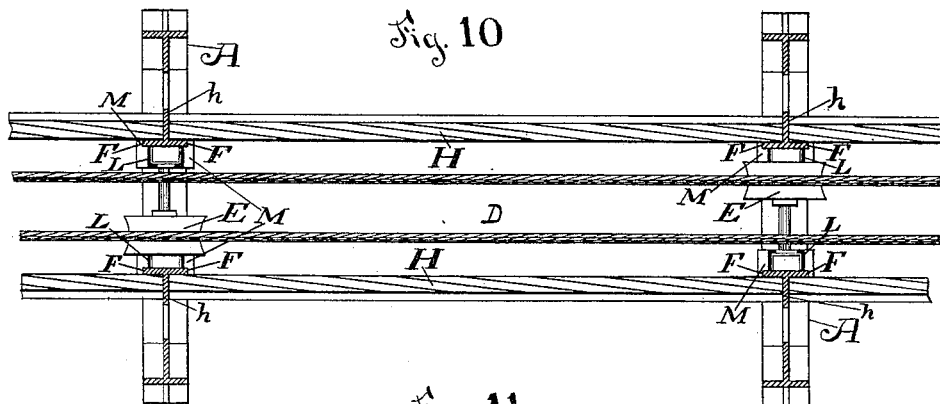
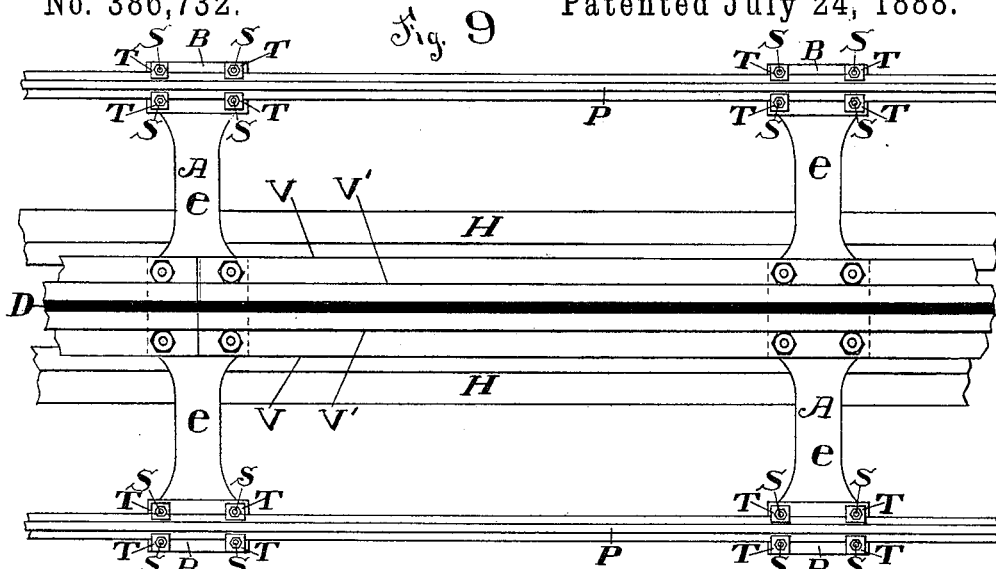
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# UNITED STATES PATENT OFFICE.

FRED W. WOOD AND JOHN FOWLER, OF LOS ANGELES, CALIFORNIA.

## CONSTRUCTION OF RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 386,732, dated July 24, 1888.

Application filed March 12, 1888. Serial No. 267,020. (No model.)

*To all whom it may concern:*

Be it known that we, FRED W. WOOD and JOHN FOWLER, citizens of the United States, residing at Los Angeles, in the county of Los Angeles and State of California, have invented a new and useful Improvement in the Construction of Railways, of which the following is a specification.

Our invention relates to the roadway, tube, and cable-carrying apparatus of cable railways, and is also adapted for use in electrical railways having underground conduits.

The cost of substantial, firm, and rigid cable road-beds as now constructed is very great, and various forms of construction have been devised for use on roads where the revenue expected to be derived does not warrant a large outlay. These cheaper forms of construction have proven objectionable for the reason that they depend upon perishable material so disposed as to require frequent renewal; also, the roads are not rigid and these several parts are liable to move independently, thus throwing the road into bad shape for operation, varying the width of the slot and the gage of the road. When such roads become subject to heavier travel, it is found necessary to discard the material used in the cheaper road and construct the road anew to increase its capacity.

One object of our invention is to provide a slot-rail simple in construction and of a new and improved form, which will not be liable to be displaced by the weight of heavy vehicles.

A further object is to produce a substantial, firm, durable, and rigid road-bed adapted to be constructed at comparatively small cost with or without pavement or permanent tubing, so that if it is first constructed without such paving or tubing it can afterward be provided with either or both without excessive cost and without discarding the material previously used.

A further object is to devise means whereby the sustaining-pulleys may be mounted upon any yoke desired, and at different heights, if required.

A further object is to provide means for hanging the pulleys, whereby they will be allowed to adjust themselves to the line of the cable.

The accompanying drawings illustrate our invention.

Figure 1 shows an elevation of one of the yokes used in our improved construction. This view is shown as a cross section of a single-track road, and the pulley on the yoke beyond is shown in position with the cable in place thereon, while the pulley mounted on the yoke shown is drawn in cross-section to show that it is fixed upon its shaft *f*. Figs. 2, 3, and 4 illustrate the improved hanger and box for the sustaining-pulleys. Fig. 5 is a cross-section of our improved road-bed, showing one of the tracks of a double-track road. Fig. 6 is a detail showing our improved slot-rail in cross-section on line *Z Z*, Fig. 7. Fig. 7 is a top view of a section of the slot-rail and illustrates the device for adjusting the same. Fig. 8 is a perspective view of our improved washer for clamping the track-rail to the yoke. Fig. 9 is a top view of section of our improved road. Fig. 10 is a plan view of a section of the single-track road, the top of the roadway being broken away to expose the cables and pulleys. Fig. 11 is a cross-section of the slot-rail near one end thereof, showing the manner of securing the slot-rails together by fish-plates. Fig. 12 is a longitudinal horizontal section of a portion of the slot-rail on the line indicated by *a a*, Fig. 6. Fig. 13 is a broken section on line *d d*, Fig. 1, showing the upper edge of the planking *H*.

In order to secure perfect rigidity, combined with comparatively cheap construction, we have invented a new and improved yoke, *A*, formed of a single casting, having through its center and upper side an opening, *D*, for the tube and slot, and having at its top, upon each side of the opening *D*, a horizontal arm, *e*, having seats *B* and *C* on the top thereof, upon which to place the track and slot rails. The arms *e* are below the level of the track-rail seats *B* and slot-rail seats *C*, so that when the rails are secured in place upon their seats there will be a large amount of space above the casting and below the top of the rails for the paving or top dressing of the street, thus avoiding the danger of fracturing the castings by allowing them to be well protected by the street paving or top-dressing.

The seats *B B* for the track-rails are at the

outer sides of the yoke, and the seats C C for the slot-rails are located immediately upon either side of the mouth of the tube-opening D. The side arms, *h h*, of the casting extend downward from the seats C C and diverge from the mouth of the opening D, so that the opening is sufficiently wide at the bottom to allow the sustaining-pulleys E to be mounted therein, while the mouth of the opening D is nearly closed, being but little more than wide enough to admit the gripper apparatus of the dummy.

Flanges F project from the face of the web of the arms *h* along the inclined inner edges thereof, which form the walls of the tube-opening D, and a corresponding flange, X, projects from the face of the web of the casting forming the bottom of the tube opening D.

The floor of the tube is formed by sheets of iron, R, laid upon the flanges X. Brackets G are provided at the lower end of the flanges F to sustain planking H, which is rested thereon and leaned against the flanges F and there held by the force of gravity to form the walls of the tube. The top plank is made to fit closely against the flange V of the slot-rail which is secured to the seats C, so as to prevent any earth from passing into the tubes between the slot-rail and the planking. The walls of the tube thus formed are nearly vertical, so that when earth is filled in around the tube the planking will have to sustain but little more than the lateral pressure of the earth which fills the trench.

The yoke A is braced by a strengthening-web, I, underneath the tube-opening D, and when placed in the earth the yoke forms a firm and rigid foundation for the track-rails and slot-rails.

The flanges F are gradually broadened at their lower ends, J, as shown in dotted lines in Fig. 2, and are beveled from their faces inward toward the web *h* of the yoke, as shown in Fig. 3, which is a cross-section on line *x x* of Fig. 2.

We mount the sustaining-pulleys E upon hangers M, which fit upon the dovetail portion J of the flanges. The height at which the hangers are held will depend upon the size of the channel formed in the hangers to fit upon the dovetailed portions J of the flanges. In the drawings the hangers are formed to place the pulleys at the lowest point possible. By making the channel in the hanger narrower the hanger will be supported at a higher point. Each pulley is fixed upon a shaft, *f*, the ends of which are journaled in boxes K. These boxes are seated in chambers L in the hangers M. The chambers L are larger than the boxes K, and we provide a channel, N, across the bottom of the box, and provide a rib, O, projecting upward from the bottom of the chamber L somewhat greater in height than the channel N is in depth and somewhat narrower in cross-section than the channel N, so that when the box K is placed in position in the chamber L it will rest upon the rib O,

projecting into the channel N, and will be free to move slightly to change the plane of revolution of the pulley. The purpose of this contrivance is to allow the pulley to adjust itself to the direction of the cable. Where the pulleys are set rigidly, it is necessary that the alignment of the pulley be exact, for if the axle of the pulley is not at right angles to the cable the cable will be caused to cut diagonally across the face of the pulley, thus creating great friction and wearing the cable and pulley unnecessarily. By means of this device the rotation of the pulley, together with the friction of the cable, will throw the pulley into proper alignment.

The track-rails P P and slot-rails Q Q are bolted to the several yokes. A sheet of iron, R, is laid to form the bottom of the tube and rests upon the flanges X of the castings A at the bottom of the opening D. The planks H are set in place upon the shelves G and leaned against the flanges F, where they are held by gravity. In case it is desired to avoid expense, earth is now filled in around the yokes and under the sheet-iron R, and the trench is then partially filled with earth. Broken stone or other ballast may then be thrown into the top of the trench to form a solid bed for the portions of the rails lying between the yokes. After the earth and broken stone are thoroughly tamped in place, the top surface may be paved or top-dressed in any way desired.

When it is desired to make the road more perfect, the earth surrounding the tube may be removed and the space filled in with cement concrete. The planking H and sheet-iron casing of the tube will sustain and give form to the concrete, which, when set, will form a continuous artificial-stone tube and road-bed. If preferred, the planking and sheet-iron may be dispensed with and suitable forms be temporarily used to hold the concrete in place until it becomes set.

In order to make it convenient to remove the track-rails, the bolts S, which secure the rails in place, are passed upward through the rail-seats and the nuts are screwed on at the top. In order to clamp the rails firmly to their seats, we provide the washer T, having on one side a projecting lip, U, formed to fit over the edge of the bottom flange of the rails. This washer is placed upon the bolt with the lip U over the flange of the rail, and the nut is screwed down thereupon, thus clamping the rail firmly to its seat. The washer T receives the jar of the rail and serves as a nut-lock as well as a clamp.

It is especially desirable that there be no projections on the yoke extending near the surface of the street, so as to be liable to be struck by the wheels of vehicles, and thus be broken. Our improved construction avoids the necessity of any such projections. The top arm, *e*, of the yoke connecting the seats B and C is depressed below the level of such seats. This brings the arm several inches below the surface of the

street, so that it will be perfectly protected by the paving material or the broken stone used for ballast.

The slot-rail O is rolled to the form shown, 5 having two flanges projecting from one side, and having the other side made of such shape as may be desirable to form one side of the slot. The lower flange, V, is wider than the upper flange, V', of the slot-rail, and the web 10 Q of the rail between the two flanges is at an obtuse angle with the under face of the lower flange, so that a vertical line from the edge of the upper flange will intersect the lower flange near the point of its junction with the web of 15 the rail, thus leaving the greater portion of the lower flange projecting outward from beneath the upper flange. By this contrivance the weight of a wheel striking upon the upper flange will be sustained by the lower flange 20 through the intervening paving or street-surface, and will serve to prevent the rail from being wrenched out of position—that is to say, before the wheel of a vehicle can strike against the narrow upper flange, V', the weight of the 25 wheel will rest upon the broad bottom flange, V, through the intervening paving or street-surface, and the weight of the wheel pressing down upon the flange V will hold the rail from turning. One object of the upper flange, V', 30 is to protect the edge of concrete, bituminous lime-rock, or asphalt pavement. Another object of the flange V' is to distribute the strain of any weight which may press downward upon the top of the rail, and prevent the rail 35 from springing sidewise.

The paving material, when in place, will cover the lower flange entirely, and thus serve to hold the rail in place, while the upper flange projects far enough over the paving material to prevent its edge from being broken. 40

In order to give greater strength to the web of the rail, we provide at intervals ribs W, projecting from the web and extending between the flanges. The bolts which clamp the 45 slot-rails to their seats are set inclined outward upwardly, so as to brace against the strain of the lower flange when the slot-rail is pressed inward by wheels striking against the upper flange.

Figs. 6 and 7 illustrate the means employed 50 by us to allow the slot-rails to be shifted. Two oblong holes, Y Y', having their greatest axes at right angles to the axis of the slot-rail, are provided in the bottom flange, V, of the slot-rail at each of the points where the slot-rails 55 rest upon a yoke. One of the holes is closer to the web of the slot-rail than the other.

The holes Z in the slot-rail seats are equidistant from the inner side of the seat C and 60 are circular.

When the road is built, bolts S S' are passed through the holes Y, Y', and Z and secured by nuts. If the slot-rail is laid at right angles with the yokes, the bolt S will fit against the inner wall of the hole Y, and the bolt S' will 65 fit against the outer side of the hole Y'. When it is desired to spring the slot-rail in to narrow the slot, the bolt S' may be removed, thus allowing the rail to be sprung.

If it is desired to spring the rail out to 70 widen the slot, the bolt S is removed. A key may then be inserted in the space between the bolt and the wall of the hole Z to hold the rail in place.

In Fig. 5, *g* represents concrete or asphalt 75 paving. *m* represents broken-stone ballast, and *n* represents the earth.

Now, having described our invention, what we claim as new, and desire to secure by Letters Patent, is— 80

1. The combination of the yoke provided with the dovetailed and downwardly-broadened flanges J J, the hangers M M, channeled to fit upon the flanges J and provided with a seat for the boxing of the pulley-shaft, the 85 pulley-shaft boxing, and the pulley-shaft.

2. The combination of the yoke A, provided with the downwardly-broadened flanges J J, and the hanger M, channeled to fit upon the flanges J J. 90

3. The improved cable roadway and tube comprising the yoke provided with the tube-opening D, the downwardly-diverging side arms, *h h*, provided with the flanges F F and brackets G, the top arms, *ee*, having the track-rail seats B B and slot-rail seats C C, the 95 planking H H, slot-rails Q Q, secured to the seats C, and the track-rails P, secured to the seats B.

4. The combination of the hangers M M, 100 provided with the chamber L and the upwardly-projecting rib O at the bottom of such chamber, the box K, smaller than the chamber L and provided with the groove N, the pulley B, and its axle. 105

5. A slot-rail comprising the web of the rail, having at the top thereof a narrow flange projecting from one side of such web, and having a broad flange at the base of such web projecting from the same side of the web as the 110 top flange, and at such an angle with the web that a vertical line drawn from the edge of the top flange will intersect the bottom flange approximately at the base of its junction with the web.

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