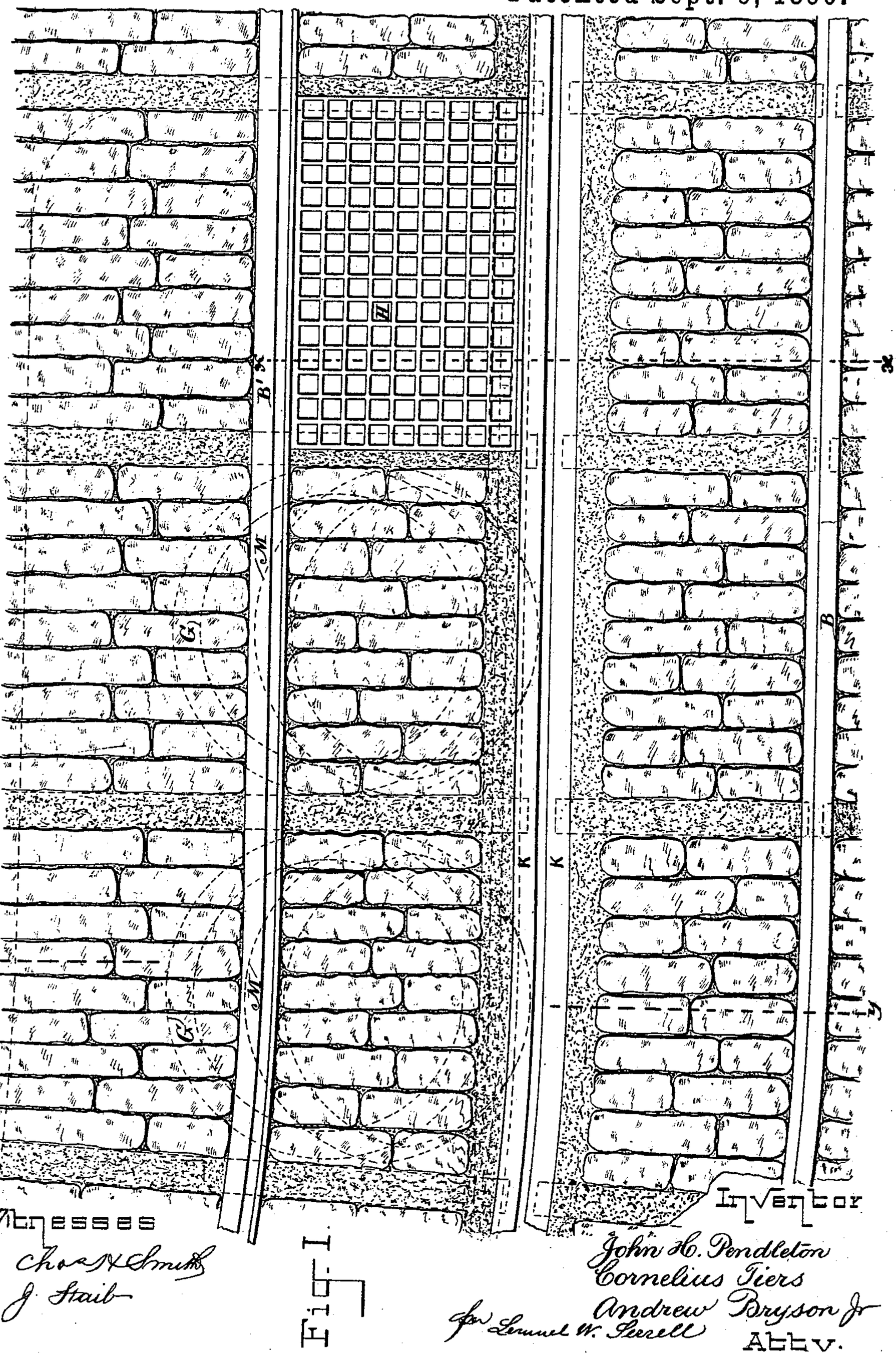
(No Model.) 5 Sheets—Sheet 1.

# J. H. PENDLETON, C. TIERS & A. BRYSON, Jr.

## CABLE RAILWAY.

No. 436,106. Patented Sept. 9, 1890.



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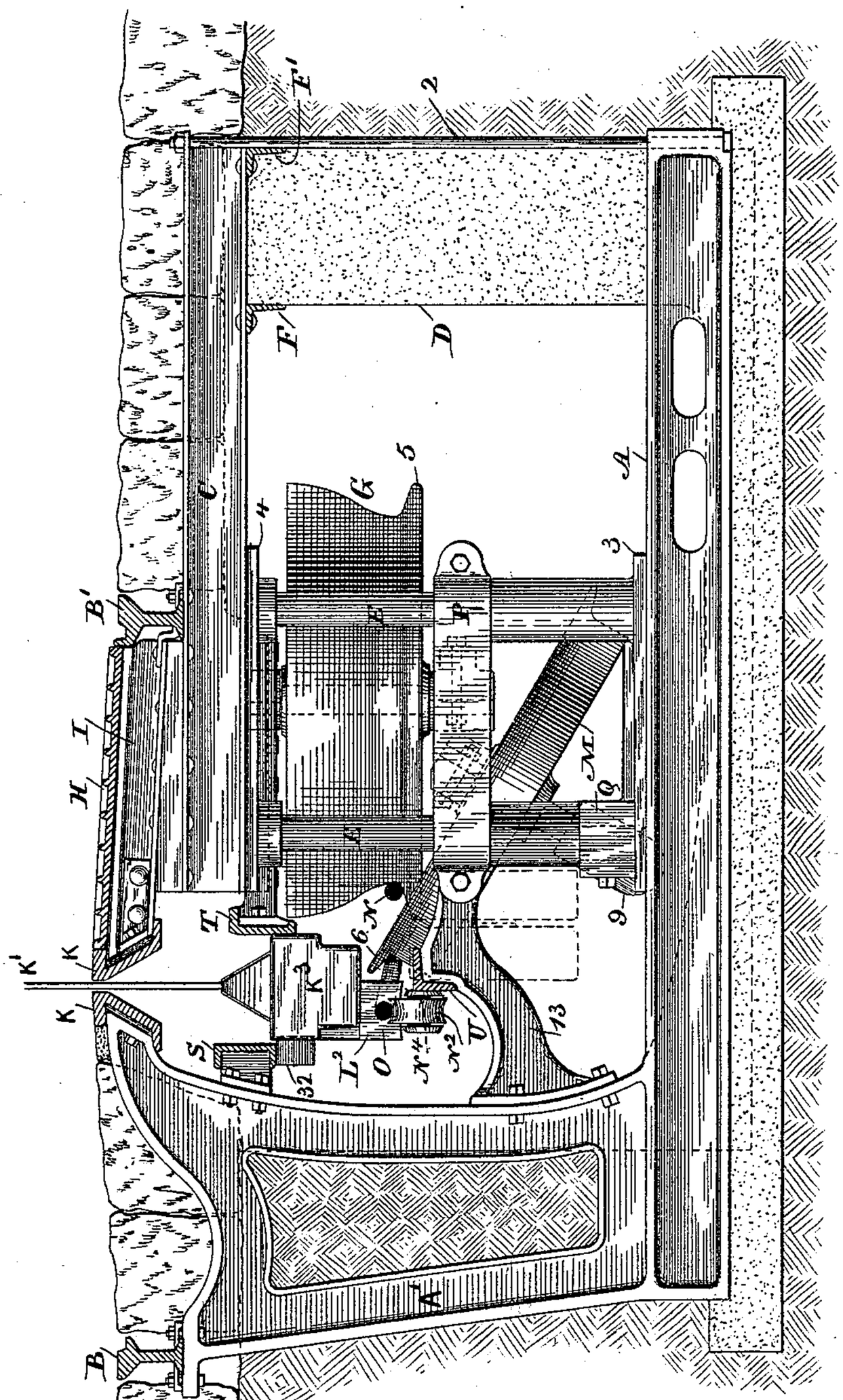
# J. H. PENDLETON, C. TIERS & A. BRYSON, Jr.

## CABLE RAILWAY.

No. 436,106. **Patented Sept. 9, 1890.**

Fig. II

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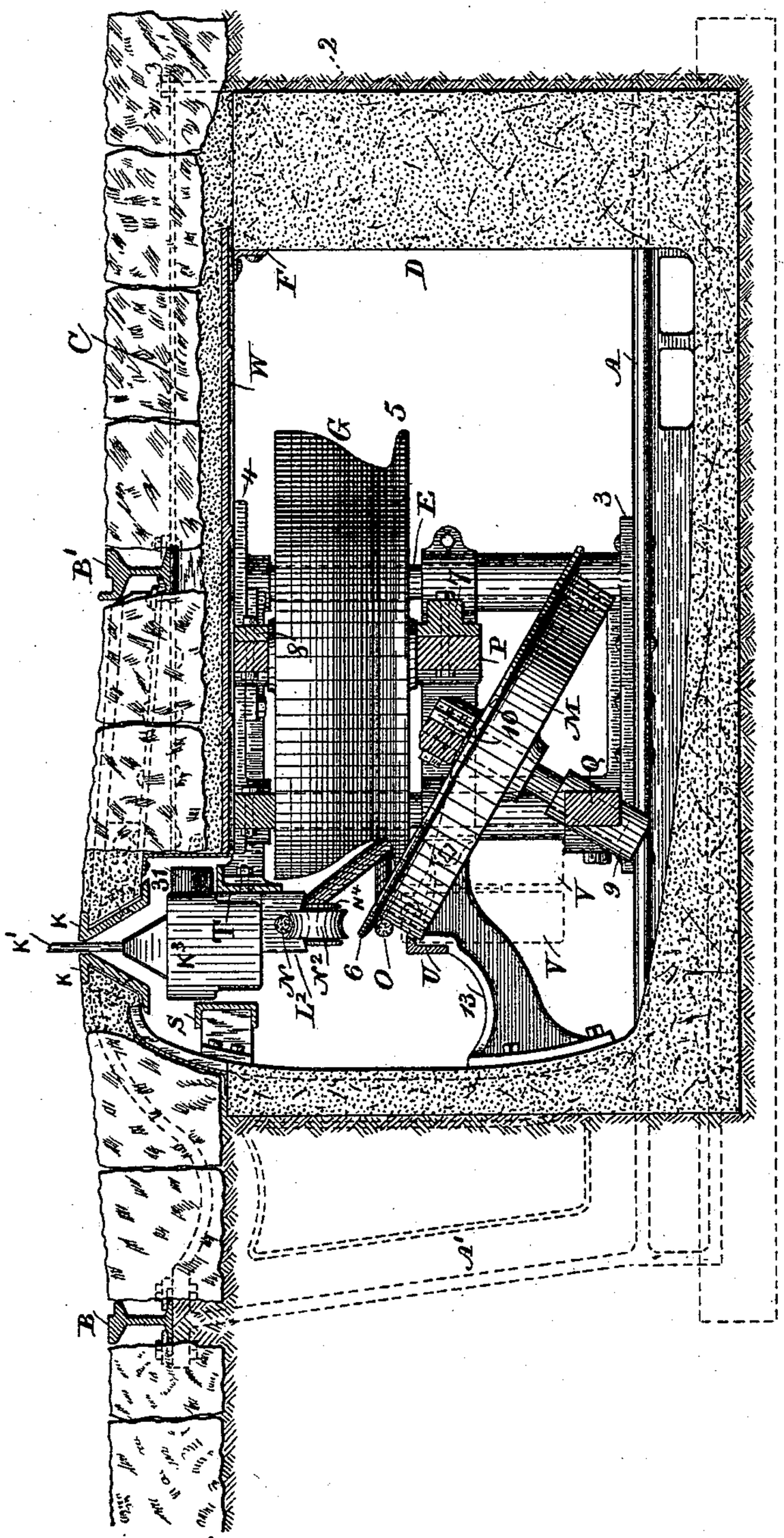
(No Model.) 5 Sheets—Sheet 3.

# J. H. PENDLETON, C. TIERS & A. BRYSON, Jr.

## CABLE RAILWAY.

No. 436,106. Patented Sept. 9, 1890.

Fig. III

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(No Model.) 5 Sheets—Sheet 4.

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## CABLE RAILWAY.

No. 436,106. Patented Sept. 9, 1890.

Fig. III.

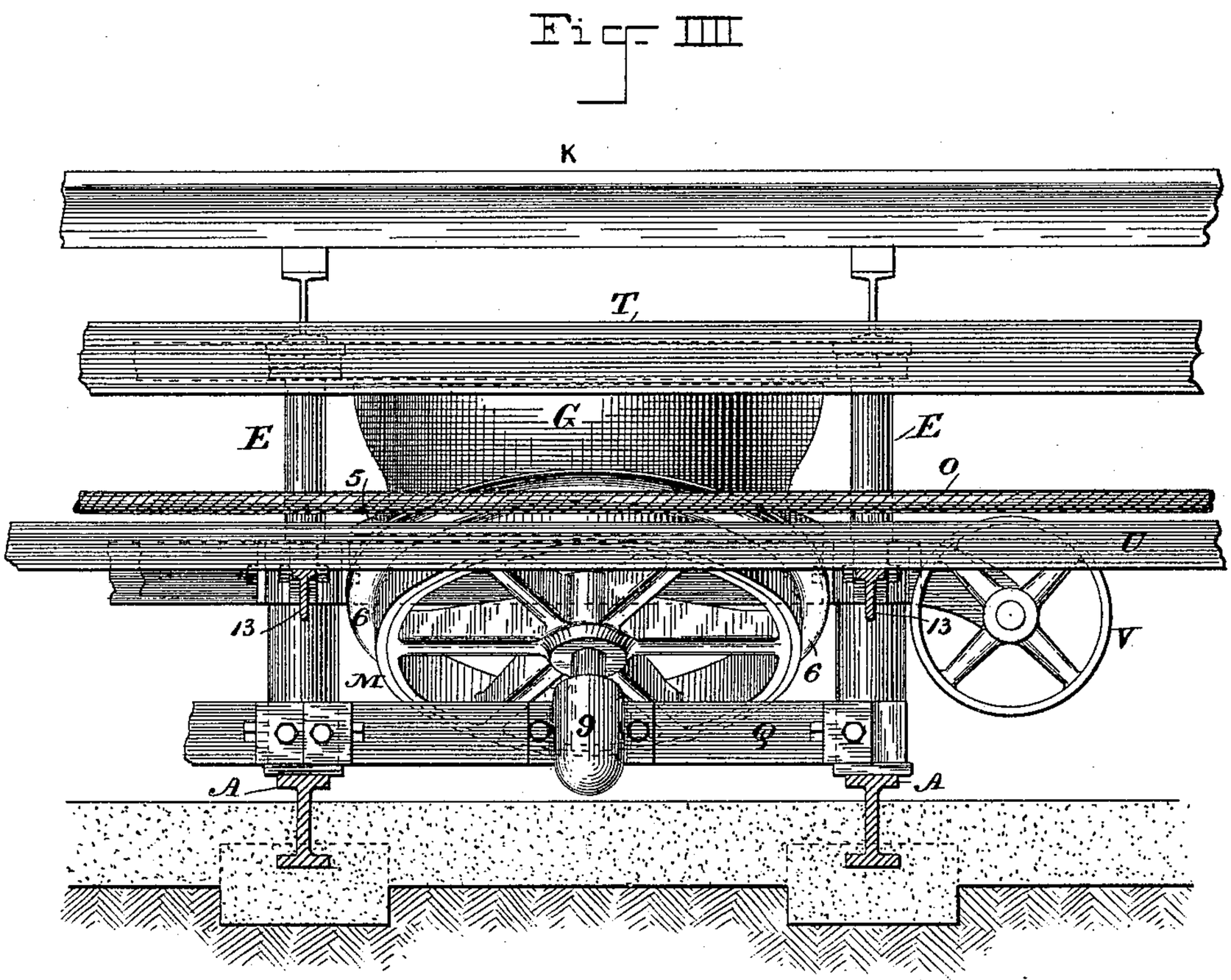
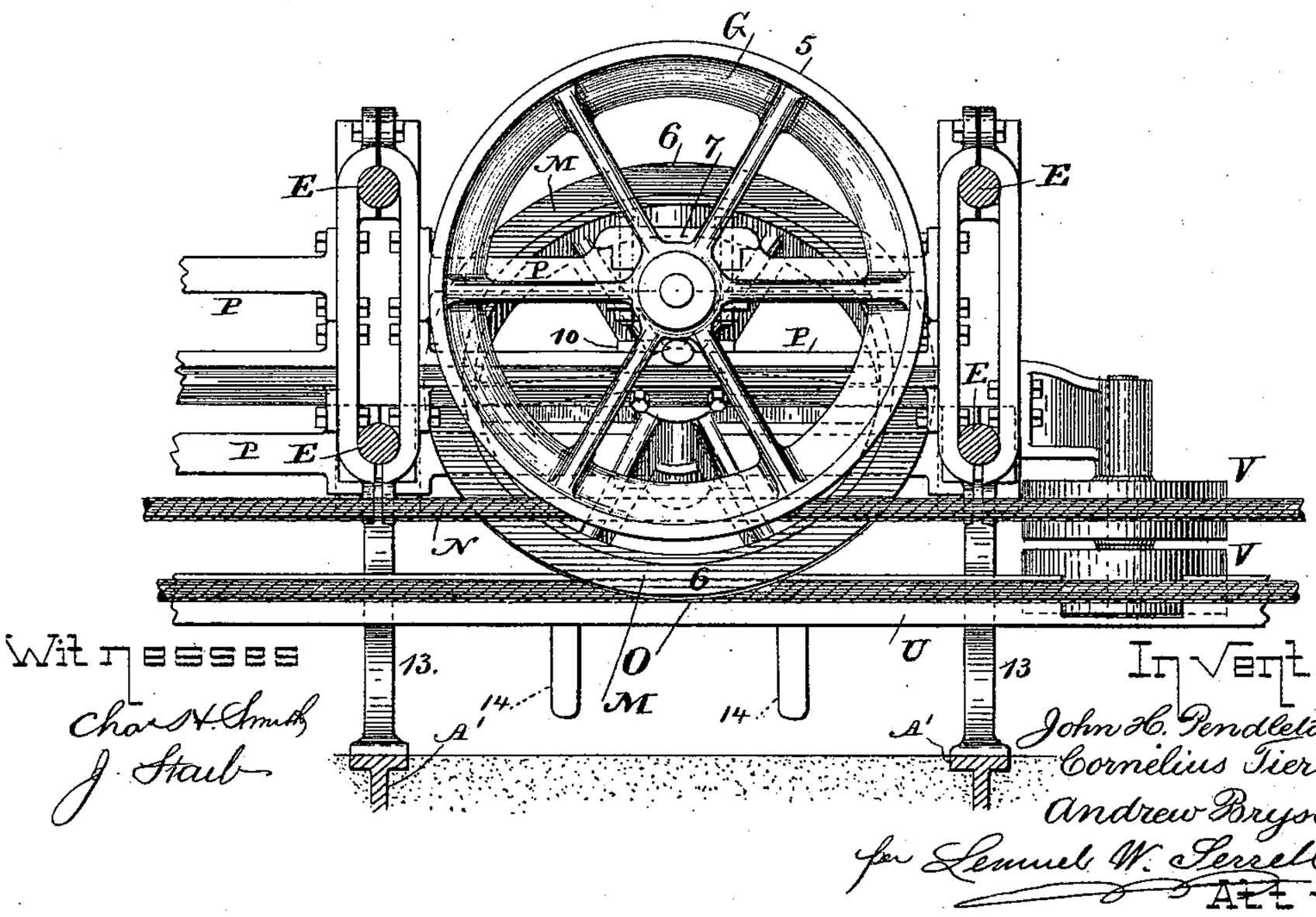



Fig. V.

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## CABLE RAILWAY.

No. 436,106. Patented Sept. 9, 1890.

Fig. VII

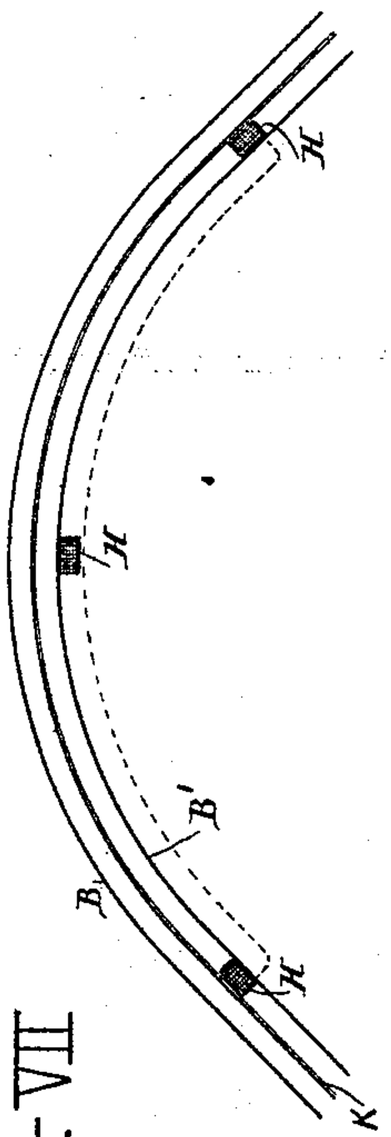
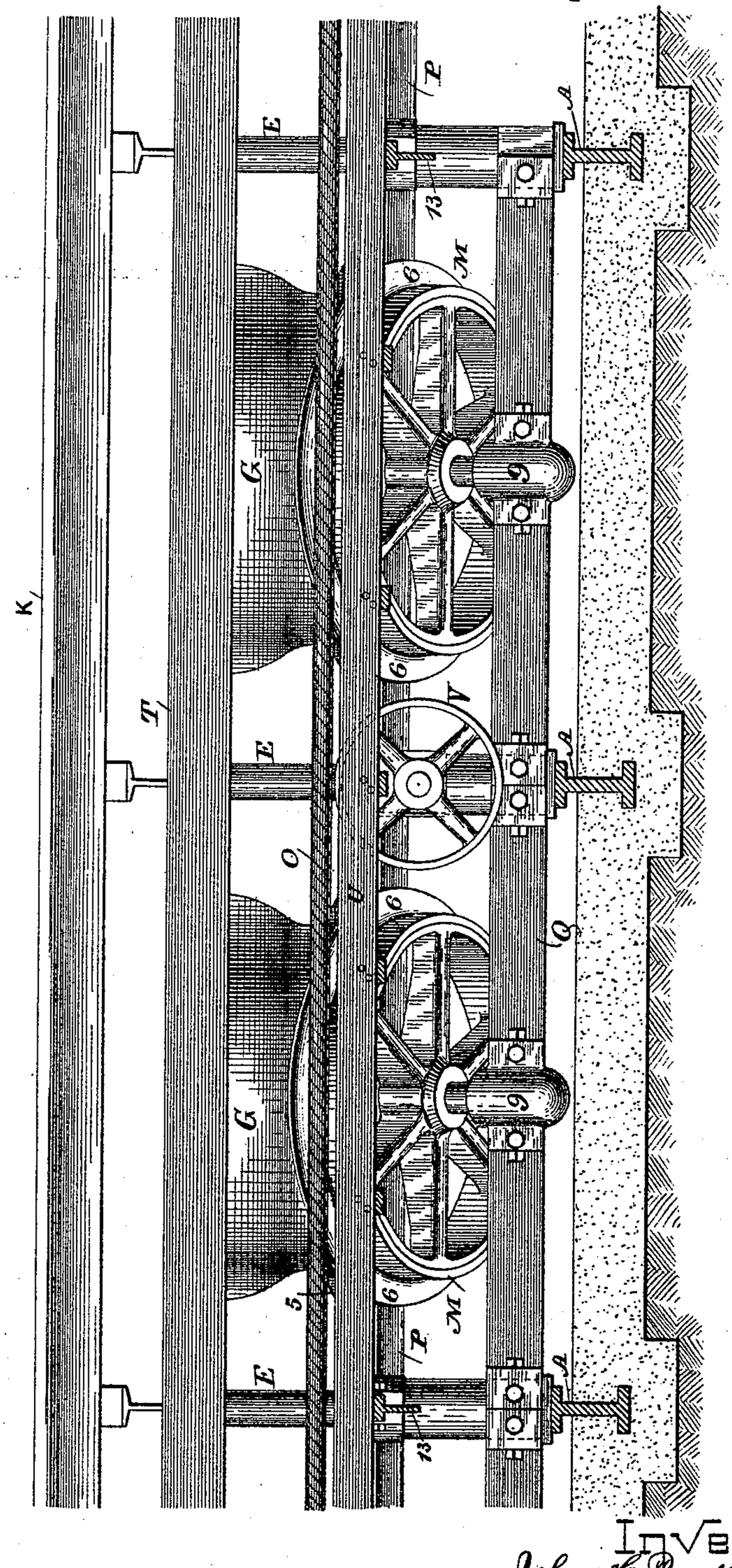



Fig. VI

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# UNITED STATES PATENT OFFICE.

JOHN H. PENDLETON, OF BROOKLYN, AND CORNELIUS TIERS AND ANDREW BRYSON, JR., OF NEW YORK, ASSIGNORS TO THE RAPID TRANSIT CABLE COMPANY, OF NEW YORK, N. Y.

## CABLE RAILWAY.

SPECIFICATION forming part of Letters Patent No. 436,106, dated September 9, 1890.

Application filed June 19, 1890. Serial No. 355,982. (No model.)

*To all whom it may concern:*

Be it known that we, JOHN H. PENDLETON, of Brooklyn, in the county of Kings and State of New York, and CORNELIUS TIERS and ANDREW BRYSON, Jr., of the city and State of New York, all citizens of the United States, have invented an Improvement in Cable Railways, of which the following is a specification.

Cable railways have heretofore been made in which one cable has passed around the curved track either at a higher or lower elevation than the level upon which the two cables usually travel, and this has necessitated several wheels at either a higher or lower level for supporting the cables in their passage around the curve of the track. It may be desirable to avoid the use of vertical carrying-sheaves at different levels on or in approaching the curved track. We therefore carry the cables at the same or nearly the same level.

Our present invention is made with reference to maintaining the two cables at the same level upon the curved portion of the track as they are upon the straight portions of the track, and in carrying out our present invention we provide guide or supporting wheels for the cables in pairs at the inner sides of the curved portions of the track. One wheel of the pair is at an inclination and has a flange upon its upper edge. The other wheel is horizontal upon a vertical axis and has a flange near its lower edge, the groove of the flange having an inclined side upwardly and a nearly horizontal side downwardly, and the grip, when connected with the cable on the inner side of the curve, moves along at about the ordinary level, so as to be above the usual supporting-wheels, and while moving in this position it is entirely free from contact with the inclined wheels and the cable sags down from the grip and rests upon the flanges of the horizontal wheels. When the grip is connected with the outer cable, such grip is depressed after passing the last pulley on the straight line, so that the grip does not lift the cable, but moves with the cable at the normal level thereof, so that the cable, as it passes along with the grip, draws against the edge of the inclined pulley and into the groove formed between the surface of the inclined pulley and the flange thereof. By these improvements a uniformity of tension upon the respective cables is maintained, and when running in their normal condition they are at the same level upon the curve as they are upon the straight portion of the track.

In the drawings, Figure 1 is a general plan view. Fig. 2 is a section at the line $x\,x$ of Fig. 1. Fig. 3 is a section at the line $y\,y$ of Fig. 1; and Fig. 4 is a section longitudinally of the trench, showing one pair of guide-wheels in elevation. Fig. 5 is a plan view with the upper frame removed. Fig. 6 is a section longitudinally of the trench with two pairs of wheels in elevation, and Fig. 7 is a diagram showing the positions of the manhole plates on the curve.

In J. H. Pendleton's application, Serial No. 344,325, filed March 18, 1890, a grip mechanism is represented that may be made use of in connection with the present trench mechanism; but we do not limit ourselves in this particular, as the present improvements are available with any grip mechanism to which a limited amount of rising-and-falling movement can be given.

The buckstays A are provided with the vertical bracket or side frame A′, and one track-rail B rests upon such side frame, the other track-rail B′ rests upon the beam C, which is preferably of **I** form and extends from the concrete D to the columns E, there being bolts 2 to connect the buckstays with the beams C, and connecting angle-irons F F′, extending along at the upper portions of the concrete or in short lengths riveted to the **I**-beams, and the length of the buckstays upon the curved portion of the track, and of the beams C is to be such as to leave a passage-way between the horizontal supporting-pulleys G and the concrete D, in order that

access may be had all along the inner side of the curve to the different wheels and devices that are used in connection with the cable; and at the two ends of the curve there are man-holes and plates H, which are supported between the deck-beams I and the rails B′ and slot-rails K. By the removal of one of these man-hole plates access can be had to the passsage-way, and we remark that in cases where the man-hole plate H can be placed outside the track there may be one man-hole and its plate at the middle portion of the curve and over the passage-way, so that access can be had to all the parts of the curve.

Heretofore it has been usual to place over the wheels that guide the cable or cables around the curve removable metal plates, which are objectionable in the roadway, as horses are liable to slip on them, and there is a considerable leakage of water around the man-hole plates, and dust and dirt pass down to the guide-wheels for the cables, and the covering-plates extend all around the curve and have to be removed whenever access is needed to any of the pulleys. We prevent this difficulty as much as possible by placing above the columns and frames and over the guide-wheels horizontal or nearly horizontal plates W, extending over the passage-way reaching to the concrete D, and above these plates a layer of cement or of asphalt or other bituminous material, preferably of an elastic nature, is placed, and the paving stones or blocks are set upon the same. By this means the roof or covering for the guide-wheels and their journals and frames is made water-tight, and in consequence of the passage-way between the wheels and the concrete being sufficiently large for workmen to obtain access to the respective parts it is unnecessary to have man-hole plates, except one in the middle of the curve or one at each end of the curve, as seen in Fig. 7, or both. The passage-way allows the workmen access to the parts for oiling or otherwise without necessitating the stoppage of the cables.

The columns E E are supported at their lower ends by frames 3, resting upon the buckstays and bolted thereto, and there are also frames 4 at the upper ends of the columns that are bolted to the beam C, and these columns are at a sufficient distance apart for the introduction of the horizontal supporting-pulleys G and inclined supporting-pulleys M, and we find it advantageous to place the axes of these pulleys G and M in a vertical plane radial to the curve of the track, and each pulley G has a nearly horizontal flange 5, the surface of the pulley above the flange forming a bearing for the cable N, and the upper portion of the pulley is flaring to an open groove, so that when the cable N comes in contact with any portion of the surface of the pulley G it will slide down and finally rest in the groove above the flange 5. The pulley M has a flange 6 projecting from its upper edge, so as to form a groove for the cable O, and it will be apparent by inspection of Figs. 2 and 3 that the cables N and O are normally in the same or nearly the same horizontal plane, and the arms of the pulley M are curved downwardly upon their upper edges, so as not to come into contact with the flange 5 of the pulley G. The horizontal frames P pass across from one pair of columns to the next, and are provided with a central cross-piece having a journal-box at the lower end of the axis or shaft of the pulley G, and there is a removable cap 7 upon this frame and a similar cap 8 upon the frame 4, so that by removing these caps 7 and 8 the pulley G can be taken out toward the concrete D and into the passage-way provided beneath the beams C. This allows for replacing either pulley G when worn or injured, and between the lower ends of the outer columns E there is a longitudinal frame Q, having a journal-box 9 for the lower end of the shaft or axis of the inclined pulley M, and there is a removable cap 10 upon the frame P for the upper journal of the inclined pulley M, so that by removing these caps either pulley M can be taken out of its position for repair or otherwise. It is to be understood that these pairs of pulleys G and M and the columns and frames for supporting the same extend all around the inner side of the curved track, and these pairs of pulleys are sufficiently near to each other, as indicated in Fig. 1, to properly support the cables as they pass around such curved track.

We have represented a grip-shank K′ extending down between the two slot-rails K and connected with the grip mechanism, in which $K^3$ is the body of the grip, and $L^2$ represents a grip-block into which the cable is received, and $N^2$ shows one of the end rollers of the grip mechanism. This grip mechanism may be changed from one side to the other, so as to connect with the cable N, as in Fig. 3, or the cable O, as in Fig. 2, and when the grip mechanism is connected with the cable N the body of the grip $K^3$ runs against the stationary rail T, the grip mechanism being at the ordinary elevation, so as to pass freely over the stationary guide-wheels upon the straight portion of the track, and the projection 31 at one side of the grip is above the stationary rail T, in order that the tension of the cable may not pull down the grip mechanism and cause the roller $N^2$ to come in contact with the edge of the inclined pulley M.

When the grip mechanism is connected with the cable O, Fig. 2, the projection 32 at the other side of the grip mechanism passes below the stationary rail S, which stationary rail S at its ends is curved upwardly, so that the projection 32 underruns such stationary rail S and brings the grip mechanism down to the normal level of the cables, or nearly

so, after the grip mechanism has passed the last pair of supporting-wheels upon the straight portion of the track. Hence, when the grip mechanism reaches the first inclined pulley M upon the curved portion of track, such grip mechanism is adjacent to the edge of such wheel M, and the portion $N^4$ of the grip mechanism adjacent to the roller $N^2$ slides against the stationary rail U, which stationary rail U is adjacent to the lower portion of the edge of the inclined pulley M, and the horizontal part of such rail U is notched out to give room for the pulley M to rotate without coming into contact with such rail U, and this rail U is supported by suitable brackets 13, which brackets are preferably in the form shown in Figs. 2 and 3, as extending from the respective columns across the trench and bolted to the brackets of the buckstays, so as to firmly support such rails U, and the brackets are curved upon their upper surfaces and the lower edge of the rail U passes below the curved upper surface of the brackets, so that if the cable O should accidentally slip below the surface of the rail U it will be deflected upwardly and override such rail and come into contact with the supporting-pulleys M, and deflectors 14 may be bolted to the rail U as an additional precaution to keep the cable from dropping below such rail U.

By the improvements thus far described it will be apparent that the grip mechanism can be connected to either of the cables, and the cables in their normal positions will travel around the curve at the same level as they occupied upon the straight portion of the track, and it is only necessary to allow the grip mechanism to rise or to remain in its normally-elevated position when connected with the inner cable of the curve, and the cable is returned upon the inclined surfaces of the horizontal supporting-pulleys G and slides down the same to the ordinary level, and when the grip mechanism is connected with the cable on the outer side of the curve such grip mechanism is automatically depressed to the level of the cable after it passes the last suppqrting-pulley upon the straight track, so as to carry the outer cable at its ordinary normal level and lay it back again into its proper place upon the periphery of the inclined supporting-pulleys M.

If desired, supporting-wheels V may be provided under the cables N O at the entrance of the curve and between the respective pairs of supporting-wheels G M, or as often as desired at intervals around the curve. These supporting-wheels V are preferably cylindrical, and their upper surfaces are slightly above the upper surfaces of the supporting-rails U and above the outer edges of the flanges 5, in order that the cables may be kept from contact with the upper surfaces of the rail U or from falling below the edges of the flanges 5, these wheels being an additional safeguard to prevent either cable falling too low, and it will also be apparent that the stationary rail T, which is adjacent to the upper edges of the horizontal pulleys G, being placed so that its lower edge is below the top edges of such horizontal pulley G it is not possible for the cable N to rise over and pass above the horizontal pulleys G.

We claim as our invention—

1. The combination, with two cables in a cable-railway system, of a supporting-wheel upon a vertical axis and an inclined supporting-wheel adjacent thereto, such wheels being flanged, substantially as specified, for supporting the two cables upon a curve in the same horizontal plane, or nearly so, as the cables travel in their normal position, substantially as set forth.

2. The combination, with two traction-cables, in a cable-railway system, of horizontal wheels on vertical axes and inclined wheels placed in pairs around the curved portion of the track for supporting the two cables in a horizontal or nearly horizontal plane, and a grip mechanism capable of being raised and lowered, and a stationary rail acting to depress the grip mechanism at the curved portion of the track when such grip mechanism is connected with the outer cable, substantially as set forth.

3. The combination, with two cables, in a cable-railway system, of supporting-wheels in pairs adapted to retain the two cables at the same or nearly the same level in passing around the curve, and a grip mechanism adapted to grasping either cable and moving in an elevated position when connected with the inner cable upon the curved portion of the track, and a supporting stationary rail against which the grip mechanism travels when connected with either cable, the grooves in the horizontal wheels having inclined surfaces for directing the cable downwardly upon such wheels after the passage of the grip mechanism, substantially as set forth.

4. The combination, with the supporting-pulleys G and M and the columns and frames for the same, of the stationary rail T above the upper edges of the pulleys G, the stationary rail U, having a vertical and horizontal member, the latter being notched adjacent to the pulleys M, supports for such rails, a grip mechanism adapted to travel in an elevated or depressed position, and the stationary rail S, acting to depress the grip mechanism at the entrance of the curve, substantially as set forth.

5. The combination, in a cable railway, of two cables, the supporting-pulleys G and M in pairs around the curved portion of the track and receiving the respective cables, the stationary rails T and U, and the supporting-

wheels V upon horizontal axes adjacent to the wheels G and M, substantially as set forth.

6. The combination, in a cable-railway system, of cable-supporting wheels G and M in pairs around the inner side of the curved track, the frames, buckstays, and beams for supporting the respective parts, the slot rails and walls forming the trench-inclosure, such inclosure being sufficiently wide to leave a passage-way adjacent to the pairs of pulleys G M, and the removable plates to the manhole openings leading to such passage-way, substantially as set forth.

Signed by us this 17th day of June, 1890.

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CORNELIUS TIERS.
ANDREW BRYSON, JR.

Witnesses:
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