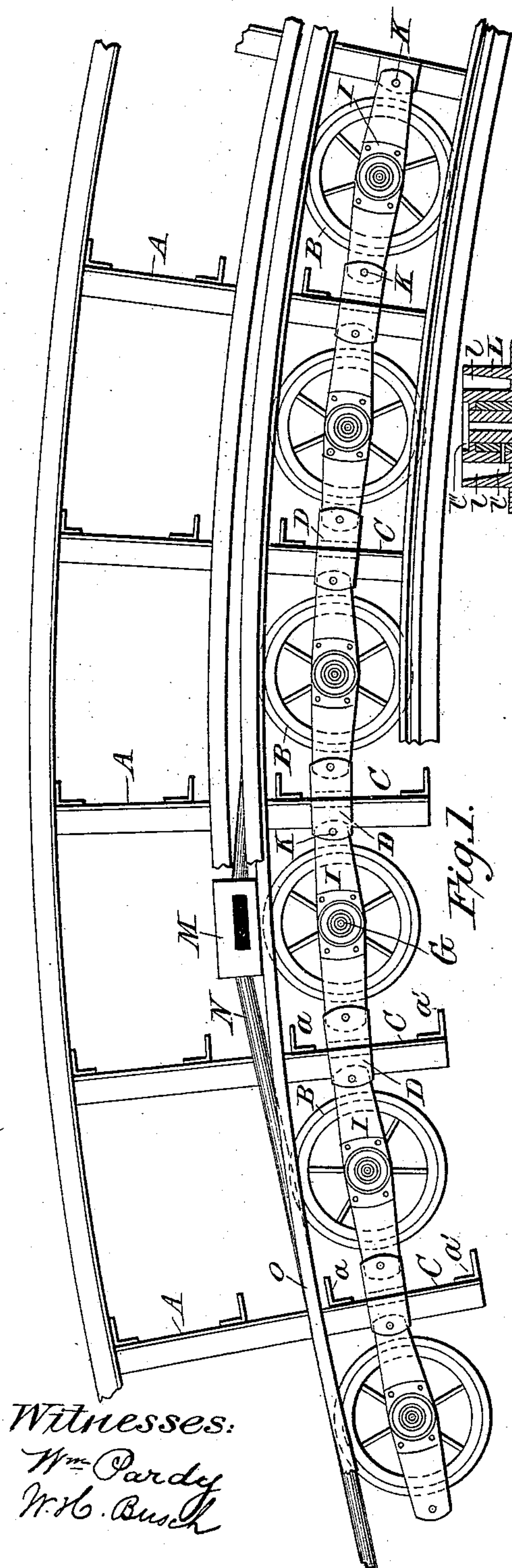


(No Model.)

C. VOGEL.  
CURVE FOR CABLE RAILWAYS.

No. 450,118.

Patented Apr. 7, 1891.



Witnesses:  
Wm. Pardey  
W. H. Busch

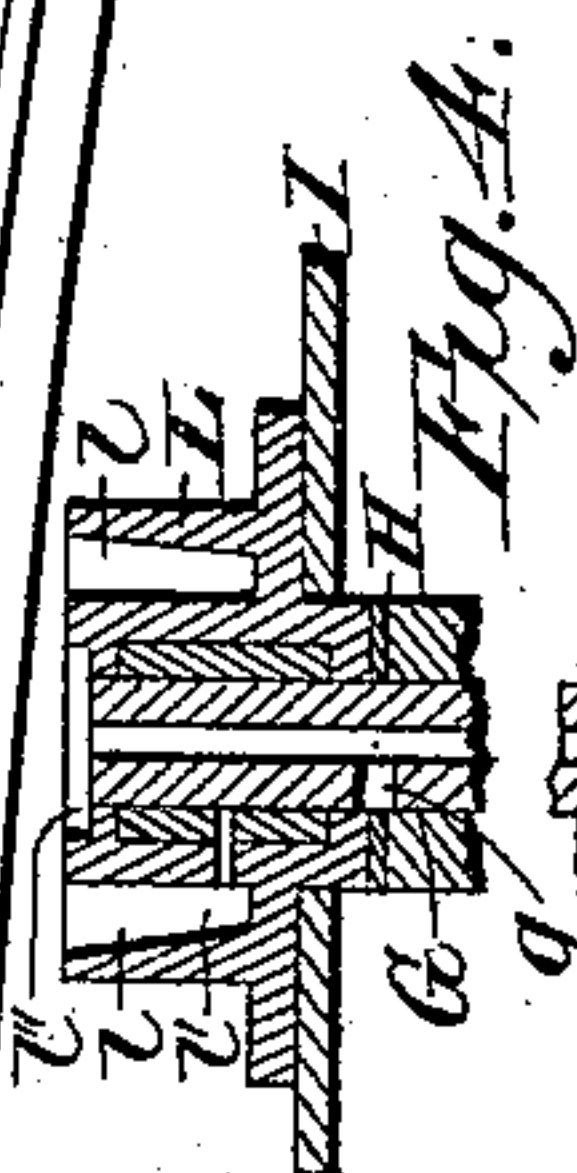
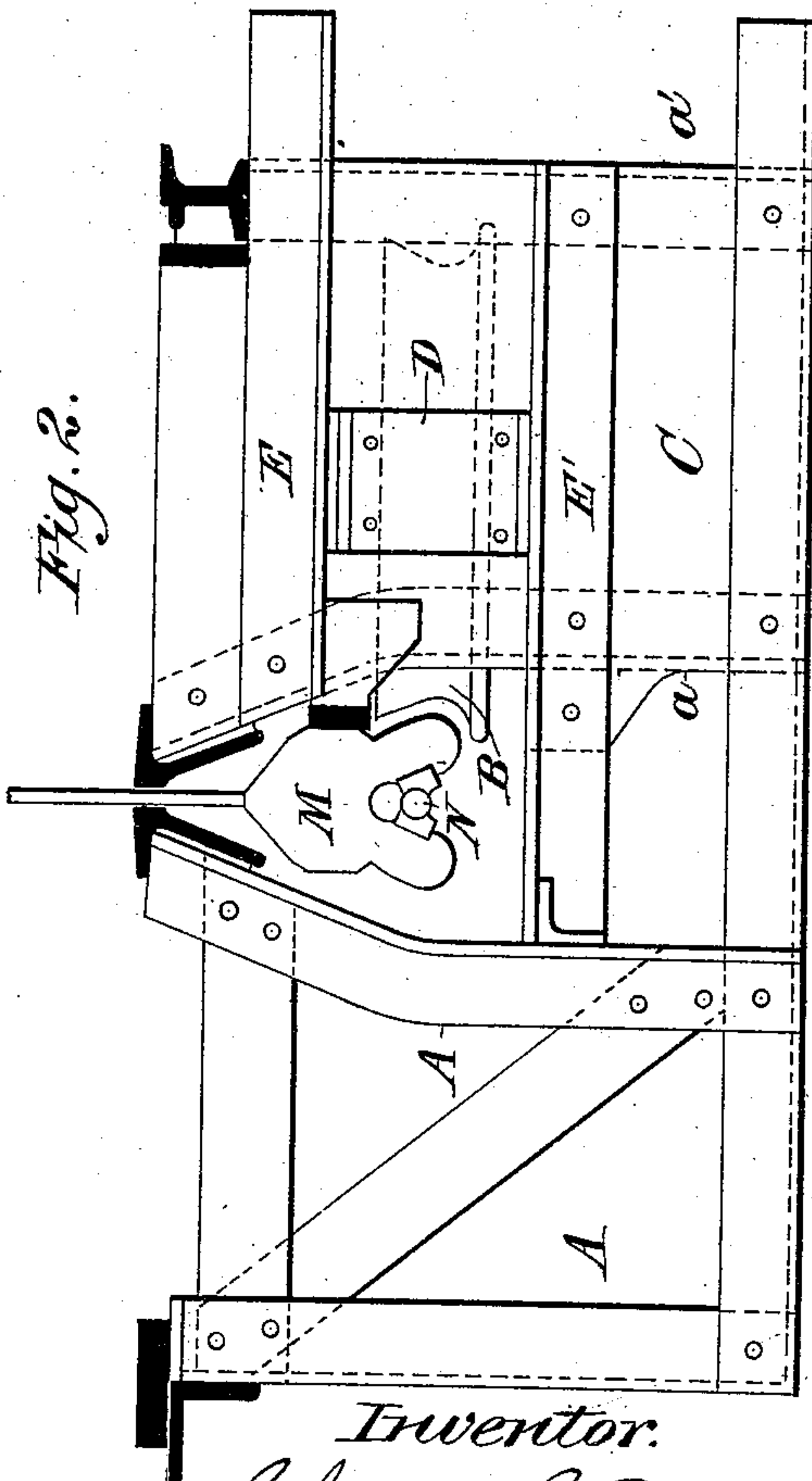
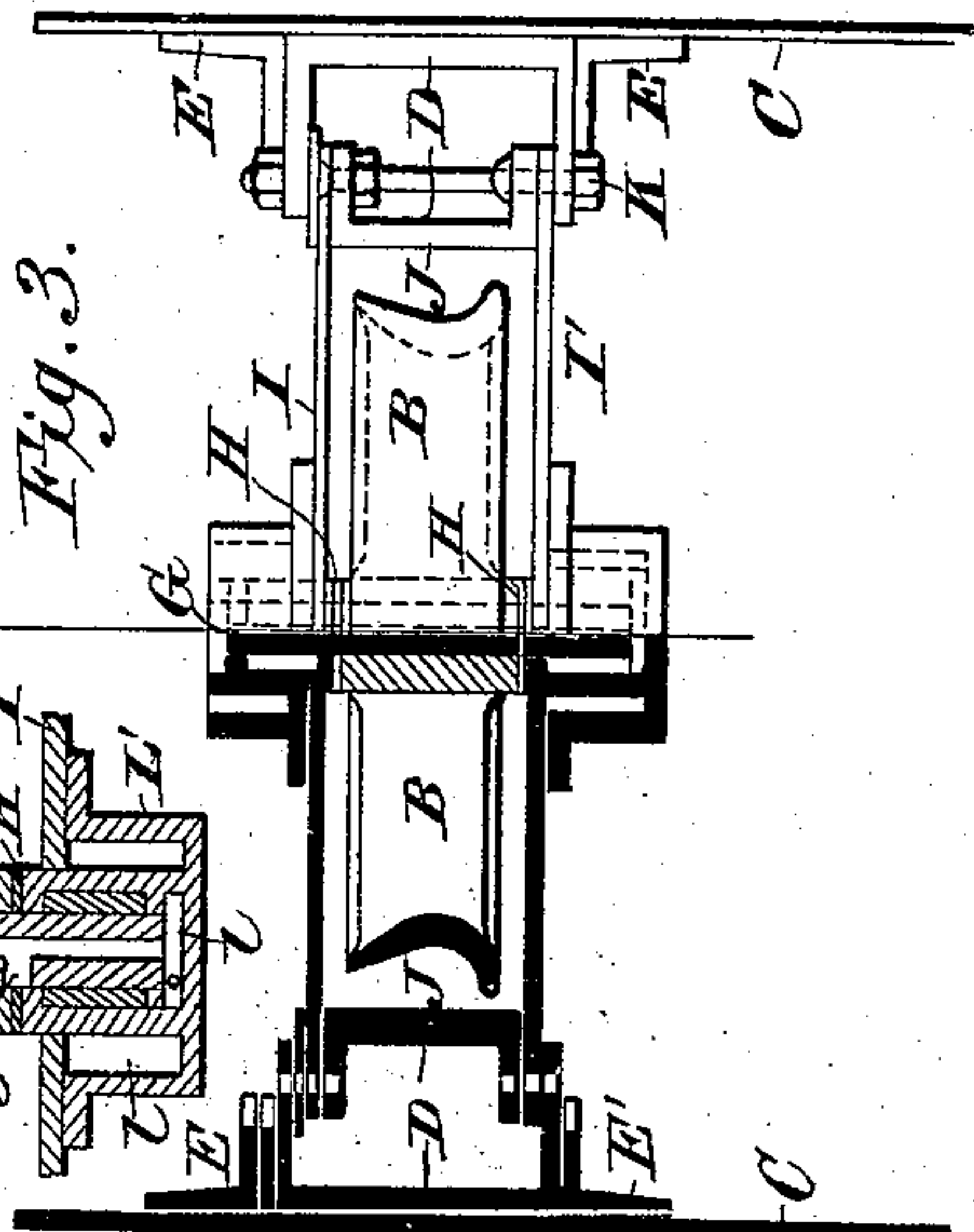


Fig. 2.



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Fig. 3.





# UNITED STATES PATENT OFFICE.

CHARLES VOGEL, OF SAN FRANCISCO, CALIFORNIA.

## CURVE FOR CABLE RAILWAYS.

SPECIFICATION forming part of Letters Patent No. 450,118, dated April 7, 1891.

Application filed June 8, 1887. Renewed April 7, 1890. Again renewed February 18, 1891. Serial No. 381,814. (No model.)  
Patented in England September 29, 1887, No. 13,194.

*To all whom it may concern:*

Be it known that I, CHARLES VOGEL, of the city and county of San Francisco, State of California, have invented Improvements in the Construction of Horizontal Curves for Cable Railways, (for which Letters Patent of Great Britain, No. 13,194, dated September 29, 1887, were granted me,) of which the following is a specification.

10 This invention relates to the construction of the subway frame-work at the point where the carrying-pulleys are set to revolve in a horizontal plane, so as to guide the cable in a curvilinear direction, and to the means of supporting and lubricating said pulleys and their spindles. It consists in a combination with the skeleton frame of the conduit of certain metallic partition-walls to which the supports for the pulley-frames are attached, and  
15 a peculiar means for hanging the pulley-frames and lubricating the journals of the pulley-spindles, as below more fully set forth.

The better to understand the object of this invention it may be stated that in practice it  
25 has been the more general custom to set the curve-pulleys in a rigid frame in such a manner as that when one had to be removed it was necessary to pry the cable away from its face to free it from contact before it could be  
30 unloosed and withdrawn from its setting, a similar difficulty occurring when either a new pulley was placed in position or the boxes for the spindle required removing—a matter of considerable inconvenience when it is con-  
35 sidered that these changes have to be made quite frequently. Again, a common form of setting for the pulleys at a curve includes a partition-wall between the pulleys of either masonry or wood, either being of necessity so  
40 thick as to largely increase the distance from center to center of the pulleys—a very material disadvantage. Finally, the system of lubricating the lower pulley-spindle bearings heretofore practiced required that the spout of  
45 the oiler had to be introduced to the bearing under the fast-revolving pulley or the pulley had to be stopped, so as to reach down between the arms, and as the chambers in which the pulleys were set were narrow and confined  
50 the operation of oiling the lower bearings was not alone inconvenient, but actually danger-

ous. It is to remedy these several difficulties that the present invention is designed.

In the accompanying drawings, forming a part of this specification, Figure 1 is a plan  
55 of so much of the skeleton frame of a subway at the curve of the road as will serve to illustrate my invention. Fig. 2 is a transverse sectional elevation of the skeleton frame of a subway at the curve point drawn on a larger  
60 scale than Fig. 1. Fig. 3 is a detached detail, partly a side elevation and partly a transverse section, of a guide-pulley and frame, showing its method of attachment to the frame of the subway. Fig. 4 is a vertical sec-  
65 tional elevation of the top and bottom bearings for the pulley-spindles with spindle and pulley-hub shown in relation thereto, a part being broken away.

In all the figures the same letters of refer-  
70 ence are used to indicate the same parts.

A A are skeleton yoke-frames, set equidistant apart throughout the subway, these being connected by either wooden planks, masonry, concrete, or sheets of iron to com-  
75 plete the cable-conduit. In the present instance these yoke-frames are shown to be formed of a series of angle-iron pieces riveted together; but any other suitable form may be used. Upon the inner side of the curve  
80 where the guide-pulleys B set there will be fastened to the uprights *a a'* an iron web-plate C. (Represented in Fig. 1 by a heavy black line.) This web-plate extends from top  
85 to bottom of the frame and covers the whole space between the uprights. It should be about three-eighths of an inch in thickness. In proper position short pieces of channel-iron forming the brackets D will be riveted  
90 to each side of the web-plate back to back, so that the same rivets will fasten a pair in place, excepting that there will be but one bracket on the last web-plate at each end of the curve. Above and below these channel-  
95 pieces D there may be fastened to the web-plate angle-iron bars *E E'*; but these do not form an essential feature of the invention, and may be dispensed with in other forms of yoke-frames.

B B are the guide-pulleys with peripheries  
100 of greater diameter at the lower edge to hold the cable from dropping off. These pulleys



have steel spindles G fastened in their hubs, and steel washers H should be placed between the hub and the upper and lower bearings.

5 I is the upper and I' the lower member of the pulley-frame, simply flat bars, as shown. J J are the end members made of short pieces of channel-iron, solidly riveted to the bottom bars I'; but they should be bolted to the upper bar I, because this bar must be detached  
10 every time the pulley is removed and replaced. These pulley-frames are inserted between the opposing brackets in each compartment between the series of web-plates, and a single  
15 bolt K will pass through the ends of each frame and the supporting-brackets, as shown.

L is an upper bearing for a pulley-spindle. (Clearly shown in Fig. 4.) It is simply an ordinary solid babbitted box with an oil-cell  
20 surrounding it, communicating with the spindle by a drilled hole l'. It will extend a trifle above the top of the spindle, so as to leave a recess l'', to hold a small quantity of oil, which will finally pass through the hole in the spindle to the lower bearing l'. The bottoms of  
25 the upper bearings rest upon the washers interposed between them and the upper face of the hub of the pulley and they are firmly bolted to the bars I of the pulley-frames.  
30 The lower bearing L' is substantially similar to the upper bearing except that it has a closed bottom, as shown.

The spindles G have holes bored entirely through their centers, and a hole g should be  
35 provided to connect the lubricating-channel with the surface of the washers.

M is the grip.

N is the cable.

O is the guide-rail to keep the grip-shank  
40 in the center of the slot.

The operation of the several parts is as follows: The narrowness of the division-walls or web-plates C gives an opportunity for setting the pulleys closer together, so that a combination of the tangential lines drawn at right  
45 angles with the radial lines of the curve which pass through the centers of the pulleys, and which tangential lines touch the peripheries of the pulleys, will form a nearer approximation to the true curve than if these tangents  
50 were drawn touching the faces of pulleys set farther apart. This is an important matter, for the closer the approximation the cable makes in passing over the guide-pulleys to

the curve of the slot the less will be the angularities in the cable at this point, and in proportion will there be less strain and wear and tear on both cable and grip. The introduction of these web-plates gives additional rigidity and strength to the entire frame of  
60 the curve. All the parts being bound and tied together, a perfect alignment is preserved between them and no opportunity is presented for that twisting and warping and shrinking away of one part from another, which is an  
65 attendant defect of similar structures composed of parts either entirely disconnected or otherwise only imperfectly joined together.

The method of hanging the pulleys in an independent frame and bolting these by a  
70 single bolt at each end to their supports permits each frame to be swung back on either bolt as a pivot, the other being withdrawn, so as greatly to facilitate the operation of changing pulleys or the bearings when worn or otherwise rendered unserviceable.  
75

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

1. In cable railways, the means for supporting the horizontal cable-guiding pulleys  
80 at curves in the road, consisting, essentially, of a series of thin metal plates fastened to the yoke-frames in a vertical position and forming together a series of compartments (conformable to the curve) to contain the cable-guiding pulleys, a series of pulley-frames,  
85 as described, adapted to receive the guide-pulleys and to be bolted to the said vertical plates, and a series of guide-pulleys for the cable suitably held and revolved within said  
90 frames, substantially as described.

2. In cable railways, the means for supporting the horizontal guide-pulley at curves in the road, consisting, essentially, of a suitable frame or support within or upon which the  
95 pulley is mounted and revolved, and suitable means for pivoting said support to the framing of the subway at opposite ends, so as to rigidly secure both frame and pulley in place when in operation, while they may be swung  
100 back on either pivot by withdrawing the other to release the pulley from contact with the cable when necessary, substantially as and for the purpose described.

CHARLES VOGEL.

Witnesses:

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WM. P. DRUM.