

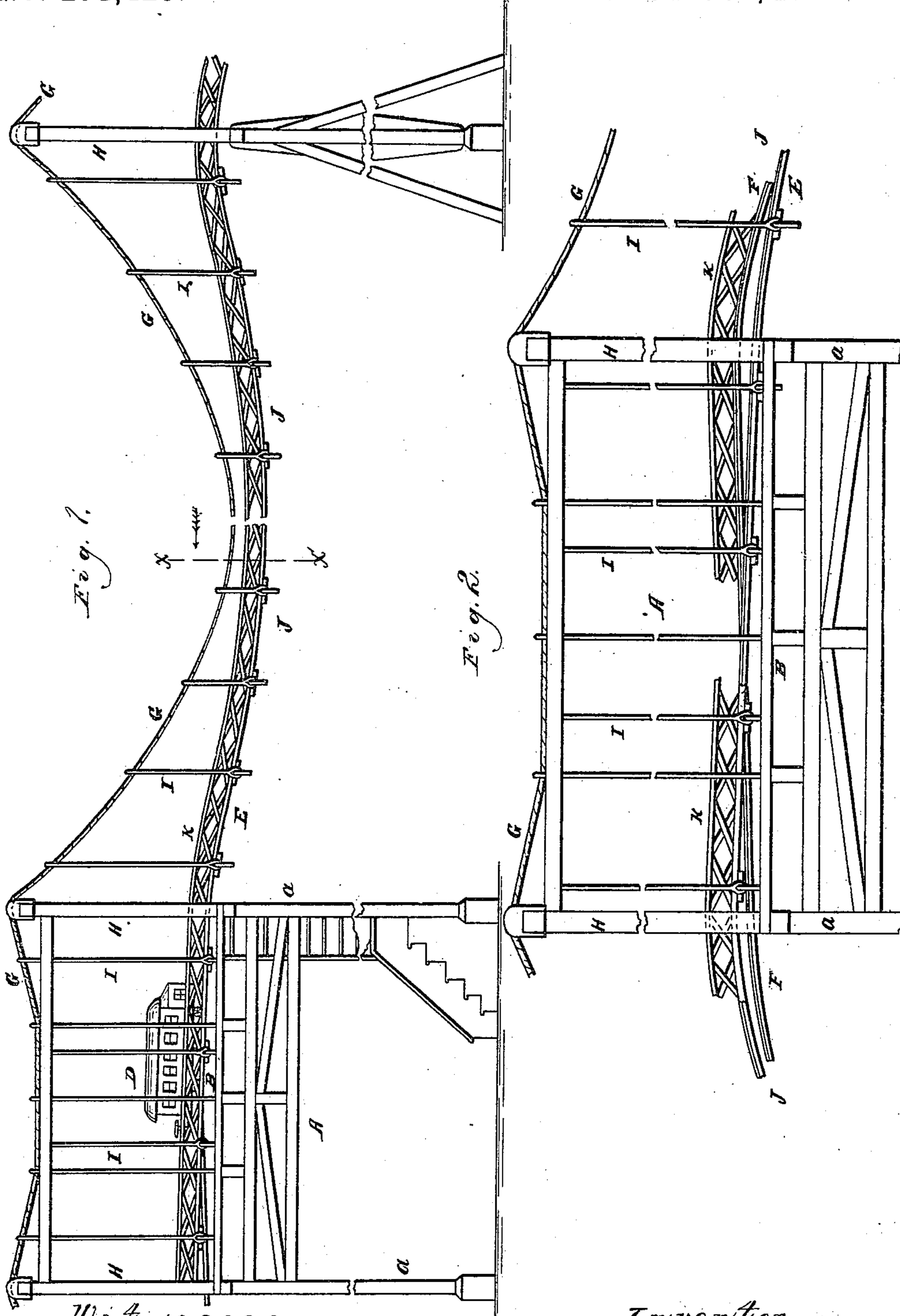
(No Model.)

2 Sheets—Sheet 1.

G. W. COOK.  
ELEVATED RAILWAY.

No. 271,425.

Patented Jan. 30, 1883.



Witnesses,  
 George Frankfurter, per. *George W. Cook,*  
*J. B. Moore.* *Girdley & Co.,*  
*his Attorneys,*

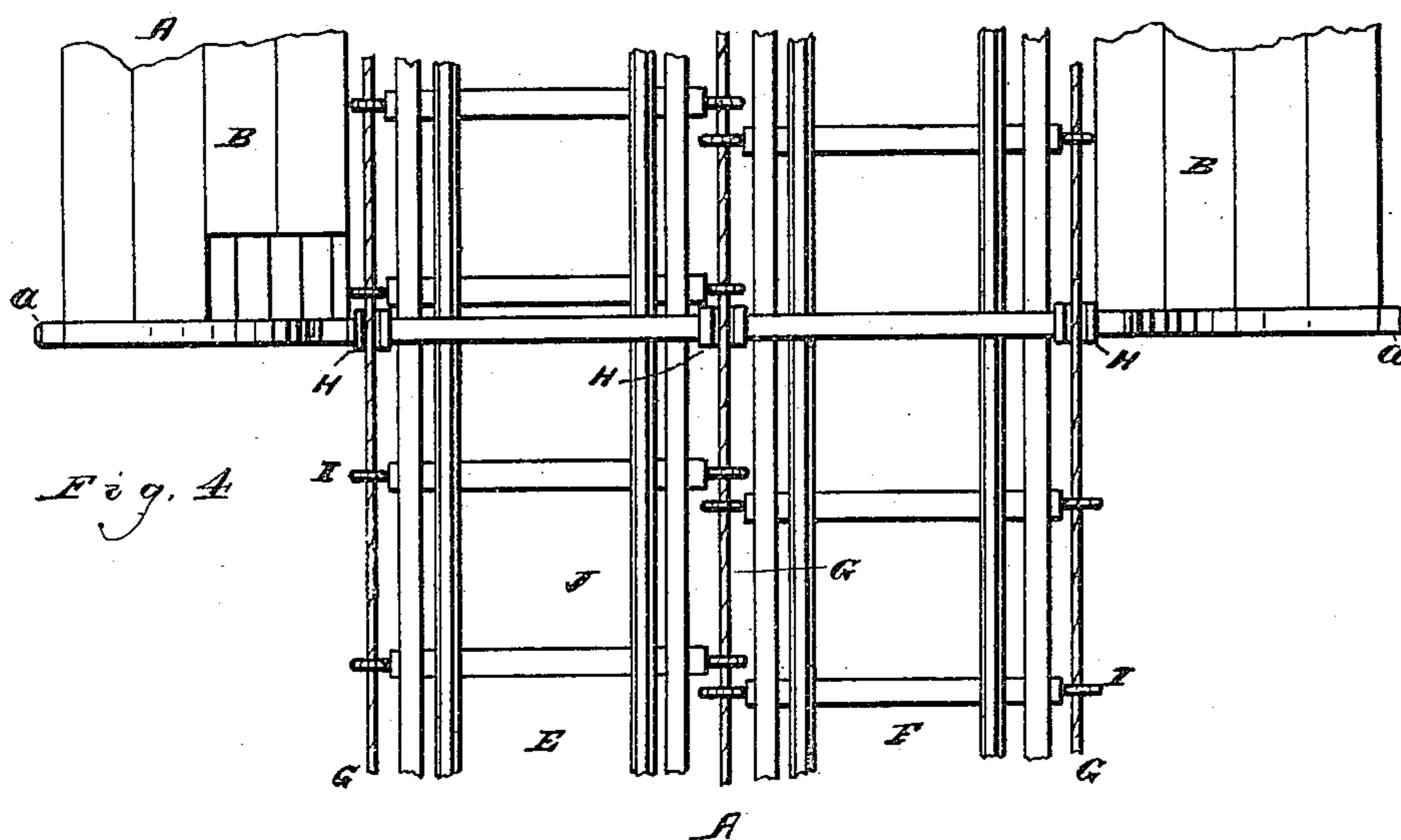
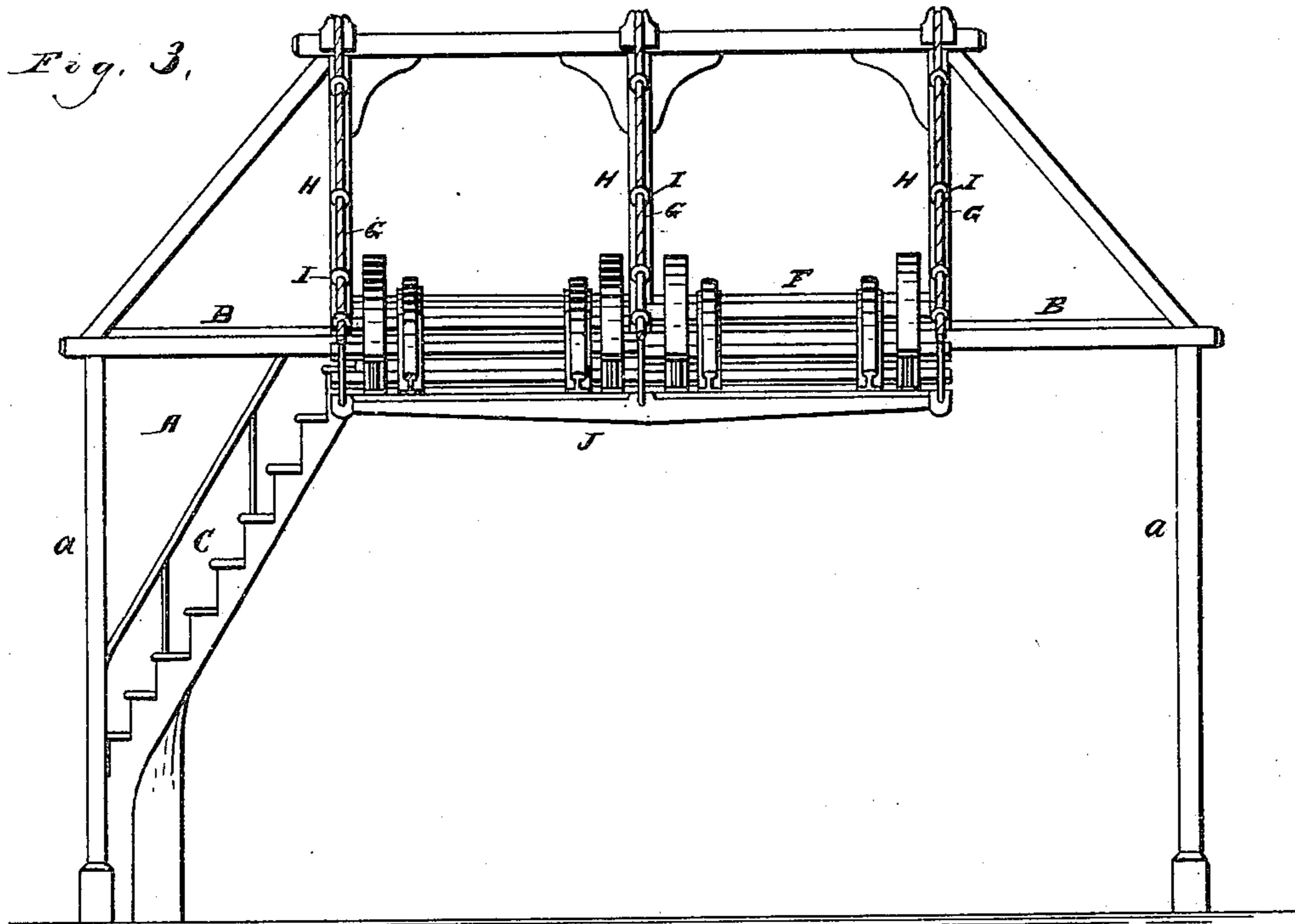
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Witnesses  
*Henry Frankfurter*  
*W. H. Morse*

Inventor.  
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# UNITED STATES PATENT OFFICE.

GEORGE W. COOK, OF CHICAGO, ILLINOIS.

## ELEVATED RAILWAY.

SPECIFICATION forming part of Letters Patent No. 271,425, dated January 30, 1883.

Application filed June 19, 1882. (No model.)

*To all whom it may concern:*

Be it known that I, GEORGE W. COOK, a citizen of the United States of America, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Elevated Railways, of which the following, in connection with the accompanying drawings, is a specification.

In the drawings, Figure 1, Sheet 1, is a side elevation of a street-railway embodying my invention. Fig. 2, Sheet 1, is a like representation of the upper part of a station, enlarged. Fig. 3, Sheet 2, is a section in the plane of the line *xx* of Fig. 1, viewed in the direction indicated by the arrow there shown; and Fig. 4, Sheet 2, is a top or plan view of a portion of the railway.

Like letters of reference indicate like parts.

My invention relates to that class of street-railways which are elevated above the streets or roadways. An objectionable feature of street-railways of this class is that property-owners along the line of the railway are seriously inconvenienced and annoyed by the obstruction caused by the railway, as well as by the noise produced by passing cars, and by the heavy steam-motors employed for drawing them. The street or roadway is also to a great extent obstructed, so that traffic thereon is impeded. Besides this the streets are darkened to a great extent by such superstructures. These are some of the chief objections urged by the public against such railways. Another objection affecting the public as well as the owners of the railway is the fact that heavy and expensive motors have heretofore been required, and consequently correspondingly heavy or strong supports for the railway have been necessary. These railways, therefore, have not only been objectionable to the public, but the construction and operation of them have required the expenditure of a large amount of capital.

My object is either wholly to avoid or greatly diminish these objectionable features; and to that end my invention consists in the means which I employ, for purposes set forth, and hereinafter stated in my several claims.

In the drawings, A represents a station, which is a superstructure supported upon posts *a a*, erected at the corners or intersections of the streets, one station being located at each intersection.

B is the floor or platform of the station. This floor is sufficiently elevated not to obstruct the street, and is of such length and width as to permit a double track to be laid thereon, and also to receive two or more cars at the same time. The floor B is reached by stairways C C extending to the street or sidewalk.

D represents a car in one of the stations A.

It is to be understood that the rule of traveling upon the right-hand side of the road in going in either direction is to be observed. For example, let E represent the "down" track, and F the "up" track. As a minor feature of my invention, I have made provision for having both tracks laid on a slight downgrade in the stations, the declination or descent being in the direction of the movement of the cars. This downgrade is most clearly represented in Fig. 2. My object in making this reverse downgrade of the tracks in the stations is to aid the starting of the cars after they have been stopped either to receive or discharge passengers.

G G G are cables suspended from station to station, and H H are cable-supports located between the stations. These cables are curved or slackened between the stations and the posts H H and between the posts H H, as shown, and the sagging or tension may be about as usual in suspension-bridges or similar structures.

I I are tie-rods depending from the cables G G G, and J is that portion of the track which is suspended between the stations and between the intermediate cable-supports. The tie-rods I I support or suspend the tracks, the latter of which have a downward curvature, which, however, is not equal to that of the cable. These downward curvatures occur between the cable-supports, as is clearly indicated in Fig. 1; in other words, both of the tracks have an up and also a down grade between each succeeding two cable-supports, and one grade runs gradually into the other. The supports H H may also aid in supporting the tracks.

A railing, K, may be made along the sides of the tracks, as shown. At the terminals of the tracks the cables should be anchored in the usual manner.

I have not here attempted to describe in detail or particularly many of the minor features

of construction incident to a structure of this kind, as those familiar with the art of building suspension-bridges and similar structures, aided by the foregoing description and by reference to the drawings, will be sufficiently instructed to reduce the essential features of my invention to practice.

Upon the cars, preferably upon an extended platform thereof, I have made provision for allowing an attendant to ride, and this platform may be inclosed and communicate by a sliding door with the interior of the car.

As a motor, compressed air may be employed, this air being supplied from cylinders underneath the car. These cylinders may be supplied from stationary reservoirs or engines at the terminals of the tracks, or at other suitable locations.

It is to be understood, of course, that each car, besides carrying one or more cylinders of compressed air, also carries a suitable driving apparatus under the control of the attendant or operator, and adapted to be driven by the escaping of the compressed air. I do not, however, here intend to restrict myself either to any particular form or construction of the cars or to compressed air as a motor, as an electric motor or other light driving motor may be employed instead of compressed air.

It is my intention to run only one car at a time upon each track and between each two cable supports—that is, I deem it best to have each dip or span of the cable sustain only one car as a moving load.

In running the cars the operation is substantially as follows: For example, suppose that the car D is ready to leave a station. The brakes are of course loosened, and the car, owing to the fact that it stands upon a downgrade of the track, will move forward out of the station, where the downgrade is still more steep. By the time the car has reached the center of the first span it will have acquired a momentum equal to its speed multiplied by its weight less the friction. This momentum will carry the car up a portion of the upgrade beyond the center of the span. I am aware that the momentum alone will not carry the car wholly up a grade equal to the downgrade on which the momentum was acquired. I proceed therefore as follows: If the car, when the brakes are released in order to allow it to start, does not start at once, sufficient power may be allowed to exert itself to give the car its ini-

tial movement. After the car is well started, I apply an amount of driving force which, together with the momentum, will be sufficient to carry the car to the decline or downgrade of the second span, and so on to the next station, a portion of the driving-power, which in the case supposed is compressed air, being applied on each downgrade. As the momentum is equal to the speed multiplied by the weight less the friction, I utilize the compressed air for increasing the speed, and as soon as the speed acquired becomes sufficient to carry the car over each upgrade I discontinue using the compressed air for the purpose referred to. It will be perceived, therefore, that by utilizing the compressed air or other motive power while the car is passing down the downgrade the action of the air will be aided by the momentum in obtaining a sufficiently high rate of speed to carry the car over the upgrades. The air-motor therefore is utilized only during a portion of the trip from station to station, and only when the car has other aids to impel it.

By employing a series of up and down grades I am enabled not only to effect rapid transit, but the railway structure may be made comparatively light, and hence comparatively inexpensive, and the objectionable features of level elevated street-railways are to a great extent, if not wholly, overcome, and the public as well as the proprietors of the road are thereby benefitted.

In the example shown I have employed three cables parallel to each other; but under some circumstances only two need be employed.

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

1. An elevated street-railway suspended by depending cables supported on and between fixed supports resting on the street, and having a track with both an up and down grade between said supports, substantially as and for the purposes specified.

2. The combination of the supports H H, cables G G, tie-rods I I, and track J, having both an up and down grade between the supports H H, substantially as shown and described.

GEORGE W. COOK.

Witnesses:

A. CHAPMAN,  
N. COWLES.