Dec. 16, 1941. L. J. VOGEL 2,266,522

AERIAL TRAMWAY

Filed April 23, 1938 2 Sheets-Sheet 1

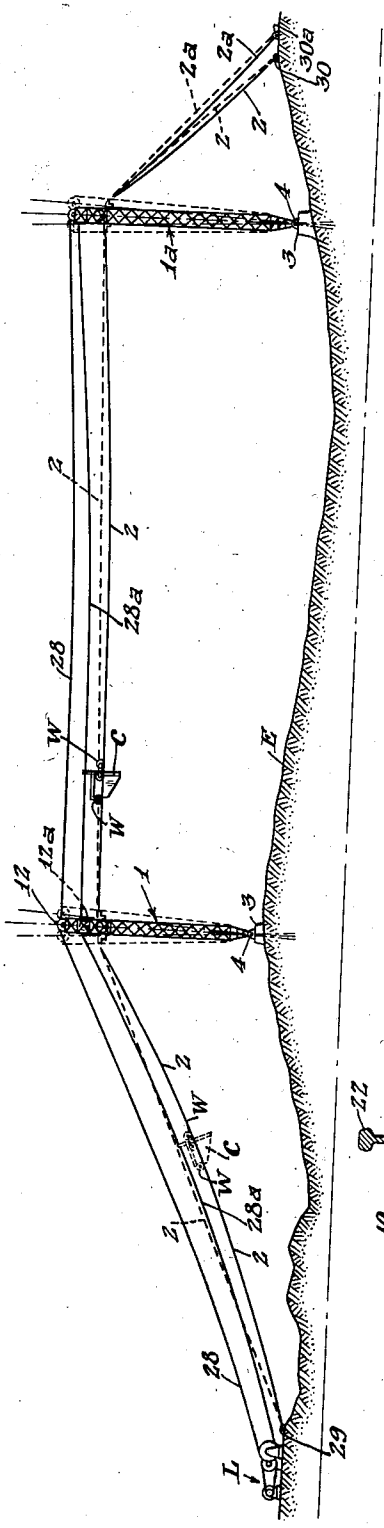


Fig. 4

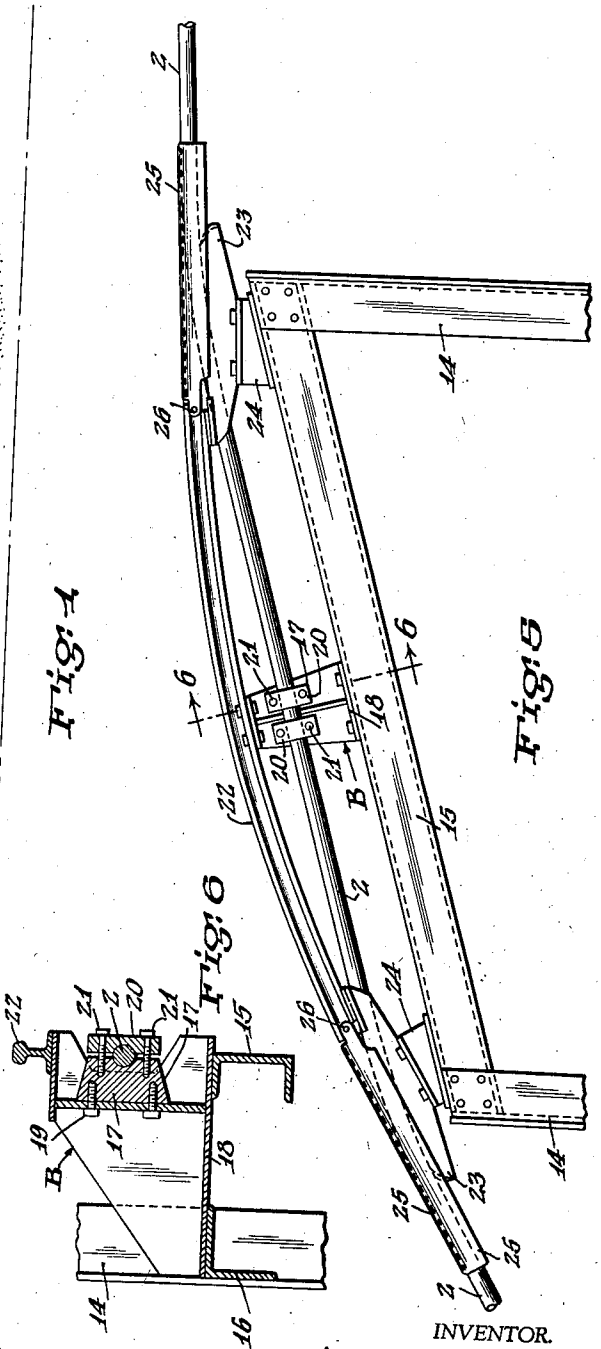


Fig. 5

Fig. 6

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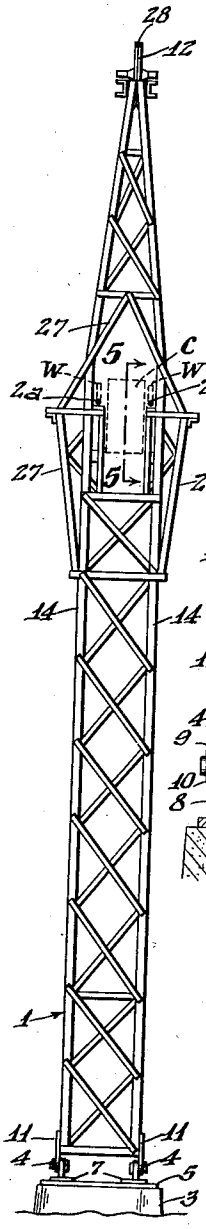


Fig. 2

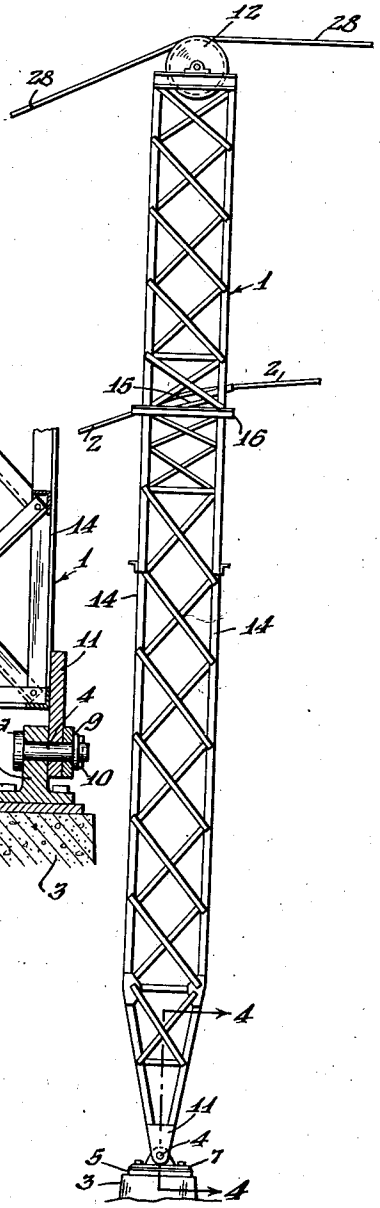


Fig. 3

Fig. 4

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UNITED STATES PATENT OFFICE

2,266,522

AERIAL TRAMWAY

Leo J. Vogel, Mount Lebanon, Pa.

Application April 23, 1938, Serial No. 203,801

3 Claims. (Cl. 104—125)

My invention relates to a new and improved aerial tramway.

The invention relates particularly to that form of aerial tramway, wherein a carrier is supported by one or more cables, and said carrier is propelled along the supporting cable or cables. In this type of tramway, the track or supporting cable or cables are supported between two or more supporting towers.

One of the objects of my invention is to devise an aerial tramway of this type, whereby the towers or other supporting means for the track cable or cables, can be made of much lighter construction than has heretofore been possible.

Another object of my invention is to mount said supporting towers turnably.

Another object of my invention is to eliminate numerous disadvantages which have resulted from the use of fixed towers.

Other objects of my invention will be set forth in the following description and drawings, which illustrate a preferred embodiment thereof, it being understood that the above stated objects of my invention are intended merely to define the same generally, and without limiting it in any manner.

Fig. 1 is a side elevation which diagrammatically shows an embodiment of my invention. In this figure I have illustrated only two supporting towers, but any desired number of additional or intermediate supporting towers can be used.

Fig. 2 is an end elevation of one of the supporting towers shown in Fig. 1.

Fig. 3 is a side elevation of one of said supporting towers, on a scale larger than the scale shown in Fig. 1.

Fig. 4 is a sectional view on the line **4—4** of Fig. 3.

Fig. 5 is a section on the line **5—5** of Fig. 2.

Fig. 6 is a section on the line **6—6** of Fig. 5.

Heretofore, in supporting the track cable upon a plurality of fixed towers, considerable lateral or bending stresses were created in such towers, by the movement of the carrier which conveyed the load. These lateral or bending stresses upon such towers varied within rather wide limits, due to changes in location of the carrier load, weather conditions and the like. It was therefore necessary to make these supporting towers of very heavy construction.

Likewise, when one or more intermediate towers were used between the terminal supports of the track cable or cables of such tramway systems, it was necessary to cause the track cable or cables to slide through supporting shoes or saddles which were provided at the towers, in order to permit the adjustment of the tension of the cable in adjacent spans. Otherwise it was necessary to provide very strong and heavy structures in order to resist the resultant eccentric loading, if the cables were fixed to the supporting towers. The sliding movement of the track through the shoes which were located upon the towers, caused great wear on said cables, with resultant short life.

According to my invention, all the supporting towers are pivotally connected to their respective foundations. If desired, only the intermediate towers and the tail tower can be pivotally connected to their respective foundations, so that the first tower, which is directly adjacent the loading station, can be rigidly connected to its foundation. One or more such towers may be thus rigidly connected, but it is preferred to have all the towers pivotally connected.

Referring to Fig. 1, this diagrammatically shows an aerial tramway system, having a loading station L. A motor of any suitable type is located at the loading station L. Said motor operates the endless pull rope or pull cable, which has the superposed runs **28** and **28***a*. The carrier C is suitably connected to one of these runs, such as for example, the run **28***a*.

In this particular invention, the carrier C is supported upon two supporting cables **2** and **2***a*. Of course, the number of supporting cables may be varied, and the invention also applies to the well known system in which only a single supporting cable is used.

In this particular embodiment, I have shown a pair of supporting towers **1** and **1***a*. Of course the number of supporting towers may be varied depending upon the length of the system.

These supporting towers may be of any suitable or conventional construction per se, although they may be of much lighter construction than the towers which are rigidly connected to their foundations.

As shown in Fig. 1 and in Figs. 2 and 3, each of these towers is turnably connected to its respective foundation **3**. As shown in Fig. 4, said foundation **3** may be made of concrete or of any other suitable material. A foundation plate **5** is connected to said foundation **3** by means of securing members **6**, which may be of any suitable type. Supporting brackets **7** are respectively fixed to the respective foundation plates **5**, by means of the members **8**. Trunnions or pivot members **4** are turnably mounted upon the upstanding portion of each member **7**. Said pivot

members 4 may be of any suitable construction. In this embodiment they are shown as being provided with heads 4a, and bearing washers 9 are mounted upon said pivot members 4, by means of cotter pins 10. Any suitable conventional pivot construction may be utilized for this purpose. The tower 1 is welded or otherwise rigidly connected to the supporting plates 11, which are mounted so as to turn either in unison with the members 4, or to turn relative to said members 4.

The tower can be connected pivotally to its foundation, so as to turn in a single plane, in any suitable manner.

The two runs 28 and 28a of the pull cable pass respectively over sheaves 12 and 12a which are turnably connected to the respective towers 1 and 1a.

It will be noted that the tower 1a is higher than the tower 1, but this relation may be varied.

The supporting cables 2 and 2a are clamped or otherwise fixedly connected to the respective towers 1 and 1a. Generally speaking, each of these towers has four uprights 14. In plan view, these uprights are located at the corners of a rectangle.

This relation is not shown in detail in the drawings, as in itself this construction is old and well known. These uprights 14 are connected by means of suitable cross-members, as shown in Figs. 2 and 3.

The bottoms of said towers are tapered, so that said towers can be pivotally connected to their foundations 3, whereby each tower can turn back and forth in a single plane, relative to its foundation 3.

This turning movement of the towers is indicated in broken lines in Fig. 1.

Referring to Fig. 5, this shows inclined saddles 23, which are fixed to an inclined member 15, which is connected to the corresponding uprights 14 of a tower. There are two of these members 15 in each tower, and said members 15 and the saddles and their accessory parts, are identical in all respects. The members 15 of each tower are parallel to each other. Each of said members 15 can have a U-shaped cross-section, with the open part of the "U" facing as shown in Fig. 6. Each saddle 23 is connected to its member 15, by means of a bracket 24.

The member 24 may be merely a spacer, so that each saddle 23 can be connected directly to the corresponding member 15. The cable 2 passes through rigid metal sleeves 25, which are pivotally connected at 26 to the rail 22. Each tower has two such rails 22. Each said rail 22 is rigidly connected to the saddles 23.

The dual construction shown is suitable for a system having two track cables 2 and 2a.

The contour of each of the saddles 23 is partially cylindrical, so as to abut and to firmly support the adjacent parts of the track cable 2.

A bracket B, having a base 18, is rigidly connected to each member 15. Each bracket B is provided with a clamping member 17 which is fixed to said bracket B, by means of members 19.

As shown in Fig. 6, the cable 2 is clamped to the member 17, by means of a supplemental clamping member 20, which is connected to the member 17 by means of screws or other fastening members 21.

Each rail 22 is welded or otherwise suitably connected at each of its ends to the respective saddles 23.

This connection may be a detachable one, as by means of screws or bolts or the like.

As shown in Fig. 1, the carrier C is provided with a suitable number of sets of wheels W. Each set of wheels rides upon one of the supporting cables 2 and 2a.

Referring to Fig. 5, these wheels W ride upon the sleeves 25 at the entering end of the tower, so that these wheels then ride off the track cables 2 and 2a, up the first pair of pivoted sleeves 25, on the rails 22, on the second pair of sleeves 25, and then back again to the cables 2 and 2a.

The track cables 2 and 2a can be anchored at the points 29, at the loading station. If desired, the cables 2 and 2a may be retained parallel to each other throughout, and they may be anchored at laterally spaced points at the loading station.

Said cables 2 and 2a are preferably anchored at separated points 30 and 30a, at the end of the aerial tramway. The points 30 and 30a may be spaced both laterally and longitudinally.

Due to this anchoring and the clamping of the supporting cables 2 and 2a to the towers, these towers are prevented from moving too far out of their normal or vertical position. The amplitude of turning movement of the towers is indicated in broken lines in Fig. 1. In Fig. 1 the normal or vertical position of each tower is shown in full lines.

When the carrier C is intermediate the loading station and the tower 1, the weight of the carrier C turns said tower 1 counterclockwise from the full-line position, to the left-hand broken-line position indicated in Fig. 1.

When the carrier C is located intermediate the towers 1 and 1a, the said tower 1 is then turned clockwise, to the right-hand broken-line position shown in Fig. 1, at which point the supporting cables 2 and 2a present any further turning movement of the tower 1. Likewise, when the carrier C is located intermediate the towers 1 and 1a, the tower 1a is turned counterclockwise from the full-line position shown in Fig. 1, to the position indicated in broken lines in Fig. 1.

If desired, each of the supporting cables may be clamped at a plurality of points, spaced from each other, to each of the towers.

The invention is not necessarily limited to the clamping of the supporting cables to each and every of the supporting towers, although this is a preferred arrangement.

As shown in Figs. 2 and 6, a reinforcing member 16 may be provided in each tower, which can serve as a horizontal working platform. This member 16 can be connected to the tower by means of braces 27.

It is to be understood that the clamping means and the other parts shown herein are illustrated merely diagrammatically, and that numerous changes can be made in practical embodiment of the invention herein.

Whenever I refer to track cable means, I include one or more track cables.

In effect, members 25 are pivoted extensions of the corresponding intermediate rail 22.

While I have shown a preferred combination, it is to be understood that the invention includes numerous valuable sub-combinations and that numerous parts may be omitted or varied without departing from the spirit of the invention.

Likewise, while the invention is particularly useful in connection with towers which are pivotally connected to their supports below the track

cable means, certain aspects of the invention are not limited to said pivotal mounting of the towers.

According to the invention, the towers are pivoted so that they split the angle which is formed by the cables at the top of the tower, thus keeping the tension of the cable the same on both sides of a tower.

With towers of the stationary type, the tension of the cable may vary in the spans on either side of the tower. However, if the tower is pivoted at its base, the tension in consecutive spans will be substantially the same because the tower can tilt so as to adjust itself to differences of tension in the adjacent spans.

This is an important improvement because in an aerial tramway, the tension changes very substantially with the movement of the load or loads along the cable track.

I claim:

1. An aerial tramway system comprising spaced base-supports, spaced towers respectively turnably connected at their bottoms to said base-supports, track cable-means rigidly fixed to said towers at respective predetermined points of said track cable-means so that the track cable-means are immovable relative to the towers at said predetermined points, said track cable-means being also fixed to additional means which are spaced from said towers and between which said towers are located, each tower having a rail rigidly fixed thereto and overlying the respective predetermined points of the track cable-means, each rail having a supplemental rail-member at each end thereof, each supplemental rail-member being mounted on said tower so that it is turnable relative to the respective rail in a vertical plane, each predetermined point being located intermediate a pair of said supplemental rail-members, said supplemental rail-members overlying portions of the track cable-means, so that the carrier is supported on said rail and on said supplemental rail-members in front of and also behind each said predetermined point, said towers being freely turnable to predetermined respective inclined positions which are oppositely inclined to the vertical direction while said cable-means are fixed to said additional means.

2. In an aerial tramway system, a tower-support, a track-cable, a tower turnably connected to said support, said tower having holding-means connected thereto and constructed to grip said track-cable and to hold the gripped part of the track-cable immovable relative to the tower, said tower having rail means connected thereto and extending in front of and also behind said holding-means and also overlying said holding-means and the track-cable, said rail means comprising an intermediate member which is held immovable relative to the tower and end members located respectively in front of and behind said intermediate member, said end-members being turnable relative to said intermediate member in a vertical plane, said holding-means being located above said support.

3. In an aerial tramway system, a tower, a track-cable, said tower having means located at the top thereof and adapted to grip a predetermined portion of the track-cable and to hold said predetermined portion immovable relative to the tower, the top of said tower having saddles which are spaced from each other in the direction of said track-cable, said saddles being rigidly fastened to the tower, a rail rigidly connected to said saddle and overlying the adjacent part of the track-cable, said rail having metal sleeves pivoted thereto at the ends of said rail, portions of said track-cable being located in said sleeves.

LEO J. VOGEL.