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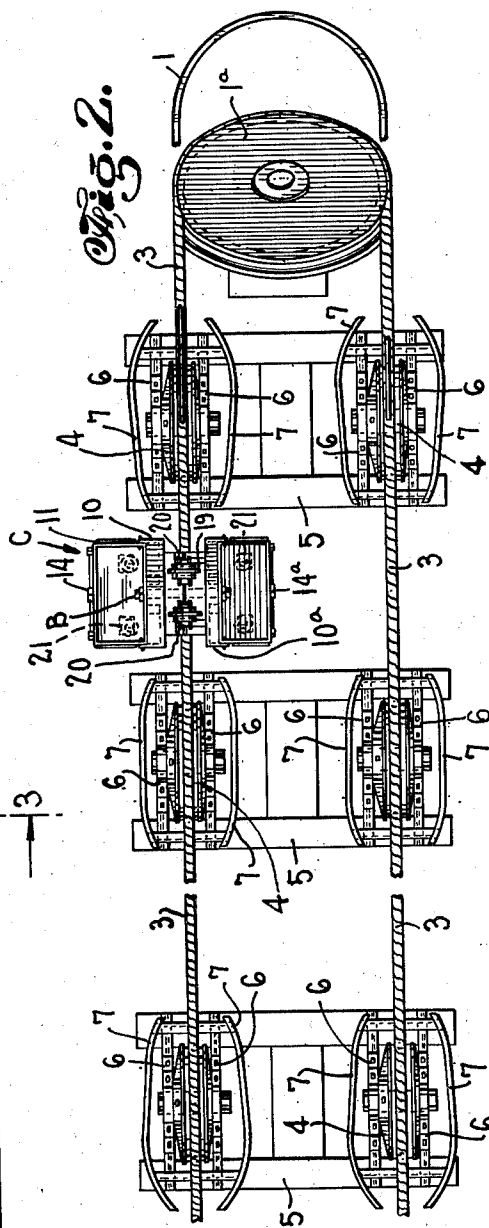
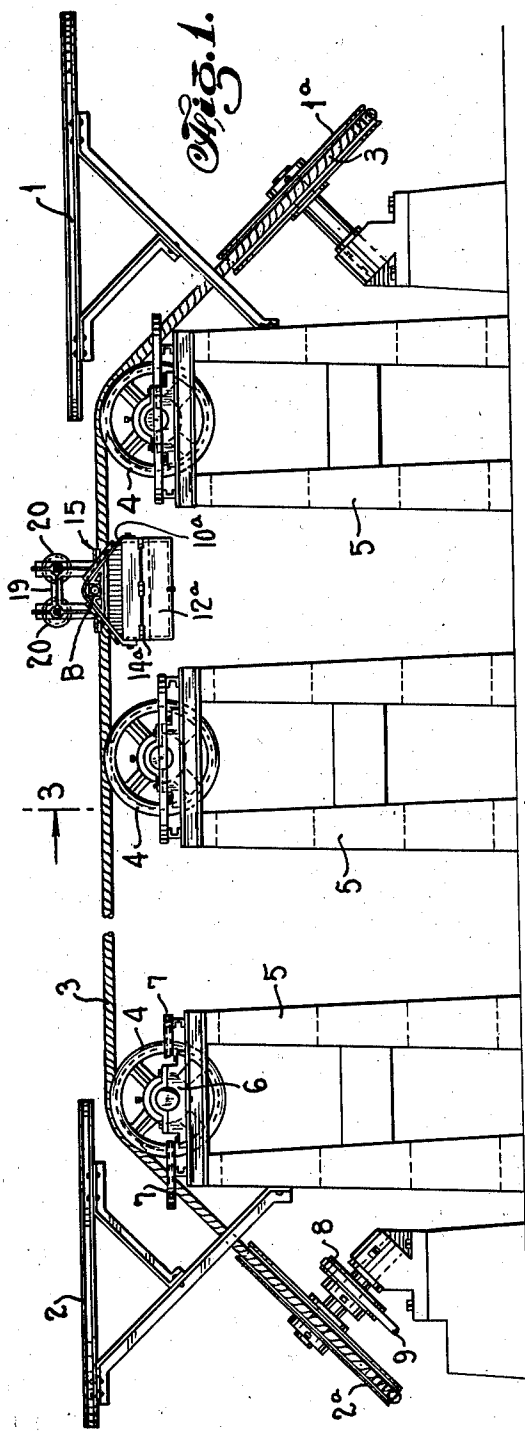
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2,116,226

MONOCABLE AERIAL TRAMWAY SYSTEM

Filed Aug. 23, 1935

2 Sheets-Sheet 1



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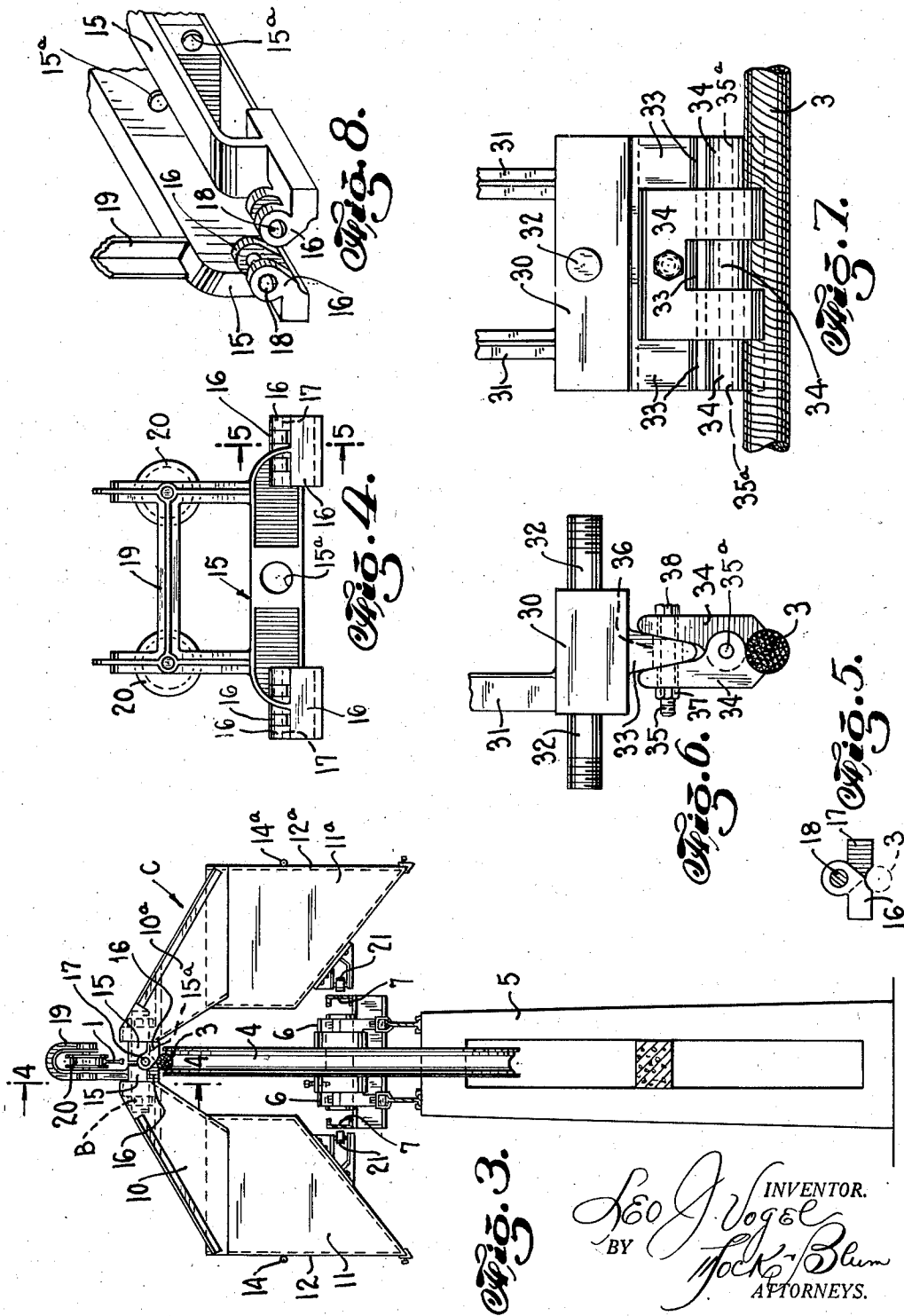
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2 Sheets-Sheet 2



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MONOCABLE AERIAL TRAMWAY SYSTEM

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6 Claims. (Cl. 104—180)

My invention relates to a new and improved aerial ropeway or tramway, both monocable and bi-cable.

One of the objects of my invention is to provide a system which shall have large capacity, and which can carry heavy loads.

Another object of my invention is to provide a monocable system which will permit the use of ropes or cables having large diameters so that heavy loads can be transported.

Another object of my invention is to improve the monocable system so that it can be used for installations for which bi-cable systems have hitherto been necessary.

Another object of my invention is to provide improved mechanism for connecting the carriers to the cable.

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 statement of the objects of my invention is intended to generally explain the same without limiting it in any manner.

Fig. 1 is a side elevation illustrating the improved system.

Fig. 2 is a partial top plan view of Fig. 1.

Fig. 3 is a sectional view, partially in elevation, along the line 3—3 of Fig. 1.

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

Fig. 5 is a sectional view on the line 5—5 of Fig. 4.

Fig. 6 illustrates a modification of the gripping means.

Fig. 7 is a front elevation of Fig. 6.

Fig. 8 is a detail perspective view of certain parts which are illustrated in Figs. 1—5.

The two systems which are generally used for aerial tramways are the bi-cable and the monocable.

In the bi-cable system the loads run on stationary cables, and the loads are hauled along this stationary cable by means of a separate traction cable or rope.

In the monocable system, a constantly moving cable is utilized for supporting and moving the loads.

The monocable system is superior to the bi-cable system, owing to greater simplicity, flexibility, and lower operating costs. However, the use of monocable systems has hitherto been limited because the monocable system could not be used for transporting heavy loads, or for high capacity requirements.

According to the improvements specified herein, the monocable system is modified so as to permit the transportation of heavy loads, while retaining the simplicity and flexibility and low cost of the monocable system.

Referring to Fig. 1, this shows stations 1 and 2. Either one of these stations can be a loading station, and the other can then be an unloading station. For convenience it is assumed that station 1 is the loading station, and that station 2 is an unloading station.

The cable 3 is guided between the stations 1 and 2, by means of any suitable number of idler sheaves 4. The sheaves 4 are mounted in suitable bearings upon supports 5. The sheaves 4 are provided with bearings 6, which are carried by the supports 5. In order to protect the sheaves and their bearings from the dependent portions of the carriers, said sheaves are provided with guard rails 7, as will be later more fully described.

Adjacent the stations 1 and 2, the endless cable 3 passes around suitable terminal sheaves 1a and 2a. The means for operating the cable 3 are not disclosed in detail, since they may be of any standard type.

In order to illustrate the invention diagrammatically, I have shown a drive pulley on the shaft of the sheave 2a and said drive pulley 8 is operated by a rope or cable 9.

Heretofore, and in operating monocable systems, it has been customary to provide the carriers with gripping members for clutching the cable, and these gripping members or gripping devices included toggles, and the carriers were provided with arms, so that each carrier had a single bucket.

Devices of this general type are shown, for example, in United States Patent No. 121,297 issued on November 28, 1871 to Robinson, in United States Patent No. 968,868 issued on August 30th, 1910, to Miller, and in United States Patent No. 1,436,911 issued on November 28, 1922, to Roe.

According to my invention, and as shown in Fig. 3, each carrier C comprises a pair of webs 10 and 10a, which support buckets or other carrying devices 11 and 11a. The web 10 and the bucket 11 are rigidly connected to each other, and the web 10a and the bucket 11a are also rigidly connected to each other.

The buckets 11 and 11a are provided with doors 12 and 12a, which may be of any suitable type. The doors 12 and 12a are connected in the usual manner to the buckets 11 and 11a, by means of hinges 14 and 14a.

As shown in Figs. 4 and 8, a pair of castings

15 are provided at the upper ends of webs 10 and 10a. Said castings are provided with lugs 16 which can interfit, so that said lugs 16 can be turnably connected to each other by means of pins 17, which pass through openings 18, which are provided in said lugs. The lugs 16 are provided at each end of each casting 15.

Each casting 15 has a hole 15a, in which a bolt B is secured. The wall of each opening 15a may be threaded, so that the threaded shank of bolt B may be screwed into position. Nuts hold the webs 10 and 10a on the respective bolts B. The bolts B are spaced so as to permit the free turning movement of castings 15, so that the jaws of the intermeshing lugs 16 can grip or release the cable. A stop may be provided for limiting the movement of the buckets away from or towards each other.

One of the castings 15 is provided with a top support 19, upon which flanged rollers 20 are mounted.

Since the buckets 11 and 11a are rigidly connected to the webs, the weight of said buckets turns the castings 15 toward each other, so that the lugs 16 grip the cable, which serves to support and to transport the loads.

Rails are provided at the loading station and at the unloading station, and the flanged rollers 20 can ride upon these rails so that the carriers can be placed upon the cable at the loading station, and said carriers are taken up upon the unloading or receiving station rails.

The rails at the stations 1 and 2 are at the same height as the flanged rollers 20, so that it is not necessary to raise or lower the load, in shifting the same onto the cable, or in removing the load from the cable.

The guards 7 which are located intermediate stations 1 and 2 function solely to prevent the carrier from contacting with the guide sheaves or their bearings. The guards 7 which are directly adjacent the unloading station are shaped so as to turn the castings 15 away from each other. Hence, the grip of the lugs upon the cable is sufficiently loosened at the unloading or receiving station, in order to permit the carrier to be detached from the cable. Likewise, when the carriers are moved off the rail of the loading station onto the cable, the guards 7 move the buckets away from each other so as to open the gripping jaws, and to enable the gripping jaws to straddle the cable and the carriers are controlled so that the jaws gradually grip the cable at the loading station, so that the load is set into movement in a gradual manner. The rails at the stations overlie the adjacent guards. The rails at the stations may be inclined upwardly, and away from the cable. At the stations, the guards 7 are shaped and they act like cams, in order to control the grip of the carrier upon the cable. The cam guards 7 can be of any desired height. The conveyors at the loading station are caused to grip the cable before the conveyor rides off the rail of the loading station. Likewise, the conveyor rides upon the rail of the unloading station, while it grips the cable, at least to some extent. The attendants at the stations can thus readily manipulate the conveyors.

It is preferable to have the buckets 11 and 11a provided with substantially equal loads. However the buckets and webs are of sufficient weight, in comparison to the loads transported by them, so as to make it unnecessary to have substantially equal loads. The carrier will tip, if there are unequal loads until the lever arm of the buck-

et having the lighter load, is increased sufficiently relative to the lever arm of the bucket having the heavier load, until stability is secured, with sufficient gripping action on the cable. If a carrier tips while gripping the cable, the cable turns or twists with the carrier.

The buckets 11 and 11a are provided with anti-friction rollers 21, which can ride along the sides of guards 7, which are provided for the guide sheaves and their bearings. Hence, if there are unequal loads, the carriers are held in upright position while they pass over the guide sheaves, if a monocable system is used. Whenever I refer to a bi-cable system, I include systems in which there are two or more supporting ropes.

In the embodiment shown in Figs. 6 and 7, the webs 10 and 10a are rigidly connected to a casting 30 having an upstanding arm 31 which serves to support the flanged rollers 20. The webs 10 and 10a are mounted upon the projecting ends of a threaded rod 32 which is rigidly connected to the casting 30. Said rod 32 can have externally threaded ends. The casting 30 is provided at its bottom with a wedge-shaped member 33, which is located between a pair of gripping arms 34 which are pivoted to each other by means of a pin 35a.

The adjacent ends of the jaws or gripping arms 34 are inclined to each other. Hence the weight of the buckets, which is transmitted through the casting 30 to the wedge-shaped member 33, forces the jaws 34 into gripping contact with the cable 3.

In order to limit the movement of the jaws 34 so they move to the gripping position, a bolt 35 is provided which passes through holes in the jaws 34 and through a hole 36 in the wedge-shaped member 33. Said bolt 35 is provided with a nut 37 and a head 38. The diameter of the bolt 35 is smaller than the diameters of the holes in the jaws 34 and it is also smaller than the diameter of the hole 36 in the wedge-shaped member 33.

Hence, the bolt 35 merely serves as a limit bolt and it does not take up any of the weight of the carrier.

It will be noted that the guide sheaves are of very large diameter, so that the bottoms of the buckets may be at or above the bottoms of the vertical guide sheaves. Hitherto, the steel cables which were used in monocable systems were limited to a maximum diameter of about one and one-half inches, because the guide-sheaves could not exceed a maximum diameter of thirty inches. This was due to the fact that a carrier having a single bucket, had an arm which extended below the guide sheaves, and the bucket was held on said arm and hung directly beneath the cable. According to my invention, the sheaves may have a diameter as great as six feet to eight feet and even more. I can use a steel cable having a diameter as great as two-and-a-half inches or more, because safety requires that when a steel cable is bent around a sheave, the diameter of the sheave should be about forty-eight times the diameter of the cable, in order to prevent excessive bending of the cable, with resultant excessive internal stresses and short cable life.

The bottoms of the buckets may be below the bottoms of the guide sheaves.

The invention can also be used on bi-cable systems. In a bi-cable system, the stationary carrier-rope rests upon saddles, which are usually curved. In the bi-cable system, the carriers are mounted on trolley-wheels. I can use the system of suspension heretofore described by connecting two buckets to the carriage of the trolley

wheels, so that the buckets are located on opposite sides of the supporting cable. By making the buckets depend a sufficient distance below the cable, the angle of maximum tilt from the vertical position can be controlled and limited, even if one bucket has more load than the other, and even if one bucket would fall off by some accident. Hence, the improved suspension with the use of long depending buckets, permits said buckets to pass below, and at the sides of the saddles.

I have shown a preferred embodiment of my invention but it is clear that numerous changes and omissions can be made without departing from its spirit.

I claim:

1. A monocable aerial tramway system comprising a supporting cable and means adapted to actuate the supporting cable, said system including guide sheaves for said supporting cable, a conveyor having gripping means which straddle and grip the cable, and load carriers connected to said conveyor and located on each side of said cable, said load carriers actuating said gripping means to the operative position.

2. A monocable aerial tramway system comprising a supporting cable and means adapted to actuate the cable, said system including guide sheaves for said supporting cable, a conveyor comprising two members which are pivoted to each other and which straddle the cable and which have jaws adapted to grip the cable, and a load carrier depending from each said conveyor member, said load carriers actuating said gripping members to the operative position.

3. A monocable aerial tramway system comprising a supporting cable and means adapted to actuate the supporting cable, said system including guide sheaves for said supporting cable, a conveyor having gripping means which straddle and grip the cable, and load carriers connected to said conveyor and located on each side of said cable, said load carriers actuating said gripping means to the operative position, said load carriers being located below the tops of the guide sheaves, and guards associated with the guide sheaves and preventing contact between the guide sheaves and the load carriers.

4. A monocable aerial tramway system com-

prising a supporting cable and means adapted to actuate the cable, said system including guide sheaves for said supporting cable, a conveyor comprising two members which are pivoted to each other and which straddle the cable and which have jaws adapted to grip the cable, and a load carrier depending from each said conveyor member, said load carriers actuating said gripping members to the operative position, said load carriers being located below the tops of the guide sheaves, and guards associated with the guide sheaves and preventing contact between the guide sheaves and the load carriers.

5. A monocable aerial tramway system comprising a loading station, an unloading station, an endless cable located between said stations, means adapted to actuate said cable, vertical guide sheaves for guiding said cable, a conveyor having gripping means adapted to straddle and to grip said cable, load carriers connected to said conveyor and located on each side of said cable, said load carriers being adapted to actuate said gripping means to the operative position, said stations having rails and said conveyors having roller means adapted to ride upon said rails so that a conveyor can be placed on said cable and a conveyor can be removed from said cable, and cam means located adjacent said stations and adapted to actuate said load carriers in a direction transverse to the direction of movement of the adjacent part of the cable, the rails overlying the adjacent cam means.

6. In an aerial tramway system, cable means, a supporting device located on said cable means, said supporting device including members which are turnable towards each other to grip the cable means and turnable away from each other to release said cable means, buckets connected to said members and movable in unison with said members, said cable means being located between said members and said buckets, said buckets having lever arms rigidly connected thereto and also rigidly connected to said members, the vertical extents of said lever arms being sufficiently longer than the horizontal extents of said lever arms so that said supporting device remains operatively on said cable, irrespective of differences of loads in the buckets.

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