

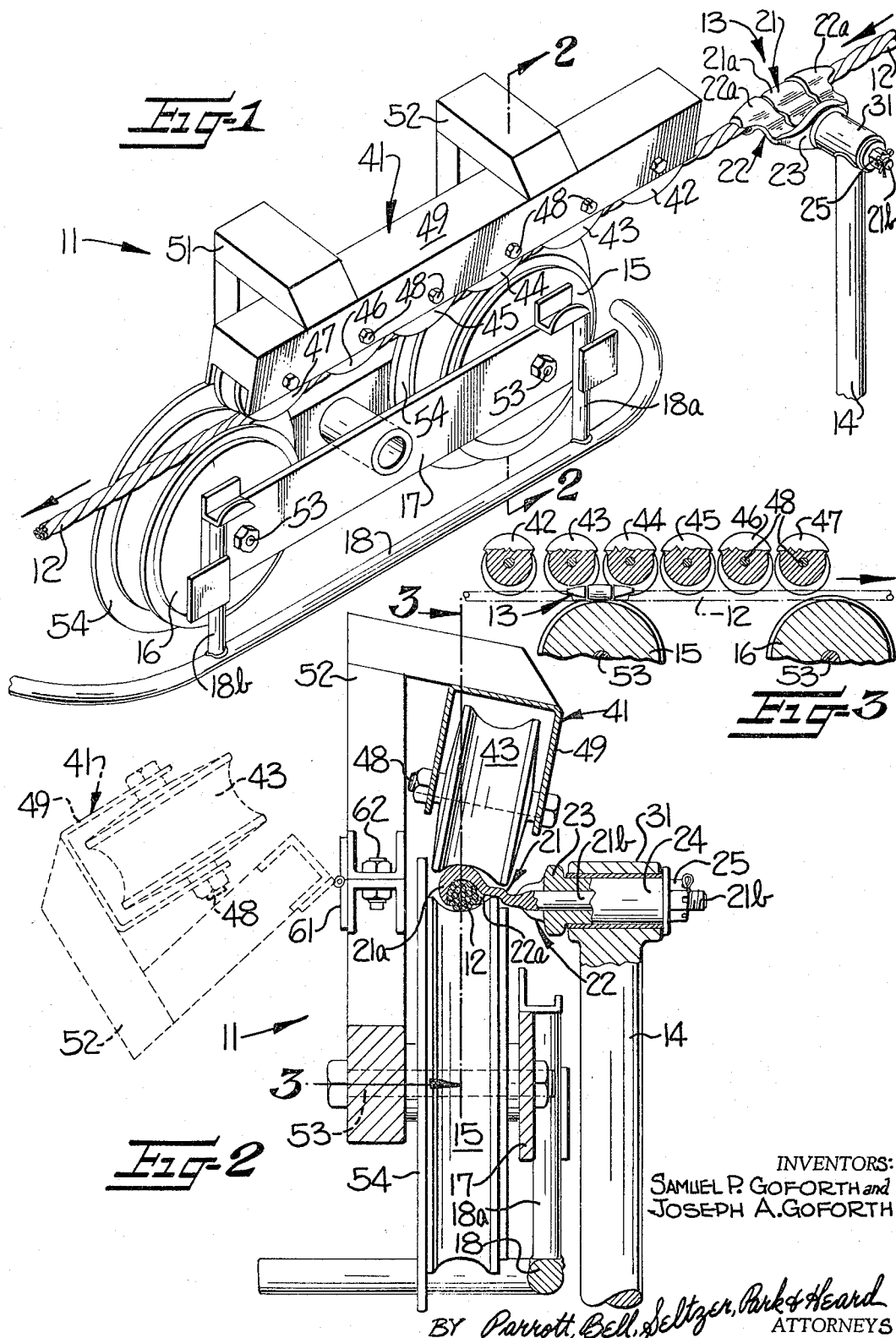
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CABLE-RETAINER FOR CHAIR LIFT ASSEMBLY

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INVENTORS:
SAMUEL P. GOFORTH and
JOSEPH A. GOFORTH

BY Parrott, Bell, Seltzer, Park & Heard
ATTORNEYS

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CABLE-RETAINER FOR CHAIR LIFT ASSEMBLY
Samuel P. Goforth and Joseph A. Goforth, Shelby, N.C.,
assignors to Goforth Brothers, Inc., Shelby, N.C., a
corporation of North Carolina
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This invention relates to movable carriers such as chair lift assemblies and the like and more particularly to means for retaining the conveyor cable of a chair lift assembly in proper track on the supporting members of the lift during movement of the cable along a predetermined course.

A chair lift, such as the type used in overhead ski tows, amusement rides and the like, generally includes an endless conveyor cable supported intermediate its length by tower-mounted rotatable sheaves which engage and support the cable for longitudinal movement. A plurality of passenger chairs or carriers are suspended at spaced intervals along the length of the cable by hanger bars attached to the cable by suitable clamps. The clamps are generally designed to allow pivotal movement of the hanger bar about the clamp in a longitudinal direction, i.e., in the direction of travel of the cable so as to retain the carrier in a substantially horizontal position during elevational changes over the path of travel of the cable.

Due to movement of occupants in the chairs and erratic movement of the cable in its travel, the chairs sometimes swing sideways. Sideways movement is particularly undesirable when the chair is closely approaching or in the process of passing a support tower of the chair lift assembly. Such movement can cause violent engagement between the chair and the tower or disengagement of the cable from its supporting sheave, both results extremely dangerous and possibly injurious to the occupants of the chair.

In an effort to prevent such possible injury to passengers, the towers have heretofore been provided with guide bars adapted to contact the hanger bars of the chairs and thus limit inwardly directed sideways movement of the chair as it passes the tower. Such guide bars have been successful in preventing violent engagement between the chair and the tower, but not in preventing disengagement of the cable from its supporting sheaves during chair approach toward and passage by the tower. Indeed, it has been found that in many instances the contact between the hanger bar and the guide bar itself produces a force on the cable, tending to displace the same from the supporting sheaves and thus adding to the danger in the operation of the assembly.

It is an object of the present invention to provide improved means for discouraging displacement of a chair lift conveyor cable from that portion of its desired path of travel immediately forwardly of and extending through a support sheave or sheaves due to the displacing forces exerted on the cable by lateral swinging moment of a chair.

A related and more specific object is to provide a cable-retaining device for counteracting the displacing forces exerted on the conveyor cable due to contact of the hanger bar supports of the chairs with guide bars located adjacent the support sheaves to prevent inward lateral movement of the chair during its passage thereby.

It is a further object to provide a cable-retaining means in the form of rollers so positioned with respect to the supporting sheaves of the cable as to discourage lateral movement of the cable and swinging movement of the chair during passage of the chair-supporting clamp over that portion of its desired path of travel immediately forwardly of the sheaves, and so as to positively prohibit the

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aforesaid undesirable movements during the critical passage of the chair-supporting clamp onto the supporting sheaves.

It is an additional object to provide a device of the type described which is so constructed and designed as to permit assembly and disassembly of the chair lift, when desired, with speed and facility.

A still further object of the invention is to provide a device of the type described which is of simple and economical construction compared to that of standard chair lift components, but which is durable and reliable in operation and provides additional safety features for occupants of the chair lift during operation of the assembly.

Some of the objects of the invention having been stated, other objects will appear as the description proceeds, when taken in connection with the accompanying drawings, in which—

FIGURE 1 is a perspective view of a sheave support section of a chair lift assembly showing a portion of a conveyor cable and a hanger bar of a chair attached thereto, and incorporating the cable-retaining rollers of the present invention therein;

FIGURE 2 is a cross-sectional view taken along line 2—2 of FIGURE 1 with the cable shown in advanced position along its path of travel from that seen in FIGURE 1, and showing in broken lines an alternate or cable-releasing position for the cable-retaining rollers; and

FIGURE 3 is a partial cross-sectional view taken along line 3—3 of FIGURE 2 and looking in the direction of the arrows.

Referring more specifically to the drawings, a portion of the chair lift conveyor system is shown in FIGURE 1, illustrating in particular one of the cable guiding and supporting units of the present invention. The supporting unit of the system, generally indicated at 11, is suitably mounted on a supporting tower or pylon (not shown) and is adapted to pass a conveyor cable therethrough. A portion 12 of the cable is seen in FIGURE 1 and is adapted to be moved by suitable means, not shown, through the unit in the direction indicated by the arrows.

Attached to the cable and extending substantially horizontally outwardly therefrom is a clamp 13 which has a downwardly extending hanger bar 14 secured to an outer end thereof. Suspended below the cable and attached to a lower end of the hanger bar (not shown) is a passenger chair of the system. It is to be understood that a plurality of chairs are secured to the cable by substantially similar clamps and hanger bars at spaced intervals along its length and a description of the clamp 13 and hanger bar 14 in FIGURE 1 is intended to apply to all such chair securing means.

The support unit 11 of the system includes a pair of substantially vertically mounted, rotatable sheaves 15, 16 which are spaced along the desired path of movement of the cable by means of an elongate bracket 17. An elongate guide bar 18 is attached to the bracket by means of a pair of downwardly extending rods 18a, 18b, and is positioned below the spacing bracket so as to lie substantially along the path of travel of the conveyor cable 12. Opposite ends of the guide bar are curved inwardly over the peripheral surfaces of the sheaves to protect the sheaves from contact by the hanger bar 14 in the event the hanger bar and chair attached thereto swing inwardly toward the sheaves at the time of entry of the clamp into the supporting unit and during its passage therethrough.

The clamp 13 of the present invention is composed of a pair of elements 21, 22 which have respective cable-engaging portions 21a, 22a. Extending outwardly from portion 21a is a central shaft 21b which is suitably threaded on its outer end. The cable-engaging surface 22a of element 22 is formed of two sections which lie

along the cable on either side of surface 21a and are integrally joined by means of a boss 23. A cylindrical spindle 24 is attached to the boss 23 and extends outwardly therefrom to surround shaft 21b of element 21. The cable-engaging portions of the two elements may be urged in opposite directions to tightly grip the cable by the tightening of a nut and washer assembly 25 which is secured to the threaded end portion of the central shaft 21b and bears against an outer edge of the spindle 24.

The hanger bar 14 is pivotally secured to the clamp 13 by means of a sleeve 31 which surrounds the spindle 24 and is retained thereon by the nut assembly 25. The sleeve permits pivotal movement of the hanger bar and chair about the spindle in a direction parallel to the direction of movement of the cable, thus retaining the chair in a horizontal position at all times during elevational changes over the path of travel of the cable.

Located generally above the sheaves 15, 16 and closely adjacent the upper surface of the cable 12 is a cable-retaining device, generally indicated at 41, which includes a plurality of circumferentially grooved rollers 42 through 47 spaced along the desired path of travel of the cable. The rollers are rotatably mounted on central shafts 48 which are secured to an inverted U-shaped channel member 49. The U-shaped member is attached to the support bracket 17 by a pair of inverted generally L-shaped arms 51, 52, which are welded or otherwise suitably secured at their lower ends to that side of the support bracket distal from sheaves 15, 16.

The first roller 42 in the path of travel of the cable is located forwardly of the first support sheave 15 and just above the point at which the hanger bar 14 makes contact with the guide bar during its entry into the support unit (FIGURE 1). The purpose of the first roller is twofold: to align the cable clamp for subsequent passage over the peripheral surface of the sheave, and to counteract the forces exerted on the cable and clamp due to initial contact of the swinging hanger bar with the guide bar which might tend to displace the cable from its desired path of travel.

Roller 43, located just behind the first roller 42, is positioned so that its grooved circumferential surface contacts the clamp prior to its disengagement from the first or aligning roller 42. A major portion of roller 43 is positioned forwardly of a plane extending perpendicularly to the desired path of travel of the cable and containing the axis of rotation of sheave 15 so that its peripheral surface engages the clamp 13 as the clamp contacts the groove periphery of the first sheave 21, thus further guiding and aiding in retaining the clamp on the sheave. The last roller 47 in the series is positioned identically with respect to the second sheave 16 as is roller 43 with respect to sheave 15 and it functions in the same manner as disclosed in regard to roller 43 to control the position of the clamp and cable during its passage into and over sheave 16.

The roller 44 is positioned with respect to sheave 15 in such a manner that it simultaneously engages the clamp 13 as it passes over the latter portion of the surface of sheave 15 and cooperates with roller 43 to retain the clamp on the sheave. The rollers 45 and 46 are located in the path of travel of the cable and clamp between the sheaves and, along with the previously mentioned rollers in the series, are so spaced with respect to each other that the clamp is continuously and sequentially engaged by the peripheral surfaces of the rollers from its reception within the circumferential of roller 42 until the reception of the clamp in the circumferential groove of sheave 16. The diameters of all of the rollers are substantially equal and preferably substantially less than the diameter of the support sheaves. As seen in the preferred embodiment shown, the roller diameters are approximately three-eighths the length of the diameter of the sheaves.

As best seen in FIGURE 2, the upper portions of arms 51, 52 slope downwardly from their inner to their outer

ends at an angle of approximately eleven degrees to the horizontal. The axes of the rollers are therefore correspondingly inclined with respect to the axes of the sheaves 15 and 16, which brings the peripheral edges of the rollers closest the hanger bar into close association with the upper horizontal surface of the projecting portion of the clamp. By inclining their axes in this manner, the two rollers 42 and 43 overlying the first sheave 15 and the roller 47 overlying the second sheave 16 cooperate with the corresponding peripheral edge of the respective underlying sheave to closely confine the outwardly projecting portion of the clamp during its most important passage onto and over the supporting sheaves, thereby at that time restraining pivotal movement of the clamp in both directions about the longitudinal axis of the cable, as well as positively prohibiting any laterally outwardly displacement of the cable from the sheave which might tend to occur due to other displacing forces which might be exerted upon the cable. The inclination of the remaining rollers serves, albeit to a lesser extent, somewhat similar functions by discouraging lateral displacement of the cable in an outward direction and by restricting that pivotal movement of the cable and clamp tending to occur due to rebounding contact of the hanger bar 14 with the guide bar 18.

To prevent possible disengagement of the cable and the clamp from the peripheral grooves of the sheaves in a direction opposite the hanger bar, the vertical rear face of each of the sheaves may be provided with a flange plate 54 which extends outwardly from the periphery of the sheave to overlie the corresponding edges of the adjacent rollers thereto (FIGURE 2).

To facilitate assembly and disassembly of the chair lift in the event of repair or relocation, the cable-retaining rollers may be pivotally mounted to the sheave section by providing the L-shaped arms 51, 52 with hinges, one of which 61 is seen in FIGURE 2. By releasing a nut and bolt assembly 62 securing upper and lower portions of the arms in alignment, the upper portion of the arms and the rollers may be swung away from the cable to a position indicated by the dashed lines in FIGURE 2, and the cable then may be easily lifted from the peripheral grooves of the supporting sheaves.

The length of the cable-engaging portions of the clamp along the extent of the cable and their cross-sectional diameter may vary and the cable-retaining rollers may be accordingly spaced and inclined so as to insure that the clamp is at all times in contact with the circumferential surface of one of the rollers during its passage over the sheave section.

From the foregoing description and explanation of the invention, it can be seen that the cable-retaining roller device of the present invention may be easily constructed and adapted for use with the support sheaves of a chair lift assembly and is an effective safety device in guiding and retaining the traveling conveyor cable on the peripheral surface of the support sheaves during the passage of passenger chairs and their supporting elements thereby.

In the drawings and specification there has been set forth a preferred embodiment of the invention and, although specific terms are employed, they are used in a generic and descriptive sense only and not for purposes of limitation, the scope of the invention being defined in the claims.

That which is claimed is:

1. In a chair lift assembly including a cable adapted for longitudinal movement along a predetermined desired path of travel, an elongate clamp secured to the cable and movable therewith and having a projecting portion extending substantially horizontally outwardly therefrom, a chair-supporting hanger bar connected to the projecting portion of the clamp and extending downwardly therefrom, and at least one circumferentially grooved sheave rotatable about a substantially horizontal axis and positioned beneath and intermediate the length of the desired

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path of travel of the cable to support the cable and the clamp for movement thereover and to permit passage of the downwardly extending hanger bar along one side thereof; the combination therewith of a cable-retaining device comprising a plurality of serially arranged, circumferentially grooved rollers positioned above said desired path of travel of said cable for movement of the cable and said clamp thereunder, a first of said rollers positioned in relation to the desired path of movement of the cable forwardly of said sheave, a second of said rollers positioned in relation to the desired path of travel of the cable such that a major portion of said second roller is located between said first roller and a plane perpendicular to the desired path of travel of the cable and containing the axis of rotation of said sheave, the spacing between the circumferential surfaces of said first and second rollers along the path of travel of the cable being such that said clamp is engaged continuously and successively by said first and second rollers from the reception thereof within the circumferential groove of said first roller until the reception thereof within the circumferential groove of said sheave, and said second roller being positioned with respect to said sheave so as to closely confine said projecting portion of the clamp therebetween and thereby restrain pivotal movement of said clamp about the longitudinal axis of the cable.

2. A cable-retaining device as defined in claim 1 wherein said closely confining positioning of said second roller includes the rotational axis of said second roller being inclined toward said hanger bar so that opposing peripheral edges of said second roller and said sheave adjacent the hanger bar define a reduced clearance therebetween to closely confine the clamp and prevent both pivotal movement of the clamp about the cable and disengagement of the cable from the peripheral surface of the sheave in the direction of the hanger bar.

3. A cable-retaining device as defined in claim 2 including a flange extending radially outwardly from the peripheral edge of said sheave opposite said hanger bar and overlying the adjacent peripheral edge of said second roller to prevent displacement of the cable from the peripheral surface of said sheave in a direction away from the hanger bar.

4. An overhead conveyor assembly as defined in claim 1 including a guide bar located on the same side of said sheave as said downwardly-extending hanger bar, said guide bar extending in a direction substantially parallel to the desired path of movement of said cable to slidably engage said hanger bar during its movement past said sheave and limit pivotal movement of the hanger bar and clamp about the axis of said cable, and wherein said first roller is located above said guide bar to contact said clamp at approximately the same time said guide bar contacts said hanger bar during cable travel and to restrain sideways displacement of the cable from its desired path of travel due to contact of the hanger bar with the guide bar.

5. A cable-retaining device as defined in claim 1 including a third roller of said plurality of rollers positioned rearwardly of said second roller and sheave in relation to the path of travel of said cable such that said clamp is simultaneously engaged by said third roller and said sheave during its movement therethrough to guide the clamp in the circumferential groove of the sheave.

6. A cable-retaining device as defined in claim 1 including a third roller positioned rearwardly of said second roller along the desired path of movement of said cable to simultaneously contact said clamp during its passage over said sheave, said second and third rollers having their rotational axes inclined toward said hanger bar so that the peripheral edges of the second and third rollers adjacent the hanger bar define a reduced clearance with the opposing peripheral edge of said sheave to closely confine the projecting portion of said clamp and prevent

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displacement of the cable from the peripheral surface of the sheave in the direction of the hanger bar.

7. A cable-retaining device as defined in claim 1 including a second circumferentially grooved sheave rotatable about a substantially horizontal axis and positioned rearwardly of said one sheave along the desired path of travel of said cable, said second sheave engaging the cable to support the same for movement thereover, and an additional roller of said plurality of rollers positioned forwardly of said second sheave along the desired path of movement of said cable, said additional roller being positioned to simultaneously engage and confine the clamp during its movement over the peripheral surface of the second sheave.

8. A cable-retaining device as defined in claim 7 wherein said plurality of rollers are so positioned with respect to each other along the desired path of travel of said cable and clamp that their peripheral surfaces continuously and sequentially engage the clamp from the reception thereof within the circumferential groove of said first roller until the reception thereof within the circumferential groove of said second sheave.

9. A cable-retaining device as defined in claim 8 including a guide bar located on the same side of said sheave as said downwardly extending hanger bar, said guide bar extending in a direction substantially parallel to the desired path of movement of said cable to slidably engage said hanger bar during its movement past said sheave and limit pivotal movement of the hanger bar and clamp about the axis of said cable, and wherein the rotational axes of said plurality of rollers are inclined toward said hanger bar such that the peripheral edges of the rollers adjacent the hanger bar overlie a side portion of the clamp and oppose sideways movement of the clamp and cable during passage of the hanger bar past the guide bar.

10. An overhead conveyor assembly as defined in claim 1 and further including means mounting said cable-engaging rollers for pivotal movement from a first cable-overlying position to a second position beside said cable to permit removal of the cable from the support sheave for disassembly of the chair lift assembly.

11. In a chair lift assembly including a cable adapted for longitudinal movement along a predetermined desired path of travel, an elongate clamp secured to the cable and movable therewith having a projecting portion extending substantially horizontally outwardly therefrom, a chair-supporting hanger bar connected to the projecting portion of the clamp and extending downwardly therefrom, and a pair of circumferentially grooved sheaves rotatable about substantially horizontal axes and being located at spaced positions beneath the cable along said path of travel to support the cable and clamp for movement thereover and to permit passage of the downwardly extending hanger bar along one side thereof; the combination therewith of a cable-retaining device comprising a plurality of serially arranged, circumferentially grooved rollers positioned above and along said path of travel for movement of the cable and said clamp thereunder, a first of said rollers positioned forwardly of the first of said sheaves in said path of travel, a second of said rollers positioned such that a major portion thereof is located between said first roller and a plane perpendicular to said path of travel and containing the axis of rotation of said first sheave, a third roller of said plurality positioned rearwardly of said second roller and said first sheave along said path of travel, each of said second and third rollers engaging said clamp during a portion of its movement over the circumferential groove of said first sheave, and an additional roller positioned such that a major portion thereof is located forwardly of a plane perpendicular to said path of travel and containing the axis of rotation of the second of said sheaves, said additional roller engaging the clamp during an initial portion of its movement over the circumferential groove of the second

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sheave, the rotational axes of said plurality of rollers being inclined toward said hanger bar to overlie said outwardly projecting portion of said clamp, and said plurality of rollers being spaced so that their peripheral surfaces continuously and sequentially engage said clamp from its reception within the circumferential groove of said first roller until its reception within the circumferential groove of the said second sheave to guide said clamp and cable onto and over the circumferentially grooved sheaves.

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ARTHUR L. LA POINT, *Primary Examiner.*

D. F. WORTH, *Assistant Examiner.*