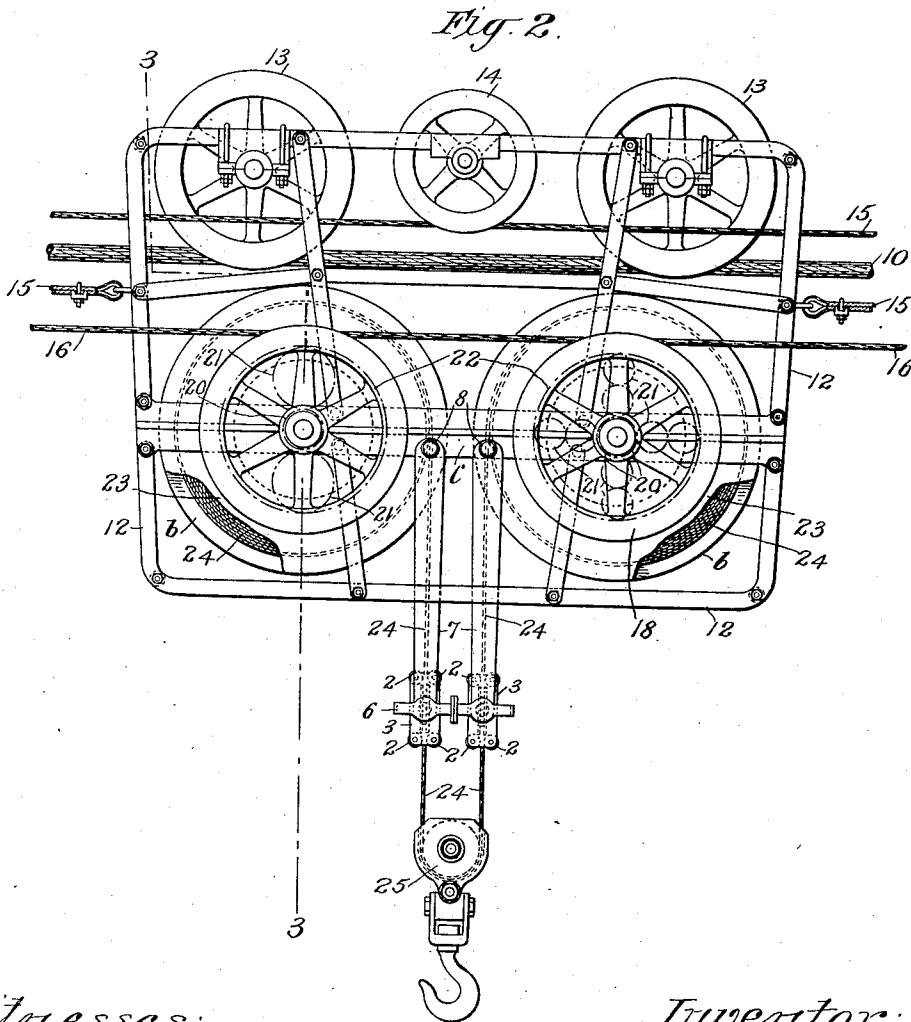
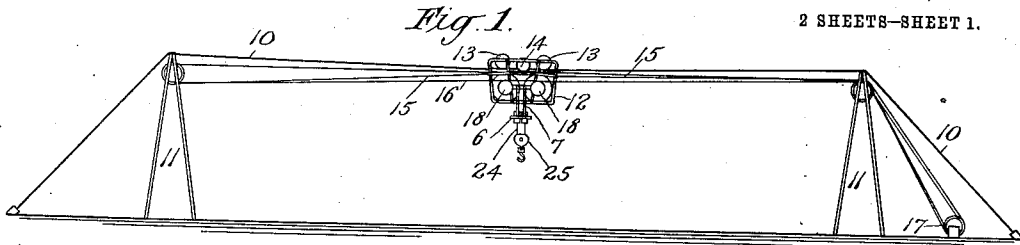


C. C. SUNDERLAND.
CABLEWAY.
APPLICATION FILED DEC. 12, 1911.

1,077,921.

Patented Nov. 4, 1913.
2 SHEETS—SHEET 1.



Witnesses:
P. M. Tilden.
J. C. Brown

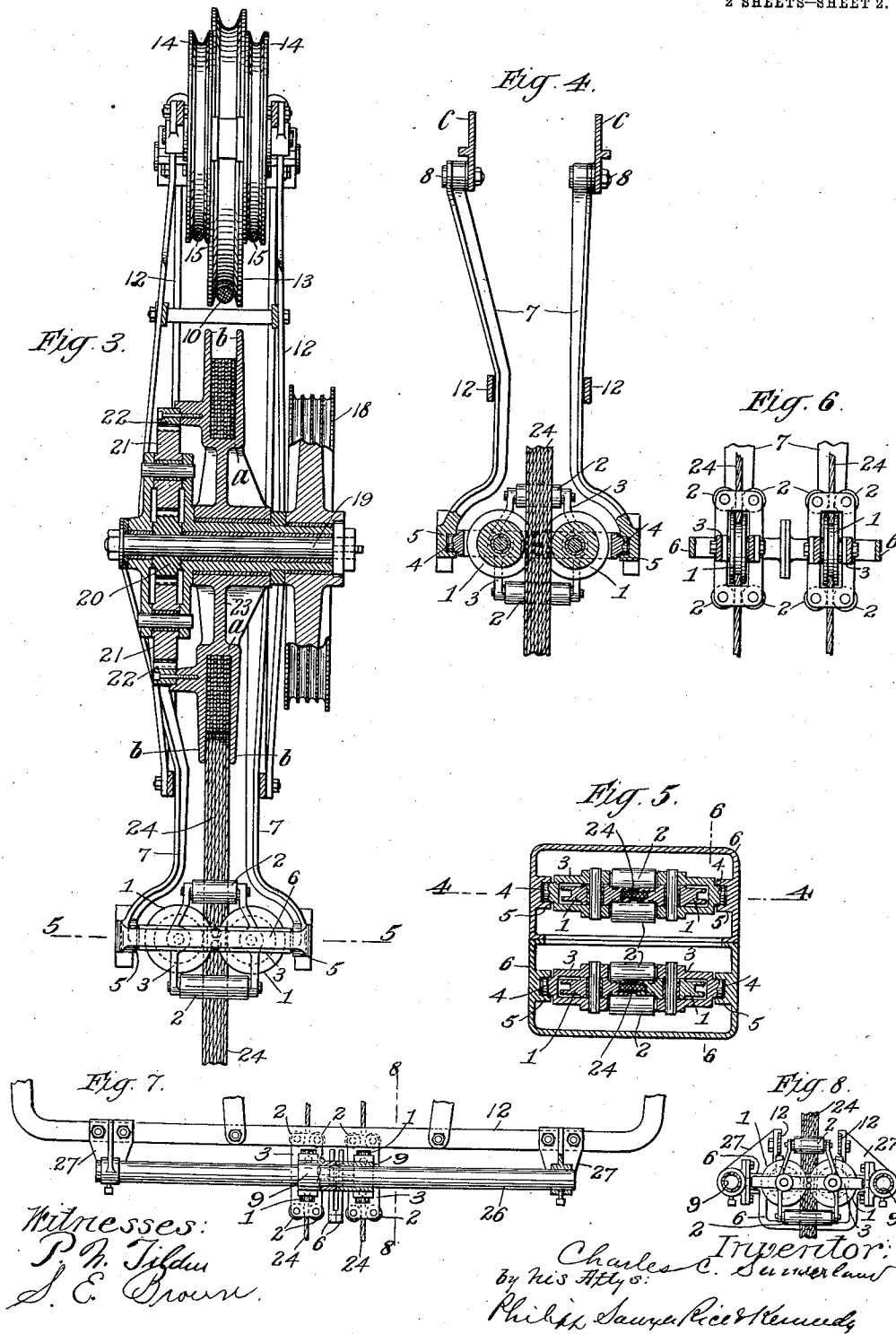
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UNITED STATES PATENT OFFICE.

CHARLES C. SUNDERLAND, OF TRENTON, NEW JERSEY, ASSIGNOR TO JOHN A. ROEBLING'S SONS COMPANY, A CORPORATION OF NEW JERSEY.

CABLEWAY.

1,077,921.

Specification of Letters Patent.

Patented Nov. 4, 1913.

Application filed December 12, 1911. Serial No. 665,352.

To all whom it may concern:

Be it known that I, CHARLES C. SUNDERLAND, a citizen of the United States, residing at Trenton, county of Mercer, and State of New Jersey, have invented certain new and useful Improvements in Cableways, fully described and represented in the following specification and the accompanying drawings, forming a part of the same.

This invention relates to cableways of that class in which a carriage moving along the cableway is employed, on which carriage are mounted the winding drums and fall rope operated thereby to raise and lower the load, the object of the invention being to provide an improved construction of the fall rope portion of the mechanism by which certain difficulties heretofore existing in the operation of such cableways shall be avoided.

The invention has been made in connection with a cableway and carriage such as described and claimed in United States Letters Patent to Cooney, No. 972,825, dated October 18, 1910, and will be described in connection with such a construction. In the cableway shown in the patent referred to, the use of fall rope carriers supporting the hoisting rope is avoided by making the hoisting rope endless and winding the fall rope upon drums geared to driving wheels operated by the hoisting rope, so that the two drums are operated by the movement of the hoisting rope in either direction, to wind or unwind the fall rope and thus raise or lower the fall block suspended by the fall rope. The fall rope drums of the patent are spirally grooved for the purpose of winding the fall rope layer upon layer, the rope used being the regular round rope. Such cableway carriages, and other cableway carriages in which the fall rope has been wound upon a drum or drums, have not been successful in practice, especially under heavy loads, because the swinging of the carriage and of the fall rope resulted in the rope not winding on the drum or drums evenly as intended, but bunching at the end or middle of the drum or drums and then sliding off onto a smaller diameter, causing heavy shocks to the carriage and exceedingly heavy rope stresses, making frequent renewal of the fall rope and other ropes of the cableway necessary. This difficulty is avoided and an entirely successful cableway of this class provided,

in accordance with the present invention, by using a flat band as the fall rope and making the drums of substantially the same width as the rope, so that the rope simply winds on itself, and providing suitable guiding devices to prevent the flat fall rope twisting and secure its proper winding upon the drums. The flat fall rope and narrow drums therefor may be used in some cases without the guiding devices, and thus the previous difficulties of the bunching and dropping of the rope avoided. But such a construction is not entirely satisfactory and under some conditions cannot be used successfully, because in practice it develops another difficulty, that the fall rope has a tendency to twist as it is wound on the drum, this twist being so pronounced that at times the rope may turn completely over.

For a full understanding of the invention, constructions embodying the same as applied in its preferred form in connection with the cableway carriage of the patent referred to are illustrated in the accompanying drawings, forming a part of this specification, and these constructions will now be described in detail and the features forming the invention then specifically pointed out in the claims.

In the drawings:—Figure 1 is a diagrammatic view of the cableway and carriage. Fig. 2 is a side elevation of the carriage with the fall rope and winding drums partially broken away. Fig. 3 is a sectional elevation looking to the right on the line 3 of Fig. 2. Fig. 4 is a vertical section of one of the guiding devices for the fall rope and its support, the section being taken on the line 4 of Fig. 5. Fig. 5 is a section on the line 5 of Fig. 3. Fig. 6 is a section of the guiding devices on the line 6 of Fig. 5. Fig. 7 is a detail side elevation of a portion of the carriage, partly in section, showing another form of support for the guiding devices. Fig. 8 is a section on the line 8 of Fig. 7.

Referring to the drawings, the construction shown is, except for the present invention, substantially the same as described and shown in Letters Patent No. 972,825, above referred to, so that only a brief statement of the parts illustrated is required here, reference being made to said Letters Patent for a full description of their construction and operation.

The main cable 10 forming the cableway is carried by the towers 11 and on this runs the cableway carriage having the frame 12, in which are mounted the supporting wheels 13 riding on the main cable 10, the traction wheels 14 for the traction rope 15 connected to the carriage at opposite sides, and the hoisting mechanism operated by the hoisting rope 16. The traction rope 15 and hoisting rope 16 run over pulleys in the towers 11, and are connected to winding drums 17 operated by the engine in the usual manner to move the carriage in either direction and to raise and lower the load.

The hoisting mechanism operated by the hoisting rope 16 consists, as in the patent referred to, of the two driving wheels 18 on which the endless hoisting rope is wound, the shafts 19 of these driving wheels being geared by gears 20 thereon, and intermediates 21, to internal gears 22 on the fall rope winding drums 23, a single intermediate gear being used for one winding drum and two intermediates for the other winding drum, so that the drums 23 are rotated in opposite directions by the movement of the hoisting rope 16 and driving wheels 18 in either direction, and thus wind equally upon the two drums or unwind equally therefrom the fall rope 24 having its opposite ends attached to the drums, this fall rope 24 being shown as carrying the usual fall block 25 for attachment to the load.

Referring now to the features modified or added for the embodiment of the present invention, the fall rope 24, instead of being a round rope as in previous cableways of this class, is a flat band of suitable width to secure the required strength and proper action in carrying out the invention. This band may be made in any suitable manner and the width may be varied according to the strength required. For a proper winding of this flat fall rope, the drums 23 are provided with a winding seat *a* having deep flanges *b* so as to accommodate the required length of fall rope, and these flanges are spaced so as to form a drum of substantially the same width as the fall rope, so that successive layers of fall rope upon the drum wind accurately upon and from each other between the flanges in winding and unwinding, and are held in position against sidewise play on the drums. The tendency of the flat fall rope to twist, so as to interfere with the proper winding, is avoided by suitable guiding devices, which assure the proper position of the fall rope during winding and unwinding while at the same time permitting the freedom of movement of the fall rope and fall block required in such cableways. The preferred form of guiding devices is that shown, in which the fall rope is guided between rollers bearing upon its sides and grooved rollers in which the edges of the fall

rope run, two sets of side rollers preferably being used, respectively above and below the edge guiding rollers. As shown, these guiding rollers 1 grooved at their edges to receive the fall rope and the side rollers 2 arranged in pairs above and below the edge rollers 1, are mounted in bearing frames 3, which are made in two parts bolted together as shown and pivoted by pivot studs 4 thereon in bearings 5 carried by bars forming separate frames for the two guiding devices for the two legs of the fall rope loop. The pivot studs 4 permit the independent sidewise rocking of each set of guiding rollers to accommodate the fall rope, and the freedom of the fall rope and each guiding device to move longitudinally of the carriage with the fall rope is secured by mounting each frame 6 in a pair of swinging arms 7 pivoted at 8 on the side bars of the carriage frame C. Each guiding device may thus move longitudinally of the carriage independently of the other guiding device as the two legs of the fall rope loop wind on or upon their drums. The two frames are shown as in their inner positions with the fall rope wound upon the drums, in which position the frames 6 abut against each other. The swinging of the fall rope transversely to the cableway is provided for, of course, by the swinging movement of the carriage on the main cable 10. Instead of mounting the guiding devices in swinging arms 7, they may be carried in any other suitable manner to provide for the movement desired to accommodate the fall rope.

In the construction shown in Figs. 7 and 8 the frames 6 carrying the guiding devices are secured to sleeves 9 mounted to slide freely on rods 26 carried by brackets 27 on the bottom bars of carriage frame 12, thus securing the same freedom of movement of the guiding devices as in the construction shown in Figs. 1 to 6, without the swinging arms 7.

The system of swivel guides shown is of value in preventing friction and consequent wear of the flat fall rope, while securing its proper winding on the drums. The plurality of side rollers spaced apart avoids abrupt angles at the guides and the swivel mounting of the rollers automatically adjusts itself to the line of tension of the fall rope without undue friction, while the free movement of the guiding devices as the angle between the two legs of the fall rope increases or decreases secures an efficient operation and avoids friction which otherwise would be produced by such variation of angle.

The term "flat fall rope" herein is intended to include any form of flexible lifting element, metallic or otherwise, which is formed flat so as to secure the results desired with comparatively small thickness radially to the winding drum and thus wind

upon itself in a volute coil on a drum of practical size.

It will be understood that the invention is not to be limited to the particular form of conveying apparatus or carriage or drum operating devices shown nor to the particular arrangement of the fall rope and drums illustrated, but that the invention may be applied in other cableways and similar hoisting and conveying systems, and that modifications may be made in the fall rope guiding devices also without departing from the invention.

What I claim is:—

1. The combination with a way, a carriage moving thereon, hoisting drums on the carriage, and means for operating the drums, of a fall rope loop between the drums formed by a flat fall rope supported by the drums at opposite ends of the loop, the rope receiving portions of the drums being of substantially the width of the fall rope and flanged to support the rope coil.

2. The combination with a way, a carriage moving thereon, hoisting drums on the carriage, and means for operating the drums, of a fall rope loop between the drums formed by a flat fall rope supported by the drums at opposite ends of the loop, the rope receiving portions of the drums being of substantially the width of the fall rope and flanged to support the rope coil, and guiding devices between the drums and load for preventing the twisting of the fall rope.

3. The combination with a way, a carriage moving thereon, hoisting drums on the carriage, and means for operating the drums, of a flat fall rope carried by the drums, the rope receiving portions of the drums being of substantially the width of the fall rope, and flanged to support the rope coil, and guiding devices between the drums and load for preventing the twisting of the fall rope, said guiding devices including separate guides for the two parts of the fall rope loop mounted to move independently of each other with the fall rope sidewise of the rope.

4. The combination with a way, a carriage moving thereon, hoisting drums on the carriage, and means for operating the drums, of a flat fall rope carried by the drums, the rope receiving portions of the drums being of substantially the width of the fall rope and flanged to support the rope coil, and guiding devices between the drums and load for preventing the twisting of the fall rope, said guiding devices including separate guides for the two parts of the fall rope loop mounted to move independently of each other with the fall rope sidewise of the rope and to rock with change of inclination of the fall rope.

5. In combination, a cableway, a carriage mounted upon the cableway, a pair of hoisting drums mounted in the carriage, a fall

rope loop between the drums formed by a flat fall rope, the flanges upon said drums spaced substantially the width of the fall rope, and means to operate the drums, the ends of the fall rope being attached respectively to the drums.

6. In combination, a pair of flanged winding drums, a fall rope loop between the drums formed by a flat fall rope, the flanges on each drum being spaced substantially the width of the fall rope, the ends of the fall rope being respectively attached to the drums, and means to move the drums simultaneously to raise or lower the fall rope loop.

7. In combination, a pair of flanged winding drums, a fall rope loop between the drums formed by a flat fall rope, the flanges on each drum being spaced substantially the width of the fall rope, the ends of the rope being respectively attached to the drums, and guides adapted to direct the rope to the drums without twist.

8. In combination, a flat fall rope, a drum adapted to wind up the rope in a volute coil, a plurality of pairs of guiding rollers adapted to bear upon the sides of the rope, a frame carrying said rollers and adapted to permit the rollers automatically to maintain their position in a line tangential to the volute coil.

9. The combination with a hoisting drum, of a flat fall rope 24, and a guiding device for the fall rope consisting of edge rollers 1 and side rollers 2 above and below the edge rollers, a frame in which the rollers are carried mounted to rock sidewise of the fall rope, and a support for the frame movable sidewise of the fall rope.

10. The combination with two hoisting drums, of the flat fall rope 24 having its ends carried by the drums, and guiding devices for the fall rope, including separate guides for each leg of the fall rope loop, separate frames in which the guides for each leg are mounted to rock sidewise of the fall rope independently of the guides for the other leg, and a frame support on which the frames are free to move independently with the fall rope sidewise of the rope.

11. The combination with a way, a carriage moving thereon, hoisting drums on the carriage, and means for operating the drums in any position of the carriage on the way, of a flat fall rope carried by the drums, the rope receiving portions of the drums being of substantially the width of the fall rope and flanged to support the rope coil.

12. The combination with a way, a carriage moving thereon, hoisting drums on the carriage, and means for operating the drums in any position of the carriage on the way, of a flat fall rope carried by the drums, the rope receiving portions of the drums being of substantially the width of the fall rope

and flanged to support the rope coil, and guiding devices between the drums and load for preventing the twisting of the fall rope.

13. In combination, a cableway, a carriage
5 mounted upon the cableway, a flat fall rope, a pair of hoisting drums mounted in the carriage, the flanges upon said drums spaced substantially the width of the fall rope, and means to operate the drums in any position
10 of the carriage on the cableway, the ends of

the fall rope being attached respectively to the drums.

In testimony whereof, I have hereunto set my hand, in the presence of two subscribing witnesses.

CHARLES C. SUNDERLAND.

Witnesses:

AUSTIN C. COOLEY,
SAML. E. WILSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."
