Aug. 25, 1925. 1,551,223

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AERIAL CABLE CARRIER FOR HEAVY DUTY

Filed May 26, 1924 4 Sheets-Sheet 1

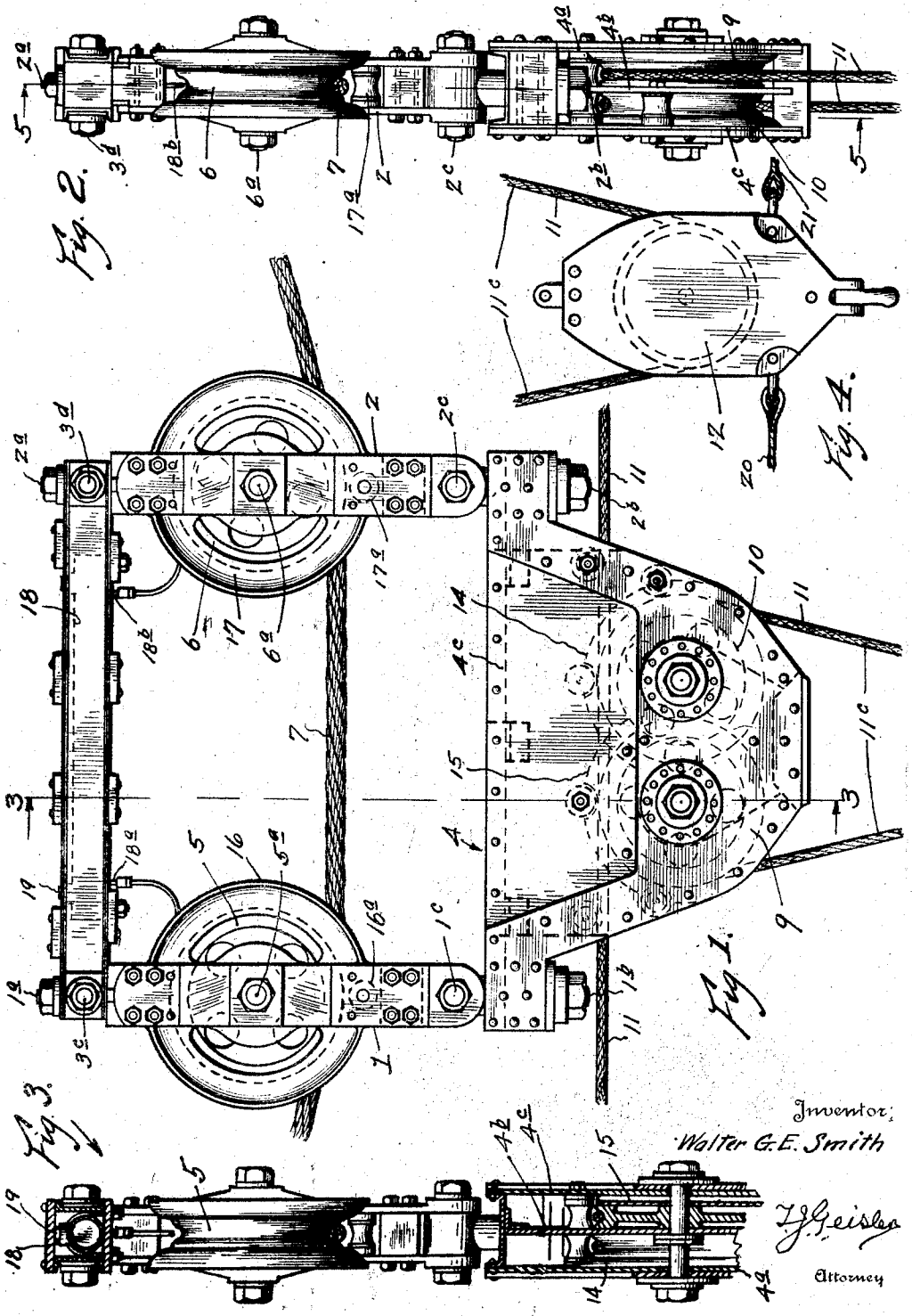


Fig. 2.

Fig. 4.

Fig. 1.

Fig. 3.

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Filed May 26, 1924 4 Sheets-Sheet 2

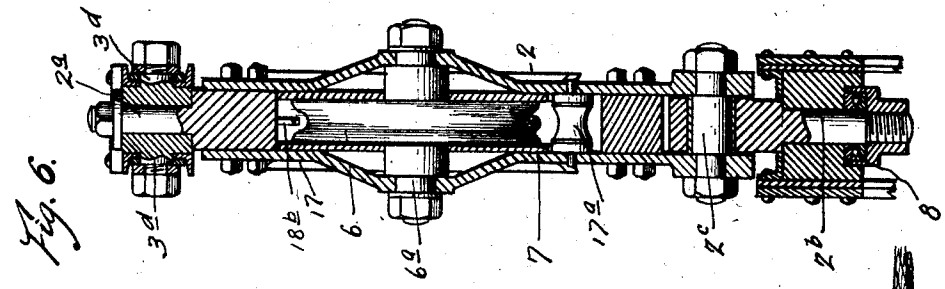


Fig. 6.

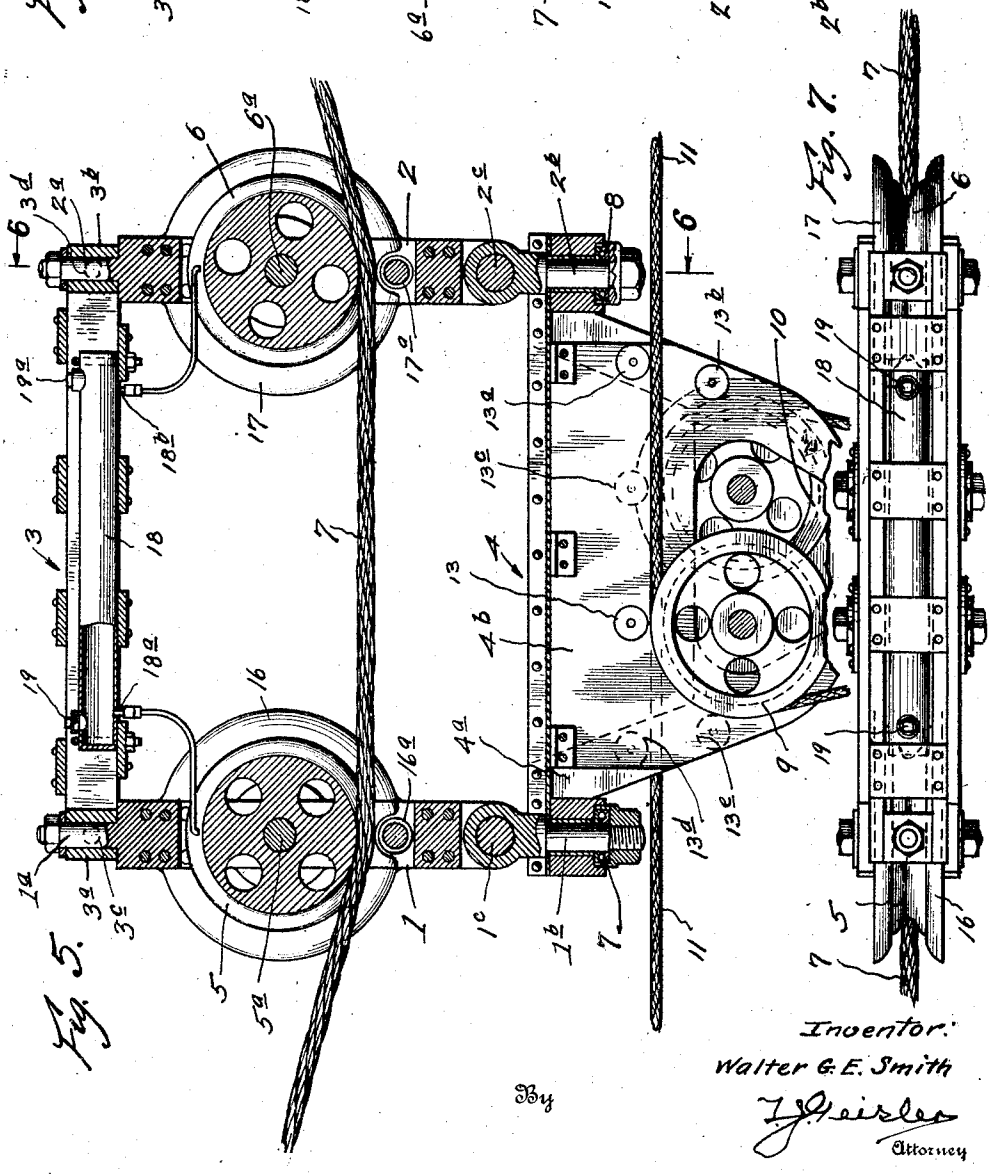


Fig. 5.

Fig. 7.

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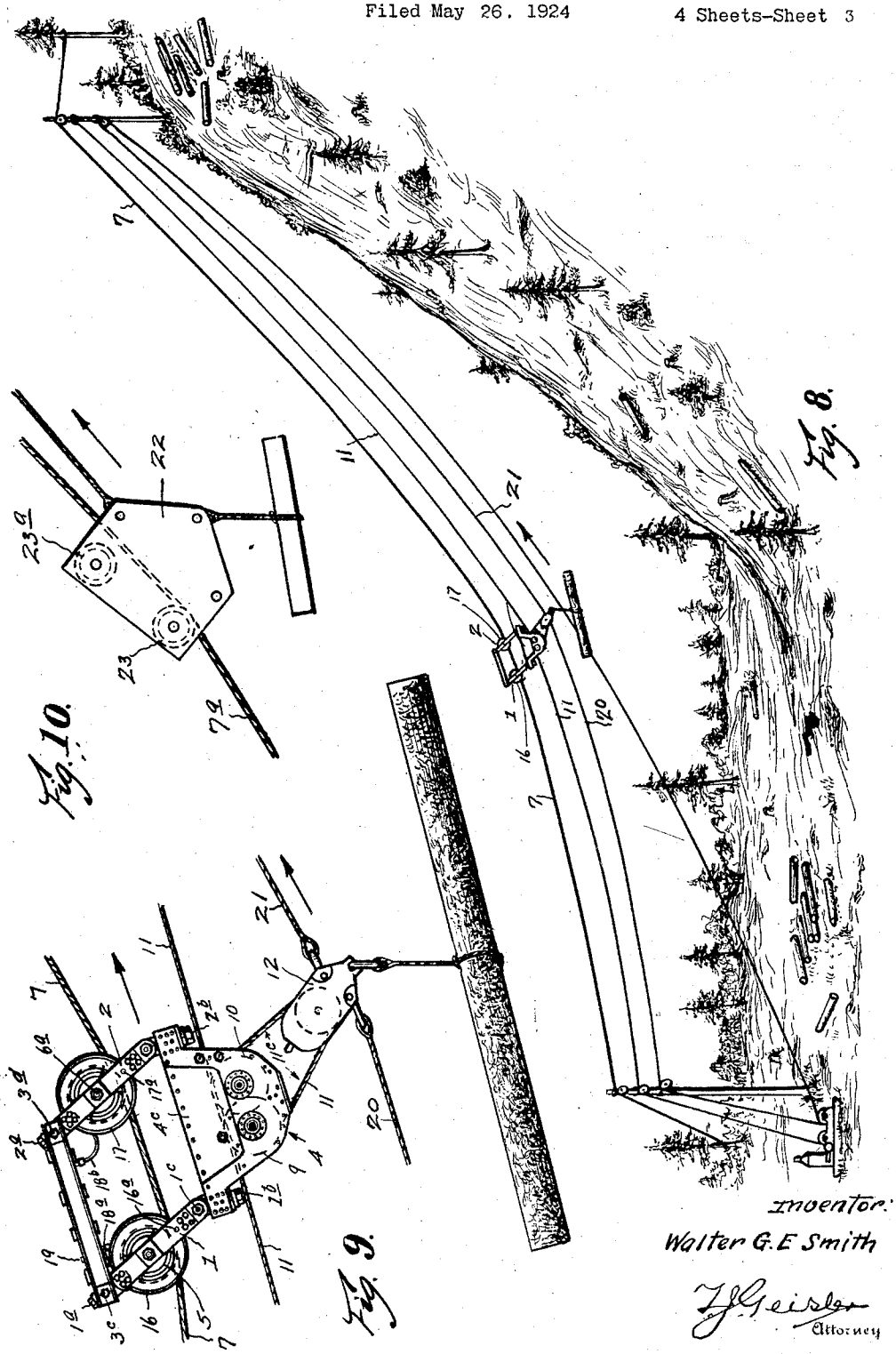


Fig. 8.

Fig. 10.

Fig. 9.

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AERIAL CABLE CARRIER FOR HEAVY DUTY

Filed May 26. 1924 4 Sheets-Sheet 4

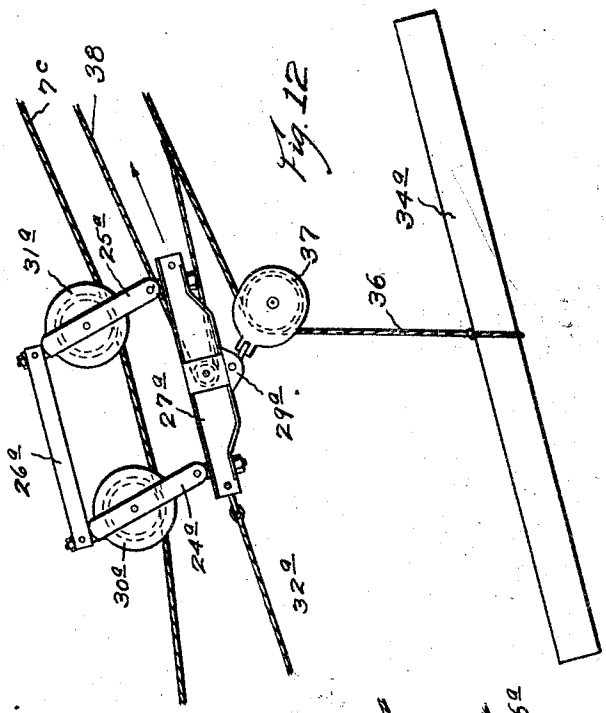


Fig. 12

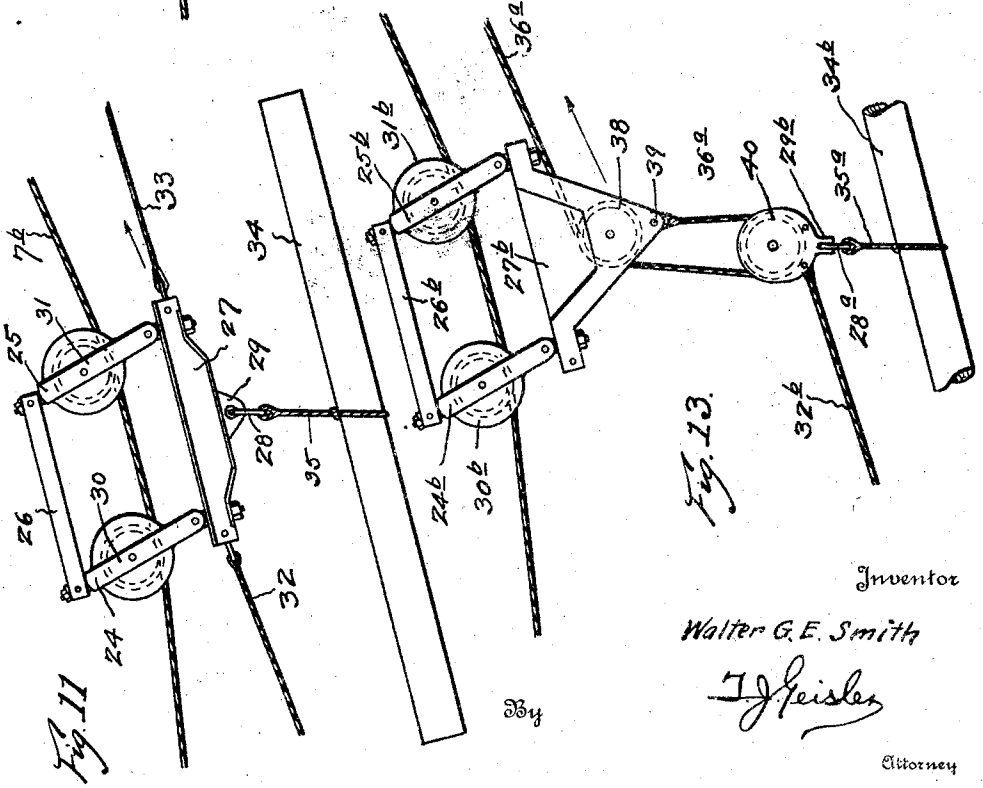


Fig. 13.

Fig. 11

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Patented Aug. 25, 1925. 1,551,223

UNITED STATES PATENT OFFICE.

WALTER G. E. SMITH, OF PORTLAND, OREGON.

AERIAL CABLE CARRIER FOR HEAVY DUTY.

Application filed May 26, 1924. Serial No. 715,911.

To all whom it may concern:

Be it known that I, WALTER G. E. SMITH, a citizen of the United States, and a resident of Portland, county of Multnomah, and State of Oregon, have invented a new and useful Improvement in Aerial Cable Carriers for Heavy Duty, of which the following is a specification.

My invention relates to an overhead carrier to be used for carrying heavy loads such, for example, as in logging operations.

As well known, the cable and its maintenance constitutes an important factor in an aerial carrier system. Heretofore the body of the carrier comprised generally two rigid spaced sides between which the sheaves were rotatably mounted on transverse fixed axles. The sheaves were therefore held to alinement with a straight line. On the other hand, the cable tended to flex laterally as well as vertically, more or less. Hence, when the carrier runs over a section of the cable in which the lateral curves occur, the flanges of the rim of the sheaves were disposed at an angle relatively to the sides of the cable, and subjected the latter to undue wear, greatly shortening its life and correspondingly increasing the cost of maintenance of the overhead carrier system, as well as increasing the drag which must be overcome by the engine.

The main object of my invention is to eliminate the said undue wear of the cable and sheaves.

I attain this object of my invention by providing the body of the carrier with flexible sheave mountings, adapted to permit the sheaves to follow the lateral curves in that section of the cable over which the carrier is running, thus permitting the flanges of the sheaves to follow the curvatures of the cable in substantially parallel relation therewith.

Another undesirable feature of aerial carriers is that when the carrier is drawn along the track especially on steep grades, the pull tends to lift one end thereof off of the track, and thus the carriage will tend to ride on one end only. The load also tends to tip the carriage longitudinally when the track cable is inclined at an angle with a horizontal plane. With one end of the carriage free to swing, the carriage can pivot with the swaying of the load and thus cause the sides of the sheaves and the guides to cut into the track cable as well as to impose severe strains on the single supporting sheave and its connections. Therefore, the further object of my invention is to remedy such undesirable conditions. I attain this object by providing a carrier body comprising spaced vertical members, and upper and lower horizontal members having articulate connections with said vertical members, such connections being adapted to permit the vertical members to assume angular positions in the vertical plane relatively to said horizontal members, and to swivel on vertical axes, thus permitting the frame members of the carrier as well as the sheaves to assume any position which will accommodate curves in the cable whether occurring in a vertical plane, or any plane making an angle with the latter.

The details of construction of my invention are hereinafter described, with reference to the accompanying drawings in which:

Fig. 1 is a side elevation of my improved aerial carrier and shows the relative position of the cables;

Fig. 2 is an end elevation of the carrier;

Fig. 3 is a vertical section taken along the line 3—3 of Fig. 1;

Fig. 4 is a detail elevation of a fall block which the aerial carrier supports;

Fig. 5 is a longitudinal vertical section taken along the line 5—5 of Fig. 2;

Fig. 6 is a larger scaled transverse vertical section taken along the line 6—6 of Fig. 5;

Fig. 7 is a plan view of the device; and

Fig. 8 is a diagrammatic representation of a typical arrangement of my device when my aerial carrier is used in logging operations.

Fig. 9 is a diagrammatic representation of my aerial carriage when affected by forces tending to lift one of its ends,

Fig. 10 is a diagrammatic representation of a rigid type of carriage affected by similar forces.

Figs. 11, 12 and 13 illustrate diagrammatically different modifications of my invention adapted to various manners of rigging.

My improved aerial carrier is provided with a body made up of two vertical members 1 and 2, an upper horizontal member 3

and a lower horizontal member 4, the ends of said members being pivotally connected together. The vertical members 1 and 2 constitute blocks for the track sheaves 5 and 6 respectively, which are mounted upon sheave pins 5^a and 6^a respectively, said sheaves ride upon the track cable 7 and support the body of the aerial carrier. The track cable 7 constitutes a guide way for the aerial carrier upon which the carrier moves. The connections between the horizontal and vertical members are pivoted and are preferably of the universal joint type so as to permit relative movement in any direction.

The vertical member 1 is provided with longitudinally disposed trunnions 1^a and 1^b at each end, the trunnion 1^a being provided on the upper end of the member and the trunnion 1^b at its lower end. The vertical member 2 is provided with similar trunnions 2^a and 2^b. At each forked end of the upper horizontal member pivoted blocks 3^a and 3^b are mounted, and the trunnions 1^a and 2^a are respectively journaled in these blocks. Said blocks 3^a and 3^b are pivotally mounted for rotation about a horizontal axis, upon the integral trunnions 3^c and 3^d. These trunnions are arranged normal to said trunnions 1^a and 1^b as is shown in Fig. 6, and thus provide pivotal connection which permit relative movement between the members in any direction. The trunnions 1^b and 2^b are also pivotally connected to the vertical members 1 and 2, respectively, they being rotatably mounted on pins 1^c and 2^c carried by the lower end of the members 1 and 2 respectively. Said trunnions 1^b and 2^b are journaled for rotation about a vertical axis at the opposite ends of the lower horizontal member 4. A thrust bearing 7 is provided on the end of the trunnion 1^b and a similar bearing 8 is provided on the end of the trunnion 2^b. These thrust bearings are preferably of the ball roller type so as to permit a freer movement. The lower horizontal member 4 is preferably made up of three spaced plates 4^a, 4^b and 4^c, respectively, so that load supporting sheaves 9 and 10 may be mounted for rotation therein. The sheave 9 is mounted between the members 4^b and 4^c and the sheave 10 is mounted between the members 4^a and 4^b. The cable 11, as a load lifting line, is hooked about said sheaves forming a loop 11^c in which the fall block 12 is mounted, as shown in Fig. 4. The cable 11 passes horizontally over the upper surface of the sheave 10 as shown in Fig. 5, hangs pendent therefrom in the loop 11^c, passes about the fall block 12 and passes up over the left hand side of the sheave 9, as shown in the figure, and over the top in a horizontal plane. Guide rollers are provided for said cable. Three of the rollers 13, 13^a and 13^b, are mounted between the plates 4^b and 4^c, and the three remaining rollers 13^c, 13^d and 13^e, are mounted between the plates 4^a and 4^b. The rollers 13^a and 13^d hold the cable against the sheaves 9 and 10, respectively. Guard plates 14 and 15 are mounted on the opposed faces of the plates 4^a and 4^c, as shown in Fig. 3, which co-operate with the rollers 13^a and 13^d, respectively, for directing the cable on to the sheaves 9 and 10, respectively. The sheave 9 is mounted for rotation upon a sheave pin 9^a and the sheave 10 on a similar sheave pin 10^a. These sheave pins pass through all of the plates 4^a and 4^b and 4^c to receive the support of both of the relatively thick side plates 4^a and 4^c. The middle plate 4^b is provided only to separate the sheaves and to provide supports for one end of the rollers 13 to 13^e, inclusive. The vertical members 1 and 2 are also provided with guard plates 16 and 17 which, with the guide rollers 16^a and 17^a, serve to guide the cable on to the sheaves 5 and 6 respectively.

The upper horizontal member 3 is preferably a built-up structural member and encloses a recess in which a reservoir 18 for lubricating oil is held. A supply of lubrication can be held in this reservoir 18 and be directed, through the outlets 18^a and 18^b, on the sheaves 5 and 6, respectively, and the lubrication thus deposited on the sheaves 5 and 6 will be transferred to the track cable 7. The track cable 7 being lubricated or covered with a coating of oil or grease is thus better prepared to withstand the effects of corrosion and also provides a more effective surface on which the track pulleys or sheaves may operate. The reservoir 18 is provided at each end with fittings 19 and 19^a through which the reservoir 18 may be filled with a lubricant. These fittings are preferably of that type which are adapted for connection with a pressure operated lubricating device.

The aerial carrier is drawn along the track cable 7 by cables 20 and 21 which are fastened to opposite sides of the fall block 12 as shown at Fig. 9. As before mentioned, the load is lifted relatively to and from the ground by the tightening and slackening of the cable 11. The tightening of the cable tends to eliminate the loop 11^c and thus tends to raise the load further away from the ground.

The track cable 7, especially when used in logging operations, is suspended at points a substantial distance above the ground. Usually the points of connection differ in elevation, for example, one end of the cable may be on top of a hill and the opposite end may be attached to a support in a ravine and thus the cable makes a substantial angle with a horizontal plane.

The weight of the cable tends to curve the same and when there is a difference in ele-

vation between the supports this curve is not a uniform arc, and thus when the carriage is pulled along the cable, the difference in curvature tends to cause the carriage to be tipped gradually as it moves from one end of the cable to the other. When a track cable makes a substantial angle with a horizontal plane, the pulling of the cable 20 or 21, when it pulls the carriage along, tends to rock the carriage longitudinally so that it tends to lift one wheel from the track cable. If the sides of the carriage, as 22, which constitute the support for the track cable pulleys 23 and 23^a, are rigid, the forward pulley 23^a is actually lifted from the cable 7^a, as diagrammatically illustrated in Fig. 10, and this permits the free end of the carriage to be pivoted about by the swaying of the load and causes the side members 22 to strike and cut into the cable 7^a, which causes the cable and side members to be worn unduly. The swaying of the logs with the track also tends to lift one track cable pulley from engagement with the track. The lifting of one pulley not only results in the cutting of the track cable but also in severe twisting strains about the connections between members, when all of the weight of the carriage and of the load are carried on one of the members instead of being equally divided on both.

When aerial carriers are used in logging operations they must be of massive and correspondingly expensive construction, and thus if the severe strain should result in the fracture of any part, which would cause the carrier to be rendered inoperative, a substantial loss would be incurred by the operating company. In my construction, in which the joints are permitted to yield when acted upon by these forces, as shown in Fig. 9, and the load and the carriage are permitted to assume their natural positions, the undue strain on the carriage is eliminated and the carrier is not so apt to become broken, nor will parts have to be replaced as often.

When the cable is curved laterally, also, the track cable sheaves are permitted to rotate about a vertical axis so as to remain parallel to the sides of the track cable without tending to bite into the track cable and cut the same. This not only tends to lengthen the life of the track cable and thus cut down the expense of replacement, but also tends to cause the carrier to move along the track by the application of less power and thus permits the use of the smaller engines to perform this work.

I do not wish to be limited to the arrangement of the cables and sheaves, that I have shown, because my aerial carrier is equally adaptable for use in any of the standard systems of logging or aerial conveying.

My invention is not limited to the preferred type of carriage hereinbefore described in which two sheaves are mounted on the lowermost horizontal member. In Figs. 11 to 13 inclusive, I illustrate how my invention may be incorporated in other types of carriages now in common use.

In Fig. 11 the vertical members 24 and 25 are connected to the horizontal members 26 and 27 through universal joints and the load 34 is suspended from a link 28 fastened through an eye 29 formed on the under face of said lower horizontal member 27. As in the carriage previously described, the track sheaves 30 and 31 are journaled in the vertical members 24 and 25, respectively, which act as sides for these pulleys. In this type of carriage the carriage is drawn along the track cable 7^b in either direction by the haul-in lines 32 and 33. The load 34 is supported by a choker 35 and if it is necessary to move the load 34 vertically this is accomplished by tightening or slackening the track cable 7^b.

In Fig. 12 the vertical members 24^a and 25^a are connected by universal joints to the upper horizontal member 26^a and the lower horizontal member 27^a. The track sheaves 30^a and 31^a are journaled in the vertical member 24^a and 25^a and ride upon the track cable 7^c. In this type of carriage the load lifting line 36 is mounted over a block 37 fastened to an eye 29^a on the lower side of the horizontal member 27^a. A control line 38 is fastened to the loading line 36 some distance in advance of the point at which the loading line passes over the pulley 37 and the free end of this line 38 is wound about the drum of the control hoist, as is the load lifting line 36. The load 34^a is lowered vertically towards the ground by drawing in the cable 38 which moves its point of connection with the cable 36 closer to the point at which the cable 36 passes over the block 37. To lift the load 34^a further from the ground the cable 38 is slackened so as to permit its point of connection with the load lifting line 36 to be moved further away from the block 37 and thus when the carriage is drawn along by a pull on the load lifting line 36 the log will be lifted further from the ground. It is obvious that the cable 38 thus operates merely as a stop against which the load lifting line 36 pulls when it draws the carriage along the track 7^c.

In Fig. 13 the carriage is made up of horizontal members 24^b and 25^b, an upper horizontal member 26^b and a lower horizontal member 27^b. As in the other carriages, the track sheaves 30^b and 31^b are journaled in the vertical members 24^b and 25^b respectively. In this type of carriage, however, a sheave 38 is rotatably mounted in the lower horizontal member 27^b and a connection 39 is formed on the under face of this member for the load lifting line 36^a. The load lifting line is formed in a loop in which the fall block 40 rides and the cable in passing from

this loop is mounted over the sheave 38. The haul-in line 32^b is fastened to the fall block 40 and is arranged in the opposite direction to the load lifting line 36^a. The length of the loop in the cable 36^a is determined by the amount of tension of the haul-in line 32^b when the carriage is being moved in the direction of the arrow. That is, the carriage is drawn along by pulling in the line 36^a and by holding back on the line 32^b, the length of the loop in the line 36^a is maintained. Thus to increase the loop, the force tending to hold back the line 32^b is increased and obviously to decrease the length of the loop the holding back force is decreased. The load 34^b is supported by a choker 35^a which is fastened to a line 28^a in an eye 29^b formed on the under side of the fall block 40.

I claim:

1. In an aerial carrier of the character described, spaced sheaves, alined vertical sheave mountings carrying said sheaves, upper and lower horizontal members pivotally connecting the ends of said mountings, the pivot axis of each of said mountings extending substantially diametrically through the sheaves carried thereby.

2. In an aerial carrier, a body comprising spaced vertical members and upper and lower horizontal members having articulate connections with said vertical members, such connections adapted to permit the vertical members to assume angular positions in a vertical plane relatively to said horizontal members and to swivel on vertical axes, and a sheave rotatably mounted in each vertical member.

3. In an aerial carrier, a body comprising spaced vertical members and upper and lower horizontal members, the latter being connected to said vertical members by universal joints, and a sheave rotatably mounted in each vertical member.

4. In an aerial carrier, a body comprising spaced vertical members and upper and lower horizontal members having articulate connections with said vertical members, such connections adapted to permit the vertical members to assume angular positions in a vertical plane relatively to said horizontal members and to swivel on vertical axes, a sheave rotatably mounted in each vertical member, a sheave element suspended from said body.

5. In an aerial carrier, a body comprising spaced vertical members and upper and lower horizontal members having articulate connections with said vertical members, such connections adapted to permit the vertical members to assume angular positions in a vertical plane relatively to said horizontal members and to swivel on vertical axes, the latter being connected to said vertical members by universal joints, a sheave rotatably mounted in each vertical member, a sheave element suspended from said body.

6. In an aerial carrier of the character described a body comprising upper and lower horizontal members provided with forked ends, pieces pivoted in said forked ends, vertical members jointedly connected to said pieces, a sheave rotatably mounted in each vertical member.

7. In an aerial carrier of the character described a body comprising upper and lower horizontal members provided with forked ends, pieces pivoted in said forked ends, vertical members jointedly connected to said pieces, a sheave rotatably mounted in each vertical member, a sheave element suspended from said carrier body.

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