July 29, 1924. 1,502,997

H. H. B. MARRIAN ET AL

AERIAL TRANSPORTER

Filed Dec. 23, 1922 2 Sheets-Sheet 1

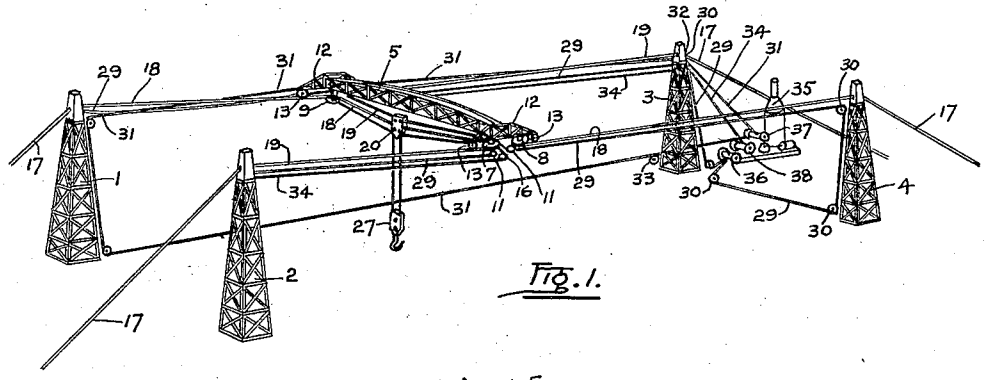

Fig. 1.

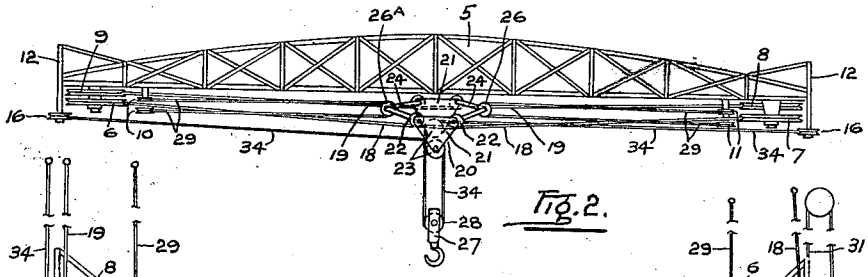

Fig. 2.

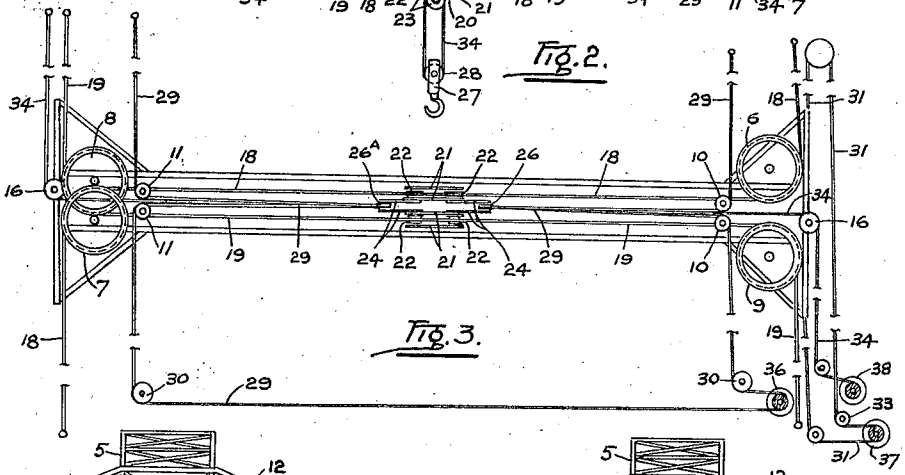

Fig. 3.

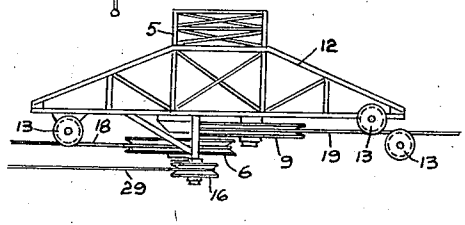

Fig. 4

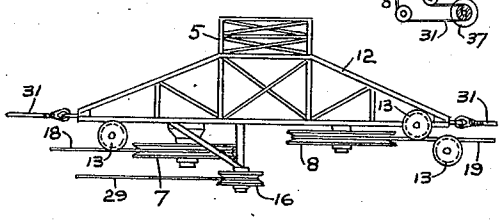

Fig. 5.

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HARRY HERBERT BLAKEMORE MARRIAN
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AERIAL TRANSPORTER

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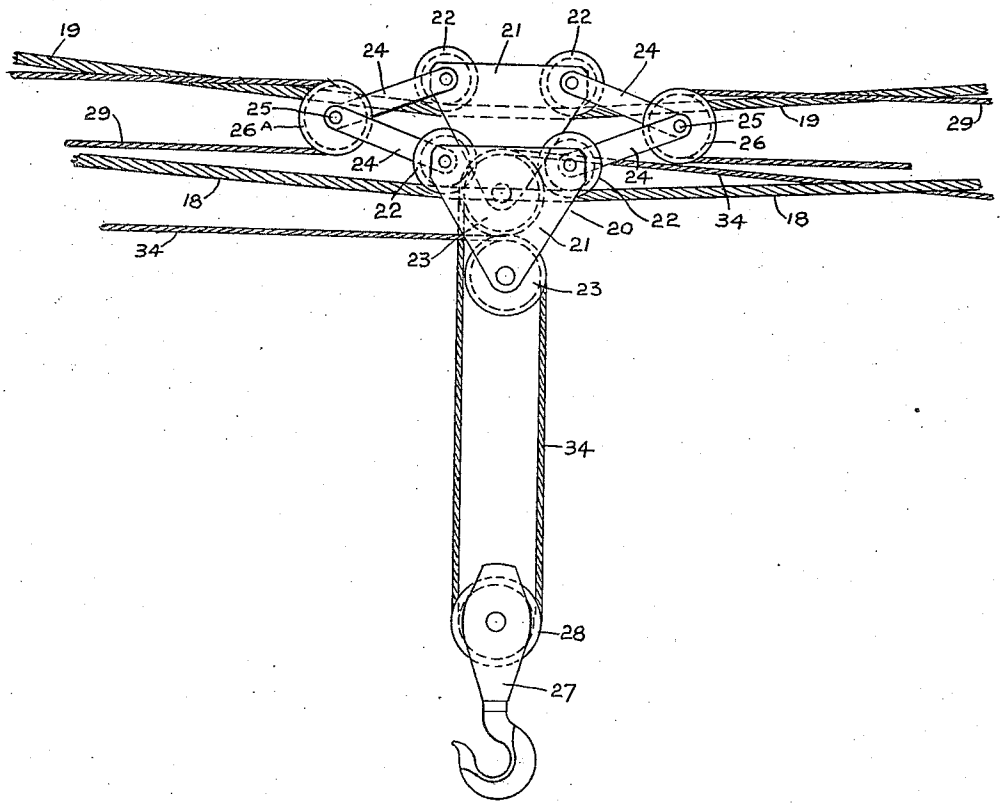

Fig. 7.

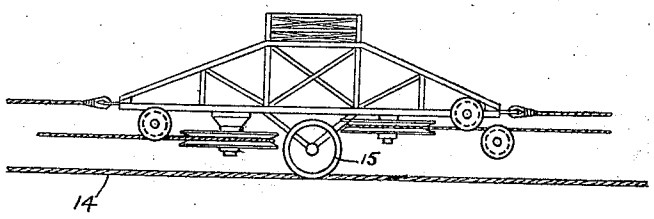

Fig. 6.

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UNITED STATES PATENT OFFICE.

HARRY HERBERT BLAKEMORE MARRIAN AND ERNEST EDWARD CARVER, OF VANCOUVER, BRITISH COLUMBIA, CANADA.

AERIAL TRANSPORTER.

Application filed December 23, 1922. Serial No. 608,783.

To all whom it may concern:

Be it known that we, HARRY HERBERT BLAKEMORE MARRIAN and ERNEST EDWARD CARVER, both subjects of the King of Great Britain, and residents of the city of Vancouver, in the Province of British Columbia, Canada, have invented certain new and useful Improvements in Aerial Transporters, of which the following is a specification.

Our invention relates to improvements in aerial transporters, and has for its objects the handling of loads over a given area in a safe and expeditious manner, in which the novel principle of using a transverse member designed to withstand end compressional strains is substituted for the hitherto common use of a girder upon a rigid trackway for supporting the load to be carried, whereby a great reduction is effected in the weight of the transverse member and all other structural parts, and the use of aerial cableways is rendered possible. A further object is to provide a cheap and strong aerial transporter which may be readily erected or removed from place to place without scaffolding, thus increasing its usefulness manyfold, and consists of a set of towers supporting one or more pairs of cables and a transverse member between the opposite ends of which is supported a load carriage, as will be more fully described in the following specification, in which:—

Fig. 1 is a perspective view of our invention.

Fig. 2 is a longitudinal view of the traverse strut showing the disposition of the supporting cables and carriage.

Fig. 3 is a plan view showing the arrangement of the several cables supporting the traverse strut, the carriage and the load.

Fig. 4 is a view of one end of the strut and its sheaves.

Fig. 5 is a view of the opposite end of the strut and its sheaves.

Fig. 6 is a view of an end of the strut showing the strut carried upon a supporting track.

Fig. 7 is an enlarged view of the carriage.

In the drawings like characters of reference indicate corresponding parts in each figure.

The numerals 1, 2, 3 and 4 indicate towers of any desired construction which are erected at the corners of the rectangular area which it is desired to encompass with the transporter.

5 indicates, in general, the traversing strut which is formed in such a manner that the strains imposed thereon are in direct endwise compression. 6, 7, 9 and 9 are sheaves rotatably and horizontally mounted adjacent the ends of the strut 5, around which the aerial cables lead. 10 and 11 are sheaves rotatably mounted in a horizontal plane beneath the strut 5 adjacent its ends, the purpose of which will hereinafter appear. 12 indicates end trusses of the strut 5 on the cord of which guide sheaves 13 are suitably mounted. Where the span between the supporting towers is excessive or the loads to be carried are great, it may be preferred to employ additional aerial track cables 14, see Fig. 6, one extending between towers 1 and 3 and the other between towers 2 and 4, upon which cables supporting sheaves 15 would run, being suitably mounted under opposite ends of the strut 5 for the purpose of relieving the tension upon the cables. 16 indicates a further pair of horizontally disposed sheaves mounted under opposite ends of the traversing strut 5 upon and around which the load raising cable leads.

17 are ropes secured to the top of the towers 1, 2, 3 and 4 leading to suitable ground anchorages. 18 is a cable secured to and extending horizontally from the top of tower 1 around sheave 6 thence lengthwise of and under strut 5 passing around sheave 7 and thence to the top of the tower 4 to which it is secured.

19 is a similar cable secured to and extending from the top of tower 2 around sheave 8 under strut 5 around sheave 9 and to the top of tower 3 to which it is secured.

It will thus be seen that the cables 18 and 19 each lead from a tower to opposite ends of the strut 5 under the full length of which the cables run parallel to each other and on reaching the ends of the strut the cables lead to a tower diagonally opposite the one that they each started from, thereby bringing the strut into endwise compression while it is suspended upon the cables. It will also be apparent that while the cables extend between diagonally opposite towers the strut is permitted free transverse movement between the towers 1

and 2 and the towers 3 and 4 it must by this method of suspension remain at a given angle to a line drawn between the towers 1 and 3 and the towers 2 and 4 irrespective of its position. 20 indicates generally the carriage, see Fig. 7, which supports the load and transports it lengthwise of the strut 5, and which consists of two pairs of plates 21 triangular in form, each pair being spaced apart and having a pair of rope sheaves 22 rotatably mounted between the plates adjacent the upper angles thereof, and a sheave 23 mounted in a similar manner at the lower extremity of the pair of plates. 24 are pairs of links each link is pivotally connected at its inner end to a side plate adjacent each of the sheaves 22, the outer ends of each pair being connected together by a hinge pin 25, which also serves as a pivot upon which is rotatably mounted a sheave 26 or 26A.

The load is suspended from the carriage by the cable passing over the sheaves 23, such load and the weight of the carriage being equally borne by each of the cables 18 and 19 upon which the sheaves 22 run. 27 is a hoisting block of ordinary construction having a rope sheave 28 rotatably mounted therein.

29 indicates the cross traversing cable one end of which is attached to the head of tower 1 from whence it is taken to and around sheave 10 at one end of the strut 5 thence around sheave 26 on the carriage 20 and around a further sheave 10 at the strut end, thence to a sheave 30 at the head of towers 3 from whence it is passed around a drum 36 of the winding engine 35 from which it may be hauled in or paid out from as desired and from which the cable then leads through suitable pulleys to a sheave 30 at the head of tower 4 thence to one sheave 11 at the opposite end of the strut 5 through to and around sheave 26A on the opposite side of the carriage 20, back to the other sheave 11 and from thence to the head of tower 2 where it is secured.

The simultaneous hauling in of one side and paying out of the opposite of the intermediate portion of cable 29 imparts movement to the carriage endwise of the strut 5 as desired.

31 is the length traversing cable, one end being attached to a strut end in any desired position, see Fig. 5, from whence it is taken to the head of tower 3 over a block 32, see Fig. 3, around the drum 37 of the winding engine, and back over a further block 33, through to the head of tower 1 around a suitable block thereon and its opposite extremity being attached to any desired portion of the strut end from which it is first connected so that by simultaneous hauling in of one side and paying out of the opposite side of the intermediate portion of the cable 31 the strut 5 is caused to move along the cables 18 and 19 between the towers 1 and 2 and the towers 3 and 4.

34 indicates the lift cable one end of which is secured at the head of tower 2 from whence it leads around a sheave 16 at one end of the strut 5 thence lengthwise of the strut and over one sheave 23 of carriage 20 dropping perpendicularly to and around sheave 28 of hoisting block 27 and upwardly to the further sheave 23 of the carriage, thence horizontally to the opposite end of strut 5 around a further sheave 16 and through a suitable block at the head of tower 3 and down to a drum 38 of the winding engine around which it is wound to raise the load or paid out to lower it.

35 is a winding engine of any desired type having drums 36, 37 and 38 each of which are operable independently of the others in forward or reverse direction. The drum 36 operates the cable 29 to impart movement to the carriage lengthwise of the cables 18 and 19 to any desired position intermediate the length of the strut 5.

The drum 37 operates the cables 31 to move the transverse strut 5 between the pair of towers 1 and 2 and the pair 3 and 4. The purpose of the drum 38 is to raise or lower the hoisting block 27 and its load.

Having thus described the several parts of our invention, we will now explain its use.

Our transporter would preferably be erected for use on a rectangular area though it could be used efficiently on any area which is a parallelogram. In ordinary cases four supporting towers would suffice but in cases where an area of great length is to be covered we may prefer to erect one or more towers between the towers 1 and 3 and the towers 2 and 4, in order to reduce the sag of the various cables.

Attention is here drawn to the arrangement of the cables 29, 31 and 34 whereby they are each adapted to exert their respective efforts through interrelated moving parts of the transporting mechanism, yet the operation of any one of them does not effect the set of either of the other two.

Assuming a load to be situated adjacent the foot of tower 1 and it being desired to transport it to a loading point adjacent tower 4, the drum 37 of the winding engine hauls in one side and pays out the opposite side of cable 31 imparting movement to the strut 5 along the cables 18 and 19 until it is above the load to be raised.

The hoisting block 27 is attached to the load and the cable 34 is wound upon the drum 38 raising the load to a sufficient height and is there held, the drum 38 remaining stationary, one side of the cable 31 is wound upon the drum 37 whilst the

opposite side is being paid out, drawing the strut 5 in the direction of the towers 3 and 4.

Simultaneously, if desired, a side of the cable 29 is wound upon drum 36 and the opposite side paid out from the drum, thereby imparting movement to the carriage along the track cables 18 and 19 below the strut 5 to bring it adjacent that end thereof nearest to tower 4, when on paying out of the cable 34 the load is lowered in its desired position.

It will be noted from the foregoing that the vertical position of the hoisting block is in no wise affected by the movement of the carriage lengthwise of the strut or of the movement of the strut lengthwise of the side cables 18 and 19.

It will thus be seen that we have devised a transporter which can be economically erected and operated, and which possesses amongst other advantages over those of the gantry principle, unobstructed access on both sides and both ends to the area over which it works, making it equally valuable for water front loading as for yard work.

What we claim as our invention is:

1. The combination with a series of corner supports of cable means extending between the corner supports, a transversely arranged strut carried by said cables, said cable means having load carrying portions thereof extending horizontally between opposite ends of the strut.

2. The combination with a series of corner supports of a pair of cables extending from two of the corner supports to the corner supports diagonally opposite, a transverse strut having its ends engaged with said cables and serving to maintain the cables in parallel relation to each other and load supporting cable means extending horizontally between opposite ends of the strut.

3. The combination with a series of corner supports, of a transversely movable strut, a pair of cables extending from a pair of corner supports to opposite ends of the strut, thence extending lengthwise of the strut in opposite directions and from thence to the corner supports diagonally opposite to those from which each cable started, and means carried by those portions of the cables which extend lengthwise of the strut for supporting the load.

4. In an aerial transporter, corner supports, a transversely movable strut, parallel cableways extending between the corner supports and lengthwise of the strut and cable means for moving the strut transversely of itself and longitudinally of those portions of the cableways extending directly between the corner supports.

5. In an aerial transporter, corner supports, a traversing strut, parallel cableways extending between the corner supports and lengthwise of the strut, means for moving the strut transversely of itself and longitudinally of those portions of the cableways extending directly between the supports, and a load carriage movable longitudinally of the strut and carried upon said cableways.

6. In an aerial transporter corner supports, a traversing strut, parallel cableways extending between the corner supports and lengthwise of the strut, means for moving the strut transversely of itself and longitudinally of those portions of the cableways extending directly between the corner supports, a load carriage movable longitudinally of the strut and carried upon said cableways and means for raising and lowering a load suspended from said carriage.

7. In an aerial transporter, corner supports, a traversing strut and a pair of cables extending between diagonal corner supports and having an intermediate portion of each cable extending longitudinally beneath the strut, and engaging means between the cables and strut whereby the strut is adjustably carried by holding the strut under longitudinal compression from each end thereof.

8. In an aerial transporter, the combination with the traversing strut and a pair of supporting cables having portions thereof extending longitudinally beneath the strut at different levels, and a carriage comprising two members, one of which is carried on each cable portion, a link connection between the members, and cable means co-acting with the link members to adjust the carriage longitudinally of the aforesaid cable portions.

9. In an aerial transporter, the combination with the traversing strut and a pair of supporting cables having portions thereof extending longitudinally beneath the strut at different levels and a carriage comprising two members, one of which is carried on each cable portion, a link connection between the members, cable means co-acting with the link members to adjust the carriage longitudinally of the aforesaid cable portions, and independent means for raising and lowering the load suspended from the carriage.

Signed at Vancouver, B. C. this 30th day of November, 1922.

HARRY HERBERT BLAKEMORE MARRIAN.
ERNEST EDWARD CARVER.

Witnesses:
HARRY PEARMAN WIRKINE,
J. J JOHNSTON.