June 20, 1944. W. G. WEHR 2,351,727

CARRIER FOR OVERHEAD CONVEYER SYSTEMS

Filed March 11, 1943 2 Sheets-Sheet 1

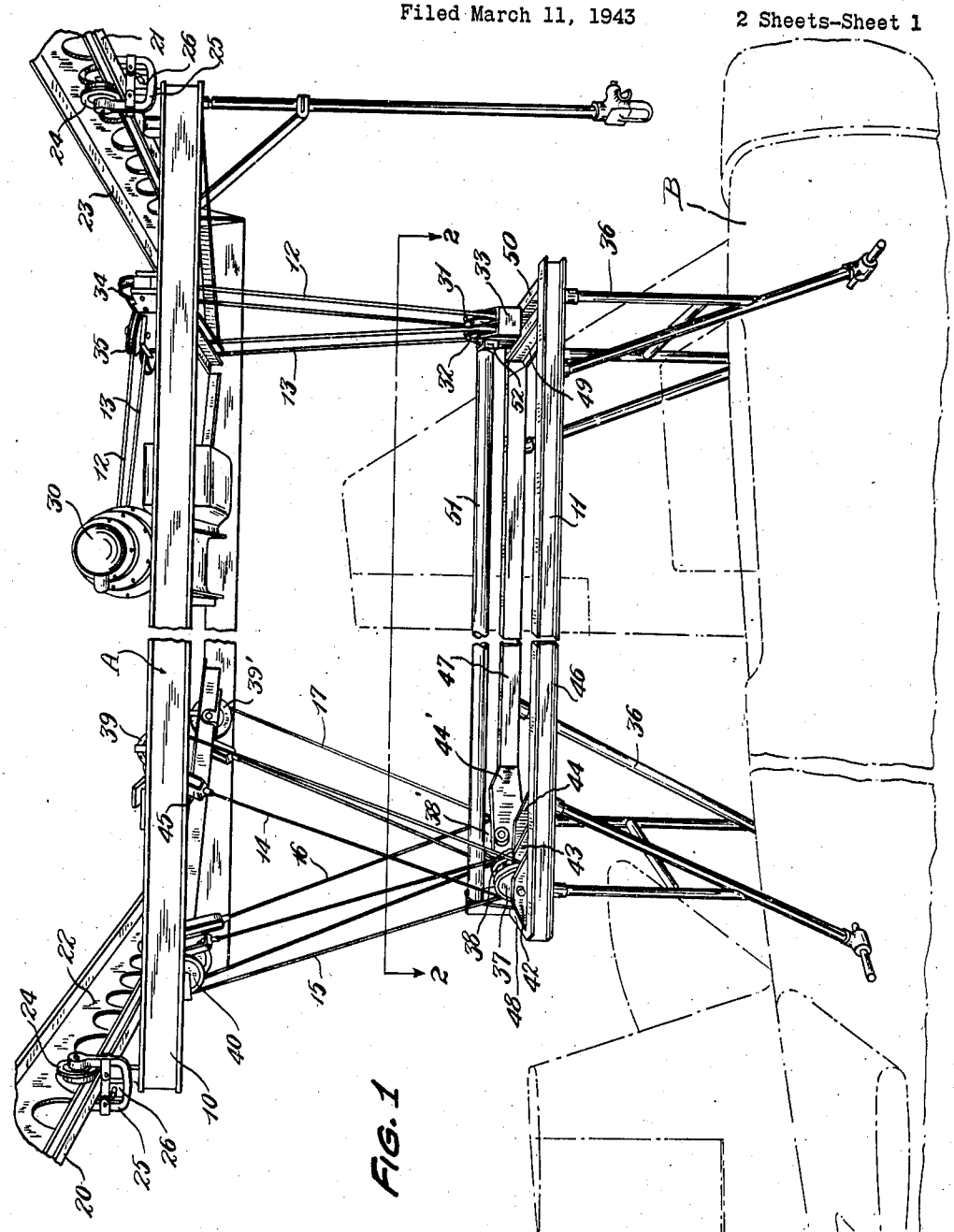


FIG. 1

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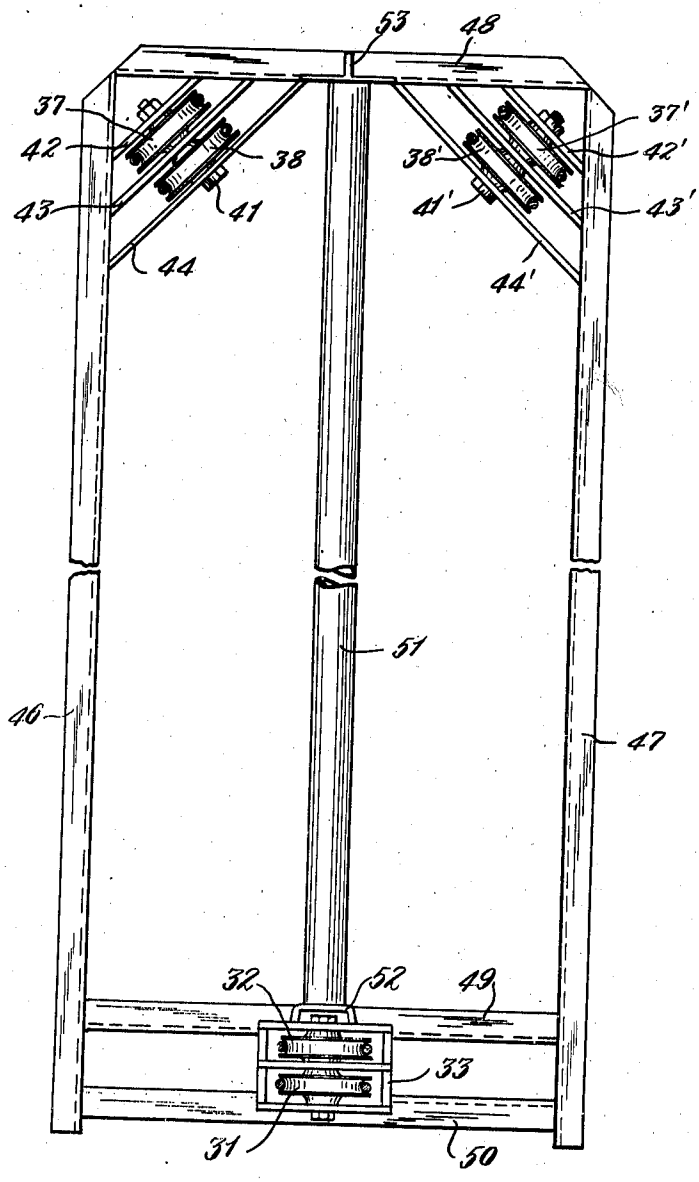


FIG. 2

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CARRIER FOR OVERHEAD CONVEYER SYSTEMS

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Application March 11, 1943, Serial No. 478,756

4 Claims. (Cl. 212—126)

The present invention relates to material handling overhead tramrail systems and more particularly to an overhead movable crane or carrier, including a cable-suspended load-carrying member. In some aspects, the invention may be considered as an improvement on the device disclosed in a copending application of Arthur L. Medenwald, Serial No. 402,888.

The aforesaid Medenwald application discloses a frame or platform, commonly called a load member, adapted to have a load placed thereon or affixed thereto, suspended from an overhead movable support by means of three pairs of cables. The respective cables of each pair are operatively connected to the overhead movable support at spaced points and to the load member at substantially the same point. The general shape of the load member shown is that of an elongated rectangle and one pair of cables is connected thereto at or adjacent to the center of one end thereof while the other two pairs of cables are connected thereto adjacent to the opposite corners of the other end. The suspension cables are attached to hoist mechanism, which makes it desirable to have the suspended load member as light as possible consistent with other requirements.

When a load, such as persons on a platform, or an airplane being moved along an assembly line and attached thereto as by fixtures or the like connected to the respective corners of the load member, is carried by an elongated rectangularly-shaped load member suspended from an overhead movable support in the manner shown in the aforesaid application, any shifting of the load, particularly at the end where the single pair of cables is attached to the load member, produces torsional strains in the load member which may cause movement thereof and, in turn, movement of the load. Any material or appreciable twisting of the load member with a resulting movement of the load defeats the purpose of the suspension referred to.

With the foregoing in mind, the principal object of the present invention is the provision of a novel material or load handling device of the character referred to comprising an extremely light rigid load member.

The invention resides in certain details of construction and combinations and arrangements of parts, and further objects and advantages thereof will be apparent from the following description of the preferred embodiment described with reference to the accompanying drawings forming a part of the specification, in which similar reference characters designate corresponding parts, and in which:

Fig. 1 is a perspective view of a part of a material handling overhead tramrail system embodying the present invention; and

Fig. 2 is a plan view approximately on the line 2—2 of Fig. 1.

The invention is herein illustrated and described as embodied in a material handling overhead tramrail system of a type manufactured by The Cleveland Crane and Engineering Company and known commercially as "Cleveland Tramrail." However, it is to be understood that the invention is susceptible of various modifications and alternative constructions and is applicable to various types of material handling overhead systems other than the particular type illustrated, such as overhead monorail underslung carrier systems and the like. For the most part, the material handling system shown and described herein is well known in the art and only those parts thereof which are necessary to a complete understanding of the present invention are herein illustrated and described in detail.

Referring to the drawings and particularly to Fig. 1, the reference character A designates generally an overhead movable crane or carrier comprising a movable elongated rectangular frame or support 10 and a load member in the form of an elongated rectangular frame 11 suspended from the overhead movable support 10 by three pairs of cables 12, 13; 14, 15; 16, 17, arranged as tackles. The frame 10 is supported by and movable along a runway comprising parallel inverted T-shaped rails 20, 21 welded to the lower ends of T-shaped beams 22 and 23, respectively. The beams 22 and 23 are suspended from an overhead structure (not shown) in any convenient manner. The frame 10 is suspended from the rails 20 and 21 by four trucks, one of which is located adjacent to each corner of the frame. The trucks are identical in construction and comprise pairs of wheels 24 in engagement with opposite flanges of the inverted T-shaped rails and rotatably supported in the upper ends of U-shaped yoke members 25, which in turn are pivotally connected for rotation about both horizontal and vertical axes to members 26 welded to the frame 10 adjacent to the corners thereof.

One end of each of the cables 12 to 17 inclusive is connected to the cable drum of a motor driven hoist mechanism designated generally by the reference character 30 located on the frame 10. The other ends of the cables are connected to fixed points of the frame 10 from which points the

cables extend downwardly at an angle and around sheaves rotatably connected to the frame 11. From the sheaves on the frame 11 the cables return to the frame 10, parallel with the first reach thereof, where they are guided by suitable sheaves to the cable drum of the hoist mechanism 30. In the embodiment shown, the cables 12 and 13 are connected to the right-hand end of of the frame 10 adjacent to the sides. From the frame 10 the cables extend around sheaves 31 and 32 respectively, which sheaves are rotatably supported in axial alignment in a bracket member 33 welded to the right-hand end of the frame 11 at or adjacent to the center line thereof. From the sheaves 31 and 32 the cables extend upwardly in a direction parallel to the first reaches thereof and, after passing over the sheaves 34 and around guide sheaves 35, are connected to the cable drum of the hoist mechanism.

The pairs of cables 14, 15 and 16, 17 are located at the opposite end of the carrier or crane and are arranged in such a manner that the planes of the respective pairs are angularly disposed with respect to each other, in this instance at approximately a right angle, and intersect each other on the center lines of the frames 10 and 11 extended. The cable 15 is connected to the frame 10 at or adjacent to the center line thereof while the cable 14 is connected to the near side of the frame, as viewed in Fig. 1, an appreciable distance back from the left-hand end. From their connections with the frame 10, the cables 14 and 15 extend downwardly in inclined directions and pass around sheaves 37 and 38, respectively. From the sheaves 37 and 38 the cables return to the frame 10 in a direction parallel to the first reaches thereof, and after passing about suitable guide sheaves including the sheaves 39, 40, they are connected to the drum 30 of the hoist mechanism. The sheaves 37 and 38 are rotatably supported in axial alignment with each other on a shaft 41 extending through plates 42, 43 and 44 welded to the frame 11 and extending angularly across the near left-hand corner thereof. The cables 16 and 17 are connected to the left-hand far corners of the frames 10 and 11 in a manner similar to that in which the cables 15 and 16 are connected to the left-hand near corners of the same members and the construction will not be described in detail. Suffice it to say that the corresponding parts are designated by the same reference characters with prime marks affixed thereto.

From the foregoing description, it will be apparent that the tackles formed by the respective pairs of cables are angularly disposed with respect to each other and that the pairs of tackles lie in intersecting generally vertical planes. In the embodiment shown, the ends of the cables other than those connected to the drum of the hoist mechanism 30, are connected to the frame 10 through the medium of link members 45 pivotally connected to the frame proper, but any other suitable construction can be employed. It is also to be understood that while the cables are arranged to constitute a single tackle, any tackle arrangement other than that shown may be employed. Alternatively, the ends of the cables connected to the frame 10 can be connected to the frame 11 at or adjacent to the points where the sheaves about which they extend are located. The tackles or cables not only serve as suspending means but also constitute guy wires for preventing lateral movement, swinging, etc., of the frame 11 with reference to the frame 10.

Referring to the drawings it will be noted that both corners of the frame 11 at the left-hand end thereof are directly supported by cables while the corners at the right-hand end of the frame 11 are not directly supported since the sheaves 31 and 32 are connected to the frame at or adjacent to the center line thereof. In view of the fact that the corners at the right-hand end of the frame 11 are not directly supported, the frame will tend to twist and lose its stability when loaded adjacent to the corners or when a load adjacent to the corners is shifted. For example, if the device is employed to move an airplane B along an assembly line with the airplane suspended therefrom by fixtures 36 connected to the frame 11 adjacent to the corners thereof, variation in the load, particularly adjacent to the right-hand corners, as viewed in Fig. 1, will tend to twist the frame and in turn cause a movement of the airplane. A shifting load of the character referred to might result from workmen climbing about the outer ends of the wings of the airplane, etc. The advantage of the cable suspension shown is the fact that it is capable of suspending the frame 11, or the load, free from sway, etc. while permitting it to be moved vertically by hoist mechanism, and any twisting of the frame 11 defeats the purpose thereof. However there is a limit beyond which the weight of the frame or load member cannot be increased in an effort to attain stability or rigidity thereof, since the load member constitutes a dead weight on the hoist mechanism and to this extent reduces the weight of the material that can be handled thereby with any given hoist mechanism.

According to the provisions of the present invention the load member is made as light as possible consistent with other requirements. In the embodiment shown this is accomplished by making the frame 11 out of comparatively light structural steel members, in the present instance, longitudinally and transversely extending channel members 46 to 50 arranged as shown in the drawings and welded or otherwise secured together in a suitable manner. The channel members are comparatively light in weight and twisting of the frame formed thereby is prevented by a longitudinally extending torsion resisting member connected to opposite ends of the frame at or adjacent to the center line thereof. As shown, the torsion resisting member comprises the tube 51 the right-hand or lower end of which is welded to a U-shaped bracket 52, which bracket is in turn welded to one side of the bracket 33 which in turn is welded to the cross channels 49 and 50. The other end of the tube 51 is welded to a bracket 53 which in turn is welded to the center of the cross channel 48. The result of the present construction is a very light but extremely rigid load member for a carrier or crane comprising the cable arrangement disclosed.

From the foregoing description of the preferred embodiment of the invention it will be apparent that the objects heretofore enumerated and others have been accomplished and that a new and improved overhead movable crane or carrier including a lightweight rigid load member suspended by a cable arrangement similar to that in the aforementioned Medenwald application has been provided. While the preferred embodiment has been shown and described in considerable detail, it is merely illustrative of the invention and is not to be considered as limiting the invention as various modifications and al-

ternative embodiments will be apparent to those skilled in the art to which the invention relates.

Having thus described my invention, I claim,

1. In apparatus of the character referred to, a movable overhead member, a load member, means comprising three pairs of cables for suspending said load member from said movable overhead member, means for operatively connecting the respective cables of each pair to one of said members at spaced points, means for operatively connecting the respective cables of each pair to the other of said members so that the respective cables of each pair are connected to said last named member at substantially the same point but spaced from and disaligned with the points at which the other pairs of cables are connected thereto, whereby the respective cables of each pair are angularly disposed to each other and the respective pairs of cables lie in non-parallel generally vertical planes, a torsion resisting member connected to said load member adjacent to the place where two of said cables are connected thereto and intermediate the places where the other cables are connected thereto, and means for letting out and taking up said cables.

2. In apparatus of the character referred to, a movable overhead support, a load member comprising an elongated frame, means comprising three pairs of cables for suspending said load member from said overhead support, means for operatively connecting the respective cables of each pair to said overhead support at spaced points, means for operatively connecting the respective cables of one pair to said load member adjacent to the center of one end of said frame and the respective cables of the other pairs of cables to said load member adjacent to opposite corners of the other end of said frame, whereby the respective cables of each pair are angularly disposed to each other and the respective pairs of cables lie in non-parallel generally vertical planes, a torsion resisting member connected to opposite ends of said frame adjacent to the centers thereof, and means for letting out and taking up said cables.

3. In apparatus of the character referred to, a movable overhead support, a load member comprising an elongated frame, means comprising three pairs of cables for suspending said load member from said overhead support, means for operatively connecting the respective cables of each pair to said overhead support at spaced points, means for operatively connecting the respective cables of one pair to said load member adjacent to the center of one end of said frame and the respective cables of the other pairs of cables to said load member adjacent to opposite corners of the other end of said frame, whereby the respective cables of each pair are angularly disposed to each other and the respective pairs of cables lie in non-parallel generally vertical planes, a torsion resisting member in the form of a tube connected to opposite ends of said frame adjacent to the centers thereof, and means for letting out and taking up said cables.

4. In apparatus of the character referred to, an elongated movable overhead support, a load member comprising an elongated frame, means comprising three pairs of cables for suspending said load member from said overhead support, means for operatively connecting the respective cables of each pair to said overhead support at spaced points, means for operatively connecting the respective cables of one pair to said load member adjacent to the center of one end of said frame and the respective cables of the other pairs of cables to said load member adjacent to opposite corners of the other end of said frame, whereby the respective cables of each pair are angularly disposed to each other and the respective pairs of cables lie in non-parallel generally vertical planes, a torsion resisting member in the form of a tube connected to opposite ends of said frame adjacent to the centers thereof, and means for letting out and taking up said cables.

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