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Rikman et al.

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[45] **Dec. 11, 1973**

[54] **DEVICE FOR THE TRANSPORTATION OF LOADS BETWEEN OPERATIONS**

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Related U.S. Application Data

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[52] **U.S. Cl.** ..... **198/20 R,** 198/177 R

[51] **Int. Cl.** **B65g 17/20,** B65g 47/61

[58] **Field of Search** ..... 198/20, 177 R, 177 T

[56] **References Cited**

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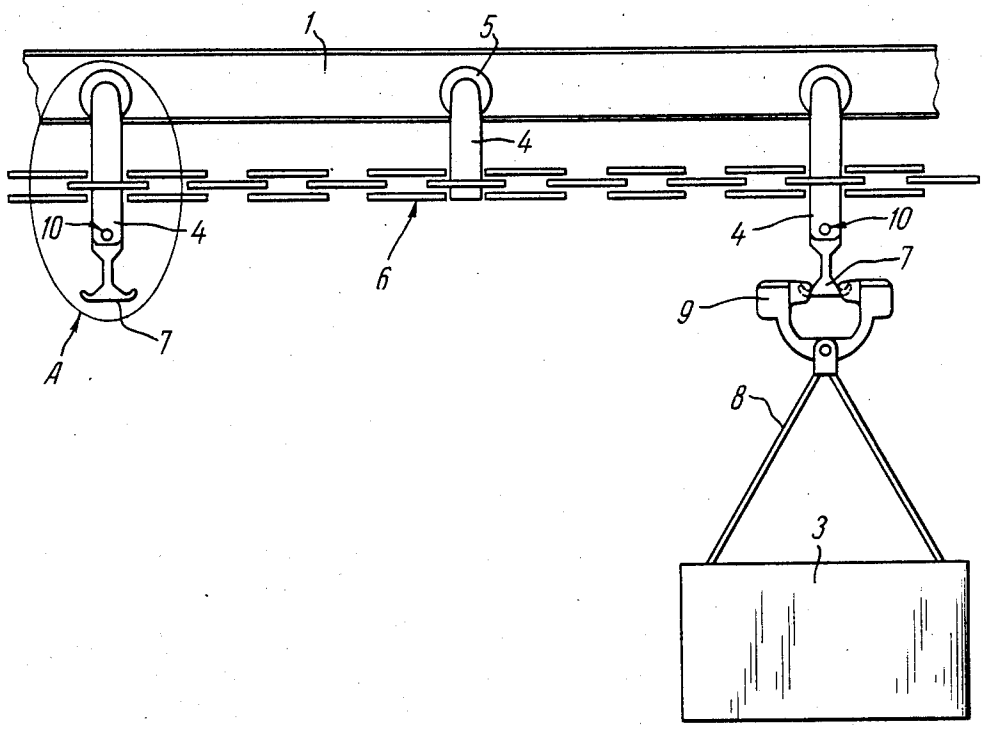
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[57] **ABSTRACT**

The device of the present invention comprises overhead guide tracks along each of which carriages travel having hooks secured to them through hinged joints for attaching a hanger with a load. Between said tracks there is arranged an overhead transfer conveyor whose trolleys are provided with forks that engage with the carriage when the hanger is being removed from or (attached to) the hook. The teeth of the fork are arranged at the level of the joint and have a height equal to the height of the upper part of the hook, which makes it possible to return the hook to its initial position to ensure reliable engagement should the hook deviate from its vertical position in the zone of engagement.

1 Claim, 7 Drawing Figures



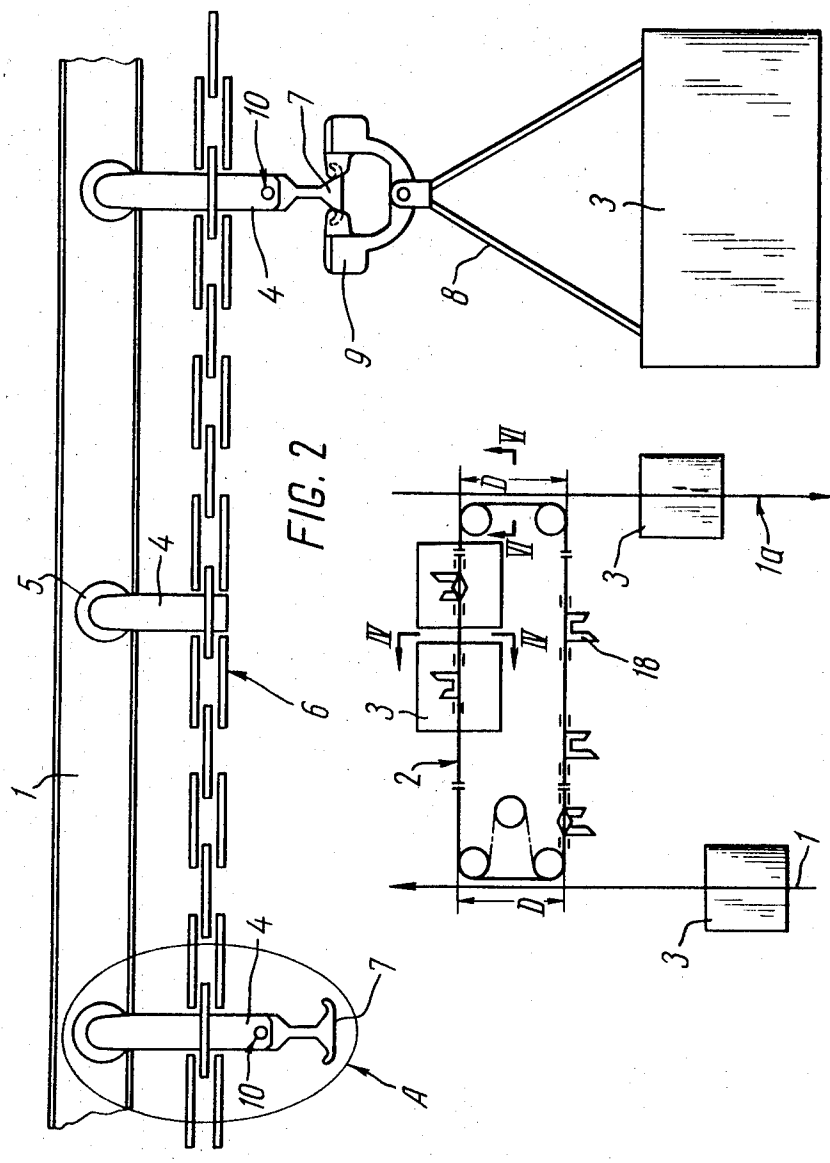


FIG. 2

FIG. 1

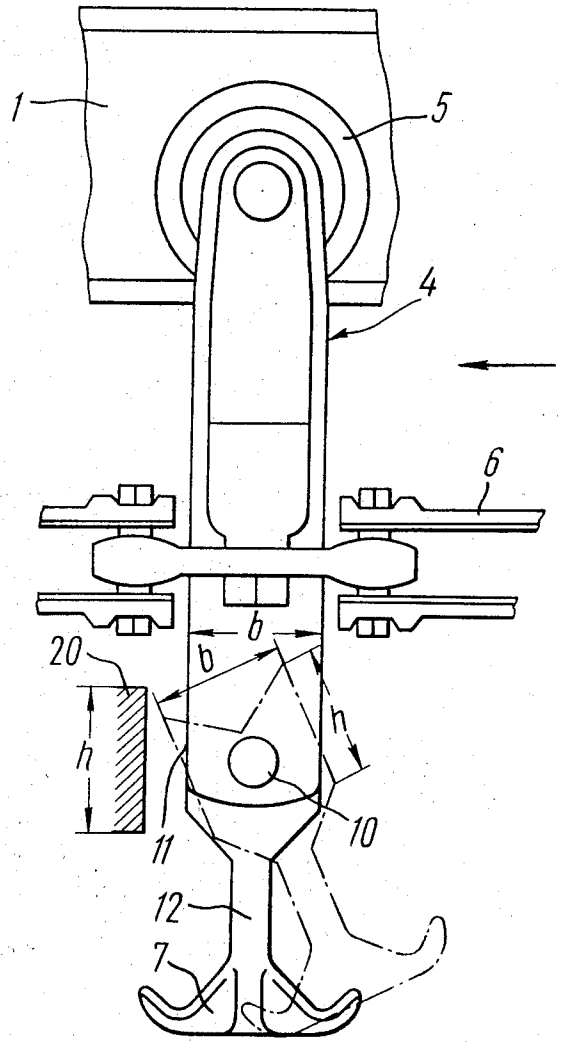


FIG. 3

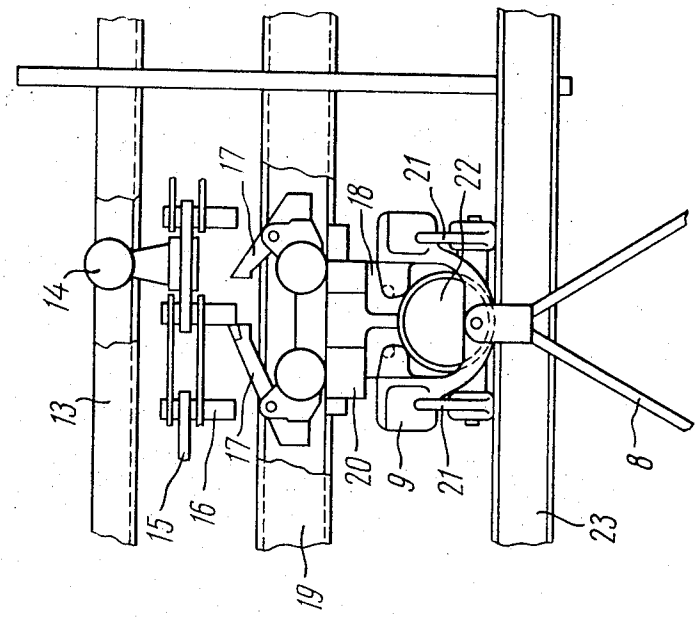

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FIG. 5

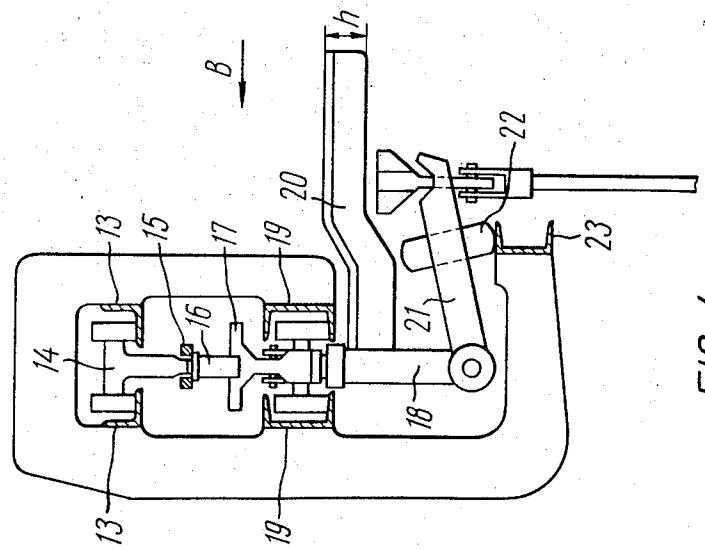

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FIG. 4

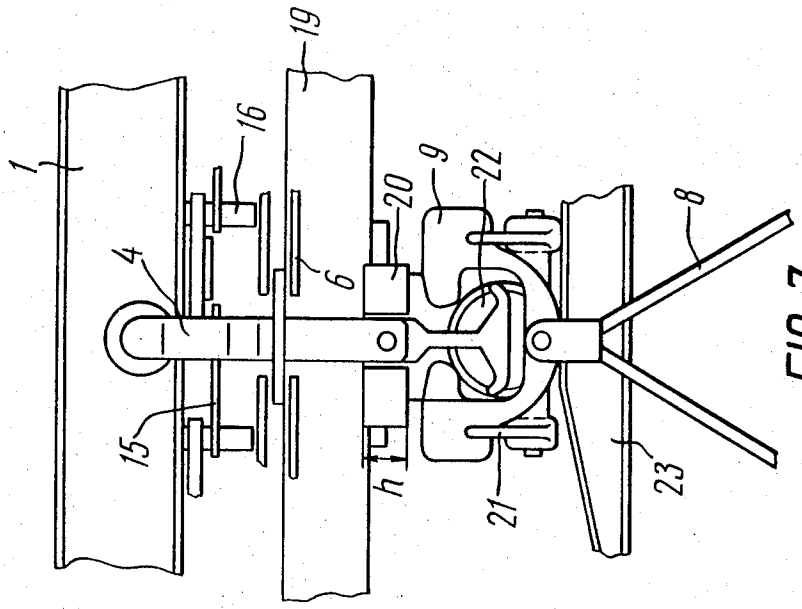


FIG. 7

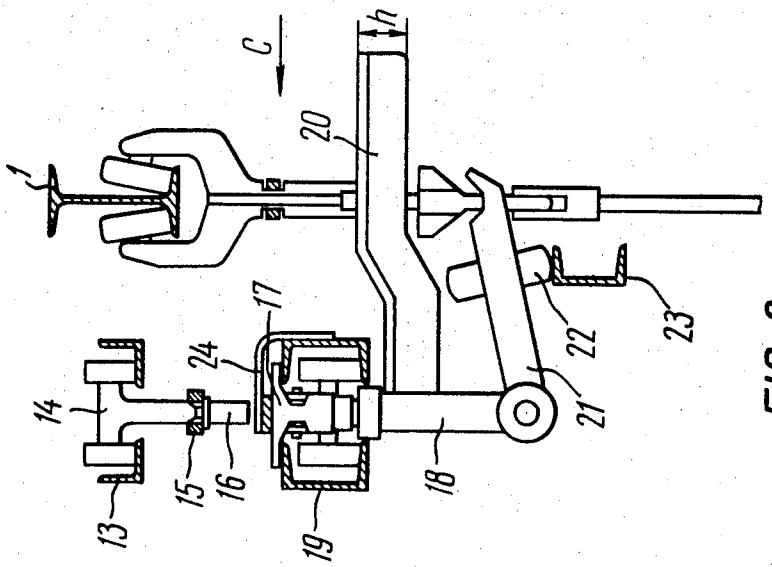


FIG. 6

DEVICE FOR THE TRANSPORTATION OF LOADS BETWEEN OPERATIONS

This is a continuation of Ser. No. 163,711, filed on July 19, 1971 now abandoned.

The present invention relates to the field of mechanical handling equipment for machine building, and more particularly to equipment for the transportation of loads between operations.

There are known devices for the transportation of loads between operations comprising overhead guide tracks along each of which carriages carrying a traction member move. Hooks to which hangers with the load are attached are rigidly fixed to the carriages.

Between the said guide tracks there is arranged an overhead transfer conveyor serving to transfer the load from one guide track to the other. The conveyor is provided with an endless traction member to which pushers moving the trolleys are fixed. Each trolley is provided with a fork having front and rear teeth that engage with a carriage on a guide track when a hanger with a load is being removed from or attached to a hook. In addition, each trolley is provided with a lever for gripping the hanger with its load when it is being removed from or attached to a hook, and when it is being carried along the overhead transfer conveyor.

In the described devices for the transportation of loads between operations, the hook is rigidly fixed to the carriage. A hook with such fastening to the carriage can be used only on horizontal guide tracks, and it cannot be used on inclined tracks, since on the inclined sections of such tracks it is impossible to ensure reliable holding of the load as a result of its misalignment relative to the centre line of the hook and lack of reliable engagement between the hanger carrying the load and the hook.

An object of the present invention is to provide a device for the transportation of loads between operations that will ensure reliable transportation of the load both along horizontal and along inclined sections of the guide tracks.

Another object of the present invention is to ensure the return of the hook to a vertical position and its remaining in this position when the load is being removed from or attached to the hook.

In accordance with these and other objects, there is proposed a device for the transportation of loads between operations, comprising overhead guide tracks along each of which carriages carrying a traction member move, hooks for attaching hangers with the load being fixed to the carriages, and an overhead transfer conveyor arranged between said guide tracks. The conveyor is provided with a traction member with pushers moving trolleys, each of which has a lever for gripping the load hanger, and forks with teeth that engage said carriages when the lever is being used to remove a hanger from or attach it to the hook of a carriage. According to the invention, in such a device the hook is attached to the carriage by means of a hinged joint, while its section in the zone of fastening has side surfaces that are approximately parallel to the centre line of the hook, the distance between them being not less than the width of the carriage, the teeth of the fork being arranged at the level of the joint, and at least one of said teeth having a height approximately equal to the height of the said section of the hook, so that upon deviation of the hook from a vertical position this tooth, interacting with a side surface of the hook, will return it to a vertical position.

The device for the transportation of loads between operations according to the present invention ensures the reliable transportation of loads along three-dimensionally arranged guide tracks and their attachment to the transfer conveyor.

The nature of the present invention will become more fully apparent from a consideration of the following description of an exemplary embodiment thereof, taken in conjunction with the accompanying drawings, in which:

FIG. 1 is a schematic view of the device for the transportation of loads between operations;

FIG. 2 is a section of a guide track with carriages and a load;

FIG. 3 is an enlarged view of detail A 0f FIG. 2;

FIG. 4 is a sectional view through IV—IV of FIG. 1 of the overhead transfer conveyor;

FIG. 5 is a view along arrow B in FIG. 4;

FIG. 6 is a section through VI—VI of FIG. 1; and l,

FIG. 7 is a view along arrow C in FIG. 6.

The device for the transportation of loads between operations comprises two overhead guide tracks 1 (FIG. 1) and 1*a* between which overhead transfer conveyor 2 is arranged for transferring load 3 from one guide track l to the other guide track 1*a*.

Carriages 4 (FIGS. 2 and 3) with supporting rollers 5 are installed on each guide track L, 1*a*. These carriages carry chain traction member 6 and sister hook 7 onto which hanger 8 for load 3 is fitted with its shackle 9. Hook 7 is secured to carriage 4 by means of hinged joint 10.

Section 11 of hook 7 that is in the zone of attachment of the hook to carriage 4 has side surfaces arranged parallel to the longitudinal axis of symmetry 12 of hook 7. The distance *b* between these surfaces in the plane of rotation of hook 7 is equal to the width *b* of carriage 4. Such a design of the upper section 11 of hook 7 allows it to protrude beyond the limits of carriage 4 when it deviates from a vertical position.

Overhead transfer conveyor 2 is provided with rail 13 (FIGS. 4 and 5) along which carriages 14 move while carrying chain traction member 15. Secured on this traction member are pushers 16 that interact with stops 17 arranged on each trolley 18 moving along rail 19.

Fork 20 having a front and a rear tooth for engagement with carriage 4 is secured on this trolley. Fork 20 is so secured to trolley 18 that its teeth are at the level of joint 10 (FIGS. 2, 3, 6 and 7), while the height *h* of these teeth is approximately equal to the height *h* of section 11 of hook 7. Such an arrangement of the teeth of fork 20 relative to hook 7 and their considerable height allow hook 7 to be returned to its initial position upon accidental deviation thereof from its vertical position in the zone of engagement with fork 20.

The vertical position of hook 7 is required for ensuring reliable engagement between shackle 9 of hanger 8 and hook 7 when a load is being attached to it.

Installed on trolley 18 is lever 21, a portion of which is made in the form of a fork, the lever being supported by roller 22 on master guides 23. This lever is designed to grip stackle 9 of hanger 8 when it is being removed from hook 7 and during transportation along conveyor 2.

The device for the transportation of loads between operations functions as follows:

Carriages 4 move along guide track l under the action of traction member 6.

Guide tracks l and 1*a* generally follow a complicated three-dimensional route including inclined sections (not shown in the drawings).

When load 3 is being carried along the inclined sections, axis 12 of hook 7 and hanger 8 with load 3 will be arranged vertically due to the hinged attachment of hook 7. Shackle 9 will be reliably engaged with hook 7.

Transfer conveyor 2 along which trolleys 18 travel under the action of traction member 15 is arranged at places where load 3 is to be removed from carriages 4.

A load is taken from carriage 4 in the following manner:

The carriage with the load, moving along tracks l and acting upon the automatic control means (not shown in the drawings) calls trolley 18 which moves along rail 19 by pusher 16 secured on traction member 15 up to a definite zone of the turning portion of rail 19, whereat trolley 18 stops. This definite turning zone is determined by the position of the teeth of fork 20. The front tooth of fork 20 locates across track l in the zone of movement of carriage 4, whereas the rear tooth is arranged outside the zone of movement of carriage 4.

Lever 21 is deflected to the lower position owing to the height of master guide 23.

The trolley 18 is stopped in the definite turning zone with the aid of bar 24 secured on the rail 19.

In the zone of disengagement of pusher 16 and stops 17, traction member 15 is offset inside with respect to the rail axis and pusher 16 guides trolley 18 outside the inner edge of wide stop 17, and bar 24 is so arranged along the rail axis as not to interfere with the motion of pushers 16.

At the disengagement zone, bar 24 has a gentle rise, to lower front wide and rear narrow stops 17 thus disengaging trolley 18 from pusher 16.

Trolley 18 enters the load removing zone before carriage 4 and waits for the latter. As soon as carriage 4 with the load enters the removing zone, it becomes engaged with the stationary front tooth of fork 20 thereby guiding trolley 18 along the turning section of rail 19. During combined travel with carriage 4, trolley 18 passes from the turning portion of the rail to that portion parallel to track l. Carriage 4 in this case locates between the front and rear teeth of fork 20, whereas lever 21 is under the respective surfaces of shackle 9.

While moving with carraige 4, lever 21 starts rising due to the fact that the master guide 23 has a gentle rise, the lever taking shackle 9 with the load and lifting it above hook 7. The load removing operation is then completed.

At this section, track l and rail 19 are parallel to each other.

After removing the load, trolley 18 reaches the turning section of the transfer conveyor. Located here is the end of bar 24, retaining stops 17 in the lowered position. Pusher 16 commences to move trolley 18 along rails 19. The front tooth of fork 20 deflects forwardly aside, and the rear tooth of the fork passes rearwardly aside of carriage 4. Levers 21 with the load move aside from carriage 4.

Thus, members 20 and 21 do not interfere with the movement of carriage 4 after the load is transferred.

Master guides 23 on which lever 21 rests has a gentle rise on this section. When moving along this load removing section, lever 21 gradually rises, gripping shackle 9 with load 3, to a height ensuring the moving of shackle 9 out of engagement with hook 7. At the curved section, front stop 17 of trolley 18 moves out from under bar 24 and engages with pusher 16 of traction member 15. The trolley with load 3 on lever 21 is transported along transfer conveyor 2 until its stops before attaching load 3 to hook 7 of carriage 4 moving along guide track 1*a*. Load 3 should be attached to hook 7 when the latter is in a vertical position, to ensure reliable operation. When there is an increased resistance in hinged joint 10 of hook 7 after it travels along an inclined section of guide track 1*a*, hook 7 may not return under the action of its own weight to a vertical position upon approaching the zone where load 3 is to be attached to it by conveyor 2.

If hook 7 deviates from a vertical position, its side surfaces 11 protrude beyond the limits of carriage 4. Height *h* of the tooth of fork 20 is sufficient to ensure contact of the tooth with protruding surface 11 of hook 7, and a force appears that turns hook 7 relative to joint 10 to a vertical position and keeps it in this position while load 3 is being attached to hook 7.

Master guides 23 have a smooth downward slope in the zone of load attachment. Upon joint motion along the attachment section, lever 21 with shackle 9 smoothly lowers, attaching shackle 9 to hook 7.

On the curved section, trolley 18 disengages from carriage 4 and is picked up by pusher 16 of traction member 15. Thus the transfer cycle is completed.

What is claimed is:

1. A device for the transportation of loads between operations comprising at least two overhead guide track means; at least one first carriage means arranged on each of said guide track means; a first traction member secured to said first carriage means; hook means hinged to said first carriage means; each of said hook means having in the zone of its attachment to said first carriage means a section with side surfaces approximately parallel to the longitudinal axis of symmetry of said hook means, the distance between said surfaces being not less than the width of said first carriage means connected to said carriage means; hanger means connected to said hook means for carrying said load attached thereto; an overhead transfer conveyor means arranged between said at least two guide track means and including at least one second carriage means of said conveyor means; overhead tracks wherealong said second carriage means move; a second traction member secured to said second carriage means; pusher means secured to said second traction member; trolleys interacting with said pusher means to be movable thereby; rails whereon said trolleys move; a lever mounted on each of said trolleys to grip said hanger means when transferring it from the first carriage means of one of said guide track means to the first carriage means of the other of said guide track means; master guide means used as supports for said lever and having an inclined surface to rise and lower said lever during removal or suspension of said hanger means with the load from said hook means, said trolleys having a fork secured thereto with teeth meshing with said first carriage means of said overhead guide track means to ensure a synchronous travel of said trolleys with said first carriage means during removal or suspension of said hanger means from said hook means, said fork being so secured on said trolleys that said teeth are

level with the point of attachment of said hook means to said first carriage means, at least one tooth of each fork having a height approximately equal to the height of said section of said hook means, so that upon deviation of said hook means from a vertical position, this tooth interacting with the side surface of said hook means will return it to its vertical position for reliable attachment of said hanger means to said hook means upon attachment of the load thereto.

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