ABSTRACT

A transport unit constructed for the suspension of load-carrying containers or the like for single-track overhead conveyor systems, incorporating two undercarriages which are operatively coupled together by a coupling mechanism of the invention. This coupling mechanism comprises swivel frame means embodying a support frame having two support arms, and wherein such coupling mechanism further includes at most two pairs of swivel joints arranged at pivot axes which are disposed substantially perpendicular to one another.
TRANSPORT UNIT FOR OVERHEAD OR SUSPENDED CONVEYOR SYSTEMS

BACKGROUND OF THE INVENTION

The present invention relates to an improved construction of transport unit designed for the suspension thereat of suitable load-carrying containers of an overhead conveying system, the transport unit embodying two undercarriages.

Transport units for overhead or suspended conveying systems are already known to the art and typically are designed in such a fashion that load-carrying containers or the like, conveniently referred to as load containers, can be suspended at the transport units in such a way that they can be conveyed along horizontally laid linear and curved track rails. In the event that the transport units must also travel over vertical or inclined track rails, then special measures have to be undertaken if a prerequisite of the conveying operation requires the load containers to be continuously transported in a vertical or near vertical position. To this end, the coupling or connection between the load hooks and the load containers must be appropriately movably constructed.

It is further known to the art, especially when conveying larger loads, to use instead of a single undercarriage two or more. In overhead conveyor systems employing horizontal curves the necessity thus arises of hingedly coupling these undercarriages with one another. This may be accomplished, for instance, by connecting the undercarriages with a support beam which is rotatably coupled with the undercarriages by means of a vertically arranged trunnion or pivot pin. However, with this type of physical construction it is not possible to travel through curves arranged in a vertical plane, and therefore, for the vertical transport of the load containers only a single undercarriage is used. This, in turn, however results in a limitation with respect to the maximum weight which can be transported by the loaded conveying container.

SUMMARY OF THE INVENTION

Therefore, a real need exists in the art for an improved transport unit for overhead conveyor systems or the like which effectively overcomes the aforementioned drawbacks associated with the prior art constructions. The present invention, therefore, has for one of its primary objectives to provide just such a transport unit which effectively fulfills this need.

Another, more specific object of the present invention relates to an improved design of transport unit for overhead conveying systems which enables the transport of reasonably heavy loads through the curves of horizontally laid tracks as well as the curves of vertically laid tracks, without the danger of failure of the system, damage to the load, and danger to the operating personnel in the area.

Still another extremely significant object of the present invention relates to an improved transport unit for overhead conveying systems incorporating novel mechanism for coupling together the undercarriages, so that a solid connection exists between these undercarriages which nonetheless still permits movement of the undercarriages and the load containers both through horizontal curves as well as curves disposed in a vertical plane in a faultless, reliable and positive fashion.

Now, in order to implement these and still further objects of the invention, which will become more readily apparent as the description proceeds, the transport unit of the present invention contemplates coupling together the undercarriages by swivel frame means embodying a support frame having two support arms, and wherein the coupling arrangement furthermore at most embodies two pairs of swivel or hinge joints arranged at pivot axes which are disposed substantially perpendicularly to one another. It is an advantageous feature of the invention if one of the pairs of swivel joints is mounted at the undercarriages in a direction parallel to the surface of the track over which the undercarriages travel and transverse to the direction of travel of such undercarriages, whereas the other pair of swivel joints are arranged at the swivel frame means in a direction perpendicular thereto. Furthermore, the one respective ends of the support arms are advantageously hingedly connected with the pair of swivel joints at the undercarriages whereas the other respective ends of the support arms are articulated with the other pair of swivel joints mounted at the swivel frame means.

Additionally, the invention further contemplates the feature of advantageously providing support or retaining arms at the swivel frame means for receiving the load-carrying container and for transporting such container in a desired or optional position with respect to the transport unit.

BRIEF DESCRIPTION OF THE DRAWING

The invention will be better understood and objects other than those set forth above will become apparent when consideration is given to the following detailed description thereof. Such description makes reference to the annexed drawing wherein:

FIG. 1 is a top plan view of a preferred embodiment of inventive transport unit with a load-carrying container suspended thereat and showing this transport unit upon travelling through a horizontal track curve;

FIG. 2 illustrates the transport unit of FIG. 1 when passing through a curve located in a vertical plane, the load-carrying container being situated at the concave side of the track curve;

FIG. 3 illustrates the transport unit of FIG. 1 while passing through a curve also disposed in a vertical plane, but wherein the load-carrying container is situated at the convex side of the track curve;

FIG. 4 is a side view, on an enlarged scale, illustrating the transport unit of FIGS. 1–3 while passing through a horizontal track section and showing details of the swivel joints; and

FIG. 5 is an end view of the arrangement depicted in FIG. 4.

DETAILS DESCRIPTION OF THE PREFERRED EMBODIMENTS

Describing now the drawings, in FIG. 1 reference numeral 1 designates a horizontal curve of an overhead track upon the rail or track flanges 1a of which there travel two undercarriages 4 and 5. Each track surface or flange 1a is defined by a horizontal plane taken through the contact lines of the support rolls 6 of each such undercarriage 4, 5. In FIGS. 2 and 3 there is shown a curve track portion 2 arranged in a substantially vertical plane, wherein the track flanges or surfaces 2a define a curved surface disposed perpendicu-
lar to the plane of the paper. The use of the expression "track surface" should simplify the hereinafter given discussion of the components interconnecting these undercarriages 4 and 5 with one another.

The number of travelling rolls 6, wherein in FIGS. 1–5 there have been shown provided 8 such rollers for each undercarriage, will be seen to be distributed in two halves, in other words with four rollers at the upper side and four rollers at the lower side of the associated track flange or surface 1a and 2a, respectively, of the respective track portions 1 and 2, and thus, provide the prerequisite for conveying of the transport units along optionally arranged track rails.

Now since the undercarriages 4, 5 are operatively coupled with one another — in a manner more fully to be considered hereinafter — it is only necessary to equip one of the undercarriages with a suitable drive mechanism. In the exemplary embodiment illustrated, such is the case for the undercarriage 5 which, for instance, has mounted thereat a suitable electric motor 7 or some other appropriate prime mover. This electric motor 7 drives one or more of the travelling rolls 6 of the undercarriage 5 through the agency of a suitable reduction gearing 8, or can serve to drive a special drive gear or wheel. In the latter situation, it is possible to provide the power takeoff via a suitable non-illustrated pinion or gear which meshes with a rack arranged at the associated track surface or flange, thus forming a positive driving connection.

Now in each of the arrangements illustrated herein, it will be seen that the undercarriages 4 and 5 are coupled with one another in operable association through the agency of a novel swivel frame means, designated in its entirety by reference character 9. This swivel frame means 9 will be seen to comprise, for instance, a substantially rectangular support frame 10 having the respective bores 11 and 12 along the lengthwise extending sides 10a thereof. Now in each of the bores 11 and 12 there is arranged a respective swivel or hinge joint mechanism 30 and 31, one part of which is connected with the support frame 10 and the other part with the associated support arm 13, 14. Such a swivel joint mechanism can, for instance, consist of two detachable ball journal bearings, the outer race or ring of which is fixedly connected with the support frame 10 and the inner race or ring with the associated support arm 13, 14. Hence, if the support frame 10 there is provided a pair of swivel or hinge joints 30, 31, the axes of rotation of which are directed substantially perpendicular to the support frame 10.

Now the other ends of the support arms 13 and 14 are coupled with the undercarriages 4 and 5, respectively. This coupling can likewise consist of swivel joint mechanisms 15, 16, as shown, the axes of rotation of which, however, in this case extend perpendicular to the swivel joint mechanisms 30, 31 arranged at the support frame 10. The fact that the support arms 13 and 14 of FIGS. 2 and 3 are shown to possess different lengths is of no significance. What is of importance is the arrangement of the axes of rotation of the pairs of swivel joints 30, 31 and 15, 16 in a direction substantially perpendicular to one another, with the swivel joints 15 and 16 also forming one pair of such swivel joints.

Continuing, it will be observed that the support frame 10 together with the support or retaining arms 17, 18 arranged at the smaller sides 10b of the rectangular support frame 10 as well as the rotatably arranged disks 19, form the actual suspension system for the overhead conveyor. The load-carrying container 20 possessing the schematically represented support or suspension troughs 21 can be suspended at the plate members 19 of the aforesaid suspension system. Since these plate members 19 are arranged rotatably with respect to the suspension system, it is possible for the load-carrying container 20 to move into a vertical position independently of the momentary position of the transport unit.

FIGS. 1–5 illustrate the advantages attained by virtue of the arrangement of the swivel or pivot axes of the swivel joints perpendicular to one another at the support frame 10 and the undercarriages 4, 5, as previously explained. When travelling through a horizontal curve the undercarriages 4 and 5 change their relative position with respect to the suspension system through the aid of the swivel joints 30, 31 provided at the support frame 10. On the other hand, if the conveying system moves through a curve arranged in a vertical plane, then with the aid of the swivel joints 15, 16 arranged at the undercarriages 4, 5 respectively, these undercarriages 4 and 5 likewise change their position relative to the overhead suspension system.

The swivel frame 10 secured by means of two pairs of swivel joints 30, 31 and 15, 16 to the undercarriages provides a stable, relatively simply constructed apparatus which permits the easy suspension of load-carrying containers 20 thereat, and which is especially suitable for conveying larger loads.

While there is shown and described present preferred embodiments of the invention, it is to be distinctly understood that the invention is not limited thereto but may be otherwise variously embodied and practiced within the scope of the following claims.

What is claimed is:

1. A transport unit of a single-track overhead conveyor system for suspending thereat load-carrying containers and the like, comprising two undercarriages adapted to travel upon the track, each of said undercarriages being provided with rollers arranged to bear against opposite surfaces of the track, means for coupling together said two undercarriages, said coupling means comprising swivel frame means embodying a support frame having two support arm means, said coupling means further including at most two pairs of swivel joints arranged at pivot axes which are disposed substantially perpendicular to one another one of said pairs of swivel joints being arranged at said undercarriages, the other pair of swivel joints being mounted at said swivel frame means, said swivel joints co-acting with said support arm means to permit said support arm means to pivot relative to said support frame.

2. The transport unit defined in claim 1, wherein said one pair of said swivel joints arranged at said undercarriages is disposed in a position extending substantially parallel to said opposite surfaces of the track and transverse to the direction of travel of said undercarriages, the other pair of swivel joints mounted at said swivel frame means being arranged in a direction perpendicular thereto.
3. The transport unit as defined in claim 1, wherein one of the pair of the ends of said support arm means being hingedly connected via said swivel joints arranged at said undercarriages with said undercarriages, the opposite pair of ends of said support arm means being hingedly connected with said support frame via said pair of swivel joints provided thereat.

4. The transport unit as defined in claim 3, further including retaining arm means provided at said support frame for receiving a load-carrying container and for transporting such container in random position with respect to the transport unit.