MONORAIL RUNNING GEAR FOR SUSPENSION CRANES

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Fig. 1

Fig. 2

Fig. 3

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MONORAIL RUNNING GEAR FOR SUSPENSION CRANES

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4 Claims. (Cl. 105—154)

This invention relates to monorail running gear for suspension cranes, and has particular reference to an improvement in the manner of forming and mounting the wheels or rollers on a supporting rail.

One type of running gear for suspension cranes, and the like, generally in use includes flanged wheels guided along the edges of the flanges of an I-beam or an inverted T-beam in an effort to prevent lateral tilting of the gear carriage with resultant displacement of the wheels. While this arrangement is effective to a certain extent, disalignment and binding of the wheels on the rail frequently occurs and the relatively large area of contact between the wheel treads and flanges and the surface of the beam flange, as well as its edges, develops added friction, requiring increased operating power, while, at the same time, the distance between the flanges of the opposite rollers or wheels must always be made to suit the flange width of the beam constituting the trackway, thereby limiting use only to beams whose flanges have the same profile or cross sectional width throughout the trackway.

Another type of gear utilizes conical or cylindrical rollers without flanges, on the assumption that because of the oppositely inclined upper sides of the beam flanges forming the trackway it would be possible to prevent binding and disalignment. This arrangement functions efficiently only when two pairs of wheels are used with their axles spaced relatively far apart, and is not effective where a single pair of wheels is involved.

Accordingly, the present invention has as one of its objects the provision of a running gear including wheels whose inner corners are so formed as to have engagement substantially in the zone of the bottom fillet area of an I-beam or inverted T-beam while the treads of the wheels are disposed at an outwardly flaring angle with respect to the upper surfaces of the flanges of the beam. Thus, by constructing the wheels or rollers to engage only in and about the base fillet portions of the beam, it is possible to provide a trolley which will travel with a minimum of resistance on rails of the same cross section or on rails formed by beams of different cross section. In the latter connection, it may be pointed out that commercially available I-beams or inverted T-beams have their flange width increasing in suitable ratio to the height of the beam, but the thickness of the web changes only slightly and consequently the arc of the base fillet connecting the web and the base flanges are substantially the same or are of such little difference that wheels according to the present invention may readily pass from one rail to another even though the beams are of different cross section. Thus, with the present invention, planning, construction, and subsequent extension is simplified, as well as the interconnection between existing installations.

Other objects may appear as the description proceeds in connection with the accompanying drawing, in which:

Figure 1 is a side elevation of a two-axle trolley carrying a suspended electric hoist.

Figure 2 is a front elevational view showing the cross section of one form of beam in full lines and a larger type of beam in dotted lines.

Figure 3 is a detail view on a larger scale illustrating the manner of forming the inner corners of the roller for engagement with the bottom fillet areas of the structural member constituting the trackway.

Similar character references designate like parts throughout the several figures of the drawings.

According to the embodiment of the invention shown in the drawings the trolley carriage consists of a cross bar 1 pivotally connecting by pivot 2 a pair of substantially U-shaped bearing frames 3, said frames having the upper portions of their arms 15 formed to receive a pair of rollers 4 mounted on axes 3 by means of roller bearings 5. The distance between the arms 15 of the bearing frame 2 is sufficient to allow even the broadest flange 7 to pass freely between them. In the example shown, the cross bar 1 supports an electric hoist 8.

As will be seen from the drawings, the arrangement of the rollers 4 is such that the clearance between the bearing portions of opposite rollers is only slightly greater than the thickness of the web of the beam constituting the beam of the trackway. Thus, as previously indicated, since the thickness of the web 8 varies only by the fractional part of an inch in different beams, the entire trolley can be guided along beams having a relatively wide variety of dimensions with practically the same play. This is shown, for example, in Figure 2 wherein a beam of one cross section is shown in full lines, and behind it, in dot and dash lines a second beam of larger cross sectional characteristics is shown as aligned therewith at the location of the base fillets of the smaller beam.

The axles or journals 9 of the rollers 4 have their axes 8 arranged at such an angle that the peripheral thread portions 10 of the rollers
form an angle or with the upper side 11 of the base flange of the beam, the said angle flaring or increasing outwardly toward the edge 12 of the related flange. The inner corners or edge-thread portions of the rollers 4 are of rounded or concave formation as shown at 13 thereby to conform substantially to the curvature of the base fillets 14 between the web 8 and flange 1 of the beam constituting the trackway.

From the foregoing it will now be seen that the distinctive feature of the present invention resides in providing rollers 4 having their inner edges or corners 15 formed on an arc whose radius is substantially equal to the radius of the head fillets thereby to engage the base fillets 14 of the structural member constituting the trackway, while the peripheral thread portions 10 are flared outwardly at an angle to both the axes 9 of the rollers and the upper surfaces 11 of the base flanges of the beam. This arrangement provides in effect a point contact between the rollers and the trackway at a point where the roller is held between one face of the web and the related upper face of the beam flange, thus reducing the relative play or lost motion between the rollers and the trackway to a minimum, and also minimising tendency to bind due to any friction between the pairs of rollers and the beam because of variation in the roughness of the top surface of the bottom flange.

Moreover, only rolling friction as distinguished from sliding friction occurs between the rollers and the trackway. Also, even if one side of the trolley should tend to move ahead of the other, and shift its position, which, incidentally could occur only within the range of the limited play existing between the roller and the web, the rollers will be readily guided back to their correct position parallel to the direction of the track due to the substantial point contact produced between the rounded edges of the rollers and the grooves provided by the web fillets.

I claim:

1. A monorail trolley for suspension cranes and the like, including, in combination, a structural member constituting a track and having a web and base flanges connected by concave fillets, a frame of substantially U-shaped formation having arms adapted to straddle the base flange of the beam, a roller carried by each arm of the frame and mounted on an axis disposed at an angle to the web of the beam, said roller having its inner marginal edge of convex formation to correspond to and engage the base fillet of the beam between the web of the beam and the upper face of the related flange thereof, said roller also having a peripheral portion disposed at an outwardly flaring angle with respect to the inclined upper face of the base flange of the beam.

2. A monorail trolley for suspension cranes and the like, including, in combination, a structural member constituting a track and having a web and base flanges connected by concave fillets, a frame, a pair of rollers mounted on the frame at opposite sides of the web and having convex edge thread portions corresponding substantially to the concave fillets at opposite sides of the web and engaging therewith.

3. A monorail trolley for suspension cranes and the like, including, in combination, a structural member constituting a track and having a web and base flanges connected by concave fillets, a frame, a pair of rollers mounted on the frame at opposite sides of the web, said rollers being mounted in oblique inwardly converging planes with respect to the vertical axis of the web and having their inner corners shaped convex to correspond substantially to the said concave fillets to travel therein, the peripheral portions of said rollers formed on an angle to clear the adjacent face of the related base flange.

4. A monorail trolley for suspension cranes and the like, including, in combination, a structural member constituting a track and having a web and base flanges connected by concave fillets, a pair of frames of substantially U-shaped formation providing arms disposed at opposite sides of the track, a cross bar pivotally connected at each end with the related lower portion of each frame, whereby each frame may move relative to the other, and a pair of rollers mounted on each frame at opposite sides of the web and having convex edge thread portions corresponding substantially to the concave fillets at opposite sides of the web and engaging therewith.

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