

# United States Patent

[11] 3,604,567

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## FOREIGN PATENTS

141,914 4/1920 Great Britain..... 212/18

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[54] **OVERHEAD TRAVELLING CRANE**  
**5 Claims, 12 Drawing Figs.**

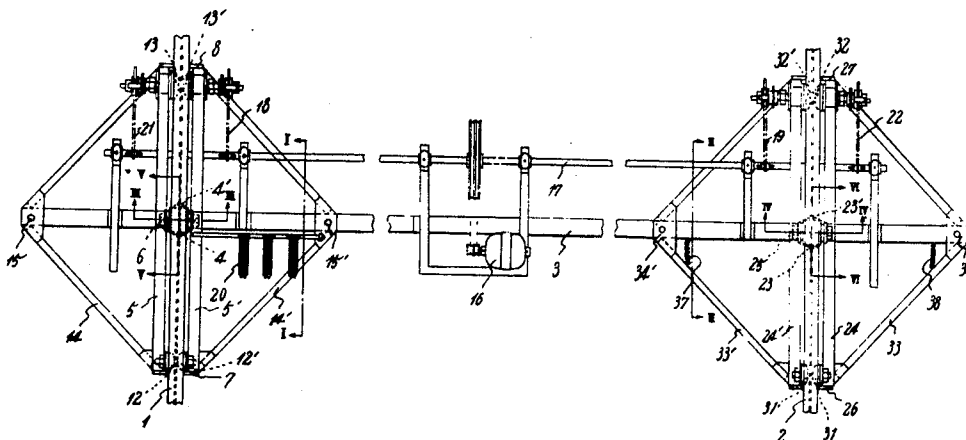
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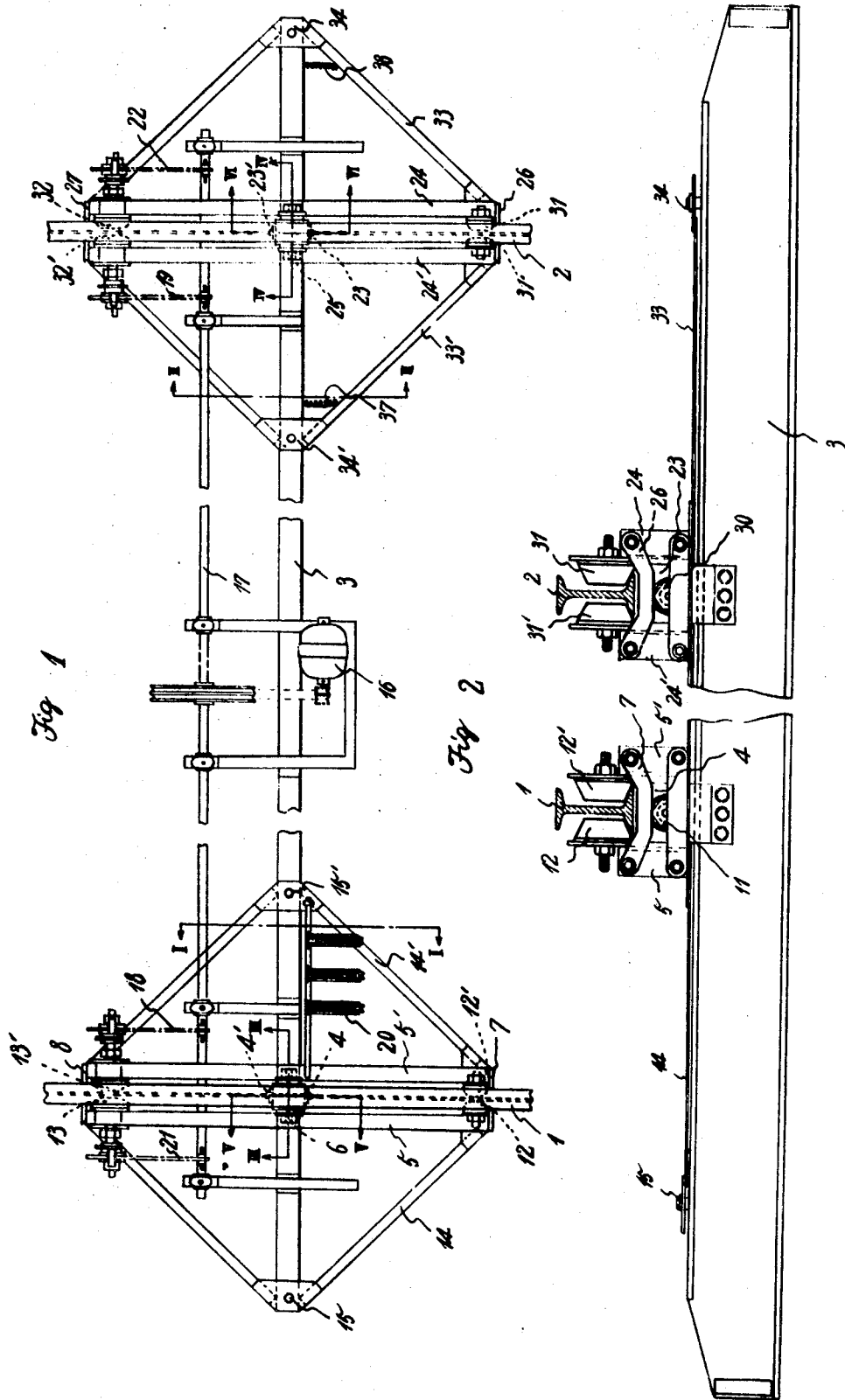
[51] Int. Cl..... **B66c 17/00**

[50] Field of Search..... 212/10-21,  
 73, 74, 124, 125, 131

[56] **References Cited**  
**UNITED STATES PATENTS**  
 1,752,026 3/1930 Phillips..... 212/18  
 3,389,809 6/1968 Wilson ..... 212/18

**ABSTRACT:** An overhead travelling crane comprises a hoist suspended from a girder which travels on two parallel I-rails which are perpendicular to the girder. The girder is suspended from each rail by a carriage which consists of a pair of parallel bars, parallel to, below, and on opposite sides of the rails. These bars are connected at their centers by a shaft and at each end by links pivotally connected to each bar so as to permit limited relative motion between the bars. Each bar supports at each end a roller which rides on the lower flange of the rail. The bars form part of triangular frames which can swing slightly in a horizontal plane relative to the girder. The object of the arrangement is to permit the suspension system for the girder to accommodate itself to unevennesses of the rails.





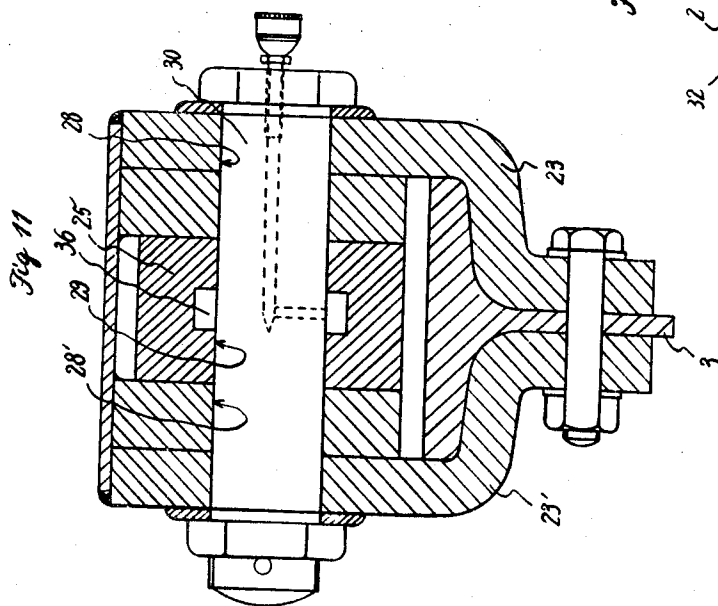
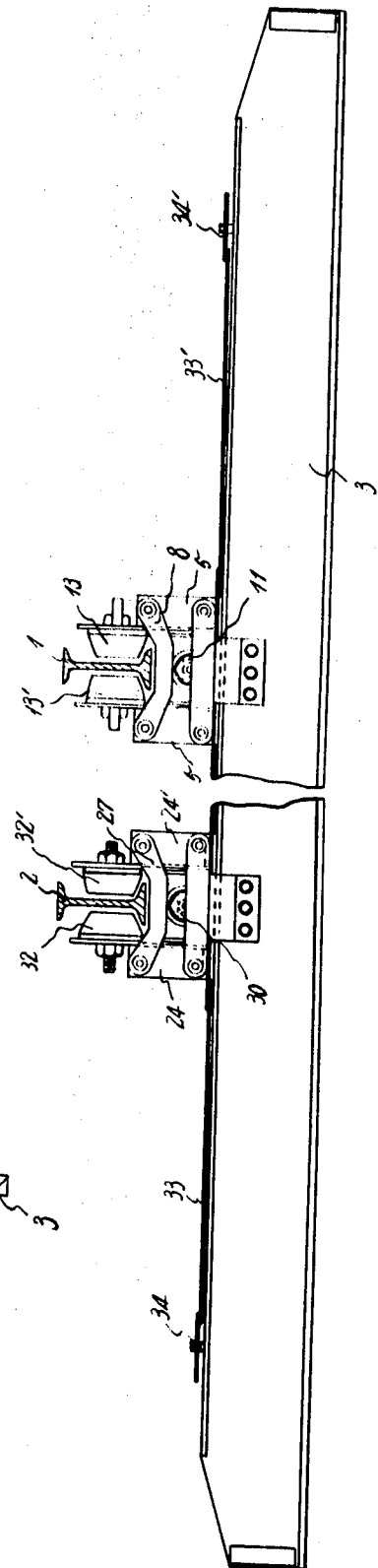


*Fig. 3*



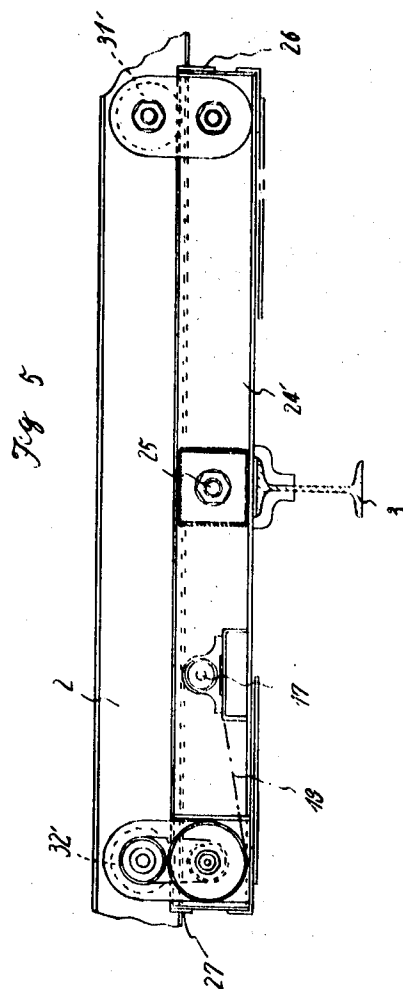
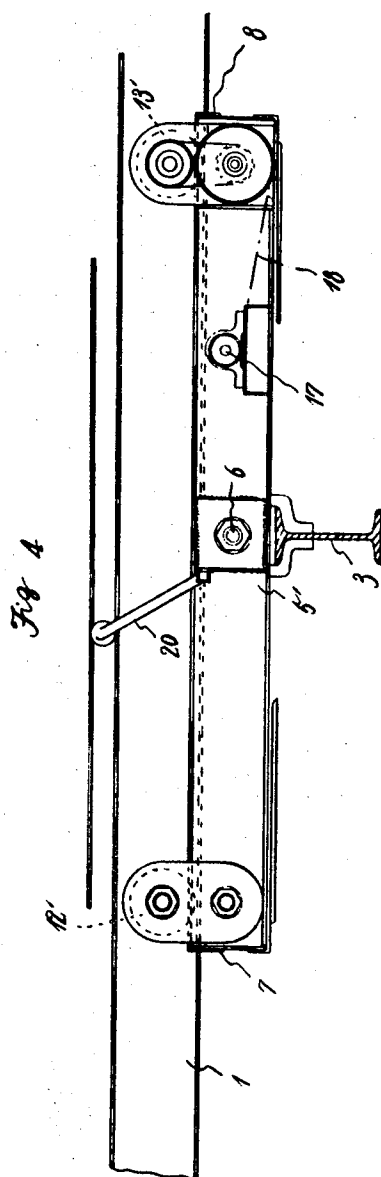


Fig 7

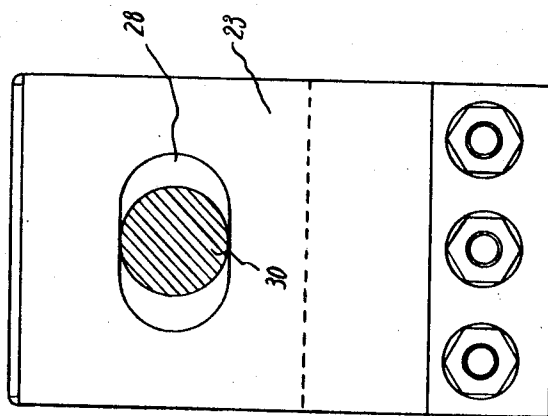
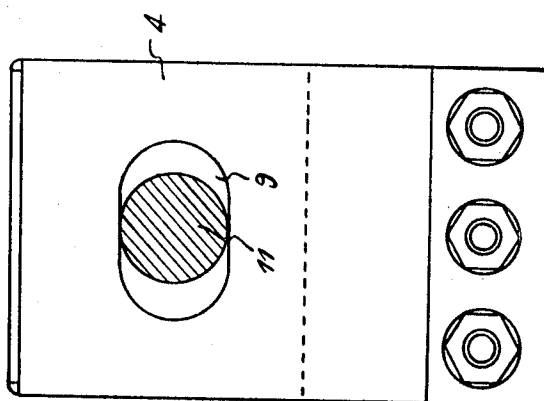


Fig 6



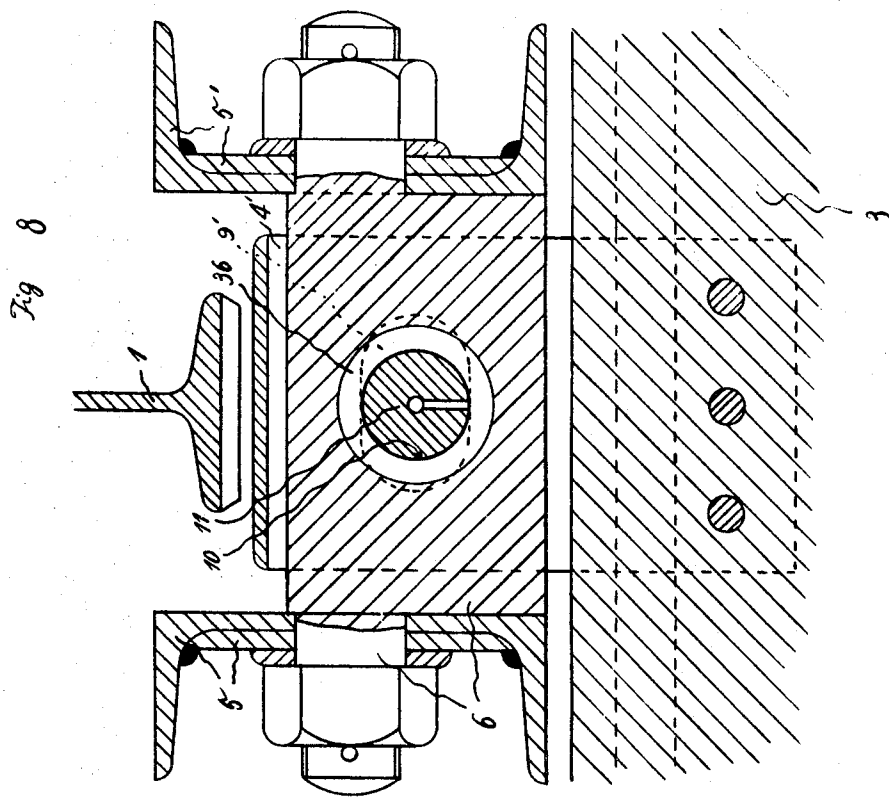


Fig 10

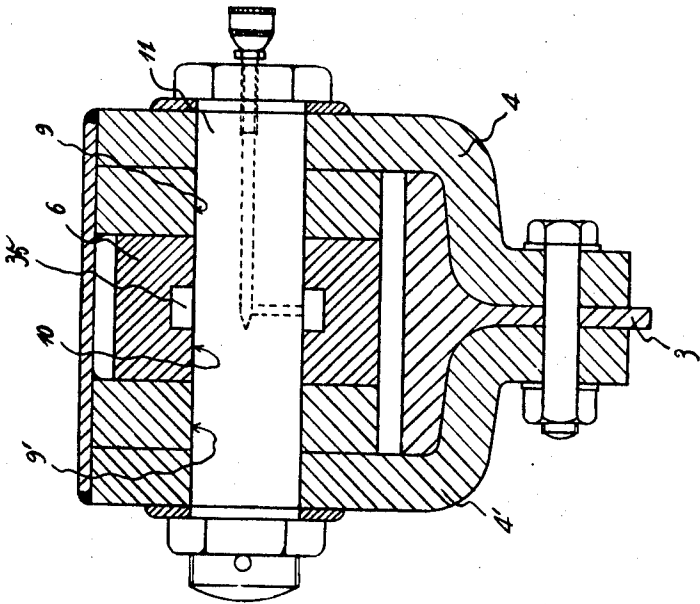


Fig 9

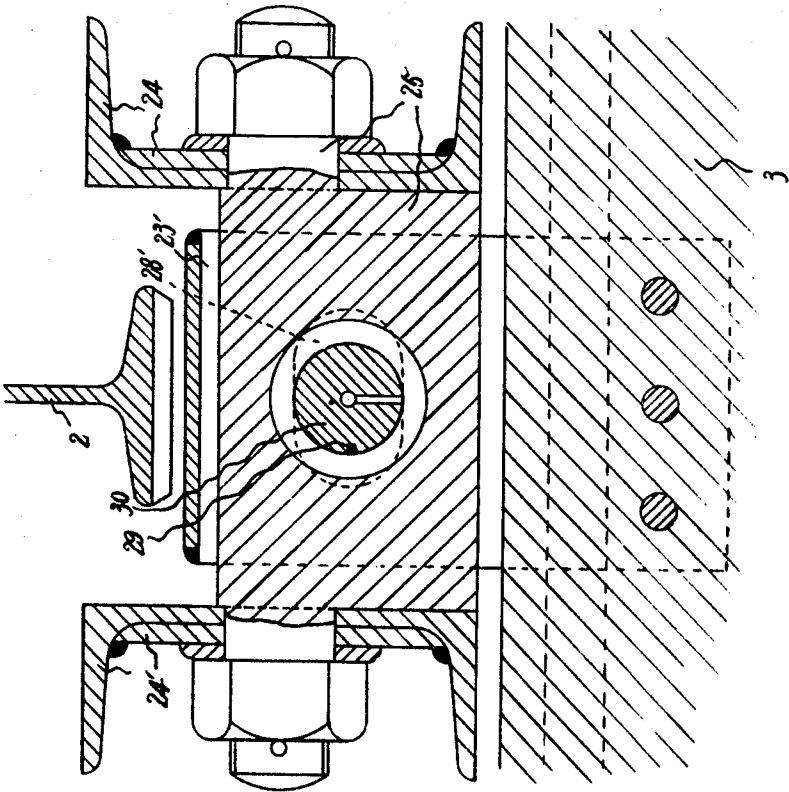
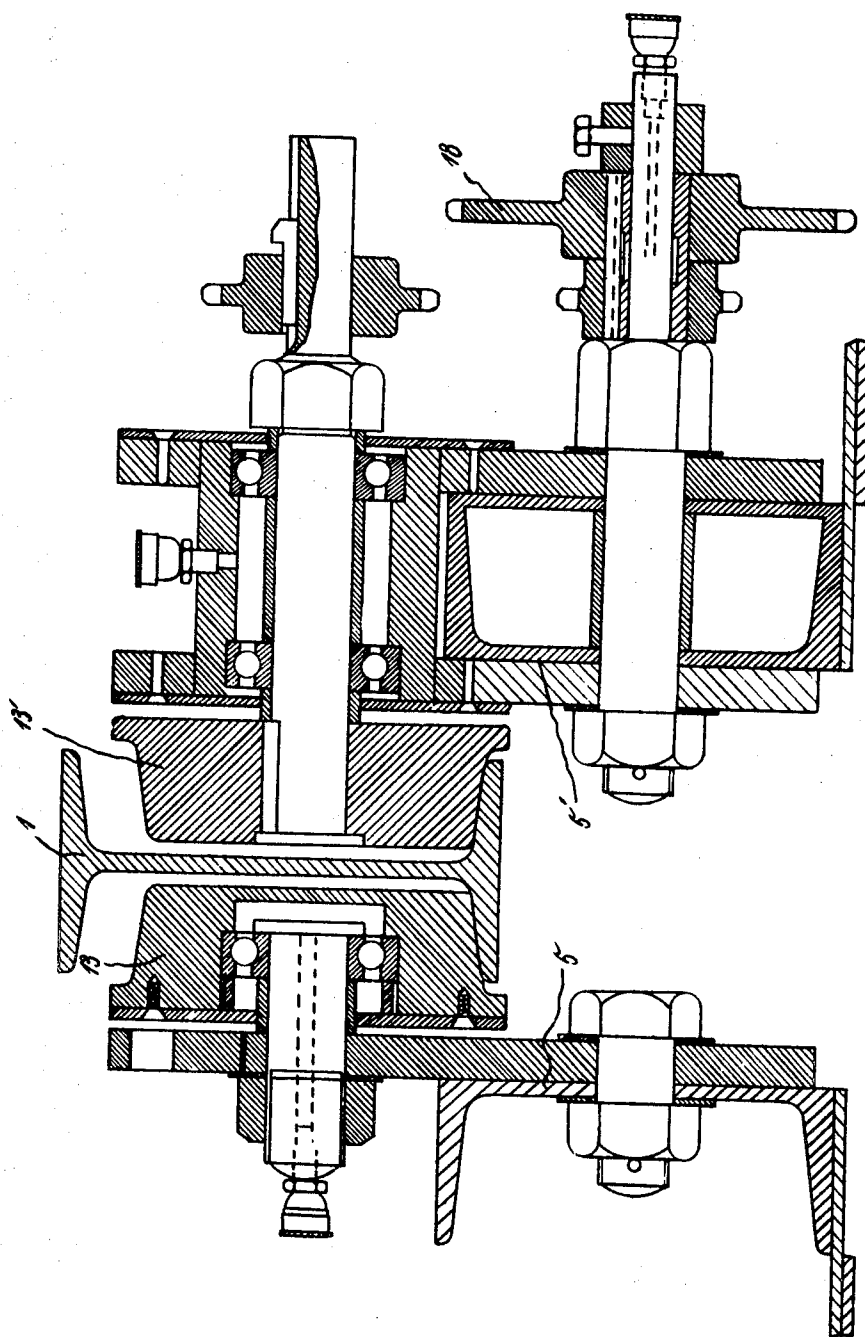


Fig. 12



## OVERHEAD TRAVELLING CRANE

## SUMMARY OF THE INVENTION

This invention relates to an overhead travelling crane, which is characterized by a peculiar relation between a travelling girder and its guide rails.

The primary object of the present invention is to provide an overhead travelling crane which does not slip or vibrate while travelling.

In conventional overhead travelling cranes, the surfaces of the guide rails contacted by the wheels are not actually straight but are usually uneven, although they are designed so that the error in laying of the guide rails may be as small as possible. Consequently, the crane is caused to slip, vibrate, etc., while the crane is moving.

These and other objects and features of this invention will be better understood upon consideration of the following detailed description and the accompanying drawings in which:

FIG. 1 is a top plan view showing an overhead travelling crane according to this invention;

FIG. 2 is a front elevational view of the overhead travelling crane in FIG. 1 with the central portion broken away;

FIG. 3 is a back view of the overhead travelling crane shown in FIG. 1;

FIG. 4 is a sectional view taken along the line I—I of FIG. 1;

FIG. 5 is a sectional view taken along the line II—II of FIG. 1;

FIG. 6 is a detail view showing the left-hand support for the crane, as seen from the front;

FIG. 7 is a detail view showing the right-hand support for the crane, as seen from the front;

FIG. 8 is a sectional view taken along the line III—III of FIG. 1;

FIG. 9 is a sectional view taken along the line IV—IV of FIG. 1;

FIG. 10 is a sectional view taken along the line V—V in FIG. 1;

FIG. 11 is a sectional view taken along the line VI—VI of FIG. 1; and

FIG. 12 is a sectional view taken along the line VII—VII of FIG. 1.

Referring now to FIGS. 1-12, illustrated embodiment of the overhead travelling crane according to this invention will now be described.

As shown in the drawings, support 4 and support 4' project upwardly from the left side (as seen in FIG. 1) of the girder 3 which crosses under guide rail 1 and guide rail 2 at the right angles thereto.

Transverse supporting bars 5 and 5' under guide rail 1 are parallel thereto and connected to each other by the shaft 6, connecting arm 7 and connecting arm 8. The horizontal spindle 11, which is parallel to the transverse supporting bars 5 and 5', passes through the oval hole 9, oval hole 9' and bore 10 provided on the support 4, support 4' and shaft 6 respectively, (as best seen in FIGS. 9 and 10). Rollers 12' and 13' at the front and the rear respectively, of the transverse supporting bar 5' ride on the right side of the lower flange of the guide rail 1, and roller 12 and roller 13 at the front and rear respectively, of the transverse supporting bar 5 ride on the left side of the lower flange of the guide rail 1. (Right, left, front and rear are given as seen in FIG. 1, with the lower part of this FIG. being considered the front.). The end of triangular frame 14 on the left side of the transverse supporting bar 5 is loosely connected to the girder 3 at 15. The end of triangular frame 14' on the right side of the transverse supporting bar 5' is loosely connected to the girder 3 at 15'. The support 23 and the support 23' project upwardly from the side of the girder 3. Transverse supporting bars 24 and 24', extend parallel to the guide rail 2, and are connected to each other at their central portions by the shaft 25, and at their ends by connecting arm 26 and connecting arm 27 respectively. The horizontal spindle 30, which is parallel to the transverse supporting bars 24 and

24', passes through the oval hole 28, oval hole 28' and bore 29 in support 23, support 23' and side shaft 25 respectively, as best seen in FIG. 11. Rollers 31 and 32 at the front and rear respectively of the transverse supporting bar 24 ride on the right side of the lower flange of the guide rail 2, and rollers 31' and 32' at the front and the rear respectively of the transverse supporting bar 24' ride on the left side of the lower flange of the guide rail 2. The end of triangular frame 33 on the right side of the transverse supporting bar 24 is loosely connected to the girder 3, at 34. The end of triangular frame 33' on the left side of the transverse supporting bar 24' is connected to the girder 3, at 34'. The main drive shaft 17 connected to the electric motor 16 carried by the girder 3 is connected with the roller 13' and the roller 32' through transmission 18 and transmission 19 respectively, and the main shaft 17 is connected to the roller 13 and the roller 32 by power transmission 21 and power transmission 22 respectively.

In the drawings, 20 indicates a trolley pole mounted on the triangular frame 14', while 35 and 36 indicate grease rings at the centers of the shafts 6 and 25 respectively.

Therefore, in the present invention, normal rotation of the electric motor 16, transmitted through the main shaft 17, the power transmission 21, the power transmission 18, the power transmission 22 and the power transmission 19 causes the roller 13, the roller 13', the roller 32 and the roller 32' to rotate normally, and the girder 3 then moves forward along the guide rail 1 and the guide rail 2. When the direction of rotation of the electric motor 16 is reversed, the roller 13, the roller 13', the roller 32 and the roller 32' rotate reversely, and then the girder 3 moves backward along the guide rail 1 and the guide rail 2. If, during these movements the rollers encounter any unevenness of the lower flanges of the guide rail 1 and the guide rail 2 such that the front roller 12 or the roller 12' on the left side of the girder 3 becomes lower than the rear roller 13 or the roller 13', then, the front of the transverse supporting bar 5 or the transverse supporting bar 5' becomes higher than its rear. If the front roller 31 or the roller 31' becomes lower than the rear roller 32 or the roller 32', the front of the transverse supporting bar 24 or the transverse supporting bar 24' becomes higher than the rear thereof. On the contrary, when the front roller 12 or the roller 12' on the left side of girder 3 becomes higher than the rear roller 13 or the roller 13', the rear of the transverse supporting bar 5 or the transverse supporting bar 5' becomes higher than the front thereof. When the front roller 31 or the roller 31' becomes higher than the rear roller 32 or the roller 32', the rear of the transverse supporting bar 24 or the transverse supporting bar 24' becomes higher than the front thereof. Vertical motion by the transverse supporting bars 5, 5' and the transverse supporting bars 24 and 24' is possible, since they have no direct connection to girder 3. If the guide rail 1 should deflect in a horizontal plane, the rollers 12 and 12' carried by the transverse supporting bars 5 and 5' are compelled to deflect to one side or the other and the rear ends of the transverse supporting bars 5 and 5' are apt to turn in the opposite direction. Accordingly the shaft 6 between the transverse supporting bar 5 and the transverse supporting bar 5' turns together with the horizontal spindle 11 which passes through the bore 10 of the shaft 6. Since the front end of the horizontal spindle 11 slides in the oval hole 9 of the support 4, the transverse supporting bars 5 and 5' can turn smoothly. When the roller 13 and the roller 13' are compelled to deflect right or left due to horizontal deflection of guide rail 1, the front ends of the transverse supporting bars 5 and 5' swing right or left as the case may be, but at this time the front end and rear end of the horizontal spindle 11 slide within the oval holes 9 and 9', so that the transverse supporting bars 5 and 5' turn smoothly as stated above. If the guide rail 2 curves in a horizontal plane, the rollers 12 and 12' at the rear ends of the transverse supporting bars 24 and 24' are apt to turn to the right or left. For that reason the shaft 25 between the transverse supporting bars 24 and 24' turns together with the horizontal spindle 30 which extends through the bore 29 in the shaft 25. As the front end

of the horizontal spindle 30 slides in the oval hole 28' of the support 23' and the rear end of the horizontal spindle 30 slides in the oval hole 28 of the support 23, the transverse supporting bar 24 and 24' can turn smoothly. When the rollers 13 and 13' are compelled to deflect to the right or left of the exact direction of movement due to horizontal deflection of the guide rail 1, the front ends of the transverse supporting bars 24 and 24' swing right or left, but at this time the front end and rear end of the horizontal spindle 30 slide within the oval holes 28 and 28', so that the transverse supporting bar 24 and 24' can turn smoothly as stated above. Since a tolerance is provided at the fitting connecting the girder 3 to the edge of triangular frames 14 and 14' at the left of the transverse supporting bar 5 and at the right side of 5' respectively, the triangular frames 14 and 14' can turn smoothly with the transverse supporting bar 5 and 5'. And since there is a tolerance at the fitting connecting the girder 3 to the edges of triangular frames 33 and 33' at the left side of transverse supporting bar 25 and at the right side of 25' respectively, the triangular frames 33 and 33' can turn smoothly with the transverse supporting bar 25. And even when there is a difference in height between the left and right side of the lower flange surfaces of the guide rails 1 and 2, transverse supporting bars 5, 5' and 24, 24' can turn freely around the horizontal spindle 11 and 30 as an axis. Consequently the left transverse supporting bars 5 and 5' and the right transverse supporting bars 24 and 24', even when there is limited vertical or horizontal deflection, permit full freedom of motion, without oscillation of the girder 3.

What is claimed is:

1. A carriage for supporting a travelling girder from a guide rail having two oppositely projecting flanges, said carriage comprising:

a pair of bars parallel to, and on opposite sides of said rail, longitudinally spaced means on each bar carrying rollers positioned to ride on said flanges,

shaft means pivotally connecting the central portions of said bars,

link means positioned near each end of said bars and pivotally connected to each of said bars to permit at least one of said bars to swing relative to the other in a vertical plane about said shaft while preventing horizontal separation of said bars, and

a spindle extending through said shaft means parallel to said bars and by means of which said girder is pivotally supported from the central portions of said bars.

2. A carriage as claimed in claim 1 in which said spindle is mounted in said shaft and on said girder to permit relative movement between said shaft and girder laterally of said spindle.

3. A carriage as claimed in claim 1 which each bar forms one side of a generally horizontal triangular frame, the corner of which frame remote from said bar is loosely connected to said girder.

4. A travelling crane comprising a girder supported by two spaced carriages as claimed in claim 1.

5. A travelling crane as claimed in claim 4 comprising a motor carried by said girder and transmission means through which said motor drives at least one roller in each carriage.

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